Animal Legal Defense Fund

525 East Cotati Avenue, Cotati, California 94931 T 707.795.2533 F 707.795.7280

December 8, 2017

Submitted electronically via the Federal eRulemaking Portal
Docket No. FWS-HQ-IA-2017-0070

Chief Tim Van Norman
Branch of Permits, DMA
United States Fish and Wildlife Service
5275 Leesburg Pike
Falls Church, Virginia 22041

Re: Cape Mountain Zebra Hunting Trophy Import Permit Applications from John R. Warren, Jr., Austin, Texas, PRT-47139C

Dear Chief Van Norman:

On behalf of the Animal Legal Defense Fund ("ALDF")—a national non-profit organization and its more than 200,000 members and supporters—we object to the permit application from John R. Warren, Jr., Austin, Texas, PRT-47139C (the "Trophy Hunter") that seeks permission to import a Cape mountain zebra hunting trophy from South Africa. *See* 82 F.R. 51875 (Nov. 8, 2017).

The Trophy Hunter fails to provide any evidence to support the required enhancement finding for this import. In fact, the application affirmatively provides information demonstrating the import would be to the *detriment* of the species. Therefore, granting the permit would violate the Endangered Species Act ("ESA") and the United States Fish and Wildlife Service's ("FWS") implementing regulations. 16 U.S.C. § 1539; 50 C.F.R. §§ 17.21, 17.22.

The letter supporting the application merely recites general discussions about the species. There is no mention of what, if any, benefit resulted *specifically* from the killing of the zebra at issue, or any other specific information that would allow FWS to reach the conclusion that the specific action at issue meets the enhancement requirement. There is not even sufficient information to support a fallacious argument that *this* trophy hunt somehow provided economic benefits to conservation efforts. All that is provided is a price list that suggests—but does not demonstrate—that $3,500 was paid to a private company for killing the zebra at issue. But there is no showing any conservation efforts resulted from that small payment. Rather, the information provided by the private game ranch at issue demonstrates its small unmanaged herd is likely damaging the species due to inbreeding.

This failure is not surprising given that empirical data has demonstrated that international trophy hunting undermines international wildlife conservation and antipoaching efforts. Rather than enhancing the survival of the species, as required, trophy hunting is simply a "***horror show***" that in no "way helps conservation of Elephants or any other animal."[1] The FWS itself has concluded that international trophy hunting often undermines the goals of the ESA, a conclusion also reached by numerous studies. Those studies and other empirical data further demonstrates that photo safaris and ecotourism generate ***15 times*** the revenue of trophy hunting while avoiding the significant harms to the species caused by trophy hunting and other forms of poaching. Put simply, the FWS must deny this application because it does not meet the standards for issuance under the ESA.

LEGAL BACKGROUND

The Cape mountain zebra (*Equus zebra zebra*) is listed as endangered under the ESA, 41 Fed. Reg. 24062 (June 14, 1976), and is listed on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora ("CITES"), *see* https://www.cites.org/eng/app/appendices.php. An endangered species is protected from import unless the import will "enhance the propagation or survival of the affected species." 16 U.S.C. § 1539(a)(1)(A).

To meet the enhancement requirement, the activity "must go beyond having a neutral effect and actually have a *positive effect*." U.S. Fish and Wildlife Service Handbook for Endangered and Threatened Species Permits (1996) (emphasis added); *see also* Tab 2, FWS, *Ensuring the Future of the Black Rhino* (Nov. 25, 2014) ("To issue a CITES permit for an Appendix I animal, we must determine that the import will not be for purposes that are detrimental to the survival of the species. But . . . the ESA goes even further. To grant an ESA permit, we must find that allowing the import will *enhance* the species' survival"). The *applicant bears the burden* of demonstrating that they qualify for the exception. *See* 50 C.F.R. § 13.21(b) ("fail[ure] to demonstrate a valid justification for the permit" warrants denial); *see also, e.g.*, Letter from Anna Barry to John F. Cuneo, Jr. (Oct. 14, 2011) ("To meet the requirements under the ESA *you need to be able to demonstrate* how your proposed activities *directly* relate to the survival of this species in the wild." (emphasis added)). The positive effect must be a direct cause of the proposed activities. *See id.*

To issue a permit authorizing otherwise prohibited acts, the FWS must first find that: (1) the permit was "applied for in good faith;" (2) the permit "will not operate to the disadvantage of such endangered species;" and (3) the proposed action "will be consistent with the purposes and policy" of the ESA. 16 U.S.C. § 1539(d).

---

[1] *See* Tab 1, https://twitter.com/realDonaldTrump/status/932397369655808001 (Nov 19, 2017 tweet from President Trump, emphasis added).

These requirements were intended to "limit substantially the number of exemptions that may be granted under the [ESA]." H.R. Rep. No. 93-412 p. 17 (1973).

DISCUSSION

I. THE TROPHY HUNTER'S APPLICATION DOES NOT SATISFY THE ENHANCEMENT REQUIREMENT.

A. The unmanaged breeding at the private game ranches does not enhance the propagation or survival of the species as required.

The Trophy Hunter's application should be denied because the proposed import does not "enhance the propagation or survival of the affected species." 16 U.S.C. § 1539(a)(1)(A). Not only does the specific action at issue—a trophy import—not meet the enhancement requirement, the unmanaged breeding at a private game ranch, called Ezulu,[2] *also* fails to provide a well-managed conservation program that contributes to the long-term survival of the species. *See* Application Materials at pp. 20-23 of 318 (May 2017 email chain between Regina Lennox and Ezulu Game Reserve representatives, explaining that the herd of 20 Cape mountain zebras are simply there to be hunted on demand, "they run wild and do their own breeding naturally," without any management program or other efforts to avoid inbreeding or other genetic problems that will arise as a result of maintaining such a small herd).

1. The unmanaged breeding of the zebra on the private game ranches is *not* the action being authorized.

The ESA requires a direct link between the authorized action and the required effect. *See* 58 Fed. Reg. 32,632 (June 11, 1993) (questioning "whether there is a *direct cause and effect* relationship between education through exhibition of living wildlife and enhancement of survival in the wild of the species exhibited") (emphasis added). The plain language of the ESA only allows the FWS to permit an "otherwise prohibited action" if *that action* enhances the species' survival. 16 U.S.C. § 1539(a)(1)(A) (emphasis added).

Here, the action that the FWS would be permitting is the import of a hunting trophy. The import of a hunting trophy is not carried out for the purpose of enhancing the species. Indeed, it, by definition, represents the premature killing of a member of the endangered species, which is directly contrary to the core purpose of the ESA. Rather, the import of a hunting trophy is undertaken solely for the personal benefit of the hunter and the commercial benefit of the private game ranch where the endangered animal was killed.

The Trophy Hunter's application merely includes a price list suggesting the private game ranch was paid $3,500 for the zebra killing, but it does not even claim

[2] *See* http://www.ezulugamereserve.com/.

that the money derived from the hunt contributes to conservation (as opposed to be used by the private game ranch for non-conservation purposes or simply profit). Nor does the Application submit evidence demonstrating such funds were only paid based on the belief the trophy import would be authorized. Therefore, the Trophy Hunter fails to provide a "full statement of why the permit is justified." 50 C.F.R. § 17.22(a)(1)(vii).

2. Regardless, the unmanaged breeding fails to enhance the propagation or survival of the species.

The Trophy Hunter not only fails to provide affirmative evidence that the ranch where he killed the zebra conducts breeding efforts that enhance the survival of the species, the Application demonstrates exactly the opposite. *See* 77 Fed. Reg. 431, 434 (Jan. 5, 2012) ("benefits can only be realized when the breeding program is scientifically based and conducted in a manner that contributes to the continued survival of the species…However, breeding just to breed without adequate attention to genetic composition and demographics of the breeding population, may not provide a clear conservation benefit to an endangered species.").

Rather than *enhancing* the genetic strength and potential viability of the species, the unmanaged breeding on this ranch is causing detriment to the species. Leading authorities on the Cape mountain zebra have explained that "the long-term security of the subspecies is, however, still uncertain," because a "third of the metapopulation on privately owned land could be at risk for a number of reasons. . . [the] primary concern is the *small size of many privately owned subpopulations*." Tab 3 at 406 (emphasis added).[3] The representative of the private game ranch here admitted that it has a herd of only 20 Cape mountain zebras that are not bred with other populations but instead simply "run wild and do their own breeding naturally." *See* Application Materials at pp. 20-23 of 318 (May 2017 email chain between Regina Lennox and Ezulu Game Reserve representatives). Small populations generally are not successfully able to reestablish or expand the population of the species, Tab 3 at 406, meaning the Ezulu zebras are serving little or no conservation purpose in their current state and instead are simply there to be hunted on demand as the Ezulu representative explained.

This conclusion was adopted by South Africa's officials in their supposed non-detriment finding. Tab 4, Scientific Authority of South Africa, *Non-Detriment finding for Equus zebra zebra (Cape mountain zebra)*, May 20, 2015. That official document expressly acknowledged that "[t]he biggest current threat to the Cape mountain zebra *is the loss of genetic diversity*. Currently the national population is highly fragmented into a large number of small subpopulations and no meta-population

[3] Tab 3, Hrabar, Halszka and Kerley, Graham, *Conservation goals for the Cape mountain zebra Equus zebra zebra—security in numbers?*, 2013 Fauna & Flora International, Oryx, 47(3), 403–409.

management is practised." *Id.* at 1 (emphasis added). Yet, the Ezulu facility is simply exacerbating that loss of genetic diversity and, therefore, undoubtedly *harming* the species potential survival, not enhancing it.

Moreover, the program at Ezulu likely contributes to the introduction of non-native species, has a higher risk of hybridization, inbreeding, and other potential genetic problems that pose a risk to the survival of the species. Indeed, inbreeding is an acute concern for the Cape mountain zebra. *See* Tab 3 at 407 (recognizing that small populations at private facilities such as Ezulu suffer from "[i]nbreeding depression and genetic drift," which is a secondary threat to the species associated with small populations).

South Africa has failed to adopt a formal management plan for the Cape mountain zebra: all that currently exists is a draft. Tab 5[4] at 35 ("At present there is no formal management plan for Cape mountain zebra."). Importantly, that draft plan acknowledged that trophy hunting continued to pose a "moderate to high risk to the survival of this subspecies in South Africa." *Id.* at 38. The draft plan further recognizes several important steps are required "to reduce this risk of quasi-extinctions of Cape mountain zebra," including steps designed to reduce hybridization risk, and ensure small populations are bred with other populations to avoid inbreeding. *Id.* Yet, the Ezulu game reserve engages in conduct that directly undermines those important management goals, further demonstrating the circumstances at issue for this permit application are *detrimental* to the species and not enhancing as required.

B. Trophy hunting does not provide any enhancement or benefits.

1. The DOI's U.S. Fish and Wildlife Service has recognized that trophy hunting fails to benefit the subject species.

FWS itself has previously concluded that "uses of captive wildlife can be detrimental to wild populations" because "consumptive uses," including captive hunting, can "stimulate a demand for products which might further be satisfied by wild populations." 44 Fed. Reg. 30044 at 30045 (May 23, 1979). The FWS further recognized that allowing any legal use facilitates poaching because "[p]ersons illegally obtain specimens from wild populations and claim them to be captive-produced." *Id.*

---

[4] Tab 4, Birss, C., Cowell, C., Hayward, N., Peinke, D., Hrabar, H.H. and Kotze, A. 2016. *Biodiversity Management Plan for the Cape mountain zebra in South Africa.* Jointly developed by CapeNature, South African National Parks, Eastern Cape Parks and Tourism Agency, National Zoological Gardens, Department of Environmental Affairs, Northern Cape Department of Environment and Nature Conservation, Eastern Cape Department of Economic Development, Environmental Affairs and Tourism and Free State Department of Economic, Small business, Tourism and Environmental Affairs. Version 1.0.

FWS further questioned the benefits of trophy hunting in 2014 when it suspended permitting importation of trophies for certain elephants and lions. 79 Fed. Reg. 26986 (May 12, 2014). As the FWS concluded, the data suggested antipoaching efforts had been ineffective—with increases of poaching despite the revenues of trophy hunting—and ultimately the data was insufficient to support the conclusion that "sport-hunting in Zimbabwe is enhancing the survival of the species" as required. *Id.*; *see also* 79 Fed. Reg. 44459 at 44461 (July 31, 2014) (reaching similar conclusion); *Humane Society v. Kempthorne*, 481 F. Supp. 2d 53, 62 (D.D.C. 2006) (enjoining an FWS program allowing lethal take of endangered gray wolves, holding that: "[t]he language 'propagation or survival of the affected species,' is on its face, antithetical to the killing of 43 members of an endangered species barring some direct and immediate danger imposed by the individual animals killed to other members of the species.") (vacated as moot).

2. Numerous studies have similarly demonstrated that international trophy hunting is detrimental to conservation.

a. Trophy hunting does not produce revenues for conservation or antipoaching efforts.

The proponents of international trophy hunting, and the Trophy Hunter here, assert the revenues provided by the hunting fees allows improvements to wildlife conservation efforts. But it is apparent that trophy hunting fails to provide more than a "negligible" financial impact toward conservation efforts. Even where trophy hunting is authorized, "[r]ural councils . . are notoriously underfunded and almost always have nothing in their coffers to support" conservation efforts. *See* Tab 6, National Geographic, *Is Trophy Hunting Helping Save African Elephants?*, Adam Cruise (Nov. 17, 2015) (citing a 2014 report for the Chiredzi Rural District in Zimbabwe); *see also* Tab 7, Economists at Large, *The $200 Million Question: How much does trophy hunting really contribute to African communities?* (Feb. 2013) at 3 ("hunting companies contribute only 3% of their revenue to communities living in hunting areas. The vast majority of their expenditure does not accrue to local people and businesses, but to firms, government agencies and individuals located internationally or in national capitals.").

"Government corruption can be a factor," as corrupt officials take all revenues before they make their way to any conservation or antipoaching efforts. Tab 6. As the head of Safari Operators Association of Zimbabwe concluded conservation efforts receive "[n]othing[, z]ero," because "most of that money may be consumed to a large extent through administration costs and does not necessarily filter directly to conservation." Tab 8, CBS News, *Who profits from trophy hunting riches in Zimbabwe?* (Oct. 14, 2015). Unfortunately, such corruption is not isolated as "good governance is also absent from almost the entire big game hunting sector in many countries." *See* Tab 9, International Union for the Conservation of Nature and its Resources, *Big Game Hunting in West Africa. What is its Contribution to Conservation* (2009) at 10. As a result, "[t]hose who currently have control of the

system are not prepared to share that power and undertake adjustments that would mean relinquishing control," and as a result the revenues from trophy hunting ultimately "serves individual interests, but not those of conservation, governments or local communities." *Id.*

It is not just corruption. Many of these communities are poor and have significant economic challenges with providing basic needs to their human populations. Thus, any money that does filter to local communities is often used to "provide infrastructure and feeding schemes for local communities" rather than for conservation or antipoaching efforts. *See* Tab 10, HuffPost.com, Group Lobbying to end Trophy Hunting Ban is Alarmingly Close with Ryan Zinke (Nov. 23, 2017); *see also* Tab 11, Economists at Large, *The Lion's Share? On the Economic Benefits of Trophy Hunting* (2017) (determining trophy hunting represents at most .03% (3 hundredths of 1 percent) of GDP in the eight study countries, and that trophy hunters made up less than .1% (1 tenth of 1 percent) of tourists).

b. Trophy hunting *encourages* poaching by expand the market for illicit goods.

Trophy hunting also does not facilitate antipoaching efforts, rather, it *encourages* poaching. Even without empirical evidence, this conclusion should be apparent as trophy hunting is, by definition, simply a form of quasi-legalized poaching. And in many of these nations where the legal authorization is derived from a corrupt system, the line between trophy hunting and poaching is illusory.[5]

The FWS itself has recognized authorized hunting *encourages* poaching because "[p]ersons illegally obtain specimens from wild populations and claim them to be captive-produced." 44 Fed. Reg. at 30045; *see also* Tab 12, Valerius Geist, *How Markets in Wildlife Meat and Parts, and the Sale of Hunting Privileges, Jeopardize Wildlife Conservation*, Conservation Biology, Issue 1 (Mar. 1988) (similar conclusion); Tab 13, Congressional Research Service, *International Illegal Trade in Wildlife: Threats and U.S. Policy* (July 23, 2013) at 9 ("Authorities in South Africa have documented evidence of suspected abuse of legal trophy hunting as a means to

[5] There is, in fact, legitimate concern that businesses and individuals engaged in the international trophy hunting industry are engaged in conduct that runs afoul of the Foreign Corrupt Practices Act. *See generally* https://www.justice.gov/criminal-fraud/foreign-corrupt-practices-act; *see also* http://heavy.com/news/2015/07/walter-palmer-federal-international-zimbabwe-charges-charged-crimes-federal-corrupt-practices-act-laws-zimbabwe-united-states-extradition-treaty-info/ (discussing the possibility that the individual that killed Cecil the Lion violated the FCPA). As the Council's notice itself makes clear, there are many United States based businesses that economically benefit from international trophy hunting, and there is no doubt payments are made to government officials under circumstances where the entity or person making such payment has knowledge the funds are being used improperly.

illicitly procure rhino horn for further black market sale."); 70 Fed. Reg. 52319, 52321 (recognizing the legal trophy trade has resulted in poaching activity).

The interests of poachers and trophy hunters are also aligned in focusing on killing the rarest (and most critically endangered) of species, because those are the ones that have the most monetary and prestige value. *See* Tab 14, Courchamp F, Angulo E, Rivalan P, Hall RJ, Signoret L, *et al. Rarity Value and Species Extinction: The Anthropogenic Allee Effect*, PLOS Biology (2006).

c. Ecotourism and other non-hunting alternatives are more effective at creating revenue for conservation and antipoaching efforts.

More importantly, it is clear that non-hunting revenue generating alternatives would be more effective. One community leader in Zimbabwe formally endorsed a "switch from hunting to more profitable non-consumer-based tourism, such as sightseeing and photography." Tab 8; *see also* Tab 7 at 3 (noting some community leaders focus on photo safari operators, because they are more financially beneficial). This is because "conservation results from big game hunting are lower than those of neighbouring national parks or reserves," because "[t]he economic results of big game hunting are low," and [h]unting contributions to GDP and states' national budgets are insignificant, especially when considering the size of the areas concerned." Tab 15 at 10. Put simply, "[h]unting does ***not*** however play a significant economic or social role" in African conservation efforts. *Id.* (emphasis added).

Indeed, "despite the huge fees paid by trophy hunters, ecotourism has been shown to generate ***15 times*** the revenue of trophy hunting, much of which goes to conservation efforts. It's a simple numbers game: while 70% of Americans would pay to see a lion, less than 7% would pay to kill one, making lions more valuable alive than dead." *See* Tab 16, Conserve, *7 Drawbacks to Trophy Hunting as Conservation* (Aug. 21, 2015) (emphasis added); Tab 11 at 5 ("Kenya, for example, banned almost all hunting in 1977 and has seen high growth in tourism industries, and a pushback by large ecotourism operators against the reintroduction of hunting. In 2014, Botswana followed Kenya's example. Trophy hunting may actually deter growth in other forms of tourism, and these costs may overwhelm any economic benefits (already recognized to be minor) of the trophy hunting industry."); *see also* Tab 7 at 3 (recognizing many community leaders focus on photographic operators versus hunters, because they do not even receive the 5% of hunting fees they are supposed to receive).

Put simply, captive hunting, as well as the ancillary result of hunt trophy imports, violate the plain language and purpose of the ESA and its implementing regulations and the Trophy Hunter's application should be denied.

CONCLUSION

The Trophy Hunter's import application fails to demonstrate that the import will enhance the propagation or survival of the species. To the contrary, by very definition, the conduct represented by the existence of these trophies is the premature killing of a member of an endangered species, which is directly contrary to the core purpose of the ESA and cannot be justified under any standard. Thus, the FWS must deny this application.

Should the agency make a decision inconsistent with established law by issuing the requested permits, we request ten days advanced notification prior to the issuance of these permits in accordance with 50 C.F.R. § 17.22(e)(2). We further request that you include with such notice a copy of the individualized enhancement finding for the applicant. For purposes of such notification, please contact Tony Eliseuson via email at aeliseuson@aldf.org or via phone at (707)795-2533, ext. 1043.

Very truly yours,

ANIMAL LEGAL DEFENSE FUND

By: 

Anthony T. Eliseuson
Senior Staff Attorney

INDEX OF ATTACHMENTS

Tab 13: Congressional Research Service, *International Illegal Trade in Wildlife: Threats and U.S. Policy* (July 23, 2013).

Tab 14: Courchamp F, Angulo E, Rivalan P, Hall RJ, Signoret L, *et al. Rarity Value and Species Extinction: The Anthropogenic Allee Effect*, PLOS Biology (2006).

Tab 15: *Killing for Trophies: An Analysis of Global Trophy Hunting Trade*, IFAW (Jan. 14, 2016).

Tab 16: Conserve, *7 Drawbacks to Trophy Hunting as Conservation* (Aug. 21, 2015).

Tab 1

Donald J. Trump
@realDonaldTrump

Follow

Big-game trophy decision will be announced next week but will be very hard pressed to change my mind that this horror show in any way helps conservation of Elephants or any other animal.

3:57 PM - 19 Nov 2017

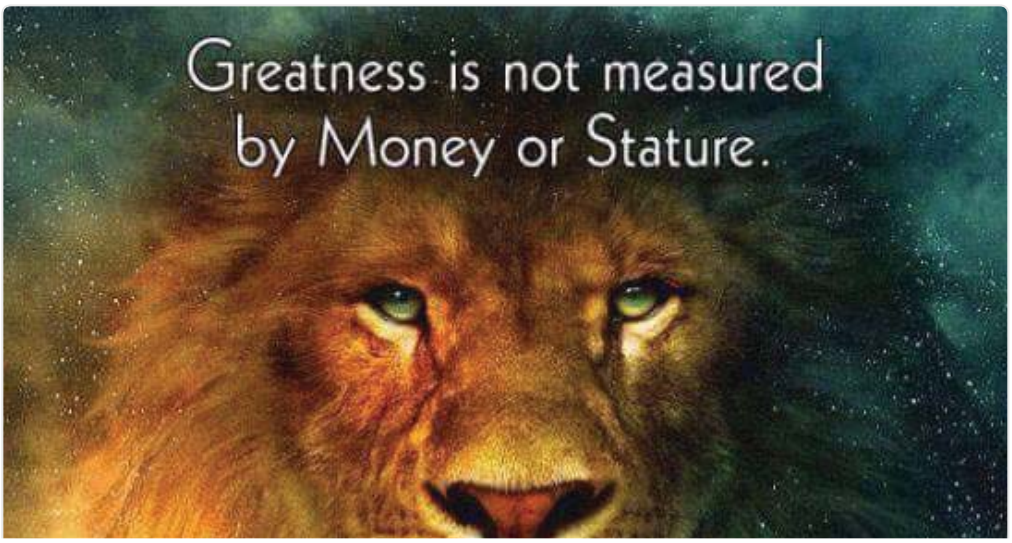
13,475 Retweets **64,895** Likes

25K 13K 65K

Judy @jlswls2012 · Nov 19
Replying to @realDonaldTrump
Well that would be awesome if you actually did the right thing for once. However, as an adult, let alone President it would have been nice if you would have gotten all the facts fist. You saw the backlash, you saw it wasn't right. Not a leader.

3

Candlem @Candaceleone1 · Nov 19
Replying to @realDonaldTrump



Tab 2

U.S. Fish & Wildlife Service

(https://www.fws.gov/)

(https://www.facebook.com/usfws)

(https://twitter.com/usfws/)

(http://www.flickr.com/photos/usfwshq

(http://www.youtube.com/usfws)

Open Spaces

A Talk on the Wild Side.

Ensuring the Future of the Black Rhino (https://www.fws.gov/news/blog/index.cfm/2014/11/25/Ensuring-the-Future-of-the-Black-Rhino)

November 25, 2014

Fewer than 5,000 black rhinos still exist in Africa. Photo Credit: Karl Stromayer/USFWS

We are currently evaluating whether to approve two applications to import sport-hunted black rhino trophies from Namibia (https://www.fws.gov/international/permits/black-rhino-import-permit.html), and we are looking for information to help us make our decision.

The black rhino is endangered. Fewer than 5,000 still exist in Africa, according to 2010 data from the IUCN Red List of Threatened Species (http://www.iucnredlist.org/details/6557/0). Poachers have massacred rhinos to take their horn, valued as a status symbol and carving material, and for its alleged medicinal properties.

No one wants a world where rhinos don't exist, so why, people ask, are we even considering the permits to bring a sport-hunted rhino trophy into the United States? Another death won't help bring rhino population numbers back, some may argue.

Actually, unless it does, we will not grant these permits.

The black rhino is listed in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (https://www.fws.gov/international/cites/) (CITES), a global treaty that regulates international trade in certain plants and animals. To issue a CITES permit for an Appendix I animal, we must determine that the import will not be for purposes that are detrimental to the survival of the species.

But the black rhino is also protected by the U.S. Endangered Species Act (https://www.fws.gov/endangered/what-we-do/international-stories.html) (ESA), and the ESA goes even further. To grant an ESA permit, we must find that allowing the import will *enhance* the species' survival.

We will issue a permit if, and only if, the latest science and other data show that the rhino is taken as part of a well-managed conservation program that contributes to the long-term survival of the species.

We'll base our determination on such factors as the biological needs of the rhino, possible threats to the population (such as poaching and habitat loss) and current population estimates.

We'll also look at Namibia's management strategy as well as how money generated by this particular hunt is used for the management and conservation of black rhinos specifically.

Namibia does have a national black rhino conservation strategy, which an article on the website of *Conservation Magazine* calls "remarkably consistent with scientific recommendations (http://conservationmagazine.org/2014/01/can-trophy-hunting-reconciled-conservation/)." The strategy authorizes an annual harvest of five post-reproductive male black rhinos.

Some older bulls, which are themselves no longer breeding, compete with younger males and prevent them from breeding -- sometimes even killing them. This means, the growth rate of the population is reduced because these younger, fertile males are prevented from fathering new rhinos. Therefore, the removal of older males can provide those younger bulls with a greater opportunity to reproduce, thus benefiting the species in the long term.

There are many who cannot come to terms with a single rhino being hunted whatever the circumstances, and while we can debate the ethics of trophy hunting, the Service makes its decisions only on the grounds of sound science and species conservation. To that end, we must recognize that hunters were some of the earliest conservationists and remain among its most dependable supporters, generating vast revenues that preserve land and contribute toward broad-scale conservation programs. They have been integral to conservation efforts in the United States, and that same model of conservation can and does help foreign species too if it is correctly implemented. That is our challenge in evaluating a trophy import permit and where we look to the public to provide us with additional data to supplement those we receive from the range country, permit applicant, conservation organizations or academic institutions.

If we decide that these two trophies can be imported, it does not mean we are turning our backs on rhinos.

Poaching and trafficking continue to be a key threat. Rhino horn – even though it is made from keratin, the same stuff as fingernails – is alleged in some societies to cure everything from hangovers to cancer. The Service works to educate the public and counter these groundless myths to stem demand and eliminate the root cause of poaching.

With our Ivory Crush (https://www.fws.gov/le/elephant-ivory-crush.html) a year ago, we made it clear that the United States will not tolerate the trafficking of elephants, rhinos or any other imperiled species. Our law enforcement program drives out poaching by targeting criminal cartels and middlemen that are the engine of this illegal trade.

Operation Crash, which has broken up two major international rhino-horn smuggling rings, continues to bring guilty pleas.

We have taken innovative steps, such as a partnership with *Antiques Roadshow* (https://www.fws.gov/director/dan-ashe/index.cfm/2013/4/16/Keeping-Rhinos-Alive-by-Watching-What-Antiques-You-Buy) to let new audiences know of the potential peril in buying products made from rhino horn.

Our Rhinoceros and Tiger Conservation Fund (https://www.fws.gov/international/wildlife-without-borders/rhino-and-tiger-conservation-fund.html) provides funds for on-the-ground conservation, in the same way that trophy hunting can if it's done right.

We are determined to help save the black rhino, and we're hoping that EVERYONE -- the public, hunters, NGOs and academics -- will help us in that pursuit.

NOTE: You can submit comments on the trophy import permit applications through December 8. Comments on the applications should be sent to DMAFR@fws.gov (mailto:DMAFR@fws.gov). Please include the *Federal Register notice (https://www.federalregister.gov/articles/2014/11/06/2014-26357/endangered-species-marine-mammals-receipt-of-applications-for-permit)* publication date, the PRT-number and the name of the applicant in your request or comment submission. For more information, please refer to our Q&A (https://www.fws.gov/international/permits/black-rhino-import-permit.html).

Comments (1) (https://www.fws.gov/news/blog/index.cfm/2014/11/25/Ensuring-the-Future-of-the-Black-Rhino#comments) |
[Add Comment (javaScript:launchComment('E34F2D38-C12A-C7B3-8DA4CBB9E803C0DC'))] [Subscribe to Comments (javaScript:launchCommentSub('E34F2D38-C12A-C7B3-8DA4CBB9E803C0DC'))]

Bad science on your part, immoral on any grounds. The black rhino is severely endangered and you just added to it. Conservation by any means? Don't you mean conservation by any amount of $? You have helped to kill an endangered species today. How disappointed you must feel with yourself and your agency. I will never support funding for you again.
(https://www.fws.gov/news/blog/index.cfm/2014/11/25/Ensuring-the-Future-of-the-Black-Rhino#c77173AFE-D19D-E708-08BE02F0A26DB3DC) Posted By Natalie Gray | 3/26/15 8:50 PM
[Add Comment (javaScript:launchComment('E34F2D38-C12A-C7B3-8DA4CBB9E803C0DC'))] [Subscribe to Comments (javaScript:launchCommentSub('E34F2D38-C12A-C7B3-8DA4CBB9E803C0DC'))]

Tab 3

Conservation goals for the Cape mountain zebra Equus zebra zebra – Security in numbers?

Article *in* Oryx · July 2013

DOI: 10.1017/S0030605311002018

1 author:

Halszka Hrabar
Nelson Mandela University
10 PUBLICATIONS **1,165** CITATIONS

Conservation goals for the Cape mountain zebra *Equus zebra zebra*—security in numbers?

HALSZKA HRABAR and GRAHAM I. H. KERLEY

Abstract The target of the 2002 IUCN Action Plan for the Cape mountain zebra *Equus zebra zebra* was for a population of 2,500 animals. We assessed the validity of this goal by reviewing the conservation status of the subspecies and the prospects of achieving larger populations. All subpopulations were identified and data on each were collected by means of a questionnaire survey. The total extant Cape mountain zebra population was found to consist of at least 2,790 individuals in 52 subpopulations. The target number of 2,500 has therefore been exceeded and this success is largely attributable to the private sector, as there are at present double the number of privately owned subpopulations (35) compared to formally protected subpopulations (17) and the percentage of the population on privately owned land rose from 14% in 1998 to 32% in 2009. The security of the subspecies is still of concern, however, as the growing proportion of the metapopulation on private land is more vulnerable to threats associated with small populations and management actions. The total existing area available to the Cape mountain zebra is > 935,191 ha and it could potentially support a considerably larger population. We conclude that the IUCN target is substantially below the potential for recovery of the Cape mountain zebra and we recommend this target be revised in the light of these findings. More comprehensive conservation strategies to address current and potential future threats are also needed.

Keywords Available habitat, Cape mountain zebra, *Equus zebra zebra*, minimum viable population, private owners, South Africa, threats

Introduction

Conservation targets are invariably a compromise between the theory-based ideals that would ensure the persistence of a species or population and the reality of the constraints of resources and opportunity (Margules & Pressey, 2000). Ideally, targets should be driven by the commitment to the persistence of a species, which should inform decision-makers as to the resource investment required to achieve the conservation objectives. However, such compromised targets may also be influenced by a poor understanding of the needs of a species for survival, as well as underestimation of the potential to achieve larger, more reliable, conservation targets. An example of the former is where conservation targets for many large mammal species have been set based on earlier estimates of minimum viable populations with an effective population size of c. 500 (e.g. Lande & Barrowclough, 1987; Armbruster & Lande, 1993). This figure of 500 is, however, based on maintaining genetic variation in leg hair patterns in fruit flies and is 30 years old (Franklin, 1980) and outdated. Recent estimates have been consistently higher than this (Reed et al., 2003). Traill et al. (2007), for example, showed the median minimum viable population for mammals should be > 4,000 breeding individuals. An example of the underestimation of conservation potential is where land-use changes or policies increase the opportunity for conservation, such as the recent burgeoning investment in private nature reserves in South Africa (Sims-Castley et al., 2006). It is therefore clear that the revision of conservation targets should be ongoing, with a view to maximising the potential for species' survival. Here we review the conservation status of the Cape mountain zebra *Equus zebra zebra* in the context of the accepted conservation goals for this subspecies, as well as the opportunity to achieve greater and more successful conservation outcomes. We also highlight the key role that private land ownership may have in the preservation of this subspecies.

Recent genetic studies (Moodley & Harley, 2005) have confirmed the validity of the subspecies-focused conservation efforts for the Cape mountain zebra. Endemic to South Africa, they were once widespread in the mountains of the Western and Eastern Cape Provinces (Millar, 1970a, b; Fig. 1). Excessive hunting and habitat loss to agriculture, however, left their numbers in a critical state in the 1950s, with < 80 individuals remaining in only three relic populations. One of these populations, formally protected (i.e. on government land) in the Mountain Zebra National Park since 1937, consisted of 19 individuals at the time, and the Kammanassie Nature Reserve and Gamka Nature Reserve populations consisted of no more than five and six individuals at their respective nadirs (Millar, 1970a; Lloyd, 1984).

Since the 1950s the number of Cape mountain zebras has gradually increased through active conservation programmes, with a metapopulation approach through translocations to ensure continued population growth and genetic diversity (Novellie et al., 2002). By 2002 the

HALSZKA HRABAR (Corresponding author) and GRAHAM I. H. KERLEY Centre for African Conservation Ecology, Department of Zoology, Nelson Mandela Metropolitan University, PO Box 77000, Port Elizabeth 6031, South Africa. E-mail halszka.hrabar@live.nmmu.ac.za

Received 21 July 2011. Revision requested 16 September 2011. Accepted 13 December 2011.

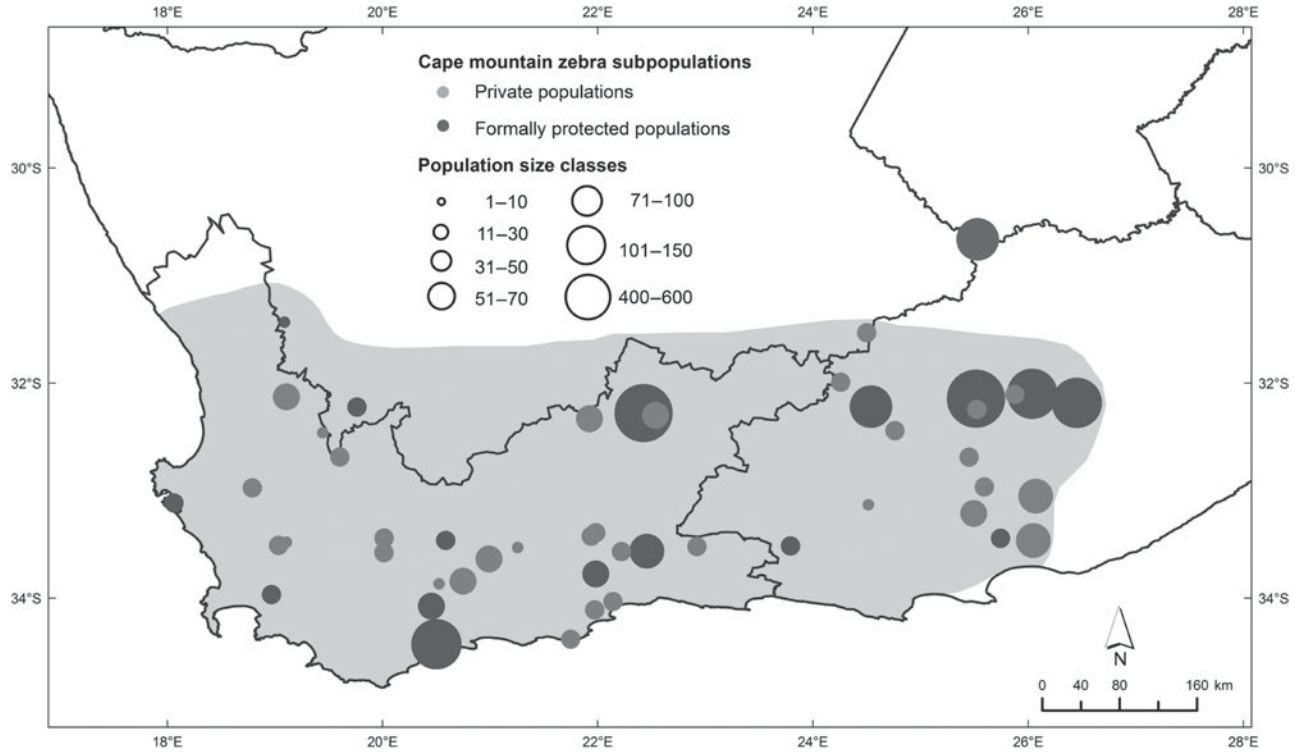


FIG. 1 Approximate historical (shaded region; Novellie et al., 2002) and current distribution of all privately owned (as identified in this study) and formally protected Cape mountain zebra *Equus zebra zebra* subpopulations in South Africa.

Cape mountain zebra population totalled > 1,600 individuals in six national parks, 10 provincial reserves and 17 private reserves distributed across most of their natural range (Castley et al., 2002). This suggested that strategies to conserve the Cape mountain zebra, categorized as Vulnerable on the IUCN Red List (Novellie, 2008), were on track to achieve the objective of the IUCN Action Plan to 'build up numbers to a target of 2,500 as quickly as possible' (Novellie et al., 2002). Kerley et al. (2003) showed that the subspecies also serves as a key umbrella taxon in a conservation plan for the Cape Floristic Region, being a large mammal endemic to the area. Privately owned land has played a crucial role in the conservation of the Cape mountain zebra from as far back as the 1930s when the last few groups in the Cradock area were saved from extinction by local farmers (Skead, 2011). This population was formally protected in 1937 by the proclamation of the Mountain Zebra National Park, which was expanded in 1964 permitting the further incorporation of a number of mountain zebra groups occurring on neighbouring private farms (Penzhorn, 1975). The subsequent increase of this population enabled the translocation of individuals to 25 other protected areas during the 1980s and early 1990s, a number of which were private game ranches (Novellie et al., 2002). Subpopulations maintained by private landowners have since increased considerably and by the late 1990s sales from the private sector were possible. Private populations have, however, been poorly monitored in recent years and the contribution of the private sector towards conservation efforts was previously unknown.

We carried out a survey to determine (1) the extant population size, (2) the contribution of the private sector towards the conservation of the Cape mountain zebra, (3) threats to the subspecies, and (4) future conservation prospects. We use these findings to evaluate the currently accepted IUCN conservation target of 2,500 individuals, highlight the role of private ownership for conservation of the Cape mountain zebra, and identify the need to understand the role of predation and hunting on the conservation strategy for the subspecies.

Methods

We first identified private owners of Cape mountain zebras from permit records and through contacts with individuals involved in conservation within the distribution area of the Cape mountain zebra (Millar, 1970a). Formally protected populations were identified through the species lists of reserves. A questionnaire was sent to all owners regarding the current and historical details of each subpopulation (numbers, deaths, translocations and population growth data), property size and location, presence of predators, records of predation events, interest in hunting of the Cape mountain zebra, and ownership motivation. A basic indication of population performance was required: 'good'

if the population had increased since reintroduction, 'stable' if it had remained unchanged, and 'poor' if there had been a decrease in numbers. Ownership motivation enquiries included (1) whether Cape mountain zebras were considered an asset to the property, (2) whether there was an interest in purchasing more, and (3) the reasons for owning the species.

Questionnaires were completed in direct interviews with as many owners as possible, to ensure a clear understanding of the questions and answers. Similar data were retrieved for subpopulations on formally protected land (provincial reserves and national parks). *t*-tests were used to test for differences between private and public populations/properties (Zar, 1999).

Results

A total of 52 Cape mountain zebra subpopulations were identified. There is now double the number of privately owned populations (35) compared to formally protected populations (17; Fig. 1). The number of privately owned subpopulations has doubled since 2002, whereas there is only one additional formally protected population (Fig. 2; Table 1).

The total extant Cape mountain zebra population was found to consist of at least 2,790 individuals (count data from one known private population were unobtainable) and the average annual rate of increase in population size between 2002 and 2009 was 10.6% (Fig. 3). The majority (68%) of individuals are on formally protected land (despite the larger number of privately owned subpopulations) and the mean size of formally protected populations was significantly larger than privately owned populations ($t = 2.94$, df = 49, $P < 0.01$; Table 1). For example, the Mountain Zebra National Park and Karoo National Park subpopulations alone made up 22 and 18%, respectively, of the population. The percentage of the population on privately owned land has, however, risen from 14% in 1998 to 32% (Fig. 3). Two extralimital populations occur in Gariep Nature Reserve in the Northern Cape (Fig. 1) and in the West Coast National Park, which is c. 70 km from the closest historically-recorded Cape mountain zebra population in the Piketberg (Skead, 2011).

We found that the total area available to the Cape mountain zebra is > 291,881 ha on private land (the sizes of two private properties were not obtainable) and 643,310 ha on formally protected land; i.e. a total of 935,191 ha. Formally protected properties were significantly larger (Table 1) than privately owned areas ($t = 3.264$, df = 47, $P < 0.01$), yet zebra density was not significantly different between the two property types ($t = 0.360$, df = 47, $P = 0.721$; Table 1).

Thirty-six questionnaires were completed (22 by private land owners). From these, the performance of

TABLE 1 A comparison between privately owned and formally protected Cape mountain zebra *Equus zebra zebra* subpopulations.

	Privately owned	Formally protected
No. of populations	35	17
Total no. of individuals	902	1,888
Mean population size ± SD	27 ± 19 (n = 34)	111 ± 167 (n = 17)
Population size range	4–65	3–596
Total land area available (ha)	>291,881[1]	643,310
Mean property size ± SD (ha)[2]	9,115 ± 11,181 (n = 32)	37,842 ± 47,787 (n = 17)
Property size range (ha)[2]	1,100–54,000	1,800–180,000
Mean zebra density (ha^{-1})[2]	0.006 ± 0.007 (n = 32)	0.007 ± 0.008 (n = 17)

[1]Excludes two properties for which area data are not available
[2]Excludes one population kept on cultivated fields

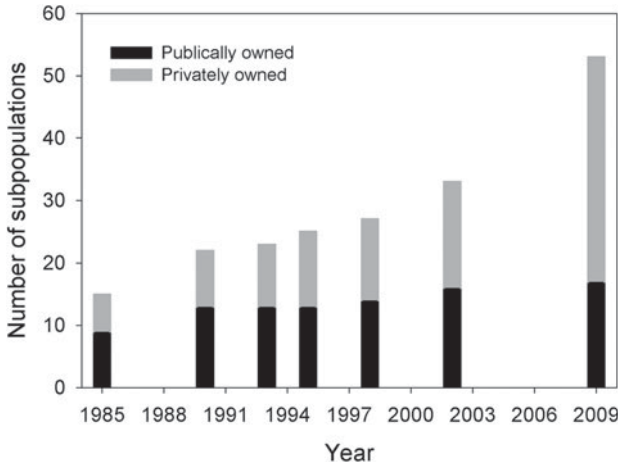


FIG. 2 The total number of Cape mountain zebra subpopulations on privately owned and formally protected land in South Africa from 1985–2009 (data for 1985–1998 from Novellie et al. (2002), and 2002 data from Castley et al. (2002).

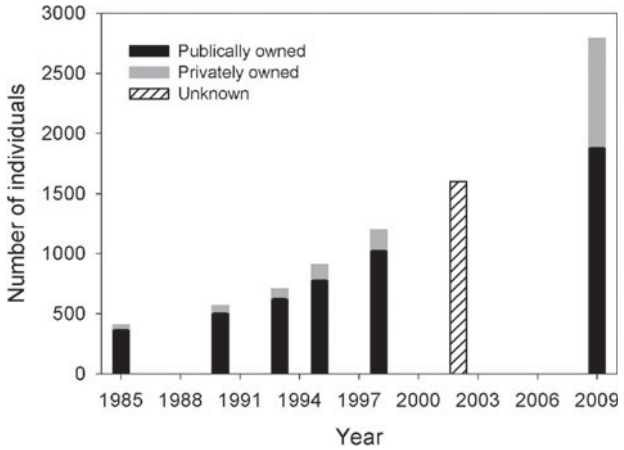


FIG. 3 The total number of Cape mountain zebras on privately owned and formally protected land in South Africa from 1985–2009 (data for 1985–1998 from Novellie et al. (2002), and 2002 data from Castley et al., 2002).

27 populations (11 formally protected and 16 private) was reported as good, six were stable (two formally protected and four private) and three had decreased in size (two formally protected and one private). One population with poor performance was subjected to drought conditions soon after release, and one suffered from poaching and emigration. Ten of the 52 subpopulations have fewer than the recommended 14 animals (Novellie et al., 1996) and eight of these are privately owned (four of which have not increased in size despite being more than 10 years old). Additionally, six out of 22 privately owned populations (only those with appropriate data included) have only had a single introduction event.

The lion *Panthera leo* has been reintroduced into two privately owned areas that have Cape mountain zebra (in 2003 and 2007) as well as into the Karoo National Park (in 2010). Cheetahs *Acinonyx jubatus* have been reintroduced into the area of four subpopulations (between 2004 and 2007). Predation reports from the survey are limited to a single lion kill of an adult in a private population, and at least five kills by lions in the Karoo National Park (Craig Tambling, pers. comm.). One leopard *Panthera pardus* kill of a foal was reported but no cheetah kills.

Attitudes of private owners towards Cape mountain zebra were positive and 20 out of 22 private owners considered them as an asset to their property. Only 10 owners were interested in purchasing more, however, because many of the populations were considered to be near carrying capacity. The most common motivation for owning Cape mountain zebras (owners could have more than one reason) was for the conservation of the subspecies (20 owners). Twelve owners aimed to breed Cape mountain zebra for sale and/or have owned them for their tourism value. Only five owners were interested in hunting the Cape mountain zebra.

Discussion

Efforts to conserve the Cape mountain zebra have so far been a success, to the extent that the extant population exceeds the target size of 2,500 individuals set by the 2002 IUCN Action Plan (Novellie et al., 2002) and is now a minimum of 2,790 animals. Population growth has also continued to remain positive, as the mean annual rate of increase was maintained at 10% between 2002 and 2009, compared to 8.6% from 1985 to 1995 (Novellie et al., 1996), 9.6% between 1995 and 1998 (Novellie et al., 2002) and 8.4% between 1998 and 2002. Given the fact that most populations are recently founded, and new populations are being added, it is highly likely that the Cape mountain zebra has the potential to reach about double the current number. It is therefore clear that the IUCN target set in 2002 was substantially below the potential for in situ Cape mountain zebra conservation, as well as being well below current estimates of minimum viable populations for large mammals (Traill et al., 2007). Given that mature individuals make up about one third of wild equid populations (e.g. Gobi khulan *Equus hemionus*; Feh et al., 2001) and that the minimum viable population (breeding individuals) for large mammals is c. 4,000 (Traill et al., 2007), a more appropriate target population size could potentially be as large as 12,000 individuals. A minimum viable population therefore needs to be identified for Cape mountain zebra and the target population size revised.

The successful growth of the Cape mountain zebra population is attributable to two key factors: (1) the metapopulation approach to the management of the subspecies, and (2) the increase in available habitat. The expansion of formally protected areas such as the Mountain Zebra and Karoo National Parks, which have increased from 6,536 and 41,000 ha to 28,412 and 88,122 ha, respectively, has allowed the further expansion of the two largest subpopulations. Most notable, however, is the crucial role the private sector has played in increasing the available habitat and the distribution of the Cape mountain zebra within its range, doubling the number of subpopulations in the last decade. Additionally, private owners are becoming increasingly important in purchasing available animals from existing subpopulations, thereby ensuring continued growth of these populations by reducing density dependent effects (as observed in the De Hoop population, Smith et al., 2007). A further benefit of privately owned populations is that management of these areas is often aimed at achieving maximum population growth rates (through promoting grassland for Cape mountain zebra, for example; Smith et al., 2011; Faith, 2012), whereas management of formally protected areas needs to focus on conserving the natural habitat and its biodiversity. Given the role of the number of subpopulations in the persistence of a metapopulation (Hanski, 1991) the increase in the number of subpopulations contributes substantially to the conservation of this subspecies.

Although the status of the Cape mountain zebra has clearly improved, the long-term security of the subspecies is, however, still uncertain. The majority of the metapopulation currently lives on formally protected land (which is vital, according to Novellie et al., 2002), yet the third of the metapopulation on privately owned land could be at risk for a number of reasons. Of primary concern is the small size of many privately owned subpopulations. Novellie et al. (1996) noted the wasted effort in introducing an excessively small number of founder individuals, as this tends to result in either a failed reintroduction or poor population performance in the long term (see also Komers & Curman, 2000). Our survey confirmed this effect on demographics, as four out of six subpopulations that have not increased since their introduction had founder populations of < 14 individuals. This may be a result of a form of the Allee effect, in which

reproduction is enhanced by conspecific competition between males (Stephens et al., 1999). Inbreeding depression and genetic drift is a second threat associated with small populations (Frankham, 1996), and susceptibility to diseases such as equine sarcoids is greater in inbred populations (Sasidharan, 2006; Sasidharan et al., 2011). The IUCN Action Plan (Novellie et al., 2002) recommended that one or two animals be added to subpopulations once every 5–10 years to avoid inbreeding depression, yet neither this nor the advice for a minimum founder population of 14 individuals has been adhered to because of the cost of investing in a large number of animals (pers. comms with private land owners).

Furthermore, most of the metapopulation is at risk of inbreeding because all reintroduced subpopulations except for that in De Hoop Nature Reserve originate from only one of the natural relic populations (in Mountain Zebra National Park). Two thirds of the entire genotype is therefore located in just two populations, both of which are at risk because of limited habitat availability. Even though numbers exhibit a positive trend, the subspecies cannot be considered secure until the full genetic diversity is conserved and represented throughout the metapopulation. Another factor that could affect demographics and genetic diversity of privately owned subpopulations in the future is hunting (Lloyd & Rasa, 1989; Milner et al., 2006). Although owners expressed little interest in hunting Cape mountain zebra, if the current ban on imports of Cape mountain zebra trophies into the USA is lifted, this could change. The effect could be two-fold: (1) the demand for the Cape mountain zebra by private land owners may increase because of the rise in their value, thereby increasing the number of subpopulations still further; (2) hunting of selected individuals in small populations could have a significant negative effect on this socially complex species; e.g. removal of bachelor males would prevent the formation of new breeding herds with new genetic input (Lloyd & Rasa, 1989).

The potential loss of genetic integrity through hybridization between the plains zebra *Equus burchelli* and Cape mountain zebra needs to be considered. Hybridization is more likely to occur in poor habitats or small populations, where low mate availability and skewed sex ratios may lead to exclusion of some individuals from mating (Mace & Waller, 1998; Jansson et al., 2007), which is the case for a number of Cape mountain zebra populations. A horse *Equus ferus* x Cape mountain zebra hybrid has been reported in De Hoop Nature Reserve, for example, where a bias towards adult male Cape mountain zebra exists (i.e. significantly more males than the expected 1 : 1 sex ratio; Peter Lloyd, pers. comm.). Hybridization within the genus *Equus* is well documented and even occurs between two wild equid species with naturally overlapping distributions (plains zebra and Grevy's zebra *Equus grevyi*; Cordingley et al., 2009). The occurrence of this hybridization in the Laikipia ecosystem of northern Kenya may be because of the skewed sex ratio in favour of males within Grevy's zebra and the numerical dominance of plains zebra in the region (Cordingley et al., 2009). Hartmann's mountain zebra *Equus zebra hartmannae* x plains zebra hybrids have also been reported (unconfirmed genetically) in the wild in Etosha National Park (Oliver Ryder, pers. comm.). There are, however, no records of Cape mountain zebra x plains zebra hybrids that we are aware of, although the two species are sympatric in five areas. Hybridization with plains zebra as a threat to Cape mountain zebra populations is not of great concern, as fertile hybrids are unlikely because of the large difference in the number of chromosome pairs between the two species (44 vs 32 in plains zebra and Cape mountain zebra, respectively). Grevy's zebra and plains zebra, which do produce fertile hybrids, have a more similar number of chromosome pairs (46 vs 44 respectively; Ryder et al., 1978; Cordingley et al., 2009).

Further potential threats to the Cape mountain zebra include predation, poaching and emigration. Poaching and emigration (facilitated by poor fencing and fence-cutting) have already had a negative impact on one formally protected population, which decreased from 143 individuals in 2002 to 102 in 2009.

The predation environment for Cape mountain zebra has changed in the last decade. Previously, predation would have been by leopards, which are present at low (but unknown) densities in many localities where there are Cape mountain zebras. Four populations are, however, now exposed to cheetahs and three to lions, and the second largest population, in the Karoo National Park, is one of the populations now exposed to lions (since 2010). There are no known cases of foals being killed by leopards or cheetahs and because of the Cape mountain zebra's relatively large body weight (203–260 kg) lions are the only predator to pose a real threat to adults (Mills & Hes, 1997; Hayward & Kerley, 2005; Hayward et al., 2006; Owen-Smith & Mills, 2008). Predation pressure is therefore still minimal.

Predation could restore a facet of natural selection, thereby causing a healthy improvement in Cape Mountain Zebra populations, yet the impact on numbers could still be negative. Exposure to predators has substantial behavioural implications, as shown by the impact of wolf *Canis lupus* reintroduction on ungulates in the Yellowstone system (Ripple & Beschta, 2004). Thus the reintroduction of predators can be expected to substantially alter the resource use and demographics of the Cape mountain zebra, and this needs to be taken into account in the conservation planning for this subspecies. We predict that Cape mountain zebra populations exposed to predators will have decreased growth rates and lower overall densities.

In conclusion, targets for the conservation of the Cape mountain zebra clearly need to be reassessed, as the previous target of 2,500 individuals is well below estimates of the minimum viable population and also well below the

population potential for in situ conservation of the Cape mountain zebra. High numbers alone may not be sufficient to ensure the security of this subspecies, or other threatened species. Conservation of the full range of genetic diversity also needs to be a priority (i.e. including genes from the two 'unutilized' relic subpopulations into the rest of the metapopulation), as well as ensuring threats associated with small populations (common in metapopulations) are minimized. The effective population size (i.e. number of breeding individuals) in subpopulations and the entire metapopulation is also an important contributing factor to a species' survival, yet this is still not known for the Cape mountain zebra. The increasing role of private landowners in conservation in South Africa is evident, together with the problems associated with private ownership, such as control of management actions such as hunting.

We recommend that conservation efforts for the Cape mountain zebra should now include: (1) increasing the size of existing small subpopulations, (2) ensuring the genetic diversity of subpopulations, (3) gaining a better understanding of the effect of hunting and predation on demographics, (4) determining the effective population size in subpopulations and the metapopulation, (5) determining the potential population size for the available habitat, and (6) identifying the minimum viable population size. With such efforts, together with the continued increase in habitat availability (capable of supporting 7,000 adults; Reed et al., 2003), the chances for the long-term conservation of the subspecies would be greatly enhanced.

These recommendations have been passed on to the appropriate authorities and private land owners are now able to access current Cape mountain zebra management recommendations and general information from a website dedicated to the subspecies. The above-mentioned six recommendations have become a priority for research, and the results from this study will be included in the next management plan for the species.

Acknowledgements

This survey was funded by the Professional Hunters Association of South Africa. The authors thank all the reserve owners and managers who took the time to complete the questionnaire and to O. Huyser for his input.

References

Armbruster, P. & Lande, R. (1993) A population viability analysis for African elephant (*Loxodonta africana*): how big should reserves be? *Conservation Biology*, 7, 602–610.

Castley, G., Lloyd, P.H. & Moodley, Y. (2002) *Cape Mountain Zebra,* Equus zebra zebra *Taxon Data Sheet*. IUCN Conservation Assessment Management Plan, Randburg, South Africa.

Cordingley, J.E., Sundaresan, S.R., Fischhoff, I.R., Shapiro, B., Ruskey, J. & Rubenstein, D.I. (2009) Is the endangered Grevy's zebra threatened by hybridization? *Animal Conservation*, 12, 505–513.

Faith, J.T. (2012) Palaeozoological insights into management options for a threatened mammal: southern Africa's Cape mountain zebra (*Equus zebra zebra*). *Diversity and Distributions*, 18, 438–447.

Feh, C., Munkhtuya, B., Enkhbold, S. & Sukhbaatar, T. (2001) Ecology and social structure of the Gobi Khulan *Equus hemionus* subsp. in the Gobi B National Park, Mongolia. *Biological Conservation*, 101, 51–61.

Frankham, R. (1996) Relationship of genetic variation to population size in wildlife. *Conservation Biology*, 10, 1500–1508.

Franklin, I.R. (1980) Evolutionary change in small populations. In *Conservation Biology: An Evolutionary–Ecological Perspective* (eds M.E. Soule & B.A. Wilcox), pp. 135–149. Sinauer, Sunderland, USA.

Hanski, I. (1991) Single species metapopulation dynamics: concepts, models and observations. *Biological Journal of the Linnean Society*, 42, 3–16.

Hayward, M.W., Henschel, P., O'Brien, J., Hofmeyr, M., Balme, G. & Kerley, G.I.H. (2006) Prey preferences of the leopard (*Panthera pardus*). *Journal of Zoology*, 270, 298–313.

Hayward, M.W. & Kerley, G.I.H. (2005) Prey preference in the lion. *Journal of Zoology*, 267, 309–322.

Jansson, G., Thulin, C.G. & Pehrson, A. (2007) Factors related to the occurrence of hybrids between brown hares *Lepus europaeus* and mountain hares *L. timidus* in Sweden. *Ecography*, 30, 709–715.

Kerley, G.I.H., Pressey, R.L., Cowling, R.M., Bosshoff, R.M. & Sims-Castley, R. (2003) Options for the conservation of large and medium-sized mammals in the Cape Floristic Region hotspot, South Africa. *Biological Conservation*, 112, 169–190.

Komers, P.E. & Curman, G.P. (2000) The effect of demographic characteristics on the success of ungulate re-introductions. *Biological Conservation*, 93, 187–193.

Lande, R. & Barrowclough, G.F. (1987) Effective population size, genetic variation, and their use in population management. In *Viable Populations for Conservation* (ed. M.E. Soule), pp. 87–123. Cambridge University Press, Cambridge, UK.

Lloyd, P.H. (1984) The Cape mountain zebra 1984. *African Wildlife*, 38, 144–149.

Lloyd, P.H. & Rasa, O.A.E. (1989) Status, reproductive success and fitness in Cape mountain zebra (*Equus zebra zebra*). *Behavioral Ecology and Sociobiology*, 25, 411–420.

Mace, R.D. & Waller, J.S. (1998) Demography and population trend of grizzly bears in the Swan Mountains, Montana. *Conservation Biology*, 12, 1005–1016.

Margules, C.R. & Pressey, R.L. (2000) Systematic conservation planning. *Nature*, 405, 243–253.

Millar, J.C.G. (1970a) Census of Cape mountain zebra: part I. *African Wildlife*, 24, 17–25.

Millar, J.C.G. (1970b) Census of Cape mountain zebra: part II. *African Wildlife*, 24, 105–114.

Mills, G. & Hes, L. (eds) (1997) *The Complete Book of Southern African Mammals*, 1st edition. Struik Publishers, Cape Town, South Africa.

Milner, J.M., Nilsen, E.B. & Andreassen, H.P. (2006) Demographic side effects of selective hunting in ungulates and carnivores. *Conservation Biology*, 21, 36–47.

Moodley, Y. & Harley, E.H. (2005) Population structuring in mountain zebras (*Equus zebra*): the molecular consequences of divergent demographic histories. *Conservation Genetics*, 6, 953–968.

Novellie, P. (2008) *Equus zebra ssp. zebra.* In *IUCN Red List of Threatened Species v. 2012.2*. Http://www.iucnredlist.org [accessed 21 November 2012].

Novellie, P., Lindeque, M., Lindeque, P., Lloyd, P. & Koen, J. (2002) Status and Action Plan for the Mountain Zebra (*Equus zebra*). In *Equids: Zebras, Asses and Horses: Status, Survey and Conservation Action Plan* (ed. P. Moehlman), pp. 28–42. IUCN, Gland, Switzerland.

Novellie, P.A., Millar, P.S. & Lloyd, P.H. (1996) The use of VORTEX simulation models in a long term programme of reintroduction of an endangered large mammal, the Cape mountain zebra (*Equus zebra zebra*). *Acta Oecologica*, 17, 657–671.

Owen-Smith, N. & Mills, M.G.L. (2008) Predator–prey size relationships in an African large-mammal food web. *Journal of Animal Ecology*, 77, 173–183.

Penzhorn, B.L. (1975) *Behaviour and population ecology of the Cape Mountain Zebra* Equus zebra zebra *Linn., 1758 in the Mountain Zebra National Park*. PhD thesis. University of Pretoria, Pretoria, South Africa.

Reed, D.H., O'Grady, J.J., Brook, B.W., Ballou, J.D. & Frankham, R. (2003) Estimates of minimum viable population sizes for vertebrates and factors influencing those estimates. *Biological Conservation*, 113, 23–34.

Ripple, W.R. & Beschta, R.L. (2004) Wolves and the ecology of fear: can predation risk structure ecosystems? *Bioscience*, 54, 755–766.

Sasidharan, S.P. (2006) Sarcoid tumours in Cape mountain zebra (*Equus zebra zebra*) populations in South Africa: a review of associated epidemiology, virology and genetics. *Transactions of the Royal Society of South Africa*, 61, 11–18.

Sasidharan, S.P., Ludwig, A., Harper, C., Moodley, Y., Bertschinger, H.J. & Guthrie, A.J. (2011) Comparative genetics of sarcoid tumour-affected and non-affected mountain zebra (*Equus zebra*) populations. *South African Journal of Wildlife Research*, 41, 36–49.

Ryder, O.A., Epel, N.C. & Benirschke, K. (1978) Chromosome banding studies of the Equidae. Cytogenet. *Cell Genetics*, 20, 332–350.

Sims-Castley, R., Kerley, G.I.H., Geach, B.G.S. & Langholz, J. (2006) The Socio-economic significance of eco tourism-based private game reserves in South Africa's Eastern Cape Province. *Parks*, 15, 6–18.

Skead, C.J. (2011) *Historical Incidence of the Larger Land Mammals in the Broader Eastern Cape*. 2nd edition. (eds A. Boshoff, G.I.H. Kerley & P. Lloyd). Centre for African Conservation Ecology, Nelson Mandela Metropolitan University, Port Elizabeth, South Africa.

Smith, R.K., Marais, A., Chadwick, P., Lloyd, P.H. & Hill, R.A. (2007) Monitoring and management of the endangered Cape mountain zebra *Equus zebra zebra* in the Western Cape, South Africa. *African Journal of Ecology*, 46, 207–213.

Smith, R.K., Ryan, E., Morley, E. & Hill, R.A. (2011) Resolving management conflicts for an endangered species in a habitat classified as a World Heritage Site? *Environmental Conservation*, 38, 325–333.

Stephens, P.A., Sutherland, W.J. & Freckleton, R.P. (1999) What is the Allee effect? *Oikos*, 87, 185–190.

Traill, L.W., Corey Bradshaw, J.A. & Brook, B.W. (2007) Minimum viable population size: a meta-analysis of 30 years of published estimates. *Biological Conservation*, 139, 159–166.

Zar, J.H. (1999) *Biostatistical Analysis*. 4th edition. Prentice-Hall, Englewood Cliffs, USA.

Biographical sketches

Halszka Hrabar's research interests include plant–herbivore interactions and population dynamics of large mammals, including sex ratios at birth. Her research on zebras began in the Serengeti, Tanzania, and is now focused on conservation issues for the Cape mountain zebra in South Africa. Graham Kerley is Director of the Centre for African Conservation Ecology at the Nelson Mandela Metropolitan University and a member of the Board of South African National Parks. His research interests focus on conservation biology and the consequences of resource use by large herbivores and predators.

Tab 4

Non-detriment finding for *Equus zebra zebra* (Cape mountain zebra)

Reference Number: Equ_zeb_zeb_May2015

Date: 20 May 2015

Issued by the Scientific Authority of South Africa

Summary of findings

Equus zebra zebra (Cape mountain zebra) is included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). There have been several requests from the private sector for the establishment of an export quota for Cape mountain zebra hunting trophies, which is allowed for Appendix I species in accordance with CITES Resolution Conf. 2.11 (Rev.). In terms of Article III of the Convention, an export permit shall only be granted for an Appendix I species when a Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of that species. This document details the undertaking of a non-detriment finding (NDF) (Figure 1) for Cape mountain zebra and is based on the best current available information. This information is current as of May 2015.

The Cape mountain zebra is endemic to South Africa. Though once widely distributed in the mountains of the Eastern and Western Cape provinces, the subspecies is currently limited to a number of small fragmented subpopulations that are isolated by fences. Although the species occurs in the Cape Floristic Region, it is currently more common in the Nama Karoo Biome and the Grassland Biome of the Eastern Cape. Evidence suggests that this was also true in historical times. In 2009 the total population was estimated at 2790 animals in approximately 52 subpopulations of which 17 are formally protected and 35 occur on privately owned properties. The population is increasing and it is currently estimated at 4000 individuals. These estimates are based on recent quantitative data as the numbers of Cape mountain zebra on all of the formally protected areas, which amounts to 69% of the population, are counted annually.

The Cape mountain zebra is long-lived, with mares of up to 21 years of age producing foals and stallions of up to 19 years of age remaining fertile in the wild. The reproductive rate is low due to the long gestation period of approximately 12 months and the single foal produced approximately every 25 months (range 12 – 69 months). In the presence of a full set of competitors, the Cape mountain zebra is a specialist adapted to rugged terrain and is a selective grazer. Cape mountain zebra are poor dispersers and at present dispersal is severely limited by fences. The subspecies is tolerant of human activities and adapts well within transformed landscapes.

The biggest current threat to the Cape mountain zebra is the loss of genetic diversity. Currently the national population is highly fragmented into a large number of small subpopulations and no meta-population management is practised. Prolonged hunting and habitat loss decimated the population and no less than 80 individuals remained in the 1950s. Small numbers of animals have been re-introduced

elsewhere but all of these subpopulations (except for that of De Hoop Nature Reserve) originated from Mountain Zebra National Park. This has resulted in low genetic variation and a risk of inbreeding depression. Inbreeding may increase the susceptibility of individuals to the equid disease *Equine sarcoidosis*.

There are currently no CITES quotas in place for the Cape mountain zebra and currently no hunting of this subspecies takes place in any provincial or national parks where it occurs. Limited hunting of Cape mountain zebra is allowed on private properties in the Eastern Cape, but until recently translocation was the only form of harvest approved in the Western Cape. The overall aim of harvest at present is mostly population management/control and the growth of the national meta-population. Hunting of Cape mountain zebra is monitored through CITES exports, while translocation is monitored through a permit system on a case by case basis, based on good, sound knowledge, but effects of harvesting (e.g. on heterozygosity and fitness) are not currently monitored. There is a medium confidence in the current monitoring of the harvest but confidence is limited by budgetary and capacity constraints. The national management system is more informal as there is no set structure with activities measured against a larger adaptive framework. In some cases local management plans are available but there is no approved national plan that is aimed at managing the genetic integrity of the Cape mountain zebra.

Over 69% of the national population is strictly protected within national and provincial parks, but budgetary and capacity constraints have lowered the confidence in the effectiveness of these strict protection measures. Restrictions in the form of a prohibition on hunting in the Western Cape have been very effective in preventing overuse, however it is debatable whether this prohibition has been to the benefit or detriment of the subspecies. CapeNature has recently started approving hunting applications on a case by case basis. No conservation incentives for either the subspecies or its habitat are derived from hunting Cape mountain zebra within the Western Cape. In the Eastern Cape, hunting has potentially benefitted the Cape mountain zebra, but has not necessarily incentivized habitat conservation.

In conclusion, the non-detriment finding (Figure 1) undertaken for the Cape mountain zebra as summarized in the analysis of the key considerations above, demonstrates that legal local and international trade in live animals and the export of hunting trophies at present poses a moderate to high risk to the survival of this subspecies in South Africa (Figure 2A). This however is mostly due to a lack of meta-population management and low conservation incentives derived from the harvest of Cape mountain zebra. If a small hunting quota was to be introduced, it will likely increase the economic value of the Cape mountain zebra, which is anticipated to generate species and habitat conservation incentives. If the Cape mountain zebra had a higher economic value, there would be more of an incentive to conserve the subspecies and limit the introduction of alternative high-value extra-limital species that can lead to habitat deterioration. More landowners investing in the subspecies will increase its abundance and improve its conservation status within its natural distribution range. It is however important that the quota be based on sound ecological principles, and that its impact on numbers and the overall heterozygosity of the population be monitored. The development and effective implementation of a Biodiversity Management Plan (BMP) will further improve the management and monitoring of the Cape mountain zebra. If a small quota and a BMP are introduced in parallel it will, as

shown in Figure 2B, lead to a non-detriment finding for this subspecies. The following is thus recommended

1. A small cautious hunting quota must be determined through a population viability analysis that considers genetic diversity within the population. The implementation of the quota must be monitored through a research project.
2. A Biodiversity management Plan must be developed and implemented to improve the meta-population management of the Cape mountain zebra.

Upon implementation of recommendations 1 and 2 above, the export of hunting trophies can be allowed.

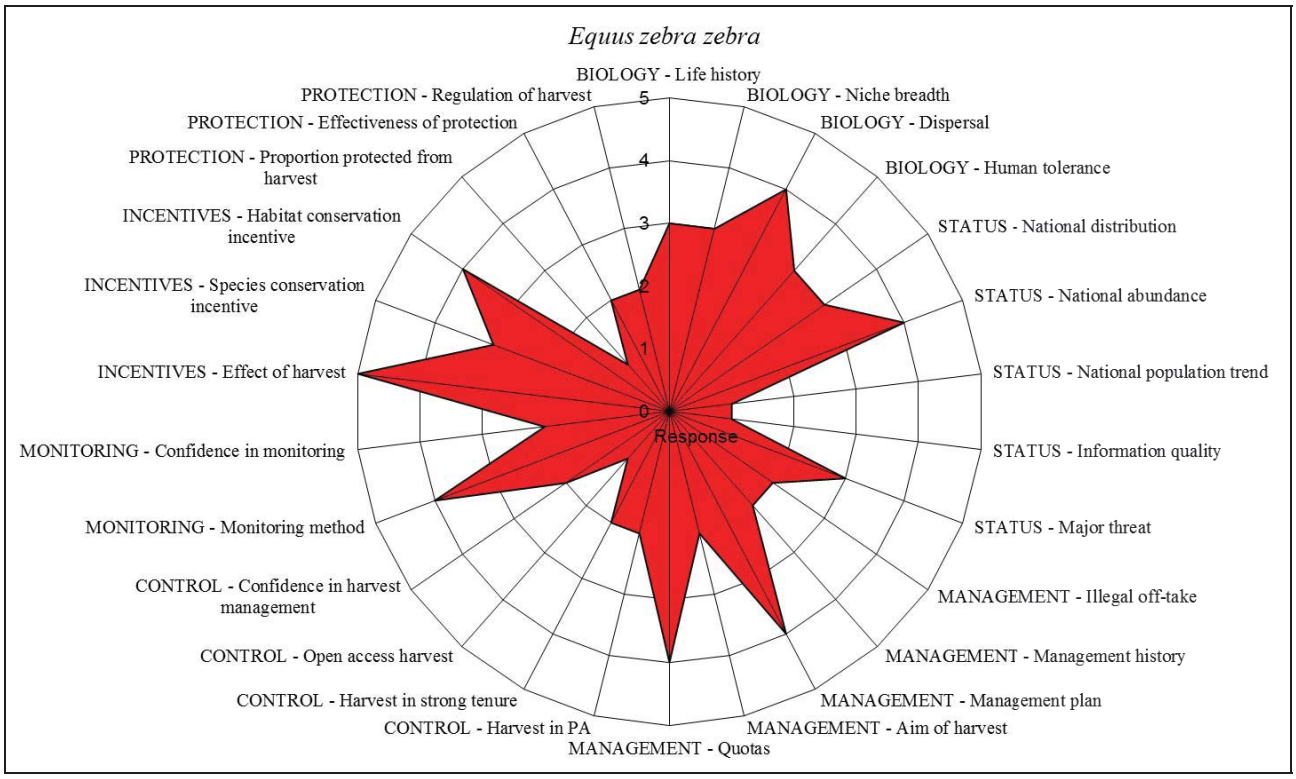


Figure 1: Radar chart summarizing the non-detriment finding assessment for *Equus zebra zebra* (Cape mountain zebra) in accordance with the CITES NDF checklist. Higher scores are indicative of higher risks. The shaded area in the radar chart demonstrates an overall moderate to high risk to the subspecies.

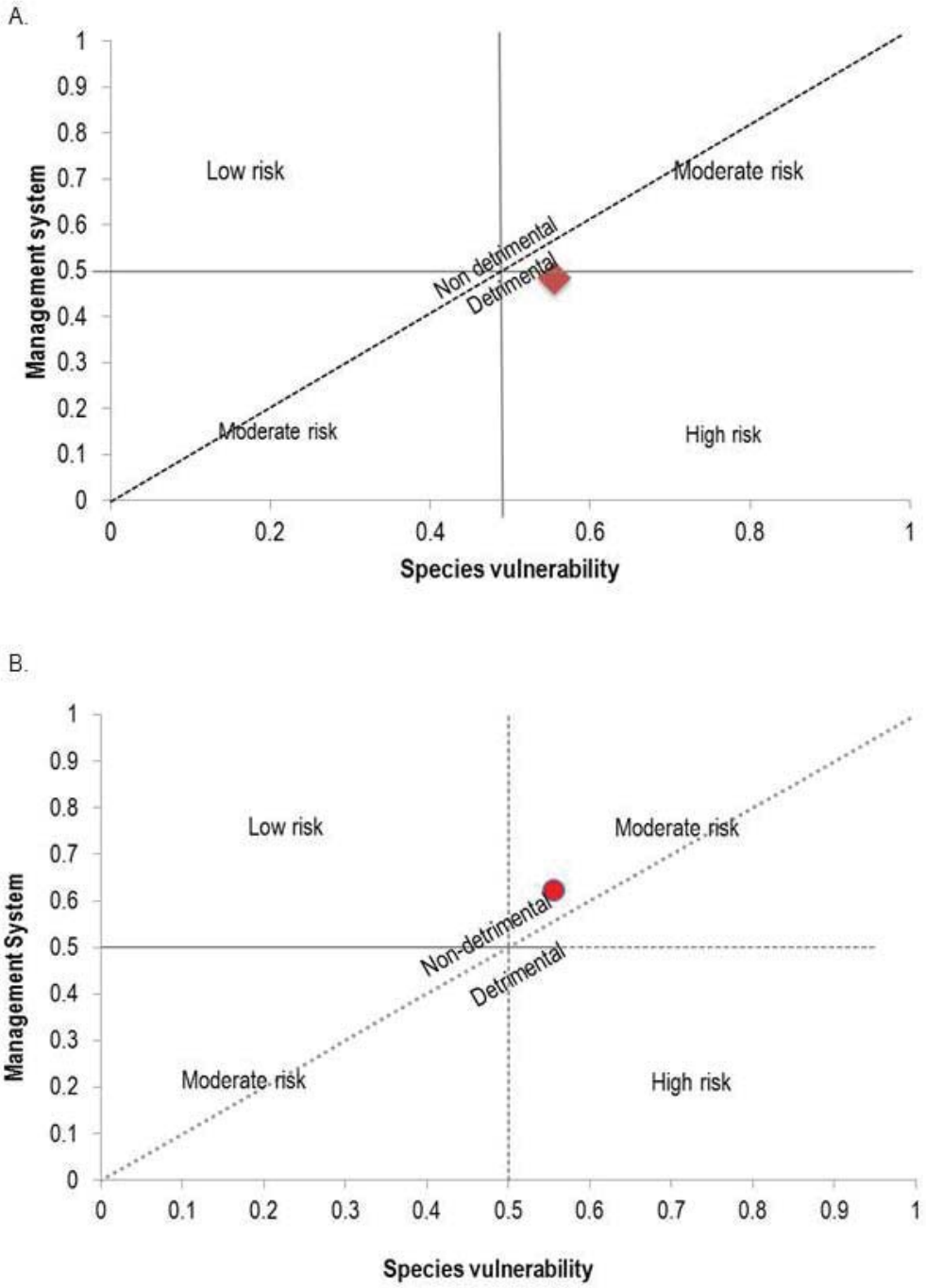


Figure 2: The level of risk of harvesting for *Equus zebra zebra* (Cape mountain zebra) as represented by the relationship between species vulnerability (biology and status) and the management system to which the species is subjected (management, control, monitoring, incentives and protection). Figure 2A is an indication of the current situation where the subspecies is at a moderate to high risk and trade is detrimental, while 2B indicates the potential risk to the species after the allocation of a small hunting quota and the development of a biodiversity management plan. In this scenario the species is at moderate risk and trade is not detrimental.

Table 1: Detailed non-detriment finding (NDF) assessment for *Equus zebra zebra* (Cape mountain zebra) conducted in accordance with the CITES NDF checklist. Scores assigned to each question are indicated (bold text in shaded blocks) along with detailed explanations/justifications. Higher scores are indicative of higher risks.

Biological characteristics		
1. Life history: What is the species' life history?	High reproductive rate, long-lived	1
	High reproductive rate, short-lived	2
	Low reproductive rate, long-lived	**3**
	Low reproductive rate, short-lived	4
	Uncertain	5
The Cape mountain zebra has a low reproductive rate and individuals are long-lived. Both males and females can live for more than 20 years. Breeding herds consist of one male and on average 2.4 females (range 1 - 5) and their offspring, which remain stable for many years (Penzhorn & Novellie 1991). Adult females in a herd are unrelated. Female social rank appears to affect the reproductive sex allocation with dominant females producing significantly more female offspring. The reproductive rate is low due to the long gestation period of approximately 12 months and a single foal is produced (Skinner & Smithers 1990). Foals are born all year round, but there is a definite peak of births in the rainy season. Mares produce their first offspring at 4-5 years of age, with an average foaling interval of 18 months. According to Penzhorn (1985) the median foaling interval was 25 months (range 13 - 69 months) in Mountain Zebra National Park (MZNP) and the annual foaling rate 32%. Mares may continue to produce foals up to the age of 21 years and possibly longer. Stallions remain fertile for up to 19 years in the wild (Skinner & Smithers 1990). Both male and female offspring leave the herd at around 22 months, often about four months after the birth of a sibling. According to Lloyd & Rasa (1989) as cited by Skinner & Smithers (1990) the mortality rate of foals appears to be high and to be related to behavioural factors. In De Hoop Nature Reserve, nine of the eleven foals that died were offspring of subordinate mares. It is suggested by Lloyd & Rasa (1989) that these foals died as a result of broken bones inflicted by dominant mares. Hrabar (pers. comm.), however believes that foal survival is higher under conditions of higher resource availability (i.e. less competition between females) and the current absence of predators in most areas in this subspecies' range.		
2. Ecological adaptability: To what extent is the species adaptable (habitat, diet, environmental tolerance etc.)?	Extreme generalist	1
	Generalist	2
	Specialist	**3**
	Extreme specialist	4
	Uncertain	5
Although the Cape mountain zebra occurs in the Cape Floristic Region, it is currently more common in the Nama Karoo Biome and the Grassland Biome of the Eastern Cape. Evidence suggests that this was also true in historical times. It is adapted to rugged terrain and can be considered a habitat specialist. Cape mountain zebra are predominantly grazers and highly selective feeders. Within the Gamka Mountain Nature Reserve, Cape mountain zebra favour habitats with high grass cover and within these habitats select sites containing high abundances of highly palatable grasses (e.g.		

Themeda triandra*). These habitats only comprise 30% of the nature reserve and of this only 60% qualify as good habitat for Cape mountain zebra (Watson* et al*., 2005). This corresponds with a study conducted in MZNP showing that Cape mountain zebra utilize only 26% of plants available at feeding sites and only seven of the 17 grass species present (Grobler 1983); it is thus a dietary specialist too. In the presence of a full set of competitors the Cape mountain zebra is deemed a specialist and will utilise mountainous areas, however in the absence of competition, for example on game farms, the Cape mountain zebra will display more generalist characteristics. The intrinsic nature of the species is that of a specialist.*

3. Dispersal efficiency: How efficient is the species' dispersal mechanism at key life stages?	Very good	1
	Good	2
	Medium	3
	Poor	**4**
	Uncertain	5

At present, the dispersal of the Cape mountain zebra is restricted by fences and it is dependent on translocation (e.g. by game farmers) for dispersal. Some historical evidence indicates that the subspecies is a poor disperser even where adequate habitat is available. Historically the Cape mountain zebra has seemingly always been restricted to a small range within South Africa, suggesting inferior dispersal capabilities.

4. Interaction with humans: Is the species tolerant to human activity other than harvest?	No interaction	1
	Pest / Commensal	2
	Tolerant	**3**
	Sensitive	4
	Uncertain	5

The Cape mountain zebra is tolerant to human activities. They adapt to changes in the landscape and readily utilise lawns or transformed landscapes.

National status

5. National distribution: How is the species distributed nationally?	Widespread, contiguous in country	1
	Widespread, fragmented in country	2
	Restricted and fragmented	**3**
	Localized	4
	Uncertain	5

Cape mountain zebra are endemic to South Africa and were once widely distributed in the mountains of the Eastern and Western Cape provinces (Hrabar & Kerley 2013). Excessive hunting and habitat loss due to agriculture reduced numbers of these animals to less than 80 individuals in just three localities in the 1950s. At present the subspecies has a limited distribution within the Western, Eastern and Northern Cape provinces. The population is fragmented into small sub-populations (Figure 1), which are isolated by fences. Although the subspecies occurs in the Cape Floristic Region, it is currently more common in the more grassy habitats of the Nama Karoo and Grassland Biomes of the Eastern Cape. Evidence suggests that this was also true in historical times. The majority of the population (69%) occurs on formally protected land (643 310 ha versus 291 881 ha of private land). The proportion on privately owned land has increased from 14% in 1998 to around 32% in 2009. The expansion of formally protected areas such as the Mountain Zebra National Park (MZNP) and Karoo

National Park (KNP) have allowed the growth of the two largest sub-populations, which now make up 22% and 18% of the global population, respectively.

The total existing area likely available to the Cape mountain zebra is > 935 191 ha and could potentially support a considerably larger population. The average size of private properties with Cape mountain zebra is 6 214 ha compared to formally protected areas of 38 860 ha.

The subspecies has also been translocated extralimitally and a population of 92 individuals occurs on the Gariep Dam Nature Reserve within the Free State.

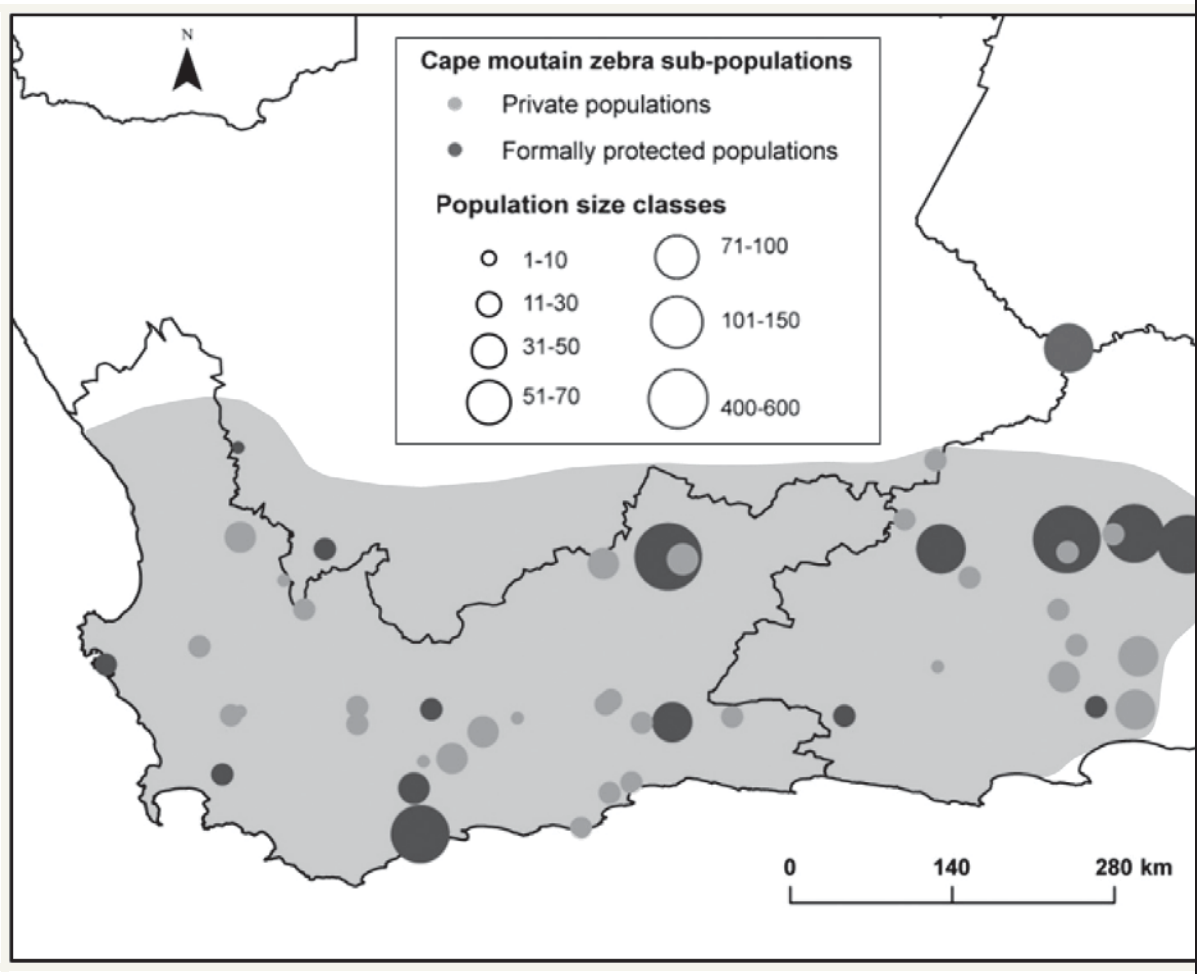


Figure 1. Approximate historical (shaded region; Novellie et al., 2002) and current distribution of all privately owned (as identified in Hrabar & Kerley 2013) and formally protected Cape mountain zebra Equus zebra zebra *subpopulations in South Africa. (Figure copied from Hrabar & Kerley 2013, Oryx.)*

6. National abundance: What is the abundance nationally?	Very abundant	1
	Common	2
	Uncommon	3
	Rare	4
	Uncertain	5

The Cape mountain zebra is considered rare in South Africa with a limited distribution associated with the southernmost biomes occurring in the Western, Eastern and Northern Cape provinces. The subspecies is currently considered as Vulnerable on the IUCN Red List both nationally and globally (VU D1). In 2009 the population was estimated at a minimum of 2790 animals in no fewer than 52 subpopulations (17 formally protected and 35 on private land) (Hrabar & Kerley 2013, Table 1). It is estimated that the population might be closer to 4000 individuals at present, therefore no longer qualifying as Vulnerable under the D criterion. The draft 2014 Red List assessment for Cape mountain zebra suggests a Least Concern status may be more appropriate because i) the number of mature individuals exceeds the criteria D threshold, ii) the population size is increasing and iii) there is a lack of severe threats.

The subspecies has also been translocated extralimitally and a population of 92 individuals occurs on the Gariep Dam Nature Reserve within the Free State.

Table 1: A comparison between private land and formally protected Cape mountain zebra subpopulations in 2009 (Copied from Hrabar & Kerley 2013).

	Private land	*Formally protected*
No. of populations	*35*	*17*
Total no. of individuals	*902*	*1 888*
Mean population size ± SD	*27±19 (n=34)*	*111±167 (n=17)*
Current population size range	*4-65*	*3-596*
Total land area occupied (ha)	*>291 881[1]*	*643 310*
Mean property size ± SD (ha)[2]	*9 115±11 181 (n=32)*	*37 842±47 787 (n=17)*
Property size range (ha)[2]	*1 100 – 54 000*	*1 800 – 180 000*
Mean zebra density (ha^{-1})[2]	*0.006±0.007 (n=32)*	*0.007±0.008 (n=17)*

[1] Excludes two properties for which area data are not available

[2] Excludes one population kept on cultivated fields

7. National population trend: What is the recent national population trend?		
	Increasing	1
	Stable	2
	Reduced, but stable	3
	Reduced and still decreasing	4
	Uncertain	5

The population of Cape mountain zebra is increasing and is currently estimated at approximately between 3500 and 4000 individuals. The extant population exceeds the target size of 2500 individuals set by the 2002 IUCN Action Plan (Novellie et al.*, 2002). The mean annual rate of increase was maintained at 10% from 2002 – 2009, compared to 8.6% from 1985 to 1995 (Novellie* et al.*, 1996), 9.6% from 1995 to 1998 (Novellie* et al.*, 2002) and 8.4% from 1998 and 2002. A new population survey is required to determine whether the 10% increase continues to be maintained. Given the fact that most populations have recently been founded and new populations are being added, it is likely that the Cape mountain zebra population has the potential to double in size (Hrabar & Kerley 2013). The expansion of formally protected areas such as the MZNP and KNP have allowed for the further expansion of the two largest subpopulations, which are still increasing and currently make up 22% and 18% of the global population, respectively. The total existing area available to the Cape mountain*

zebra is > 935 191 ha and could potentially support a considerably larger population. According to Traill et al*. 2007 the desired population size should be around 12 000 individuals (4000 breeding individuals).*

8. Quality of information: What type of information is available to describe abundance and trend in the national population?	Quantitative data, recent	1
	Good local knowledge	2
	Quantitative data, outdated	3
	Anecdotal information	4
	None	5

The last assessment of the population status was conducted in 2009 by H. Hrabar. Annual counts are however conducted for all the formally protected subpopulations which means recent data are available for at least 69% of the subpopulations.

9. Major threats: What major threat is the species facing (underline following: loss of genetic diversity / overuse/ habitat loss and alteration/ invasive species/ other: small isolated subpopulations; disease; predation, poaching and emigration) and how severe is it?	None	1
	Limited/Reversible	2
	Substantial	3
	Severe/Irreversible	4
	Uncertain	5

Long term security of the subspecies is still uncertain. The biggest threat to the subspecies is the loss of genetic diversity. This is the result of a previous genetic bottleneck and the current small subpopulations which are isolated from each other. In the absence of genetic management of the subspecies under these conditions, the likelihood of inbreeding has increased which may explain the observed increase in disease frequency.

i. Loss of genetic diversity through inbreeding depression and genetic drift

This is currently the biggest threat to the Cape mountain zebra. Prolonged hunting and habitat destruction over the past 300 years have decimated Cape mountain zebra populations within South Africa. According to Moodley and Harley (2005) this has resulted in low genetic variation within individual populations indicative of population fragmentation and drift. They however found higher levels of diversity within the entire Cape mountain zebra gene pool and recommended a management strategy that entailed mixing of original populations to halt further loss of genetic diversity.

As part of the meta-population approach it has been recommended that founder populations should comprise of no less than 14 animals and that at least one new animal is introduced to the population every 10 years (Hrabar & Kerley 2013). According to data gathered in 2008, 10 of the 52 known subpopulations have fewer than the recommended 14 animals (8 out of the 10 are on private land) and no new individuals have been introduced to 6 out of the 22 privately owned subpopulations that were established more than 10 years ago (Hrabar & Kerley 2009). The problem is exacerbated by the social structure of the Cape mountain zebra as the behaviour of the males tends to reduce the effective population size (a fraction of the males dominate matings for an extended period of time). A 1:1 sex ratio is recommended, yet surplus males are often removed. Surplus males are required for establishing new herds with dispersing females. Most of the meta-population is at risk of inbreeding.

All reintroduced subpopulations, except for that in De Hoop Nature Reserve, originate from MZNP, while De Hoop is at risk because of prolonged isolation.

ii. Disease

Equine sarcoidosis: This Equid disease is widespread and has also been found in Cape mountain zebra. In both the Gariep Nature Reserve and the Bontebok National Park the disease reached epidemic proportions where 22% and 53% of the population was infected, respectively (Sasidharan 2006). It has been found that inbred populations are more susceptible to this disease (Sasidharan 2006). Isolation of small populations may therefore lead to increased susceptibility to the disease due to inbreeding.

African Horse sickness (AHS): Cape mountain zebra is a carrier of AHS. As a result restrictions (Animal Diseases Act, 1984 (Act 35 of 1984, as amended)) are in place for the movement of Cape mountain zebra, especially into the AHS controlled areas of the Western Cape (set out by the Department of Agriculture in 2003).

iii. Mismanagement or lack of implementation of a meta-population strategy

A lack of management action to ensure that subpopulations remain viable and breeding on good quality habitat, to prevent the introduction of alien and extra-limital species into Cape mountain zebra range and habitat, and to prevent modification of suitable habitat, is a current threat to the population. Effective implementation of the meta-population strategy is urgently required.

iv. *Conservation in sub optimal habitat (limited grass). See paper Faith 2011.*

Cape mountain zebra is most likely a refuge species that has survived in sub-optimal habitat in the Cape Floristic Region but may in fact be more suited to grassland habitat. In sub-optimal habitat there is a decrease in population densities and conflict in management objectives (e.g. infrequent vs. regular burning to favour grassland). For the Cape mountain zebra, reclaimed agricultural fields are a possible solution for population expansion.

v. *Risk of hybridisation*

*There is a risk of hybridization between Hartmann's mountain zebra (*Equus zebra hartmannae*) and Cape mountain zebra, where their ranges overlap or as a result of introductions onto the same properties. Deliberate mixing of herds has also occurred. Results from a recent genetic analysis of translocated animals in the Eastern Cape Province showed the animals included Hartmann's mountain zebra, Cape mountain zebra and plains zebra with various hybrids between the three. In the Western Cape there are four legal Hartmann's mountain zebra subpopulations within the Cape mountain zebra's natural distribution range. Since phenotypic assessments will not provide reliable results, the National Zoological Gardens have initiated the development of genetic markers to test for hybrids, although testing for hybrids is presently not a requirement for translocation. Some provinces have policies in place to prevent extralimital establishment of this subspecies (e.g. KwaZulu-Natal and North-West), while the Free State does not allow any further introductions of Cape mountain zebra.*

vi. *Predation*

Four subpopulations of Cape mountain zebra occur with cheetah and recently lion were introduced into three areas inhabited by Cape mountain zebra. The two largest subpopulations in the KNP and MZNP are now exposed to predation by lions (since 2010 and 2013, respectively). The impact on the mountain zebra populations are being monitored (Novellie, per. Comm). Lions are currently the only predator that may pose a real threat to adults. It is predicted that populations exposed to predators will have decreased growth rates and lower overall densities.

Harvest management		
10. Illegal off-take or trade: How significant is the national problem of illegal or unmanaged off-take or trade?	None	1
	Small	2
	Medium	3
	Large	4
	Uncertain	5

Illegal translocations and poaching occurs on a limited scale. Cases of Cape mountain zebra being hunted, sold or exported as Hartmann's mountain zebra have also been reported. There is currently no illegal off take of Cape mountain zebra in any of the national parks where they occur. No illegal removals of Cape mountain zebra from Gariep Nature Reserve have been reported.

11. Management history: What is the history of harvest?	Managed harvest: ongoing with adaptive framework	1
	Managed harvest: ongoing but informal	2
	Managed harvest: new	3
	Unmanaged harvest: ongoing or new	4
	Uncertain	5

Cape mountain zebra are endemic to South Africa and were once widely distributed in the mountains of the Eastern and Western Cape Provinces (Hrabar & Kerley 2013). Excessive hunting and habitat loss due to agriculture reduced numbers to less than 80 individuals in just three localities in the 1950s. Since the 1950s the number of Cape mountain zebras has gradually increased through translocations aimed at ensuring continued population growth and genetic diversity (Novellie et al*., 2002). By 2002 the Cape mountain zebra population totalled > 1 600 individuals in six national parks, 10 provincial reserves and 17 private reserves distributed across most of their natural range (Castley* et al*., 2002). Translocation of animals from existing populations (particularly the larger populations) is considered to be necessary to ensure continued population growth, genetic diversity and increasing distribution of the subspecies within its natural range (Hrabar & Kerley 2009). Hunting of the Cape mountain zebra is permitted in the Eastern Cape, but until recently in the Western Cape translocation was the only harvesting allowed for the subspecies. Recently Western Cape has started considering hunting applications on a case by case basis. Harvesting and translocation is monitored through a permit system on a case by case basis, based on good, sound knowledge. The management system is however more informal as there is no set structure with activities measured against a larger adaptive framework.*

12. Management plan or equivalent: Is there a management plan related to the harvest of the species?	Approved and co-ordinated local and national management plans	1
	Approved national/state/provincial management plan(s)	2
	Approved local management plan	3
	No approved plan: informal unplanned management	4
	Uncertain	5
There is currently no approved national management plan for Cape mountain zebra. South African National Parks (SANParks) do not have a specific management strategy for Cape mountain zebra, although management of the subspecies follows the general policy for the management of large mammals in SANParks protected areas. According to CapeNature, a management plan is not required for the introduction or keeping of Cape mountain zebra on private land. Private landowners however may have general ecological management plans for their specific properties. Eastern Cape Parks and Tourism Agency has management plans for each of the four Cape mountain zebra subpopulations that are under their management.		
13. Aim of harvest regime in management planning: What is harvest aiming to achieve?	Generate conservation benefit	1
	Population management/control	2
	Maximize economic yield	3
	Opportunistic, unselective harvest, or none	4
	Uncertain	5
Although there are elements of generating conservation benefits, maximizing economic yield and opportunistic harvesting, the harvest regime is predominantly for the purposes of population management/control through the translocation of animals.		
14. Quotas: Is the harvest based on a system of quotas?	Ongoing national quota: based on biologically derived local quotas	1
	Ongoing quotas: "cautious" national or local	2
	Untried quota: recent and based on biologically derived local quotas	3
	Market-driven quota(s), arbitrary quota(s), or no quotas	4
	Uncertain	5
The occasional off-take of small numbers of animals to be sold to suitable buyers or at game auctions to generate income takes place in the absence of quotas. This however is not a loss to the total population and thus not considered to be harvested individuals. There is no national quota for hunting Cape mountain zebra, although in the Eastern Cape trophy hunting of a small number of older males has been allowed (a total of 3 over the past 5 years).		
Control of harvest		
15. Harvesting in Protected Areas: What percentage of the legal national harvest occurs in State-controlled Protected Areas?	High	1
	Medium	2
	Low	3
	None	4
	Uncertain	5
Translocation was included as a harvest activity in this assessment. A number of animals have been		

translocated from certain protected areas to private land. Eastern Cape Parks & Tourism Agency has sold and translocated 33 animals out of a total of 370 in 2013 alone. Within the Western Cape and in SANParks there is very little translocation at present, but in the past numerous groups were translocated from MZNP to establish subpopulations on private land. Hunting of Cape mountain zebra is not allowed in any of the provincial or national parks within its natural distribution range but is allowed within provincial reserves in the Free State where Cape mountain zebra occur extralimitally.

16. Harvesting in areas with strong resource tenure or ownership: What percentage of the legal national harvest occurs outside Protected Areas, in areas with strong local control over resource use?	High	1
	Medium	2
	Low	3
	None	4
	Uncertain	5

In this assessment translocation is included as a harvest activity. Cape mountain zebra subpopulations on private land have increased in size and as a result landowners have translocated some individuals between private properties. Apart from translocations, a limited number of Cape mountain zebra are also hunted on private game farms within the Eastern Cape.

17. Harvesting in areas with open access: What percentage of the legal national harvest occurs in areas where there is no strong local control, giving *de facto* or actual open access?	None	1
	Low	2
	Medium	3
	High	4
	Uncertain	5

There are no Cape mountain zebra occurring in open access areas.

18. Confidence in harvest management: Do budgetary and other factors allow effective implementation of management plan(s) and harvest controls?	High confidence	1
	Medium confidence	2
	Low confidence	3
	No confidence	4
	Uncertain	5

In the Western Cape, budgetary and human resource capacity required for the development and implementation of species management plans is limited. Furthermore, according to CapeNature, a low budget for fence maintenance has led to Cape mountain zebra escaping from formally protected areas and hybridizing with horses and ponies. There is however a medium confidence in the current permitting system. SANParks indicated a high confidence in their harvest management for Cape mountain zebra, while Eastern Cape Parks has a medium confidence in their management systems. Private landowners indicated a medium confidence in the provincial Department's ability to implement management plans and harvest controls. The provincial conservation agency in the Free State has a high confidence in its harvest management and permitting system in relation to Cape mountain zebra.

There is an overall medium confidence in the way harvest is managed at present.

Monitoring of harvest		
19. Methods used to monitor the harvest: What is the principal method used to monitor the effects of the harvest?	Direct population estimates	1
	Quantitative indices	2
	Qualitative indices	3
	National monitoring of exports	4
	No monitoring or uncertain	5

Translocation is included as a harvest activity in this assessment as there is limited off-take through hunting. At present harvest of Cape mountain zebra is being monitored through a provincial permit system and CITES exports. The effects of harvest, which includes both translocation and hunting, are however not currently monitored and there is often a lack of knowledge of what happens on the ground. Copies of Professional Hunters registers and permits are sent to the relevant government departments but it is difficult for scientists/ecologists within the Department to access these records and they are thus not effectively used as a monitoring tool. The last population survey for Cape mountain zebra was conducted in 2009 and a repeat survey is needed.

20. Confidence in harvest monitoring: Do budgetary and other factors allow effective harvest monitoring?	High confidence	1
	Medium confidence	2
	Low confidence	3
	No confidence	4
	Uncertain	5

There is an overall medium confidence in the current system for harvest monitoring but there is currently no capacity to analyse information received from private game farms. The Free State has a high confidence in monitoring the numbers of harvest operations. The effect of such harvest on a single population is monitored but the effect on the larger meta-population is not monitored.

Incentives and benefits from harvesting

21. Utilization compared to other threats: What is the effect of the harvest when taken together with the major threat that has been identified for this species?	Beneficial	1
	Neutral	2
	Harmful	3
	Highly negative	4
	Uncertain	5

In this section translocation as a harvest activity was excluded from the assessment. Here the objective was to determine what the effect of hunting would be on the population, taken together with the loss of genetic diversity, the major threat to the subspecies. Within the Eastern and Western Cape, hunting of Cape mountain zebra is regulated through a permitting system. The decision on whether to issue a permit is made on a case by case basis by determining whether the hunt will be detrimental to the specific subpopulation. CapeNature is concerned about the lack of knowledge on the heterozygosity within each subpopulation (and thus the genetic value of each specimen to the entire population) and therefore has applied the precautionary principle until recently by not allowing any hunting of Cape mountain zebra. Through incentivizing the keeping of Cape mountain zebra by private landowners, hunting in the Eastern Cape has led to an increase in the numbers within the province and has thus been beneficial to the subspecies, although there is no information on what effect hunting has had on the heterozygosity of the population.

At present there is no knowledge on the heterozygosity within each subpopulation and how it would be affected by harvest. Further research with population modelling is required to obtain the necessary information.

22. Incentives for species conservation: At the national level, how much conservation benefit to this species accrues from harvesting?	High	1
	Medium	2
	Low	3
	None	4
	Uncertain	5

Hunting of Cape mountain zebra is allowed in the Eastern Cape where it has potentially benefitted the conservation of the subspecies. The Eastern Cape hosts approximately one third of the total

population. Within the Western Cape where hunting is strictly regulated, no species conservation benefit is derived from hunting. For this reason the current contribution of hunting to the conservation of the Cape mountain zebra through incentives is low. Hunting was permitted for the first time in 2014 in the Gariep Nature Reserve, Free State.

23. Incentives for habitat conservation: At the national level, how much habitat conservation benefit is derived from harvesting?	High	1
	Medium	2
	Low	3
	None	4
	Uncertain	5

No additional habitat is added to the conservation estate as a direct result of the harvesting of Cape mountain zebra. Cape mountain zebra are introduced on already existing game farms and no other land uses are converted to game farms purely for the purposes of keeping or hunting Cape mountain zebra.

Protection from harvest

24. Proportion strictly protected: What percentage of the species' natural range or population is legally excluded from harvest?	>15%	1
	5-15%	2
	<5%	3
	None	4
	Uncertain	5

The majority of the Cape mountain zebra population (69%) occurs on formally protected land (Hrabar & Kerley 2013). No hunting is allowed in any of the National parks where Cape mountain zebra occur, while within the Eastern Cape no hunting is currently taking place in any of the Eastern Cape Parks.

25. Effectiveness of strict protection measures: Do budgetary and other factors give confidence in the effectiveness of measures taken to afford strict protection?	High confidence	1
	Medium confidence	2
	Low confidence	3
	No confidence	4
	Uncertain	5

Within the Western Cape there is a low to medium confidence in the effectiveness of the strict protection measures for Cape mountain zebra as budget and capacity are limited. There is no budget to maintain and fix fences which has allowed animals to escape. Within SANParks there is a high confidence in the effectiveness of the protection measures in place, while there is a medium confidence in the Eastern Cape, although there are some budgetary limitations. In the Free State there is a high confidence in the effectiveness of the protection measures afforded to the subspecies, which are unaffected by budgetary constraints. Overall there is a medium confidence in the effectiveness of protection measures, with budgetary and capacity constraints identified as the main limitations.

26. Regulation of harvest effort: How effective are any restrictions on harvesting (such as age or size, season or equipment) for preventing overuse?	Very effective	1
	Effective	2
	Ineffective	3
	None	4
	Uncertain	5

Only hunting was considered as a harvest activity for this section of the assessment. Until recently no hunting was permitted in the Western Cape; the restrictions on harvesting were thus very effective as no animals could be utilised. Hunting is permitted within the Eastern Cape and the restrictions implemented have been effective in preventing overuse. It is debatable whether the effective to very

effective restrictive measures controlling the hunting of Cape mountain zebra is to the benefit or detriment of the subspecies. These restrictions may not be effective in promoting the conservation of the Cape mountain zebra, although they have been effective in preventing overuse. The restrictions however have not completely stopped the illegal use or translocation of animals.

List of participants

1. Alan Wheeler (CapeNature)
2. André Geldenhuys (Welgevonden)
3. Annelise Vlok (CapeNature)
4. Carl Brown (CapeNature)
5. Carly Cowell (SANParks)
6. Coral Birss (CapeNature)
7. Craig Geldenhuys (Welgevonden)
8. Dale Cunningham (Profesional Hunters Association South Africa & Wildlife Ranching South Africa)
9. Danelle Kleinhans (CapeNature)
10. Dean Peinke (Eastern Cape Parks & Tourism Agency)
11. Deon Hignett (CapeNature)
12. Elsabé Swart (Department of Environment and Nature Conservation Northern Cape)
13. Guy Palmer (CapeNature)
14. Hlaszka Hrabar (Nelson Mandela Metropolitan University Researcher)
15. Jaco van Deventer (CapeNature)
16. Jeanetta Selier (South African National Biodiversity Institute)
17. Michéle Pfab (SANBI)
18. Peter Novellie (SANParks)
19. Thea Carroll (Department of Environmental Affairs)

References:

Faith, J.T. 2012. Palaeozoological insights into management options for a threatened mammal: southern Africa's Cape mountain zebra (*Equus zebra zebra*). *Diversity and Distributions* 18, 438-447.

Grobler, J.H., 1983. Feeding habits of the Cape mountain zebra *Equus zebra zebra* LINN.1758. *Koedoe* 26, 159-168.

Hrabar, H. and Kerley, G.I.H., 2013. Conservation goals for the Cape mountain zebra Equus zebra zebra – security in numbers. *Oryx*, in press.

Hrabar, H. and Kerley, G.I.H., 2009. Cape mountain zebra status report. Centre for African Conservation Ecology, Nelson Mandela Metropolitan University, Port Elizabeth, South Africa.

Moodley, Y. and Harley, E.H., 2005. Population structuring in mountain zebras (*Equus zebra*): The molecular consequences of divergent demographic histories. *Conservation Genetics* 6(6), 953-968.

Penzhorn, B.L. and Novellie, P.A. 1991. Some behavioural traits of Cape mountain zebras (*Equus zebra zebra*) and their implications for the management of a small conservation area. *Applied Animal Behaviour Science* 29, 293-299.

Penzhorn, B.L. 1985. Reproductive characteristics of a free-ranging population of Cape mountain zebra (Equus zebra zebra). *Journal of reproduction and fertility* 73 (1), 51-57.
Sasidharan, 2006. Sarcoid tumours in Cape mountain zebra (Equus zebra zebra) populations in South Africa: a review of associated epidemiology, virology and genetics. Transactions of the Royal Society of South Africa 61(1), 11-18.
Skead, C.J. 2011. *Historical incidence of the larger land mammals in the Broader Eastern Cape*. 2nd Edition. Eds A. Boshoff, G.I.H. Kerley & P. Lloyd. Centre for African Conservation Ecology, Nelson Mandela Metropolitan University, Port Elizabeth, South Africa.
Skinner, J.D. and Smithers, R.H.N. 1990. *The mammals of Southern Africa Subregion*. University of Pretoria.
Watson, L.H., Odendaal, H.E., Barry, T.J. and Pietersen, J. 2005. Population viability of Cape mountain zebra in Gamka Mountain Nature Reserve, South Africa: the influence of habitat and fire. *Biological Conservation* 122, 173-180.
Cape mountain zebra website: http://capemountainzebra-nmmu.co.za/cape-mounatin-zebra-faq.html

Tab 5

Government Gazette
Staatskoerant

REPUBLIC OF SOUTH AFRICA
REPUBLIEK VAN SUID AFRIKA

Vol. 618 2 December / Desember 2016 No. 40464

PART 1 OF 2

ISSN 1682-5843

9 771682 584003 40464

DEPARTMENT OF ENVIRONMENTAL AFFAIRS

NO. 1483 **02 DECEMBER 2016**

NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004)

BIODIVERSITY MANAGEMENT PLAN FOR CAPE MOUNTAIN ZEBRA (EQUUS ZEBRA ZEBRA)

I, Bomo Edith Edna Molewa, Minister of Environmental Affairs, hereby give notice of my intention to publish the Biodiversity Management Plan for the Cape Mountain Zebra (*Equus zebra zebra*), under section 43(3) read with section 100 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).

Members of the public are invited to submit to the Minister, within 30 days after the publication of the notice in a *Gazette*, written representations on, or objections to the draft Biodiversity Management Plan for Cape Mountain Zebra (*Equus zebra zebra*) to the following addresses:

By post to: The Director General: Department of Environmental Affairs
Attention: Ms Humbulani Mafumo
Private Bag x447
Pretoria
0001

By hand at: Environment House, 473 Steve Biko Road, Arcadia, Pretoria, 0083.

By e-mail: hmafumo@environment.gov.za or by fax: 0865411102; or (012) 3999586.

An electronic copy of the draft Biodiversity Management Plan for Cape Mountain Zebra (*Equus zebra zebra*) can be downloaded from the link: http://www.environment.gov.za//Documents/.

Comments received after the closing date may not be considered.

BOMO EDITH EDNA MOLEWA
MINISTER OF ENVIRONMENTAL AFFAIRS

SCHEDULE

BIODIVERSITY MANAGEMENT PLAN FOR THE CAPE MOUNTAIN ZEBRA *Equus zebra zebra* IN SOUTH AFRICA

Photo: R. Smith

Jointly developed by
CapeNature, South African National Parks, Eastern Cape Parks and Tourism Agency, National Zoological Gardens, Department of Environmental Affairs, Northern Cape Department of Environment and Nature Conservation, Eastern Cape Department of Economic Development, Environmental Affairs and Tourism and Free State Department of Economic, Small business, Tourism and Environmental Affairs

Coral Birss[1], Carly Cowell[2], Natalie Hayward[1], Dean Peinke[3], Halszka Hrabar[4] and Antoinette Kotze[5]

[1] CapeNature
[2] South African National Parks
[3] Eastern Cape Parks and Tourism Agency
[4] Nelson Mandela Metropolitan University
[5] National Zoological Gardens of South Africa

Citation

Birss, C., Cowell, C., Hayward, N., Peinke, D., Hrabar, H.H. and Kotze, A. 2016. Biodiversity Management Plan for the Cape mountain zebra in South Africa. Jointly developed by CapeNature, South African National Parks, Eastern Cape Parks and Tourism Agency, National Zoological Gardens, Department of Environmental Affairs, Northern Cape Department of Environment and Nature Conservation, Eastern Cape Department of Economic Development, Environmental Affairs and Tourism and Free State Department of Economic, Small business, Tourism and Environmental Affairs. Version 1.0

FOREWORD – Dr Peter Novellie

This draft Biodiversity Management plan (BMP) constitutes an important milestone in the conservation of Cape mountain zebra. It traces the long history of conservation measures and research aimed at ensuring the future of the subspecies, from the early efforts of the first half of the twentieth century to the most recent update on its conservation status. This well documented history, together with an extensive consultation process, enabled the BMP to accurately identify the threats currently facing Cape mountain zebra, as well as to formulate a set of objectives designed to counter the threats. Finally the BMP outlines the next important steps, which constitute the governance arrangements for the implementation of the plan, and then its submission to the Department of Environmental Affairs for gazetting for public participation.

From the perspective of a thirty year personal association with the conservation of Cape mountain zebra I see in this plan a significant new approach. Responsibility for the conservation of mountain zebra has always been shared across a range of authorities and individuals, but never previously has there been such close collaboration between them. The BMP is the product of extensive consultation and information sharing between diverse role players in different levels of government and in the private sector. This collaborative process has not been finally concluded, but will continue after gazetting, and indeed throughout the implementation of the plan. The emphasis on monitoring, data collection and adaptive management in the BMP will ensure an ongoing process of information sharing and joint learning.

In providing for collaborative adaptive management the BMP resonates well with emerging ideas in the scientific literature on species conservation. A threatened species cannot be protected in isolation, only in the context of the social ecological system in which it occurs. Social ecological systems are complex and inherently unpredictable. Traditional species protection measures often assume predictability, requiring conservation authorities to decide in advance whether a given activity may or may not have deleterious consequences for the species.

Authorization for the activity is then granted or withheld, usually without any monitoring of the consequences. This is unrealistic for complex, unpredictable systems, which are more appropriately dealt with by adaptive management (Doremus 2001; Green and Garmestani 2012). The BMP for Cape mountain zebra departs from traditional predictivist measures, committing to adaptive management and to the essential requirements of monitoring and review.

Unless adaptive management is conducted within a governance framework that is itself adaptive it has little chance of success (e.g. Walker 2012). This realization has produced a growing body of scholarship on adaptive governance (reviewed by Chaffin *et al.* 2014). Provision for monitoring, information sharing and collaborative learning are seen by many authors as essential to adaptive governance of complex systems (e.g. Dietz *et al*. 2003; Cilliers *et al.* 2013). Another feature conducive to adaptive governance is a diversity of authorities, each with its own geographic area and domain of authority, with each authority linking with others on common issues (Olsson *et al.* 2007; Biggs *et al.* 2012). Diverse governance can enable dynamic responses in the face of rapid change and uncertainty, whereas single-level, centralized governance units do not have the variety of response capabilities necessary to deal with complexity (Olsson *et al.* 2007). Another advantage of diversity is that strengths at one level can offset weaknesses at another (Biggs *et al.* 2012). Far from being an encumbrance, the diversity of institutions involved in the conservation of Cape mountain zebra may actually be a strength.

The Cape mountain zebra currently faces a number of complex challenges, not least the unavoidable shortage of human and financial resources to implement required conservation measures and monitoring. Perfect solutions will seldom be possible but, through collaboration across diverse levels, the BMP promises to find innovative, workable solutions.

EXECUTIVE SUMMARY

Endemic to South Africa, Cape mountain zebra (*Equus zebra zebra*) numbers declined to less than 60 individuals at the beginning of the 20th century. These animals were isolated in three locations: Cradock (Eastern Cape), Kammanassie and Gamkaberg (Western Cape). Since then, conservation action has resulted in steady increases in the overall population number and distribution, however, the residual effects of a potential genetic bottleneck currently threatens the long term survival of the species throughout its natural distribution range. Cape mountain zebra now occur in a number of genetically separate and isolated populations and are threatened by, among other, small sub-population sizes, habitat fragmentation and hybridization with other equid species. Collaborative and integrated management among stakeholders, as well as public support, is required for effective management of the sub-populations to ensure the maintenance of genetic diversity within the meta-population and to promote sustainable utilisation by the private sector.

Cape mountain zebra is listed as Vulnerable (D1) by the IUCN and on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; a convention which regulates the international trade of the species, and requires a non-detriment finding for export permits to be granted.

At the end of 2015, the Cape mountain zebra meta-population comprised approximately 4,872 individuals in 76 sub-populations throughout South Africa. The meta-population is considered stable, increasing and has exceeded the previous target set in the 2002 IUCN Equid Specialist Group Status Action Plan for the mountain zebra as a species. Apart from the three relict sub-populations occurring on protected areas (Kammanassie Nature Reserve, Gamkaberg Nature Reserve and Mountain Zebra National Park), Cape mountain zebra have been reintroduced to another nine protected areas within their natural distribution range and 7 protected areas outside the natural distribution range, comprising approximately 70% of the population. Cape mountain zebra populations on private land were estimated at 1,481 individuals, in 2015, comprising approximately 30% of the total population.

In 2011, a partnership between CapeNature, the Wilderness Foundation, the World Wildlife Fund - South Africa and the Table Mountain Fund was initiated towards the drafting of a Biodiversity Management Plan (BMP-S) for Cape mountain zebra. The initiative was primarily aimed at integrating the efforts of the then Mountain Zebra Working Group into the BMP-S. An inter-agency collaboration between the South African National Parks, CapeNature, Eastern Cape Parks and Tourism Agency, National Zoological Gardens of South Africa, the National Department of Environmental Affairs, Northern Cape Department of Environment and Nature Conservation, Eastern Cape Department of Economic Development, Environmental Affairs and Tourism and Free State Department of Economic, Small business, Tourism and Environmental Affairs, ensued and acknowledged the need for a Cape mountain zebra BMP-S to ensure the long term survival of the species in nature.

Stakeholder engagements identified threats and challenges including the loss of genetic diversity through inbreeding and genetic drift, diseases such as equine sarcoidosis, the risk of hybridization, predation, poaching, emigration threats, and the lack of implementation of a meta-population strategy. The selection of the Cape mountain zebra for a BMP-S is based on the requirements of the NDF, its threat status, the requirement for meta-population management and inter-agency

cooperation towards shared objectives for the conservation of the species, standardised monitoring, collaborative research, increased participation by landowners and opportunities as a flagship for protected area expansion and stewardship initiatives.

During the Cape mountain zebra BMP-S development process, both internal and external stakeholder consultation developed the following **desired state** for the Cape mountain zebra:

> *The scientifically sound conservation (including regulation) of an ecologically healthy and genetically diverse meta-population of Cape mountain zebra*

The **vision** is:

> *An increasing, genetically healthy meta-population, supporting sustainable off-takes, with an increased conservation value and private sector investment in Cape mountain zebra*.

The desired state is underpinned by the following **goals**.

1. Conservation of the Cape mountain zebra meta-population.
2. Advancement of knowledge and understanding regarding the genetic diversity of the Cape mountain zebra meta-population.
3. Eliminate risk for genetic contamination due to hybridisation with other equine species and safeguard Cape mountain zebra in their natural distribution range.
4. Mitigate and manage the impact of current and emerging diseases.
5. Long-term monitoring of Cape mountain zebra meta-population dynamics and habitat.
6. Aligned legislation and mandates.
7. Effective communication, collaboration and coordination among stakeholders.

The prioritised **strategic objectives** of the Cape mountain zebra BMP-S are as follows:

1. to maintain genetic diversity in the Cape mountain zebra meta-population,
2. to implement monitoring and research to inform adaptive management,
3. to consistently and uniformly implement legislation, regulations, policies and guidelines, and
4. to ensure effective communication, collaboration and coordination between stakeholders and the public for Cape mountain zebra conservation.

The implementation of this BMP-S will have the following **benefits.**

1. The Cape mountain zebra population remains stable and increasing.
2. Scientifically-sound meta-population management is implemented, and through this, the full extent of the genetic diversity is represented throughout the population.
3. The population is ecologically healthy and secure (including being regulated effectively and efficiently).
4. Implementation and maintenance of sustainable off-takes to support the NDF.
5. Private sector support and investment in Cape mountain zebra conservation.

The Biodiversity Management Plan for the Cape mountain zebra is aimed at **identifying**, **allocating** and **undertaking** the required, identified actions to enable stakeholders to contribute to the overall desired outcome of ensuring the long term survival of the subspecies in nature and thereby ensuring

the sustainable, non-detrimental harvest and off-take as an economic incentive for private land owners participating in the meta-population strategy.

The BMP-S therefore focusses on actions and strategies to strengthen the overall population performance, distribution and genetic diversity to ensure overall population fitness and resilience of the meta-population within the natural distribution range (and including protected areas with populations outside the natural distribution range).

ACKNOWLEDGEMENTS

The authors would like to express their gratitude to all those who contributed to the development and compilation of this biodiversity management plan:

- The South African National Parks (SANParks), the Department of Environmental Affairs and the South African National Biodiversity Institute for hosting the first Stakeholder workshop at Tokai in November 2013.
- Participants in the Stakeholder Workshop held at Tokai, November 2013 (list attached as Appendix A).
- CapeNature Staff and Technical Working Group for contributions to the first draft (list attached as Appendix B).
- SANParks Scientific Services and Veterinary Wildlife Group for contributions to the first draft (list attached as Appendix B).
- Annelise le Roux for proof reading the first draft.
- Dr Peter Novellie for conducting the expert review and writing the foreword.
- Dr Lauren Waller for facilitating the Cape mountain zebra Biodiversity Management Plan: Actions and Relevant Agreements Workshop held at Driftsands Nature Reserve, May 2016.
- Guy Palmer for contributions and edits to the final draft.
- Humbu Mafumo (Department of Environmental Affairs) for contributions and edits to the final draft.
- Jeanetta Selier (South African National Biodiversity Institute) for contributions and edits to the final draft.
- Cobus Theron (Endangered Wildlife Trust) for contributions to the final draft.
- Participants in the Actions and Relevant Agreements Workshop held at Driftsands Nature Reserve, May 2016 (attendance list attached as Appendix E).
- Christine Kraft, Elsabe Swart and Marnus Smit (Northern Cape Department of Environment and Nature Conservation) for contributions and edits to the final draft.

ABBREVIATIONS AND ACRONYMS

AHS	African Horse Sickness
BES	Biodiversity Economy Strategy
BMP-S	Biodiversity Management Plan for Species
BPV	Bovine papillomavirus
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species in Wild Fauna and Flora
CN	CapeNature
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DEA: BC	Department of Environmental Affairs – Biodiversity and Conservation Branch
ECPTA	Eastern Cape Parks and Tourism Agency
EWT	Endangered Wildlife Trust
DNA	Deoxyribonucleic acid, the molecule that carries most of the genetic instructions used in the development, functioning and reproduction of all known living organisms
EC DEDEAT	Eastern Cape Department of Economic Development, Environmental Affairs and Tourism
FPAs	Fire Protection Associations
FS DESTEA	Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs
HEI	Higher Education Institutions
HMZ	Hartmann's mountain zebra
IUCN	International Union for Conservation of Nature
MOU	Memorandum of Understanding
MSE	Management Strategy Evaluation
MZWG	Mountain Zebra Working Group
NC DENC	Northern Cape Department of Environment and Nature Conservation
NDF	Non-detriment Finding
NDR	Natural distribution range
NEM: BA	National Environmental Management: Biodiversity Act 10 of 2004
NEM: PAA	National Environmental Management: Protected Areas Act 57 of 2003
NEMA	National Environmental Management Act 107 of 1998
NP	National Park
NR	Nature Reserve
NRF	National Research Foundation
NZG	National Zoological Gardens of South Africa
PHASA	Professional Hunters Association of South Africa
PMG	Parliamentary Monitoring Group
PZ	Plains zebra
SAHGCA	South African Hunters and Game Conservation Association
SANBI	South Africa National Biodiversity Institute
SANParks	South African National Parks
SCC	Species Survival Commission
TMF	Table Mountain Fund
ToPS	Threatened or Protected Species Regulations
ToR	Terms of Reference

WCNCB	Western Cape Nature Conservation Board
WC GDDB	Western Cape Game Distribution Database
WC DEA & DP	Western Cape Department of Environmental Affairs and Development Planning
WCP	Western Cape Province
WCPAES	Western Cape Protected Area Expansion Strategy
WG1	Working Group on Biodiversity and Conservation
WRSA	Wildlife Ranching South Africa
WWF	World Wildlife Fund
WWF-SA	World Wide Fund for Nature – South Africa

GLOSSARY OF DEFINITIONS, SCIENTIFIC AND TECHNICAL TERMS

In this BMP-S, unless the context indicates otherwise, a word or expression defined in the National Environmental Management: Biodiversity Act (NEM: BA, Act 10 of 2004) or Protected Areas Act (NEM: PAA, Act 57 of 2004) has the same meaning.

Genetic diversity	Genetic diversity is the total number of genetic characteristics in the genetic makeup of a species. It is distinguished from genetic variability, which describes the tendency of genetic characteristics to vary. Genetic diversity is required for populations to adapt to environmental change. It is measured using an array of molecular and quantitative methods. Large populations of naturally outbreeding species usually have extensive genetic diversity, but it is usually reduced in populations and species of conservation concern (Frankham *et al.* 2006).
Monitoring	The collection and analysis of repeated observations or measurements to evaluate change in status, distribution or integrity in order to track the impacts of directed management implemented to achieve a stated management objective.
Protected areas	• Any area declared or proclaimed as such in terms of Section 3 or listed in the Second Schedule to the Western Cape Nature Conservation Management Act, 1997 (Act No. 9 of 1997); or • Any of the protected areas referred to in Section 9 of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003).

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1) INTRODUCTION

The Cape mountain zebra (*Equus zebra zebra*) is endemic to South Africa. It is a subspecies of Mountain zebra (*Equus zebra*) which historically occurred in the mountains of the Great Escarpment from the south west of Angola, through Namibia, the Northern Cape of South Africa, and the Cape Fold mountains in the Western and Eastern Cape Provinces. Gradual separation over time resulted in two distinct subspecies, namely the Hartmann's mountain zebra (*Equus zebra hartmannae*) to the north and Cape mountain zebra to the south.

Cape mountain zebra numbers declined drastically to less than 60 individuals at the beginning of the twentieth century. These animals were isolated in three locations: Cradock, Kammanassie and Gamkaberg. Conservation action has resulted in steady increases in the overall population numbers and distribution, however the residual effects of the genetic bottleneck currently threatens the long term survival of the species throughout its natural distribution range (NDR).

Cape mountain zebra now occur in a number of genetically depauperate and isolated populations and are threatened by small sub-population sizes, habitat fragmentation and by hybridisation with other equids.

Collaborative and integrated management among stakeholders, as well as public support, is required for effective management of the sub-populations to ensure the maintenance of genetic diversity and sustainable utilisation by the private sector.

1.1 The need for a BMP-S for Cape mountain zebra

Cape mountain zebra have a limited NDR confined to the extreme south-south west of the country. They are a near endemic to the Cape Floristic Region (Boshoff *et al.* 2015; Hrabar and Kerley 2015; Birss *et al.* 2015; Hrabar and Kerley 2013), an internationally recognised global Biodiversity Hotspot (Myers *et al.* 2002).

At the end of 2015, the Cape mountain zebra metapopulation comprised approximately 4,872 individuals in 76 sub-populations throughout South Africa. Apart from the three relict sub-populations occurring on protected areas (Kammanassie Nature Reserve (NR), Gamkaberg NR and Mountain Zebra National Park), Cape mountain zebra have been reintroduced to another 9 protected areas within their NDR and 7 protected areas outside the NDR. Approximately 70% of the population occurs in state owned protected areas (Hrabar and Kerley 2015).

Cape mountain zebra is listed as VULNERABLE (D1)[1] by the IUCN (Novellie 2008) and on Appendix I of the Convention on International Trade in Endangered Species (CITES), which regulates International trade, and requires a non-detriment finding (NDF) for export permits to be granted.

In 2011, a partnership between CapeNature, the Wilderness Foundation and the World Wildlife Fund (WWF): Table Mountain Fund (TMF), was initiated toward the drafting of a BMP-S for Cape mountain zebra. The initiative was primarily aimed at contextualising the efforts of the Mountain Zebra Working Group (MZWG) into the BMP-S, being considered the most appropriate legislative

[1] VULNERABLE D1: A taxon is VULNERABLE (VU) when the best available evidence indicates that it meets any of the criteria VU, and it is therefore considered to be facing a high risk of extinction in the wild. This criterion identifies very small or restricted populations. A taxon qualifies for criterion D if the population of mature individuals is smaller than the threshold set for each of the categories of threat. Under the VU category there are two options, D1 and D2. A taxon qualifies for VU D1 if the population size is estimated to number fewer than 1,000 mature individuals.

provision for realising the collective objectives and building on the successes of the MZWG, for Cape mountain zebra conservation, however, financial and logistical constraints impeded the initiative.

An inter-agency collaboration between the South African National Parks (SANParks), CapeNature and the Eastern Cape Parks and Tourism Agency (ECPTA) acknowledges the need for the Cape mountain zebra BMP-S, to ensure the long term survival of the species in nature, and to formalise the collaborative efforts of participatory parties of the MZWG.

During two consecutive stakeholder workshops (CITES NDF and initial BMP-S in 2013), threats identified included the loss of genetic diversity through inbreeding and genetic drift, diseases such as equine sarcoidosis, the risk of hybridisation, predation, poaching and emigration threats, and the absence of a metapopulation management strategy, thus the need for an integrated inter-agency cooperative, including broader stakeholder involvement, towards the objectives of a BMP-S was initiated.

The selection of the Cape mountain zebra for a BMP-S is based on the requirement of the NDF; its threatened status; the requirement for metapopulation management and inter-agency cooperation towards shared objectives for the conservation of the species; standardised monitoring; collaborative research; increased participation by landowners, and opportunities as a flagship for Protected Area expansion and stewardship initiatives.

1.2 Vision and desired state

The global Cape mountain zebra population is considered stable and increasing and has exceeded the previous target set in the 2002 IUCN Equid Specialist Group Status Action Plan for the Mountain Zebra (Novellie *et al.* 2002). However, the long term survival of the species is considered to be dependent on the implementation of a sound metapopulation management strategy and integrated action plans in order to mitigate the threats of inbreeding, hybridisation, loss of genetic variation, disease resilience and fragmentation.

During the Cape mountain zebra BMP-S stakeholder consultation workshop held in November 2013, the following desired state for the Cape mountain zebra was developed:

The scientifically sound conservation (including regulation) of an ecologically healthy and genetically diverse metapopulation of Cape mountain zebra.

The vision is an increasing, genetically healthy metapopulation, supporting sustainable off-takes, with an increased conservation value and private sector investment in Cape mountain zebra.

The desired state is underpinned by specific goals which guided the development of the BMP-S. These are:

1. Conservation of the Cape mountain zebra meta-population.
2. Advancement of knowledge and understanding regarding the genetic diversity of the Cape mountain zebra metapopulation.
3. Eliminate genetic contamination due to hybridisation with other equine species and safeguard Cape mountain zebra in their NDR.
4. Mitigate and manage the impact of current and emerging diseases.
5. Long-term monitoring of Cape mountain zebra meta-population dynamics and habitat.

6. Aligned legislation and mandates.

7. Effective communication, collaboration and coordination among stakeholders.

1.3 Objectives of the BMP-S

The prioritised strategic objectives of the Cape mountain zebra BMP-S are as follows.

1. To maintain genetic diversity in the Cape mountain zebra metapopulation.
2. To implement monitoring and research to inform adaptive management.
3. To consistently and uniformly implement legislation, regulations, policies and guidelines.
4. To ensure effective communication, collaboration and coordination between stakeholders and the public for Cape mountain zebra conservation.

1.4 Benefits of the BMP-S

The envisaged benefits of implementing this BMP-S are:

- The Cape mountain zebra population remains stable and increasing.
- Scientifically-sound metapopulation management is implemented, and through this, the full extent of the genetic diversity is represented throughout the population.
- The population is ecologically healthy and secure (including being regulated effectively and efficiently).
- Implementation and maintenance of sustainable off-takes to support the NDF.
- Private sector support and investment in Cape mountain zebra conservation.

1.5 Anticipated outcomes of the BMP-S

The Biodiversity Management Plan for the Cape mountain zebra is aimed at identifying, allocating and undertaking the required, identified actions to enable stakeholders to contribute to the overall desired outcome of ensuring the long term survival of the subspecies in the wild and thereby ensuring the sustainable, non-detrimental harvest and off-take as an economic incentive for private land owners participating in the metapopulation strategy. The BMP-S therefore focusses on actions and strategies to strengthen the overall population performance, distribution and genetic diversity to ensure overall population fitness and resilience of the metapopulation within the NDR (and including protected areas populations outside the NDR).

The BMP-S further highlights the research and monitoring activities which will provide:

1. A snapshot of current genetic structure within and among the sub-populations.

2. Determine the phylogenetic relationships to ensure maximum biodiversity for future evolutionary change.

3. Ensure an increasing metapopulation to prevent loss of genetic variation.

4. Sub-population source, structure, distribution, size and management data to inform adaptive implementation and management of translocations and harvesting quotas at site and national level.

2) SPECIES BIOLOGY AND BACKGROUND INFORMATION

2.1 Species ecology and biology

2.1.1 Taxonomic description

Taxon name: *Equus zebra zebra* Linnaeus, 1758 (Novellie 2008).

Common names: Cape mountain zebra (English), Kaapse bergsebra / bergkwagga (Afrikaans), idauwa (isiXhosa), Dou (San), Daou (Khoikhoi) (Skinner and Chimimba 2005).

Taxonomic level: Subspecies

Groves and Bell (2004) investigated the taxonomy of the mountain zebras and concluded that the Cape mountain zebra and Hartmann's mountain zebra are distinct, and suggested that the two would be better classified as separate species, *Equus zebra* and *Equus hartmannae*. However, Moodley and Harley (2005) concluded that the two taxa could not be described as different species but, on the basis of their nuclear genetic distinctiveness, indicated that it is appropriate to regard them as different subspecies. That is the approach adopted for this BMP-S.

Mountain zebra are medium-sized, striped equids and differ from plains zebras (*Equus quagga*) in that the dark stripes on the head and body are narrower and more numerous and are without shadow stripes on the hindquarters. Mountain zebra has white underparts with a narrow black centre line extending over the chest and belly, a black tipped muzzle, a distinct dewlap and the markings over the sacral area form a gridiron pattern. The dewlap is more conspicuous in the Cape mountain zebra. Adult Cape mountain zebras have a shoulder height ranging from 116 to 128 cm and weigh between 204 and 372 kg (Penzhorn 1988).

2.1.2 Distribution of Cape mountain zebra

Mountain zebra historically occurred in the mountainous habitats associated with the availability of fresh water on the Great Escarpment from the extreme south west of Angola, through Namibia, the Northern Cape of South Africa, and the Cape Fold belt in the Western and Eastern Cape Provinces (Novellie *et al*. 2002). A large plain of unsuitable or marginal habitat known as the Knersvlakte, (an area between the northernmost extent of the Cederberg and Bokkeveld mountain ranges, and the southernmost extent of the Kamiesberg mountain range), is postulated by Novellie *et al*. (2002) to have inhibited gene flow between those mountain zebra occurring to the north and those occurring further south. However, Boshoff *et al*. (in Skead 2011) suggests that the population segregation may have occurred further north. Irrespective of where the separation occurred, it over time resulted into two distinct subspecies, namely the Hartmann's mountain zebra to the north and Cape mountain zebra to the south (Refer to Figure 1).

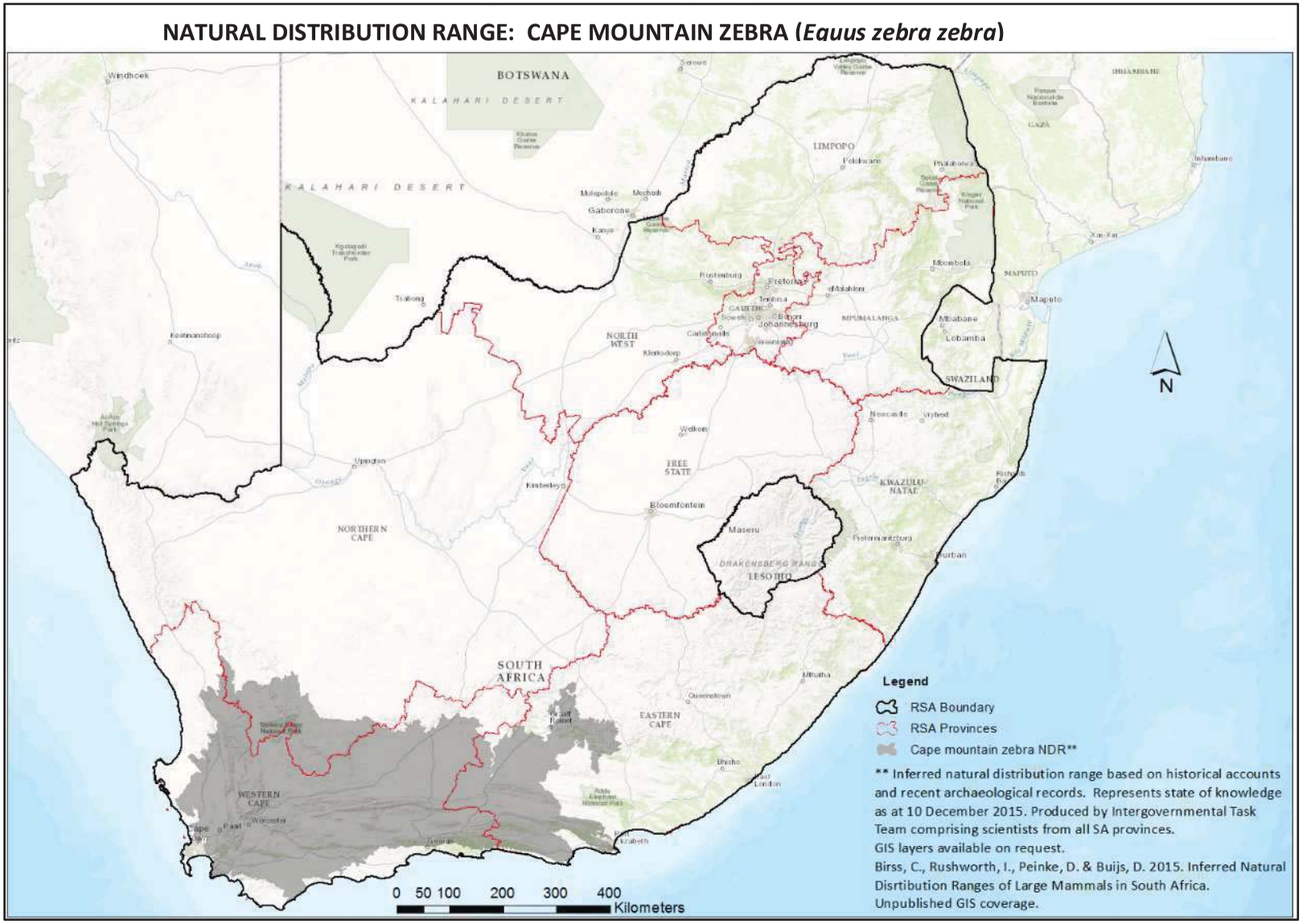


Figure 1. Cape mountain zebra natural distribution range.

Cape mountain zebra inhabit rugged, broken mountainous and escarpment areas up to 2,000 m above sea level with a diversity of grass species and perennial water (Moodley and Harley 2005, Penzhorn in press). They are predominantly grazers, only browsing during unfavourable conditions i.e. during drought. The natural distribution range of Cape mountain zebra includes the Cederberg-Bokkeveld mountain ranges, the mountains of the Great Escarpment and the Cape Fold Belt, extending eastward to Beaufort West and the Roggeveld mountains up to the Swaershoek mountains between Somerset East and Cradock and south east to include the Great and Little Winterhoek mountains near Uitenhage in the Eastern Cape (Skead 2011, Boshoff *et al*. 2015, Birss *et al*. 2015).

Hunting and habitat loss had reduced Cape mountain zebra numbers to only 58 individuals in a few relict populations by the beginning of the 20th century (Novellie *et al*. 2002, Moodley and Harley 2005, Hrabar and Kerley 2015). By 1998 the total Cape mountain zebra population had grown to approximately 1,200 animals with the largest population estimated at 250 animals, at Karoo National Park (NP) where they had been reintroduced from the relict Cradock population (Lloyd 2002; Novellie *et al*. 2002).

2.1.3 Status of Cape mountain zebra sub-populations

Today, Cape mountain zebra occur in a number of protected areas within their NDR, these include the Baviaanskloof Nature Reserve (NR), Mountain Zebra NP, Karoo NP, Camdeboo NP, Tankwa Karoo NP, Bontebok NP, De Hoop NR, Hottentots-Holland NR, Anysberg NR, Kammanassie NR, Gamkaberg NR and Oorlogskloof NR. The total estimated population on protected areas within the NDR is close to 2,650 individuals. A further 690 individuals occur in sub-populations outside the NDR, these include Addo Elephant NP, Table Mountain NP, West Coast NP, Commando Drift NR, Tsolwana NR and Gariep NR. Combined, there are a total of approximately 3,391 animals in 19 sub-populations, 3 have 14 or less individuals. Refer to Table 1 for Cape mountain zebra sub-population sizes, distribution, sub-population source/s and relevant management authority in 2015.

The Cape mountain zebra populations on private land were estimated at 1,481 individuals in 2015, comprising approximately 30% of the total population (Hrabar and Kerley 2015). All are assumed to have been derived from the relict Cradock sub-population and are similarly expected to be exposed to limited gene flow. The number of Cape mountain zebra sub-populations on private land has increased notably from 38 in 2009 to 59 in 2015 and contribute significantly to an increased distribution and abundance of Cape mountain zebra. The average sub-population size increased from 25 to 29, and range from 5 to 120 individuals in a sub-population (Hrabar and Kerley 2015).

The Cape mountain zebra population has maintained an overall average growth rate of between 8.6% and 9.6% since 1985 and animals have been successfully reintroduced into various protected areas and onto private land across its former range (Novellie *et al*. 2002; Hrabar & Kerley 2015). Cape mountain zebra has also been introduced into protected areas and private land outside its former range, in the Eastern Cape, Western Cape, Northern Cape and the Free State Provinces.

SANParks has nine National Parks on which Cape mountain zebra occur. Three of these parks are outside of the NDR (West Coast, Table Mountain and Addo Elephant National Parks). Table Mountain and Bontebok National Parks have small populations and due to the size of the parks will not support population growth but can form a key role in the maintenance of genetic diversity. West Coast, Addo and the remaining National Parks (Tankwa Karoo, Mountain Zebra, Karoo and Camdeboo National Parks) are of sufficient size for population growth. All of the National Parks have

habitat in suitable condition for maintenance of Cape mountain zebra populations, given that SANParks allows for natural flux in systems and populations across space and time.

CapeNature has five Nature Reserves with Cape mountain zebra at present. Four of these reserves are suitable for the maintenance and growth of Cape mountain zebra sub-populations (Anysberg NR, Gamkaberg NR, Kammanassie NR and De Hoop NR), whilst the other Cape mountain zebra sub-population (Hottentots-Holland NR) has performed poorly and is not expected to improve.

Eastern Cape Parks and Tourism Agency manages 3 populations of Cape mountain zebra. Commando Drift and Tsolwana Nature Reserves, which are outside of the NDR both have good habitat and have healthy and productive populations from which animals are regularly harvested for the purposes of live sale. The Baviaanskloof NR population, which is located within the natural range, has by comparison performed very poorly, and is believed to have suboptimal habitat.

The Northern Cape Province has one Provincial nature reserve with Cape mountain zebra present (Oorlogskloof NR). The habitat is marginal for Cape mountain zebra and is one of the main factors attributed to the slow population growth rate of Cape mountain zebra on the reserve. One reserve (Doornkloof NR) has also been identified as having suitable habitat for Cape mountain zebra but falls outside the NDR of the species.

Even though the Free State sub-population is outside the NDR, the habitat of Gariep NR has proven to be suitable for the maintenance of a Cape mountain zebra sub-population. The same habitat extends to Tussen die Riviere NR (Free State Province) and Oviston NR (Eastern Cape Province) and the opportunity exists to extend the Cape mountain zebra sub-population to occupy an area that would comprise approximately 45 000 ha.

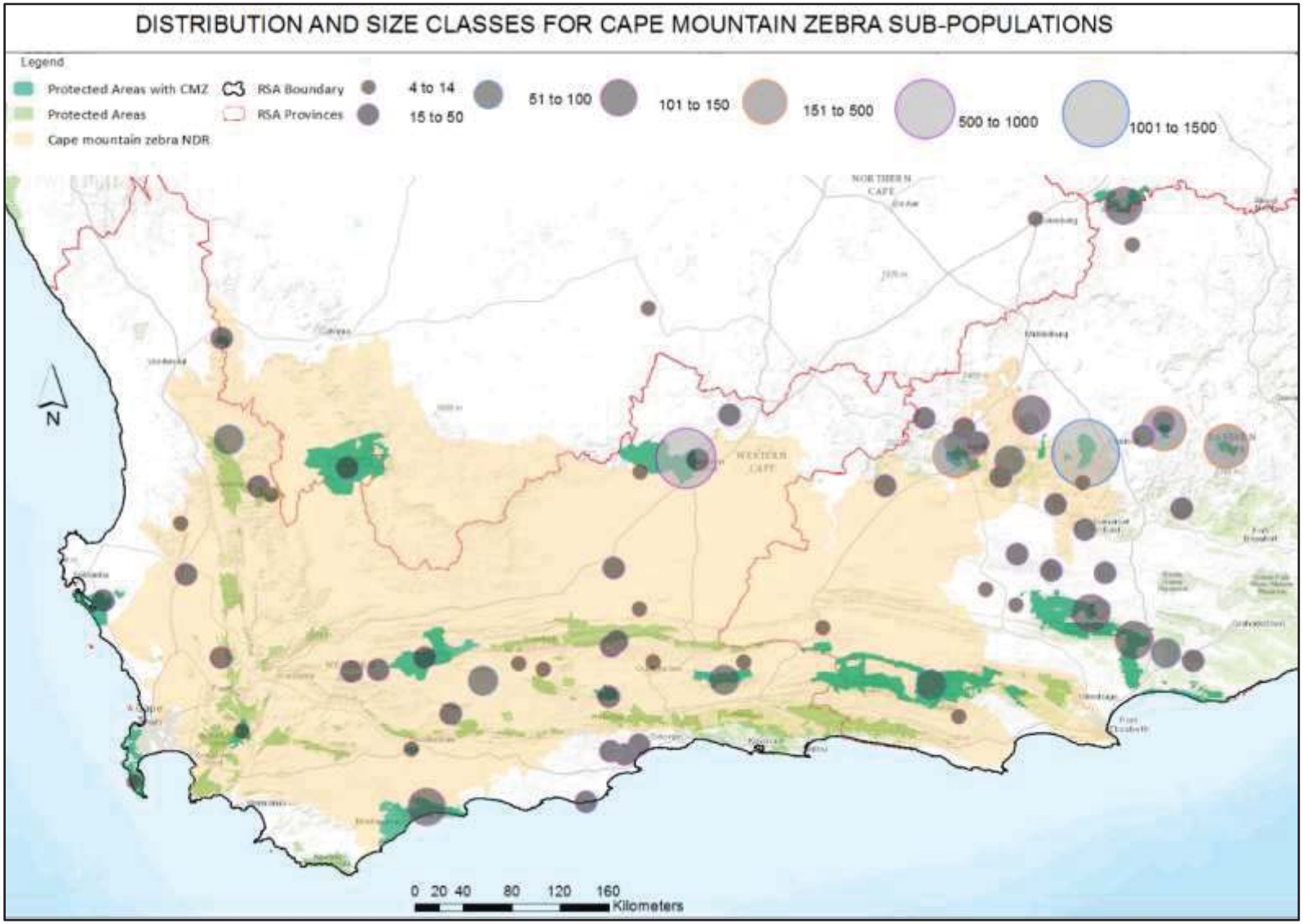


Figure 2. Distribution of Cape mountain zebra sub-populations *(Data courtesy of Dr H Hrabar and CapeNature WC GDDB)*

Table 1: Cape mountain zebra sub-population sizes, distribution, sub-population source/s and management authority in 2015.

Property Name	Property Type	Management Authority / Conservation Agency	In Natural Distribution Range	Population Estimate	Source Population
Anysberg NR	Protected Area	CapeNature	Yes	21	Karoo NP
De Hoop NR Complex (Includes Overberg Test Range)	Protected Area	CapeNature	Yes	115	Cradock and Kammanassie NR
Gamkaberg NR	Protected Area	CapeNature	Yes	42	Gamkaberg NR
Hottentots-Holland NR	Protected Area	CapeNature	Yes	5	De Hoop NR
Kammanassie NR	Protected Area	CapeNature	Yes	70	Kammanassie NR
Oorlogskloof NR	Protected Area	Northern Cape DENC	Yes	18	Gariep NR, Bontebok NP
Tsolwana NR	Protected Area	ECPTA	No	162	Cradock
Commando Drift NR	Protected Area	ECPTA	No	156	Unknown
Baviaanskloof NR	Protected Area	ECPTA / CapeNature	Yes	51	Unknown
Gariep NR	Protected Area	Free State DESTEA	No	103	Cradock, Karoo NP
Karoo NP	Protected Area	SANParks	Yes	842	Cradock
Tankwa Karoo NP	Protected Area	SANParks	Yes	41	Cradock, Karoo NP
Mountain Zebra NP	Protected Area	SANParks	Yes	1,191	Cradock
West Coast NP	Protected Area	SANParks	No	42	Cradock, Karoo NP
Bontebok NP	Protected Area	SANParks	Yes	14	Cradock
Addo Elephant NP	Protected Area	SANParks	No	120	Cradock, Karoo NP
Camdeboo NP	Protected Area	SANParks	Yes	236	Cradock, Karoo NP
Table Mountain NP	Protected Area	SANParks	No	4	Cradock, Karoo NP

Property Name	Property Type	Management Authority / Conservation Agency	In Natural Distribution Range	Population Estimate	Source Population
Addo Elephant NP (and Contractual)	Protected Area	SANParks	No	103	Cradock, Karoo NP
Private	Private	Private	Yes	750	Cradock
Private	Private	CapeNature	Yes	45	De Hoop NR
Private	Private	NC DENC / CapeNature	Yes	10	Oorlogskloof NR
Private	Private	Private	No	786	Cradock
Private	Private	Private	Unknown	Unknown	Northern Cape
TOTAL				**4,872**	

 # Data courtesy of Dr H Hrabar and CapeNature WC GDDB

Table 2: Summary of Cape mountain zebra distribution by Province: percentage contribution to metapopulation and NDR.

Province	% Contribution to Cape mountain zebra metapopulation	% Contribution to Cape mountain zebra NDR
Western Cape Province	37%	64%
Eastern Cape Province	59%	23.5%
Northern Cape Province	2%	12.5%
Free State Province	2%	0%

2.1.4 Genetic status of Cape mountain zebra sub-populations

Past research mostly focused on investigating the genetic factors influencing the persistence of the Cape mountain zebra. Moodley and Harley (2005) found low genetic variability within individual Cape mountain zebra sub-populations, but that there is moderate variability within the meta-population. They assessed the genetic status of the three relict Cape mountain zebra sub-populations, including the Cradock, Gamkaberg and Kammanassie populations. They found that the small populations are grossly inbred, with low numbers of alleles/locus and resultant low heterozygosity. As a consequence of inbreeding, genetic drift and marked reduction of genetic variation, all three relict Cape mountain zebra stocks were significantly differentiated from each other. The entire metapopulation has still maintained much of its historical variation, albeit in three separate and highly inbred stocks. It was recommended that a management strategy that supports the mixing of relict Cape mountain zebra populations be drafted in order to halt the further loss of Cape mountain zebra genetic diversity (Moodley and Harley 2005; Hrabar and Kerley 2015).

Moodley and Harley (2006) indicated that the population size of the relict sub-populations of Kammanassie and Gamkaberg Nature Reserves had not yet recovered, with estimates of 38 and 28 respectively (1999 to 2000 data), and that fundamental genetic information was required to inform conservation management strategies. They postulated that, in enduring severe and sustained population bottlenecks, further major losses in genetic variation are expected to occur in Cape mountain zebra populations as well as the appearance of more divergent sub-populations, due to

inbreeding and genetic drift. The Cradock population, has the highest number of founder animals shows recovery from a demographic bottleneck but low genetic variation due to inbreeding was observed. This is in contrast to the Hartmann's mountain zebra. Evidence from the De Hoop population where two relict populations (Cradock and Kammanassie), both with low genetic variation, were mixed shows genetic variation comparable to that of natural free-ranging populations (where genetic bottlenecks are not indicated).

The number of individuals for the sub-populations were estimated at 70 for Kammanassie and 42 for Gamkaberg, in 2015, with a growth rate that decreased substantially, averaging at 0 to 2% over the last 10 years. This emphasises the importance of accurate population census (Birss 2016 pers comm.). Both these populations are critically important to maintain genetic diversity in Cape mountain zebra as the loss of one of these will reduce the genetic variability substantially.

The effective management of genetic diversity can be complex as the mixing of genetic material within and between populations might be necessary to avoid future loss of allelic variation. In addition, inbreeding and genetic drift may compromise genetic fitness and may lead to the extinction of some sub-populations or the sub-species. The recommendation to ensure that conservation efforts are directed at safeguarding smaller populations against isolation and limited gene flow are critical to maintain viable populations (Moodley and Harley 2005, Hill 2009).

Data collected for 58 of the 75 Cape mountain zebra sub-populations by Hrabar and Kerley (2015) identified 13 (7 protected areas and 6 private land) sub-populations as having a reduced threat of inbreeding due to founder populations being equal to or more than 14 individuals and not being exposed to hybridisation with plains zebra, and also indicates that 12 of these sub-populations co-occur with plains zebra, 3 of which are protected area populations. The Cradock population, which has the highest number of founder animals, shows recovery from a demographic bottleneck, but low genetic variation due to inbreeding was observed. It is therefore critical that sub-populations do not become isolated and that gene flow between populations is maintained or simulated to prevent further deleterious genetic consequences, including genetic drift (Moodley and Harley 2005, Hill 2009).

Hybrids of Cape mountain zebra with plains zebra have been confirmed for one protected area and recommendations for the conservation management of Cape mountain zebra include the assessment of habitat condition and management, population size, prevalence of skewed sex ratios and to develop risk averse strategies to minimise risk of future translocations and the probability of producing hybrids. Evidence that the difference in chromosomal numbers may not be a barrier to the exchange of genes between equid species warrants further research and reproductive assessments of Cape mountain and plains zebra hybrids (Dalton *et al*., in press).

Table 3. Cape mountain zebra sub-populations threatened by hybridisation with other equids (Hartmann's mountain zebra-HMZ; horses, donkeys and plains zebra-PZ.) (CapeNature 2016; Hrabar and Kerley 2015; FS DESTEA; NC DENC; ECP DEDEAT).

Property Name	Cape mountain zebra sub-population with presence of other equids	Cape mountain zebra sub-population bordering other equids
Anysberg NR	No	Yes (Horses)
De Hoop NR Complex (Includes Overberg Test Range)	No	Yes (Horses, donkeys)
Gamkaberg NR	No	No
Hottentots-Holland NR	No	No
Kammanassie NR	No	Yes (PZ)
Oorlogskloof NR	No	No
Tsolwana NR	No	Yes (HMZ)
Commando Drift NR	No	No
Baviaanskloof NR	No	No
Gariep NR	No	No
Karoo NP	Yes (PZ)	Yes (PZ)
Tankwa Karoo NP	No	Yes (PZ)
Mountain Zebra NP	Yes (PZ)	Yes
West Coast NP	No	Yes (PZ)
Bontebok NP	No	No
Addo Elephant NP	No	Unknown
Camdeboo NP	No	No
Table Mountain NP	No	No
Addo Elephant NP (Contractual)	No	No
Private (number of sub-populations known)	10	20
TOTAL COUNT	**12**	**25**

 # Data courtesy of Dr H Hrabar and CapeNature WC GDDB

Hybridisation between Cape and Hartmann's mountain zebra (Gray 1971), due to injudicious translocations results in fertile offspring. Genetic test results for a translocation consignment between private properties confirmed hybridisations between Cape and Hartmann's mountain zebra as well in both mountain zebra sub-species and plains zebra (*Equus quagga burchelli*), (Birss, personal communication 2015).

Historically, the ranges of Cape mountain zebra would have overlapped with the now extinct sub-species of plains zebra (*Equus quagga quagga*) but habitat preferences would have caused them to rarely occur in sympatry. Introductions of the extant subspecies of plains zebra in sympatry with Cape mountain zebra onto protected areas and private land were not discouraged. It was assumed that if hybridisation does occur, offspring would be infertile due to different chromosome numbers (Dalton *et al.* 2016 in press).

2.1.5 Life history and reproduction

Lloyd and Rasa (1989) attempted to determine the effects of status of the reproductive success and fitness of both males and females, and relate these findings to the sex ratios of offspring for dominant and subordinate mares, and to determine the subsequent fate of these offspring. The social structure of Cape mountain zebra was shown to be complex with very specific spatial structures. This is generally characterised by small breeding units that remain stable, both numerically and hierarchically over extended periods of time. The typical social structure is one of small harems comprising an adult stallion and one to three (maximum five) mares and their dependent foals; non-breeding groups consist primarily of bachelors, but sometimes include young fillies (Penzhorn 1984; Rasa and Lloyd 1994; Penzhorn 2016 in press). The majority of harem-forming species have a social structure typified by short male tenure periods and dispersal of male offspring only into bachelor groups.

In equids, where male herd tenure can be long, both males and females disperse; males forming a bachelor group and females either joining other breeding units. Dispersing Cape mountain zebra colts and fillies both tend to join a non-breeding group (Rasa and Lloyd 1994). Cape Mountain zebra breeding units are characterised by long stallion herd tenure, averaging 7 years, but usually for life, and breeding mares typically remain in the same breeding units until their own death or the death or sup-plantation of the breeding stallion. Since father's herd tenure and daughter's oestrus, which occurs at a relatively early age, overlap, dispersal of daughters as well as sons is an effective means of circumventing inbreeding (Penzhorn 1984; Rasa and Lloyd 1994).

Cape mountain zebra has a low reproductive rate due to a long gestation period of approximately 12 months, after which a single foal is produced with foaling peaking in the rainy season, however, foaling can occur year round. Life expectancy is over 20 years and breeding herds remain stable for many years, averaging 1 male to 2.4 unrelated females. Socially ranked mares produce their first offspring between 4 and 5 years of age with an average foaling interval of 25 months, however, dominant mares produce significantly more offspring and mares can continue to produce up to the age of 21. Stallions remain fertile for up to 19 years. Both male and female offspring leave the herd after approximately 22 months, or within four months after the birth of a sibling, and join non-breeding groups which are important for the forming of nucleus breeding pairs (Penzhorn 1982; Penzhorn 1985; Skinner and Smithers 1990; Penzhorn and Novellie 1991).

Foal mortality is related to behavioural factors, where dominant mares attack the foals of sub-ordinate mares, possibly causing broken legs and fatalities (Lloyd and Rasa 1989; Skinner and Smithers 1990), potentially related to competition for resources (Hrabar 2015 pers. comm.).

Cape mountain zebras are not territorial and home ranges of breeding herds overlap with seasonal variation. Home range sizes for Mountain Zebra NP were estimated to range between 3.1 – 16.0 km^2, averaging 9.4 km^2 (Penzhorn 1982; Skinner and Smithers 1990).

2.1.6 Habitat requirements and resource assessment

As mentioned previously, Cape mountain zebra naturally inhabit rugged, broken mountainous and escarpment areas and are dependent on the presence of grass and perennial water. Remaining, untransformed natural areas representing these habitats are largely confined to protected areas. Cape mountain zebra seasonally migrate, where possible, between habitat types and predominantly select areas with high grass cover and limited population growth may be the result of confinement to upland areas with restricted access to year-round grass-rich habitats and drinking water.

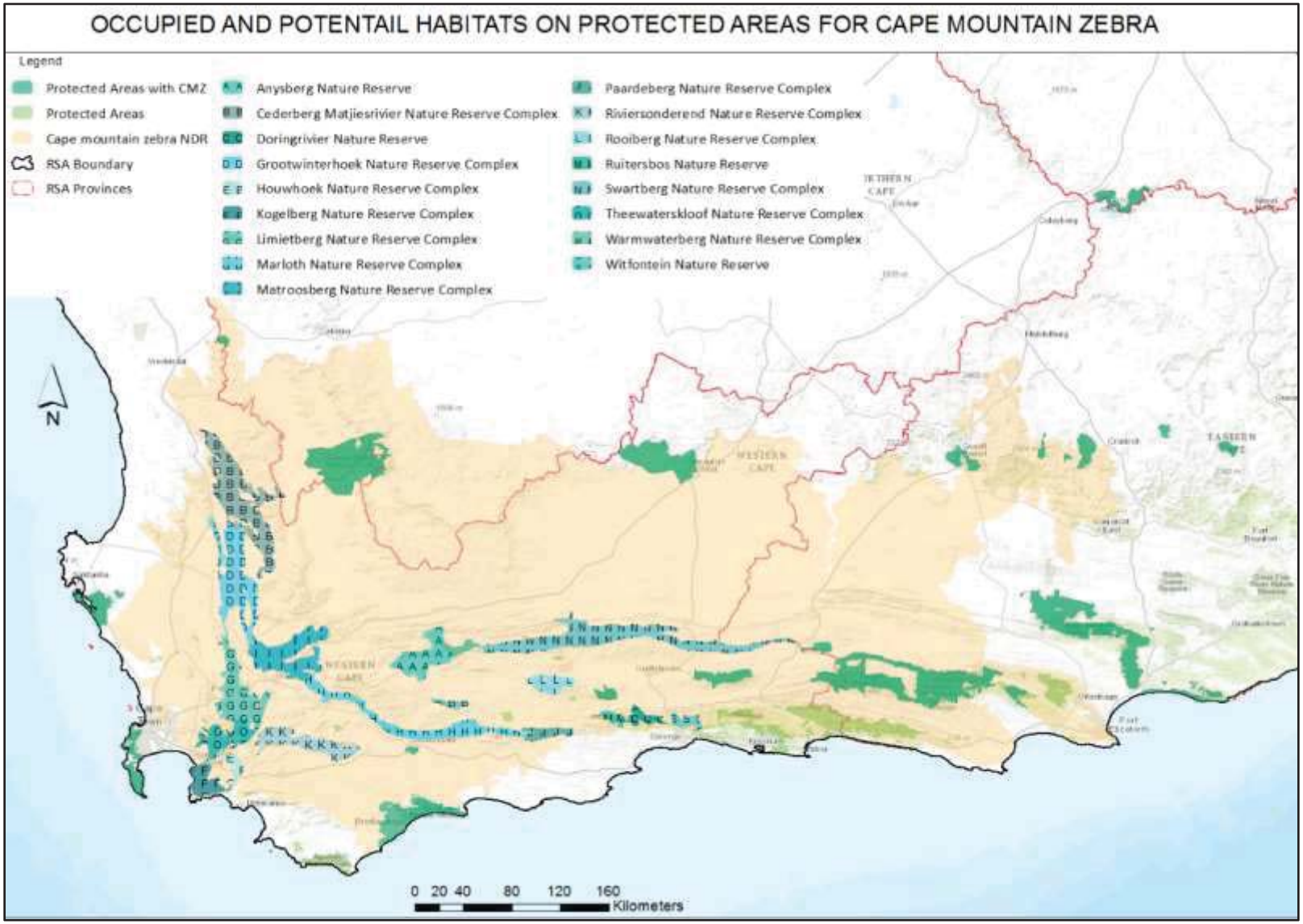


Figure 3. Occupied and Potential Cape mountain zebra habitats – Initial Assessment of Protected Areas in the WCP only.

Cape mountain zebra is regarded as a partial refugee species, as some populations have been confined to suboptimal areas of its historic range contributing to poor population performance (Lea *et al.* in press). Estimates of potential suitable biomass production in some reserves indicate that populations may have reached their optimum stocking potential. These reserves are inadequate in size or densely stocked with other game species and cannot accommodate higher densities of Cape mountain zebra (Birss and Schutte-Vlok 2015 pers comm.). Using inadequate assessments of habitat suitability may grossly over-estimate the conservation potential of existing protected areas where current populations are confined to marginal habitats. As habitats shift with land use and climate change, the current distribution of protected areas may be inappropriate to meet future conservation goals (Lea *et al.* in press). Additional protected areas within the NDR have suitable habitat, but it is essential to apply appropriate stocking models considerate of the forage production potential, climate, total game stocking, size of suitable habitat, accessibility to water and areas of high grass cover. It has also been suggested that environments transformed by agriculture may be suitable for Cape mountain zebra (Smith *et al.* 2011).

A large proportion of research conducted on Cape mountain zebra focus on habitat suitability for the species. Habitat suitability studies were conducted for Bontebok NP (Kraaij and Novellie 2010; Watson *et al.* 2011; Strauss 2015), De Hoop NR (Smith *et al.* 2007; Hurzuk 2009; Smith *et al.* 2011), Gamkaberg NR (Watson *et al.* 2005), Mountain Zebra NP (Winkler and Owen-Smith 1995) and Kammanassie NR (Watson and Chadwick 2007). All studies showed that Cape mountain zebra prefer habitat with a high grassy component, and that only small portions of these reserves have suitable habitat for the species (Hurzuk 2009; Strauss 2015). Winkler and Owen-Smith (1995) suggested that seasonal variations in vegetation communities utilised by zebra were not only influenced by changes in grass quality, but also by variations in grass quantity. It was also highlighted that habitat selection (including availability) must not be viewed in isolation since water, mineral licks, shelter, as well as social factors, are also known to influence habitat use in large herbivore species (Winkler and Owen-Smith 1995). Penzhorn and Novellie (1991) suggested that ideally conservation areas should be large with sufficient varied habitats to sustain populations throughout summer and winter. The existence of large populations of antelope could be detrimental to zebras due to interspecific competition (Hurzuk 2009). Strauss (2015) suggests that Cape mountain zebra have season-specific and site-specific feeding strategies to ensure adequate quantity and quality of forage throughout the year.

There appears to be considerable scope, >935,191 ha, for increasing the area and number of sub-populations of Cape mountain zebra (Hrabar and Kerley 2013). An assessment of the CapeNature protected areas consolidated with mountain catchment areas in the Western Cape indicates that potential habitat of <855,940 ha could be available for the reintroduction and reinforcement of a number of viable Cape mountain zebra populations, (populations >100 individuals), (Birss *et al.* 2016). However, a careful and systematic evaluation of potential sites for habitat suitability, area of suitable habitat, stocking potential, security and manageability will have to be carried out. Several Nature Reserves (some are clusters of several protected areas) have the potential to contribute significantly to new sub-populations of Cape mountain zebra including Bokkeriviere NR, Cederberg NR, Matjiesrivier NR, Groot Winterhoek NR, Outeniqua NR, Rooiberg NR and Swartberg NR. Although these areas have suitable habitat, some will need additional and/or improved fencing to facilitate management of Cape mountain zebra and other species which may influence Cape mountain zebra population health.

In order to assess the priority potential sites for Cape mountain zebra in the Western Cape, CapeNature applied a two-step process to evaluate sites within its protected area network. The method starts with a desktop assessment and concludes with an on-site assessment of the habitat. This method may be used as a template for developing a more general prioritisation approach that could be applied to Cape mountain zebra across its NDR.

2.1.7 Known diseases

Marais *et al.* (2007) proposed that, since the entire Cape mountain zebra population originates from a very small genepool, a reduced innate immune system diversity exists which leads to the increased susceptibility of some smaller populations to equine sarcoids. Genetic diversity and levels of heterozygosity have been shown to be lower in populations of Cape mountain zebra that are affected by sarcoids (Sasidharan 2004; Nel *et al.* 2006). Equine sarcoid is a virus causing tumours in horses and donkeys and is associated with high levels of inbreeding. It is thought to manifest in animals due to complex interactions between the aetiologic agent, the environment and the host genome. In horses, the bovine papillomavirus (BPV) types 1, 2 and 13 are involved in the pathogenesis of sarcoids (Alcântara *et al*. 2015). In a comparison of genetic parameters and sarcoid tumours in Cape mountain zebra affected populations showed low levels of heterozygosity, genetic diversity and polymorphisms. These populations were also highly inbred (Sasidharan 2004, Sasidharan *et al*. 2011).

The persistence of sarcoids in a population could potentially be linked to the social structures of herds where one stallion will breed with a harem for long periods of time (Sasidharan 2004). Tumour-affected Cape mountain zebra exhibit higher mortality rates than non-affected due to reasons that seem unrelated to any apparent climatic variations. Sasidharan (2004) recommends research on the comparative investigation on the immunological status of different Cape mountain zebra populations and epidemiological studies towards shedding more light on equine sarcoids.

Sasidharan (2004) suggests that anecdotal evidence may point to impaired immune function in Cape mountain zebra populations. Necropsy reports for Cape mountain zebra that died of disease symptomatic of African Horse Sickness (AHS) or equine encephalosis is unique in that zebras in general have been reported to be resistant to both. Equid movement quarantines for AHS are expected to impact on gene flow simulations through translocations.

Cape mountain zebra generally harbour high tick loads but no comparative studies have been done on parasitic loads between sarcoid-affected and non-affected zebras. Incidences of subclinical equine babesiosis have been reported in Cape mountain zebra (Young *et al.* 1973).

2.2 Population statistics and trends

The overall population growth rate of the Cape mountain zebra metapopulation has remained positive (Hrabar and Kerley 2013; Hrabar and Kerley 2015), however, not all sub-populations are maintaining a positive growth rate (Hrabar *et al.* 2015; CapeNature 2016). The mean annual rate of increase was maintained at 10% from 2002 – 2009, compared to 8.6% from 1985 to 1995 (Novellie *et al.* 1996), 9.6% from 1995 and 1998 (Novellie *et al*. 2002) and 8.4% from 1998 and 2002.

It should be noted that when assessing population numbers and their changes over time, that due to the unknown error around the estimates for the count of the entire population it is difficult to assess the accuracy of the trends or to be able to put confidence bounds around the increase figures.

In total the Cape mountain zebra population is estimated to have increased by 75% (from 2,790 to 4,872 individuals) over the period 2009 to 2015 (Hrabar and Kerley 2015) which translates to an average annual increase of 11%. Historical national population growth figures were as follows: from 1985 to 1995: 8.6% and from 1995 to 1998: 9.6% (Novellie *et al.* 2004).

Table 4: Cape mountain zebra population trends by management authority.

Province	Number of sub-populations	Population estimate	Population trend	Challenges or threats
SANParks	9	2,593 (1,089 in 2010 to 2,525 in 2015)	11.8% average increase	Low genetic diversity, predation effects unknown, hybridisation, sarcoids
ECPTA	3	369 (261 in 2007 to 369 in 2015)	9% average increase	Low genetic diversity
CapeNature	5	253 (228 in 2010 to 253 in 2015)	1.12% average increase	Poor population performance, hybridisation, habitat insecure, habitat alteration (water abstraction)
FS DESTEA	1	103 (45 in 2004 to 103 in 2015)	6.5% average increase4	Low genetic diversity
NC DENC	1	18	1.33% average increase	Low genetic diversity, sarcoids, poor population performance, insecure habitat, management and regulatory capacity constraints
Private	55	1,481 (946 in 2010 to 1,481 in 2015)	9.47% average increase	Low genetic diversity

2.3 Research

A scientific literature review has produced a list of important research findings, outcomes and recommendations to be taken into account in designing action plans for this BMP-S. These research findings and recommendations are incorporated into the relevant sections of this document.

The National Zoological Gardens of South Africa (NZG), a declared National Research Facility of the National Research Foundation (NRF) since 2004, is uniquely placed to generate new knowledge, core technologies and data pools/collections commensurate with international standards. It now has a critical mass of equipment, skills and users and the potential for networking and attracting collaboration. The facility offers unique opportunities for the advancement of science and for an interface between science and the public, and the additional provision of opportunities for skills development. Within the broad strategic context of the NZG, the thematic driver for research focuses on ways to attract, develop and retain talent and to uphold excellence in all investments in knowledge, people and infrastructure. In its role as a national research facility, the NZG assist agencies and organisations, in collaboration, to fulfil their collective mandates for the

conservation of biodiversity, ultimately enhancing the collective efforts in southern Africa for the conservation of regional biodiversity (Kotze and Nxomani 2011).

The NZG's strength is bringing together expertise from a variety of disciplines in synergy and an interdisciplinary approach rarely encountered in other research institutions. This strength is supported by appropriate human capacity, infrastructure and sustained funding for core scientific activities in both conservation biology and wildlife health.

The NZG has built up a unique resource to conduct and promote molecular genetic research in Africa, in response to a need to understand the relationships between the degree of genetic diversity, molecular diagnostics, phylogenetics and genetic factors that determine population viability of threatened species as a result of habitat fragmentation. National genetic databases have been established for a variety of species, including bontebok (*Damaliscus pygargus pygargus*), and are being expanded for species such Cape mountain zebra.

The implementation of effective metapopulation management for Cape mountain zebra aimed at conserving and maximising genetic diversity (inclusive of reproductive vigour and disease resilience) of the metapopulation, with due consideration of the potential deleterious genetic consequences, is heavily reliant on the undertaking to implement focussed applied research in partnership with the NZG.

2.4 Utilisation and socio-economic context

The decimation of wildlife through trophy hunting by early settlers and explorers in the 19th century promoted the recognition among some hunters of the need to protect remaining game populations (Lindsey *et al.* 2007). Van Stittert (2005) suggests that the privatisation and commercialisation of wild "game" animals was already well-advanced in the Cape in the late 19th century and driven by the ostrich feather trade and local demand for meat and skins, and in the twentieth by commercial sport hunting. Formally protected Nature Reserves were an anomaly in the Cape. After establishment, public game reserves were reallocated for farming and were restricted where they survived at all.

Ostrich domestication was a watershed in the wild animal history of the Cape. The recognition of land owner rights and suppression of itinerant hunting and trading in game provided an effective legal monopoly over game animals that could be converted into either profit or patronage resulting in steady enclosure of private farms in the east and north (Transvaal) after I883, financed by profits from the ostrich feather boom. The first record of a farmer fencing part of his farm to protect animals refers to Mr Alexander van der Byl who enclosed bontebok on approximately 2,500 ha near Bredasdorp. The establishment of National Parks by central government due to the potential tourism value and precarious position of the remnant royal game in the Cape was intended to rescue the surviving gemsbok (*Oryx gazella*) (Gordonia), bontebok (Bredasdorp) and elephant (*Loxodonta africana*) (Uitenhage/Alexandria) in 1931, and Cape mountain zebra (Cradock) in 1937, from the threat of 'provincial prejudice' and private parsimony by creating a national park for each animal (Van Stittert 2005; Du Toit 2012).

Examples of conservation success by private land owners (including wildlife ranchers) commonly cited are the cases of the southern white rhinoceros (*Ceratotherium simum simum*), bontebok, black wildebeest (*Connochaetes gnou*), Cape mountain zebra and the geometric tortoise (*Psammobates geometricus*) (Lindsey *et al.* 2007; Cousins *et al.* 2008). Cousins *et al.* (2008) states that the maintenance of natural areas through wildlife ranching is obviously beneficial to conservation and protects habitat from radical transformation and also provides additional space which supports formal conservation as ranchers become "custodians of components of metapopulations" for a variety of species, both introduced and non-introduced.

The role of wildlife ranching for landscape level conservation, in general, is thought to be essential due to the limited government funding available for conservation, however, the practicality of ranching wildlife for conservation is challenging. In addition to the challenges of combining economic gain with conservation objectives, ranchers are often faced with relatively smaller enclosed areas and this necessitates the need for intensively managed wildlife populations. In order to enhance the role of wildlife ranching within conservation, clear guidance and support for ranchers is likely to be required to boost endorsement and minimise economic loss to ranchers (Cousins *et al*. 2008; Lindsey *et al*. 2007).

Hrabar and Kerley (2013; 2015) report that the most common motivation for stocking Cape mountain zebra on private land was for the conservation of the species and the least common motivation was hunting. Private land stakeholders, however, have expressed aspirations for Cape mountain zebra derived incentives through hunting, trading and stocking accessibility (Birss personal communication 2016) as well as stocking of Cape mountain zebra on private land, outside of their NDR (Hrabar and Kerley 2015; Taylor *et al*. 2016).

Hunting of Cape mountain zebra by South African hunters and land owners for population management and ecotourism purposes is permitted and granted by the relevant provincial conservation authorities on the merit of applications. Cape mountain zebra, being listed on CITES, requires a positive NDF in order to allocate hunting quotas for international export and in some cases additional requirements may include enhancement findings (i.e. United States of America: Endangered Species Act) – this limits accessibility of international clients to hunt Cape mountain zebra.

According to Lindsey *et al.* (2007), South Africa has the largest hunting industry in Africa in terms of number of operators, visiting hunters, animals shot and revenues generated, however, also cautions that the value of wildlife trophies create pressure for the issuance of large and increasing CITES quotas. Further, they refer to the insistence by hunters and hunting advocates that trophy hunting is of major importance for conservation in Africa, involves low off-takes, high prices and is sustainable, thus plays a role in creating incentives for the conservation of threatened species, but that CITES restrictions on trophy exports impose limitations on revenues from trophy hunting and incentives gained from restricted species. Discussions concerning trophy hunting are polarised which is exacerbated by the lack of reliable data on the impact of trophy hunting.

2.5 Conservation measures

Historically, excessive hunting as well as habitat loss and fragmentation due to agriculture reduced Cape mountain zebra numbers to less than 80 individuals in just three localities in the 1950s. Since the 1950s the number of Cape mountain zebra has gradually increased through translocations to ensure continued population growth and genetic diversity (Novellie *et al.* 2002). By 2002, the Cape mountain zebra population totalled >1 600 individuals in six national parks, 10 provincial reserves and 17 private reserves distributed across most of their natural range (Castley *et al*. 2002). According to Hrabar and Kerley (2015) over 70% of the national population is strictly protected within National Parks and provincial Nature Reserves.

The two smallest remnant populations of Cape mountain zebra occur in the Kammanassie and Gamka Mountains. The registered title deeds recognising the State Forest portions of the Kammanassie date back to 1878, the area was then known as the Langkloof State Forest (Schutte-Vlok *et al.* 2012). The earliest records of Cape mountain zebra census dates back to July 1986 when the Kammanassie NR was still managed by the National Department of Forestry. Kammanassie only became part of the provincial department during 1988, and prior to this very little attention had been given to the Cape mountain zebra population on this NR. When the reserve was established in 1978 the estimated number of Cape mountain zebra was six

(Odendal 1978). The earliest record of Cape mountain zebra on the Kammanassie mountain dates back to 1949, with a total of 15 animals recorded. Today the population is estimated at 70 animals (Cleaver 2004).

Gamkaberg NR was purchased by the Department of Nature and Environmental Conservation in 1974 for the express purpose of conserving, in their natural habitat, the remaining population of Cape mountain zebra occurring there (Barry *et al.* 2016). The Gamkaberg population was estimated at 42, in 2015, from a founder population of 6 animals (Barry *et al.* 2016).

Challenges around the survival of the Gamkaberg population include limited suitable habitat as they are fenced within the approximately 10 000 ha with limited availability of water during the dry months. The recent addition of the Fontein property means that the Cape mountain zebra now have access to two additional reliable borehole water points (Barry *et al.* 2016)

Cape mountain zebra occurred on the Outeniqua NR (established in 1936) but this population went extinct in the early 1970s possibly due to translocations and poaching was largely uncontrolled (Lloyd 1984) .

In 1956 and 1957, the then Cape Provincial Administration purchased the properties De Hoop and Windhoek, east of Bredasdorp, and later the farm The Nook was added. The original De Hoop NR was proclaimed in 1957, as the first Provincial nature reserve, and used as an experimental game breeding farm (Scott and Scott 2002). The De Hoop Cape mountain zebra population was estimated at 115, in 2015, and animals move between De Hoop NR and the adjacent Denel Overberg Test Range. Ten animals were introduced to De Hoop in the 1970s, five from Mountain zebra NP and five from Kammanassie (Hey 1995). They are subject to low incidence of sarcoid tumour caused by the bovine papillomavirus (BVP) DNA types (Novellie *et al.* 2002; Sasidharan 2005).

In 1999, nine Cape mountain zebra from Karoo NP were introduced into the Anysberg NR at Vrede Valley. On 16 August 2004, a further eight zebra from Karoo NP was released into the reserve. Today the Cape mountain zebra sub-population is estimated at 21 animals. In 2012, the Anysberg NR was expanded by 12,832 ha with assistance from WWF-SA and funding from the Leslie Hill Succulent Karoo Trust, and this has increased the reserve to over 80 000 ha in size (Schutte-Vlok 2015).

2.5.1 The Mountain Zebra Working Group (MZWG)

A further overview of past conservation measures for Cape mountain zebra indicates that the conservation management of the South African Cape mountain zebra metapopulation is shared by five conservation agencies, namely SANParks (a parastatal organisation responsible for the management of South Africa's National Parks), CapeNature (public entity of the Western Cape Department of Environmental Affairs and Development Planning), Eastern Cape Parks and Tourism Agency (public entity of the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism), the Northern Cape Department of Environment and Nature Conservation and the Free State Department of Economic, Small business development, Tourism and Environmental Affairs.

The MZWG was established to coordinate the conservation of mountain zebras in South Africa. Initially the focus was on the Cape mountain zebra, but was later expanded to include the Hartmann's mountain zebra in South Africa. The MZWG acted as a national body of interested and affected parties established to implement the Action Plan for Mountain Zebra as outlined in *Equids: zebras, asses and horses – status survey and conservation action plan*, published by the IUCN Equid Specialist Group in 2002. The primary role of the MZWG was to ensure that mountain zebra populations in South Africa are regularly monitored and to revise the strategy outlined in the Action Plan, when necessary. The MZWG has not officially been active since 2010 although much of the intentions of the working group had been adopted by participatory conservation agencies, either through policy or management commitment. Doctor Halszka Hrabar and Professor Graham

Kerley, associated with the Nelson Mandela Metropolitan University, Port Elizabeth, have been primarily responsible for regular population status reports and liaison with private land owners, conservation agencies and conservation managers towards maintaining the momentum of the MZWG mandate.

The MZWG adopted a Terms of Reference which was aimed at *inter alia*:

1. To coordinate the future conservation of mountain zebras in South Africa;

2. To act as local body of interested and affected parties whose mandate is to implement the Equid Specialist Group Action Plan for Mountain Zebra as outlined by Novellie *et al.* (2002);

3. To monitor mountain zebra populations on a regular basis, and to revise the strategy outlined in the Action Plan when and where necessary using the monitoring information obtained;

4. To ensure appropriate implementation of the Action Plan, as well as scientific advisory personnel to ensure the Action Plan is followed and that the necessary revisions and any other sources of relevant information are brought to the attention of those responsible for implementation; and

5. Recognising the role that private landowners played historically in saving this animal from extinction, promoting a spirit of co-operation with current and future landowners, and regularly communicating relevant information to the private sector to achieve this goal.

Conservation management policies were developed and adopted by provincial conservation agencies for the translocation and hunting of Cape mountain zebra (the latter dating back to the early 1980s). Protocols for the monitoring of Cape mountain zebra in various reserves were developed and distributed in order to coordinate this matter and produce a reliable database on population status. A draft protocol for assessing the habitat of any receiving property was also developed.

In 2010 attempts to reconvene the MZWG failed and therefore CapeNature in partnership with SANParks initiated the BMP-S process, aiming to disband the MZWG in favour of a BMP-S steering committee and to drive towards a stakeholder workshop to draft a BMP-S for the Cape mountain zebra.

At present there is no formal management plan for Cape mountain zebra. SANParks currently has no specific management strategy for Cape mountain zebra, and management follows the general policy for the management of large mammals in SANParks. The Mountain Zebra and Karoo National Parks, which have the largest populations, have been increased greatly in area over the past decade, and consequently the Cape mountain zebra populations have been expanding in these parks. Both parks have introduced lions and other large predators, and their impact on the mountain zebra populations are being monitored (Novellie, personal communication).

An inter-agency collaboration between SANParks, CapeNature and ECPTA acknowledges the need for the Cape mountain zebra BMP-S, to ensure the long term survival of the species in nature, and to formalise the collaborative efforts of participatory parties of the MZWG.

CapeNature, in partnership with SANParks and the Eastern Cape Parks and Tourism Agency, initiated a process to develop a BMP-S for Cape mountain zebra, in terms of the NEM: BA, in collaboration with the Northern Cape Department of Environment and Nature Conservation, the National Zoological Gardens of South Africa and the Free State Department of Economic, Small business development, Tourism and Environmental Affairs.

Finally, in the development of this BMP-S, it is envisaged that the governance of Cape mountain zebra metapopulation management and the implementation of the BMP-S will be taken over by a BMP-S steering

committee, including regulatory and other conservation authorities to provide oversight and accountability for the implementation of actions as detailed in the Action Tables.

2.5.2 Metapopulation management

A metapopulation is defined as a group of geographically isolated populations of the same species that may exchange individuals through dispersal, migration or, when implemented as a management strategy, human-controlled movement and the availability of empty habitats that are largely connected (Hanski 1999; Olivier *et al.* 2009). Implementation of human-mediated metapopulations becomes necessary when individuals no longer have the ability to move between patches or to recolonise empty patches (Akçakaya *et al.* 2007). The implementation of metapopulation processes may improve the persistence of mammals in fragmented habitats (Olivier *et al.* 2009). The managed metapopulation approach has been proposed for large herbivores in South Africa, where extensive areas are needed to hold a viable population (Elmhage and Angerbjörn 2001). Akçakaya *et al.* (2007) propose that what conservation needs is not necessarily metapopulations *per se*, but the metapopulation approach and concepts, which allow for the assessment of the persistence of a species that happens to exist in a metapopulation, either naturally or due to habitat loss and fragmentation.

Elmhage and Angerbjörn (2001) suggested a managed metapopulation approach as a means to solve problems of inbreeding in small, isolated populations with a high extinction risk, when:

1. There are discrete habitat patches large enough to hold breeding sub-populations (Hanski 1999); and
2. Ecological processes that work on both local and regional (metapopulation) scales (Hanski 1999).

Elmhage and Angerbjörn (2001) cautioned against the assumption that all populations with patchy distributions and some degree of connectivity are metapopulations. They emphasise the importance to investigate the demographic properties of sub-populations in different population networks, on a case by case basis in order to contribute to the conservation and management of large mammals in fragmented habitats. In addition to human-mediated dispersal through reintroduction and translocation, dispersal can be increased by conserving or restoring the habitat between existing populations. This can reduce local extinctions by facilitating the 'rescue effect' of colonization, and it can increase the rate of recolonization following local extinction. One example to increase the overall persistence of the species is linking populations through habitat corridors (Akçakaya *et al.* 2007).

Effective metapopulation management for Cape mountain zebra by the conservation agencies involved (see above), should aim to conserve the allelic diversity and promote and maintain genetic diversity within and between the relevant sub-populations of the metapopulation, in particular the potential loss of rare alleles in the isolated relict populations at Kammanassie and Gamkaberg, either caused by genetic drift or genetic swamping. Genetic data are often used to assess "population connectivity" because it is difficult to measure dispersal directly at large spatial scales, however, estimates of genetic divergence alone provide little information on demographic connectivity (Allendorf *et al.* 2012). "Genetic rescue" is considered to play a crucial role in the persistence of small natural populations and is an effective conservation tool under certain circumstances, however, the occurrence of outbreeding depression following heterosis in the first generation in some cases indicates that care is needed when considering the source of populations for rescue (Allendorf *et al.* 2012).

It has been recommended by various authors (Hrabar *et al.* 2015; Hrabar and Kerley 2013; Hrabar and Kerley 2015; Hill 2009; Sasidharan *et al.* 2011; Moodley and Harley 2006) that the three relic populations should be mixed. With due consideration to the potential deleterious genetic consequences as indicated by Frankham *et al.* (2002) and Allendorf *et al.* (2012), introductions into either Kammanassie and or Gamkaberg sub-populations must be avoided and alternative locations for mixing and monitoring the effects of mixing must

be considered. In this regard, it would be recommended that the mixing of sub-populations first takes place between those contained in state-owned protected areas, for proper monitoring of the result, before translocations to private properties are considered.

As animals are available to be sourced from the De Hoop NR, Gamkaberg NR and Kammanassie NR populations, new populations derived from various mixtures of these source animals and carefully selected numbers of Cradock-source animals should be established. These new populations should be introduced into the top priority sites as determined by the prioritisation and site selection criteria listed in this BMP-S.

More than 40 individuals in various groups have escaped from De Hoop NR and now occur on private land. In some instances these animals are being persecuted and poached. Hybridisation with horses and donkeys have been observed (Marais 2015).

The Cape mountain zebra metapopulation comprises the following four main elements:

1. A good number of widely distributed sub-populations derived from the Cradock lineage that form the bulk of the Cape mountain zebra population (including private land sub-populations),
2. The Gamkaberg NR population,
3. The Kammanassie NR population,
4. The De Hoop population which is a Cradock- and Kammanassie-derived population which does still represent rare alleles from the Kammanassie population (Moodley and Harley 2006).

Finally, the management and monitoring of the Cape mountain zebra metapopulation should be guided by this BMP-S and all agencies and eventually, private and corporate landowners, should strive to promote the conservation of the Cape mountain zebra. Only a collaborative and focused science-based effort, supported by sound management principles and best practice will ensure the success and future survival of the species.

It appears from the available body of knowledge, that many and rather specific recommendations to improve the survival of Cape mountain zebra in the wild and within its NDR have been made throughout the years, but that little action has been taken in this regard.

2.5.3 Non-detriment finding (NDF)

Hrabar and Kerley (2015) estimate that the potential Cape mountain zebra population on occupied private land could have been between 2,205 and 2,427 individuals in 2015. They also indicated that the most common motivation for stocking Cape mountain zebra on private land was for the conservation of the species while the least common motivation was hunting. However, during a workshop convened by SANBI in order to prepare a Non-detriment Finding, private land stakeholders expressed aspirations for Cape mountain zebra derived incentives through hunting, trading and stocking accessibility (Birss personal communication 2016). Although hunting by South African hunters and land owners for population management and ecotourism purposes is permitted and granted on the merit of applications, Cape mountain zebra, being listed on CITES, requires a positive Non-detriment Finding in order to allocate hunting quotas for export – thus limits accessibility of international clients to hunt Cape mountain zebra.

In May 2015 the Scientific Authority of South Africa, as established in terms of Section 60(1) of the NEM: BA, conducted an NDF assessment for the Cape mountain zebra in terms of the CITES Regulations (Equ_zeb_zeb_May2015). As stated previously, the purpose of this NDF was to assess whether or not the trade (international) in Cape mountain zebra is likely to have a detrimental impact on the population(s) of the species.

The NDF undertaken for the Cape mountain zebra demonstrates that legal local and international trade in live animals and the export of hunting trophies at present poses a moderate to high risk to the survival of this subspecies in South Africa. It continues to state that if a small hunting quota were to be introduced, it would in all likelihood increase the economic value of the Cape mountain zebra, which is anticipated to generate species and habitat conservation incentives. Subsequently, if the Cape mountain zebra had a higher economic value, there would be more of an incentive to conserve the subspecies and limit the introduction of alternative high-value extra-limital species that can lead to habitat deterioration.

Recommendations from the NDF include the development and effective implementation of a Biodiversity Management Plan for Cape mountain zebra to improve metapopulation management and the parallel implementation of a small cautious hunting quota supported by a population viability analysis which considers genetic diversity within the population, with effective monitoring and research (Scientific Authority. 2015).

The intention of this BMP-S is to promote the conservation and future survival in the wild of the Cape mountain zebra within its NDR with the actions flowing from the planning process to achieve this goal.

2.5.4 Population viability analysis

Local extinction refers to the extinction of a single population in a spatially separate patch, global extinction refers to the loss of all members of a species in all of its constituent populations, and quasi-extinction (Ginsberg *et al.* 1982) to the risk of decline below a specified population size within some specified time (Lindenmayer and Burgman 2005). Population viability analysis is a modelling tool which is used to predict the likelihood of a population reaching a minimum size and threshold in the future. Ginzburg *et al.* (1982) cautioned decision makers to ensure a good understanding of predictive modelling and to, not merely rely on experts' ability to obtain a result or the interpretation of a final conclusion. Previous models (using a quasi-extinction threshold of 10 individuals at the time horizon of 50 years) deployed for both Kammanassie and Gamkaberg Cape mountain zebra sub-populations, indicated that the viability of the Gamkaberg NR was uncertain and argued that limited suitable habitat and the absence of regular fires increased the probability of quasi-extinction (based on population growth rates between 1973 and 2004). The predicted low probability of a quasi-extinction for the Kammanassie sub-population is influenced by rapid population growth after the series of fires from 1997 onwards, and above average rainfall. Although the study suggests that the risk of quasi-extinction of the Cape mountain zebra sub-populations were relatively low over the next 50 years, it was still higher than expected and highly dependent on environmental factors and management decisions (Watson *et al.* 2005, Watson and Chadwick 2007). This risk is exacerbated by small population sizes, inbreeding and competition with other species for suitable habitat (Penzhorn and Novellie 1991; Novellie *et al.* 2002, Watson *et al.* 2005, Watson and Chadwick 2007).

The main management recommendations to reduce this risk of quasi-extinctions of Cape mountain zebra include:

- Deliberate mixing of relict populations in order to maintain and improve genetic diversity;
- Re-enforcement of existing populations prioritised over the establishment of new populations;
- Regulation of translocations to prevent hybridisation;
- Research into the implications of disease and disease risk management;
- Translocation of animals to other protected areas;
- Acquisition of land adjacent to protected areas with Cape mountain zebra;
- Changing fire management in the habitat preferred by Cape mountain zebra to increase the availability of palatable grasses; and
- Formation of conservancies with adjacent landowners.

(Novellie *et al.* 2002; Moehlman 2002; Moodley and Hartley 2005; Watson *et al.* 2005; Watson and Chadwick 2007; Sasidharan *et al.* 2011; Hrabar *et al.* 2011; Hrabar and Kerley 2015; Strauss 2015).

The 2002 IUCN Status and Action Plan for the Mountain Zebra *Equus zebra* (Novellie *et al.* 2002) suggested a Cape mountain zebra population target of 2,500. This number, now exceeded, needs to be reassessed (Hrabar and Kerley 2013). Kerley *et al.* (2003) suggests Cape mountain zebra population targets of 7,249 for pre-transformation areas and 5,194 excluding transformed areas within the NDR in the Cape Floristic Region. The population estimate of 4,791, in 2015, of which 3,268 occurs on protected areas, could potentially increase by 3,240 on protected areas in the NDR, in the long term, with the effective implementation of a sound metapopulation strategy, thereby indicating that a target population of 6,500 on protected areas may be an attainable goal (Birss *et al.* 2016).

During 2015 and 2016, SANBI convened a number of workshops to facilitate the development of Cape mountain zebra population simulation models to inform formal evaluation of management strategies (including harvesting). The workshops introduced the basic principles of the Management Strategy Evaluation (MSE) framework. The model allows for the monitoring of off-takes of various age and sex ratios under different management strategies. From this information robust quantitative analysis can be conducted to provide advice on selective hunting quotas and introduction strategies or relocations schemes to achieve the targets considered for optimal resource use (Winker 2016a).

A time-series analysis of long-term established mountain zebras within protected areas was aimed at: (1) to predict and forecast the absolute numbers of long-term protected subpopulations, (2) to determine the average rate of increase across populations and (3) to provide robust population trend estimates, and associated uncertainties, with implications for the IUCN Red list status. The estimated global mean of the rate of increase across the 10 subpopulations was 6.9% per annum and suggests a potential further increase of at least 4,073 animals by 2025, depending on the availability of habitat (Winker 2016b).

Incorporating carrying capacity limits into forward projections is expected to constrain future growth potential of the nine identified source populations. To maintain rates of increase in source population numbers, the expansion of available land or the founding of new source populations on suitable land will be required (Winker 2016c).

The development and implementation of site and national level MSE models to provide decision support for the evaluation of off-takes is recommended. These models should support the implementation of a CITES quota, providing for constant monitoring and evaluation. A hunting quota determined through a population viability analysis that considers genetic diversity within the population is being developed and the implementation thereof will be monitored through a research project.

2.6 Conservation status and legislative context

In South Africa, legislative jurisdiction regarding the conservation and management of wildlife is shared between the national and provincial governments. The Constitution mandates that “nature conservation, excluding National Parks, national botanical gardens and marine resources,” is one of the functional areas in which there is concurrent national and provincial legislative jurisdiction.

South Africa has nine provinces: Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West, and Western Cape. A great deal of legislative and executive jurisdiction over issues of conservation and management of wildlife, including regulation of imports and exports, is exercised by these provincial governments. National government wields significant legislative jurisdiction over the protection of wildlife, in large part to create national uniformity on the matter.

The NEM: BA and its subsidiary legislation put in place protections for various species that are threatened or otherwise in need of protection. It also provides the authority for consolidating fragmented biodiversity legislation in the country through the establishment of national norms and standards specific to certain particularly vulnerable animals. Enforcement of the NEM: BA and its subsidiary legislation is shared across various tiers of government (Goitom 2013).

2.6.1 International obligations

The Convention on Biological Diversity (CBD)

South Africa is a Party to the CBD. Parties to the CBD adopted the Strategic Plan for Biodiversity 2011-2020, in 2010 in Nagoya, Japan, with the purpose of inspiring broad-based action in support of biodiversity over the following decade by all countries and stakeholders. In recognition for the urgent need for action the United Nations General Assembly also declared 2011-2020 as the United Nations Decade on Biodiversity. The Strategic Plan is comprised of a shared vision, a mission, strategic goals and 20 targets and serves as a framework for the establishment of national and regional targets, promoting the three objectives of the CBD.

The development and implementation of this BMP-S addresses Strategic Goal C: Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity. This BMP-S specifically aims to contribute to the Target 12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly to those in decline, has been improved and sustained. This target specifically related to IUCN listed threatened species and has two components:

- Preventing extinction. Preventing extinction entails that those species which are currently threatened do not move into the extinct category; and
- Improving the conservation status of threatened species. An improvement in conservation status would entail a species increasing in population to a point where it moves to a lower threat status.

Progress towards this target would help reach other targets contained in the Strategic Plan, including Target 13. Further actions taken towards this target could also help to implement commitments related to the species focussed multilateral agreements such as CITES (CBD 2013).

The World Heritage Convention

Cape mountain zebra occur on 7 protected areas within the Cape Floristic Region World Heritage Site: Table Mountain NP, Anysberg NR, Kammanassie NR, Gamkaberg NR, Theewaterskloof NR and the Baviaanskloof NR.

IUCN Red List

In 2008, the IUCN Red List status for Cape mountain zebra changed from “Endangered” to “Vulnerable” (VU D1) as the total population was estimated at approximately 500 mature individuals and increasing.

CITES

South Africa is a Party to the CITES, which thus governs and controls South Africa’s international trade in CITES-listed species. The Cape mountain zebra is listed in Appendix I of CITES i.e. species threatened with extinction which are or may be affected by trade. Refer to South Africa’s CITES Regulations (see below).

2.6.2 National legislation

NEM: BA

The NEM: BA gives effect to the constitutional commitment to take reasonable legislative measures that promote conservation by providing for the management and conservation of biological diversity and the sustainable use of indigenous biological resources.

Threatened or Protected Species (ToPS) Regulations, 2007

The ToPS Regulations, 2007, promulgated in terms of NEM: BA came into force in February 2008. The regulations provide for the protection of species that are threatened or in need of protection to ensure their survival in the wild and give effect to the Republic's obligations. At the time of writing (February 2016), the ToPS Regulations are going through a comprehensive process of review, amendment and repeal.

CITES Regulations, 2010

The CITES Regulations under NEM: BA came into force in March 2010. The regulations give effect to South Africa's obligations as a signatory to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (see above) insofar as creating a permitting system to regulate the international trade (import, export and re-export) of listed species (live animals as well as specimens / products) as well as concomitant administrative, compliance and enforcement structures.

In terms of Regulation 6(3)(c) of the CITES Regulations (read with Article IV of the CITES (Convention) and Section 1 of the NEM: BA), an export permit shall only be granted for an Appendix I (or II) listed species when a Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of that species.

A NDF is defined in the CITES Regulations to mean a finding by the Scientific Authority advising that a proposed export of an Appendix I (or II) specimen will not be detrimental to the survival of the species and that a proposed import of an Appendix I specimen is not for purposes that would be detrimental to the survival of the species.

NEM: PAA

NEM: PAA provides for the protection and conservation of ecologically viable areas representative of South Africa's biodiversity and natural landscapes and seascapes in protected areas. Protected areas in South Africa offer a viable tool for habitat protection and the protection and maintenance of ecologically viable numbers of the Cape mountain zebra and their associated species and habitats.

2.6.3 Other relevant South African legislation

Apart from the National Environmental Management Act, 107 of 1998 (NEMA) and its related Acts and Regulations, the nine provincial conservation ordinances / acts are the major regulatory instruments for the regulation of wild animal species in South Africa.

Transvaal Nature Conservation Ordinance, 12 of 1983 (implemented in Gauteng; Limpopo including Gazankulu and Venda; North West including Bophuthatswana and Lebowa and Mpumalanga Provinces) and augmented by:

- Gauteng Nature Conservation Ordinance, 1983 - Gauteng Nature Conservation Act, 2014;
- Limpopo Nature Conservation Ordinance, 1983 - Limpopo Environmental Management Act, 2003; Gazankulu Nature Conservation Act, 5 of 1975, Venda Nature Conservation Act, 10 of 1973;
- Mpumalanga Ordinance, 1983 - Mpumalanga Nature Conservation Act, 10 of 1998;
- North West Nature Conservation Ordinance, 1983; Bophuthatswana Nature Conservation Act, 1973; Lebowa Nature Conservation Act, 1973, and tribal rule.

Cape Province Nature Conservation Ordinance, 19 of 1974 (implemented in the Western Cape; Eastern Cape including Ciskei and Transkei; Northern Cape and North West Provinces) and augmented by:

- Western Cape Nature Conservation Ordinance, 19 of 1974 - Western Cape Biodiversity Bill *in prep*.
- Northern Cape Nature Conservation Ordinance, 19 of 1974 - Northern Cape Nature Conservation Act, 9 of 2009
- Eastern Cape Nature Conservation Ordinance, 19 of 1974; Ciskei Nature Conservation Act, 10 of 1987; Transkei Decree 9 of 1992.

Natal Nature Conservation Ordinance, 15 of 1974 (implemented in KwaZulu-Natal Province, including KwaZulu)

- KwaZulu Nature Conservation Act, 29 of 1992 - KwaZulu-Natal Nature Conservation Management Act, 9 of 1997; KwaZulu Nature Conservation Act, 8 of 1975

Free State Nature Conservation Ordinance, 1969 (implemented in the Free State Province, including QwaQwa) and augmented by:

- Free State Nature Conservation Ordinance, 8 of 1969; QwaQwa Nature Conservation, 5 of 1976.

Supporting decision making instruments include National Norms and Standards and Provincial Conservation and Regulatory Policies.

Other Acts such as the Animals Protection Act, 71 of 1962 as amended, which regulates animal welfare in South Africa is also applicable to wildlife.

The Game Theft Act, 105 of 1991, the Fencing Act, 31 of 1963; the Animal Health Act, 7 of 2002, Animals Diseases Act, 35 of 1984, Medicines and Related Substances Control Act, 101 of 1965, and the Animal Matters Amendment Act, 42 of 1993, may also be relevant to Cape mountain zebra conservation as it plays a significant role in veterinary care of animals, as well as their translocation.

Furthermore, Cape mountain zebra is a carrier of AHS. As a result, certain restrictions (Animal Diseases Act) are in place for the movement of Cape mountain zebra, especially into the AHS controlled areas of the Western Cape (set out by the Department of Agriculture in 2003).

3) PLANNING FRAMEWORK

3.1 The planning context

The Cape mountain zebra BMP-S workshop planning process was aligned to the framework provided by the IUCN Species Survival Commission for species conservation planning. Refer to Figure 4. It has guided the stakeholder engagement and planning workshops in defining the desired state, objectives and actions for this BMP-S. The outputs have guided the compilation of the Action Plan and Monitoring Framework (Section 5) to enable effective monitoring and reporting, based on appropriate indicators of success (measurable indicators/outputs) for each action. This enables the tracking of progress towards achieving objectives and thus allow for the adaptive review of objectives (IUCN 2008).

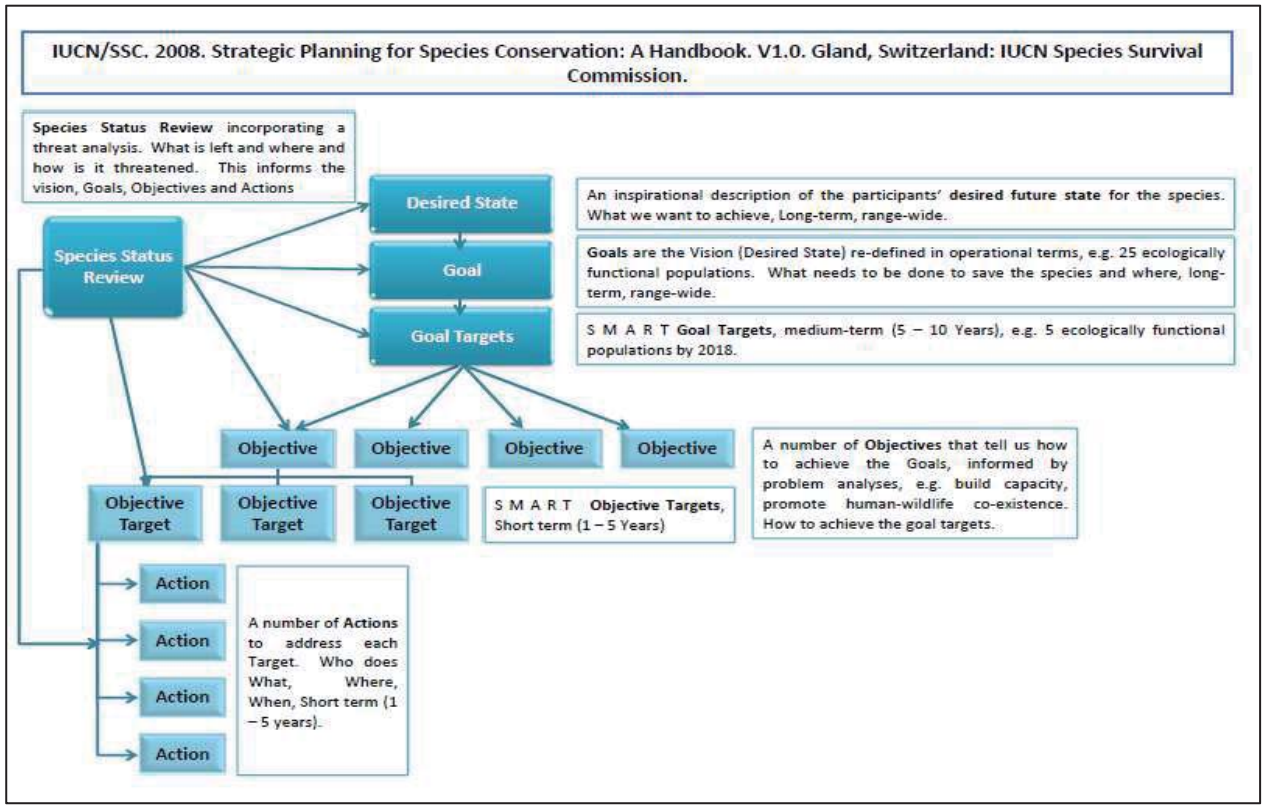


Figure 4: IUCN Species Survival Commission (SSC) schematic for species conservation planning.

3.2 Key role players

Key role players and stakeholders in the management of the Cape mountain zebra are the following (Table 5).

- Those government departments and agencies (at a national, provincial and local level) that have been mandated in terms of legislation, to protect this species, and to implement the actions identified in this plan in order to ensure the long term survival of this species in the wild.
- Other government departments involved in regulating activities that may impact on achieving the conservation objective for the species.
- Private land owners, (including wildlife ranchers), with sup-populations of Cape mountain zebra on their land;
- Researchers and research institutions involved with research relevant to the species.
- Non-governmental organisations, at both a national and international level providing funding for management implementation, research, students and projects.

Table 5. Organisations that are involved in developing and implementing various aspects of the Cape mountain zebra BMP-S.

National Government	• Department of Agriculture, Forestry and Fisheries • Department of Environmental Affairs Branch: Biodiversity and Conservation (DEA: BC) • Department of Environmental Affairs: ToPS and CITES • South African National Biodiversity Institute • South African National Parks • National Zoological Gardens of South Africa
Provincial Government	• CapeNature • Northern Cape Province: Department of Environment and Nature Conservation • Eastern Cape Province: Department of Economic Development, Environmental Affairs and Tourism • Free State Province: Department of Economic, Small Business Development, Tourism and Environmental Affairs • Eastern Cape Parks and Tourism Agency
Higher Education Institutions	• Centre for African Conservation Ecology, Nelson Mandela Metropolitan University • Manchester University • University of the Free State
Non-Government	• World Wild Fund for Nature – South Africa (WWF-SA) • Table Mountain Fund (TMF) • Wilderness Foundation • Endangered Wildlife Trust (EWT) • Wildlife Ranching South Africa (WRSA) • Professional Hunters Association of South Africa (PHASA) • South African Hunters and Game Conservation Association (SAHGCA)
Other	• Perdeberg Winery

3.3 Stakeholder engagement

Identified interested and affected parties were invited to participate in the initial Cape mountain zebra BMP-S workshop via e-mail in October 2013. The list of participants and provisional agenda for the workshop is attached as Appendix A and includes experts on Cape mountain zebra, representatives of conservation management agencies, representatives of wildlife ranching and hunting associations, private land owners and researchers (many already participated in a SANBI facilitated workshop for the compilation of the CITES NDF). Invitees were requested to participate in the workshop to facilitate the drafting of a Biodiversity Management Plan for Cape mountain zebra and were requested to recommend additional stakeholders who they thought could contribute to the proposed workshop.

The Stakeholder Workshop was held on 29 November 2013. The workshop included presentations on the current state of knowledge for Cape mountain zebra. The group as a collective developed the Desired State and identified the key threats to the long term survival of Cape mountain zebra in nature. Break-away groups led by an expert in that particular field, then facilitated the compilation objectives and action plans for each threat. The proceedings of the workshop were used to compile the draft Biodiversity Management Plan for Cape mountain zebra. This draft was compiled by representatives of SANParks and CapeNature. CapeNature engaged in two internal workshops to facilitate the adoption of a CapeNature Cape mountain zebra

metapopulation management strategy based on the outcomes of the BMP-S workshop and to contribute to developing mechanisms to enable the achievement of the objectives of the BMP-S.

The draft Cape mountain zebra Biodiversity Management Plan will be submitted to the Department of Environmental Affairs for gazetting for public participation. Stakeholders involved in the initial workshop will be provided with the draft Cape mountain zebra BMP-S and encouraged to provide further inputs via the public participation process to promote transparency.

3.4 Relevant agreements

There is currently no formal inter-agency agreement as far the management of Cape mountain zebra is concerned. Apart from the three stakeholder and internal workshops held, a meeting held between the Eastern Cape Parks and Tourism Agency, SANParks and CapeNature in January 2016 in Stellenbosch will form the basis of future inter-agency cooperative agreements, formal Memoranda of Understanding and/or protocols to be developed.

A draft inter-agency protocol for dealing with the potential threat of hybridisation between Cape mountain zebra and plains zebra, and the translocation of surplus Cape mountain zebra from National Parks is under development (Zimmermann personal communication).

3.5 Identification of lead and implementing agencies

A final BMP-S workshop with conservation agencies and other stakeholders was held on 25 May 2016 (Agenda and Attendance Registers are attached as Appendix D). During this workshop all stakeholders for the BMP-s were identified and confirmed, and the relationships between stakeholders were workshopped by small working groups as an introduction to the rest of the proceedings. The outputs of this (Venn diagrams representing different stakeholders and their respective relationships) are attached as Appendix E. This exercise informed further discussion and final agreement on who the respective lead and responsible agencies are, as well as the collaborators.

CapeNature was proposed and accepted as the overall lead agency for the CMZ BMP-S, and the workshop identified additional lead and implementing agencies, and collaborators for the respective actions under each Objective Target. The workshop and all stakeholders present concluded and reached consensus on all identified actions under each objective target.

It should be noted that the NC DENC could not attend the workshop but provided extensive comments on the document. Similarly, the EC DEDEAT and FS DESTEA could not attend either, but have also supplied comments on earlier versions of the BMP-S.

3.6 Expert verification for quality of content and context

The Biodiversity Management Plan for Cape mountain zebra (Draft Cape mountain zebra BMP-S_V2_24 April 2016.pdf) was reviewed by Dr Peter Novellie for expert verification of quality of content and context.

Dr Novellie recently retired after 32 years with SANParks, working mainly at the interface between park management planning, wildlife management and national law and policy. His other research interests include the management of ungulate herbivory in protected areas, and the conservation of threatened species. His involvement with Cape mountain zebra started in 1983 when he was appointed to a research position in the Mountain Zebra NP.

Dr Novellie is generally regarded as the Cape mountain zebra “guru” and has authored and co-authored numerous publications and recommendations on the conservation status, ecology, behaviour, monitoring and management of Cape mountain zebra during his tenure with SANParks.

Dr Novellie found the draft BMP to be thorough and excellently compiled, has endorsed this BMP and provided suggestions which have been incorporated into the content.

4) BIODIVERSITY MANAGEMENT PLAN

4.1 Lead and implementing agencies

Lead agencies: CapeNature

Implementing Agencies:

DEA:	Regulation, coordination of implementation, monitoring, evaluation and annual reporting.
CapeNature:	Regulation, research collaboration, population management, monitoring and reporting.
SANParks:	Population management, monitoring, research collaboration and reporting.
ECPTA:	Population management, monitoring, research collaboration and reporting.
EC DEDEAT:	Regulation, monitoring and reporting.
NC DENC:	Regulation, population management, monitoring, research collaboration and reporting. [Comments received from NC DENC indicate that they do not currently have the capacity (staff, budget and resources) to implement this BMP-S.]
FS DESTEA:	Population management, monitoring, research collaboration and reporting.
NZG:	Research, monitoring and reporting.
SANBI:	Monitoring, reporting and research facilitation.

4.2 Identified threats and challenges

4.2.1 THREAT: Population Fragmentation

An increase in fragmented, small, isolated sub-populations derived from an already genetically compromised population, with inhibited or non-existent gene flow, injudiciously translocated and or introduced into habitats based on poorly informed assessments of associated risks (IUCN 2013), promotes the creation of population sinks and exacerbates genetic drift (Ginzburg *et al.* 1982; Penzhorn and Novellie 2001; Elmhage and Angerbjörn 2001; Novellie *et al.* 2002; Frankham *et al.* 2002; Moodley and Harley 2006; Allendorf *et al.* 2012; Hrabar and Kerley 2013; Hrabar and Kerley 2015). Restrictions on the movement of equid animals across Horse sickness quarantine zones, will hinder the flow of genetics between sub populations (Cowell pers. comm.)

4.2.2 THREAT: Inbreeding

Breeding of closely-related individuals exacerbates the deleterious genetic consequences of enduring severe and sustained population bottlenecks in Cape mountain zebra, with continued loss of heterozygosity. The establishment of small, single source populations impedes the natural inbreeding avoidance behaviour, naturally exhibited in large viable populations through the dispersal of progeny. This compounded loss of genetic diversity predisposes the sub-populations to decreased resistance of the metapopulation to diseases and adaptation to environmental changes and stochastic events (Penzhorn 1982; Penzhorn 1984; Penzhorn 1985; Skinner and Smithers 1990; Penzhorn and Novellie 1991; Rasa and Lloyd 1994; Frankham *et al.* 2002; Moodley and Harley 2006; Allendorf *et al.* 2012).

4.2.3 THREAT: Hybridisation

Hybridisation between Cape and Hartmann's mountain zebra, due to injudicious translocations result in fertile offspring. Hybridisation between Cape mountain and plains zebra has been confirmed and concerns of introgression have been raised. Introgression is the incorporation of genes from one species or subspecies

to another through hybridisation that results in fertile offspring that further hybridise and backcross to parental populations. Typically, hybridisation occurs when humans introduce exotic species in the range of rare species, or alter habitat so that previously isolated populations are now in secondary contact. Hybridisation with other equid species have also been confirmed and are concerning as this results in displaced reproductive effort of the metapopulation (Gray 1971; Frankham *et al.* 2002; Allendorf *et al.* 2012; Marias 2015; Dalton *et al.* 2016).

4.2.4 THREAT: Habitat alteration and fragmentation

Habitat quality and quantity is negatively impacted by modification, groundwater abstraction, erosion, alien invasive species, inappropriate fire management, overstocking and transformation (Penzhorn and Novellie 1991; Winkler and Owen-Smith 1995; Watson and Chadwick 2007; Hurzuk 2009; Kraaij and Novellie 2010; Smith *et al.* 2011; Watson *et al.* 2011; Schutte-Vlok *et al.* 2012; Strauss 2015; Birss *et al.* 2016;).

4.2.5 THREAT: Insecure habitat

Inability to secure habitat (funding dependant), expand protected areas, fence and provide adequate infrastructure threaten the continued success of the Cape mountain zebra metapopulation (Hurzuk 2009; Schutte-Vlok *et al.* 2012; Hrabar and Kerley 2015, Marais 2015; Birss *et al.* 2016).

4.2.6 CHALLENGE: To implement effective metapopulation management

The implementation of an effective metapopulation management strategy in order to ensure the establishment and maintenance of viable populations on suitable habitat within the NDR, maintain allelic diversity, promote and maintain genetic diversity and the reinforcement of reproductive potential, based on sound conservation genetic principles has been recommended by various authors, however, purposeful intervention have not been implemented on a metapopulation level. The increasing establishment of small founder sub-populations, lack of reinforcement and inaction towards understanding and implementing measures to increase genetic diversity of sub-population results in inbreeding, genetic drift, and loss of allelic diversity within sub-populations, and potentially results in decreasing the effective population size (a measure of its genetic behaviour, relative to that of an ideal population) (Hrabar *et al.* 2015; Hrabar and Kerley 2015; Hrabar and Kerley 2013; Hill 2009; Sasidharan *et al.* 2015; Moodley and Harley 2006; Frankham *et al.* 2002; Allendorf *et al.* 2012; Dalton *et al.* 2016; Akçakaya *et al.* 2007; Elmhage and Angerbjörn 2001; Hanski 1999; Olivier *et al.* 2009; Ginsberg *et al.* 1982; Lindenmayer and Burgman 2005; Novellie *et al.* 2002; Moehlman 2002; Watson *et al.* 2005; Watson and Chadwick 2007; Strauss 2015).

4.2.7 CHALLENGE: To provide incentives for private land owners to maintain viable sub-populations of Cape mountain zebra

Hunting, trading and stock accessibility, have been identified as potential Cape mountain zebra derived incentives. Conservation accreditation schemes, metapopulation participation and the provision of conservation management guidelines and support have also been identified as potential incentives, whereas strict policy and legislative requirements have been noted as disincentives. South Africa is very well positioned to accommodate international hunters, however CITES restrictions on trophy exports limits revenue potential and investment. Hunting advocates promote the importance of hunting for conservation in Africa, citing low off-takes, high prices and sustainability as incentives for the conservation of threatened species. Combining economic gain with conservation objectives are challenging for wildlife ranchers and strict conservation policies related to the stocking of Cape mountain zebra limits opportunities for wildlife ranchers to invest in the species, however, wildlife ranching is accredited with conservation successes for a number of species and contributing to landscape level conservation (Van Stittert 2005; Lindsey *et al.* 2007; Cousins *et al.* 2008; Du Toit 2012; Hrabar and Kerley 2015; Scientific Authority 2015).

4.2.8 CHALLENGE: To consistently and uniformly implement legislation, policies and IUCN guidelines

A concurrent legislative jurisdiction is exercised by the appointed agencies or departments of nine provinces, the national DEA and SANParks. Provinces have differing conservation legislations, policies, priorities and objectives and are funded via provincial treasuries aligned with the provincial priorities, resulting in variation in the allocation of capacity and resources for nature conservation. Collectively, the provinces have incorporated approximately 22 sets of nature conservation legislation, including decrees and tribal rules effected in previous homeland states. The concurrent competence issue (environment and nature conservation) between the national and provincial departments creates confusion for the public and potentially obscures specific mandates. The NEM: BA and its subsidiary legislation is implemented by the DEA as well as provinces and incorporates various mandatory obligations in terms of international conventions and agreements. The magnitude of legislation, processes and mandates may appear poorly aligned and inconsistently implemented, resulting in over or under regulation of specific activities towards different objectives, (Goitom 2013; Birss 2014; PMG 2014).

4.2.9 CHALLENGE: To communicate and collaborate effectively among stakeholders

The MZWG which was established in 1990, has not been officially active since 2006, but served as an engagement forum for interested and affected parties on aspects of mountain zebra conservation and management. An increase in the number of sub-populations of Cape mountain zebra on private land, an increased interest in utilisation of the species and the increased interest by NGO governing bodies within the wildlife industry in addition to the inactive MZWG, resulted in increased challenges for reconciling the objectives of conservation agencies with the objectives of wildlife ranchers, hunters, animal activists, animal welfare organisations and academia (Novellie *et al.* 2002; Hrabar and Kerley 2015; Scientific Authority 2015; Donian 2016 pers. comm.).

4.2.10 CHALLENGE: To overcome management and capacity constraints

Conservation management agencies are constrained by limited and decreasing funding for the implementation of conservation action plans, compliance and enforcement. Inadequate or inappropriate equipment, capacity and expertise within the formal conservation agency sector as well as in the private ranching sector encumbers effective management of some sub-populations. The deficiency of site-level management plans and an overall management strategy further disables effective and efficient metapopulation-oriented management of Cape mountain zebra sub-populations (Novellie *et al.* 2002; Lindsey *et al.* 2007; Cousins *et al.* 2008; Hrabar and Kerley 2013; Hrabar and Kerley 2015).

4.2.11 CHALLENGE: To create awareness

Cape mountain zebra are not currently perceived to have a conservation value. A major challenge in conservation is influencing people's behaviour. Most conservation issues are complicated and are seen by many people as a luxury, an irrelevance or a threat, despite the many benefits that it provides mankind. Cape mountain zebra has been identified as a flagship species to focus broader conservation marketing campaigns and foster awareness to gain public support, appreciation and a nurturing attitude towards Cape mountain zebra and its habitats (Smith *et al.* 2012; Hrabar and Kerley 2015).

4.2.12 CHALLENGE: To integrate conservation planning

The existing network of protected areas, protected area expansion strategies and the establishment of connectivity corridors, do not adequately incorporate Cape mountain zebra metapopulation conservation objectives. The long term conservation of Cape mountain zebra requires connectivity of suitable habitat,

access to water and optimal forage across landscapes which needs to be incorporated into integrated conservation plans (i.e. identifying spatially explicit priorities and actions for the conservation of Cape mountain zebra) (Penzhorn and Novellie 1991; Winkler and Owen-Smith 1995; Margules and Pressey 2000; Kerley *et al.* 2003; Watson *et al.* 2005; Smith *et al.* 2007; Hurzuk 2009; Ryers *et al.* 2010; Kraaij and Novellie 2010; Watson *et al.* 2011; Smith *et al.* 2011; Hrabar and Kerley 2013; Birss and Schutte-Vlok 2015 pers. comm.; Strauss 2015; Hrabar and Kerley 2015; Lea *et al.* 2016; Birss *et al.* 2016).

5) ACTION PLAN AND MONITORING FRAMEWORK

The Cape mountain zebra BMP-S planning process is aligned to the framework provided by the SSC for species conservation planning. It has guided the stakeholder engagement and planning workshops in defining the objectives and actions for this BMP-S. The various workshop outputs have guided the compilation of the Action Plan and Monitoring Framework to enable effective reporting as shown in Figure 5.

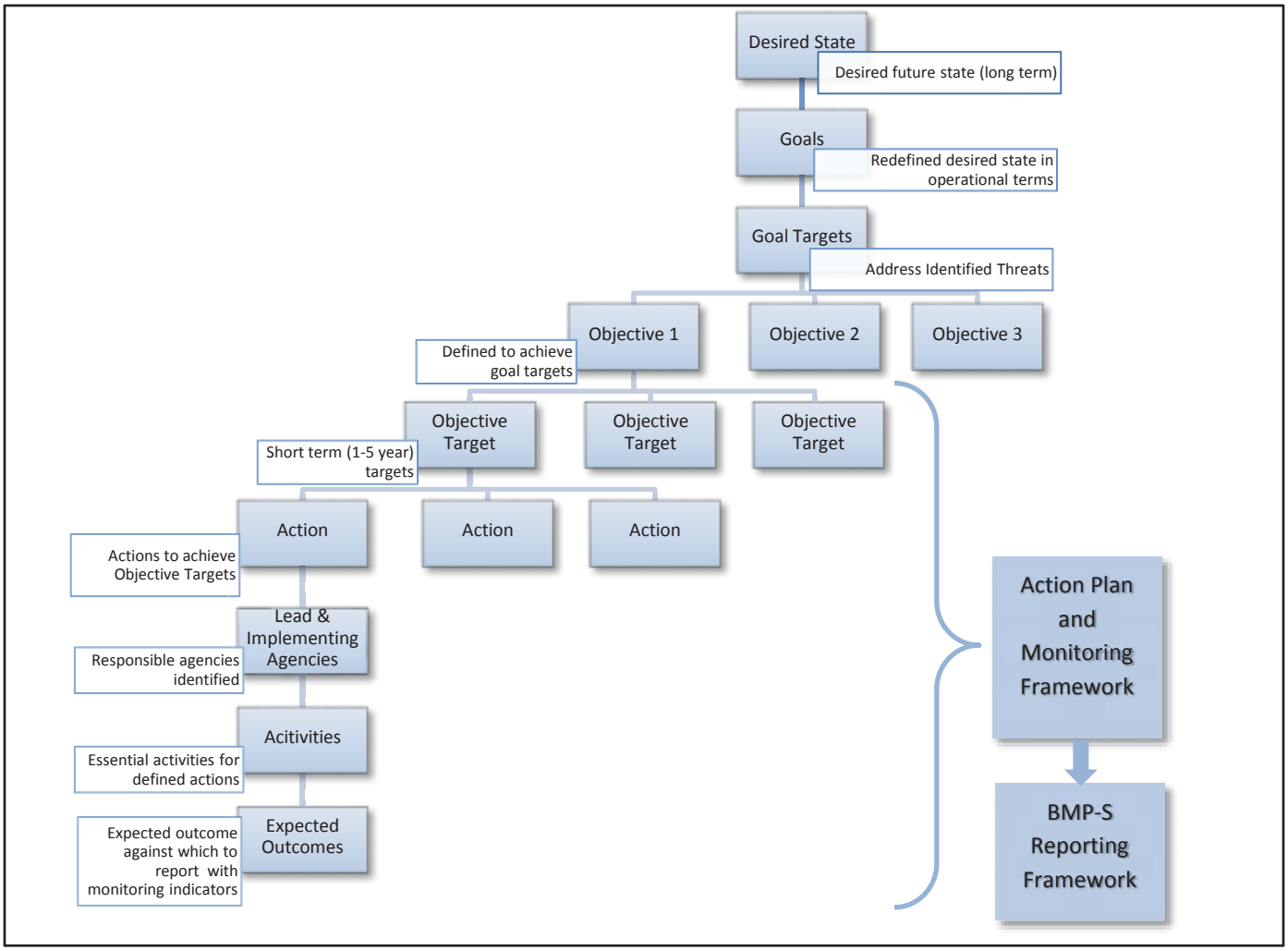


Figure 5: Action Plan and Monitoring Framework derived from IUCN SSC schematic for species conservation planning methodology applied for this BMP-S.

5.1 OBJECTIVE 1: MAINTAIN GENETIC DIVERSITY IN THE CAPE MOUNTAIN ZEBRA META-POPULATION

To achieve the above objective, the following action plans have been developed for implementation through this BMP-S. These actions will need to be implemented by the identified lead and implementing agencies to mitigate the identified threats (inbreeding; population fragmentation; insecure habitat; and hybridisation) and challenges (implementation of metapopulation management; provision of incentives for private land owners; effective communication and collaboration among stakeholders; consistent and uniform implementation of legislation; management and capacity constraints; and the integration of conservation planning).

5.1.1 Objective target: Meta-population management

5.1.1.1 ACTION:	**ESTABLISH AND MAINTAIN A CENTRALISED NATIONAL CAPE MOUNTAIN ZEBRA POPULATION DATABASE.**	
Lead agencies: Implementing agencies: Collaborators:	SANBI, CN, SANParks NZG; SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	
Essential activities:	1) Collate and update Cape mountain zebra distribution, population source, population dynamics, introductions and off-take data annually.	
Expected Outcome in 5 yrs.:	1) An up to date Cape mountain zebra distribution and population numbers database.	
Monitoring and Evaluation:	1) Effective sub-population reporting.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget	Within 1 year of gazetting BMP-S.	National centralised database established.
Challenges: NC DENC has capacity constraints.		

5.1.1.2 ACTION:	**DEVELOP AND IMPLEMENT A SOUND META-POPULATION MANAGEMENT GUIDELINE.**	
Lead agencies: Implementing agencies: Collaborators:	CN, SANParks, ECPTA SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC Higher Education Institutions (HEI)	
Essential activities:	1) Compile Cape mountain zebra meta-population management guidelines with clear objectives and principles for contributing sub-populations (including criteria for identifying source, sink and reinforcement sub-populations and meta-population management methodology); 2) Evaluate the status of all sub-populations and make recommendations for the management and contribution toward the objectives of the Cape mountain zebra meta-population.	
Expected Outcome in 5 yrs.:	1) Improved genetic diversity.	
Monitoring and Evaluation:	1) Number of meta-population strategy participants.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget	Within 1 year of gazetting BMP-S; Meta-population guideline	Meta-population management guideline developed and implemented

	implemented within 3 years of gazetting BMP-S.	
Challenges: NC DENC has capacity constraints.		

5.1.1.3 ACTION:	**DEVELOP A LIST OF PRIORITY SITES FOR REINFORCEMENT AND RE-INTRODUCTION**	
Lead agencies:	CN, SANParks, ECPTA	
Implementing agencies:	SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	
Collaborators:	EWT; WRSA	
Essential activities:	1) Develop assessment guidelines for potential reinforcement and reintroduction sites; 2) Develop prioritisation guideline for potential Cape mountain zebra reinforcement and reintroduction sites; 3) Conduct site assessments and develop prioritised list of sites.	
Expected Outcome in 5 yrs.:	1) List of priority sites for reinforcement and reintroduction; 2) Cape mountain zebra re-introduction and re-enforcement site assessment guidelines.	
Monitoring and Evaluation:	1) Increased distribution of Cape mountain zebra sub-populations in the NDR towards conservation targets.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget	Within 1 year of gazetting BMP-S; Implementation within 2 years of gazetting BMP-S.	Priority sites identified, site assessment, prioritisation and conservation translocation guidelines developed and implemented.
Challenges: NC DENC has capacity constraints.		

5.1.1.4 ACTION:	**ESTABLISH AND REINFORCE CAPE MOUNTAIN ZEBRA SUB-POPULATIONS ON PRIORITISED SITES.**	
Lead agencies:	CN, SANParks, ECPTA	
Implementing agencies:	SANParks; CN; ECPTA	
Collaborators:	EWT	
Essential activities:	1) Develop and implement guidelines for the conservation translocations, establishment and monitoring of mixed source Cape mountain zebra sub-populations (informed by expert genetic management recommendations). 2) Translocate surplus available Cape mountain zebra from source sub-populations to identified priority sites, in accordance with meta-population management guidelines.	
Expected Outcome in 5 yrs.:	1) Increased Cape mountain zebra distribution and sub-population performance.	
Monitoring and Evaluation:	1) Increased establishment and reinforcement of Cape mountain zebra sub-populations.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Funds to be raised.	Within 2 years of gazetting BMP-S.	Cape mountain zebra sub-populations re-enforced and established; increased number of Cape mountain zebra in the NDR; increased average sub-populations size.
Challenges:		

5.1.2 Objective target: Conserve a genetically diverse meta-population

5.1.2.1 ACTION:	INVESTIGATE THE GENETIC DIVERSITY OF THE CAPE MOUNTAIN ZEBRA META-POPULATION.	
Lead agencies: Implementing agencies: Collaborators:	NZG, CN, SANParks SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	
Essential activities:	1) Collect samples and analyse data from maximum number of sub-populations; 2) Research, develop and implement a cost-effective genetic sampling protocol, investigate non-invasive sampling techniques, prioritise sub-populations to be sampled and recommend minimum sample size per sub-population; 3) Research and develop suitable genetic markers using modern technologies to conduct analyses of genetic diversity within sub-populations and consequences of implemented and proposed management actions.	
Expected Outcome in 5 yrs.:	1) Baseline of genetic diversity within sub-populations.	
Monitoring and Evaluation:	1) Increased sampling efficiency and efficacy; 2) Reduced risks associated with invasive sampling techniques; 3) Reliable, repeatable genetic test results achieved; 4) Decreased risk of loss of allelic diversity; 5) Improved sub-population performance.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget	Initiate within 1 year of gazetting BMP-S; Consolidated baseline information within 5 years of gazetting BMP-S.	Standardised Protocols for genetic sampling; Standardised genetic diversity markers developed.
Challenges: NC DENC has capacity constraints.		

5.1.2.2 ACTION:	MONITOR AND MANAGE THE IMPACTS OF META-POPULATION TRANSLOCATIONS ON GENETIC DIVERSITY.	
Lead agencies: Implementing agencies: Collaborators:	NZG, CN, SANParks DEA: ToPS; SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	
Essential activities:	1) Research and develop appropriate monitoring framework to detect and predict potential impacts on the genetic diversity resulting from translocations, reinforcements and mixing or original source populations; 2) Develop genetic management recommendations for reintroduced, reinforced and mixed sub-populations; 3) Implement and monitor the effects of implementing genetic management recommendations for reintroduced, reinforced and mixed sub-populations.	
Expected Outcome in 5 yrs.:	1) Sound meta-population management and translocations for improved sub-population performance.	
Monitoring and Evaluation:	1) Decreased risk of loss of allelic diversity; 2) Improved sub-population performance.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget	Initiate within 1 year of gazetting BMP-S; Consolidated assessment after 5 years of gazetting BMP-S.	Monitoring framework, scientific genetic management and monitoring recommendations developed.

Challenges: NC DENC has capacity constraints.

5.1.2.3 ACTION:	QUANTIFY THE EXTENT OF HYBRIDISATION OF CAPE MOUNTAIN ZEBRA WITH PZ, HMZ AND OTHER EQUIDS.	
Lead agencies:	NZG, CN, SANParks	
Implementing agencies:	NZG; SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	
Collaborators:	SANBI (on database development)	
Essential activities:	1) Collate and centralise distribution data for Cape mountain zebra, PZ and HMZ and known hybrids (Cape mountain zebra with PZ, other equids); 2) Research and develop standardised genetic markers to detect hybrids and genetic profiling for the assessment of genetic integrity; 3) Develop and maintain a centralised database of genetic sequences associated with sub-population distribution.	
Expected Outcome in 5 yrs.:	1) Quantified and effectively managed hybridisation risks.	
Monitoring and Evaluation:	1) Decrease in instances of hybridisation; 2) Eliminate translocation of hybrids.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget	Initiate within 1 year of gazetting BMP-S; Genetic markers and profiling after 3 years of gazetting BMP-S.	Spatial dataset for distribution of Cape mountain zebra, PZ, and HMZ developed; standardised hybridisation detection and genetic profiling developed; genetic sequences database established.
Challenges: NC DENC has capacity constraints.		

5.1.2.4 ACTION:	CONDUCT RESEARCH TO QUANTIFY THE EXTENT AND SEVERITY OF POSSIBLE DISEASE OCCURRENCE IN CAPE MOUNTAIN ZEBRA.	
Lead agencies:	NZG, CN, SANParks	
Implementing agencies:	NZG; SANParks; CN; ECPTA; FS DESTEA; NC DENC	
Collaborators:		
Essential activities:	1) Research and develop the screening of innate immunity genes in Cape mountain zebra to identify disease associated mutations as well as determine diversity of these genes; 2) Research and develop a genetic test for the screening of babesiosis in Cape mountain zebra; 3) Research and develop a genetic test to detect the prevalence and or presence of equine sarcoids in Cape mountain zebra.	
Expected Outcome in 5 yrs.:	1) Effective disease detection and quantified disease susceptibility of Cape mountain zebra sub-populations.	
Monitoring and Evaluation:	1) Known prevalence and distribution of disease; 2) Effective management of disease risk.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget	Within 2 years of gazetting BMP-S.	Standardised genetic tests for disease susceptibility and detection developed.
Challenges: NC DENC has capacity constraints.		

5.1.2.5 ACTION:	ASSESS THE REPRODUCTIVE FITNESS OF CAPE MOUNTAIN ZEBRA SUB-POPULATIONS.	
Lead agencies: Implementing agencies: Collaborators:	NZG, CN, SANParks NZG; SANParks; CN; ECPTA;FS DESTEA; NC DENC	
Essential activities:	1) Opportunistic research and develop reproductive fitness assessment of Cape mountain zebra: conduct fundamental and applied research to further knowledge and understanding of Cape mountain zebra reproduction and integrate results into management recommendations.	
Expected Outcome in 5 yrs.:	1) Sound meta-population management for improved reproductive fitness and sub-population performance.	
Monitoring and Evaluation:	1) Sub-populations' reproductive performance assessed.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget	Opportunistic (as animals become available).	Reproductive fitness assessment report for sampled sub-populations (opportunistic during translocations).
Challenges: NC DENC has capacity constraints. Access to animals and high cost and risk of moving animals, so optimise opportunity.		

5.1.3 Objective target: Safeguard Cape mountain zebra against hybridisation

5.1.3.1 ACTION:	MANAGE THE RISK OF HYBRIDISATION OF CAPE MOUNTAIN ZEBRA WITH PZ, HMZ AND OTHER EQUIDS.	
Lead agencies: Implementing agencies: Collaborators:	SANParks, CN SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	
Essential activities:	1) Assess, quantify and prioritise Cape mountain zebra sub-populations at risk of hybridisation; 2) Develop a hybrid detection guideline based on phenotypic identification and traits.	
Expected Outcome in 5 yrs.:	1) Reduced risk of hybridisation for Cape mountain zebra sub-populations.	
Monitoring and Evaluation:	1) Decrease in hybridisation risk.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget	Within 1 year of gazetting BMP-S.	Cape mountain zebra sub-populations at risk of hybridisation assessed; hybridisation detection guideline developed (phenotypic assessment).
Challenges: NC DENC has capacity constraints.		

5.1.4 Objective target: Known impact of disease in Cape mountain zebra

5.1.4.1 ACTION:	IMPLEMENT A SARCOID SURVEILLANCE PROTOCOL LINKED TO THE NATIONAL CAPE MOUNTAIN ZEBRA POPULATION MONITORING DATABASE.	
Lead agencies:	SANParks	
Implementing agencies:	CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	
Collaborators:	NZG; DAFF: State Veterinarian; DEA: ToPS	
Essential activities:	1) Develop and maintain a reporting protocol for sarcoidosis in Cape mountain zebra sub-populations; 2) Develop and implement Cape mountain zebra sarcoidosis post mortem protocol for collection and banking of relevant material with the NZG Biobank.	
Expected Outcome in 5 yrs.:	1) Known prevalence and distribution of disease, associated with understanding of genetic diversity of sub-populations.	
Monitoring and Evaluation:	1) Known prevalence and distribution of disease; 2) Disease risk mitigation.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget	Initiate within 1 year of gazetting BMP-S.	Disease surveillance and post mortem protocols developed; Disease prevalence reported.
Challenges: NC DENC has capacity constraints.		

5.1.4.2. ACTION:	PROMOTE AND FACILITATE RESEARCH ON CAPE MOUNTAIN ZEBRA PARASITE LOAD AND HOST-PATHOGEN INTERACTIONS.	
Lead agencies:	NZG	
Implementing agencies:	SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	
Collaborators:		
Essential activities:	1) Research aetiological agents of disease to further knowledge and understanding of epidemiology.	
Expected Outcome in 5 yrs.:	1) Parasite prevalence data.	
Monitoring and Evaluation:	1) Known parasite load and distribution.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget	Initiate within 1 year of gazetting BMP-S.	Parasite Load Assessments for sampled sub-populations (Opportunistic during translocations)
Challenges: NC DENC has capacity constraints.		

5.2 OBJECTIVE 2: UNDERTAKE MONITORING AND RESEARCH TO INFORM ADAPTIVE MANAGEMENT

To achieve the above objective, the following action plans have been developed for implementation through this BMP-S. These actions will need to be implemented by the identified lead and implementing agencies to mitigate the identified threats (inbreeding; habitat fragmentation and alteration; and hybridisation) and challenges (implementation of metapopulation management; effective communication and collaboration among stakeholders; management and capacity constraints; and the integration of conservation planning).

5.2.1 Objective target: Long term monitoring of Cape mountain zebra sub-populations

5.2.1.1 ACTION:	IMPLEMENT STANDARDISED CAPE MOUNTAIN ZEBRA SURVEY AND MONITORING PROTOCOLS FOR PROTECTED AREAS TO INFORM ADAPTIVE MANAGEMENT.	
Lead agencies:	CN, SANParks, ECPTA	
Implementing agencies:	SANParks; CN; ECPTA; FS DESTEA; NC DENC	
Collaborators:	SANBI	
Essential activities:	1) Develop standardised data collection and population monitoring protocols for Cape mountain zebra sub-populations on protected areas (incorporating the guidelines compiled by the MZWG); 2) Develop standardised population monitoring protocols for Cape mountain zebra sub-populations on private land (incorporating the guidelines compiled by the MZWG); 3) Conduct regular standardised sub-population assessments according to guidelines (precision based, game census).	
Expected Outcome in 5 yrs.:	1) Quality population monitoring data to inform assessments of sub-population performance and determination of off-take quotas.	
Monitoring and Evaluation:	1) Improved and consistent population trend monitoring and reporting.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget; Supplementary funds to be raised for total census.	Initiate within 1 year of gazetting BMP-S; Total census conducted at least once per sub-population in 5 years.	Precision based total census of protected areas with Cape mountain zebra; Standardised data collection and population monitoring protocols developed and implemented.
Challenges: NC DENC has capacity constraints.		

5.2.1.2 ACTION:	IMPLEMENT RESEARCH ON HABITAT MANAGEMENT (INCLUDING IMPROVEMENT AND REHABILITATION) FOR CAPE MOUNTAIN ZEBRA.
Lead agencies:	CN, SANParks, ECPTA
Implementing agencies:	SANParks; CN; ECPTA; FS DESTEA; NC DENC
Collaborators:	Manchester University, EWT
Essential activities:	1) Facilitate research to inform appropriate Cape mountain zebra habitat management, (incorporate fire, alien vegetation, predation and game stocking where applicable). 2) Implement best-practice and research findings for integrated fire-alien vegetation-game stocking-predation for Cape mountain zebra habitat management.

Expected Outcome in 5 yrs.:	1) Applied research informing management actions for Cape mountain zebra sub-populations.	
Monitoring and Evaluation:	1) Research publications, draft publications and reports.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Research funding to be sourced.	Initiate within 1 year of gazetting BMP-S.	Applied research on habitat management conducted, informs adaptive management of Cape mountain zebra sub-population sites.
Challenges: NC DENC has capacity constraints.		

5.2.1.3 ACTION:	**SUBMIT ANNUAL CAPE MOUNTAIN ZEBRA SUB-POPULATION STATUS REPORTS.**	
Lead agencies:	CN, SANParks, ECPTA	
Implementing agencies:	SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	
Collaborators:	SANBI	
Essential activities:	1) Develop and implement standardised annual reporting formats for Cape mountain zebra sub-populations; 2) Collate sub-population status reports and analyse overall meta-population performance.	
Expected Outcome in 5 yrs.:	1) Quality population data to inform conservation assessments.	
Monitoring and Evaluation:	1) Improved meta-population performance. 2) Improved knowledge and understanding of meta-population performance.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget	Within 1 year of gazetting BMP-S; Annually.	Standardised reporting formats developed and implemented.
Challenges: NC DENC has capacity constraints.		

5.2.1.4 ACTION:	**ASSESS POPULATION PERFORMANCE AND HABITAT CONDITION FOR CAPE MOUNTAIN ZEBRA ON PRIVATE LAND.**	
Lead agencies:	CN, EC DEDEAT	
Implementing agencies:	CN; EC DEDEAT; FS DESTEA; NC DENC	
Collaborators:	SANBI; SANParks; ECPTA; HEI; EWT	
Essential activities:	1) Regulatory agencies to develop and implement standardised habitat and population assessments for Cape mountain zebra on private land (incorporating the guidelines compiled by the MZWG); 2) Conduct assessment of habitat quality, habitat area availability, intra-specific competition and water availability for Cape mountain zebra sub-populations on private land.	
Expected Outcome in 5 yrs.:	1) Quality population and habitat conditions data to inform conservation assessments.	
Monitoring and Evaluation:	1) Improved meta-population performance; 2) Maintenance of ecological processes.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget	Within 2 years of gazetting BMP-S.	Standardised habitat and population assessments for Cape mountain zebra on private land developed and implemented.
Challenges: NC DENC has capacity constraints.		

5.3 OBJECTIVE 3: CONSISTENTLY AND UNIFORMLY IMPLEMENT LEGISLATION, REGULATIONS, POLICIES AND GUIDELINES

To achieve the above objective, the following action plans have been developed for implementation through this BMP-S. These actions will need to be implemented by the identified lead and implementing agencies to mitigate the identified threats (insecure habitat; and hybridisation) and challenges (provision of incentives for private land owners; effective communication and collaboration among stakeholders; consistent and uniform implementation of legislation; and management and capacity constraints).

5.3.1 Objective target: Consistent and uniform development and implementation of legislation and policy.

5.3.1.1 ACTION:	DEVELOP NATIONAL TRANSLOCATION GUIDELINES	
Lead agencies:	CN, SANParks, DEA: ToPS	
Implementing agencies:	DEA: ToPS; NZG; SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	
Collaborators:	EWT	
Essential activities:	1) Develop a national guideline to avoid and manage the risks of Cape mountain zebra hybridising with PZ, HMZ and other equids, including mitigation of hybridisation risks to be implemented in the event of escapes from protected areas and stewardship (including custodianship) sites; 2) Develop and implement a national protocol for DNA sampling, testing and reporting on hybridisation; 3) Develop a national translocation guideline (Norms and Standards in terms of section 9, read with section 100, of NEM: BA, which includes a requirement for genetic testing and translocation policy) for Cape mountain zebra, incorporating the risks posed by AHS on translocations.	
Expected Outcome in 5 yrs.:	1) Appropriate regulatory measures developed and gazetted to reduce hybridisation and genetic risks to Cape mountain zebra sub-populations.	
Monitoring and Evaluation:	1) Uniform policy and regulation.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget	Initiate within 1 year of gazetting BMP-S; Norms and Standards after 5 years of gazetting BMP-S.	National guidelines and protocols for avoiding and mitigating the risks of hybridisation developed; National norms and standards for translocation of Cape mountain zebra developed.
Challenges: NC DENC has capacity constraints.		

5.3.1.2 ACTION:	IMPLEMENT AN ADAPTIVE MANAGEMENT STRATEGY FOR SUSTAINABLE OFF-TAKES OF CAPE MOUNTAIN ZEBRA CAPE MOUNTAIN ZEBRA
Lead agencies:	SANBI, CN, SANParks
Implementing agencies:	SANParks; CN; EC DEDEAT; FS DESTEA; NC DENC
Collaborators:	DEA; ECPTA
Essential activities:	1) Develop an appropriate adaptive MSE model for determining sustainable Cape mountain zebra hunting quotas; CITES removed so that local and international hunting (removal of the animal) is captured

	2) Develop and implement standardised site-level decision support and assessment models for evaluating and advising on the potential site level impacts of off-takes.	
Expected Outcome in 5 yrs.:	1) Sustainable off-takes and management of Cape mountain zebra sub-populations.	
Monitoring and Evaluation:	1) Trophy hunting exports. 2) Permits issued for translocation or hunting.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget	Within 1 year of gazetting BMP-S.	A system for the allocation of CITES hunting quota; Site level off-take assessment model developed.
Challenges: NC DENC has capacity constraints.		

5.4 OBJECTIVE 4: EFFECTIVELY COMMUNICATE, COLLABORATE AND COORDINATE BETWEEN STAKEHOLDERS AND THE PUBLIC FOR CAPE MOUNTAIN ZEBRA CONSERVATION

To achieve the above objective, the following action plans have been developed for implementation through this BMP-S. These actions will need to be implemented by the identified lead and implementing agencies to mitigate the identified threats (inbreeding; habitat and population fragmentation; insecure and altered habitat; and hybridisation) and challenges (implementation of metapopulation management; provision of incentives for private land owners; effective communication and collaboration among stakeholders; consistent and uniform implementation of legislation; management and capacity constraints; integration of conservation planning; and increasing awareness).

5.4.1 Objective target: Establish and maintain partnerships for Cape mountain zebra conservation.

5.4.1.1 ACTION:	FORMALISE INTER-AGENCY COLLABORATION TO COORDINATE AND REVIEW THE IMPLEMENTATION OF THE CAPE MOUNTAIN ZEBRA BMP-S.	
Lead agencies: Implementing agencies: Collaborators:	DEA: BC CN; SANParks; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	
Essential activities:	1) Establish a Steering Committee for the implementation and review of the Cape mountain zebra BMP-S; 2) Develop Steering Committee terms of reference and reporting framework; 3) Develop and implement an inter-agency capacity development and exchange strategy; 4) Draft an inter-agency MOU for the exchange, and or donation of Cape mountain zebra to attain the objectives of the Cape mountain zebra BMP-S.	
Expected Outcome in 5 yrs.:	1) Effective, collaborative coordination among stakeholders.	
Monitoring and Evaluation:	1) Steering Committee Terms of Reference; Inter Agency MOUs.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget; Supplementary funding to be raised to enable agency	Initiate within 1 year of gazetting BMP-S.	Cape mountain zebra BMP-S Steering Committee established; Inter-agency capacity developed; Cape mountain zebra sourced and donated.

capacity building and knowledge exchange.		
Challenges: NC DENC has capacity constraints.		

5.4.1.2 ACTION:	**ENGAGE AND COLLABORATE WITH STAKEHOLDERS TO ACHIEVE THE OBJECTIVES OF THE CAPE MOUNTAIN ZEBRA BMP-S.**	
Lead agencies:	CN, SANParks, ECPTA	
Implementing agencies:	DEA; SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	
Collaborators:	Private Sector; WRSA; NZG	
Essential activities:	1) Evaluate the potential for and implement custodianship agreements and fence-permeability agreements for Cape mountain zebra sub-populations exposed to habitat availability pressure; 2) Communicate Cape mountain zebra BMP-S aligned research, implementation progress, research needs and requirements to stakeholders, research partners and research institutions; 3) Compile a Cape mountain zebra driven People and Parks conservation strategy. 4) Investigate and report on National Biodiversity Economy Strategy (BES) ventures appropriate for Cape mountain zebra.	
Expected Outcome in 5 yrs.:	1) Cape mountain zebra sub-populations secured on good habitat and effectively managed; Knowledge generated and disseminated.	
Monitoring and Evaluation:	1) Agreements and MOUs signed; Research and People and Parks projects implemented.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget	Initiate within 1 year of gazetting BMP-S.	Stewardship; Custodianship agreements; Collaborative research projects; People and Parks projects implemented; identified BES ventures implemented.
Challenges: NC DENC has capacity constraints.		

5.4.1.3 ACTION:	**IMPLEMENT HABITAT EXPANSION THROUGH STEWARDSHIP, CUSTODIANSHIP AND CONNECTIVITY CORRIDORS.**	
Lead agencies:	CN, SANParks, ECPTA	
Implementing agencies:	SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	
Collaborators:	EWT; WWF; DEA: BC	
Essential activities:	1) Integrate Cape mountain zebra habitat requirements into conservation planning processes and identify priority Cape mountain zebra habitat sites at provincial and national level to inform expansion and custodianship initiatives; 2) Prioritise and implement Cape mountain zebra stewardship and custodianship agreements at priority sites; 3) Purchase suitable land for Cape mountain zebra habitat expansion.	
Expected Outcome in 5 yrs.:	1) Cape mountain zebra sub-populations secured on good habitat and effectively managed.	
Monitoring and Evaluation:	1) Integrated conservation planning with Cape mountain zebra habitat priorities; 2) Cape mountain zebra habitat expansion and land acquisition.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget; Supplementary funding to be raised for land acquisitions.	Initiate within 1 year of gazetting BMP-S.	Integrated conservation planning, prioritised Cape mountain zebra stewardship and land acquisition sites identified.

Challenges: NC DENC has capacity constraints.

5.4.2 Objective target: Increase private sector investment and support for Cape mountain zebra conservation.

5.4.2.1 ACTION:	DEVELOP INCENTIVES FOR STAKEHOLDERS TO PARTICIPATE IN AND CONTRIBUTE TO ACHIEVING THE OBJECTIVES OF THE CAPE MOUNTAIN ZEBRA BMP-S.	
Lead agencies:	CN, SANParks, ECPTA	
Implementing agencies:	DEA: BC; NZG; SANBI; SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	
Collaborators:	EWT; Private Sector, WRSA; Birdlife; DEA: ToPS	
Essential activities:	1) Investigate and develop appropriate incentives for participation in Cape mountain zebra conservation, in consultation with stakeholders;	
Expected Outcome in 5 yrs.:	1) Increased participation in Cape mountain zebra conservation by private land owners.	
Monitoring and Evaluation:	1) Distribution of Cape mountain zebra sub-populations - number of properties and extent of occurrence.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget; Supplementary funding to be raised for stakeholder workshops.	Within 1 year of gazetting BMP-S.	Incentives schemes developed for participation in Cape mountain zebra conservation, BES ventures implemented.
Challenges: NC DENC has capacity constraints.		

5.4.2.2 ACTION:	DEVELOP INCENTIVES FOR THE EFFECTIVE IMPLEMENTATION OF THE META-POPULATION MANAGEMENT STRATEGY BY ALL STAKEHOLDERS.	
Lead agencies:	CN, SANParks, ECPTA	
Implementing agencies:	DEA: BC; SANParks; CN; ECPTA; EC DEDEAT; NC DENC	
Collaborators:		
Essential activities:	1) Develop and implement Cape mountain zebra meta-population custodianship endorsement scheme.	
Expected Outcome in 5 yrs.:	1) Increased participation by Cape mountain zebra custodians.	
Monitoring and Evaluation:	1) Distribution of Cape mountain zebra sub-populations - number of properties and extent of occurrence.	
Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget; Supplementary funding to be raised for stakeholder workshops.	Within 2 years of gazetting BMP-S.	Cape mountain zebra meta-population custodians endorsed.
Challenges: NC DENC has capacity constraints.		

5.4.2.3 ACTION:	DEVELOP INCENTIVES FOR THE EFFECTIVE AVERSION AND MITIGATION OF CAPE MOUNTAIN ZEBRA HYBRIDISATION THREATS.
Lead agencies:	CN, SANParks, ECPTA

Implementing agencies:	SANParks; CN; ECPTA; EC DEDEAT; NC DENC
Collaborators:	Private Sector; WRSA
Essential activities:	1) Investigate, develop and implement incentives for extirpation of HMZ from prioritised areas in the Cape mountain zebra NDR.
Expected Outcome in 5 yrs.:	1) Increased participation in Cape mountain zebra conservation by private land owners and other stakeholders.
Monitoring and Evaluation:	1) Distribution of Cape mountain zebra sub-populations - number of properties and extend of occurrence.

Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget; Supplementary funding to be raised for stakeholder workshops.	Within 3 years of gazetting BMP-S.	Extirpation of HMZ and Cape mountain zebra hybrids in priority Cape mountain zebra areas.

Challenges: NC DENC has capacity constraints.

5.4.3 Objective target: Increase public awareness and education on the status and threats facing Cape mountain zebra.

5.4.3.1 ACTION:	IMPLEMENT ENVIRONMENTAL EDUCATION AND EXTENSION INITIATIVES TO PROMOTE AWARENESS ON THE STATUS AND THREATS FACING CAPE MOUNTAIN ZEBRA.
Lead agencies:	CN, SANParks
Implementing agencies:	SANParks; CN; ECPTA; NC DENC
Collaborators:	NZG; EWT
Essential activities:	1) Develop resources and tools to facilitate environmental education and extension, focussing on the status and threats facing Cape mountain zebra; 2) Incorporate Cape mountain zebra as a case study in environmental education initiatives, i.e. the Green Matter Gamification Initiative.
Expected Outcome in 5 yrs.:	1) Increased awareness of stakeholders and public on the importance of Cape mountain zebra as an indicator species.
Monitoring and Evaluation:	1) Resources and tools developed and number of people targeted.

Funding / Resources	Timeframe	Measurable Indicators / Outputs
Agency operational budget; Supplementary funding to be raised for environmental education activities.	Within 2 years of gazetting BMP-S.	Resources and tools developed for environmental education and extension; environmental education activities conducted.

Challenges: NC DENC has capacity constraints.

6) CAPE MOUNTAIN ZEBRA BMP-S REPORTING FRAMEWORK

Below is the outline of the reporting framework based on the draft provided by DEA. It indicates the actions and the responsible reporting agencies.

ACTIONS	RESPONSIBLE AGENCY	TIMELINE	RESOURCES NEEDED	IMPLEMENTING AGENCIES / COLLABORATORS	DELIVERABLES	MEASURABLE OUTCOMES	PROGRESS	CHALLENGES / CORRECTIVE MEASURES
OBJECTIVE 1	MAINTAIN GENETIC DIVERSITY IN THE CAPE MOUNTAIN ZEBRA META-POPULATION							
Objective Target 1.1	Meta-population management							
1.1.1 Maintain a centralised national Cape mountain zebra population database.	SANBI, CN, SANParks			NZG; SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	Spatial Cape mountain zebra distribution databases	National centralised database established		
1.1.2 Develop and implement a sound meta-population management guideline.	CN, SANParks, ECPTA			CN; SANParks; ECPTA; EC DEDEAT; FS DESTEA; NC DENC; HEI	Meta-population management guideline; Assessment of sub-populations	Meta-population management guideline developed and implemented		
1.1.3 Develop a list of priority sites for reinforcement and reintroduction.	CN, SANParks, ECPTA			SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC; EWT; WRSA	Priority sites identified; Site assessment, translocation and prioritisation guideline	Priority sites identified; Increased distribution of Cape mountain zebra sub-populations in NDR		
1.1.4 Establish and reinforce Cape mountain zebra sub-populations on prioritised sites.	CN, SANParks, ECPTA			SANParks; CN; ECPTA; EWT	Translocation of Cape mountain zebra to priority sites	Increased distribution of viable Cape mountain zebra sub-populations		
Objective Target 1.2	Conserve genetically diverse meta-population							
1.2.1 Investigate the genetic diversity of the Cape mountain zebra meta-population.	NZG, CN, SANParks			SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	Genetic sampling protocol; Genetic markers developed; Samples collected.	Baseline of genetic diversity in sub-populations		
1.2.2 Monitor and manage the impacts of meta-population translocations on genetic diversity	NZG, CN, SANParks			SANParks; CN; DEA: ToPS; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	Genetic monitoring framework and management recommendations	Sound meta-population translocations		
1.2.3 Quantify the extent of hybridisation of Cape	NZG, CN, SANParks			NZG; SANParks; CN; ECPTA; EC DEDEAT;	Centralised distribution data for Cape mountain zebra, HMZ and PZ;	Managed hybridisation risk		

ACTIONS	RESPONSIBLE AGENCY	TIMELINE	RESOURCES NEEDED	IMPLEMENTING AGENCIES / COLLABORATORS	DELIVERABLES	MEASURABLE OUTCOMES	PROGRESS	CHALLENGES / CORRECTIVE MEASURES
mountain zebra with PZ, HMZ and other equids.				FS DESTEA; NC DENC	Genetic markers for hybridisation; Genetic sequence database			
1.2.4 Conduct research to quantify the extent and severity of possible disease occurrence in Cape mountain zebra.	NZG, CN, SANParks			NZG; SANParks; CN; ECPTA; FS DESTEA; NC DENC	Innate immunity genes screened; genetic tests for babesiosis and sarcoidosis	Disease risk mitigated		
1.2.5 Assess the reproductive fitness of Cape mountain zebra sub-populations.	NZG, CN, SANParks			NZG; SANParks; CN; ECPTA;FS DESTEA; NC DENC	Reproductive fitness of Cape mountain zebra sub-populations assessed	Improved reproductive fitness in Cape mountain zebra sub-populations		
Objective Target 1.3	Safeguard Cape mountain zebra against hybridisation							
1.3.1 Manage the risk of hybridisation of Cape mountain zebra with PZ, HMZ and other equids.	SANParks, CN			SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	Hybrid detection and hybrid risk assessment protocols	Decrease in instances of hybridisation		
Objective Target 1.4	Known impact of disease in Cape mountain zebra							
1.4.1 Implement a sarcoid surveillance protocol linked to the national Cape mountain zebra population monitoring database.	SANParks			SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC; NZG; DAFF: State Veterinarian; DEA: ToPS	Sarcoid surveillance	Disease prevalence and impact documented		
1.4.2 Promote and facilitate research on Cape mountain zebra parasite load and host-pathogen interactions.	NZG			SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC	Parasite load assessments and epidemiology research	Research outputs		
OBJECTIVE 2	IMPLEMENT MONITORING AND RESEARCH TO INFORM ADAPTIVE MANAGEMENT							
Objective Target 2.1	Long term monitoring of Cape mountain zebra sub-populations							
2.1.1 Implement standardised Cape mountain zebra survey and monitoring protocols for protected	CN, SANParks, ECPTA			SN; SANParks; ECPTA; FS DESTEA; NC DENC; SANBI	Precise game censuses; standardised monitoring protocols	Accurate population trend data		

ACTIONS	RESPONSIBLE AGENCY	TIMELINE	RESOURCES NEEDED	IMPLEMENTING AGENCIES / COLLABORATORS	DELIVERABLES	MEASURABLE OUTCOMES	PROGRESS	CHALLENGES / CORRECTIVE MEASURES
areas to inform adaptive management.								
2.1.2 Implement research on habitat management (including improvement and rehabilitation) for Cape mountain zebra.	CN, SANParks, ECPTA			CN; SANParks; ECPTA; FS DESTEA; NC DENC, Manchester University; EWT	Research informing and implementation of integrated habitat management for Cape mountain zebra	Research publications; Improved habitat management		
2.1.3 Submit annual Cape mountain zebra sub-population status reports.	CN, SANParks, ECPTA			SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC; SANBI	Standardised annual reporting and status reports	Quality Cape mountain zebra sub-population data		
2.1.4 Assess population performance and habitat condition for Cape mountain zebra on private land.	CN, EC DEDEAT			CN; EC DEDEAT; FS DESTEA; NC DENC; SANBI; SANParks; ECPTA; HEI; EWT.	Standardised habitat and population assessments for introductions	Viable populations introduced		
OBJECTIVE 3	CONSISTENTLY AND UNIFORMLY DEVELOP AND IMPLEMENT LEGISLATION, REGULATIONS, POLICIES AND GUIDELINES							
Objective Target 3.1	Consistent and uniform implementation of legislation and policy							
3.1.1 Develop national translocation guidelines.	CN, SANParks, DEA: ToPS			DEA: ToPS; NZG; SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC; EWT	National guidelines for mitigation of hybridisation risk, DNA testing and translocation of Cape mountain zebra	Uniform policy and regulation – managed hybridisation risk		
3.1.2 Implement national guidelines for management of off-takes in accordance with the CITES NDF recommendations for Cape mountain zebra.	SANBI, CN, SANParks			SANParks; CN; EC DEDEAT; FS DESTEA; NC DENC; DEA; ECPTA	MSE for sustainable harvesting and Cape mountain zebra quotas	Sustainable hunting quotas		
OBJECTIVE 4	EFFECTIVELY COMMUNICATE, COLLABORATE AND COORDINATE BETWEEN STAKEHOLDERS AND THE PUBLIC FOR CAPE MOUNTAN ZEBRA CONSERVATION							
Objective Target 4.1	Establish and maintain partnerships for Cape mountain zebra conservation							
4.1.1 Formalise inter-agency collaboration to	DEA: BC			SANParks; CN; ECPTA; EC DEDEAT;	Cape mountain zebra BMP-S Steering	Inter-agency collaboration		

ACTIONS	RESPONSIBLE AGENCY	TIMELINE	RESOURCES NEEDED	IMPLEMENTING AGENCIES / COLLABORATORS	DELIVERABLES	MEASURABLE OUTCOMES	PROGRESS	CHALLENGES / CORRECTIVE MEASURES
coordinate and review the implementation of the Cape mountain zebra BMP-S.				FS DESTEA; NC DENC	Committee; Inter-agency MOU and capacity exchange			
4.1.2 Engage and collaborate with stakeholders to achieve the objectives of the Cape mountain zebra BMP-S.	CN, SANParks, ECPTA			DEA; SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC; Private Sector; WRSA; NZG	Stewardship; Custodianship agreements; MOUs; Research partnerships	Stakeholder participation in Cape mountain zebra conservation		
4.1.3 Implement habitat expansion through stewardship, custodianship and connectivity corridors	CN, SANParks, ECPTA			SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC; EWT; WWF; DEA: BC	Integrated conservation plans informing stewardship and land acquisition	Stewardship agreements and land acquisition for Cape mountain zebra conservation		
Objective Target 4.2	Increase private sector investment and support for Cape mountain zebra conservation							
4.2.1 Develop incentives for stakeholders to participate in and contribute to achieving the objective of the Cape mountain zebra BMP-S.	CN, SANParks, ECPTA			DEA: BC; NZG; SANBI; SANParks; CN; ECPTA; EC DEDEAT; FS DESTEA; NC DENC; EWT; Private Sector; WRSA; Birdlife; DEA: ToPS	Stakeholder consultations and participation in BES ventures	Incentives developed		
4.2.2 Develop incentives for the effective implementation of the meta-population management strategy by all stakeholders.	CN, SANParks, ECPTA			DEA: BC; SANParks; CN; ECPTA; EC DEDEAT; NC DENC	Custodianship endorsements	Cape mountain zebra meta-population custodianships		
4.2.3 Develop incentives for the effective aversion and mitigation of Cape mountain zebra hybridisation threats.	CN, SANParks, ECPTA			SANParks; CN; ECPTA; EC DEDEAT; NC DENC; Private Sector; WRSA	Incentives for HMZ extirpation from Cape mountain zebra NDR	Incentives developed		
Objective Target 4.3	Increase public awareness and education on the status and threats facing Cape mountain zebra							

ACTIONS	RESPONSIBLE AGENCY	TIMELINE	RESOURCES NEEDED	IMPLEMENTING AGENCIES / COLLABORATORS	DELIVERABLES	MEASURABLE OUTCOMES	PROGRESS	CHALLENGES / CORRECTIVE MEASURES
4.3.1 Implement environmental education and extension initiatives to promote awareness on the status and threats facing Cape mountain zebra.	CN, SANParks			SANParks; CN; ECPTA; NC DENC; NZG; EWT	Environmental education and awareness incentives	Environmental education and awareness tools; Target groups engaged		

7) REFERENCES

De Alcântara B.K., Alfieri A.A., Headley S.A., Rodrigues W.B., Otonel R.A.A., Lunardi M. and Alfieri A.F. 2015. Molecular characterization of bovine Deltapapillomavirus (BPV1, 2, and 13) DNA in equine sarcoids. Pesquisa Veterinária Brasileira 35(5):431-436. Brazil.

Allendorf, F.W., Luikart, G.H. and Aitken, S.N. 2012. Conservation and the Genetics of Populations. Blackwell Publishing. Hoboken, United States.

Akçakaya, H.R., Mills, G. and Doncaster, C.P. 2007. The role of metapopulations in conservation. In: Key Topics in Conservation Biology (Ed. by D. Macdonald and K. Service), pp. 64–84. Blackwell Publishing, Oxford, UK.

Barry, T., Schutte-Vlok, A. and Wheeler, A.D. 2016. Gamkaberg World Heritage Site and Nature Reserve Complex: Protected Area Management Plan. Unpublished report, CapeNature, Cape Town.

Biggs, R., M. Schlüter, D. Biggs, E.L. Bohensky, S. Burnsilver, G. Cundill, V. Dakos, T. Daw, L. Evans, K. Kotschy, A. Leitch, C. Meek, A. Quinlan, C. Raudsepp-Hearne, M. Robards, M.L. Schoon, L. Schultz and P.C . West. 2012. Towards principles for enhancing the resilience of ecosystem services. *Annual Review of Environment and Resources* 37, 421-448.

Birss, C., Rushworth, I., Peinke, D. and Buijs, D. 2015. Inferred Natural Distribution Ranges of Large Mammals in South Africa. Unpublished GIS coverage.

Birss, C., Saul, L. and Schutte-Vlok, A. 2016. Draft CapeNature Report: A method for assessing potential re-introduction sites for Cape mountain zebra in the Western Cape Province.

Birss, C. 2014. Conservation in a Regulatory Framework in: Kotze, A., Lane, E. and Nxomani, C. (eds). One Health. Centre for Wildlife Health, National Zoological Garden of South Africa, Pretoria. ISBN: 978-0-620-59504-9.

Boshoff, A.F. Landman, M. and Kerley, G.I.H. 2015. Filling the gaps on the maps: historical distribution patterns of some larger mammals in part of southern Africa. Transactions of the Royal Society of South Africa. University of South Africa Press, Pretoria.

Convention on Biological Diversity. 2013. https://www.cbd.int/sp/elements/default.shtml; https://www.cbd.int/sp/targets/ and https://www.cbd.int/doc/strategic-plan/2011-2020/Aichi-Targets-EN.pdf downloaded on 21 June 2016.

Chadwick, P. and Watson, L. H. 2007. Management of Cape mountain zebra in the Kammanassie Nature Reserve, South Africa. South African Journal of Wildlife Research37: 31-39.

Chaffin, B. C., H. Gosnell, and B. A. Cosens. 2014. A decade of adaptive governance scholarship: synthesis and future directions, *Ecology and Society* **19**(3): 56. http://dx.doi.org/10.5751/ES-06824-190356.

Cilliers, P., H. C. Biggs, S. Blignaut, A. G. Choles, J. S. Hofmeyr, G. P. W. Jewitt, and D. J. Roux. 2013. Complexity, modeling, and natural resource management. *Ecology and Society* **18**(3): 1. http://dx.doi. org/10.5751/ES-05382-180301.

Cleaver, G. 2004. Environmental impacts of large-scale groundwater abstraction on eco-systems of the Kammanassie Mountain. M. Tech. thesis. University of South Africa. Pretoria.

Cleaver, G., Brown, L.R., Bredenkamp, G.J., Smart, M. and Rautenbach, CJ de W., 2003. Assessment of environmental impacts of groundwater abstraction from Table Mountain Group (TMS) Aquifers on ecosystems in the Kammanassie Nature Reserve and environs. Water Research Commission Report No. 1115/1/03.

Clinchy, M., Haydon, D.T. and Smith, A.T. (2002) Pattern does not equal process: what does patch occupancy really tell us about metapopulation dynamics? The American Naturalist, 159, 351–362

Cousins, J.A., Sadler, J.P. and Evans, J. 2008. Exploring the role of private wildlife ranching as a conservation tool in South Africa: stakeholder perspectives. Ecology and Society 13 (2): 43.

Dalton, D.L., Zimmerman, D., Mnisi, C., Taplin, M., Novellie, P., Hrabar, H. and Kotze, A. in press. Hiding in plain sight: evidence of hybridisation between Cape mountain and plains zebra.

Dietz, T., E. Ostrom, and P. C. Stern. 2003. The struggle to govern the commons. Science 302:1907-1912. http://dx.doi.org/10.1126/ science.1091015.

Doremus, H. 2001. Adaptive Management, the Endangered Species Act, and the Institutional Challenges of New Age Environmental Protection, Washburn Law Journal 41: 50-89, Available at: http://scholarship.law.berkeley.edu/facpubs/973.

Du Toit, J.G. and Van Schalkwyk, O.L. 2012. How to improve wildlife production in South Africa. Unpublished Report. Pretoria.

Elmhagen, B. and Angerbjörn, A. 2001. The applicability of metapopulation theory to large mammals. Oikos, 94, 89–100.

Frankham, R., Ballou, J.D. and Briscoe, D.A. 2002. Introduction to Conservation Genetics. Cambridge University Press. Cambridge. United Kingdom.

Friedman, Y. and Daly, B. 2004. Red Data Book of the Mammals of South Africa: A Conservation Assessment. CBSG Southern Africa, Conservation Breeding Specialist Group (SSC/IUCN), Endangered Wildlife Trust. South Africa

Ginzberg, L.R., Slobodkin, L.B., Johnson, K. and Bindman, A.G., 1982. Quasi-extinction probabilities as a measure of impact on population growth. Risk Anal. 2: 171–181.

Goitom, H. 2013. Wildlife Trafficking and Poaching: South Africa. The Law Library of Congress. https://www.loc.gov/law/help/wildlife-poaching/southafrica.php Accessed on 17 February 2016.

Gray, A.P. 1971. Mammalian Hybrids – A Checklist with Bibliography. Commonwealth Agricultural Bureaux. Farnham Royal, Slough SL2 3BN. England.

Green, O.O. and Garmestani, A.S. 2011, Adaptive Management to Protect Biodiversity: Best Available Science and the Endangered Species Act, *Diversity* 4, 164-178; doi:10.3390/d4020164.

Groves, C.P. and Bell, C.H. 2004. New investigations on the taxonomy of the zebras genus *Equus*, subgenus *Hippotigris*. Mammalian Biology, 69: 182 - 196.

Hanski, I. 1999. Metapopulation Ecology. Oxford University Press, Oxford, UK.

Hill, A.H. 2009. Is isolation the major genetic concern for endangered equids? Animal Conservation 12: 518 – 519. The Zoological Society of London.

Hrabar, H. and Kerley, G.I.H. 2013. Conservation goals for the Cape mountain zebra *Equus zebra zebra* – security in numbers? Fauna and Flora International. Oryx 47 (3): 403 – 409.

Hrabar, H. and Kerley, G.I.H. 2015. Cape mountain zebra 2014/15 Status Report. Port Elizabeth: Centre for African Conservation Ecology, Nelson Mandela Metropolitan University Report 63.

Hrabar, H. Birss, C. Peinke, D. King, S. Novellie, P. Kerley, G. and Child, M. 2015. A Conservation Assessment of *Equus zebra* ssp. *zebra*. In: M.F. Child, E. Do Linh San, D. Raimondo, H. Davies-Mostert and L. Roxburgh (ED), The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

Hurzuk, A.H. 2009. The DHNRC Cape mountain zebra Management Plan First Draft. Cape Peninsula University of Technology. Unpublished.

IUCN/SSC. 2008. Strategic Planning for Species Conservation: A Handbook. Version 1.0. Gland, Switzerland: IUCN Species Survival Commission. 104pp.

IUCN/SSC (2013). Guidelines for Reintroductions and Other Conservation Translocations. Version 1.0. Gland, Switzerland: IUCN Species Survival Commission, viiii + 57 pp. ISBN: 978-2-8317-1609-1

Kerley, G.I.H., Pressey, R.L., Cowling, R.M., Boshoff, A.F. and Sims-Castley, R. 2003. Options for the conservation of large and medium-sized mammals in the Cape Floristic Region hotspot, South Africa. Biological Conservation 112: 169 - 190.

Kotze. A. and Nxomani. C. 2011. The National Zoological Gardens of South Africa: a National Research Facility. International Zoo Yearbook. (2011) 45: 30 – 37.

Kraaij, T. and Novellie, P.A. 2010. Habitat selection by large herbivores in relation to fire at the Bontebok National Park (1974-2009): the effects of management changes. African Journal of Range and Forage Science 27(1): 21-27.

Lea, J.M.D., Kerley, G.I.H, Hrabar, H., Barry, T.J. and Schultz, S. in press. Conservation of ecological refugees: habitat suitability and population performance across fragmented Cape mountain zebra populations.

Lindenmayer, D. and Burgman, M. 2005. Practical Conservation Biology. CSIRO Publishing, Collingwood, Australia. ISBN 0 643 09089 4.

Lloyd, P.H. and Rasa, O.A.E. 1989. Status, reproductive success and fitness in Cape mountain zebra (*Equus zebra zebra*). Behavioural Ecology and Socio-biology 25: 411-420.

Lloyd, P. H. 2002. Cape mountain zebra conservation success: an historical perspective. In: B. L. Penzhorn (ed.), Proceedings of a Symposium on Relocation of Large African Mammals, pp. 39-41. Onderstepoort, South Africa.

Lindsey, P.A., Roulet, P.A. and Romanach, S.S. 2007. Economic and conservation significance of the trophy hunting industry in sub-Saharan Africa. Biological Conservation 134 (2007): 455 – 469.

Margules, C.R. and Pressey, R.L. 2000. Systematic Conservation Planning. Nature 405: 243 – 253.

Marais, A. 2015. Cape mountain zebra outside De Hoop Nature Reserve. CapeNature Unpublished Report. Hermanus.

Marais, H.J., Nel, P., Bertschinger, H.J., Schoeman, J.P. and Zimmerman, D. 2007. Journal of the South African Veterinary Association 78(3): 145-148.

Myers, N., Mittermeier, R.A., Mittermeier, C.G., da Fonseca, G.A.B. and Kent, J. 2000. Biodiversity hotspots for conservation priorities. Nature. Vol 403. 24 February 2000. Macmillan Magazines Ltd.

Moehlman, P.D. (ed.) 2002. Equids: Zebras, Asses and Horses. Status Survey and Conservation Action Plan. IUCN/SSC Equid Specialist Group.

Moodley, Y. and Harley, E.H. 2005. Population structuring in mountain zebras (*Equus zebra*): the molecular consequences of divergent demographic histories. Conservation Genetics 6: 953-968.

Mucina, L. and Rutherford, M.C. (eds.) 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Nel, P.J., Bertschinger, H., Williams, J. and Thompson, P.N. 2006. Descriptive study of an outbreak of equine sarcoid in a population of Cape mountain zebra (*Equus zebra zebra*) in the Gariep Nature Reserve. Journal of the South African Veterinary Association 77(4): 184-190.

Novellie, P. 2008. *Equus zebra ssp. zebra*. The IUCN Red List of Threatened Species 2008: e.T7959A12876612. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T7959A12876612.en. Downloaded on 09 February 2016.

Novellie, P., Lindeque, M. Lindeque, P., Lloyd, P. and Koen, J. 2002. Status and Action Plan for the mountain zebra (*Equus zebra*). In: P. D. Moehlman (ed.), Equids: Zebras, Asses and Horses. A Status Survey and Conservation Action Plan, pp. 28-42. IUCN, Gland, Switzerland.

Novellie, P. A., Millar, P. S. and Lloyd, P. H. 1996. The use of VORTEX simulations models in a long-term programme of re-introduction of an endangered large mammal, the Cape mountain zebra (*Equus zebra zebra*). Acta Oecologica 17: 657-671.

NRF. 2008. NRF Vision 2015: Strategic Plan of the National Research Foundation. Accessed on 15 February 2015. http://www.nrf.ac.za/sites/default/files/documents/NRF%20Vision%202015.pdf

Olsson, P., C. Folke, V. Galaz, T. Hahn, and L. Schultz. 2007. Enhancing the fit through adaptive co-management: creating and maintaining bridging functions for matching scales in the Kristianstads Vattenrike Biosphere Reserve Sweden. Ecology and Society 12(1): 28. [online] URL: http://www.ecologyandsociety.org/vol12/iss1/art28/.

Olivier, P.I., Van Aarde, R.J. and Ferreira, S.M. 2009. Support for a metapopulation structure among mammals. Mammal Review 39: 178–192.

Parliamentary Monitoring Group (PMG). 2014. Minutes - Provincial conservation: support, resources, challenges and constraints in implementing conservation mandate: Department of Environmental Affairs briefing. https://pmg.org.za/committee-meeting/17878/ Accessed on 17 February 2016.

Penzhorn, B. In press. *Equus zebra*. In: J. S. Kingdon and M. Hoffmann (eds.). The Mammals of Africa, Academic Press, Amsterdam, The Netherlands.

Penzhorn, B.L. and Novellie, P.A. 1991. Some behavioural traits of Cape mountain zebras (*Equus zebra zebra*) and their implications for the management of a small conservation area. Applied Animal Behavioural Science 29: 293-299.

Penzhorn, B.L. 1988. *Equus zebra*. In: Mammalian Species. The American Society of Mammalogists. No. 314, pp. 1-7.

Penzhorn, B.L. 1984. A long-term study of social organisation and behaviour of Cape mountain zebras. Zeitschift für Tierpsychologle 64: 97-146.

Pietersen, J. 2005. Population viability of Cape mountain zebra in the Gamka Mountain Nature Reserve, South Africa: the influence of habitat and fire. Biological Conservation 122 (2005): 173 – 180.

Rasa, O.A.E. and Lloyd, P.H. 1994. Incest Avoidance and Attainment of Dominance by Females in Cape mountain zebra (*Equus zebra zebra*). Behaviour 128 (3 – 4).

Ryers, B., Roux, D., Cowling, R.M., Ginsburg, A.E., Nel, J.L. and O'Farrell, P. 2010. Conservation Planning as a Transdisciplinary Process. Conservation Biology 24 (4): 957 – 965.

South African Constitution. 1996. Schedule 4.
http://www.info.gov.za/documents/constitution/1996/96conssec4.htm

SABSTC2370.48_SABS0331_3. SABS 0331. 1999. Code of Practice for the Translocation of certain species of wild herbivores. South African Bureau of Standards.

Sasidharan, S.P. 2004. Comparative genetics of selected Southern African mountain zebra (*Equus zebra zebra* and *Equus zebra hartmannae*) populations. Unpublished MSc Thesis. Department of Production Animal Studies, Faculty Veterinary Science, University of Pretoria. 115pp.

Sasidharan, S.P., Ludwig, A., Harper, C., Moodley, Y., Bertshinger, H.J. and Guthrie, A.J. 2011. Comparative genetics of sarcoid tumour-affected and non-affected mountain zebra (Equus zebra) populations. South African Journal of Wildlife Research 41(1): 36 – 49.

Schulze, E. 2016. Free State Department of Economic, Small business development, Tourism and Environmental Affairs Report: Cape mountain zebra population data – Gariep Nature Reserve. Unpublished.

Schutte-Vlok, A., Wheeler, A. and Cleaver-Christie, G. 2012. Kammanassie Nature Reserve Management Plan 2013 – 2018. CapeNature.

Scientific Authority of South Africa. 2015. Non-detriment finding for *Equus zebra zebra* (Cape mountain zebra). Reference Number: Equ_zeb_zeb_May2015. Date: 20 May 2015. Issued by the Scientific Authority of South Africa.

Skead, C.J. 2007. Historical Incidence of the Larger Land Mammals in the broader Eastern Cape, Second Edition (eds. Boshoff, A.F., Kerley, G.I.H. and Lloyd, P.H.). Port Elizabeth: Centre for African Conservation Ecology, Nelson Mandela Metropolitan University. ISBN 1-920176-08-X

Skead, C.J. 2011. Historical Incidence of the Larger Land Mammals in the broader Western and Northern Cape, Second Edition (eds. Boshoff, A.F., Kerley, G.I.H. and Lloyd, P.H.). Port Elizabeth: Centre for African Conservation Ecology, Nelson Mandela Metropolitan University. ISBN 1-920176-08-X

Skinner, J.D. and Chimimba, C.T. (revisers) 2005. The Mammals of the Southern African Subregion. Third Edition. Cambridge University Press, Cape Town. ISBN 978-0521-84418-5.

Skinner, J.D. and Smithers, R.H.N. 1990. The Mammals of the Southern African Subregion. Pretoria University Press.

Smith, R.J., Verissimo, D. and MacMillan, D.C. 2012. Marketing and Conservation: How to Lose Friends and Influence People. Durrell Institute of Conservation and Ecology, University of Kent, Caterbury, UK.

Smith, R.K., Marais, A., Chadwick, P., Lloyd, P.H. and Hill, R.A. 2007. Monitoring and management of the endangered Cape mountain zebra *Equus zebra zebra* in the Western Cape, South Africa. African Journal of Ecology 46: 207-213.

Smith, R.K., Ryan, E., Morley, E and Hill, R.A. 2011. Resolving management conflicts: could agricultural land provide the answer for an endangered species in a habitat classified as a World Heritage Site. Environmental Conservation 38: 325 - 333.

Strauss, T. 2015. Cape mountain zebra (Equus zebra zebra) habitat use and diet in the Bontebok National Park, South Africa. Nelson Mandela Metropolitan University, unpublished thesis, 179pp.

Taylor, A., Lindsey, P., and Davies-Mostert, H. 2016. An assessment of the economic, social and conservation value of the wildlife ranching industry and its potential to support the Green Economy in South Africa. The Endangered Wildlife Trust, Johannesburg.

Van Stittert, L. 2005. Bringing in the Wild: The Commodification of Wild Animals in the Cape Colony/province c. 1850 – 1950. The Journal of African History 46, No 2 (2005): 269 – 291.

Vlok J. and Coetzee K. 2008. Ecological capacity of the Little Karoo for larger wildlife. Report and maps compiled for Gouritz Initiative. (www.gouritz.com)

Watson, L.H., Odendaal, H.E. Barry, T.J. and Pietersen, J. 2005. Population viability of Cape mountain zebra in Gamka Mountain Nature Reserve, South Africa: the influence of habitat and fire. Biological Conservation 122: 173-180.

Watson, L.H. and Chadwick, P. 2007. Management of Cape mountain zebra in the Kammanassie Nature Reserve, South Africa. South African Journal of Wildlife Research 37(1): 31-39.

Watson, L.H., Kraaij, T. and Novellie, P. 2011. Management of rare ungulates in a small park: habitat use of bontebok and Cape mountain zebra in Bontebok National Park assessed by count of dung groups. South African Journal of Wildlife Research 41(2): 158-166.

Winker, H. 2016a. Technical DRAFT Report: Development of a population simulation model for Cape mountain zebra towards formal evaluation of management strategies. Unpublished SANBI report. SANBI/BAM/STATS/2016/MZ/H2.

Winker, H. 2016b. Technical Report: Time-series analysis of long-term established mountain zebras within protected areas (1985-2015) with implications for IUCN listing. Unpublished SANBI report. SANBI/BAM/STATS/2016/MZ/H1.

Winker, H. 2016c. Technical Report: Incorporating carrying capacity limits into forward projection of source populations of Cape mountain zebra. Unpublished SANBI report. SANBI/BAM/STATS/2016/MZ/H1S1.

Winkler, A. and Owen-Smith, N. 1995. Habitat utilisation by Cape mountain zebras in the mountain Zebra National Park, South Africa. Koedoe, 38(1): 83 - 93.

Young, E., Zumpt, F., Boomker, J., Penzhorn, B.L. and Erasmus, B. 1973. Parasites and diseases of Cape mountain zebra, black wildebeest, mountain reedbuck and blesbok in the Mountain Zebra National Park. Koedoe 16: 77-81.

APPENDIX A: CAPE MOUNTAIN ZEBRA BMP-S WORKSHOP PARTICIPANTS AND WORKSHOP INVITATION

Cape mountain zebra BMP-S Stakeholder Workshop, SANParks CRC, Tokai, 27 November 2013

Name	Organisation	Email
Alan Wheeler	CapeNature	adwheeler@capenature.co.za
Carly Cowell	SANParks	Carly.Cowell@sanparks.org
Coral Birss	CapeNature	cbirss@capenature.co.za
Danelle Kleinhans	CapeNature	dkleinhans@capenature.co.za
Dick Carr	Private	dickcarr@hilbert.co.za
Dr David Zimmerman	SANParks	david.zimmerman@sanparks.org
Dr Dean Peinke	Eastern Cape Parks	dean.peinke@ecpta.co.za
Dr Peter Novellie	SANParks	novellie@netactive.co.za
Christine Kraft	NC DENC	christine.dtec@gmail.com
Guy Palmer	CapeNature	gpalmer@outlook.com
Halszka Hrabar	NMMU	halszkahcovarr@gmail.com
Jaco van Deventer	CapeNature	jvdeventer@capenature.co.za
Jeanetta Selier	SANBI	J.Selier@sanbi.org.za
Justin Buchman	SANParks	Justin.Buchman@sanparks.org
Andre Geldenhuys	Private	nicki@ege.co.za
Roland January	SANParks	Roland.January@sanparks.org
Trevor Adams	SANParks	Trevor.Adams@sanparks.org
Bontle Morwe	DEA	morweb@detea.fs.gov.za
Sussane Schultz	Manchester University	susanne.shultz@manchester.ac.uk
Jess Lea	Manchester University	jessica.lea@postgrad.manchester.ac.uk
Tebogo Mashua	DEA	TMashua@environment.gov.za
Natalie Hayward	CapeNature	nhayward@capenature.co.za
Stephen Mitchell	Chairman Western Cape WRSA	smitchell@nashuaisp.co.za
Gail Cleaver	CapeNature	gail@capenature.co.za
Fergill Fortiun	Paardeberg Winery	fergill@perdeberg.co.za
Buntu Mzamo	DEDEAT	buntu.mzamo@dedea.gov.za
Nicola Van Wilgen	SANParks	Nicola.VanWilgen@sanparks.org

CAPE MOUNTAIN ZEBRA BIODIVERSITY MANAGEMENT PLAN WORKSHOP

VENUE: CRC HALL

29 November 2013

Purpose of Workshop:
The aim of this workshop is to produce a draft biodiversity management plan for Cape mountain zebra. The draft BMP-S will then be summarized and presented to the workshop participants for comment. Following this the BMP-S will be submitted for gazetting and on approval will be published.

WELCOME AND INTRODUCTION	08h30-08h45	Carly Cowell
Feedback of NDF	08h45-09h15	Jeanetta Selier
Presentation status of Cape mountain zebra, selection for BMP-S	09h15-09h30	Coral Birss
Overview of BMP-S	09h30-10h00	Coral Birss
TEA	**10h00-10h30**	
BMP-S Planning Outline	10h30-10h50	Coral Birss
Desired state formulation	10h50-11h50	Carly Cowell
Hierarchy of objectives	11h50-12h45	Carly Cowell
LUNCH	**12h45-13H30**	
Threat identification	13h30-14h00	Carly Cowell
Action plans outlines	14h00-15h00	Group work
TEA	**15h00**	
Close and way forward	15h00-15h30	Coral and Carly

APPENDIX B: CONTRIBUTORS TO COMPILING FIRST DRAFT

- CapeNature Technical Working Group and Contributors
  Jonkershoek (25-27 November 2015); Vrolijkheid (21 – 22 January 2016)
    - Kevin Shaw
    - Dr Andrew Turner – Editing
    - Natalie Hayward – Workshop Facilitation
    - Lee Saul
    - Johan Huisamen
    - Dr AnneLise Schutte-Vlok
    - Alexis Olds and Dr Antoinette Veldtman – Literature Review and Research Summary
    - Dr Ernst Baard - Editing
    - Gail Cleaver-Christie – Action Plans
    - Jaco van Deventer
    - Deon Hignett – Legislative context
    - Tom Barry
    - Graham Lewis
    - Blanche de Vries
    - Coral Birss
    - Ivan Donian

- SANParks Reference Group and Contributors (Scientific Services and Veterinary Wildlife Unit)
    - Carly Cowell
    - Nicola van Wilgen
    - Dr Sam Ferreira
    - Dr Markus Hofmeyr
    - Dr David Zimmerman
    - Dr Angela Gaylard

- February 2016: Comments and Contributions to Authors' Draft
    - Nicola van Wilgen - SANParks
    - Alan Southwood - EC DEDEAT
    - Erika Schulze - FS DESTEA
    - Christine Kraft - NC DENC
    - Marnus Smit - NC DENC
    - Dr Ernst Baard - CapeNature
    - Gail Cleaver-Christie - CapeNature
    - Dr Andrew Turner - CapeNature

APPENDIX C: TEMPLATE FOR SUGGESTED EDITS / ADDITIONS / CHANGES

TEMPLATE FOR SUGGESTED EDITS / ADDITIONS / CHANGES TO THE DRAFT	
Section:	Page:
Section content:	
Nature of comment:	Edit / Change / Deletion / Addition / Recommendation
Action taken:	
NOTES:	
Section:	Page:
Section content:	
Nature of comment:	Edit / Change / Deletion / Addition / Recommendation
Action taken:	
NOTES:	
Section:	Page:
Section content:	
Nature of comment:	Edit / Change / Deletion / Addition / Recommendation
Action taken:	
NOTES:	
Section:	Page:
Section content:	
Nature of comment:	Edit / Change / Deletion / Addition / Recommendation
Action taken:	
NOTES:	
Section:	Page:
Section content:	
Nature of comment:	Edit / Change / Deletion / Addition / Recommendation
Action taken:	
NOTES:	
Section:	Page:
Section content:	
Nature of comment:	Edit / Change / Deletion / Addition / Recommendation
Action taken:	
NOTES:	

APPENDIX D:

AGENDA

CAPE MOUNTAIN ZEBRA BIODIVERSITY MANAGEMENT PLAN: ACTIONS AND RELEVANT AGREEMENTS WORKSHOP

VENUE: Driftsands Nature Reserve
25 May 2016

Purpose of Workshop:
The aim of this workshop is to facilitate further collaboration between stakeholders to enable agreement between Lead and Implementing Agents for the successful implementation of the Cape mountain zebra BMP.

Tea	8:30 – 9:00	
Welcome & Introduction	9:00 – 9:10	Ernst Baard
Overview of Process & Plan for the Day	9:10 – 9:30	Lauren Waller
Icebreaker: VENN	9:30 – 10:30	All
Tea	10:30 – 10:45	
Session 1: Agreement on Action Plan	10:45 – 12:15	Lauren Waller & All
Lunch	12:15 – 13:00	
Session 2: Agreement on Action Plan	13:00 – 14:30	Lauren Waller & All
Wrap Up	14:30	Lauren Waller
DEA – The Way Forward	14:40	Humbu Mafumo
Close	15:50	Ernst Baard

APPENDIX D: ATTENDANCE REGISTER AND INVITEE LIST FOR THE ACTIONS AND RELEVANT AGREEMENTS WORKSHOP FOR HTE IMPLEMENTATION OF THE CAPE MOUNTAIN ZEBRA BMP-S

CapeNature

Attendance Register

Page 1 / 1

Name of Event	Cape mountain zebra BMP actions and relevant agreements Workshop	Facilitator/s	Lauren Waller
Venue	Boardroom, Driftsands Nature Reserve	Service Provider	
Date(s)	25 May 2016	Time / Duration	

Participant Details

No.	Name and Surname	Organisation/Institution	Telephone	Email	Signature
1	Jaco van Deventer	CapeNature	0824555564	jdeventer@capenature	[signature]
2	Carly Cowell	SANParks	0217137510	carly.cowell@sanparks	[signature]
3	Coral Birss	CapeNature	0813603015	cbirss@capenature.co.za	[signature]
4	Wessel Hattingh	Groot Aarbeidsfontein	0825289810	[illegible]	[signature]
5	Salomé Hattingh	Groot Aarbeidsfontein	0829400522	[illegible]	[signature]
6	Deshni Pillay	SANBI	0834882275	d.pillay@sanbi.org.za	[signature]
7	Andrew Turner	CapeNature	021 8?? 8000	aaturner@capenature.co.za	[signature]
8	Ernst Baard	CapeNature	0214830003	ebaard@capenature	[signature]
9	Gareth Mortimer	CapeNature	0796148889	[illegible]@capenature.co.za	[signature]
10	Natalie Hayward	"	0218668000	nhayward@capenature.	[signature]
11	Michael Hanson	"	[illegible]	[illegible]@capenature...	[signature]
12	Rae Smith	NZG	073 259 6542	rae@nzg.ac.za	[signature]
13	Lauren Waller	CapeNature	072 592 3915	lwaller@capenature.co.za	[signature]

1

CapeNature

Attendance Register

Page 1 / 2

Name of Event	Cape mountain zebra BMP actions and relevant agreements Workshop	Facilitator/s	Lauren Waller
Venue	Boardroom, Driftsands Nature Reserve	Service Provider	
Date(s)	25 May 2016	Time / Duration	

Participant Details

No.	Name and Surname	Organisation/Institution	Telephone	Email	Signature
14	Antoinette Kotze	NZG	0831456902	antoinette@nzg.ac.za	[signature]
15	Jeanetta Selier	SANBI	0834588063	j.selier@sanbi.org.za	[signature]
16	Gail Cleaver-Christie	Cape Nature	0823172040	gail@capenature.co.za	[signature]
17	Craig Geldenhuys	Swartberg Game Breeders	097 5772875	craigageldenhuysca@gmail.co.za	[signature]
18	Stephen Mitchell	WRSA	0826765474	smitchell@wrsa[illegible]	[signature]
19	Dick Carr	Pvt: Kobaken CNR	0722484832	dickcarr@hilbert.co.za	[signature]
20	Azwinahi Muingi	DEA	012 399 9608	[illegible]@environment.gov.za	[signature]
21	Olga Kumalo	DEA	012 399 8818	okumalo@environment.gov.za	[signature]
22	Magdel Boshoff	DEA	012-3999604	mboshoff@environment.gov.za	[signature]
23	Dean Peinke	ECPTA	083 616 2567	dean.peinke@ecpta.co.za	[signature]
24	David Zimmerman	SANParks	0836306593	david.zimmerman@sanparks.org	[signature]
25	Angelo Gaylard	SANParks	0829666176	angelo.gaylard@sanparks.org	[signature]
26	Manetjie Engelbrecht	CapeNature	0828143959	mengelbrecht@capenature.co.za	[signature]

2

CapeNature

Attendance Register

Page 1 / 1

Name of Event	Cape mountain zebra BMP actions and relevent agreements Workshop	Facilitator/s	Lauren Waller
Venue	Driftsands Nature Reserve	Service Provider	
Date(s)	25 May 2016	Time / Duration	

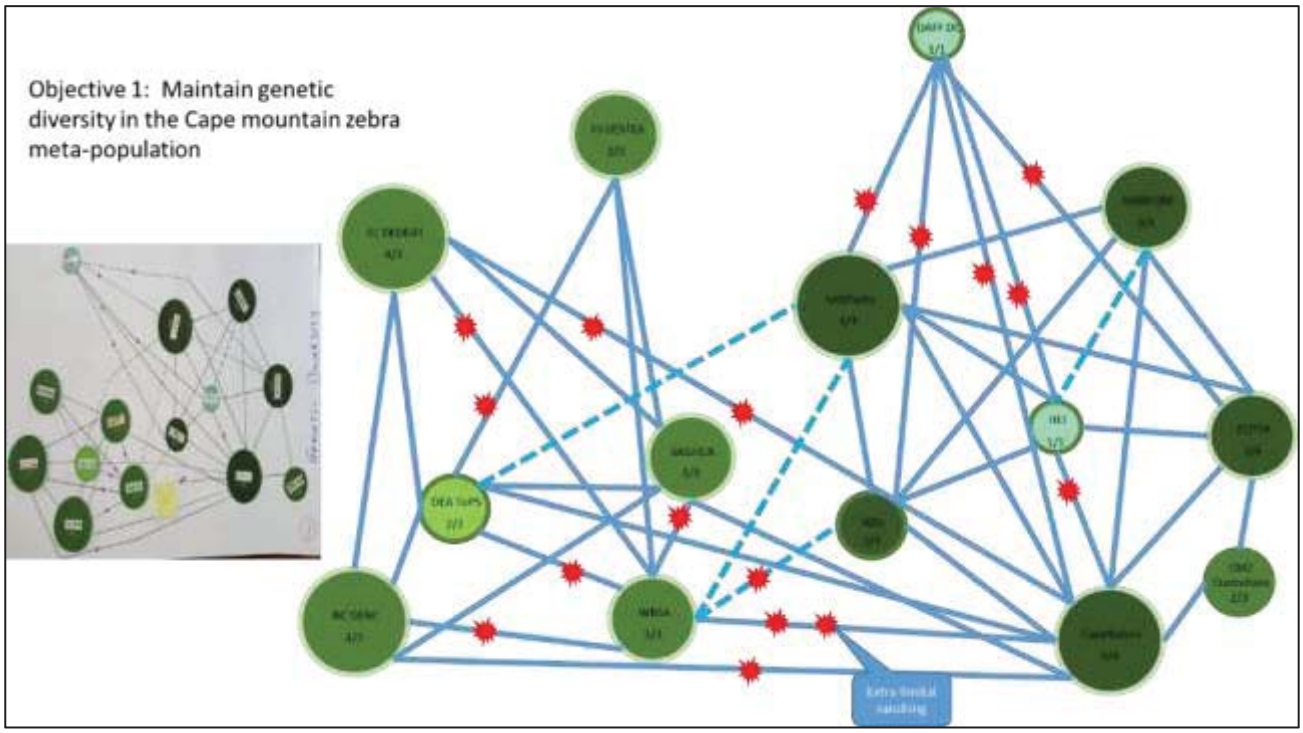
Participant Details

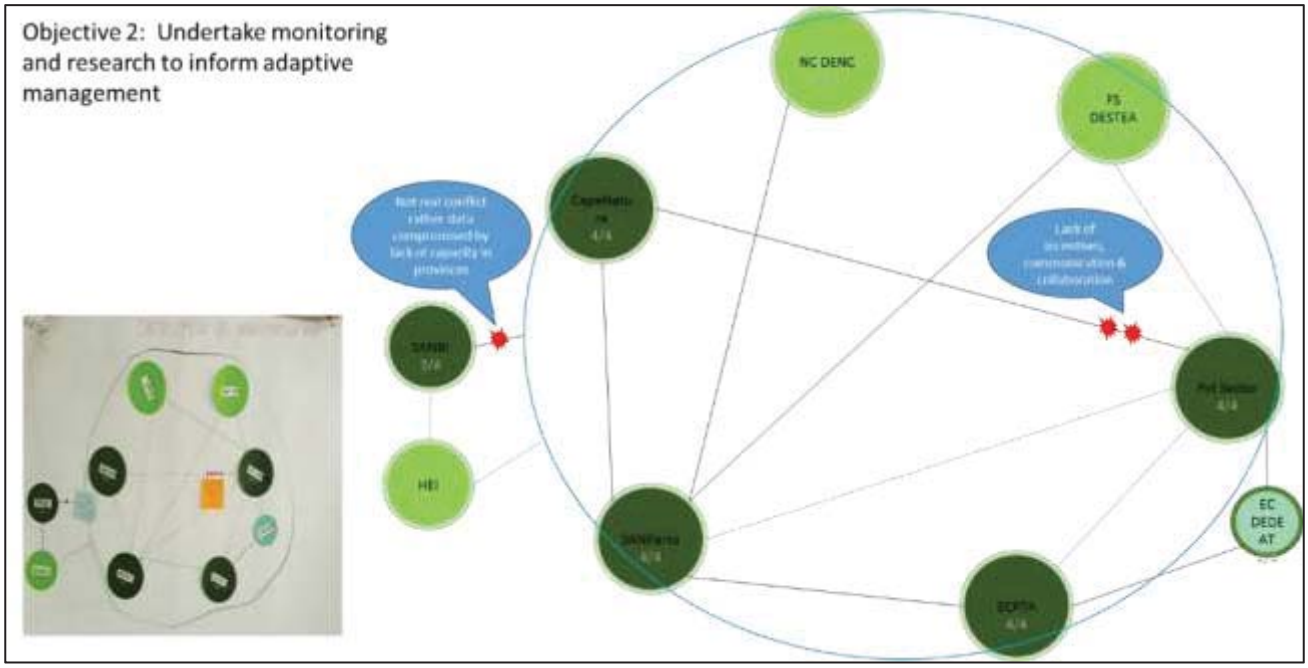
No.	Name and Surname	Organisation/Institution	Telephone	Email	Signature
27	[illegible]	DEA	[illegible]	[illegible]	[illegible]
28	[illegible]	DEA	082 457 2222	[illegible]	[illegible]
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					

3

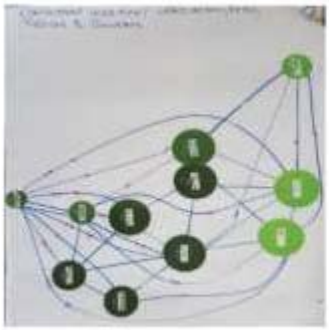
Cape Mountain Zebra Biodiversity Management Plans Action Lists Workshop				VENN group allocation			
Attendees							
Andrew Turner	CapeNature	aaturner@capenature.co.za	Yes			X	
Angela Gaylard	SANParks	angela.gaylard@sanparks.org	Yes			X	
Antoinette Kotze	NZG	antoinette@nzg.ac.za	Yes	X			
Azwinaki Muingi	DEA	AMuingi@environment.gov.za	Yes				X
Carly Cowell	SANParks	Carly.Cowell@sanparks.org	Yes	X			
Coral Birss	CapeNature	cbirss@capenature.co.za	Yes	X			
Craig Geldenhuys	Private	craiggeldenhuys01@gmail.com	Yes			X	
Dr David Zimmerman	SANParks	david.zimmerman@sanparks.org	Yes	X			
Deshni Pillay	SANBI	D.Pillay@sanbi.org.za	Yes			X	
Dick Carr	Private	dickcarr@hilbert.co.za	Yes	X			
Dr Dean Peinke	ECPTA	dean.peinke@ecpta.co.za	Yes	X			
Ernst Baard	CapeNature	ebaard@capenature.co.za	Yes		X		
Gail Cleaver-Christie	CapeNature	gail@capenature.co.za	Yes			X	
Garth Mortimer	CapeNature	gmortimer@capenature.co.za	Yes				X
Humbu Mafumo	DEA	HMafumo@environment.gov.za	Yes				X
Jaco van Deventer	CapeNature	jvdeventer@capenature.co.za	Yes		X		
Jeanetta Selier	SANBI	J.Selier@sanbi.org.za	Yes			X	
Lauren Waller	CapeNature	lwaller@capenature.co.za	Yes				
Magdel Boshoff	DEA	MBoshoff@environment.gov.za	Yes		X		
Natalie Hayward	CapeNature	nhayward@capenature.co.za	Yes			X	
Rae Smith	NZG	rae@nzg.ac.za	Yes				X
Salomie Havenga	Groot Phesantefontein	salome@gphranch.com	Yes		X		
Stephen Mitchell	Western Cape WRSA	smitchell@nashuaisp.co.za	Yes		X		
Olga Kumalo	DEA	OKumalo@environment.gov.za	Yes		X		
Wessel Havenga	Groot Phesantefontein	wessel@gphranch.com	Yes				X
Wilma Lutsch	DEA	Wlutsch@environment.gov.za	Yes	X			
Marietjie Engelbrecht	CapeNature	mengelbrecht@capenature.co.za	Yes				X
Michael Hanson	CapeNature	mhanson@capenature.co.za	Yes		X		
Apologies			28	7	7	7	6
Nicola Van Wilgen	SANParks	Nicola.VanWilgen@sanparks.org					
Michele Pfab	SANBI	M.Pfab@sanbi.org.za					
Frikkie Rossouw	EC DEDEAT	Frikkie.Rossouw@dedea.gov.za					
Halszka Hrabar	NMMU	halszkahcovarr@gmail.com					
Fergill Fortiun	Paardeberg Winery	fergill@perdeberg.co.za					
Andre Geldenhuys	Private	nicki@ege.co.za		sent representative			
Dale Cunningham	WRSA	dale@huntec.co.za		e-mailed, sent representatives			
Ernst du Preez	Groot Phesantefontein			e-mailed, sent representatives			
Cobus Theron	EWT	cobust@ewt.org.za		written inputs provided			
Christine Kraft	NC DENC	christine.dtec@gmail.com					
Elsabe Swart	NC DENC	elsabe.dtec@gmail.com					
David Paulse	NC DENCE	David.dtec@gmail.com		written inputs provided, Christine Kraft			
Nacelle Collins	FS DESTEA	collinsn@detea.fs.gov.za		telephoned			
No response							
Roland January	SANParks	Roland.January@sanparks.org		SANParks represented by C. Cowell, A. Gaylard and D Zimmerman			
Trevor Adams	SANParks	Trevor.Adams@sanparks.org		SANParks represented by C. Cowell, A. Gaylard and D Zimmerman			
Bontle Morwe	FS DESTEA	morweb@detea.fs.gov.za					
Sussane Schultz	Manchester University	susanne.shultz@manchester.ac.uk		In UK			
Jess Lea	Manchester University	jessica.lea@postgrad.manchester.ac.uk		In UK			
Tebogo Mashua	DEA	TMashua@environment.gov.za		DEA represented by W. Lutsch, H. Mafumo, A. Muingi, M. Boshoff, O. Kumalo			
Adri Kitshoff	WRSA	ceo@wrsa.co.za					
Buntu Mzamo	DEDEAT	buntu.mzamo@dedea.gov.za					
Lizanne Nel	SAGHCA	lizanne@sahunt.co.za					
Justin Buchman	SANParks	Justin.Buchman@sanparks.org		SANParks represented by C. Cowell, A. Gaylard and D Zimmerman			
Alan Southwood	EC DEDEAT	Alan.Southwood@dedea.gov.za					
Dr Peter Novellie	SANParks	novellie@netactive.co.za					
Alexis Symonds	SANParks	alexis.symonds@sanparks.org		SANParks represented by C. Cowell, A. Gaylard and D Zimmerman			

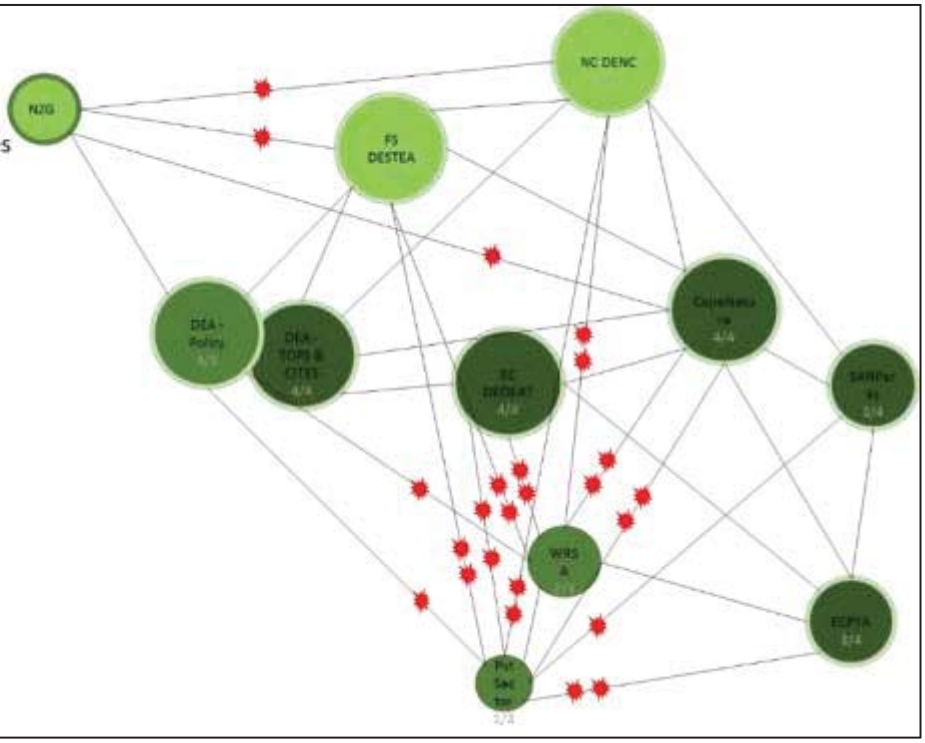
APPENDIX E: VENN DIAGRAMS ON STAKEHOLDER RELATIONSHIPS TOWARDS ACHIEVING THE OBJECTIVES OF THE BMP-S: ACTIONS AND RELEVANT AGREEMENTS WORKSHOP FOR THE IMPLEMENTATION OF THE CAPE MOUNTAIN ZEBRA BMP-S



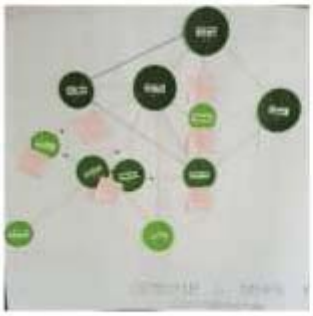


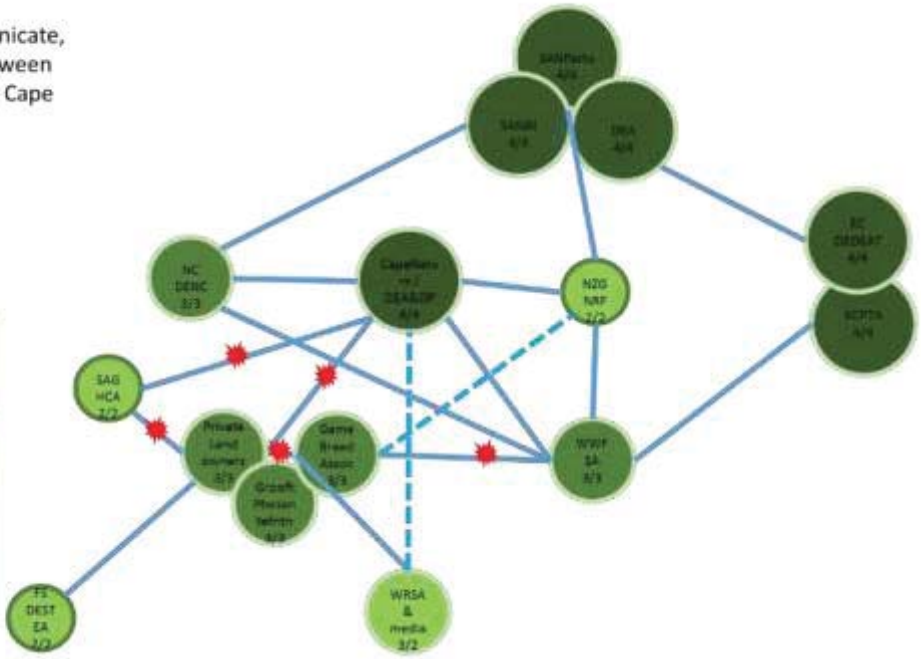
Objective 3: Consistently and uniformly implement legislation, regulations, policies and guidelines





Objective 4: Effectively communicate, collaborate and coordinate between stakeholders and the public for Cape mountain zebra conservation





APPENDIX F: NOTES

Tab 6

NATIONAL GEOGRAPHIC

https://news.nationalgeographic.com/2015/11/151715-conservation-trophy-hunting-elephants-tusks-poaching-zimbabwe-namibia.html

Wildlife Watch

Is Trophy Hunting Helping Save African Elephants?

Fees from trophy hunting of elephants that are supposed to help local communities—and elephants—often don't.

By **Adam Cruise**, for National Geographic

PUBLISHED NOVEMBER 17, 2015

Sport hunting in Zimbabwe is big business, with hunters such as David Barrett paying $10,000 for the experience. Barrett, who is British, and others argue that Western hunters provide vital revenue to local communities.

PHOTOGRAPH BY BARCROFT MEDIA/ GETTY

African elephants are in trouble. Their numbers have fallen from as many as ten million a hundred years ago to as few as 400,000 today. Recent losses are largely from poaching for the illegal ivory trade (some 30,000 elephants a year), but also because of the shrinking habitat for elephants, as people open up land for farming and development.

Killing more elephants to help save the species is one counterintuitive strategy for preserving them. Here's the thinking: Invite hunters from rich countries to pay generous fees to shoot specified numbers of elephants, and use that money for conservation and to help give local communities a boost. Do that, the theory goes, and poor villagers won't need to poach elephants to feed their families.

The International Union for Conservation of Nature, an internationally recognized organization that sets the conservation statuses for species, supports this idea. "Well-managed trophy hunting can provide both revenue and incentives for people to conserve and restore wild populations, maintain areas of land for conservation, and protect wildlife from poaching," its guiding principles say.

But a closer look at trophy hunting in Africa shows that the industry employs few people and that the money from hunt fees that trickles down to needy villagers is minimal. Government corruption can be a factor. In Zimbabwe, for instance, individuals associated with President Robert Mugabe have seized lands in lucrative hunting areas. Trophy hunting isn't stopping poaching, especially in countries that have a poor record of protecting their wildlife.

Six countries—South Africa, Zimbabwe, Zambia, Mozambique, Namibia, and Tanzania—have many of the remaining savanna elephants. Along with Cameroon and Gabon, these nations allow sport hunting regardless of the level of decline in their elephant populations. (Botswana, which has more than 130,000 elephants by one recent estimate, has banned trophy hunting.)

According to the latest figures, Tanzania's elephant population has fallen from nearly 110,000 in 2009 to just over 43,000 at the end of 2014—a 60 percent drop. Mozambique's elephants declined from an estimated 20,000 to 10,300 during the same period. In Zimbabwe, a recent survey shows massive losses in some parks.

In Tanzania and Mozambique, elephants are now considered at risk of extinction, which means that none of their products can be traded commercially. But trophies aren't considered commercial products.

Namibia, a destination for sport hunters, is one of six African countries with significant populations of savanna elephants. In Etosha National Park, tourists come from around the world to see the elephants.

PHOTOGRAPH BY MANUEL ROMARIS, GETTY

Here's how many tusks that the Convention on International Trade in Endangered Species of Fauna and Flora (CITES) allows hunters to export from the big six countries in 2015:

- Zimbabwe: 1,000 tusks
- Namibia: 180 tusks
- Zambia: 160 tusks
- Tanzania: 200 tusks
- Mozambique: 200 tusks
- South Africa: 300 tusks

Trophy hunting in Zimbabwe made the news in October when an unidentified German hunter shot what may have been one of the continent's largest bull elephants. From 2003 to 2013, trophy hunters exported more than 28 tons of tusks from Zimbabwe.

Zimbabwe and Namibia's sport hunting programs provide contrasting examples of the benefits of this form of conservation.

Zimbabwe's CAMPFIRE

Supporters of trophy hunting often cite Zimbabwe's CAMPFIRE (Communal Areas Management Programme for Indigenous Resources), in which rural district councils allow locals to sell safari operators access to their wildlife. In turn, safari operators sell sport hunting opportunities, mostly to foreigners.

"Since its inception, CAMPFIRE has been very successful," the foundation's website states. It says that households participating in CAMPFIRE increased their incomes by an estimated 15 to 25 percent.

But the benefits from the program are not equally shared within the communities, according to a 1997 study analyzing CAMPFIRE, and corruption has eaten away at revenue.

Rural councils in Zimbabwe are notoriously underfunded and almost always have nothing in their coffers to support the communities in their districts. For example, revenue from sport hunting in the Chiredzi Rural District (where the hunter shot that big bull elephant) was negligible, according to a 2014 end-of-year report.

RURAL COUNCILS IN ZIMBABWE ARE NOTORIOUSLY UNDERFUNDED AND ALMOST ALWAYS HAVE NOTHING IN THEIR COFFERS TO SUPPORT THE

COMMUNITIES IN THEIR DISTRICTS.

In the report, the council's chairman suggested it would be better to switch from hunting to more profitable non-consumer-based tourism, such as sightseeing and photography.

While a portion of the hunting fees foreigners pay (which can run into the tens of thousands of dollars) is earmarked for community projects such as CAMPFIRE, Emmanuel Fundira, Chairman of Safari Operators Association of Zimbabwe, told CBS News in October that rural councils get "nothing." In most cases, he said, corrupt government officials take the money.

CAMPFIRE CEO Phindile Ncube told CBS News that his rural district, Hwange, made more than $158,000 in hunting fees during the past year. He claimed that the money is goes to infrastructure and food programs for local communities.

But when CBS interviewed local villagers, they said they haven't received a cent from the council.

Furthermore, hunting operations in wildlife-rich areas are being seized by Zimbabwe's land-hungry political elite, according to a 2014 report from Born Free, a wildlife conservation nonprofit, and C4ADS, a nonprofit conflict and security analysis firm. Safari and game reserves are one of the few remaining lucrative industries in Zimbabwe, both for legal and illegal hunting.

Tanzania's Serengeti National Park is picture postcard elephant habitat. The country has lost 60 percent of its elephants to poaching in just five years.

PHOTOGRAPH BY MICHAEL MELFORD, NATIONAL GEOGRAPHIC CREATIVE

The takeover of these lands has coincided with overhunting and poaching, according to the report, as the political elites who have come to manage them are driven more by profit than conservation. Revenue is more likely to go into personal and foreign bank accounts than into conservation and community programs.

Major General Engelbert Rugeje, for instance, who's the chief of staff of Zimbabwe's army, is linked in the report to land seizures in Save Valley Conservancy, home of 80 percent of Zimbabwe's rhinos. Poaching in the area has already begun, the report says. Rugeje also alleged to have been involved in the eviction of 350 villagers at Matutu conservancy in Chiredzi.

Namibia's Conservancy Approach

In Namibia, elephant numbers have been increasing, and the nation's conservancy approach is applauded as a factor in this success.

Established by the Namibian government in 1996, the program grants communities the power to manage wildlife on communal land and to work with private companies to develop their own tourism markets.

The latest government statistics indicate that the estimated contributions from trophy hunting exceeded $70 million. The vast majority of this income is returned to operators and spin-off beneficiaries such as airlines, hotels, tourism facilities, but there is a trickle-down effect.

In 2000, the total income to communal conservancies from all forms of wildlife use, including trophy hunting, amounted to $165,000. Six years later, this had increased almost tenfold to $1,330,000. Though small compared to the overall income from trophy hunting, it does provide one in seven Namibians with $75 a month.

Conservancy lands given over to trophy hunting have the added benefit of keeping the wild, wild. If these areas were farmed, for instance, the incentives for conservation would undoubtedly wane, and habitat loss would reduce wildlife numbers. The ecological footprint of trophy hunting—even of a safari lodge catering for groups of wildlife watching tourists—is far lighter than that of commercial farming.

A park warden sits on the skull of an elephant that died by cyanide poisoning in Zimbabwe's Hwange National Park in 2013, where poaching has increased significantly in some areas.

PHOTOGRAPH BY AARON UFUMELI, EPA/CORBIS

Conservancies offer hunt operators land largely devoid of people—a draw for hunters who want an African wilderness experience. Camps are small, with few overheads other than equipment and licenses.

The Namibian model has critics, however.

As reported in Africa Geographic, some government officials have handed out elephant hunting permits in an effort to get political support from the communities, especially in the Kunene region, which is renowned for its rare desert elephants.

Plus, the country's export quota of 90 elephants doesn't include permits to hunt "problem animals," but Namibian law allows hunters to easily obtain permits to shoot elephants judged to be in conflict with people.

A CLOSER LOOK AT TROPHY HUNTING IN AFRICA SHOWS THAT THE INDUSTRY EMPLOYS FEW PEOPLE AND THAT THE MONEY FROM HUNT FEES THAT

TRICKLES DOWN TO NEEDY VILLAGERS IS MINIMAL.

According to a CNN report in 2014, these permits are sometimes granted even before a "problem" animal has been identified. A hunter can then shoot any elephant a community declares to be a problem, whether it's actually a problem or not. CNN reported that several desert elephants have been shot either for their meat or for the cash from hunt fees.

In a letter posted online, Namibia's Ministry of Environment and Tourism strongly denied these claims. Namibia, the ministry says, has more elephants now than in the past hundred years, and "one of the reasons for their increase in numbers is that they have a value."

The Money Story

According to an IUCN report, the sport hunting industry does not provide significant benefits to the communities where it occurs. Across Africa, there are only about 15,000 hunting-related jobs—a tiny number, especially considering that the six main game-hunting countries alone have a population of nearly 150 million.

Besides that, local communities make an average of only ten cents a hectare (25 cents an acre) from trophy hunting. A return that small, the report says, explains locals' "lack of interest in preserving hunting areas and their continued encroachment and poaching."

With more than one-sixth of the land in those six countries set aside for trophy hunting, and the fact that land-hungry politicians are seizing more and more land for themselves, impoverished rural communities often resort to poaching and the illegal wildlife trade to sustain themselves.

Citing the failure of trophy hunting interests to provide much needed revenue for both conservation and communities, and the failure of governments to control rampant elephant poaching, the U.S. Fish and Wildlife Service imposed a ban on imported elephant trophies from Zimbabwe and Tanzania for 2014 and 2015. The ban is likely to be extended indefinitely.

The view that sport hunting of elephants in Zimbabwe and Tanzania is causing more harm than good is gaining momentum. In Zimbabwe, says Gavin Shire, a spokesperson at the service, "trophy hunting does not currently support conservation efforts that contribute towards the recovery of the species."

Still, the U.S. Fish and Wildlife Service's director, Dan Ashe, maintains that there is a place for "responsible, scientifically managed sport hunting." The Service, he says, "remains committed to combating heinous wildlife crimes while supporting activities that empower and encourage local communities to be a part of the solution."

Read more stories about wildlife crime and exploitation on Wildlife Watch. Send tips, feedback, and story ideas to ngwildlife@natgeo.com.

Adam Cruise is a journalist and author specializing in wildlife, and frequently contributes to National Geographic.

FOLLOW ADAM

Tab 7

The $200 million question

How much does trophy hunting really contribute to African communities?

economists | at | large |

ADDING VALUE TO SOCIETY

Final report

Prepared for The African Lion Coallition

February 2013

Report prepared by:
Economists at Large Pty Ltd
Melbourne, Australia
www.ecolarge.com
research@ecolarge.com
Phone: +61 3 9005 0154
Fax: +61 3 8080 1604

Citation:
Economists at Large, 2013. *The $200 million question: How much does trophy hunting really contribute to African communities?*, a report for the African Lion Coalition, prepared by Economists at Large, Melbourne, Australia.

Lead author:
Roderick Campbell

SUMMARY

Advocates for the African trophy hunting industry invariably claim that hunting revenues provide benefits to rural communities. Responding to calls to list African lions on the US Endangered Species Act, Safari Club International officials stated:

> *Hunters and hunting actually benefit Africa's lions — as well as its humans. Revenues from hunting generate $200 million annually in remote rural areas of Africa.* (Rudolph and Hosmer 2011)

Analysis of literature on the economics of trophy hunting reveals, however, that communities in the areas where hunting occurs derive very little benefit from this revenue.

How much revenue reaches communities?

> *We're more closely allied with the photographic operators than the hunters. They are finishing off the wildlife before we've had a chance to realize a profit from it. Hunters don't recognize us; they only recognize the government …25 percent of hunting fees goes into the 'hole' at the district. We're supposed to get 5 percent: we don't even see that.* (Sachedina 2008, p152)

Research published by the pro-hunting International Council for Game and Wildlife Conservation and the UN Food and Agriculture Organisation, supported by other authors, finds that hunting companies contribute only 3% of their revenue to communities living in hunting areas. The vast majority of their expenditure does not accrue to local people and businesses, but to firms, government agencies and individuals located internationally or in national capitals. As the quote above demonstrates, expenditure accruing to government agencies rarely reaches local communities due to corruption and other spending requirements.

How important is the trophy hunting industry?

Trophy hunting advocates present the industry as large, citing figures such as $200m in annual revenue. But in the context of national economies, the industry is tiny, contributing at best a fraction of a percent of GDP. Nature based tourism does play a significant role in national development, but trophy hunting is insignificant. Across the investigated countries, trophy hunting revenue was only 1.8% of tourism revenues.

Where does the $200m estimate come from?

Rudolph and Hosmer (2011)'s $200m figure is based on Lindsey, Roulet and Romanach (2006), a study based on weak sources and methodology. $100m of this estimate is based on an unpublished study by the Professional Hunters Association of South Africa. Estimates of expenditure in several other countries are based on personal communication with safari companies and other unverifiable sources. The $200m estimate should be used with caution.

Would a listing of lions on the US ESA impact communities or the African economy?

A study by hunting advocates, Lindsey et al (2012), has suggested that reduced lion hunting would have minimal impact on the financial viability of trophy hunting. Even this study has been found to overstate the significance of lions to the industry. The industry is primarily driven by hunting of buffalo and plains game such as antelope.

CONTENTS

INTRODUCTION

Despite being listed by the IUCN as "vulnerable" African lions are targeted by commercial trophy hunting operators in at least 8 countries (Lindsey et al. 2012). Numbers of wild lions have been in rapid decline in recent years. Estimates of the current population are between 32,000 and 35,000 (Riggio et al. 2012), a decline of more than 30% in the last twenty years (Nowell et al. 2012). While the main causes of this decline are habitat encroachment and human-animal conflict between lions and farming communities, studies such as Packer et al. (2010) have shown that trophy hunting is also directly contributing to this decline. There is little debate, even from hunting advocates such as Lindsey et al. (2012), that the long-term viability of wild lion populations will be enhanced if fewer lions are shot by trophy hunters.

Commercial trophy hunting operates to differing degrees in around 14 African nations, the major countries being South Africa, Tanzania, Botswana and Zimbabwe (Booth 2010). Trophy hunting attracts much attention due to the nature of the business – foreign tourists (aided by foreign hunting companies) killing wild animals, including endangered species, in low-income countries with limited governance.

Several animal protection organizations, including the International Fund for Animal Welfare (IFAW), Humane Society International (HSI) and Born Free Foundation / Born Free USA have formed the African Lion Coalition to lobby for increased legal protection of wild lion populations. One initiative of the coalition is a petition to list the African lion as endangered under the Endangered Species Act (ESA) of the United States. The impact of such a listing would be to end the importation into the USA of lion parts, including hunting trophies. An ESA listing does not amount to a ban or moratorium on lion hunting; it is aimed at conserving the species by reducing the "take" of lions by Americans.

In response to the African Lion Coalition's campaign for ESA listing of African lions, the presidents of Safari Club International and the Safari Club International Foundation claimed:

> *Hunters and hunting actually benefit Africa's lions — as well as its humans. Revenues from hunting generate $200 million annually in remote rural areas of Africa.* (Rudolph and Hosmer 2011)

While claims are often made about the value of hunting tourism, more comprehensive analysis of benefits accruing to populations where hunting occurs is harder to come by. The prices paid for hunting trips and trophy fees seem expensive by US standards and even more so by African standards. A 21 day lion hunt for example, can cost the hunting party between $20,000 and $70,000 (Lindsey et al. 2012). But without understanding the different stakeholders involved and where this money goes, it is difficult to assess how much local communities actually benefit.

There are many stakeholders in the African trophy hunting industry. The hunters themselves are almost entirely foreigners, with an estimated 46% of lion trophies being imported into the USA (Telecky 2013). Agents, hunting operators (or "outfitters") and professional hunters are also almost entirely foreign. Government agencies at national, sub-national and local levels are also stakeholders through fees and permits. Lastly, but most importantly for protection of wildlife, are the local communities who live in areas with hunting concessions.

Local communities are the most important stakeholders in conservation discussions as it is their local environment and their livelihoods that are in question. Without the strong involvement of local people it is impossible to reduce poaching, reduce human-animal conflict, reduce agricultural encroachment on wildlife habitat and ensure the sustainable management of the area in question.

Sustainable management will depend on long term, reliable and equitable revenue streams accruing to local communities. The crucial question for understanding trophy hunting's potential to provide incentives for conservation, therefore, is how much hunting revenue is shared with local communities.

This paper

In this paper we test some of the central themes of the trophy hunting debate:

- How much hunting revenue is received by communities in trophy hunting areas?
- How much of revenue translates into economic benefit for rural people?
- Is $200m a lot of money across Africa?
- Would a listing of lions on the US ESA have an impact on rural African communities?

REVENUE SHARING WITH LOCAL COMMUNITIES

Despite many authors recognizing the importance of revenue sharing with local communities for conservation initiatives, most concede that little revenue trickles down to the local level:

> *Despite some successes, rural communities living in or near wildlife areas rarely benefit adequately from trophy hunting activities. Inequitable distribution of hunting revenues represents the most serious threat to the long term sustainability of the industry.* (Lindsey 2008)

> *A few of the forward-looking outfitters are entering into dialogue with the communities and engage in small-scale social upliftment projects. However, most companies do mere 'window dressing' and are not taken to task, as the requirements set by the Wildlife Division are particularly vague in this regard. Hunting outfitters, and indeed many tourist providers want it to be their privilege to decide when and how to engage with communities without having the need imposed upon them. They prefer a paternalistic approach rather than a true empowerment of the communities to manage the wildlife.* (Baldus and Cauldwell 2004 p34)

A study jointly published by the International Council for Game and Wildlife Conservation and the UN Food and Agriculture Organisation, Booth (2010), explored the income and expenditure of hunting companies in Tanzania, which has the largest trophy hunting industry in East Africa.

Booth (2010) had access to confidential financial records of trophy hunting companies and was able to compile an "approximate income and expenditure statement of a hypothetical company in Tanzania". Booth's results provide an insider's insight into which stakeholders benefit from trophy hunting. We see that very little of the expenditure of these operators, or "outfitters", accrues locally, with only around 3% going to community development.

Table 1: Expenditure of hunting operators

Gross expenditure	Expenditure as a percentage of income[1]	Description	Area where expenditure accrues
Operating expenses	24%	Various - food, drink, vehicle and camp maintenance.	Various, local, national, international
Wildlife division fees	22%	Various fees charged by Tanzania Wildlife division.	National
Management costs	17%	Town and camp management, managerial salaries, director drawings, business travel.	Local (camp management), national, international.
Wages and welfare	11%	Staff wages, social welfare tax.	Local and national
Support service industries	9%	Payments to hotels, air charter, "professional services", etc.	National and international
Professional hunter expenses	6%	Remuneration and associated costs of professional hunters.	International
Area and community development	3%	Payments to community-based organisations, payments to communities, payments for welfare, education, etc.	Local
Administrative costs	2%	Service and utility costs.	Local and national
Central and local government levies/duties, etc.	1%	Royalties, duties, various licences.	Local and national

Source: Booth (2010) p23

Few of these expenditure items will be at the local level, and the great majority of spending is on items that accrue outside the hunting areas. Processed food and drink items will be largely imported internationally or from urban areas. Fees and levies accrue largely to central governments. While some camp management and maintenance will provide opportunities for local employment and income to locally owned businesses, wages, directors' drawings, business travel, etc. will almost entirely accrue to parties far from hunting areas. Remuneration of professional hunters, withdrawals by directors, business travel and profits will almost certainly accrue largely to international parties (Booth 2010 p24).

[1] Note that these percentages differ slightly from Booth's original calculations, as all items are expressed as a percentage of gross revenue. Booth expressed only profit as a percentage of revenue, with other items here expressed as a percentage of total cost.

In this breakdown of spending, Booth does not mention the problem of corruption that is pervasive in regional governments. Authors from all sides of the conservation debate acknowledge the problems that corruption brings to conservation efforts and the barrier it presents to ensuring benefits reach communities, see for example IUCN (2009); Mbaiwa (2004); Peake (2004); Barnett and Patterson (2006); Sachedina (2008); Nelson and Nshala (2007). For an overview of the effects of corruption on conservation efforts, see Smith and Walpole (2005).

Booth (2010) also notes:

> *Capital replacement and commission payments to hunting agents and for professional hunters' commissions for the clients which are generally paid outside the country are not included here.* (p23)

This suggests that the benefits of hunting are spread even thinner than suggested above.

Booth's estimate of a mere 3% of revenues being shared with local communities is supported by other authors such as Sachedina (2008) and IUCN (2009).

Sachedina (2008) conducted extensive fieldwork in northern Tanzania investigating the role of foreign NGOs, tourism and hunting in conservation and development. He found that little hunting revenue was shared with local communities:

> *In reality, few benefits filtered to local communities; probably closer to 3-5 percent of hunting revenues actually reached villages where hunting occurred.* (p150)

> [Hunting] *utilises extensive areas and hunting operators contribute minute fractions of their turnover to legally mandated community development.* (p386)

In an interview with a village official:

> *We're more closely allied with the photographic operators than the hunters. They are finishing off the wildlife before we've had a chance to realize a profit from it. Hunters don't recognize us; they only recognize the government …25 percent of hunting fees goes into the 'hole' at the district. We're supposed to get 5 percent: we don't even see that.* (p152)

> *Attitudes towards tourists were combined with a vigorous resentment towards tourist hunting in Simanjiro, which was longstanding, intense and widespread. Villagers felt that hunting was destructive, exploitative, and disempowering, and jeopardised village* [community-based tourism] *revenues.* (p166)

IUCN (2009) investigated the benefits that actually accrued to communities in several countries in Africa and compared this with the area of land hunting concessions occupied. They then calculated the return to communities per hectare of hunting concession.

Table 2: Benefits of hunting per hectare

Country	Benefits distributed to local communities per hectare ($USD)
Zambia	0.06
Tanzania	0.04
Namibia	0.16
C.A.R.	0.06
Burkina Faso	0.07
Benin	0.18

Source: IUCN (2009) p72

We see that across Africa local communities receive minimal benefit from trophy hunting, particularly when we consider the vast areas of land that hunting concessions occupy.

HOW IMPORTANT IS THE TROPHY HUNTING INDUSTRY?

While all sides of the trophy hunting debate acknowledge that local communities must benefit more from hunting revenues, little consideration is given to how much difference reforming the industry would actually make to economic development and poverty alleviation efforts in Africa. The implication of authors such as Safari Club International's Rudolph and Hosmer (2011) is that trophy hunting is a large industry. $200m in trophy hunting revenue – or even 3% of this revenue as discussed above – sounds significant when presented in the context of undeveloped rural communities, but it is an insignificant amount in the context of national economies.

We see below that tourism revenues in lion range countries are between 0.6% and 6.4% of GDP. Tourism as a whole plays a modest role in overall economic activity, but is more significant as an employer due to its labor intensive nature (UNWTO 2006).

Table 3: Tourism and GDP

Country	GDP 2011[a] US$m	Inbound tourism revenue estimate[b] USD$m	Tourism revenue as percentage of GDP
South Africa	408,240	9,547	2.3%
Ethiopia	31,710	522	1.6%
Cameroon	25,460	159	0.6%
Tanzania	23,710	1,457	6.1%
Zambia	19,210	125	0.7%
Botswana	17,300	218	1.3%
Namibia	12,300	517	4.2%
Burkina Faso	10,190	72	0.7%
Zimbabwe	9,900	634	6.4%
Total	558,020	13,251	2.4%

[a] World Bank website
[b] UNWTO (2012)
Note – all figures have been converted to 2011 dollars for comparison

Most tourism in African lion range countries is non-consumptive nature tourism. Among holiday and leisure visitors, nature-based attractions are the dominant motivations for travelling to southern Africa. Aside from tourists who are visiting friends and relatives, tourism industries in lion range countries is almost entirely based on nature tourism (Scholes and Biggs 2004).

While nature tourism is a significant part of the economy of some lion range countries, in all countries, trophy hunting is a small percentage of overall tourism revenues, as shown in the table below.

Table 4: Hunting and tourism

Country	Tourism revenue[a] US$m	Trophy hunting revenue[b] US$m	Trophy hunting revenue as a percentage of tourism revenue
South Africa	9,547	112	1.2%
Ethiopia	522	1.45	0.3%
Cameroon	159	2.4	1.5%
Tanzania	1,457	32.9	2.3%
Zambia	125	7	5.6%
Botswana	218	25.4	11.7%
Namibia	517	32.8	6.3%
Burkina Faso	72	0.8	1.1%
Zimbabwe	634	20	3.2%
Total	13,251	234.75	1.8%

[a] UNWTO (2012)

[b] Lindsey, Roulet and Romanach (2006)

Note – all figures have been converted to 2011 dollars for comparison

Trophy hunting is a very small part of the tourism industry in most countries. Overall trophy hunting accounts for less than 2% of tourism revenues. Even this seems an overstatement – several figures above, including the outlier figure of Botswana are based on unpublished sources, discussed below. Note also that despite reports of high hunting revenues in Botswana, trophy hunting is to be banned there from 2014 (Khama 2012).

As a portion of any national economy, trophy hunting is completely insignificant, with revenue never accounting for more than 0.27% of GDP (Namibia). Authors such as Barnett and Patterson (2006) who claim trophy hunting can account for several percent of GDP are misguided.

We saw above that trophy hunting revenues fail to reach rural communities. Any suggestion that trophy hunting can play a significant role in economic development at a wider scale is completely implausible when the industry is considered in the context of national economic activity.

WHERE DOES THE $200M ESTIMATE COME FROM?

The source of the industry revenue figures quoted above, Lindsey, Roulet, and Romanach (2006) is also the likely source of Rudolph and Hosmer's (2011) $200m revenue claim. As the only continent-wide estimate of trophy hunting revenue, this study is widely quoted by both hunting advocates like Rudolph and Hosmer and opponents such as IUCN (2009). Given the prominence of this figure, it is worth examining the study in more detail.

Lindsey, Roulet and Romanach's paper is based on a literature review of "published and unpublished literature" and personal communications with trophy hunting industry sources. The revenue-related figures are reproduced in Table 5 below:

Table 5: African trophy hunting revenue estimate

Country	Revenue estimate (USD $m)	Source	Note
South Africa	100	Professional Hunters Association of South Africa Website www.phasa.co.za	No such estimate available on site at time of writing. No response to repeated requests for information.
Namibia	28.5	Damm (2005)	Author's estimates based on Ministry of Environment and Tourism visitor statistics.
Tanzania	27.6	Baldus and Cauldwell (2004)	Authors' estimates based on Selous Game Reserve data.
Botswana	20	Botswana Wildlife Management Association	Publication not available on internet. No response to repeated requests for information.
Zimbabwe	16	Booth, 2002. Analysis of Wildlife Markets (sport hunting and tourism). WWF-SARPO Report, Harare.	Publication not available.
Zambia	5	Lewis and Alpert (1997)	Figure in source report is actually $3.1m.
Cameroon	2	Mayaka et al. (2005)	This is a secondary source, Lindsey, Roulet and Romanach seem not to have read primary source document, which is not available on the internet.
Central African Republic	1.4	Roulet, P.A., 2004a. Ph.D. Thesis, Orleans University.	Source in French, not reviewed here.
Ethiopia	1.3	Personal communication from safari company	
Burkina Faso	0.6	Chardonnet, B 1999.	Source in French, not reviewed here.
Total	202.4		

Table 5 shows that few of the sources used to compile Lindsey, Roulet, and Romanach's (2006) estimate of trophy hunting revenue are publically available or employ any sort of systematic methodology. Almost half of their final estimate is from a South African estimate that does not seem to exist. Another study quoted by Lindsey, Roulet and Romanach is Damm (2005). This study lists estimates of South African hunting revenue of $68m and $81m and also emphasizes the paucity of data available.

Of the studies used by Lindsey, Roulet and Romanach, only the figures from Namibia and Tanzania are easily available and show any working and methodology. While no more thorough estimate exists at this time, the widely quoted $200m revenue estimate is based on very weak sources and methodology and should be used with caution.

IMPACT OF AN ESA LISTING

The African Lion Coalition's proposal to list lions on the United States Endangered Species Act would limit the importation of lion trophies hunted in Africa. This does not equate to a ban on hunting of lions, but aims to reduce the number of lions shot by American hunters, as it is thought fewer trophy hunters would choose to hunt lions if they are unable to return home with a trophy. The results of Lindsey et al. (2006) suggest that trophies are important to hunters and that the listing would reduce the number of lions hunted.

Reduction in the number of lions hunted would have a minimal impact on the overall revenues of the trophy hunting industry, estimated by Lindsey, Roulet, and Romanach (2006) at $200m per year, discussed above. Lindsey et al. (2012) modelled the financial importance of lion hunting to the African trophy hunting industry under several scenarios. Under their "sustainable off-take" scenario, which assumes a reduction from current rates to 0.5 lions are hunted per 1000km^2, these authors found no impact on the financial viability of trophy hunting operations in Mozambique, Namibia and Zambia, and minor impacts in Tanzania and Zimbabwe.

Lindsey et al.'s (2012) results overstate any impacts, as their model assumes that lion hunters will not substitute a lion hunt with another hunt. The most likely response of American hunters to lion trophy import restrictions will not be to refrain from hunting altogether, but instead to hunt another species (Campbell 2012). Lions are only the fourth most preferred species by American hunters according to a survey by Lindsey et al. (2006). This survey did not include consideration of cost, and given the high prices of lion trophies further substitution is likely to occur in real world markets.

These results are supported by authors such as Baldus and Cauldwell (2004), who found that that "buffalo are by far the most important species", contributing 22.1% of trophy fees in Tanzania, far more than any other species. Booth (2009) also found that "Trophy buffalo are the most important species driving the economics of the hunting industry in southern and eastern Africa". While lion hunts are expensive, cheaper hunting packages focused on plains game, i.e. not including larger, more dangerous animals, are far more popular and are the "bread and butter" of the hunting industry (pp15-16).

Given the relatively minor role that lion hunting plays in overall trophy hunting revenue generation and the ability of hunters to substitute lion hunts with hunts of other species, it seems highly unlikely that an ESA listing would have any material impact on the industry.

CONCLUSIONS

Contribution to community development is minimal

Trophy hunting advocates consistently portray the industry as a major contributor to African community development. Our research indicates that its contributions are in fact minimal. Authors from all sides of hunting and conservation debates agree that local communities are key stakeholders for conservation initiatives, yet they generally receive minimal benefits from trophy hunting.

A study published by the pro-hunting International Council for Game and Wildlife Conservation and the UN Food and Agriculture Organisation found that hunting operators in Tanzania contribute only 3% of their turnover to the communities that are affected by hunting. These calculations are supported by other authors and the conclusion that hunting contributes insufficiently to community development is widely acknowledged.

Would reforms help improve the situation of disadvantaged communities?

Industry advocates imply that a solution is to reform the industry to share more of its revenue. However, the trophy hunting industry is not a large industry in terms of its contribution to GDP or as a part of the wider tourism industry. Improving economic development and the lives of communities is not, therefore, going to be affected by minor changes in the trophy hunting industry, but will be better served by broader development efforts and sustainable tourism. Studies that estimate the revenue of the trophy hunting industry are generally based on weak data and should be used with caution.

Listing African lions on the ESA will have minimal impacts on the trophy hunting industry

Efforts to list the African Lion on the US Endangered Species Act will have minimal impacts on the trophy hunting industry and therefore on communities in Africa. The trophy hunting industry is driven by hunting of buffalo and plains game – lion hunting is not a major revenue generator for the industry. Pro-hunting studies have concluded that reduced lion hunting would make almost no difference to the area of financially viable hunting land.

A very low cost contribution to conservation

A reduction in the number of lions hunted will, however, increase the chances of the species' survival in the wild and maintain an important asset for future generations. There are many factors influencing the long-term sustainability of wild lion populations including hunting, habitat loss, prey depletion and agricultural expansion. One threat that the USA can directly assist with is to reduce hunting by American hunters. The ESA listing provides a chance to help lions at almost no cost to people.

REFERENCES

Baldus, R, and A Cauldwell. 2004. “Tourist Hunting and Its Role in Development of Wildlife Management Areas In Tanzania.” In *Sixth International Game Ranching Symposium – Paris July 6-9, 2004*, 1–45. Paris, France.

Barnett, Rob, and Claire Patterson. 2006. *Sport Hunting in the Southern African Development Community (SADC) Region: An Overview*.

Booth, Vernon R. 2009. *A Comparison of the Prices of Hunting Tourism in Southern and Eastern Africa*. Joint publication of FAO and CIC. Budapest.

Booth, Vernon R. 2010. *Contribution of Hunting Tourism: How Significant Is This to National Economies*. Joint publication of FAO and CIC.

Campbell, Roderick. 2012. *Mane Assumptions - A Review of Lindsey Et Al (2012) The Significance of African Lions for the Financial Viability of Trophy Hunting and the Maintenance of Wild Land*. A report for the African Lion Coalition, prepared by Economists at Large, Melbourne, Australia. http://www.ecolarge.com/work/mane-assumptions/.

Damm, Gerhard. 2005. “Hunting in Namibia 2004: A Summary.” *African Indaba* 3 (4): 1–20.

Damm, Gerhard R. 2005. “Hunting in South Africa: Facts, Risks, Opportunities.” *African Indaba* 3 (4&5). http://www.huntinglegends.com/wp-content/uploads/2008/10/damm_hunting_southafrica_20051.pdf.

IUCN. 2009. *Big Game Hunting in West Africa. What Is Its Contribution to Conservation? Area*. Published by the International Union for Conservation, Gland, Swizerland and Cambridge, UK.

Khama, Ian. 2012. “State of the Nation Address.” *Government of Botswana Website*. http://www.gov.bw/en/News/2012-State-of-the-Nation-Address/.

Lindsey, P, P Roulet, and S Romanach. 2006. “Economic and Conservation Significance of the Trophy Hunting Industry in Sub-Saharan Africa.” *Biological Conservation* 134 (4) (February): 455–469. doi:10.1016/j.biocon.2006.09.005. http://linkinghub.elsevier.com/retrieve/pii/S0006320706003831.

Lindsey, P. A., R. Alexander, L. G. Frank, A. Mathieson, and S. S. Romanach. 2006. “Potential of Trophy Hunting to Create Incentives for Wildlife Conservation in Africa Where Alternative Wildlife-based Land Uses May Not Be Viable.” *Animal Conservation* 9 (3) (August): 283–291. doi:10.1111/j.1469-1795.2006.00034.x. http://doi.wiley.com/10.1111/j.1469-1795.2006.00034.x.

Lindsey, Peter A. 2008. “Trophy Hunting in Sub Saharan Africa: Economic Scale and Conservation Significance.” *Best Practices in Sustainable Hunting*: 41–47.

Lindsey, Peter Andrew, Guy Andrew Balme, Vernon Richard Booth, and Neil Midlane. 2012. "The Significance of African Lions for the Financial Viability of Trophy Hunting and the Maintenance of Wild Land." Ed. Brock Fenton. *PLoS ONE* (1) (January 11). doi:10.1371/journal.pone.0029332. http://dx.plos.org/10.1371/journal.pone.0029332.

Mayaka, Theodore B., Theo Hendricks, Justus Wesseler, and Herbert H.T. Prins. 2005. "Improving the Benefits of Wildlife Harvesting in Northern Cameroon: a Co-management Perspective." *Ecological Economics* 54 (1) (July): 67–80. doi:10.1016/j.ecolecon.2004.09.020. http://linkinghub.elsevier.com/retrieve/pii/S0921800904003945.

Mbaiwa, Joseph E. 2004. "The Socio-Economic Benefits and Challenges of a Community-Based Safari Hunting Tourism in the Okavango Delta, Botswana." *The Journal of Tourism Studies* 15 (2): 37–50.

Nelson, Fred, and Rugemeleza Nshala. 2007. "The Evolution and Reform of Tanzanian Wildlife Management." *Conservation and Society* 5 (2): 232–261. http://conservationandsociety.org/article.asp?issn=0972-4923;year=2007;volume=5;issue=2;spage=232;epage=261;aulast=Nelson.

Nowell, K., C. Breitenmoser-Wursten, U. Breitenmoser, and M. Hoffmann. 2012. "Panthera Leo." *IUCN Redlist*. http://www.iucnredlist.org/details/15951/0.

Packer, C, H Brink, B M Kissui, H Maliti, H Kushnir, and T Caro. 2010. "Effects of Trophy Hunting on Lion and Leopard Populations in Tanzania." *Conservation Biology : the Journal of the Society for Conservation Biology* 25 (1) (March): 142–53. doi:10.1111/j.1523-1739.2010.01576.x. http://www.ncbi.nlm.nih.gov/pubmed/20825444.

Peake, Debbie. 2004. "Botswana 2004 - A Review." *African Indaba* 2 (3): 7–12. http://www.africanindaba.co.za/Archive04/AfricanIndabaVol2-3.pdf.

Riggio, Jason, Andrew Jacobson, Luke Dollar, Hans Bauer, Matthew Becker, Amy Dickman, Paul Funston, et al. 2012. "The Size of Savannah Africa: a Lion's (Panthera Leo) View." *Biodiversity Conservation* (doi:10.10. doi:10.1007/s10531-012-0381-4. www.springerlink.com.

Rudolph, Larry, and Joe Hosmer. 2011. "Why Being Hunted Is Good for Africa's Lions." *Daily Caller*. http://dailycaller.com/2011/03/04/why-being-hunted-is-good-for-africas-lions/.

Sachedina, H.T. 2008. "Wildlife Is Our Oil : Conservation , Livelihoods and NGOs in the Tarangire Ecosystem , Tanzania." *Word Journal Of The International Linguistic Association*. University of Oxford. http://african-environments.ouce.ox.ac.uk/pdf/sachedina_dphil.pdf.

Scholes, R.J., and R. Biggs. 2004. *Ecosystem Services in Southern Africa: A Regional Assessment*. Regional scale component of the Southern African Millennium Ecosystem Assessment.

Smith, Robert J., and Matthew J. Walpole. 2005. “Should Conservationists Pay More Attention to Corruption?” *Oryx* 39 (03) (April 5): 251–256. doi:10.1017/S0030605305000608. http://www.journals.cambridge.org/abstract_S0030605305000608.

Telecky, Teresa. 2013. *Comments on U.S. Fish and Wildlife Service Docket No. FWS-R9-ES-2012-0025*. Submission by The Humane Society of the United States, Humane Society International and The Fund for Animals on US FWS 90-day finding that listing the African lion subspecies as endangered may be warranted.

UNWTO. 2006. *Report of the World Tourism Organization to the United Nations Secretary-General in Preparation for the High Level Meeting on the Mid-Term Comprehensive Global Review of the Programme of Action for the Least Developed Countries for the Decade 2001-2010*. http://www.un.org/special-rep/ohrlls/ldc/MTR/WorldTourisminput.pdf.

UNWTO. 2012. *UNWTO Tourism Highlights*. United Nations World Tourism Organization,. http://mkt.unwto.org/sites/all/files/docpdf/unwtohighlights12enlr_1.pdf.

Tab 8

PAPACO STUDIES - NUMBER 2

BIG GAME HUNTING IN WEST AFRICA

WHAT IS ITS CONTRIBUTION TO CONSERVATION?

UICN – Programme Aires Protégées d'Afrique du Centre et de l'Ouest – PAPACO
(IUCN – *West and Central African Protected Areas Programme – PAPACO*)

The geographical terminology used in this study, and its presentation, are in no way an expression of any opinion on the part of the IUCN regarding the legal status or authority of any country, territory or region or on the tracing of its borders.

The opinions expressed in this publication are not necessarily those of the IUCN.

Published by: IUCN, Gland, Switzerland and Cambridge, United Kingdom.

Citation: UICN/PACO (2009). La grande chasse en Afrique de l'Ouest: quelle contribution à la conservation ? (Big Game Hunting in West Africa. What is its contribution to conservation?

ISBN: 978-2-8317-1204-8

Cover photo: Bertrand Chardonnet
Photo credit: Bertrand Chardonnet

Produced by: IUCN – PACO – Protected Area Programme (see www.papaco.org)

Available from:

UICN – Programme Afrique Centrale et Occidentale
01 BP 1618 Ouagadougou 01
Burkina Faso
Ph. (226) 50 36 49 76
E-mail: paco@iucn.org
Website: www.iucn.org/places/paco and www.papaco.org

The "études du Papaco" (Papaco Studies) series offers documented analyses which aim to stimulate reflection and debate on the conservation of biodiversity in West and Central Africa.

It sheds light on a situation or a topic, but does not claim to provide an exhaustive coverage of the subject.

Readers wishing to deepen the analysis, add ideas or share their opinions on the topics raised, are strongly encouraged to do so by sending their comments to: **uicn@papaco.org**

Pertinent contributions will be put on line at **www.papaco.org**, under the section "études du papaco" where a discussion forum is opened for each study.

The complete report used to prepare this document in the "études du Papaco" series was written by Bertrand Chardonnet, in French, with the title "Grande chasse en Afrique de l'Ouest: contribution à la conservation ?" (Big Game Hunting in West Africa. What is its contribution to conservation?)

It is also available on the website www.papaco.org under the "études du Papaco" section.

This study was carried out with the financial support of the Fonds Français pour l'Environnement Mondial (French Fund for the World's Environment).

CONTENTS

LIST OF MAPS

LIST OF ACRONYMS

Acronym	French	English
ACP	Association des Guides de Chasse Professionnels (France)	Association of professional hunting guides (France)
AFD	Agence Française de Développement	French Development Agency
AGEREF	Association de Gestion des Réserves de Faune	Wildlife reserve management association
AP	Aire Protégée	Protected area
APFC	Association pour la Protection de la Faune Centrafricaine	Association for central African wildlife protection
AVIGREF	Association Inter-Villageoise de Gestion des Ressources Naturelles et de la Faune	Inter-village wildlife and natural resource management association
CAMPFIRE	Communal Areas management Programme for Indigenous Resources	-
CBNRM	Community Based Natural Resources Management	-
CENAGREF	Centre National de Gestion des Réserves de Faune	National centre for wildlife reserve management
CREMA	Community Resource Management Area	-
CVGF	Comité Villageois de Gestion de la Faune	Village wildlife management committee
DFC	Direction de la Faune et des Chasses	Directorate of wildlife and hunting
DG	Direction Générale	General Directorate
DNCN	Direction Nationale de la Conservation de la Nature	National Directorate of Nature Conservation
FAO	Organisation des Nations Unies pour l'Alimentation et l'Agriculture	Food and Agriculture Organisation (UN)
FEM	Fonds pour l'Environnement Mondial	Global Environment Facility (GEF)
FIC	Fonds d'Intérêt Collectif	Collective interest fund
FFEM	Fonds Français pour l'Environnement Mondial	French Fund for the World's Environment
FFRB	Fondation Française pour la Recherche sur la Biodiversité	French foundation for biodiversity research
FMI	Fonds Monétaire International	International Monetary Fund (IMF)
GEPRENAF	Gestion Participative des Ressources Naturelles et de la Faune	Participative management of natural resources and wildlife
GMA	Game management Area	-
GTZ	Coopération Technique Allemande	German development cooperation agency (now GIZ)
IGF	Fondation Internationale pour la Gestion de la Faune	International foundation for wildlife management
IK	Zone d'Intérêt Cynégétique à Gestion Communautaire	Community-managed hunting interest area
IPHA	Association Internationale des Guides de Chasse Professionnels	International professional hunters' association
LRA	Armée des Rebelles du Seigneur	Lords' Resistance Army
MIKE	Monitoring Illegal Killing of Elephants	-

NAMC	Natural Agricultural Marketing Council (South Africa)	-
NCRF	Natural Resources Consultative Forum	-
OFINAP	Office National des Aires Protégées	National office of protected areas
OMT	Organisation Mondiale du Tourisme	World Tourism Organisation (WTO)
ONG	Organisation Non Gouvernementale	Non-governmental Organisation (NGO)
PAPACO	Programme Aires Protégées d'Afrique du Centre et de l'Ouest de l'UICN	IUCN's Central and West African protected areas programme
PFNL	Produits Forestiers Non Ligneux	Non-wood forest products
PIB	Produit Intérieur Brut	Gross Domestic Product (GDP)
PN	Parc national	National park
PNKK	Parc national du Niokolo Koba (Sénégal)	Niokolo Koba National Park (Senegal)
PNUD	Programme des Nations Unies pour le Développement	United Nations Development Programme (UNDP)
RCA	République Centrafricaine	Republic of Central Africa
RDC	République Démocratique du Congo	Democratic Republic of Congo (DRC)
SanParks	Parcs nationaux d'Afrique du Sud	National parks of South Africa
SCI	Safari Club International	-
TANAPA	Tanzanian National Parks	-
TRAFFIC	Wildlife Trade Monitoring Network	-
UNWTO	Organisation des Nation Unies pour le Tourisme	UN World Tourism Organisation
UICN	Union Internationale pour la Conservation de la Nature	International Union for the Conservation of Nature (IUCN)
USAID	Agence de Coopération des USA	US Agency for International Development
UTO	Unité Technique Opérationnelle	Technical operational unit
WMA	Wildlife management Area	-
WWF	Fonds Mondial pour la Nature	World Wide Fund for Nature
ZAWA	Zambian Wildlife Authority	-
ZCV	Zone Cynégétique Villageoise	Village hunting area
ZIC	Zone d'Intérêt Cynégétique	Hunting interest area
ZOVIC	Zones Villageoises de Chasse	Village hunting area

RESUME

La grande chasse occupe aujourd'hui des surfaces très importantes en Afrique sub-saharienne (approximativement 1,4 million de km²), ce qui représente 22% de plus que la surface de tous les parcs nationaux de cette région. C'est donc une composante importante des paysages ruraux de nombre de pays d'Afrique sub-saharienne. La présente étude vise à préciser le rôle de la grande chasse en Afrique, et plus spécifiquement en Afrique de l'Ouest. L'analyse des données récoltées a permis de préciser la pertinence de la grande chasse selon des critères de conservation, socio-économique et de bonne gouvernance.

Sur le plan de la conservation, la grande chasse présente des résultats irréguliers: il existe des zones de chasse qui sont stables géographiquement et dont les populations de faune sauvage sont importantes, mais ce n'est pas le cas général. Une grande disparité de qualité existe entre les zones. Les résultats de conservation, à niveau de gestion égale, sont moins bons que ceux obtenus par les parcs ou réserves qui sont leurs voisins. Les zones de chasse sont moins à même de résister aux pressions venues de la périphérie que les parcs, et jouent par conséquent un rôle moindre dans les stratégies futures de conservation. Un point positif indéniable du résultat de conservation obtenu, est qu'il l'a été avec un financement donné en quasi-totalité par les chasseurs, sans l'aide de bailleurs de fonds, et souvent sans l'engagement des Etats.

Sur le plan économique, les résultats sont très faibles. L'usage du sol par la grande chasse ne supporte pas la comparaison avec les autres usages agro-pastoraux, parfois dans un rapport très élevé. Les contributions de la grande chasse aux PIB et aux budgets des Etats sont négligeables au regard des surfaces concernées. Les sommes générées à l'ha, tant pour le secteur privé que pour les Etats n'atteignent pas les ratios nécessaires pour un bon aménagement. Les retombées pour les populations, même dans le cadre de projets spécifiques, sont négligeables, et ne peuvent pas les inciter à arrêter le braconnage et le développement des zones agricoles. Le nombre d'emploi créés (15 000 pour toute l'Afrique), est faible au regard des 150 millions d'habitants qui peuplent les huit principaux pays de chasse, et par rapport aux surfaces utilisées (16,5% de ces huit pays). Au total, le secteur est consommateur d'espace sans retour socio-économique à la hauteur.

La « gouvernance » est également absente de pratiquement toute la filière de la grande chasse pour un bon nombre de pays. Les personnes qui ont le contrôle actuel du système ne sont pas prêtes à partager le pouvoir et à se lancer dans des ajustements qu'ils ne contrôlent pas. Ils tentent, grâce à l'opacification du système, de faire perdurer un système de gestion qui est largement essoufflé. Cette position sert des intérêts particuliers, mais pas l'intérêt de la conservation, des Etats, ou des communautés locales.

La chasse a joué, et joue encore, un rôle de conservation en Afrique. Il n'est pas certain qu'elle le jouera à l'avenir dans les mêmes conditions. Par contre, elle ne joue pas de rôle économique ou de rôle social significatif, et ne contribue pas à la bonne gouvernance.

La question peut cependant se résumer ainsi: peut-on faire mieux en conservation de ces zones que ce qu'a fait la grande chasse jusqu'à présent ? Cela n'est pas sûr, d'autant plus que la grande chasse s'est autofinancée.

L'avènement de la rétribution des services environnementaux et des financements durables permet d'envisager le financement des réseaux d'aires protégées sous un angle nouveau. L'environnement est de plus en plus considéré comme un bien global qui ne peut être utilisé pour des intérêts exclusifs particuliers ou d'une minorité.
Dans les réseaux modernes d'aires protégées, les zones de chasse ont encore un rôle de conservation important à jouer: celui du financement et du maintien des zones périphériques des blocs de conservation.

SUMMARY

Today in sub-Saharan Africa, very large areas are used for big game hunting (approximately 1.4 million km²), which is 22% more than all national Parks of the region. Therefore, it is an important component of African rural landscapes. This study clarifies the role of big game hunting, with an emphasis on West Africa. The data gathered has been analysed to clarify the pertinence of big game hunting according to conservation, socio-economic and good governance criteria.

Regarding conservation, big game hunting shows mixed results. Some areas are geographically stable, and wildlife populations are significant, but this is not the norm. Large disparities are seen between areas. Where management levels are similar, the conservation results from big game hunting are lower than those of neighbouring national parks or reserves. Hunting areas are less resistant to external pressures than national parks, and thus will play a lesser role in future conservation strategies. An undeniable positive result is that the conservation results that are obtained are entirely financed by the hunters, without support from donors and often without government commitment.

The economic results of big game hunting are low. Land used for hunting generates much smaller returns than that used for agriculture or livestock breeding. Hunting contributions to GDP and States' national budgets are insignificant, especially when considering the size of the areas concerned. Economic returns per hectare, for the private sector and for governments are insufficient for proper management. Returns for local populations, even when managed by community projects (CBNRM) are insignificant, and cannot prompt them to change their behaviour regarding poaching and agricultural encroachment. The number of salaried jobs generated (15 000 all over Africa) is low considering that 150 million people live in the eight main big game hunting countries, and that hunting takes up 16.5% of their territory. To summarise, the hunting sector uses up a lot of space without generating corresponding socio-economic benefits.

Good governance is also absent from almost the entire big game hunting sector in many countries. Those who currently have control of the system are not prepared to share that power and undertake adjustments that would mean relinquishing control. They attempt, thanks to a fairly opaque system, to keep a largely exhausted management system going. This position serves individual interests, but not those of conservation, governments or local communities.

Hunting used to have, and still has, a key role to play in African conservation. It is not certain that the conditions will remain the same. Hunting does not however play a significant economic or social role and does not contribute at all to good governance.

The question, however, can be summarised today as: can we do conservation better than big game hunting has up until now, in those areas where big game hunting is practiced? This is not at all sure, all the more so in that big game hunting pays for itself.

The advent of consideration of environmental services and sustainable financing makes it possible to envisage financing these networks from a new angle. The environment is increasingly seen as a global good which cannot be used exclusively for individual interests or those of a minority.

In modern protected area networks, hunting areas still have an important role to play in conservation: that of financing and maintaining the peripheral areas around conservation blocks.

10 Summary sheets
to understand the role of big game hunting

The scale of big game hunting in Africa

The People

Around 18 500 tourist hunters go big game hunting in Africa every year. Hunts are organised by approximately 1 300 organisations that employ around 3 400 guides and 15 000 local staff. On average, a hunting safari[1] organisation will only have an average of 14.5 hunt clients per year and each guide will only take 5.5 hunters out annually.

The Places

Big game hunting areas take up huge areas of land: for the 11 main big game hunting countries, the surface area occupied is 110 million hectares, in other words 14.9% of the total land area of these countries. In addition to these hunting areas, protected areas occupy, in these 11 countries, 68.4 million hectares, i.e. 9.4% of the national territory. The sum of the hunting areas and protected areas therefore represents 24.3% of the surface area of these countries. This leaves a proportion of the country for human habitation that is difficult to reconcile with the development of these countries, the population density of which averages 34 people per km^2.

Animals Killed

Tourist hunters kill around 105 000 animals per year, including around 640 elephants, 3 800 buffalo, 600 lions and 800 leopards. Such quantities are not necessarily reasonable. It can be noted for example, that killing 600 lions out of a total population of around 25 000 (i.e. 2.4%) is not sustainable. A hunting trip usually lasts from one to three weeks, during which time each hunter kills an average of two to ten animals, depending on the country.

Financial Flows

The annual turnover for big game hunting in Africa is estimated at $US200 million, in other words around 100 billion CFA F, half of which is generated in South Africa and the rest in the other countries of Sub-Saharan Africa. The contribution to the countries' GDP is 0.06% for the 11 main big game hunting countries. The contribution to national budgets is also low: one percent of the land classified as big game hunting territory contributes 0.006% to the government budget. The contribution of hunting to the national budget is highest in Tanzania, where it is still only 0.3% and uses 26% of the national land area.

Returns per hectare in big game hunting areas

On average, big game hunting generates a turnover of $US1.1/ha in the 10 big game hunting countries (excluding South Africa), which is very low compared to agricultural use (300 to 600 times more), in a context where the peripheral zones of protected areas are already occupied. This figure does not reach the minimum ratio for the cost of developing a protected area (at least $US2/ha), and can be seen as the sole explanation for the gradual degradation of hunting areas. The local community's share is around $US0.10/ha (or 50 FCFA/ha), explaining their lack of interest in preserving hunting areas and their continued encroachment and poaching.

[1] Translators note: in this document, the term "safari" used on its own refers to safaris for spotting and photographing animals only. When the safari is for the purposes of hunting, the term "hunting safari" is used.

The scale of big game hunting in West Africa

Surface area

The big game hunting sector covers around 13 000 km^2 in West Africa, in other words 2.2‰ of its surface area (6.139 570 km^2). This is low with regard to the surface area of protected areas which cover around 10% of this territory. The potential for future extension of hunting areas is, however, very limited. In fact, hunting areas only really concern two countries (Burkina Faso and Benin), covering around 3.5% of their land area.

Economic Gain for Governments

The total big game hunting income for all countries in West Africa is 340 million CFA F per year. For the government, this income represents only 0.65 (Benin) and 2.35 (Burkina Faso) per ten thousand of the State budget. The contribution to the GDP of the countries is low with regard to the surface area concerned: 0.08‰ in Benin and 0.17‰ in Burkina Faso. It can therefore be considered that big game hunting takes up considerable areas of land in both these countries, without any real gain on a per hectare basis:

Criterion	Burkina Faso	Benin
% of the national territory	3.4	3.5
% of the State budget	0.0235	0.0065
% of GDP	0.017	0.008

The economic productivity of hunting areas is therefore negligible for these two countries.

The contribution to the socio-economic well-being of the populations

The number of jobs created is also low for the 3.5% of the national territory that is used: it is estimated at 400 permanent staff (for at least 6 months per year) and 400 temporary staff (for less than 2 months per year). It should be recalled that these countries have a total population of 19.4 million. The total return on big game hunting for all West Africa is around 80 million CFA F/year. On a per hectare basis, the average return for the population is very low: around 60 CFA F/ha used for big game hunting, while these zones are located in favourable farming land, where cotton for example would generate 150 000 CFA F/ha, in other words 2 500 times more.

West Africa in the African hunting industry

Hunting safaris here are the cheapest in all Africa (slightly higher in Benin), and at these prices it is unlikely that local operators make a profit commensurate with the investments required. In a market governed by supply and demand, this demonstrates just how unattractive the services offered are in this region. Around 370 big game hunters come to Benin and Burkina Faso per year, out of a potential of 18 500 hunters every year in Africa; in other words, 2% of the market.

The future of big game hunting in conservations strategies

Apart from Burkina Faso and Benin, the relatively poor results of the big game hunting sector and the clearly low potential in the other countries would seem to indicate that the future for conservation in West African countries does not lie in setting up big game hunting areas.

The conservation value of big game hunting

Conservation objectives and indicators

Conservation is about preserving the current ecological capital, or even increasing it. We focussed on four indicators:

- How well hunting area perimeters are preserved: this helps establish the resistance of "hunting areas" to pressure.
- How well vegetation coverage is maintained within hunting areas, that is to say how hunting areas can maintain habitat quality which helps sustain wild animals.
- To what extent the list of animal species present in the hunting area is maintained: are certain species better preserved by hunting areas than others?
- Changes in the populations of different wildlife species within the hunting areas.

Assessing management levels

These indicators are often studied in comparison with a neighbouring protected area where hunting is not allowed (national parks, reserves etc.). Such areas need to be sufficiently well-managed (including surveillance), even if not to the same level as the management of the neighbouring hunting area. Only analogous sites are compared; weighing up an abandoned protected area with a managed hunting area would not give pertinent data.

The management of hunting areas is self-financed by hunters, and therefore exists when hunting is carried out. Even if hunting area management is not ideal; at least it exists.

Large disparity in value among hunting areas

The first finding is that there is a large disparity in the quality of the different hunting areas. There are clearly hunting areas which fulfil their conservation role well, have geographically stable perimeters and have large wild animal populations, but this is not the general rule.

Comparison of hunting areas and UICN Category II "National Parks"

Hunting areas seem to have lower performance levels than national parks, for an equivalent management level:

- In the preservation of their perimeters
- In the preservation of vegetation that is found there
- National parks play a greater role in the conservation of species that are particularly sensitive to human pressure
- Hunting areas almost always have a lower animal population density than national parks

In total, for equivalent management levels, hunting areas play less of a role in conservation than national parks, which is fairly logical in light of their vocation. Hunting areas seem less well armed than national parks to deal with the future challenges that will be faced by protected areas.

What is the future of conservation in hunting areas?

Hunting areas probably have an important role to play in stabilising the peripheral areas of conservation blocks. The fact that they are self-financing also places them in an ideal position, so long as protected area networks do not have sustainable financing and would have no other option than to simply abandon the conservation block. Today, when government commitment and funding for conservation is insufficient, hunting areas represent an interesting option. It is not sure that this will be the case in the future with the increase of human pressure and the setting up, we hope, of well-functioning protected area networks.

Big Game Hunting and Demography

Big game hunting and the space required

Big game hunting requires vast areas of land to be sustainable. The 11 main big game hunting countries in Africa allocate 110 million hectares to this activity, carried out by 18 500 hunters, in other words around 6 000 ha per hunter. These hunting areas represent 14.9% of the surface area of these 11 countries which also count a total population of 250 million inhabitants for an average population density of 34 people per km^2.

The context of the demographic explosion

The population of the majority of these African countries has quadrupled since the 1960s, a period where the majority of protected areas were already classified. Furthermore, this population has been condensed due to the years of drought in the Sahel and elsewhere, which modified the isohyets and brought herders into contact with farmers, leaving, in the end, little space unoccupied. The notion of marginal or abandoned land has practically disappeared.

Areas available for big game hunting

These days, with demographic growth, the land available for hunting areas is diminishing. During this study, a statistical link was able to be made between human density and the proportion of the national territory allocated to big game hunting, whereby if the human population density of the country is 30 inh/km^2, the country classifies 16% of its land for big game hunting. When the density rate is 70 inh/km^2, the proportion of the territory falls to 6%. In the majority of the countries hunting areas are therefore threatened simply by the demographic explosion and this should be taken into account when drawing up future policy.

Demography and protected area networks

In the 11 main big game hunting countries, protected areas take up 9.4% of the national surface area, to which is added the 14.9% of hunting areas. This represents a total of 24.3% dedicated to conservation (or to the sustainable use of wildlife), a figure much greater than the 12% required by international standards. The fight against poverty, the quest for food security and the demographic explosion are not compatible with this figure of 24% that will certainly drop considerably in the future, and to the detriment of which? Protected areas or hunting areas? The protected area networks must therefore work to preserve the most useful 12%, as the rest could be counterproductive for conservation by hindering human development.

In the current demographic context, what is the use of big game hunting?

The poor socio-economic returns on big game hunting noted by this study and its lower performance levels in terms of conservation do not make it a priority solution for land use or conservation in the future. Kenya for instance has seen its population multiplied by 2.7, going from 14 million in 1977 (when hunting was stopped) to 38 million in 2008, in other words a density that has shot up from 24 inh/km^2 to 65 inh/km^2. However, this country has at the same time developed a tourism sector that is 40 times larger than the hunting sector at the time, focusing on a network of protected areas that cover 8% of the national territory.

Big game hunting can therefore be seen as a complementary conservation tool to protected areas, being one of the possible options for developing the peripheral areas of conservation blocks. It should not be used to replace protected areas.

Big Game Hunting and Gross Domestic Product

General data

An important item of data for analysing development is Gross Domestic Product (GDP): in absolute terms, per unit of surface area and per capita. The table below presents the figures for the main big game hunting countries:

Country	Contribution of big game hunting to GDP as a %	% of national territory covered by hunting areas	GDP per hectare in $US	GDP from hunting in per hectare in $US
South Africa	0.04	13.1	2092	2.1
Namibia	0.45	11.4	76	13.9
Tanzania	0.22	26.4	135	0.7
Botswana	0.19	23.0	186	12.7
Zimbabwe	0.29	16.6	142	1.4
Zambia	0.05	21.3	145	0.4
Cameroon	0.01	8.4	386	0.1
Republic of Central Africa (RCA)	0.10	31.5	24	0.3
Ethiopia	0.01	0.8	118	0.02
Burkina Faso	0.02	3.4	221	0.07
Benin	0.01	3.6	423	0.05

It can be noted that the GDP values per hectare in Benin and Burkina Faso are close to those obtained by agricultural production (around $US300/ha).

Low productivity of big game hunting

On average for these 11 countries, the surface area occupied by big game parks is 14.9% of national territory, and the contribution of big game hunting to the GDP is 0.06%. This makes the economic productivity of these hectares very low. This information shows that hunting is not a good option for land use, in particular in a context where priorities are to reduce poverty and establish food security. However, big game hunting (unlike small game hunting) is essentially carried out on land exclusively reserved for that purpose.

The least productive countries per hectare are Ethiopia (hunting areas have virtually disappeared there), Burkina Faso and Benin (where hunting trips are very cheap), Cameroon (where hunting areas are under high pressure from agriculture). These are the countries where closing down of hunting could make the biggest contribution to development by freeing-up land that is not very economically productive (but what would the consequences be for conservation?). These are also the countries where it is most difficult to change local communities' attitudes to conservation, due to the lack of any gain for them.

Find a more productive and eco-sensitive option

Those who are doing the best economically-speaking are Namibia and Botswana. And yet, Botswana decided that better value would be obtained from running safaris and they closed down hunting in the Okavango in 2009. This option should be studied in more depth in the other countries.

What is the place for big game hunting in this context?

The socio-economic contribution and the contribution to development of big game hunting are virtually nil. Therefore, the main overall interest of big game hunting lies in its value as a conservation tool. It is this value that should be increased by better integrating hunting into conservation strategies.

Big Game Hunting and Employment for local populations

Number of jobs created by big game hunting

The data relating to the number of jobs created by big game hunting are summarised in the table below:

Country	Hunting area size in km²	Number of jobs	Number of ha per job
South Africa	160 000	5 500	2 909
Namibia	94 052	2 125	4 426
Tanzania	250 000	4 328	5 776
Botswana	103 451	1 000	10 345
Cameroon	39 830	1 200	3 319
Central African Republic	196 035	670	29 259
Burkina	9 340	280	3 336
Benin	4 000	100	4 000
TOTAL	**856 708**	**15 203**	
Average			**5 635**

Job insecurity

It can be noted that these jobs are not all permanent; many of them only last for the hunting season, i.e. six months, and most are temporary jobs to open the trails at the beginning of the season (one to two months).

Summary

The 8 countries of the above table have a total population of 140 million people. Big game hunting takes up 16.5% of the territory but overall only offers one job for every 10 000 inhabitants. It is therefore a very modest employer. The average is around one permanent job for every 5 500 ha of hunting area: it is a very low figure in comparison to agriculture, and this constitutes an important incentive for the populations to transform hunting areas into farming land.

The example of Okavango (Botswana)

One of the main reasons behind the decision to stop hunting in the Okavango was to create jobs. In Botswana, a 10 000 ha safari park with a luxury camp of nine tents (18 beds) employs an average of 38 people, in other words 2.3 permanent jobs per bed. The ratio is therefore one permanent job for every 263 ha, as against one job for every 10 345 ha for hunting. In this case, safari tourism creates 39 times the number of jobs than big game hunting for an equivalent surface area.

The example of Luangwa National Park (Zambia)

In Zambia, tourism in the Luangwa National Park alone (a park that received 42 000 visitors in 2007) created 800 permanent and/or temporary jobs in Mfuwe (NRFC, 2008), which is more than the Central African Republic on 31.5% of the national territory reserved for hunting, and the double the number of jobs in the hunting sector of Benin and Burkina Faso together.

Big game hunting jobs – low contribution to social progress

The situation can be summarised by saying that the jobs proposed are precarious, few in number and are not competitive with the resources obtained from other usages of the land, including agriculture. In this, big game hunting does not effectively contribute to development despite taking up vast areas of land.

Big game hunting and economic benefits for local populations

What are the amounts that get redistributed to local communities?

- In Zambia, the economic benefits of big game hunting for the populations of all the Game Management Areas were, in 2006, one million US dollars (approximately 500 million CFA F) for 22% of the country's surface area.
- In Zimbabwe (Programme Campfire), each home (10 people) receives one to three US dollars per year (500 to 1 500 CFA F)
- In Namibia, the figure is somewhat different, because 56% of revenues come from tourism and 22% from hunting: $US1.75 million for 10.5 million inhabitants.
- In Tanzania: 42 district councils receive one million US Dollars per year for 250 000km^2.
- In RCA, the benefits for the population are 103 million CFA F for 34 714km^2 of Village Hunting areas (ZCV).
- In Benin, benefits equal around 35 million CFA F for 3 942km2 and 300 000 people.
- In Burkina Faso, the regular benefits estimated were 34.5 million CFA F in 2005 for 9 340 km^2.

Redistribution per ha used for big game hunting

Country	Income for communities per ha in $US	Income for communities per ha of hunting area in CFA F	Average number of people per ha
Zambia	0.06	30	0.16
Tanzania	0.04	20	0.43
Namibia	0.16	80	0.02
Central African Republic	0.06	30	0.07
Burkina Faso	0.07	37	0.56
Benin	0.18	88	0.78

Local communities therefore receive 20 to 88 CFA F per ha of hunting area, in other words a pittance. Tanzania is the country where local communities benefit the least from returns on big game hunting per hectare; Namibia and Benin redistribute the most.

What amounts are redistributed per person?

On average, big game hunting redistributes $US0.10 per ha of potential village land classified as a hunting area. Again, on average, each inhabitant can therefore hope to gain $US0.30 per year (in other words 150 CFA F/year). These very low figures are comparable with those of the Campfire Programme in Zimbabwe. Furthermore, it should be highlighted that this money does not always reach the beneficiaries (mediocre governance) and that it is most often used for community actions.

Do these benefits provide incentive?

Such low benefits do not motivate local communities. Therefore, it is in their “interests” not to respect the hunting area boundaries and to poach. Furthermore, this is what they do, the informal bush meat sector being much more profitable for them. Poachers are therefore the main beneficiaries of the wildlife sector in Ghana (the bush meat trade has an annual turnover of $US200 million) and in Ivory Coast, where there is no more big game but where bush meats represents an annual turnover of $US148 million. It is significant to note that the wildlife sector in Ghana has an estimated turnover per year that is higher than the entire big game hunting sector of the whole of Africa: the informal sector “works better” than the formal hunting sector and there is therefore no incentive to change the system. Unfortunately for conservation, the economic data are a strong incentive to continue poaching.

Big Game Hunting and Tourism

Alongside big game hunting, wild animals can generate safari tourism.

Sub-Saharan Tourism, a rapidly growing sector

Tourism has been growing sharply in the past 20 years, with 20 million tourists arriving in 1995, 47 million in 2010 and 77 expected in 2020. All the forecasts concur (World Tourism Organisation):

Geographical zone	Annual average % growth from 1995 to 2000	Annual average % growth from 2000 to 2010
Tanzania	10.0	9.3
Africa	6.0	5.6

West Africa is, however, largely left out of this growth, apart from coastal destinations (Senegal and Ghana).

Hunting tourism as a percentage of the overall sector

Tourism turnover has risen considerably in the past 20 years and the percentage of hunting within tourism, which was significant, has now become marginal in several countries like South Africa (1%) and Tanzania (3%) for example:

Country	% of turnover from hunting in tourism turnover	% of national land area taken up by hunting areas
South Africa	1.2%	13%
Namibia	6.6%	11%
Tanzania	2.7%	26%
Botswana	3.7%	23%
Zimbabwe	4.7%	17%
Zambia	3.6%	21%
Ethiopia	0.7%	0.8%

The ratio between hunting as a percentage of tourism and of land use

The few percentage points of tourism earnings provided by hunting require huge percentages of national land (8 to 26%). The ratio is therefore not favourable to developing big game hunting, the surface areas of which are in addition to other protected areas where most of the tourism takes place. It can clearly be seen that in countries with other vital vocations (in terms of development), big game hunting cannot maintain the position it held prior to the demographic explosion and that of tourism.

The example of Kenya

Tourism in Kenya is now approaching a turnover of $US1 billion per year (a figure that is equivalent to that of tourism in Tanzania), while the losses projected from closing hunting in 1977 were $US30 million, and are therefore minimal in comparison. Kenya has therefore clearly benefitted financially from stopping hunting, which would have diminished anyway under demographic (65inh/km^2) and agricultural pressure.

The stakes for West Africa

For West Africa the issue concerns catching up to the other countries in the global tourism race by proposing a strategy that complies with the overall values sought by tourists, along with institutional arrangements, more professionalism and real governance. This requires a greater importance being accorded to national parks and to the local communities surrounding them.

Hunting and the private sector

The contribution of the private sector

The private sector brings recognised management efficiency and procedural flexibility to the big game hunting sector. Thus, effectiveness and efficiency are greater. In the hunting field, the private sector is self-financing. This is not the case in the conservation field where it most often depends on external funding: becoming thus a simple operator.

The constraints of the private sector

The main constraint of the private sector is that is must make a profit, however, the big game hunting sector has been described as having low profitability or none at all. Furthermore, this is one of the reasons hunting areas often deteriorate, the sums allocated to management being insufficient to limit the effects of various pressures. For safaris, the niche is only beneficial under certain conditions which must be analysed beforehand. A “private” profit-seeking entity has therefore, in most cases, no interest in taking up a protected area managerial role. If the private sector does not have its own source of funding, it becomes a mere operator (as an NGO can be), and obtaining the protected area concession must then be subject to the rules of good governance.

Private Sector and the Regulatory Role

The principle is that the private sector cannot take the place of Government as regards its governing role, the primary aspect of which is surveillance. All the examples in Africa show that short term successes in replacing Government for these tasks have led to a striking failure in the medium term. This phenomenon, described as “environmental imperialism”, is, indeed, rapidly rejected by other stakeholders, first and foremost the local communities.

Implications for State Policy

This implies that if the Government seeks to offload these tasks onto the private sector because it does not want to (or cannot) fulfil its regulatory functions, conservation objectives cannot be met. The primary condition for the private sector to be able to intervene in a country is that the rule of law be upheld, and the corollary for this is that the Government fulfil its regulatory role.

Private Sector and Human Resources

Notwithstanding economic and governance-related obstacles, the private sector is then confronted with an expertise issue: competent human resources, experienced in the same region (Africa is so diverse that local expertise is difficult to export in the short term), and sensitive to the aspirations of the population are not legion…

Private Sector and Marketing

The development of modern tourism involves the private sector, as is demonstrated by the privatisation of most state-owned hotels. As for any economic activity, the quality of operators varies and governance measures need to be set in place to monitor them. These will aim at selecting the best operators, contributing thus to improving the country’s brand image. The clientele will follow if the country’s brand image and the operator are good.

The position of the local communities: Rights of use and partnership with the private sector

Experience of Community Managed Projects

Over the past 20 years, many natural resource management programmes have been based on local community involvement in managing wildlife. They have had mitigated results, as the low incomes generated have disappointed the populations. The institutional organisation set in place often did not change much with regard to the system already in place on government-run hunting areas. Indeed, the communities had neither the right to choose their activity (hunting, safari, or other), nor to choose the operator nor to set the prices.

Private Sector – Community Partnerships

The simultaneous arrival of decentralisation and community-private sector partnerships enabled notable progress to be made in this field: the community (sometimes with the support of the decentralised local authorities) chose the activity, the operator and set the price according to the market which usually includes an annual rental fee and a share of profits (for example a tourist tax per person per night), as well as a certain number of guaranteed jobs. The private sector contributed efficiency, management and clients.

A successful example around national parks

In the Okavango, a model was set up: the local community rents an area (10 000 ha for instance) to a private operator which sets up a campsite with luxury tents and uses the National Park for visits by car and the peripheral area for safaris on foot, at night or by boat and also coordinates interaction with local populations and villages. In this way, the communities increase the conservation area of their community. This of course remains an exceptional conservation case at a time when all conservation areas are diminishing, offering a way to increase them. The community then chooses the way its area shall be used – for hunting, safaris, fishing etc.

Establishing a peripheral area on a voluntary basis

Why does this model work? Because of its economic reality. In Botswana, a safari park of 10 000 ha can be rented out at $US100 000 per year, which all goes to the community. The camp employs 40 staff and the community also receives a tourist tax per night for each client (giving them an interest in the profits, therefore in ensuring good conservation), as well as high tips. The annual rent alone for 20 000 ha of community conservation zone in Botswana brings in as much as the rural communities of the Central African Republic receive for 3.5 million hectares (and even then they only see a small proportion of that). It is also more than what Burkina Faso and Benin combined redistribute to the local populations.

Prerequisites – land use rights

This arrangement requires (if it is not already the case), an institutional adjustment: the local communities must be accorded the necessary rights of use over the land (as was instigated by the law on natural resources passed in Chad in 2008). They must also have suitable land around National Parks. Whereupon another problem arises: this suitable land is currently occupied by State hunting areas.
This phenomenon can be reproduced in West Africa by supporting the creation of community areas around national parks, facilitating contact with tourism professionals (hunting or safaris) who have the know-how and a portfolio of clients, and by encouraging partnerships.

INTRODUCTION

Big game hunting is historically the main "modern" use of African wildlife. Once the colonisers discovered the variety and numbers of big animals, they started to hunt them intensively. In reaction to this excessive and uncontrolled pressure, the first hunting regulations were drawn up. Among these, were the first protected areas in Africa; reserves were created to protect animals from the pressure of hunting.

This is how two types of geographical area were identified: firstly authorised hunting areas and secondly zones where hunting was forbidden – or "reserves". In many African countries, the network of protected areas was designed to protect wildlife from the pressure of hunting rather than to protect an ecosystem and its functioning enabling the sustainable delivery of its eco-systemic services. This is one of the reasons why certain protected area networks are unsuited to the current situation and should be re-examined.

Many reserves and hunting areas were defined more than 50 years ago under the colonial regimes, at a time when the human populations represented, in terms of numbers, 20 or 25% of current figures. Therefore, it is hardly surprising that from the outset the design concept favoured the big game hunting industry to the detriment of local populations. And yet they are the ones who must endure the consequences of living nearby: loss of land use rights, destruction of crops by animals, loss of human life and livestock.

In return, the human populations exert considerable pressure on the protected areas and on hunting areas and, in many places, pressure was greater than the preservation action and regardless of its status, the area disappeared, totally or partially, or saw its biodiversity diminished.

Today, approximately 1.4 million km^2 are used for hunting in Sub-Saharan Africa, which totals 22% more than, and in addition to, the surface area of all national parks. It is therefore one of the major components of the rural landscape in many Sub-Saharan African countries.

One of the stakes of this study is to see to what extent big game hunting helps to withstand this pressure and contributes to conservation by being a part of development, in order to recommend realistic land planning measures.

In the 1970s-80s, now more than 30 years ago, under the influence of South-African wildlife management concepts of the time, wildlife management strategies were developed based on the economic value of the animals. These theories share the same vision, summarised in one sentence "if it pays, it stays", in other words, if the wildlife is economically profitable, it will be conserved. If it is not, it will disappear. Therefore strategies based on promoting the economic value of wild animals were developed: intensive or extensive farming, hunting for tourists, organisation of areas based on the notion of load capacity[2].

Organisations specialising in the promotion of these theories then instilled big game hunting (and the game farming associated with it in certain parts of Southern Africa) with multiple advantages. These include:

- Nature conservation: including the conservation of natural areas and the wild animal species that live there,
- Rural development: helping to promote marginal land and contribute to development thanks to the financial flow from countries in the North to those in the South, the creation of an export industry that generates foreign currency for the countries of the South, a source of income for the governments of the South, a driver of development for civil society, the creation of wealth to support the whole system of hunting areas, as well as socio-economic and environmental benefits.
- Poverty reduction: as a determining element of participative policies of community-based natural resource management (CBNRM) projects and by creating benefits for local communities – financial, economic (jobs) and social (schools, dispensaries, meat etc.).

[2] This is a notion that comes from livestock breeding, where the optimal number of animals that can (must) be raised per hectare is calculated. This notion disregards the principles of African ecosystems which are based on spatial-temporal variability and was officially removed from South-African national park management strategies in 2006.

The limits of the system, as presented by these specialist organisations, only pertain to the need for greater professionalism in the sector to ensure a better contribution to conservation and development. The needs for improvement listed concern:

- The Government: need for good governance (transparency), for strict financial and economic procedures (duration of contracts, guaranteed minimum quotas), devolution of responsibilities for wild animal management to decentralised stakeholders (communities, operators etc.), compliance with scientific recommendations,
- The private sector
- The community sector
- The country where the hunters come from.

These organisations highlight the fact that sustainable development through big game hunting tourism requires a stable balance satisfactory for all in the fair distribution of financial and socio-economic benefits of big game hunting tourism (IGF, 2008).

Nonetheless, 30 years after these strategies were announced, big game hunting remains a field where objective data are lacking: the same phrases are reiterated, but always without any link to the data gathered in the field. Therefore, it is difficult to say today whether or not the stated theory has been proven or disproven by the facts and 30 years of experience in the field.

Early 2009, publication of the book "*Recreational Hunting, Conservation and Rural Livelihoods*" edited by ZSL and Barnay Dickson, Jon Hutton and William M. Adams went some way to filling the data gaps.

The book looked at the economic and conservation performance of the big game hunting sector in a wider context that included the impacts and other influences caused by human activity: persistent pollutants, loss of habitat and climate change. The book considers that hunting is only one of many human pressures on wildlife populations; their combined effect is one of the key issues for conservation and ecosystem science.

Over and above big game hunting's value as a conservation tool, which remains one of the essential points, the authors looked at the issue of the population's livelihoods. Over recent years, conservationists have been called on to demonstrate just how preserving biodiversity, in particular in developing countries, contributes to reducing local poverty. Supporters of hunting pointed out that hunting as a leisure activity led to a "win-win" situation where hunting rights enable the safari industry and rural communities to thrive, through job creation and significant income levels in regions with no other income source. The book's authors sought to calculate specific figures, including subsidy amounts (from donors for example), the distribution of costs or benefits, the comparison of revenues with other rural opportunities.

They also looked at how the institutions worked and the overall governance of the system. Indeed, hunting safaris bring in a considerable amount of foreign currency and for poor countries where governance is weak, such revenues are very attractive although difficult to manage as a public good. Once again they highlight that governance problems led hunting safari operators to need certification, which generated lively interest in the world of hunting safaris.

Finally, the question of ethics was asked thus: "is it normal, with regard to animals' well-being, to kill animals for pleasure?" This question has no easy answer in today's world.

In a context marked by environmental awareness, demographic growth, the global explosion of tourism and the emergence of sustainable funding for conservation, this study takes the same approach, and seeks figures and mapped data that can help to specify the role and the place of big game hunting in the fields of sustainable development:

- conservation,
- the economy,
- social development,
- improved governance.

The data on big game hunting are presented in the first part of the report, firstly for West Africa, subsequently for the other African countries where data are available and shed further light on these figures.

The second part analyses the data gathered, presenting an overall picture of whether or not the theories

formulated on wildlife management 30 years ago have been proven or disproven.

Finally, in the last section of the document, recommendations are made for improving the network of protected areas, reorganising the big game hunting sector for the coming years and for land planning.

1. THE HUNTING SECTOR IN AFRICA

This chapter firstly summarises some general facts and figures on hunting tourism in West Africa. The aim is not to be exhaustive, but rather to give a general outline within which to situate the study, by explaining the two main types of hunting (small game hunting and big game hunting) and the way the overall sector is organised.

1.1. Small Game Hunting

This aspect concerns mainly bird shooting. The targets may be waterfowl (ducks mainly, whether sedentary or Palaearctic migratory species) or terrestrial wildfowl (francolins, pheasant, doves, sand grouse etc.). It supposes that the area where hunting is practiced is attributed to an operator so that pressure can be monitored and regulated.

Usually, each operator is leaseholder of a given area, for a specific period and has clear specifications or a technical protocol to follow. This area may be allocated by the central department in charge of wildlife, usually through a tender process. The area can also be allocated by local communities following negotiation with the operator. In the latter case, a government check is also run, usually by the regional authority.

The areas for hunting consist of:

- Lakes, rivers, rice paddies and wetlands for waterfowl,
- Bush and fields for small terrestrial game.

In the latter case the area must be large enough for the operator to make a profit without destroying the birdlife capital. Hunting is permitted in the dry season, therefore outside cultivation periods. Areas planted with cotton are not used (furthermore the use of pesticides contributes to destroying wildfowl populations) nor are those planted with maize or millet which are bare at this time of the year. Burned areas of bush are not used either. The main hunting areas are therefore in the lowlands on the edges of farming land. Professionals estimate that around 500 000 ha are required for 35 to 50 hunters (profitability threshold) to hunt without reducing the wildfowl population, in particular that of the francolin, which constitutes the game around which the hunting day is organised. Depending on the country, six to eight francolins are shot per day of hunting. Some countries, like Senegal, have instigated an official daily quota (six francolins/day/hunter and 20 birds in total). It can be noted that warthogs and sometimes duikers and oribi are classified as small game depending on the country.

These small game parks are therefore inhabited and partially cultivated. Therefore, in most cases, they cannot be considered to be protected areas, or to be associated with one of the six IUCN categories. However, these areas have a role to play in land development, as they can be used to promote sustainable agriculture and natural resource management. They also generate revenues for the local communities, usually in the form of income from daily hunting permits. For example, in Burkina Faso, villages where small game can be hunted receive 7 500 CFA F per hunter per day of hunting.

Organising small game hunting is seen as a profitable activity as the management and lease costs of these areas are lower than those for big game hunting, as are the costs of organising the hunting trip itself (groups of around six to eight hunters).

Mixed hunting is a particular aspect of small game hunting whereby a hunter, during a single hunting trip can spend a few days small game hunting and a few days big game hunting (to shoot one or several large animals, usually antelopes). The two aspects of the trip do not take place in the same park (if the organisation is truly professional), but can be in two neighbouring parks.

Small game hunting in Africa is primarily practiced by hunters from West Africa, particularly the French and Italians. These small game parks therefore hold little significance with regard to protected areas and big game preservation. This is why they are not covered by this study.

1.2. Big Game Hunting

The objective of big game hunting is to shoot large mammals. It concerns "non-dangerous" species (antelopes, zebra and swine) and the species reputed to be dangerous, grouped into the "big five" which are the elephant, the lion, the leopard, the buffalo, and the rhinoceros (the latter now sometimes replaced by the hippopotamus).

Understandably, as against hunting non-dangerous species, hunting dangerous species requires space such that the dangerous species do not come into conflict with humans. So they are pushed back into marginal areas where economic activities are less favourable.

Big game hunting therefore takes place on land exclusively dedicated to big game and to hunting, where management tends to prevent human impact that would hinder this activity. It is therefore a very "exclusive" activity and usually takes the form of a "concession" (the names vary depending on the country), which is in fact a block of bush or forest where the government or appropriate authority (regional authority, community or individual) grants hunting rights to an organiser for a given period of time.

In this sense, the hunting area can be assimilated to a protected area where the natural resource (wildlife) is managed and selectively culled. It corresponds somewhat to IUCN Category VI, but in certain cases can correspond to Category IV. This supposes however that the primary objective of the hunting area is to conserve nature, which is not necessarily the case in the field (see predatory areas below).

Furthermore, big five game parks must be vast, not only to limit conflict with humans, but also so that shooting can be sustainable. There must be sufficient animals so that ecologically some can be killed and, at the same time, enough animals must be killed to ensure the organisation reaches the profitability threshold – one of the requirements of the private sector.

People from many countries go big game hunting. In Africa overall, North Americans (USA) make up the greatest number, particularly in countries where hunting safaris are expensive (they are followed by the Spanish). In French-speaking Africa, there are many European and particularly French hunters. This is even more pronounced in West Africa. After the French, Spanish hunters are the next largest group.

Hunter nationalities (%)	French	Spanish	Other Europeans	USA
Tanzania (Selous)	13	18	26	34
Zambia		10	15	57
Central African Republic	68		8	19
Benin	70	8	5	5

1.3. The Organisation of Hunting

The organisation of hunting requires various people/organisations which make up the sector as a whole:

- *Government*: fulfils a regulatory role: legislation, allocation of parks, setting of taxes, granting of permits and setting of quotas, monitoring, justice etc. In rare cases it may fulfil a leaseholder role, when it directly manages a park (e.g. certain parks in the north of Cameroon, a part of the "hunting interest zone" (French acronym ZIC) in Senegal).
- *The Concession holder/outfitter*: acquires management of a hunting area for a given period. It may be a simple economic operator, without any knowledge of big game hunting, in which case, they may sub-let the park (legally or not) and make the most of their investment. Sub-letting often represents a loss for the Government (e.g. in Tanzania).
- *The Organiser*: is responsible for setting up the infrastructure, developments, equipment and staff required prior to, during and after the hunt. The quality of these services plays an important role in determining the price that can be asked for the hunting safari.

- *The travel agency*: is responsible for finding clients, organising their trip and bringing them to the hunt organiser. The agency is usually located in a Western country where their clients come from.
- *The guide*: is responsible for leading the hunt: welcoming guests, guiding the hunt, preparing trophies, ensuring compliance with regulations etc. He should usually know the park well, but it is no longer always the case. Before, almost all the guides lived in the country where they worked. Now, guides often move from one country to another at the request of clients/organisers/travel agencies.
- *The staff*: help the operator and the guide to run the hunt. Trackers are members of staff and have a particularly important role to play in the success of the hunt.
- *The clients:* they come to hunt, usually from abroad. The fees they pay constitute the organiser's turnover.

In some cases but not all, the roles of concession holder, organiser, agency and guide can be grouped. This was common practice (even the norm) a few dozen years ago, but has become much less frequent as the sector has become more professional.

The organisation of one single hunting trip therefore requires the intervention of many different people to guarantee the land where game will be hunted. The cost of the hunting safari must therefore be considerable if the system, based on private operators seeking a certain degree of profitability, is to function properly. Besides the private sector, two other stakeholders must also reap the benefits:

- The Government (central and/or the regional authorities) which must benefit from some of the income to cover all or part of its regulatory activities. In practice, the department in charge of wildlife is not always independent in its management, which means that the income received by the government is not always directly used to manage the sector.

- The local communities: they bear the brunt of the costs of big game hunting. They lose the rights to use part of their land to the concession holder and cannot practice their usual agro-pastoral activities. They bear the cost of lost agricultural production due to predatory wild animals (damage to crops, loss of human and animal life etc.). However, they can reap direct benefits (taxes, part of turnover etc.) or indirect benefits such as employment by the hunting safari organiser.

Furthermore, other partners are involved in the sector: those who send and import trophies, taxidermists (who prepare the trophies), hoteliers (before and after the hunting safari), airlines (international and local), specialised insurance companies, arms manufacturers, equipment manufacturers etc. Therefore, big game hunting has a wider economic impact than just the safari organiser's turnover.

2. AN OVERVIEW OF BIG GAME HUNTING IN AFRICA

2.1. West Africa

2.1.1. Senegal
a. Institutional Context

Hunting is regulated by the Code of hunting and wildlife protection of 1986. A new version of the hunting code is currently being written.
Tourist hunting must be organised through hunting area leaseholders. The latter cannot have more than 15 hunters per week per camp and must submit an annual work plan at the beginning of the season. The leashold parks are mainly for hunting small game and warthogs. The hunting areas where warthog hunting is authorised are in the *départements* of Foudiougne and Kaffrine, the regions of Tambacounda and Kolda, and small game areas where hunting rights are held according to leasehold arrangements.
Small game hunting permits give each hunter the right to shoot one warthog per week for an additional fee of 15 000 CFA F. When warthog population density is high, the authorities may allow a second warthog to be shot for a fee of 20 000 CFA F.
Big game hunting is only practiced in the south-east, in the ZIC of Falémé. It is authorised each year from 1 January to the end of April, the dates being fixed by a local bylaw. The latter also specifies the quota of

animals that can be killed, and hunting is closed once this quota is reached. The number of hunters is also limited: six per camp and per week, each hunter must be accompanied by a tracker certified by the Water and Forests Department (maximum two hunters per tracker). A big game hunting permit holder can shoot two warthogs per week at no extra cost.

However, it should be noted that legislation authorises the Director in charge of hunting to grant exceptional permits to tourists or guests in non-leased zones open to hunting. The Minister for Water and Forests can also pass bylaws to authorise shooting of a certain number of totally protected species.
A big game hunting permit is needed to shoot the following species: buffalo, roan, hartebeest, bushbuck, oribi and duikers. Each hunter may only shoot one specimen of each species. For the entire ZIC of Falémé (and therefore of Senegal), the quota authorised for the 2004-2005 season was:

SPECIES	QUOTA	SPECIES	QUOTA	SPECIES	QUOTA
Buffalo	5	**Bushbuck**	6	**Duiker**	5
Hartebeest	5	**Oribi**	4	**Roan**	6

It can be seen that between 2000 and 2005, quotas were lowered by an average of 32.6%, which most probably indicates a drop in the overall numbers.

b. Big Game Parks

The ZIC of Falémé is located in the south-east corner of the country, at the border with Mali and Guinea. It covers a surface area of around 1.3 million ha. It includes agricultural land and is also exploited by mining companies, whose prospection and operation permits are not granted in association with the Water and Forests Administration. There is therefore a problem with regard to the uses made of the ZIC, and its sustainability is in question.
Within the ZIC, a sector of around 200 000 ha was leased in 2006 to the Relais de Kédougou. It does not appear that granting of this concession led to any specific development or surveillance. There is also a project to develop wildlife management, funded by USAID, which is still at the concept stage. An initial project phase (2003-2008) was dedicated to governance issues, firewood, and non-wood forest products. The second phase (2008-2013) must include actions to improve biodiversity and seems to be focusing on developing a pilot area of 60 to 90 000 ha to promote wildlife by establishing a partnership between the Government, the private sector and local communities.

c. The price of hunting safaris

Big game hunting safaris in Falémé are fairly cheap: a six-day first-time hunt (the expected results are not comparable to those of a “big game hunting safari”) costs €2 300 (from Kédougou à Kédougou, www.safari-malaret.com), i.e. €383/day. The same trip for small game hunting costs €1 500, i.e. €250 per day.

d. Revenues for the Government

For the Government, revenues from big game hunting are minor, generated mainly by hunting permits and gun permits (€200), as well as trophy fees if the animals are shot.

SPECIES	Amount of trophy fees CFA F		Annual Quota	Maximum possible revenues in million CFA F	
Year	**03/04**	**08/09**		**03/04**	**08/09**
Buffalo	350 000	500 000	5	1.75	2.5
Hartebeest	100 000	300 000	5	0.5	1.5
Bushbuck	60 000	160 000	6	0.36	0.96
Oribi	40 000	80 000	4	0.16	0.32
Duiker	40 000	80 000	5	0.2	0.4
Roan	200 000	400 000	6	1.2	2.4
TOTAL	-	-	31	4.17	8.08

NB: figures for trophy fees for 2008/09 vary depending on the sources.

The maximum amount the government can gain in trophy fees is around eight million CFA F per year. If 30 hunters visit the ZIC of Falémé in the year, that amount is increased by 3.9 million CFA F for permits, thus reaching a total of around 12 million CFA F.

e. Remarks

Unless there is a sharp turn around, the future of the ZIC of Falémé seems compromised. The areas where big game hunting is practiced are not direct neighbours with those that are rich in wildlife in the National Park of Niokolo Koba. These areas appear to be isolated, even more so since across the border in Mali no specific protected area has been developed along the right bank of the Falémé. The ZIC is subject to fairly high pressure from agriculture and human habitation. Furthermore, it is a site for mining prospection and exploitation (iron, gold, phosphates) that are beyond the control of the Ministry of Water and Forests. Its future therefore probably depends on a regional strategy being drawn up including the Niokolo Koba National Park, based on an up-to-date map of land use and modern environmental concepts.

2.1.2. Mali
a. Institutional Context

Wildlife and hunting management is governed by the law of 1995 which lays down the conditions for managing wildlife and its habitat, in particular, the leasing of hunting areas.
Some animals are totally protected: elephants, buffalo, giant eland, leopard, Dama gazelle, Dorcas gazelle, and red flanked duiker. Big game hunting is therefore limited to lion, large antelopes (antelope, hartebeest, Defassa waterbuck), and swine (warthog and bush pig).
It should be noted that, under certain conditions, special permits can be granted to hunt totally protected species[3].
A permit to hunt big game costs a non-resident 140 000 CFA F. There is something singular in the Malian law: the existence of trophy or capture fees for totally protected species such as chimpanzees, cheetahs, African wild dog, Addax, white Oryx, giant eland, Manatee etc.

b. Hunting areas

[3] Which is original in terms of legislation, and rather inappropriate.

Tourist big game hunting is allowed in leased ZICs. Hunting leases in ZICS cost 40 francs/ha/year. The current list (according to the 2008 annual report of the National Directorate for the Protection of Nature) of these ZIC is as follows:

- ***Northern zone ("sahelo-saharian")***

These are vast areas given over to hunting as practiced by people from Arab countries. In light of the species on the protected species list, these ZICs should only be used for hunting one mammal: the red-fronted gazelle. Nonetheless, the latter is representative of the south-sahelian ecosystems, not sahelo-saharian ones. There is, therefore, an inconsistency in the legislation as regards the ZICs of the Northern zone. Bustards, however, may be hunted. Four ZICs have been created in this category:

- Two ZIC have been leased: Tidermen-Alata, in the district of Kidal, (surface area of 312 000 ha) in 2004, and North-West Azaouad (called Salam, surface area of 1 216 000 ha) in 2006. The former has a development plan (not yet approved), while the latter does not. No development or technical activities have been undertaken here, but hunting is practiced in both zones. It is therefore comparable to "mining" activity – samples are taken with no overall management.
- A ZIC was created in 2004 in the Gao/Ménaka district (Inekar) of a surface area of 180 625 ha, but it has not been leased.
- The ZIC of Tarkint (district of Bourem) was created by bylaw on 04/08/2008.

Two other ZIC are currently being created: Tin Tiss-Borna (Rharous district, 189 286 ha) and Timtagène (Tessalit district, 879 948 ha).

- ***Southern Zone ("Sudanese")***

The ZICs in this zone should permit hunting of big and small antelope, swine and also lion. The current list is as follows:

- The ZIC of Banzana (created in 2004, 44 402 ha) in the districts of Sikasso and Bougouni, has not been leased.
- The ZIC of Flawa was created in 2004 (Bafing North) and covers 73 940 ha. The leasehold is currently being negotiated with the Malian company Mali Faune Aventures (www.malifaune.org). It is quite densly populated by people and domesticated animals.
- The ZIC of Gadougou (Bafing south-west, 31 220 ha) is being created.
- The ZIC of Nienendougou, (surface area: 50 422 ha) has not been leased. It lies adjacent to the reserve of the same name (40 640 ha, classified in 2001) which was leased (with the 3 classified forests of Dialakoro, Diangoumérila and Djinétoumania (in the districts of Bougouni and Yanfolila) in 2008 to the company "Agro Industrie Développement - AID SA". Hunting is not one of the activities planned, focus will be on natural resource management, ecotourism and safaris.

Three other ZIC are also being created: Faragama (Kita district, 52 400 ha), Tomota-Kourou (Kayes district, 38 321 ha), and Morianféréla (Yanfolila district, 9 017 ha).

The total surface area of the three active ZICs in the "Sudanese" zone is currently 168 764 ha, to which we can add the 130 958 ha for the four ZICs being created. Eventually, the seven ZICs will cover a total surface area of 299 722 ha (42 817 ha on average).

c. Revenues for the Government

In 2008, 49 tourist hunting permits were granted, mainly for small game hunting in the Ségou and Niono areas. National revenue from hunting in 2008 was 10.8 million CFA F, and 1.39 million in associated transactions.

d. Remarks

Tourist hunting in Mali is a very small sector. It would appear that big game hunting professionals have not been involved in its restructuring and little economic gain seems to be achieved with the development strategy. The overall context of protected areas seems to take little account of ecological and human realities, as will be seen later on.

2.1.3. Mauritania
a. Institutional Context

Hunting is governed by the law of 1997 on hunting and the protection of nature. In particular, it allows for the creation of wildlife management associations within each district that has wildlife or hunting interests. These associations can benefit from funding generated partly through the taxes and deductions provided for under current legislation.
It also allows for the creation of ZICs that are also areas where hunting or tourism activities are organised at high cost, by individuals or companies, who are granted a management licence in accordance with the operating conditions specified by decree. Twenty percent of the revenues generated by operating ZICs are attributed to the wildlife management associations concerned. These amounts are deposited in the special fund.
At the beginning of each year, a bylaw passed by the Minister for the Environment determines, after consultation with the wildlife management associations, the dates of the hunting season, the areas open to hunting and trophy and capture fees for each Wilaya or zone, as well as all pertinent information for better wildlife management. The only mammal on the list of hunted species (partially protected species) is the warthog. All other species are totally protected.
In practice, these institutional provisions do not seem to be widely applied. There is a Mauritanian hunters association, with around 40 members, who regularly hunt warthog and waterfowl.

b. Warthog hunting area

The only area where tourist hunters regularly go to hunt warthog is on the right bank of the lower Senegal River. A Spanish agency offers the opportunity to shoot seven warthog in four days of hunting (www.sahelsafaris.com). This does not resemble managed hunting activity and raises doubts as to the ethics of the whole operation. There do not appear to be other areas or organisations that bring in tourists or that simply manage an attributed area. The impact of big game hunting is minimal and only concerns warthogs.

c. Remarks

There are not really any big game hunting areas in Mauritania. Warthog hunting there is more akin to killing than management. Big game hunting (of other species) areas cannot be developed in this country.

2.1.4. Gambia

Only small game hunting exists (birds and warthogs). The small game hunting areas are mainly in the central and eastern part of the country.

2.1.5. Sierra Leone

To date, there is no big game hunting or tourist hunting in Sierra Leone. Around twenty years ago, trips for European hunters were organised, but only for shooting waterfowl.

2.1.6. Liberia

To date, there is no big game hunting or tourist hunting in Liberia. Up until the beginning of the 2000s a big game hunting organisation existed (West African Safaris) which specialised in the hunting of forest antelope (royal antelope, Jentink's Duiker, zebra, etc.) and was somewhat successful, but it also had a doubtful ethical reputation. This company no longer operates, and since the end of the war, conservation activities have focused on restructuring national parks and mitigating the effects of the bush meat trade.

2.1.7. Guinea
a. Institutional Context

The network of protected areas in Guinea is currently under development. While there are no hunting areas or ZIC as such to date, they are provided for in the law of 1999 governing wildlife (protection of wildlife and regulation of hunting). ZICs are each governed by regulations set by bylaws of the Ministerial authority responsible for hunting to specify the terms and conditions for hunting, the destination of hunting profits and

any compensation for prejudice to other economic sectors. Without such a bylaw, hunting is forbidden in the ZIC.

Hunting areas cover all territory in the public domain that is not classified as national parks, integrated or managed nature reserves, wildlife sanctuaries, or ZICs with the exception of roads, shipping routes and built-up areas where hunting would pose a danger for public safety.

Furthermore, in a managed nature reserve, the texts pertaining to it may authorise hunting. There is a small game hunting permit and a big game hunting permit. Each year, a bylaw from the Ministerial Authority responsible for hunting sets the maximum number of animals to be killed per species. Trophy fees must be paid in advance.

Hunting tourism can only be organised by a guide who has passed the appropriate exams. He must hold a hunting guide licence, renewed annually, that authorises him to work in the area for which he (or the company for which he works) holds the lease. Areas that may be leased are ZICs and certain parts of managed nature reserves.
The sector is managed by the National Directorate for Biological Diversity and Protected Areas, which is part of the Ministry of the Environment and Sustainable Development. There are 30 conservationists working around the country.

b. Potential big game hunting areas

Several areas have been identified for developing tourist hunting:

- Kankan Reserve, 537 000 ha,
- The cross-border protected area between Guinea and Mali, with a total surface area of 26 600 km², two-thirds of which are in Guinea. The Guinean side must have the status of managed nature reserve, which combines conservation and exploitation, and is similar to IUCN Category VI. Hunting can be authorised, in particular Giant Eland and lions are found here,
- The cross-border protected area between Guinea and Guinea-Bissau, 17 000 km² in total,
- Border area with Sierra Leone, at the forest-savana interface (Mamou to Kindia areas),
- Upper-Niger: in the buffer zone around the national park of the same name, there are Western Buffon's Kob, Defassa waterbuck, yellow-backed duiker etc.

The terms and conditions for developing these hunting areas have not yet been stipulated: private sector concessions, development through donor support in the context of a pilot project, etc. As the situation stands, while development is possible, Guinea does not offer big game hunting services.

2.1.8. Guinea Bissau

a. Institutional Context

The Institute for Biodiversity and Protected Areas (IBAP, created in 2004) is responsible for managing the different protected areas. A law on wildlife was passed in 2003. This law enables better community involvement in local resource management.

There are currently two proposals for creating national parks (Cantanhez, 650 km², and Dulombi, 1 770 km²), which will diminish the areas where hunting can take place. At the same time, there is a project to create a cross-border protected area with Guinea.

There are three types of hunting permit: tourist, national and resident (traditional). In the eight tourist hunting camps, quotas are established but Hunting Department guards only accompany hunters in three of these camps. A large number of hunting establishments in Guinea Bissau belong to foreigners.

b. Big Game Parks

Hunting in Guinea Bissau mainly concerns bird shooting. The daily quota for francolin, which constitutes the basic game, is 12 birds per day, in other words double the quota permitted in Senegal. Therefore, this is an attractive destination for hunters.
During his stay, a hunter may also shoot three warthogs, a bushbuck and a duiker, which constitutes an

added advantage over other countries. Big game hunting is forbidden (buffalo, antelopes, waterbuck), therefore only the warthog (three per permit), the bushbuck (one per permit) and the duiker (one per permit) can be hunted legally.

Each camp is attributed a hunting area, and a large part of the country is covered by attributed zones..

c. Remarks

Hunting in Guinea Bissau can be considered to be mixed and covers almost the entire country, which consists mainly of agricultural land or pasture. There are some remaining populations of big game (elephants, lions, leopards, buffalo, antelope etc.).
Nonetheless, there are not really any concessions as such, in that these imply exclusive use, development and surveillance.

2.1.9. Ivory Coast
a. Institutional Context

Hunting was outlawed in 1974, and several attempts to reopen it have been made since 1994. These files are all awaiting processing since the socio-political upheavals of 2002. Nonetheless, it should be noted that, despite the ban, hunting is widely practiced informally in Ivory Coast and supplies the bush meat trade, estimated a few years ago at 74 000 tonnes annually. This figure is probably falling due to over-hunting. Big game hunting for tourists is thus forbidden, but the Geprenaf project (World Bank) has contributed, since 1997, to give it a place in the Ivorian context. The project aimed at establishing community management of natural resources around the Comoé national park, with the identification of a biodiversity area that should be developed by local communities through hunting and ecotourism.

b. Potential big game parks

The two potential areas for big game hunting are:

- Warigué: between the Comoé national park and Burkina Faso. It lies next to the Comoé Léraba area in Burkina Faso, managed according to the same principles and created by the Geprenaf project;
- Monts Tingui, bordered in the south-west by the Comoé National Park, managed by the Geprenaf project.

Each of these areas contains an area of high biodiversity of around 1 000 km^2 (the national park has a surface area of 11 500 km^2). 66 villages, representing around 65 000 inhabitants (2003), were involved in setting up these two areas.
The challenges facing these zones are the following:

- is the conservation model compatible with sustainable agriculture?
- can we maintain the communities' interest in conservation?

The project came to an end in 2003, and the instability that followed in this region of the country significantly changed the landscape in the Warigué area (immigration, agricultural development), but the Monts Tingui area has remained relatively well preserved and a private operator is interested in it as a hunting concession. At the beginning of the 2000s, a study was carried out to improve wildlife promotion in the Haut Bandama reserve, and found that the birdlife was of particular importance. This interesting area has apparently been largely degraded since, by human occupation and agriculture.

c. Remarks

There are few other possibilities for developing new hunting areas that are sufficiently large to be significant: the North-West of the country could be the most interesting, but it has low animal densities which would delay exploitation and therefore make implementation costly. For the coming years therefore, the area concerned by big game hunting in Ivory Coast totals at most around 100 000ha. Big game hunting for tourists does not, to date, contribute to the Ivorian economy, while at the same time the turnover for informal hunting is estimated at around 100 billion CFA F per year.

2.1.10. Ghana
a. Institutional Context

In Ghana, big game hunting is theoretically open and possible, but there are no classified big game hunting

areas. The approach taken is that of natural resource management by the communities themselves, in the context of the CREMA concept (Community Resource Management Area). The underlying philosophy is that if you give wildlife a value, and local communities have the right to manage it, they will be motivated to conserve and sustainably manage their natural resources. The Wildlife Division (which is part of the Forestry Commission), set up a policy of "*collaborative wildlife management and establishment of community resources management area*" in September 2000. This concept enables any member community to organise hunting for tourists in their area.
In practice, communities wishing to set up a CREMA must fulfil certain conditions (which include the drawing up of a management plan) and obtain a certificate of decentralised transmission of management rights. As regards hunting, the community then sets its own quotas (usually with technical support from the Wildlife Division), via its executive committee, which also decides the fees hunters must pay for each animal or species killed. The certificate can only be acquired in return for committing to certain conditions, for instance not hunting endangered species. At the present time, three CREMAs are fully functional, and 12 others are currently being set up and will soon be certified.

b. Location of potential CREMAs

CREMAs are currently being set up around Mole national park and will be allowed to develop hunting as there may be big game in these areas. The government allows the communities to manage, possess and use their wildlife within their own territory. Therefore, hunting fees and the different taxes are set by the CREMA itself which keeps all the profits.
In terms of tourism, a South-African operator, (www.stevekobrine.com/Ghana.htm) brings a few clients to hunt in Ghana. The game consists of small antelopes specific to the dense West-African forests: royal antelope, black-fronted duiker, Maxwell duiker. This is hunting for the specialist collector, and takes place in the south-West in the Takoradi region.

c. Remarks

There are possibilities for developing big game hunting in Ghana, but these are limited by the rapid rate at which wildlife habitats are being converted to agriculture. In Ghana, as in Ivory Coast, the bush-meat trade is highly developed; the current turnover is estimated by Conservation International at $US250 million per year (i.e. around 125 billion CFA F). It is unlikely that the small profits from game hunting could compete with these figures. The main challenge, now that the institutional foundations are in place, is to see whether sufficient wildlife and habitat resources still exist to guarantee the viability of the CREMA programme.

2.1.11. Togo

Togo has 93 habitants per km² for a surface area of only 57 000 km². Given these figures it is clear that there is not much space available for hunting areas. Until 1991 the protected area network of Togo was managed directly by President Eyadema (including hunting areas almost exclusively for presidential use), but the political problems that began at that time led to a large part of these protected areas being invaded by the people, who felt they had been robbed of their right to use the land and natural resources. Protected area network managers have targeted two areas for big game hunting:
- Galangachie (in the North), with a surface area of 7 650 ha,
- Togodo Nord (in the South), with a surface area of 10 5000 ha.

These two areas seem very small for recreational hunting and too isolated from other biodiversity areas to contain the wildlife liable to attract hunters. Another potential area is Abdoulaye Forest (in the centre of the country), with a surface area of 30 000 ha. Studies need to be undertaken to specify the respective conservation potential and actions to be undertaken.

2.1.12. Nigeria

There is no big game hunting in Nigeria, or any areas dedicated to this activity. Big animals still live in some national parks, which themselves are suffering from the effects of demographic growth (the country has 139 million inhabitants, for a population density of 150 people per km^2) and almost entirely lack peripheral areas where hunting could take place.

Big game of the savannas still exists in the Yankari Reserve (Centre-East) which itself is marginally occupied by local communities and in that of Borgu (Centre-West) where the peripheral areas are heavily used by cattle herders. The eastern border with Cameroon (from the Gashaka Gumti National Park to Cross River

National Park) is the biotope for forest species, but few animals still live outside these protected areas. Thus, the development of new hunting areas is virtually impossible, even though hunting is allowed. It should be noted that as in Ghana and in Ivory Coast, the bush-meat trade is highly developed and has considerably reduced biodiversity.

2.1.13. Niger

Like Mali, Niger has two main ecological zones: in the North a vast saharan-sahelian zone and in the South a smaller Sudanese zone.

Hunting is authorised throughout the country, but the only attributed zones are in the North, where vast areas have been set aside for hunting, mainly for hunters from Arab countries. Little information is available on these areas which are beyond the scope of this study. In the South (Sudanese zone), demographic pressure, pressure from agriculture and herding have left few areas where large animals still exist. In practice, there is only the W National Park where, of course, hunting is prohibited.

Tamou Reserve (75 600 ha) borders the park to the North and could be developed for hunting. Nonetheless, most of this reserve is endangered by the spread of agriculture and the area that could still constitute a potential habitat for big animals is limited and located on the right bank of the Tapoa river. So the animals that come there are actually from the next-door national park. To prevent it disappearing, this reserve will require an exhaustive analysis of the problems it faces and a rapid response consisting of appropriate solutions. The possible transformation into a hunting area would, in reality, come down to allowing the animals from the national park to be hunted, however, the management objectives of two adjacent protected areas must remain compatible.

Therefore, at the present time, there are no big game parks in the Southern part of Niger and therefore no corresponding economy.

2.1.14. Burkina Faso
a. Institutional Context

The institutional context for big game hunting has been described many times before, and is not covered in detail here. Big game hunting was re-opened in 1985 in Burkina Faso, and the sector has been constantly developing ever since. In 1996, a hunting reform was carried out, with the creation of concessions (for hunting or safaris) within the Wildlife Conservation Units (there are 12 across the country).
This reform enabled the private sector to invest in managing wildlife areas and to finance them directly, thus filling in a gap in state funding. Village wildlife management committees (French acronym CVGF) were also set up in order to create a Government-private-sector-local community partnership. These CVGFs should receive a share in profits and set up a public interest fund for that purpose.

From 1996 to 1998, 24 wildlife area concessions were thus attributed to the private sector: ten for big game hunting, two for mixed hunting, six for small game hunting, three game ranches and three safari parks.
The Comoé Léraba reserve was then leased to the inter-village association for the management of natural resources and wildlife of the classified forest and partial wildlife reserve of the Comoé Léraba (French acronym AGEREF) for mixed use. In addition to these areas a certain number of Village hunting areas (French acronym ZOVIC) were created by the CVGFs and are mainly for small game hunting.

In 2007, 10 big game hunting areas were reattributed via a call for tender, this time for a duration of 20 years. The wildlife areas that had experienced management problems (lack of understanding of the reality of the area, lack of wildlife, low profitability) were not resubmitted for tender. Nor were the national parks, after the creation on 9 May 2008 of the OFINAP (National Office for Protected Areas) which is henceforth responsible for managing them.

b. Location of big game parks

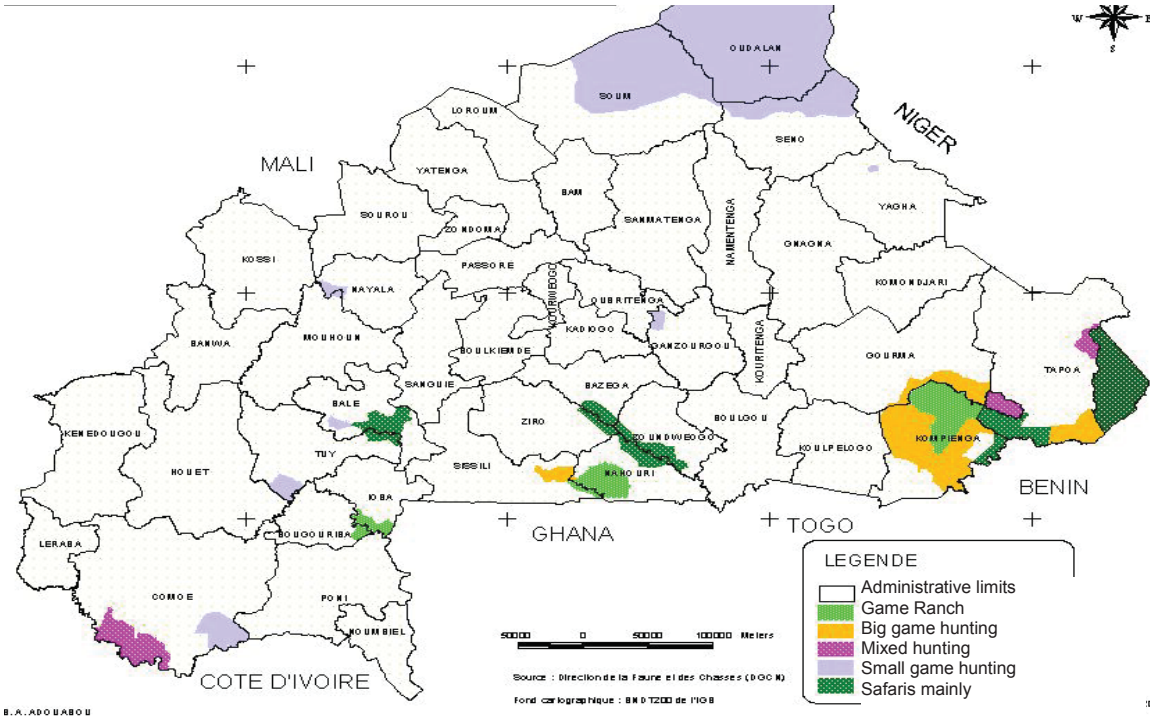
Today, the following big game parks are leased (or about to be):

Operating system	Wildlife area	Surface area (ha)	Region
Big Game Hunting	Koakrana	25 000	East
	Kondio	51 000	East
	Konkombouri	65 000	East
	Ougarou	64 426	East
	Pama centre Nord	81 452	East
	Pama centre Sud	51 774	East
	Pama Nord	81 486	East
	Pama Sud	60 762	East
	Pagou Tandougou	35 000	East
	Tapoa Djerma	30 000	East
	Sissili	32 700	Centre West
	Comoé - Léraba	124 510	Cascades
Ranch	Singou	151 800	East

Big game hunting is also practiced in another area, the Ranch of Nazinga (94 000 ha, of which around 15 000 ha is totally protected, and 78 960 ha is for hunting). Singou Ranch was not resubmitted for tender in 2007 and should now be managed directly by OFINAP, according to a yet to be specified strategy. In total, big game hunting is therefore practiced in 14 hunting areas totalling 933 870 ha:

Geographical location	Number of areas	Surface area (ha)
East	11	697 700
Centre	2	111 660
South West	1	124 510
TOTAL	**14**	**933 870**

Map 1: Situation of hunting areas in Burkina Faso



Map © Source: Directorate of Wildlife and Hunting/MECV

c. Technical and economic results of big game hunting in Burkina

The average surface area of hunting areas in Burkina Faso is 66 705 ha. Over four hunting seasons (2002-3 to 2005-6), 2 512 tourist hunting permits were granted, in other words an average of 628 per year. The average distribution over ten years of tourist hunting permits is 66% for small game hunting, 32% for big game and 2% for mixed hunting. Around 201 big game hunting permits were therefore granted during this period.

For the 2004/5 season, 615 permits were granted, of which 242 for big game hunting in the East, and a few directly granted in Ouagadougou for that zone. The 11 Eastern areas therefore hosted around 250 hunters, or an average of 22.7 per area.

Over the ten years from 1996-97 to 2005-6, the annual average number of animals killed for the main species is as follows:

Average annual number killed	Lion	Buffalo	Antelope	Hartebeest	Western Buffon's kob
East	11.9	92.2	72.8	33.4	40.8
Nazinga-Sissili	0	7.4	15.1	13.5	0.6
Comoé-Léraba	0	0.3	0.5	0.6	0.6
Total	***11.9***	***99.9***	***88.4***	***47.5***	***42***

For the main big game hunting region, the East, the annual average number of animals of the main species killed per concession is as follows (over a ten year period):

Average annual number killed	Lion	Buffalo	Antelope	Hartebeest	Western Buffon's kob
Per concession (East)	1.08	8.38	6.62	3.04	3.71

For the 2004-05 year for example, and for the Eastern region, a general idea of the success rate per species and per permit can be gained (22.7 on average per area), expressed as a percentage of the number of animals of a given species shot under permit:

Success rate per permit	Lion	Buffalo	Antelope	Hartebeest	Western Buffon's kob
Per concession (East)	6%	41%	39%	18%	22%

These success rates are fairly low: only 41% of hunters shoot a buffalo during their hunting safari. This also corresponds to a policy of selling hunting safaris according to individual animals, and not according to a trophy list. This marketing policy favours the number of hunters over the quality of the hunt itself.

It can be noted that in the Eastern region, a certain number of concession holders also organise specific small game hunting safaris. This is organised on a neighbouring sector and in addition to big game hunting helps the organiser to significantly increase their general turnover, without greatly increasing their costs. Hunting permit statistics in the Eastern region indicate that at least 150 hunters come specifically for small game hunting. The overall income for the sector is as follows:

Hunting seasons	Main stakeholders			Total
	Government	Concession holders	Communities	
2004-2005	233 391 100	1 054 137 508	47 812 300	1 340 912 808
2005-2006	235 422 050	1 189 705 338	52 177 477	1 477 304 865

When broken down according to stakeholder category, the income for the state is as follows:

Type of income/season	2004-2005	2005-2006
Hunting permit	75 112 500	68 990 000
Operating licence	22 240 000	24 475 000
Hunting guide licence	16 600 000	20 300 000
Trophy fees	90 814 200	97 453 900
Management fees	14 142 400	14 503 650
Tracking fees	4 745 000	4 446 000
Certificate of origin	760 000	1 057 000
Litigation	8 977 000	4 196 500
Total	**233 391 100**	**235 422 050**

When broken down per hectare of big game park, the government earns, in fees and taxes, around 250 CFA F per hectare. If we consider that big game hunting areas cover 3.4% of the country and bearing in mind that the Burkinabe national budget for 2009 was 1 000 billion CFA F, it is clear that per hectare, big game hunting represents little interest for the government: 3.4% of its national territory only contributes 0.23‰ of its national budget.

For the local communities, benefits for the 1996 - 2006 period were:

Type of income	Renting of a ZOVIC	Village hunting permits	Tracking fees (50%)	Management taxes (50%)	Sale of meat	Other	Total
Total	83 650 327	19 890 890	35 801 500	92 960 705	12 996 645	52 149 875	297 449 942
Annual average	8 365 032	1 989 089	3 580 150	9 296 070	1 299 665	5 214 988	29 744 994

These results are extremely low, compared to the number of inhabitants in the peripheral areas concerned (the entire Eastern region population was more than 1 million in 2004, with an average density of 23inh/km²). Even if just 100 000 people are counted as living in the areas surrounding all the country's hunting areas, the revenue per person would only be 300 CFA F per year.

The average added value therefore for local communities is 32 CFA F/ha of big game hunting area, over ten years. It is clear that such a low figure will not provide incentive for a change in mentality.

For the ten concession holders in the East having operated their area, the average income declared per area in 2004/5 is 77.7 million CFA F and the annual balance sheet reveals a deficit of 4.16 million CFA F. This overall figure seems to tally with the values calculated elsewhere: the concession holder of a big game hunting area must have a turnover of 75 to 80 million CFA F to break even. It is difficult to achieve this with big game hunting alone in light of the prices of hunting safaris and the number of animals shot in Burkina Faso.

Therefore, the expenses declared per big game hunting hectare are around 1 227 CFA F/ha (€1.87/ha), corresponding to the cost of developing and monitoring the area as well as the costs of the camp and customer service. Broken down per big game hunting client, the expenses are around €5 500 per client, which is above the average price of a hunting safari. As a result, big game hunting safaris are not sufficient to cover costs.

When calculated per hectare of big game hunting area (the figure is in fact increased by income from small game hunting that takes place alongside the big game park), concession holders' income is 1 165 CFA F/ha (but the declared result is in fact a loss of 62 CFAF/ha). Each hectare of big game hunting area therefore brings in a maximum profit of:

Currency/partner	Govt.	Concession holder	Communities	Total	Overall profits
CFA F	250	1165	32	1447	220
Euros	0.38	1.78	0.05	2.20	0.33
Percentage	*17*	*81*	*2*	*100*	-

By way of comparison, a hectare of cotton in this zone generates a turnover of 150 000 CFA F/ha. In this case, the gain per hectare for the communities is 5 000 times higher than that of big game hunting. Certain staple crops can also generate higher incomes per hectare, without requiring fertiliser.

d. The price of hunting safaris

It is difficult to establish the real price of hunting safaris for at least two reasons:

- for the large majority of them, the concession holders do not advertise the price of their safaris on their websites or in advertising, but provide them only on request. This situation is quite different from Benin for instance, where all concession holders clearly present their prices.
- The price is open to negotiation, which means that the price is lower, sometimes significantly so, to that initially quoted.

Furthermore, Burkina Faso sets itself apart from other countries by proposing different safari prices depending on which animals are to be hunted, while most countries offer six-day "buffalo" hunting safaris or 12-14-day "grand safaris" when all animals can be hunted.

The only concession holder that clearly presents the hunting safari prices (Ouagadougou-Ouagadougou price) offers:
- six-day hunting safaris: €5 150 one antelope can be shot,
- eight-day hunting safaris: €6 500 buffalo and antelope can be shot,
- ten-day hunting safaris: €7 600, again buffalo and antelope can be shot. In this case each additional day therefore costs around €500.

It can be supposed that these prices correspond to the "upper" end of hunting safari prices due to the reputation of this particular concession holder.

This hunting safari price is among the lowest in Africa for hunting of buffalo or lion. Furthermore, the price does not seem to have increased much over the past ten years. it is difficult to know why prices have not followed the general increase: reasons could be the quality of the service proposed, the fairly low success rate for the hunters (41% for Buffalo, 39% for antelope, 6% for lion), the average trophy size (little data is

available regarding the latter) etc.

e. Ecological monitoring

A census is not taken at the beginning, middle and end of a concession contract, as is the case in several countries. However, the change in animal populations is one of the key indicators for wildlife management and not having such data poses real problems for monitoring and evaluation (let alone for strategic adjustments).

The most recent overall data date from 2003, when a total aerial census was taken, which focussed particularly on elephants. Let us take the cumulative density (per km^2) of the five most important species for conservation and hunting (elephant, buffalo, antelope, hartebeest and Western Buffon's kob) as an indicator. As the objective of this study is not to assess each area, we have grouped them according to ecological zone, based on river basins (the Arly on the one hand and the Singou on the other). The areas of Kondio and Tapoa Djerma were not taken into account in the calculations and the ranches of Singou and Konkombri were counted in the Singou river basin.
The cumulative densities of these five species in 2003 (Bouché et al) are as follows:

Sector	Density/km
Arly Park	1.25
3 areas of East Arly	0.73
All Arly	0.98
6 areas of Singou	1.68

It can be seen that the hunting areas of Singou are richer (x2.3) than those of Arly and that despite being "virtually abandoned", Arly park is richer than the adjacent hunting areas (x1.7).

There is a large difference in quality among the different hunting areas in the eastern part of the country. This point is important for the rest of the study.

f. An example of community management: the Comoé-Léraba wildlife reserve

At the end of 1995, a project funded by the Global Environment Facility, began work to conserve the biodiversity of the classified forest of Comoé Léraba (South-West of the country, on the border with Ivory Coast) and to promote local development around the forest. This forest, in fact made up of two neighbouring parts, covers 124 000 ha. The project lasted until 2003 and was followed by a second one from 2003 to 2007. The first had financing of 2.45 billion CFA F, and the second 450 million CFA F (of which only 365 were spent). Nearly three billion CFA F were thus invested over 12 years.

The project supported local organisation and development and in particular established an inter-village association for natural resource and wildlife management (AGEREF) in 1999, to which the classified forest was conceded (in 2001 the forest became the Comoé-Léraba, partial wildlife reserve and classified forests). The objective of the AGEREF is to contribute to poverty reduction and improving local livelihoods through sustainable natural resource management. It is made up of representatives of the 17 neighbouring villages covering around 30 000 people.

In addition to local development (seven schools were built for instance) and many micro projects, the reserve itself was developed (527 km of trails, water sources, markers and signs, two camps etc.) and a surveillance system set in place (20 voluntary village monitors). Benefits are generated through big game hunting, safaris, fishing, beekeeping, cane rat breeding and charcoal production. The latter activities are just beginning and do not really generate revenues apart from fishing (4.4 million CFA F, of which 2.8 is for the AGEREF).

Ecological monitoring has been regularly carried out using transect walks with varying band widths, complemented by the 2005 total aerial census. Current populations are estimated at:

Species	Population according to transect walk figures	Population according to 2005 total aerial census
Buffalo	200	90
Antelope	1000 to 1500	419
Hartebeest	1500 to 2000	353
Western Buffon's Kob	300 to 500	24
Defassa Waterbuck	100 to 200	37
Bushbuck	200 to 300	-
Warthogs	3000 to 4000	43

Analysis of the data (Bouché et al., 2005) shows a drop in buffalo, antelope and hartebeest populations since 2000, and stability as regards the other species. This would seem to indicate that pressure from poaching is high in this area and reveals the limitations of the system in place. Big game hunting has taken off gradually, with test hunting safaris and is now hitting its stride thanks to a partnership with a hunting organisation that purchases part of the quota. The current quota allows shooting of four buffalo, eight antelopes, eleven hartebeests, five Western Buffon's Kob, three Defassa Waterbuck etc.

With hunting safaris being sold for €5 500 (for one buffalo, one antelope and one hartebeest in ten days) or €4 500 (seven days, one buffalo or one antelope) it is difficult to pretend that big game hunting is profitable.

It is not easy to make more than 30 million CFA F a year, and annual management costs are around 75 million CFA F, excluding depreciation on the five vehicles inherited from the projects. Until the 2006-07 season, the two best hunting seasons generated revenues of 18.3 (six safaris) and 19.3 million (seven safaris) respectively. In total, in five years (2003 – 2007), activities to develop the reserve generated benefits for the communities of around 28.9 million and 3.7 million in salaries. Generally speaking, the villages use these funds to finance their contribution to building socio-economic infrastructure in partnership with other development stakeholders.

It can be noted that the Government makes an annual contribution to operating costs by exonerating the AGEREF from paying the leasing fees (75 CFA F/ha for big game hunting, which is the minimum rate), representing a donation of 9.3 million CFA F per year at least.

Although big game hunting alone is not profitable enough to run the reserve, it should be noted that the integrity of the forest is preserved, as are the eco-systemic services.

g. Remarks

Burkina Faso has invested in promoting wildlife and hunting, but communicates little on ecological results and economic management. At the same time, it has not significantly developed its national parks which are little known or visited.

In all, big game hunting in Burkina Faso is a rather unprofitable sector: some win, some lose. The economic gain per hectare is low, as much for the government and the private operators as for the local communities, who would stand to gain more from transforming these hunting areas into farmland. The change in mentality required to promote conservation cannot take place in such a context, which calls into question the strategy being developed.

2.1.15. Benin

a. Institutional Context

After a period from 1982 to 1990 when big game hunting was forbidden in Benin, it is now practiced in five

hunting areas in the north of the country, which are either peripheral to the Pendjari National Park (three of them), or to the W national park. They cover a total surface area of almost 400 000 ha.

These zones are managed by the CENAGREF (national wildlife reserve management centre), a parastatal company that is financially independent, created in 1996 and the technical structure of which was specified in 1998. The CENAGREF is authorised to manage income generated by the wildlife sector (hunting and safaris). It is also expected that the local communities of protected areas will participate in managing these via wildlife reserve village management associations (AVIGREF).

Management is governed by the law of 2004 on wildlife. Hunting areas are leased to hunting organisers via a call for tender which took place in 2004, attributing zones for a five-year period, that can be tacitly renewed following an assessment in the 4th year (this external evaluation did indeed take place early 2009).

b. Geographical location

Big game hunting areas make up 3.5% of the country (112 622 km²).

Name	Surface area (ha)
Djona hunting area	115 200
Mekrou hunting area	102 000
Konkombri hunting area	25 000
Batia hunting area	75 000
Porga hunting area	76 500
Total	**394 000**
Average surface area	*78 840*

The average size of the zones is greater than that in neighbouring Burkina Faso (66 705 ha) by 18.2%. It would not appear to be possible to create new hunting areas in Benin, apart from the separation of Djona into two entities.

c. Technical and economic data

Income from hunting and tourism can be broken down as follows:
- 30% for AVIGREFs: 23 local villages around Pendjari and 75 local villages around W. The population concerned is around 250 000 people.
- 70% for CENAGREF: this sum is then divided between park management (70% of this sum, i.e. 49% of the total), and operations of the General Directorate (30%, or 21% of the total).

Attribution	% of total income
AVIGREF (local communities)	30%
Park management (CENAGREF)	49%
CENAGREF Management	21%

Income from hunting is as follows:

In CFA Francs	2004-05	2005-06	2006-07	2007-08	Average/year
Total	93 086 000	114 545 000	119 130 000	136 160 370	115 730 343
For the communities	27 925 800	34 363 500	35 739 000	40 848 111	34 719 103
For Pendjari park mgmnt	28 363 650	33 770 800	42 532 000	44 658 781	37 331 308
For W park mgmnt	17 248 490	22 356 250	15 841 700	22 059 800	19 376 560
For CENAGREF mgmnt	19 548 060	24 054 450	25 017 300	28 593 678	24 303 372

The average income for the local communities (250 000 people) is around 140 CFA F per person per year. The share that goes to operating Pendjari park (37.3 million), corresponds to around 14% of its annual operating budget (275 million approximately).

Per hectare, the total revenues are around 294 CFA F, of which 88 CFA F/ha are for the local communities and 206 CFA F for the government. The hunting areas of the Pendjari block contribute to the park of the same name at a rate of 211 CFA F/ha. Those of the W park only contribute 89 CFA F/ha. These benefits are similar to those in Burkina Faso (total government + communities: 282 CFA F/ha), but the proportion reserved for the local communities is greater in Benin: 30% rather than 11% in Burkina. Gains of 88 CFA F/ha for the communities is still low compared to income from agriculture.

The number of hunters coming on big game hunts in Benin has fluctuated since hunting reopened in 199-91. During the period up until 2003-4, before the latest leaseholds, an average of 99.3 permits per year were granted. Since that date, the average is 66.3 permits per year, although this is rising, with 89 permits granted during the 2007-8 season. Per concession, the annual average number of permits was 19.9 for the former period and 13.3 for the latter. The figure for the latest season is 19.8.

The number of animals killed from the main species is:

	Lion	Buffalo	Antelope	Hartebeest	Western Buffon's Kob
Annual average killed	4.2	47.8	25.2	17.8	10
Annual average per concession	0.84	9.56	5.04	3.56	2
Percentage success per hunter	6%	67%	35%	25%	14%

d. Hunting safari prices

The prices offered by the five operators are available on the Internet. A six-day hunt including the shooting of a buffalo costs between €4 500 and €5 500 (on the basis of one guide for two hunters). Mainly for the zones of Porga and Djona, a certain number of hunters go on 12-day hunts (including many Americans), for a cost of around €10 000-12 000. Overall, the average price of hunting safaris seems slightly higher than in Burkina Faso.

e. Ecological monitoring

Both national parks have a different type of ecological monitoring:

- Pendjari Park and the two associated hunting areas (Pendjari and Konkombri) are monitored via aerial census sampling carried out every two years.
- W Park is monitored annually by transect walk.

Unfortunately, as the method used in W park is based on a very small sample, it only generates a low number of contacts and does not make it possible to make a reliable calculation. Therefore, we only took into account the monitoring for Pendjari. As in Burkina Faso, we took the combined density of the five big species (Elephant, Buffalo, Antelope, Hartebeest, Western Buffon's Kob) as the indicator. The figures obtained (per km^2) are as follows:

Zones/year	2002	2003	2006
Pendjari National Park	2.25	3.06	2.37
Pendjari hunting area	0.68	0.45	0.92
Konkombri hunting area	0.48	1.41	-

NB: There are no results in 2006 for Konkombri hunting area, because the person responsible for the census considered that in light of the low number of observations made, the population for that zone could not be calculated.

We can conclude that the Pendjari Park is considerably richer than the hunting areas, indeed, depending on the year, from 2.5 to 7 times richer than the adjacent hunting areas. It can be noted that the Konkombri zone is only a thin band around 6 km wide along the right bank of the Pendjari. Ecologically speaking, this hunting area is entirely part of the river ecosystem and therefore of the national park and should, in theory, belong to the park and not be classified as a hunting area.

The total aerial census of the W-Arly-Pendjari ecosystem carried out in 2003 is the most recent one to have covered the W Park and its hunting areas. It gave the following combined densities (of the same five species) (Bouché et al., 2003):

Area	Density/km^2
W Park	0.23
Djona hunting area	0.36
Mekrou hunting area	0.82
Konkombri hunting area	1.41
Pendjari hunting area	0.45
Pendjari Park	1.98

It can be noted that:

- the ecosystem of Pendjari is much richer than that of W. W Park has a low density, but it should be borne in mind that the part in Benin is made up, for the most part, of a laterite plateau practically devoid of water and therefore fairly inhospitable for wildlife,
- The Mekrou hunting area is a transition zone for the Pendjari ecosystem and benefits from a good hydrographical network. It has a higher density than the Pendjari hunting area.
- Pendjari National Park is richer than Konkombri hunting area (which is part of its ecosystem) and almost 2.5 times richer than Mekrou hunting area and five times richer than Pendjari hunting area.

f. Monitoring of hunting

There is no system to monitor hunting as such (number of animals shot per hunter and per day of hunting, real rate of failure etc.), to locate specimens, or to monitor trophy quality (change in averages each year etc.). Only the extent to which quotas are filled is monitored, but this is not a very pertinent indicator in that the quota is not set according to any scientific basis. It would be useful to replace this indicator with the actual failure rate, which is the number of animals of a species that a hunter is allowed to kill according to the quota and to the number of hunters in the area , minus the actual number of animals of this species killed per

hunter having operated in the same area.

g. Employment in hunting areas

The employees of the five hunting areas are estimated at around 100 permanent staff (that is to say at least six months per year), plus around one hundred more temporary staff employed for one month to open the trails. On average, that means around twenty permanent jobs per zone, plus around twenty temporary jobs for one month. Taking into account the ratio of 3.5% of the country's surface area concerned by these activities, the figures are, once again, low.

h. Remarks

Benin has sought to attain a balance between national parks and hunting areas, and in the past few years has set up a functioning parastatal office for protected areas. It is currently setting up a foundation to ensure sustainable financing and communicates openly on wildlife populations and on hunting sector assessments. All these elements bode well for the future.

2.1.16. Summary of big game hunting in West Africa

The table below summarises the main data relating to big game hunting in West Africa. The data aim to highlight the spatial, economic, social and ecological importance of big game hunting areas in this sub region.

Surface area actually occupied[4]	1 328 070 ha
Attributed surface area but partially degraded[5]	1 200 000 ha
Surface area that could be used in the near future[6]	250 000 ha
Number of tourist hunters[7]	370
Number of concessions[6]	20
Number of concession holders/organisations	20
Gains for all West African local communities	80 million CFA F
Gains for the local communities per hectare dedicated to big game hunting	60 CFA F
Gains for all West African governments	340 million CFA F
Gains for governments per hectare dedicated to big game hunting	248 CFA F
Percentage of the national territory dedicated to big game hunting in Burkina	3.4 %
Percentage of the national territory dedicated to big game hunting in Benin	3.5 %
Contribution of government income (from big game hunting) to the national budget in Burkina	2.35 per 10 000
Contribution of government income (from big game hunting) to the national budget in Benin	0.65 per 10 000
Number of permanent jobs for all West Africa	380
Number of temporary jobs for all West Africa	400
Average number of lions shot per year in West Africa	15 to 20
Average number of buffalo shot per year in West Africa	180
Average number of antelope shot per year in West Africa	150
Average price for a 6-day hunting safari (including buffalo shooting)[8]	5 000 €
Average surface area of a concession in Burkina	66 705 ha
Average surface area of a concession in Benin	78 840 ha
Average number of hunters per concession in Burkina	22.7
Average number of hunters per concession in Benin	16.6
Number of hectares needed to shoot a lion	87 500 ha
Number of hectares needed to shoot a buffalo	6 500 ha
Number of hectares needed to shoot an antelope	10 000 ha
Number of hectares needed to shoot a hartebeest	16 500 ha

[4] Burkina Faso + Bénin
[5] Senegal
[6] Ivory Coast + Mali
[7] Burkina Faso + Benin + Senegal
[8] On the basis of 1 guide for 2 hunters

The big game hunting sector therefore actually covers around 13 000 km^2 in West Africa, in other words 2.2‰ of its surface area[9]. This is a low rate with regard to the surface areas of protected areas, which represent 10% of these countries. Nonetheless, possibilities for extending these hunting areas in the future are very limited. In fact, big game hunting areas really only concern two countries (Burkina Faso and Benin) for around 3.5% of their surface area.

Criterion	Burkina Faso	Benin
% of national territory	3.4	3.5
% of state budget	0.0235	0.0065
% of GDP	0.017	0.008

The productivity of hunting areas is negligible on the scale of these two countries. The number of jobs created is also low for 3.5% of the national land covered (400 permanent[10] and 400 temporary[11]) for a total population of 19.4 million.

The average gains for the local communities are very low: around 60 CFA F/ha, while these areas are located on favourable agricultural land, where cotton, for instance, would generate around 150 000 CFA F/ha, i.e. 2 500 times more.

The hunting safari prices are the lowest in Africa (with slightly higher prices in Benin) and at these prices it is unlikely that most local operators make any real profits.

Apart from for Burkina Faso and Benin, and in light of fairly low results from the big game hunting sector, and low apparent potential, it would seem that the future for conservation will not involve the setting up of big game hunting areas.

[9] 6 139 570 km²

[10] Which are in fact unstable: the majority of these jobs are for 5 months out of 12.

[11] 4 to 6 weeks per year.

2.2. Central Africa

2.2.1. Republic of Central Africa[12]

a. Institutional Context

The institutional context of big game hunting has been described in many reports (including that of Roulet) and is not covered here in detail. The legal texts in the sector are old and considered to be obsolete, as is the zoning which is now unsuited to current hunting and new land tenure issues. State administrative and financial management, carried out by the Ministry of Water and Forests, Hunting and Fishing, responsible for the environment is notable for its opacity.

Roulet's report (2008) recommends a general overhaul of the sector on an institutional level, as regards its spatial organisation, and on the organisational, technical and financial levels. This indicates a sector that has been organised for years, but where the status quo is maintained by a small group of people who benefit from it.

b. Geographical location

In theory, hunting areas represent 31.5% of the country (out of 622 984 km², for a national population of 3.9 million and a population density of 6.3 inh/km²) in other words 196 240 km², while parks and reserves occupy 11.1% of the national territory. This means that 42.6% of the country is classified as a protected area or equivalent, which constitutes a record.

Today, around 30 out of the existing 71 sectors are leased, representing 66 000 km^2. Therefore two thirds of the ZICs are not exploited. Among these sectors, those managed as village hunting areas (ZCV) represent 34.714 km^2. The Centre North has the highest concentration of hunting operators in RCA (nine): the 12 sectors and eight ZCV were rented in 2008.

A new considerable rise in land tenure conflicts can be noted, and hunting areas are faced with many problems: professional poaching, pressure from local communities hunting for their own consumption, a sharp increase in conflicts due to nomadic herding. Today, it is important that tourist hunting activities be developed in collaboration with these different stakeholders and be able to prove their ecological and socio-economic worth.

Wildlife is subject to high pressure due to the subsistence hunting carried out by the local communities in neighbouring rural areas living below the poverty level (GDP per capita is only $US350/year, 2007), and commercial hunting is practiced by people who have come in principally looking for ivory. Despite the efforts made to improve protection so good hunting safaris can be organised, many constraints persist:

- Continued "Sudanese" poaching, hunting the last of the elephants,
- High level of hunting for local consumption and trade, even on the ZCV,
- Development of new conflicts with nomadic herders.

Therefore, it would seem that the surveillance systems set up by hunting organisers are not effective enough to guarantee the sustainable shooting of animals (Roulet, 2008).

c. Technical and economic data

In 2006, 39 sectors (with an average surface area of 2 433 km²) were operated by 16 companies that hosted 198 hunters. On average, over the ten years of hunting up until 2008, it can be seen that 13.6 companies hosted 155.5 tourist hunters (i.e. 11.4 per company) exploiting 34.9 sectors, for a total surface area of 67 980 km² (i.e. 10.9% of the national territory), the sectors having an average surface area of 1 944.6 km². Therefore only one third of potential ZICs are used.

[12] The majority of the information in this chapter was obtained from the 2008 assessment on the hunting sector carried out by P.A.Roulet for the French Embassy in Bangui.

The areas along the Chadian border and in the North East are currently being abandoned and efforts are focussing on the central zones in the North. Development of the forest zones in the South East can also be observed in the areas away from the borders.

Each year, around 40 to 50 hunting guides operate in RCA: 65% of them are French, 25% Central Africans and 7% South African. It can be estimated from 2006 data that a little fewer than 500 direct jobs for six months of the year and 700 for 2.5 months (to open the trails) are generated by recreational hunting. The clients (around 200 per year in recent years) are 68% French and 19% American.

The quotas are not attributed on any scientific basis, but rather in an arbitrary manner (annual reports, operator requests, State economic interests and those of the operators). Therefore, the sustainability of hunting cannot be guaranteed, nor can the effectiveness of anti-poaching actions. The following specimens were taken in 2007:

Information	Raw Data	Average per sector
Number of animals attributed	2 376	-
Number of animals killed	831	-
Overall success rate	35%	-
Number of hunters	191	5.46
Number of animals shot per hunter	**4.4**	-
Number of Buffalo shot	181	5.17
Number of Giant Eland shot	82	2.34
Number of Lions shot	2	0.06
Number of Bongos shot	25	0.71
Number of Sitatunga (marshbuck) shot	3	0.09
Number of Antelope shot	38	1.09

It can be noted that the number of animals shot per hunter has been falling since 2002, when the figure was at 6.9. The value of 4.4 is low on an international level. The surface areas needed in 2007 to shoot an animal of a particular species are calculated as follows:

Number of hectares needed to shoot	ha
A Buffalo	37 558
A Giant Eland	82 902
A Lion	3 399 000
An Antelope	178 895

The average annual fiscal income (2002-2006) amounts to 274 million CFA F, in other words around the same amount as collected in Burkina Faso for less than one million hectares (for 6.8 million ha in RCA). This corresponds to a mere 1.5 ‰ of the State budget. This also represents a fiscal income per km^2 of 544 CFA F, while the forestry sector generates 12 682 CFA F/km², in other words 23 times more.

The 16 companies operating declared a total income of 1 billion CFA F[13], in other words around 62.5 million per company, with a high disparity between the companies. With such low turnovers, even if they are probably slightly underestimated for fiscal purposes, few companies can be making a profit.
The GDP of the RCA being 849 billion, big game hunting only represents 1.1‰ of this.

In 2006, the ZCVs had an income of 129 million CFA F (of which 103 million were for the management committees). This only represents 37 CFA F per ha. ZCVs employ around 50 people full time and 300 seasonal workers (for around six to eight weeks), for a total salary mass of around 35 million CFA F.

The price of hunting safaris is quite variable. A conventional safari (to hunt giant eland and Bongo) usually lasts 13 days, with one hunter per guide. The most expensive safaris cost €25 000 to 30 000, but a good number cost between €20 000 to 22 000. The operators with poorer reputations or those operating in less popular areas even offer hunting safaris for between €16 000 and 18 000. Six day safaris for Buffalo hunting begin at €8 500 (from Bangui, transfer to the hunting area by plane) or €6 000 without the transfer.

[13] Which is doubtless underestimated, but also reveals the fact that a considerable part of income from Safaris remains in the West. With these figures, few companies are making a profit.

d. Ecological monitoring

Wildlife is monitored sporadically by projects. In recent years two studies have given population figures:

- An aerial census in 2005 (*P.-C.Renaud, M.Fay*)

A census was taken of three blocks at a sample rate of 16%[14], which we will use for analysis. As the same method was used in 1985, the comparison 20 years later is interesting. The results of this change (from 1985 to 2005) are presented below.

In the table opposite the sectors with the highest change (even if negative) for each species are given in yellow. The rhino triangle is a hunting sector, while the two other blocks are totally protected (national park, total reserve).

It can be noted that the hunting sector has achieved "better" conservation results for only three species out of ten, even though there is active surveillance, while the other areas are almost entirely abandoned by the administration.

Sampling at 16%	Change as a % from 1985 to 2005		
Species	**Manovo Koumbala**	**Rhino Triangle**	**Vassako Bolo**
Buffalo	-43	84	304
Eland	82	-43	4
Hartebeest	-76	84	-66
Antelope	29	-10	12
WB's Cob	-57	-100	-100
D. Waterbuck	-93	-90	0
Giraffe	-87	-52	0
Bushbuck			-17
Oribi		-76	-35
Warthog	58	57	

In addition to the species conservation aspect, the census is interesting because it provides density figures which can be used to compare the zones. The densities observed per zone in n/km^2, are as follows (the areas with the best density levels are highlighted in yellow):

The hunting area has values superior to the national parks for buffalo and hartebeest.

Otherwise, the national park type zones do better than hunting areas, even if they are "forgotten" by the authorities. Vassako Bolo and the Bamingui-Bangoran national park seem even to have improved, while the neighbouring hunting areas have deteriorated considerably.

Denisties	Manovo Koumbala	Rhino Triangle	Vassako Bolo
Buffalo	0.2	1.48	0.32
Eland	0.09	0.07	0
Hartebeest	0.14	0.16	0.1
Antelope	0.07	0.06	0.07
WB's Cob	0.29	0	0
D. Waterbuck	0.01	0.01	0
Giraffe	0.01	0	0.01
Bushbuck	0	0.01	0.04
Oribi	0.02	0.01	0.01
Warthog	0.19	0.17	0.15
Total	*1.02*	*1.97*	*0.7*
Total excl. buffalo	*0.82*	*0.49*	*0.36*

In addition to the figures on population density, the problem of specific conservation arises. If the analysis is refined to consider individual species, it can be seen that huning zones have not been able to conserve the following species: Western Buffon's Kob, Defassa waterbuck, Reedbuck, Hartebeest, Giraffe, Ostrich, Lion and Elephant.

- Counting according to hunting action

This methodology, developed by the IGF, consists in noting during a hunt the animals seen and subsequently calculating the ratio of the number seen to the kilometres covered. It is therefore a kilometric quantity index. The animal encounter rate during the study in RCA (on the hunting blocks in the Centre-North, including the "rhino triangle") was fairly low, around 15 sightings per day. Due to a lack of sightings, the study could not estimate the density of lion, elephant, buffalo, giant eland, roan, Western Buffon's kob, yellow-backed duiker, blue duiker and bush pigs.

[14] Which gives an acceptably reliable sample and interval.

The number of kilometres that must be covered by car on the hunting trails to make a sighting is nonetheless an indication of the "wealth" of the zone. The following kilometres were needed during this study to sight just one specimen of the species:

Species	RCA 2007 (Bamingui – Sangba)
Hartebeest	48
Buffalo	83
Eland	725
Antelope	195
Red-flanked duiker	36
Grimme's duiker	49
Defassa waterbuck	Absent
Reedbuck	Absent
Bushbuck	68
Oribi	47
Warthog	41
Western Buffon's Kob	Absent

The comment that can be made following this study which focused on the best hunting areas in the country, is that the wildlife densities are extremely low. In which safari parks do tourists have to cover at least 36 km to see the most common animal? These figures confirm the very low densities observed by plane in 2005 and show that the current hunting area system is unable to preserve wildlife (in an extremely difficult context it must be said).

Poaching is also noted everywhere as being on the increase, including in the press by hunters back from safari. This concerns local poaching (P.Flack, *African Indaba No. 7-3*, 2009) which now also includes buffalo (Magazine *Voyages de chasse*, No. 18), but also poaching by outsiders; a culmination point was reached on 5 June 2009 with the death of six surveillance agents in the North.

e. Remarks

Wildlife has diminished considerably in RCA, and the current system of hunting areas/ZCV would appear ill-adapted to reversing the trend. Hunting results show a reduction in the average number of animals shot, with good results still obtained on the species that are least vulnerable to poaching (eland, antelope) or that live in forests with little poaching (bongo, duiker).

The socio-economic results of the hunting sector do not yet induce any hope for changing local behaviour, having an impact on their livelihoods or on their development. They are not able to prevent poaching. Thus the system set up in the north of RCA has its limitations.

2.2.2. Cameroon
a. Institutional Context

Hunting is governed by the law of 1994 on forests, wildlife and fishing, and all application texts (decrees of 1995 setting the terms and conditions of the wildlife sector). The current protected areas network covers a surface area of around 8 138 800 ha, in other words more than 17% of the national territory, and includes the following entities: 15 national parks, six wildlife reserves, three wildlife sanctuaries, three zoos, 47 hunting interest areas and 22 community-managed hunting interest zones.

Hunting areas are called hunting interest areas (ZIC), and are spread among the North (Sudanese zone), in the regions of the North and the Adamoua, and the South (Eastern region, dense forest area). There are 31 ZICs in the North and 14 in the South. Six ZICs are community-managed (ZICGC) in savannah areas and there are 16 ZICGCs in forest areas. In total, hunting areas cover more than 3 983 352 ha, in other words 84% of the country. The average surface area of a ZIC in the North region is 61 973 ha.

It shoud be noted that in the North of the country, hunting areas cover 23 332 km², in addition to the 7 300

km² classified as national park (Faro, Benoue and Boubandjida). Therefore 45% of the North region is classified as wildlife areas. However, these surface areas are theoretical, because demographic and agricultural pressure (including cotton) has reduced the surface area of a certain number of ZIC. Furthermore, there is migration into this area and certain ZIC have already lost all or part of their wildlife potential.

b. Technical and economic data

According to Terdel (2007), the population of the operational technical unit (UTO) of Boubandjida (the national park and the five adjacent ZICs) is estimated at 76 204 inhabitants (density of 10.2 inhabitants/ km²). This density is still low, but it varies from one ZIC to another. The human density in both ZICs neighbouring the Boubandjida national park is 50 inh/km², compromising the possibility of hunting. Cotton cultivation is also clearly encroaching in on this area.

The populations living around ZICs benefit from a part of the trophy fees: 40% are for the local authorities and 10% for the local populations (via development associations). For the Boubandjida UTO, the income from fees was 20.4 million CFAF in 2006-7. If half of that is distributed to the local communities (in fact the local authorities and associations), that represents 134 CFA F/person.

The following animals were killed in the 2005-06 hunting season in the savannah area:

Species	Number shot	Average per area
Elephant	18	0.82
Lion	13	0.59
Buffalo	77	3.5
Eland	61	2.77
Antelope	53	2.41
Hartebeest	80	3.64
Defassa Waterbuck	53	2.41
Western Buffon's Kob	106	4.82

To make the calculation, we considered that only 22 areas were actually operational. We can see that on average, 4.18 big animals (elephants, lions, and eland) are shot in each zone and 3.5 buffalo. It is very difficult for an operator to break even with such a low number of hunting safaris sold.

As in West Africa, we calculated the number of hectares needed to shoot an animal of a given species. For the purposes of the calculation we considered 15% of the leased areas to be unusable. The surface area used was 20 000 km²:

Species	Number of ha
Elephant	111 111
Lion	153 846
Buffalo	25 974
Giant Eland	32 736
Antelope	37 736
Hartebeest	25 000
Defassa Waterbuck	37 736
Western Buffon's Kob	18 868

c. Price of hunting safaris

As in RCA, there is considerable variability in the prices. For a 13-day hunt of giant eland, the most reputable operator markets hunting safaris at €30 000. The majority of the other operators with good reputations offer their hunting safaris for around €15 000, with a certain negotiable margin that is difficult to quantify (end price probably around €12 to 13 000). The shortest safaris for hunting buffalo (six to seven days hunting) cost around €7 000.

Forest hunting safaris always cost more, and an operator may charge up to almost double the price of their

savannah safaris. A 13-day hunt in a good quality area of Bongo costs around €28 000 to €30 000. Nonetheless, it is possible to find hunting safaris from €20 000 with certain organisers.

The share of the Cameroonian Government is around one billion CFA F. In light of the fact that the state budget is 2 276 billion CFA F, this income represents a contribution of around 0.44 ‰, produced using 8.4% of the national territory.

d. Ecological monitoring

Ecological monitoring is sporadic, but an aerial fly-over was carried out by WWF in 2008 covering a large proportion of the Northern protected areas and hunting areas. Despite imperfections in the methodology used (total census), it can be noted that out of the 22 136 km² covered, of which 7 580 are national parks, generally speaking the latter are richer in wildlife than the ZICs:

- Most of the 525 elephants (42%) were counted in the Boubandjida National Park
- Most of the buffalo were seen in Boubandjida (22%) and Bénoué (17%) National Parks
- Most of the antelopes counted were in the national parks (58%)
- The hartebeest are most concentrated in the Boubandjida National Park (27% of the total number), and 60% of hartebeests were observed in national parks.

A lot of cattle were sighted in Faro National Park (53.6% of the total cattle), which shows that this park is not managed. The same goes for human settlements, which are however, concentrated in the peripheral areas. The greatest density of cattle was noted in a ZIC. It can be noted that human activities (fields, settlements, livestock breeding) are much higher in the ZICs than in the parks. Even Faro National Park, barely managed if at all, does not have the same level of invasion as some ZICs: the effects are only noticed on peripheral areas. Overall, the status of national park, even with poor surveillance, better protects the biotope than the status of ZIC, even when it is exploited.

The latter point should be highlighted, as the local communities around national parks do not of course benefit from trophy fees, as hunting is not permitted. This shows that this low level of gain is not enough of an incentive for the communities to respect hunting areas. The national park status has a much higher influence on conservation.

Another type of ecological monitoring was carried out by the IGF foundation (as in RCA): the sightings during a hunt. For 2007 in the Faro hunting areas, the average results show that apart from buffalo, the distances that need to be covered to make a sighting are much lower in Cameroon than in RCA, indicating higher densities of wildlife[15].

2.2.3. Chad

Historically, until the 1970s, Chad was known as the best big game hunting country in French-speaking Africa. At this time, hunting was not very developed in Cameroon and was just beginning in RCA (a few elephant hunting safaris). The political and security situation led to a gradual drop in hunting and then total suspension for a long while, before starting up again, if tentatively.

Hunting safaris traditionally took place in the South-East of Chad, along the border with Central African Republic (Aouk River), and used the town of Sarh as their base. In theory, big game hunting areas covered 6.75% of Chad's national territory. Many hunting blocks were defined in the Aouk domaine, covering a surface area of around 11 850 km², of which 5 000 km² were still used for hunting until 2006. A part of the Salamat reserve was classified as the "hunting area" of Iro lake, representing a further 10 000 km² to the North-East of the Aouk domaine.

Towards the end of the 1990s, new areas were created, in particular for hunting Kudu in the West (Melfi, Goz Beïda) and Barbary sheep (Ennedi). Furthermore, in the 2000s, at the instigation of the German cooperation agency (GTZ), a pilot village hunting area was created in the west on the periphery of the Binder Léré reserve (around 40 000 ha). Unfortunately, the minimal gain generated by hunting did not prevent encroachment by agriculture and grazing.

In 2009, none of the areas in the Aouk are being operated any more, nor is the community hunting area.

[15] Also indicated by P. Flack, African Indaba n°7-3, 2009

Only the Melfi hunting area (4 260 km^2, to the north of the Siniaka Minia reserve) is leased and operated, mainly for Kudu hunting (half a dozen hunters per year).

Therefore, tourist hunting is mainly confined to the Lake Chad area, where two small game hunting concessions (mainly for duck shooting) receive from 100 to 200 tourists per year for a week's stay.

2.2.4. Other countries of Central Africa

Big game hunting is closed in Congo, Equatorial Guinea and in Gabon. In the latter country, hunting in enclosed areas is practiced for forest game (mainly Sitatunga), at the Lékedi Ranch. It is a "pilot" operation, which is not advertised on the agency's website.

In DRC, hunting is theoretically open and there are a certain number of classified hunting areas. Over the past ten years several test-safaris have been organised, but have been mostly unsuccessful, due to a lack of game. It is nonetheless possible that in the future a certain number of opportunities may arise.

2.3. Eastern and Southern Africa

2.3.1. Tanzania
a. Institutional Context

Tanzania is considered to be the number one country in Africa for big game hunting. It has an extremely vast network of protected areas:

- Parks and reserves where hunting is prohibited cover 134 881 km², in other words 14.1% of the country,
- Hunting areas of various types: hunting reserve, Game Controlled Areas, Open Areas blocks, WMA (Wildlife Management Area) and community managed areas cover 250 000 km², i.e. 26.4% Of the national territory.

Protected areas are governed by two entities:
- hunting areas are governed by the Wildlife Division, of the Environment Ministry, which accords concessions for five-year periods and sets quotas.
- national parks and reserves without hunting are governed by Tanzania National Parks (TANAPA), a parastatal organisation.

Resident hunters have the right to hunt in open areas only. Resident permits give the right to shoot the common species: Buffalo, impala, hartebeest, topi etc. Trophy fees are low and few people pay them. The gains from hunting by residents are minimal.

b. Location of hunting areas

In all, 40.5% of the country is classified as some form of protected area. The Selous reserve, which is in fact a grouping of around fifty hunting areas, is the largest hunting area in the country (in Africa even). It covers 50 000 km².

c. Technical and economic data[16]

Tanzania is the largest African country for hunting the big five: in 2004, 1 650 foreign hunters spent around 20 500 days hunting and it is estimated that more than 7 000 animals were shot (note that in Tanzania a hunter may take several permits, which means that the number of permits is not an exact reflection of the number of hunters).

In 2003, the average number of animals shot per hunter in Selous was 7.8. It is estimated that every year recreational hunters shoot around 35 elephants, 2 000 buffalo, 250 lions and 300 leopards (Lindsey, 2007). For the Selous reserve alone these figures are 30, 800, 80 and 100. It is without a doubt the African country that has the best results for these animals.

In total, 141 concessions are leased to 42 safari companies and the three largest groups hold 51 concessions (i.e. 36% of the total). The turnover from big game hunting was estimated in 2004 at $US27.7 million. The local communities (42 district councils) received $USfive million from 2001/2 to 2004/5 (Kayera 2005), i.e. around $US one million/year for 250 000 km^2, or $US0.04/ha, equivalent to 20 CFA F/ha. The revenues generated for the local communities are therefore very low under the current system. The legislation on WMAs and the new hunting policy have made improvements in these areas, but they are infrequently or never applied.

The turnover per hectare made by the different types of management structure are approximately as follows:

- All hunting areas in Tanzania: $US 0.40/ha,
- Hunting areas in the Selous reserve: $US 0.70/ha
- Safari tourism in the Selous reserve: $US 1.30/ha.

In Selous, the income for the Wildlife Division from the best concession is $US108 000 per year and the least effective brings in $US29 000 per year. The variations in quality among the zones are considerable and

[16] Most of the data comes from the work of Baldus, 2004.

the differences are due to factors such as wildlife accessibility or density.

Buffalo, leopard and lion are the mains species for big game hunting and generate 42% of the trophy fees for the Wildlife Division. Buffalo make the largest contribution with 22.1% of trophy fees and 13.3% of the total income of the Wildlife division. Each hunter shoots on average 1.5 buffalo during a hunt in the Selous Reserve. The viability of hunting areas therefore depends mainly on having a good buffalo population. Certain species such as lion are affected by hunting pressure, but this is not the case for most species. The wildlife populations have diminished in many areas due to the increase in human settlements and the bush meat trade, but not from recreational hunting.

The success rates per hunter for the main animals are given in the following table:

Species	% of the contribution to the total amount of trophy fees	% of success per hunter	% to which quota is filled
Buffalo	21,5	150	83
Leopard	10,4	25	69
Lion	9,4	20	52
Elephant	7,6	9	N/A
Zebra	7,0	50	65
Hartebeest	6,0	100	76
Hippopotamus	5,7	33	68

d. Analysis of the hunting sector by Baldus (2004)

Baldus made a precise analysis of the hunting sector in Tanzania which noted a certain number of problems:

- The lack of control by the Wildlife Division,
- The lack of professionalism of hunting guides,
- Poor ethical practices and a lack of standards in the field,
- Adjustments made to the quotas,
- Failure to comply with environmental standards (in particular for camps),
- The decline in wildlife populations[17],
- The influence exerted by safari organisations and manipulation of high government officials,
- The lack of interest in changing the current organisation and applying WMA policy.

Baldus estimates that the pressure exerted by local communities on protected areas will not stop. The concept of community management of WMAs seeks to counterbalance this pressure and encourage development of the peripheral areas. The concept is easier to implement where the communities are small and the protected area's peripheral zone is vast with a high density of wildlife.

Many of these protected areas are under high and constant pressure from resource exploitation and wildlife populations are affected even if they can still withstand organised recreational hunting. A certain number of hunting areas are no longer viable and the situation is fragile for others. The cost of protecting and managing these zones is increasing, while the income from the zone cannot keep up. There is a clear decline in the number of hunting areas and the viability of most of them. The new policy and recreational hunting management plan recommend:

- Open calls for tender for the attribution of each concession
- A control of sub-letting of zones, which could be a natural follow-up to the preceding point
- That local communities have decision-making power over the allocation of concessions and establishing quotas in their area, and that they receive and manage the funds generated.

e. Ecological monitoring

There is no real ecological monitoring of hunting areas in Tanzania, or of hunting activities and trophies collected. This is carried out sporadically by projects (e.g. GTZ), and is not exhaustive. The data are therefore partial and difficult to interpret. Projects have tried to set up monitoring systems, but these have not been implemented by the Wildlife Division. However, the 2006 census showed the drop in numbers of some

[17] Even in Selous, the 2006 census (UNESCO, 2006) showed a drop in the population of buffalo, hippopotamus, gnus and impala.

species, including buffalo.

f. Price of Safaris

The price of safaris in Tanzania has risen significantly over the past ten years. Legislation has also evolved, and it is now compulsory to hunt for 21 days to shoot a lion or an elephant. The prices shown in 2009 by three different operators lead to the following average prices (excluding trophy fees) according to the species that can be hunted:
- 21 day hunting safari (Elephant, Lion): (one hunter/one guide) = €40 000 to 60 000
- 16 day hunting safari (Leopard, buffalo): (one hunter/one guide) = €25 000 to 40 000
- 7 day hunting safari (buffalo): 7 500 € (two hunters/one guide) = €7 000 to 18 000

2.3.2. Zambia

a. Location of hunting areas

In Zambia, big game hunting areas are classified as Game Management Areas (GMA). GMAs are protected wildlife areas on land that belongs to the local communities, in which animals are protected and mainly used for organised hunting and tourist safaris.

The GMAs of Zambia cover 170 000 km², i.e. 22% of the country's surface area. They are organised into categories according to the wealth of wildlife. In 2007, there were 42 GMAs, of which 13 were in the first category, 16 in the second, 7 in the wildlife depleted category and three in the specialised hunting category (rare antelope). These GMA, as the other protected areas, are managed by the *Zambian Wildlife Authority* (ZAWA), a parastatal body.

b. Technical and economic data

ZAWA's hunting revenues are high, in 2007 they were $US3 621 132 distributed as follows:
- Trophy fees: $US2 295 202 (63% of the total)
- Concession fees: $US1 270 974 (35%)
- GMA permits: $US81 150 (2%)
- Small game permits (birds): $US36 806 (1%)
- 57% of hunters came from the USA and 10% from Spain. Furthermore, hunting is open to residents in 24 blocks and in standard areas.

c. Price of safaris

As in Tanzania, prices of hunting safaris have increased significantly in the past ten years. The prices on offer in 2009 vary depending on the operator:
- 21 days (Lion, Leopard, buffalo): (one hunter/one guide): from € 35 000 to 60 500;
- 21 days (Lion, buffalo): (one hunter/one guide): from €30 000 to 51 000
- 14 days (Leopard, buffalo): (one hunter/one guide): from €12 000 to 28 000
- 7 days (buffalo): (two hunters/one guide): from €4 600 to 11 500

It can be seen that the difference is considerable between areas and operators. The prices in the upper range are similar to those in Tanzania.

d. Analysis of the big game hunting sector: NRCF Study

We present here the results of the study carried out in June 2008 by the Natural Resources Consultative Forum: "*The impact of wildlife management policies on communities and conservation in game management areas in Zambia*". This study makes a complete analysis of the big game hunting sector in Zambia.

This report shows that GMAs in Zambia are caught in a downward spiral of economic, sociological and ecological degradation, despite the real efforts and commitments made by ZAWA, local communities and various partners.

Ten years ago, the Government implemented the 1998 Zambia Wildlife Act, as it realised that without

sustainable natural resources future generations would have to face up to an increased risk of food insecurity and poverty, which would force them to overexploit already degraded natural resources. The new national parks and wildlife policy in Zambia instigated the concept of local community management of natural resources.

Today, it appears that governance of the GMAs, through community institutions such as community natural resource committees or village action groups, does not achieve the GMA objectives. In particular, the objective of setting up a buffer zone around national parks to protect wildlife and its habitat has not been achieved. It is therefore impossible to set up a sustainable wildlife tourism industry that would make a significant contribution to the national economy and to improving livelihoods in the GMA.

This report encourages the Zambian government to launch a national review of GMA management in order to design and adopt a new wildlife management policy framework in the wider context of protected areas and natural resource management.

- GMA commercial performance levels: analysis of the use of the main hunted species ("top species": lion, leopard, black antelope, roan and buffalo) in the hunting safaris on offer shows a downward trend, as for the trophy quality of the main hunted species.
As a result, the proportion of revenues paid to the natural resource management committees was 3.7 billion Kwacha[18] per year from 2004 to 2006, and 5.15 billion in 2007. This equals around $US one million per year and per hectare revenues of $US0.059, in other words 28 CFA F/ha for the communities. In Zambia, the average population density is 13 inh/km².

- GMA ecological performance levels: the validated quantitative data suggest that in more than half the GMAs of Zambia, the animal populations have declined, mainly due to poaching. In some GMAs the wildlife status is unknown. Many hunting blocks are affected. Four GMAs have thus been downgraded from the first category to the second, and 12 other GMAs are in a critical state of wildlife degradation.

Furthermore, an aerial photographic study shows that the natural habitats available for wildlife in the GMAs are decreasing throughout the country due to human settlements, agriculture, legal claims to traditional land and poorly coordinated planning by the governmental departments.

- GMA sociological performance levels: the local communities living in the GMAs are characterised by a high level of poverty. The monthly expenditure per person is estimated at $US14. This is $US22 in rural areas in general, and $US49 in urban areas. Compared to other rural communities, the well-being of GMA residents is 30% lower than that of the national rural average.

- Factors affecting GMA performance levels: for all GMAs, the most important problems are poaching, increased human settlements, bushfires, deforestation, subsistence agriculture and illegal fishing. Food insecurity is high. A very small proportion of the funding is allocated to resource protection and only 3 GMAs really reach the minimum management criteria.

Thus, this report describes an alarming situation in the GMAs. Natural habitats and wildlife are diminishing at an alarming rate in most GMAs. The communities living in GMAs are poorer than the other rural communities of Zambia and 31 GMAs out of 36 do not reach the minimum management effectiveness requirements.

e. Game farms in Zambia

Game farms are for breeding game. They are called farms when they have a small surface area and a ranch when they are larger. They are usually enclosed. In 2008, Zambia[19] had 112 game farms, for a total surface area of 112 769 ha (average per farm: 1 007 ha). The number of animals present is 21 546 (average: 192 animals per farm). If we consider that the hunting quota for antelope is 2.5%, an average of five animals per big game farm can be shot, i.e. 560 animals in total. In reality, in 2007, tourist hunters only shot 113 animals on the private properties of game farms. It is therefore a limited market.

[18] $US1 = 5 175 Kwacha in June 2009
[19] ZAWA 2007 Annual Report.

2.3.3. Kenya

Kenya closed hunting in 1977. Since then, several unsuccessful attempts to reopen it have been made. The context in Kenya has changed much over 30 years with:

- The demographic explosion which multiplied the population by 2.7, going from 14 million inhabitants in 1977 to 38 million in 2008, in other words a population density that went from 24 inh/km^2 to 65 inh/km^2,
- The Somalian conflict which modified the movements of semi-nomadic herders,
- Increased aridity in certain zones

The zoning established for hunting in the 1950s, when there were five million inhabitants in Kenya could not last.

Wildlife today, as in all countries with a high population density, is concentrated in protected areas, although seasonal movements are noted outside of them (particularly due to their old design). In areas where livestock breeders culturally tolerate cohabitation with cattle, the presence of species such as gazelles, zebra and impala etc. can be noted. Big animals, whose hunting could be lucrative, are practically only found in protected areas. The creation of *conservancies*[20] can be noted, particularly in the Centre-North of the country (Laïkipia, Samburu, Matthews Range, etc.).

There are a few game ranches, but their main source of revenues has dropped considerably since "The Carnivore" restaurant has taken wild game off its menu under pressure from "conservationists". Only farmed crocodile and ostrich meat remain. This is an example of how difficult it is to combine trophy hunting with modern tourism.

2.3.4. Uganda

Hunting was suspended in 1979 after Idi Amin's presidency. Hunting areas before this era were practically all colonised by agriculture and livestock: the country now counts 105 inh/km². The North of the country is still subject to troubles (LRA rebellion).

Legislation on hunting was changed in 1996. An operation to reopen hunting was carried out around the Lake Mburo National Park from 2001. This operation focused on an area used for cattle farming. The first phase consisted in an operation to hunt impalas for meat ("cropping"). The income was insufficient (quota of 100 impala per year, i.e. a turnover of $US5 500 per year), the cropping option was abandoned and recreational hunting was developed.

A zone of 100 km^2 on the border of the national park was retained and a quota set (2 to 3% of the population of hunted species) including ten buffalo, seven eland, ten waterbucks etc. Between 2001 and 2005, the average annual turnover was $US34 000 and 65% of this figure was paid to the local communities.

The economic potential of the different forms of land use around Lake Mburo was studied, a rare occurrence in Africa. The income per hectare and per year is:

- Mixed agriculture: $US281.4 (= 140 700 CFA F)
- Cattle raising: $US5.8 (= 2 900 CFA F)
- Poaching: $US3.6 (= 1 800 CFA F)
- Recreational hunting: $US1.7 (= 850 CFA F)

The revenues from recreational hunting ($US170 /km²) are much higher than those noted in Tanzania by Lamprey ($US21 to 29 /km², 1995) or by Baldus ($US40 to 70 /km², 2004). They are, nonetheless too low to be competitive with agriculture. In that, Uganda is no different from the other African countries where big game hunting is not of sufficient worth to compete with agriculture.

To make hunting viable, more and larger hunting areas are needed, but in the land tenure context of the country, this is not possible, unless some reserves are declassified, as there are no big animals outside these reserves.

[20] See below

2.3.5. Ethiopia

Hunting in Ethiopia was a large sector until the DERG came to power (1974 - 1991). Demographics and the socio-political context led to hunting areas being overrun by agriculture and livestock breeding. The latter is highly developed (Ethiopia has 43 million head of cattle, the highest in Africa and 6th highest in the world) and counts for 19% of the GDP.

Today, about half a dozen hunting organisers still exist (around fifteen guides), whose main objective is to hunt Mountain Nyala, for which a quota of around thirty is set each year. All hunting areas are inhabited and livestock farming widely practiced in them. They are often the seat of interethnic conflict and automatic arms are abundant. Wildlife densities are not high and the species present have often adopted nocturnal behaviour, which does not facilitate hunting.

2.3.6. Rwanda

Since the genocide (1994), big game hunting is no longer possible in Rwanda. Before this time, it was only practiced on the western border of the Akagera National Park at Gabiro (Mutara hunting domain), in particular for African buffalo that are large trophies. This domain, as well as a good part of the national park, is now occupied by agriculture and livestock farming and there are no longer any big game hunting areas in the country.

2.3.7. Zimbabwe and Mozambique

We did not particularly focus on these two countries for two different reasons:

- In Zimbabwe, the wildlife sector has collapsed over recent years (except for national parks and government hunting areas, which were better able to resist the socio-political upheavals than the private sector). Few data are available for recent years.

- In Mozambique, the situation is just the opposite: after years of closure following the civil war which began in 1975, big game hunting in Mozambique is expanding, after a demining campaign in certain areas. In 2006, 352 tourist hunters went to Mozambique, generating income for the Government of 12.2 million new *meticals* (i.e. $US425 000), up 25% on 2005. Many South African operators and guides are working there, and many South African hunters who hunted in Zimbabwe ("regional residents" counted as tourists in the statistics) now go to Mozambique. The big game hunting sector is currently being restructured (French Development Agency funding[21]).

In this, Mozambique appears to be out of sync with its neighbour Zambia, which is reorienting the hunting sector towards tourism and with Botswana, which has just closed hunting in the Okavango.
Hunting areas represent 19.6% of the country, in other words a surface area of 157 000 km². The latter corresponds to the surface area of hunting areas in Zambia and is well above those of neighbouring Zimbabwe (65 000 km²). Some are government zones (*Coutada*) and some are managed by the local communities.

The quality of hunting safaris is not yet very high in Mozambique. Only nine lions were shot in 2007 and 14[22] in 2008, i.e. respectively 17 and 13% of the quota set by the administration. This indicates low densities and therefore a limited potential business in high-end hunting safaris. Differences in declarations between hunting safari organisers and the government reveal problems with sector governance (IGF, 2009). Furthermore, the quality of hunting guides operating in Mozambique does not seem to be the best, two of them (including one Frenchman) were arrested in June 2009 for elephant poaching[23].

For the statistics of the study, we used the figures from Zimbabwe (as in publications used as a basis for our study: Lindsey, 2007), which were known, but it is probably more accurate to consider them today as those of Zimbabwe + Mozambique.

[21] http://www.afd.fr/jahia/webdav/site/afd/users/admimozambique/public/projets/AT-faune-mai09.fr.pdf
[22] In other words, respectively one lion shot per 11 215 km²: a result around 16 times worse than West Africa.
[23] http://allafrica.com/stories/200907070963.html

2.3.8. South Africa

In South Africa, almost all big game hunting is carried out on game farms, which justifies the importance given to this activity in this study. Other safaris take place in private reserves or even in national parks (Pilanesberg National Park etc.).

Game farms have been presented by some as "the" solution to conservations problems in Africa. The data below, and the desire expressed by some to see these develop into larger entities that respect ecosystem values (conservancies), show that this is not at all the case.

a. General Data

The majority of the data presented in this chapter are those provided by the following studies:

- Study carried out for TRAFFIC by Claire Patterson and Patson Khosa: study of professional and recreational hunting in South Africa (2005),
- Study on hunting and game farming in South Africa[24] carried out by the National Agricultural Marketing Council (NAMC), a consultative committee of the South African Ministry for Agriculture.

The overall success of the sector is spoiled by the persistence of unsustainable management practices, in particular as regards quota setting and attribution of hunting concessions. It is important to encourage improvement in these practices. Currently, the demand for big game hunting in Southern Africa exceeds supply, and unethical practices have become a problem due to the intense competition that reigns.

At the end of the 1990s, the direct turnover of big game hunting tourism reached $US28.4 million in South Africa, in other words 7.5 billion CFA F. During the 2003/4 hunting season, the big game hunting sector in South Africa saw 5 to 6 000 hunters come through. These hunters shot 53 453 animals, representing a combined value of $US40.7 million[25].

By way of comparison, the sale of 21 000 head of live game in 2004 was valued at $US12 million. In addition to these foreign hunters, it is estimated that there are 200 000 resident hunters in South Africa. This sector is valued at around $US290 million[26], or $US1 450/resident hunter.

Around 9 000 farms are totally dedicated to game farming and a further 15 000 farms practice mixed activities (cattle and wildlife farming). This industry generates jobs for 5 to 6 000 people and it is estimated that 63 000 jobs are created by secondary industries such as tourism.

In 2004, 23 455 animals were killed for meat production. The marketing of live animals constitutes a relatively large proportion of the industry with a turnover of $US8.7 million in 2001. By way of comparison, in 2003, six and a half million people visited South Africa bringing in $US5.4 million in foreign currency.

During a study of game farms in the Limpopo province, 30% of the people surveyed replied that they had a game farm primarily for their own pleasure and 27% said that it was their own contribution to nature conservation. 24% of them were not financially dependent on the game farm revenues (van der Waal and Dekker, 2000).

b. Data analysis

An analysis of game farm statistics for 2000 in South Africa shows:

- There are 9 000 farms that only raise game (for this calculation the 15 000 mixed game/livestock farms are not counted, which would lower the figures given). Their average surface area is 2048 ha.
- There are 6 000 foreign hunters, i.e. 0.66 potential hunters per game farm,
- The average length of a hunting trip: seven days per client, i.e. 4.5 potential days per farm, at a daily cost of $US300/day, or $US1 350 potential annual revenues per farm from hunting days by foreign

[24] Report No. 2006-03
[25] i.e. $US6 800/hunter, which appears plausible.
[26] i.e. 7 times more than tourist hunting: South Africa is the only country in this situation in Africa, where resident hunting reaches such values and is part of the formal sector.

hunters.

- Eight animals killed per hunter, i.e. five per farm, and around $US750 per animal (which constitutes an optimistic average value) of fees paid, in other words an annual potential of trophy fees per farm of $US3 750.
- furthermore, 21 000 live animals are sold each year, in other words an average of 2.3 per farm and per year, at an average price of 2 000 Rand (excluding rhinoceros/buffalo which are an exception for farms), representing a potential annual income of $US460.

In total, the average annual income for a game farm from tourist hunting and the sale of live animals is at the most, $US5 560. At best, this corresponds to an average turnover for a game farm of 9 million CFA F: game farming is not an economically profitable market. This figure corresponds, for 10 000 farms, to around 180 million dollars in turnover, which is indeed similar to the figures given by other sources.

The estimated value of the entire wildlife industry in South Africa in 2000 is presented in the table below. It is currently estimated at around one billion Rand (= $US100 million), (Damn, 2005).

Source of revenue	Revenue (ZAR)	Percent
Biltong hunters (resident)	450,000,000	52.8
Trophy hunters (foreign)	153,000,000	17.9
Taxidermy[1]	10,000,000	1.2
Live game sales	180,000,000	21.1
Eco-tourism	40,000,000	4.7
Game meat sales	20,000,000	2.3
Total	**853,000,000**	**100**

Source: Eloff, 2002; Anon, 2000

The share of the total value of the industry generated by tourist hunters is around 18% of turnover, while resident hunters contribute 53%. The rest stems from taxidermy, live game sales, ecotourism and game meat sales.

In 2005, the average price for a day of hunting for a tourist hunter was around $US250 to 400 per day, rising to $US900 for “dangerous” game. Therefore these prices are low when the farm does not propose dangerous game hunting, but are also low compared to big game hunting in other countries and to luxury safaris.

The expenditure by resident hunters (2005) is estimated at 1.2 billion Rand ($US120 million) and additional expenditure (arms, ammunition, vehicles etc.) is estimated at 1.735 billion Rand.

c. Investment and profitability of game farms[27]

Considerable capital outlay is required to set up a game farm. The price of land has increased significantly in recent years. It is estimated that the initial development costs at least double the price of the land. Expenditure covers mainly fencing, infrastructure (animal handling, water sources, observation platforms, roads, buildings and staff housing), vehicles and various equipment and the purchase of the initial stock of wild animals.

The investment cost for a small game farm is around 2.5 million Rand, and for a large game ranch this figure can rise to 15 million Rand. In the Lowveld, the hectare costs between 3 000 and 6 000 Rand, depending on the size and the geographical location. The potential for developing ecotourism activities can be an essential factor in determining the price.

A large ranch in the Lowveld with the big five, costs around 85 million Rand, but a similar sized ranch in the

[27] The data come from an on-line university course: www.wildlifecampus.co.za

Kalahari will cost around 15 million Rand. The price of infrastructure rarely exceeds 15% of the total investment cost. This is due to the high cost of game and land, but also to the depreciation over time of the fence, the buildings and the vehicles.

For the investment to be profitable, the land would need to cost less and the game would need to be sold for a higher price than is currently the case. A farm only produces a limited number of trophy animals, especially if it is small. Therefore the revenue from recreational hunting is usually low.

Regarding the economic profitability of game ranching,[28], a major game farm agent in South Africa warns his potential clients on his website: "*Game farming is a glamorous business and people enter the game farming industry for more than purely economical reasons - therefore a game farm's income doesn't compare favourably against it's price...Don't try to convince investors to invest in a game farm... figures and business plans don't sell a game farm.*"

Game farm revenues are 80% from hunting, 10% from live game sales and 10% from tourism. According to the overall sector figures, income never covers expenditure on operations and investment, and the capital can never be recovered.

.

The final word goes to the same real estate agent: "*you can, like most game farm owners, use it purely as a 'rich man's toy*!'"

d. Conservancies[29]

Conservancies appeared several years ago as a solution to game farm problems. From a conservation point of view, game farms pose several problems such as the persecution of predators, exceeding of load capacity, the introduction of exotic species and genetic manipulation of hunted species[30]... The majority of these problems could be resolved by encouraging the setting up of conservancies: these are simply neighbouring ranches that remove their internal fences to create an area dedicated to wildlife, and where the owners work together[31].

These larger areas enable the whole range of species that make up the original biodiversity to be reintroduced and promote high added value forms of hunting and ecotourism, unlike the farms which kill a high number of specimens of low value species. The contractual joint management of conservancies better meets conservation objectives than an isolated ranch.

Furthermore, conservancies offer financial advantages: the different usage options produce more profits and joint management enables economies of scale to be reached. The land used for conservancies is worth more and better able to attract financing. Conservancies are ideal sites to develop partnerships with local communities and investors, and this can increase the socio-political sustainability of game ranching[32].

Indeed, game ranching does not only have positive effects on conservation: there is little monitoring of the ecological impact of game ranching and the development options taken. Furthermore, the game ranching industry has emerged without any suitable regulation. Game ranches are guilty of doubtful ethical practices, including what is called "canned hunting", where the animals are shot in small enclosures, with no possibility for escape, or "put and take hunting"[33], where good trophy animals are released onto the ranch just before the hunter arrives.

In South Africa, the average game farm size is only 820 to 4 920 ha depending on the province (Bothma,

---

[28] Data soruce is the internet site of the game farm real estate agency: www.gamefarmnet.co.za

[29] Data source is the article: "*The importance of conservancies for enhancing the value of game ranch land for large mammal conservation in southern Africa*", par P. A. Lindsey, S. S. Romanach & H. T. Davies-Mostert.

[30] For example, white, golden and black springboks can be found

[31] In Namibia these are simply areas jointly managed by the communities or different owners.

[32] In particular when local communities claim their legal right to recover land that belonged to their ancestors, which constitutes a major post-colonial problem.

[33] There are no other solutions on a game farm than to practice trophy hunting : their own production is always insufficient, in light of the size of the farm to be profitable. This is why there are many game transport and marketing companies in South Africa.

2002): enclosed game ranches are often overloaded with animals, causing similar ecological degradation to that seen on cattle ranches. In these small enclosed game farms the lack of large species limits their use to low value game hunting (common antelope), biltong (traditional dried meat), and the sale of live animals. Conservancies however, have larger surface areas and larger and more charismatic species can be reintroduced, enabling uses more oriented towards ecotourism and high value trophy hunting (with shooting limited to 2-5% of the male animal population). Under these conditions, the predators make a positive contribution to ecotourism and trophy hunting revenues and are therefore actively reintroduced.

The presence of the “big five” (buffalo, leopard, lion, elephant and rhinoceros), also enables tourist operators to sell the day at almost triple the price of ranches without them: $US277/night on average, as against $US88/night (P.A. Lindsey, unpublished). Similarly, in recreational hunting areas where the big five can be found prices are higher:

- $US600 – 1 300 per day in addition to trophy fees for big species,
- $US100 – 400 per day, with lower trophy fees for antelope hunting (Lindsey, 2006).

Furthermore, thanks to the economies of scale in the conservancies, management fees may well be lower than those of a game ranch of a similar size. The higher wildlife populations in the conservancies requires fewer operations of genetic management or in response to changes in environmental conditions. On small ranches, in the case of drought, it is often necessary to intervene to prevent animals dying (extra water, food, culling, capture to move them, and reintroduction when the conditions return to normal).

Finally, there are real socio-political benefits from conservancies: they offer more opportunities for local communities to get involved in the wildlife industry. They offer an appropriate institutional framework for interaction between the government and the community structures and are likely to have more political influence than ranches. Furthermore, with existing wildlife resource sharing mechanisms, a private conservancy can easily be extended to incorporate land belonging to the communities.

3. THE INDUSTRY OF BIG GAME HUNTING SAFARIS

In this section we present some data from different sources that can be used to characterise the big game hunting sector in Africa.

3.1. Some overall data

Baldus (2004) revealed the following figures concerning turnover in the main big game hunting countries:

- Tanzania: $US27.6 million
- Zimbabwe: $US22 million, which represents the ceiling reached in 1998, but which has been dropping ever since. The game ranch component has practically disappeared.
- Botswana: $US15 million
- Namibia: $US5 million.

The Safari Club International (SCI, 2008) estimates that 18 500 tourist hunters come to Africa (to 23 countries) each year, generating an annual turnover of $US200 million. It estimates that recreational hunting has a turnover of:

- In Botswana: $US20 million (and more than 1 000 jobs),
- In Namibia: in 2004, it is estimated that the turnover for hunting by tourists was $US28.5 million, representing 14% of revenues from tourism and 2.3% of the country's GDP. In 2003, local communities classified a surface area of 74 000 km^2 in 29 conservancies, i.e. 75% of the country's hunting land.
- In Zimbabwe, from 1989 to 1994 the CAMPFIRE system collected $US6 million, i.e. $US one million per year.
- In South Africa: $US100 million in turnover from tourist hunters in 2000 (Anderson 2003) (Damm, 2004)[34].
- In Tanzania: recreational hunting employs around 3 700 people, of which 2 282 are permanent jobs and 2000 temporary (www.tanzania.go.tz/)

The surface areas used for big game hunting are huge:

- 250 000 km² inTanzania[35] (Baldus & Cauldwell, 2005),
- 82 250 km² in Mozambique (Hatton, Couto & Oglethorpe, 2001)[36],
- 65 000 km² in Zimbabwe (Booth, 2002),

In Kenya, recreational hunting was forbidden in 1977 due to over hunting and corruption, causing a loss in potential earnings of around $US20-40 million/year for the country.

During the 1970s, recreational hunting existed on a large scale in Ethiopia, but with the increase in human population, in agriculture and political instability, 95% of hunting areas have been lost.

The following data come from the article: *Economic and conservation significance of the trophy hunting industry in sub-Saharan Africa*, by P.A. Lindsey, P.A. Roulet, S.S. Romanach. The table summarises the hunting statistics per country:

[34] i.e. $US16 600 hunter, a figure much higher than observed in reality!
[35] i.e. $US4 /km² of benefits for local communities
[36] Figure increased after instigation of community hunting areas: 157 000 km² (IGF)

Country	Number of operators	Number of hunting guides	Number of clients	Number of hunting days	Turnover in $USmillion	Number of animals shot/year	Number of jobs
South Africa	1 000	2 000	8 530	74 000	100	53 885	5 500
Namibia		505	5 363	15 540	29	22 462	2 125
Tanzania	42	221	1 654	20 500	27,6	7 034	4 328
Botswana	13		350	5 570	20	2 500	1 000
Zimbabwe	149	545	1 874	19 646	16	11 318	
Zambia	22		250		5	5 436	
Cameroon	23	47	175		2	960	1 200
RCA	19	41	150		1.4	738	900
Ethiopia	4	15	50		1.3	300	
Burkina	14		300		1.0	994	280
Benin	5		90		0.4	200	100
Chad	1	1	10				
TOTAL	**1 292**	**3 375**	**18 796**	**135 256**	**203**	**105 827**	**15 433**

- The high number of hunting operators and guides compared with the number of hunters can be noted: a hunting safari organisation usually only has an average of 14.5 clients per year, and each guide only guides an average of 5.5 hunters.
- The lowest results are those of South Africa, where an organisation will only have an average of 8.5 hunting clients per year, and each guide has 4.2 clients. This highlights that this is a prestige activity and a hobby, and that these hunting guides and organisations have other sources of revenue besides hunting.
- For the rest of the African countries (except for Namibia), the average is 16.8 hunters and 5.6 hunters per guide. Bearing in mind the costs, these figures are too low for these organisations or guides to be able to make a living from this activity

The following table summarises the number of hunting days per client, the animals shot and the amounts spent:

Country	Number of hunting days per client	Number of animals shot/hunter	Expenditure/hunter $US
South Africa	8.68	6.32	11 723
Namibia	2.9	4.19	5 314
Tanzania	12.39	4.25	16 687
Botswana	15.91	7.14	57 143
Zimbabwe	10.48	6.04	8 538
Zambia		10.06	20 000
Cameroon		5.49	11 429
RCA		4.92	9 333
Ethiopia		6	26 000
Burkina		3.31	3 333
Benin		2.22	4 444

These statistics are doubtless not always in line with the reality (for the amounts spent in particular), but they highlight a particularity of hunting safaris in Namibia : many hunters, for an average of only three days hunting. This is due to the fact that apart from the kudu and the Gemsbok not many other interesting trophy animals are available.

These hunters shot the following animals:

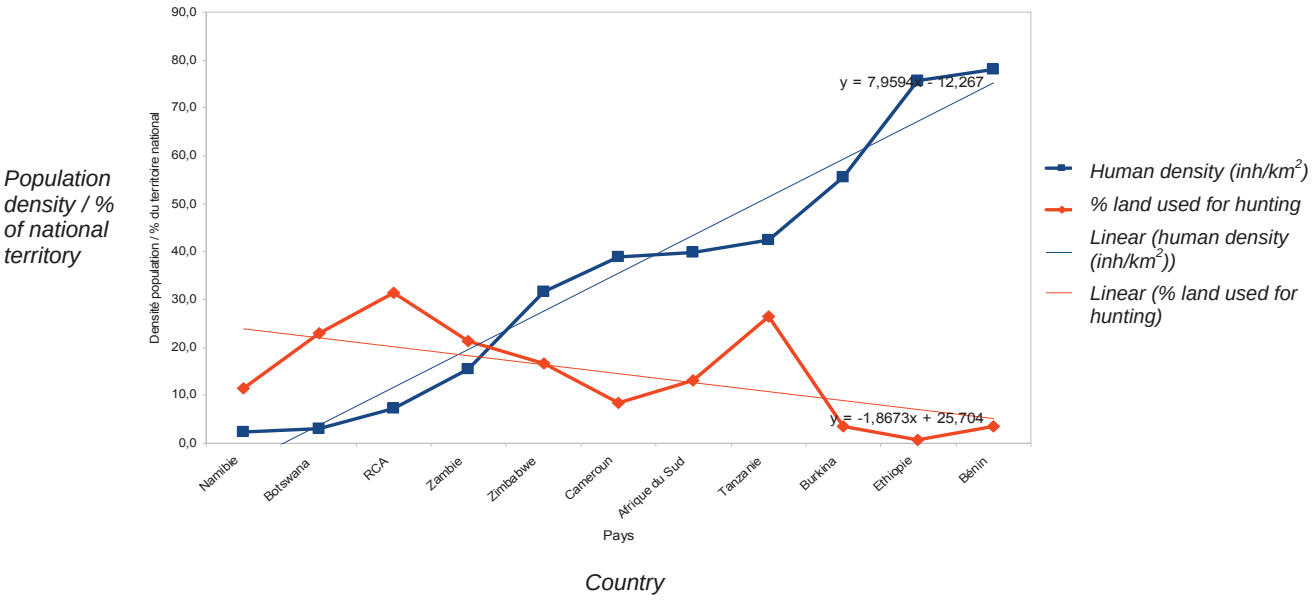
Country	Elephant	Buffalo	Lion	Leopard
Tanzania	35	2000	250	300
Botswana	270	160	0	32
Zambia	0	180	50	
Zimbabwe	243	853	89	303
South Africa	31	179	190	45
Namibia	36	20	7	121
RCA	0	180	2	16
Cameroon	25	80	12	0
Burkina	0	120	12	0
Benin	0	60	2	0
TOTAL	**640**	**3 832**	**614**	**817**

3.2. Big game hunting and demographics

The surface areas required to organise these hunting safaris constitute key data: with demographic growth, available hunting areas are getting smaller. In this section, we looked at hunting areas and other types of protected areas, and both of them together, as shown in the following tables. The surface areas used (in km^2) by big game hunting, the surface areas of other types of protected areas and the human population density are presented in the following table (Lindsey, modified):

Country	Surface Area	Hunting area surface area	% hunting	Surface area other protected areas	% other protected areas	Total % protected areas	Human population Density
South Africa	1 219 912	160 000	13.1	56 500	4.6	17.7	39.8
Namibia	825 418	94 052	11.4	107 125	13	24.4	2.4
Tanzania	945 087	250 000	26.4	134 841	14.1	40.5	42.5
Botswana	581 726	103 451	23	104 120	18	41	3.1
Zimbabwe	390 580	64 945	16.6	49 418	12.7	29.3	31.7
Zambia	752 614	160 488	21.3	59 451	7.9	29.2	15.5
Cameroon	475 440	39 830	8.4	43 000	8.7	17.1	38.8
RCA	622 984	196 035	31.5	68 918	11.1	42.6	7.2
Ethiopia	1 127 127	9 600	0.8	32 403	2.7	3.5	75.6
Burkina	274 200	9 340	3.4	22 000	8.1	11.5	55.7
Benin	112 620	4 000	3.5	8 435	7.5	11.1	78.1
TOTAL	**7 327 708**	**1 091 741**	**14.9**	**686 211**	**9.36**	**24.26**	**33.9**

If we present the curves in relation to human population density and the proportion of hunting areas in a given country, the following graph is obtained:

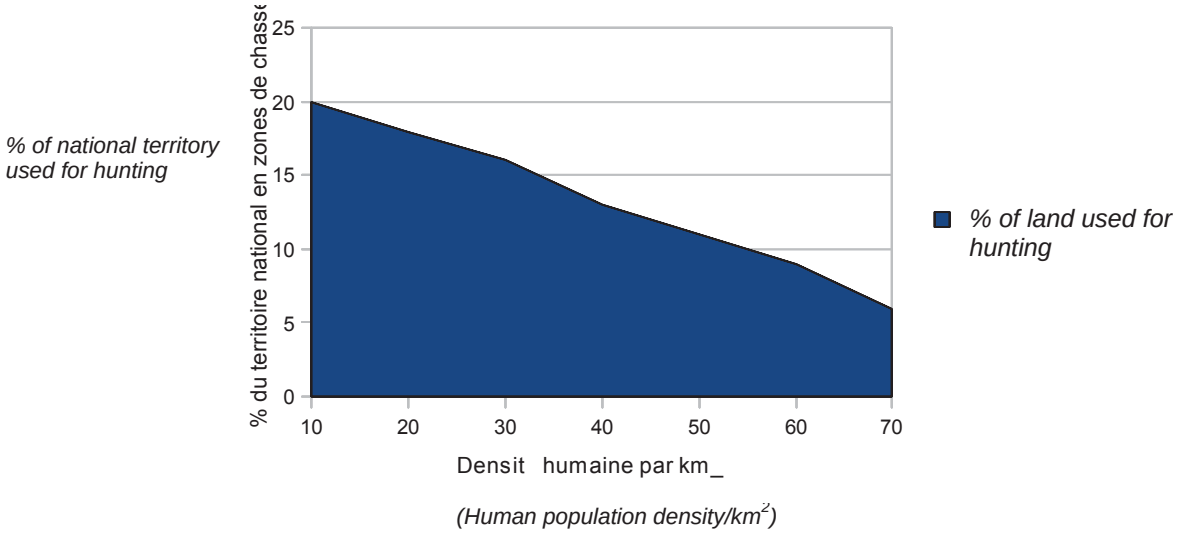


It can be noted that Tanzania has a high proportion of hunting areas compared to its population density, which is probably due to its high surface area.

The trend curves are:

- Population increase: f (x) = 7.96x – 12.27
- Reduction of hunting surface areas: f(x) = -1.87x + 25.7

Presented another way, the following graph shows the highly logical fact that the higher the population, the less room there is for big game hunting areas. This corresponds to the following relationship between population density and existence of hunting areas:
The value of the regression curve is: f(x) = - 2.32 x + 22.57. This gives indicative values of land available for hunting areas as a function of human population density.



We can thus extrapolate that Kenya, which has a current population density of 65 inh/km^2, could only have 7 to 8% of its territory dedicated to hunting if that activity were to be permitted, in other words 43 700 km^2, which is equal to around 20% of hunting areas in Tanzania.
The same estimation would thus give us a turnover of 20% of Tanzania's $US30 million (if quality were equal, which is not necessarily the case), in other words $US6 million, or 0.6% of the turnover Kenya makes

from tourism.

Population density inh/km^2	% of national territory dedicated to hunting areas
10	20
20	18
30	16
40	13
50	11
60	9
70	6

3.3. Big game hunting and Gross Domestic Product (GDP)

An important statistic for development is the Gross Domestic Product (GDP) : absolute, per unit of surface area and per capita. The table below presents the values[37] for the main big game hunting countries (and Kenya, for comparative purposes):

Country	Surface Area	Population	Density	GDP $ billion	GDP/capita in $	GDP/ha $US	GDP/ha CFA F
South Africa	1 219 912	48.5	39.76	255.15	5 384	2091.54	1 045 772
Namibia	825 418	2	2.42	6.31	3 084	76.45	38 223
Tanzania	945 087	40.2	42.54	12.79	335	135.33	67 666
Botswana	581 726	1.8	3.09	10.81	6 869	185.83	92 913
Zimbabwe	390 580	12.38	31.7	5.54	472	141.84	70 920
Zambia	752 614	11.67	15.51	10.94	922	145.36	72 680
Cameroon	475 440	18.47	38.85	18.37	1 002	386.38	193 189
RCA	622 984	4.5	7.22	1.49	355	23.92	11 959
Ethiopia	1 127 127	85.2	75.59	13.31	177	118.09	59 044
Burkina	274 200	15.26	55.65	6.06	451	221.01	110 503
Benin	112 620	8.79	78.05	4.76	625	422.66	211 330
Kenya	582 647	38	65.22	23.19	681	398.01	199 006

If these figures are lined up with those of the hunting sector, the following is obtained:

Country	GDP $ billion	turnover $ million	Contribution of big game hunting to GDP ‰	Proportion of country in hunting area %	Contribution to GDP/capita in $US	Contribution to GDP/capita in FCFA
South Africa	255.15	100	0.39	13.1	2.11	1 055
Namibia	6.31	29	4.52	11.4	13.93	6 965
Tanzania	12.79	27.6	2.16	26.4	0.72	361
Botswana	10.81	20	1.85	23	12.71	6 354
Zimbabwe	5.54	16	2.89	16.6	1.36	682
Zambia	10.94	5	0.46	21.3	0.42	211
Cameroon	18.37	2	0.11	8.4	0.11	55
RCA	1.49	1.4	0.94	31.5	0.33	167
Ethiopia	13.31	1.3	0.10	0.8	0.02	9
Burkina	6.06	1.0	0.17	3.4	0.07	37
Benin	4.76	0.4	0.08	3.6	0.05	26

On average for these 11 countries, the country's surface area taken up by hunting areas is 14.9%, and the contribution of big game hunting to the GDP is 0.59 ‰. These are therefore fairly unproductive hectares for

[37] Source: IMF, 2007, surface area in km², population in millions of inhabitants

these countries. The least productive countries on a per hectare basis are Ethiopia (hunting areas have practically disappeared there), Burkina Faso and Benin (hunting safaris are not expensive there) and Cameroon (hunting areas are under strong pressure from agriculture). Those who do the best are Namibia and Botswana. And yet, Botswana has decided that more value can be had from promoting safari tourism than hunting and closed the Okavango to hunting in 2009.

3.4. Big game hunting and tourism

In parallel to big game hunting, the same wildlife can be used for safaris. Tourism has been growing steadily for the past 20 years and the figures given for some countries by the UNWTO (UN World Tourist Organisation) are as follows for 2007:

Country	Hunting turnover $USmillion	Tourism turnover $USmillion	% hunting in tourism turnover	% country in hunting area	% other protected areas
South Africa	100	8 418	1.19	13.1	4.6
Namibia	29	434	6.57	11.4	13
Tanzania	27.6	1 037	2.66	26.4	14.1
Botswana	20	546	3.66	23	18
Zimbabwe	16	338	4.73	16.6	12.7
Zambia	5	138	3.62	21.3	7.9
Cameroon	2			8.4	8.7
RCA	1.4			31.5	11.1
Ethiopia	1.3	177	0.73	0.8	2.7
Burkina	1.0			3.4	8.1
Benin	0.4			3.5	7.5
Kenya		909			

The turnover from tourism has increased considerably over the past twenty years, and the proportion attributable to hunting, which used to be significant, is now marginal in several countries: 1% in South Africa, 3% in Botswana, Tanzania and Zambia for instance.
At the same time, these four countries dedicate a large proportion of their national territory to big game hunting: 13, 23, 26 and 21% respectively. The ratio is not favourable to the development of big game hunting, which requires additional surface areas to those of other protected areas where most tourism takes place.

The case of Tanzania is interesting, because tourism has risen more there than in the rest of Africa (UNWTO, 2007):

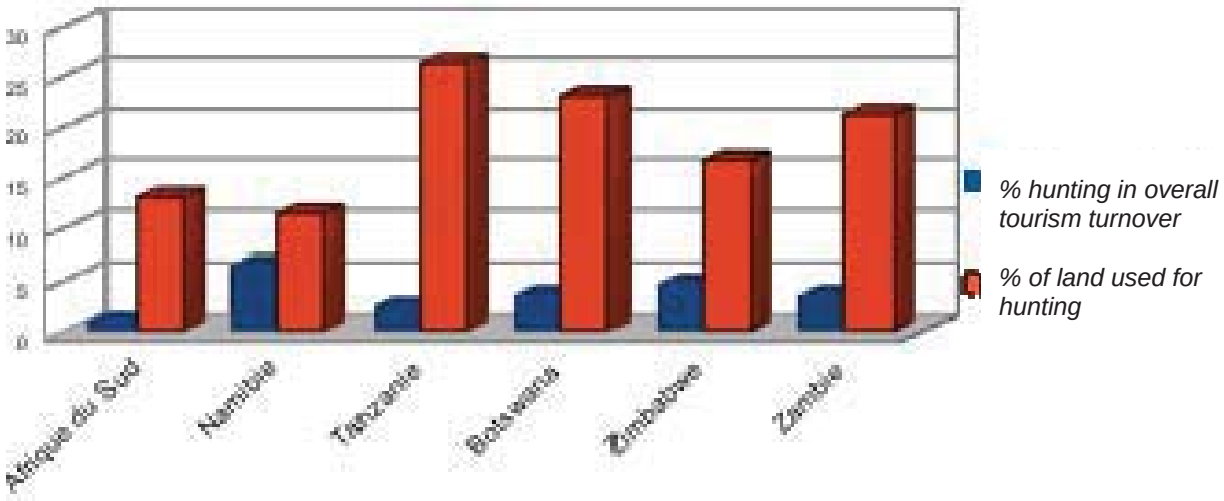
Geographical area	Average annual growth from 1995 to 2000 given as a %	Average annual growth from 2000 to 2010 given as a %
Tanzania	10.0	9.3
Africa	6.0	5.6

In 15 years tourism has changed completely in Tanzania, and there is a real demand to transform hunting areas into safari areas (five safari parks now exist in Selous, and others in Masaïland).

It can be noted that a country like Kenya is approaching $US one billion in tourism turnover (a figure as high as that of Tanzania for tourism) and that the losses mentioned from the closing of hunting in 1977 ($US30 million, SCI 2008) are minimal in comparison. Kenya has therefore benefitted financially by investing in safari tourism and closing hunting, which, in any case, would have diminished due to demographic (65 inh/km²) and agricultural pressures.

The following graph compares the percentages of hunting in the overall turnover for the tourism sector, and the hunting surface areas as a percentage of total national territory. It would appear that hunting requires vast spaces which are not made the most of and that safari tourism is much more profitable in that regard.

The biggest difference (that is to say the lowest profitability) is in Tanzania, while the smallest difference (or highest profitability) is in Namibia.



It can be noted that countries with intermediary values have had negative hunting sector assessments : Zambia (NRFC, 2008) and Botswana (where hunting has been stopped in the Okavango).

3.5. Big game hunting and employment

The number of jobs created by big game hunting is summarised in the table below:

Country	Hunting area surface area in km²	Number of jobs	Number of ha per job
South Africa	160 000	5 500	2 909
Namibia	94 052	2 125	4 426
Tanzania	250 000	4 328	5 776
Botswana	103 451	1 000	10 345
Cameroon	39 830	1 200	3 319
RCA	196 035	670	29 259
Burkina	9 340	280	3 336
Benin	4 000	100	4 000
TOTAL	**856 708**	**15 203**	
Average			**5 635**

The countries with vast hunting areas (RCA, Botswana) create proportionally fewer jobs. The average is around one permanent job for 5 500 ha of hunting area.

In the Okavango, a safari concession of 10 000 ha in which there is a luxury camp of nine tents (18 beds), employs on average 38 people, including five guides and five trackers, i.e. 2.3 permanent jobs per bed[38]. The ratio is therefore one permanent job for 263 ha, as against one per 10 345 ha with hunting. In this case, safari tourism creates 39 times more jobs than big game hunting for equivalent surface areas. This is one of the explanations for the choice to stop hunting in the Okavango (and in five sectors of the Selous in Tanzania).

[38] There are never more than 16 people for 18 beds, as they are all singles

In Zambia, tourism in the Luangwa national park alone (which had 42 000 visitors in 2007) created 800 permanent and temporary jobs in Mfuwe (NRFC, 2008) which is more than RCA[39] where 31.5% of the national territory is dedicated to hunting areas, and double the jobs for the hunting sector in Benin and Burkina Faso together. Furthermore, the tourism sector in Zambia, despite being of average size (176 000 tourists visit for the country's natural environment each year), employs 19 000 people, i.e. more than all the hunting areas in the whole of Africa. With current tourism growth rates, it is expected that in 2010 there will be 30 400 jobs, a turnover of $US304 million (50% more than the annual figure for big game hunting in all Africa), and a contribution to GDP of around 5%: it was 3.1% in 2005.

3.6. Big game hunting and the benefits for local populations

The following figures were taken from documents listed in the bibliography or identified during this study:

- In Zambia, benefits for local communities from all GMAs were, in 2006, 3.6 billion Kwacha, for 170 000 km², i.e. 22% of the country. This sum corresponds to around $US one million. Per hectare, the benefits for the population are $US0.059.
- In Zimbabwe (Campfire), each household receives one to three US dollars per year.
- In Namibia, the figure is slightly different because 56% of revenues come from "joint venture tourism", 22% from hunting. The level of income is higher: $N14 million, which is around $US1.75 million for 10.5 million ha (i.e. $US0.16 /ha).
- In Tanzania: with the current system, 42 district councils received $USfive million for five seasons 2000/1-2004/5 (Kayera, 2005). This corresponds to $US one million per year for 250 000 km², or $US0.04/ha.
- In RCA, the benefits for the communities are 103 million CFA F for 34 714 km² of ZCVs, i.e. 30 CFA F/ha (or $US0.06 /ha).
- In Benin, they are around 35 million CFA F for 3 942 km², i.e. 88 F/ha, or $US0.18 /ha.
- In Burkina Faso, the regular benefits were 34.5 million in 2005 for 9 340 km², i.e. 37 CFA F/ha ($US0.07).

It is difficult to calculate the income per person as there are not usually precise figures for the populations concerned by big game hunting areas. To give a general idea, the following summary table gives the average number of inhabitants per hectare in the country.

Country	Income for local communities per ha in $US	Income for local communities per ha in CFA F	Average number of inhabitants per hectare.
Zambia	0.06	30	0.16
Tanzania	0.04	20	0.43
Namibia	0.16	80	0.02
RCA	0.06	30	0.07
Burkina Faso	0.07	37	0.56
Benin	0.18	88	0.78

The countries in this list whose local communities benefit the least from gains per hectare given over to big game hunting is Tanzania. Those who redistribute the most are Namibia and Benin. In Namibia, where the human population density is 35 times lower than that of Benin the local communities are liable to be better involved in wildlife management.

[39] Where jobs are not completely permanent.

4. ANALYSIS

The data gathered and presented in the first sections of this study are now analysed in order to clarify:

- The conservation value of big game hunting, looking particularly at the conditions in which these results are obtained,
- The social and economic value of big game hunting : these two aspects were examined together as they are closely linked,
- Participation and good governance (including financing).

4.1. Conservation value of big game hunting

Conservation is about preserving current ecological capital or even increasing it. We looked at four indicators, the first is geographical, the second concerns vegetation cover and the last two relate to wildlife biodiversity, one being qualitative, the other quantitative. These indicators are:

- How well hunting area perimeters are preserved: this helps establish the resistance of "hunting areas" to pressure.
- How well vegetation coverage is maintained within hunting areas, that is to say how hunting areas can maintain habitat quality which helps sustain wild animals.
- To what extent the list of animal species present in the hunting area is maintained: are certain species better preserved by hunting area than others?
- Changes in the populations of different wildlife species within the hunting areas.

These indicators are often studied in comparison with a neighbouring protected area where hunting is not allowed (national parks, reserves etc.). Such areas need to be sufficiently well-managed (including surveillance), even if not to the same level as the management of the neighbouring hunting area. Only analogous sites are compared; weighing up an abandoned protected area with a managed hunting area would not give pertinent data.

4.1.1. Preserving hunting area perimeters

Demographic growth, soil degradation, the expansion of cash crops in the context of poverty reduction and the quest for food security are all factors that lead to the expansion of agricultural land, in particular at the expense of protected areas which constitute a veritable stock of land.

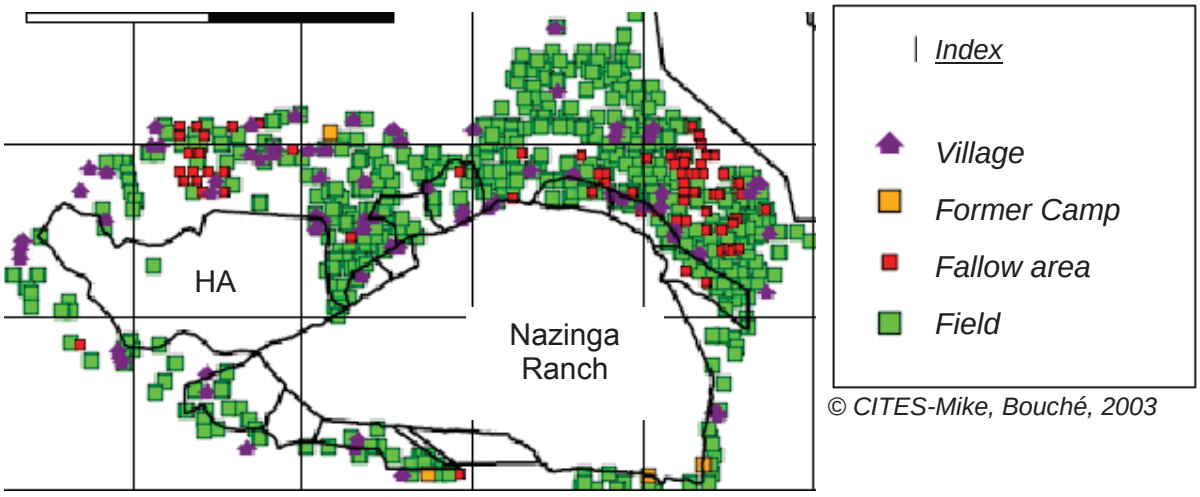
a. Examples

In the more densely populated countries, hunting areas have already disappeared (Nigeria, Malawi[40], Rwanda, Burundi, and the more populated areas of many others) and even national parks are under pressure from farmers. It is difficult to find up-to-date maps of land occupancy but data taken from aerial flyovers during wildlife census taking constitute an excellent basis for study. A few examples illustrating the pressure on hunting areas in the West-African region are given below.

In Burkina Faso, the peripheral area around the Nazinga Ranch, which is actually a state-run safari and hunting area (the only protected area in the country which receives consistent Government attention), is subject to considerable pressure and the different protected areas respond in different ways (Bouché et al.,2003). It can be noted that the ranch itself, under state management, is not colonised by fields, the leased hunting area is slightly colonised by agriculture and the community zones (ZOVIC) are practically entirely farmland and can only be used for small game hunting.

[40] In July 2009 hunting started up again in Malawi on one fenced game farm of a few hundred ha.

Map No. 2: Human pressure on Nazinga Ranch in 2003

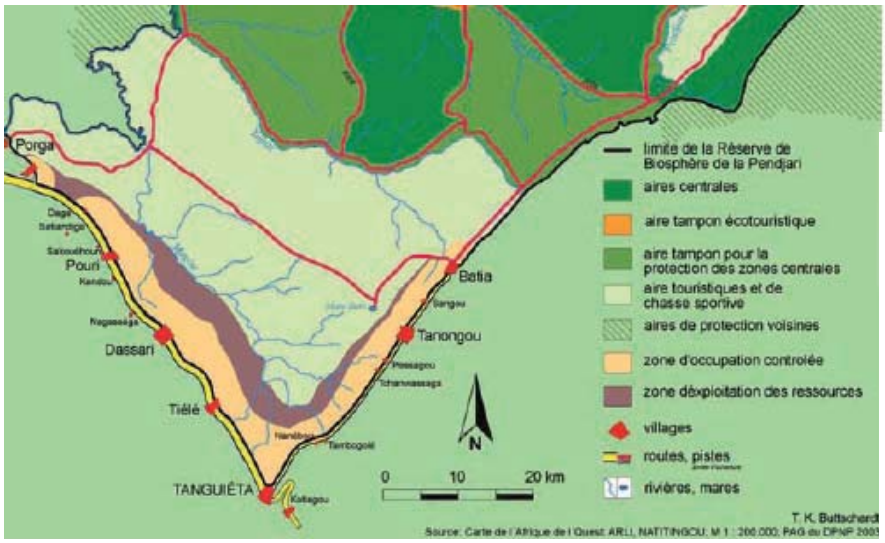


© CITES-Mike, Bouché, 2003

The entire area constitutes a practically isolated wildlife management zone, an island. This situation will be very difficult to change, as ZOVICs only work to preserve the original biotope. Furthermore, local communities regularly complain that they receive few benefits: in this case agriculture will continue to encroach on the peripheral area.

In Benin, the hunting area that borders the Pendjari National Park to the south lies next to villages that have begun to encroach on this land to the south and the east. The managers have therefore created a controlled occupation zone along its edges and an exploitation zone further inside, thus reducing the surface area of the hunting area.

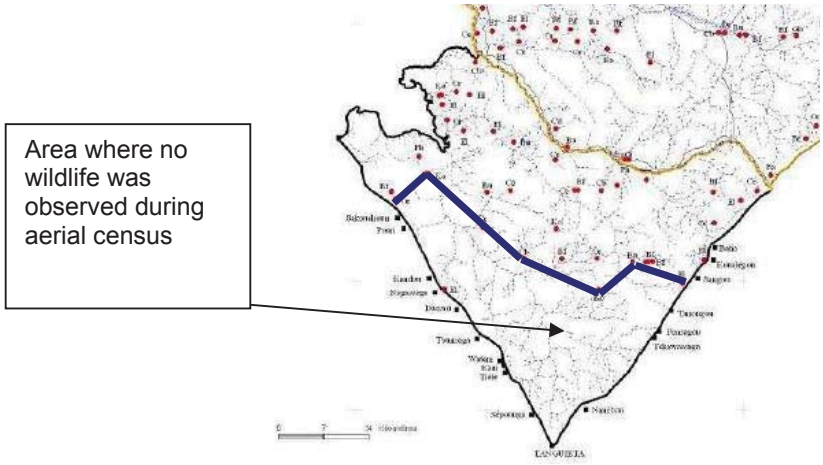
Map No. 3: Internal zoning of Pendjari hunting area



Index: Limits of the Pendjari Biosphere reserve
Central areas
Ecotourism buffer zone
Buffer zone to protect central areas
Tourism and recreational hunting area
Neighbouring protected areas
Area of controlled occupation
Area of resource exploitation
Villages
Roads, tracks
Rivers, watering holes

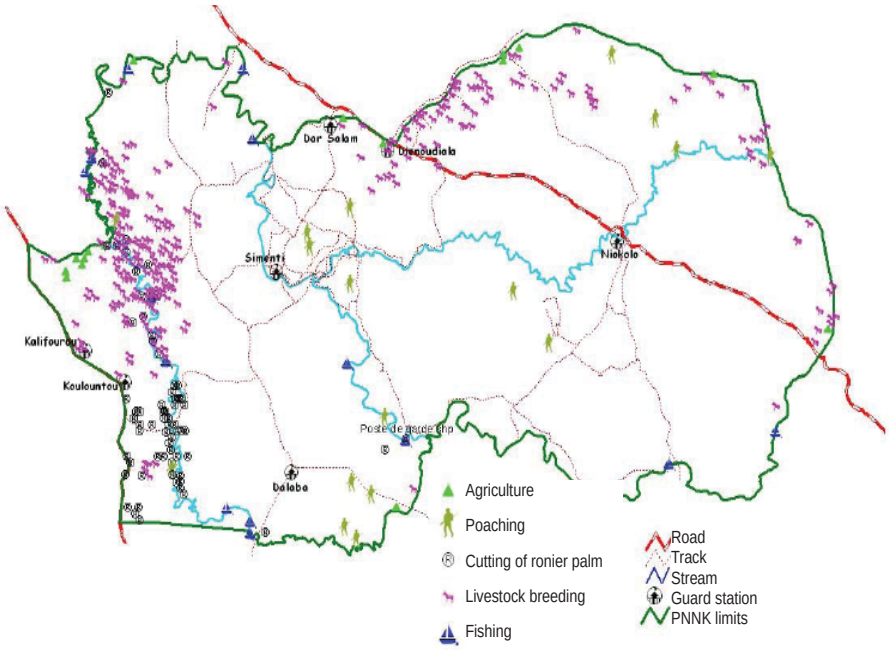
Observations made during the census of 2006 show that the negative influence of humans on the animals can be felt well beyond the area that is cultivated and used.

Map No. 4: Distribution of wildlife during 2006 aerial census (Pendjari Hunting area)



This area of human influence extends beyond the permanent settlements and fields and is clearly visible on the 2006 aerial census of the Niokolo Koba National Park in Senegal:

Map No. 5: Distribution of human activities in Niokolo Koba National Park (May 2006)

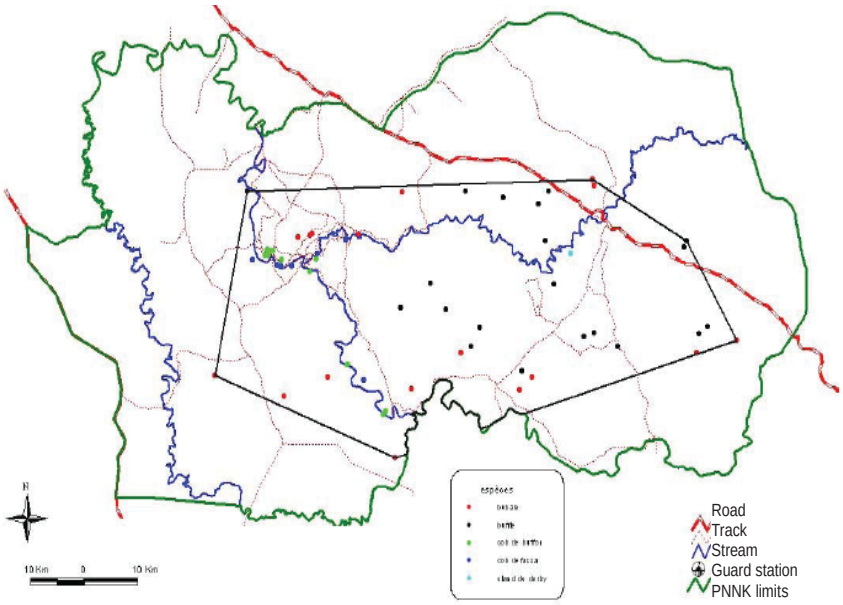


©MEPN, AP, PC. Renaud

The map of illegal human activities shows the lack of fields, apart from a small enclave of farmland to the west, but there are temporary human activities (livestock grazing etc.). The map of the distribution of wildlife (excluding antelope) shows a concentration in the centre of the park, far from pressure, in a polygon of 3000 km^2, representing around one third of the park. In this case the type of management means that the buffer zone is inside the park when it should be outside: there is no peripheral zone but the National Park's boundaries remain intact and wildlife density is graduated within the park.

More to the east of this National Park is the Falémé ZIC of which two thirds is now colonised by people. This ZIC, managed without a lease and without investment has resisted less well than the national park.

Map No. 6: Distribution of big animals (except antelope) in the KKNP: Minimal convex polygon (with 100% of the points)



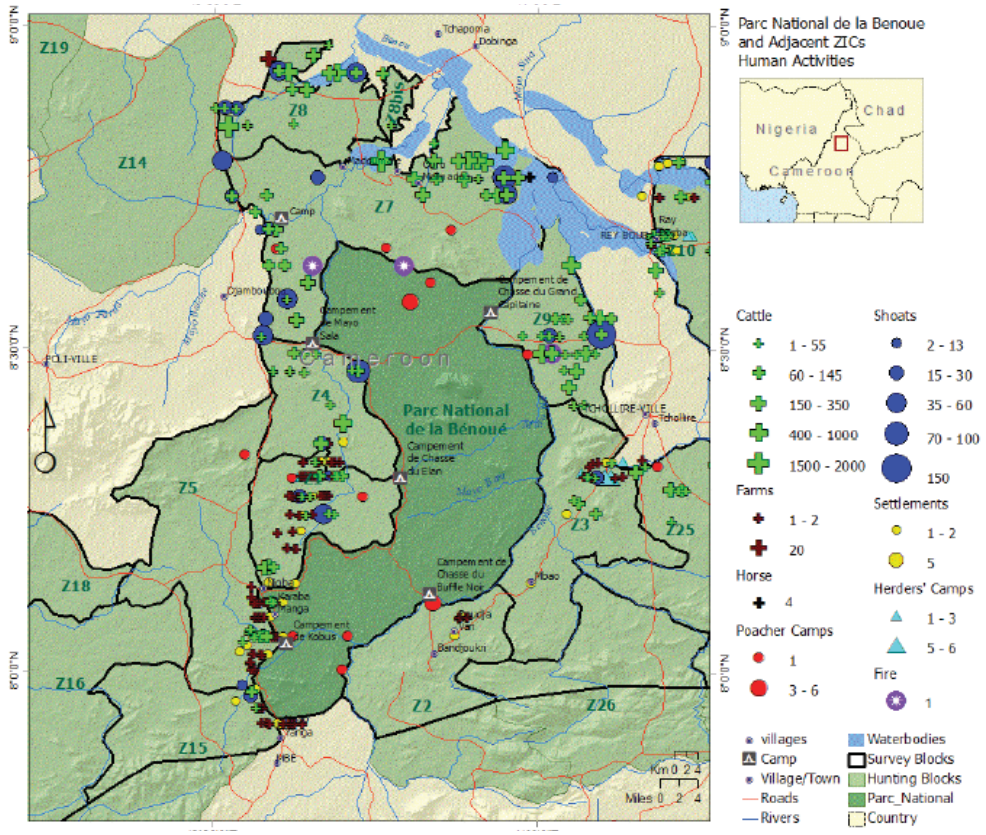
©MEPN, AP, PC. Renaud

This illustrates the importance for national parks to have a peripheral zone that can guarantee preservation of the entire national park area from the influence of human activities. These results were confirmed by Caro (1998) in Tanzania: the animal distribution factor is correlated to the lack of human settlement. In central Africa, the distribution of forest elephants is linked to the lack of roads (Blake, 2007).

In Niger, the Tamou reserve, to the north of W Park is now three quarters colonised by agriculture, illustrating the fact that a weaker protection status than that of national park (category II) has less resistance to pressure. The neighbouring hunting area in Burkina Faso is largely colonised by agriculture, while the national park is not (aerial flyover, Mike, 2003).

The following map of the central part of the Northern region of Cameroon (May 2008) clearly shows that hunting areas are more colonised than the Benoue national park, which is, however, weakly protected. National park status (under government authority) is therefore also better respected here than that of hunting areas, despite the latter being leased and active.

Map No. 7: Illegal human activity around the Benoue National Park



© *WWF/FFEM/Minfof*

Around the neighbouring national park of Boubandjida, two adjacent active hunting areas contain almost 50 inhabitants per km² and more than half of the surface area of one of them is farmland. A third zone further to the west has practically no more large animals. The national park itself is not affected.

In Chad, in unsafe areas linked to the socio-political situation, hunting areas of the Aouk domain have resisted less well than Zakouma National Park, which is still very rich in wildlife, while the domain is practically empty, invaded by cultivated fields to the west and by livestock in the centre and east.

In Zambia, we saw that the surface area of GMAs diminished under pressure from human activity. The same can be said for certain areas of Tanzania that are more exposed to demographic impacts and agriculture (Baldus, 2004).

b. Remarks

In practically all the countries, hunting areas are colonised before national parks. This is not only because they are on the periphery of the parks: in Cameroun they are not, nor are they in Zambia or in certain areas of Tanzania. One of the key problems is probably that for wildlife, human influence can be felt well beyond the borders of human settlements. If wildlife density diminishes, the private leaseholder also lowers development expenditure so as not to lose too much money, thus giving free range to human expansion.

The status of national park would appear to be well respected everywhere, even when the park is virtually abandoned by the government. The status of “government land” is certainly a factor, which is not the case for a hunting area which “seems to belong to a foreigner”.

The administrations in charge of wildlife have few data on the state of agricultural encroachment into hunting areas. This can also be explained by the fact that hunting areas are often leased by the hectare and

recognising a reduction in surface area would mean lowering the income for the government.

It can be noted that where the percentage of hunting areas in relation to the national territory is reasonable (e.g. in Benin and Burkina Faso, with 3.5%), the hunting areas seem more stable and less under threat. But it must be recognised that there are only 4 000 km^2 of hunting area left in Benin and that it is not possible to create more as all the land is occupied. In this case, a phenomenon of intensification of agriculture on cultivable land can be noted, which exerts an influence from afar on wildlife densities and distribution. Therefore, in the east of Burkina, agriculture is intensifying more on the eastern border of the hunting area block than on its western edge and the wildlife densities are also lower there.

This is probably an indication that immense hunting areas (representing 10 or 20% of a country) are difficult to manage. The private sector has difficulty in finding solutions to respond to this pressure, as it must turn a profit.

It can be noted that in countries where pressure is highest, wildlife has only really been preserved in national parks (or similar such reserves). In West Africa this is the case for Senegal, Ivory Coast, Ghana, Togo, Niger and Nigeria. In certain countries that have not set up "effective" wildlife conservation zones, wildlife is under serious threat: Mauritania, Gambia, Guinea Bissau, Guinea. In Central Africa, this is also the case for the far North of Cameroon, for Chad, DR Congo and the northern part of the Sudan, where wildlife only exists in national parks. In East Africa this is the case for Uganda, Rwanda, Burundi and to a lesser extent Kenya and Ethiopia. In Southern Africa it is the case for Malawi and Swaziland and to a lesser extent Angola.

It can be noted that it is also the case for the major part of South-East Asia, where the same significant pressure has been exerted for longer and where big game hunting disappeared around fifty years ago.

4.1.2. Maintaining vegetation cover within hunting areas

Vegetation cover within hunting areas is mainly subject to three types of pressure:

- Woodcutting for construction and energy. The socio-economic importance of wood as an energy source must be emphasised: in Benin, it generates direct annual revenues of 70 000 CFA F/year as against 140 CFA F per person (in fact for the community) generated by big game hunting (cf. section on Benin). As it is a profitable activity and easy to export from the rural sector to the urban sector, the production of firewood uses up vast natural areas. In Tanzania, it is estimated that charcoal production[41] destroys 330 000 ha of forest per year (Tanzania Association of Oil Marketing Companies, 2002), in other words, an annual rate of loss of 0.73% of forests per year. The annual consumption per person is estimated at 160 kg/year, and seven kg of greenwood are needed to make one kg of charcoal. 73% of Tanzanians use charcoal as their only domestic energy source, and 94% use it as a mixed source. The use of forest products represents 10 to 15% of the GDP of Tanzania: big game hunting only counts for 2 ‰ while taking up 26% of the land. The *Miombo* zones (rich in *Brachystegia sp.* and *Julbernardia sp.*) are particularly concerned.

  In Zambia, it is estimated that charcoal creates 42 000 full time jobs in rural areas and 4 500 more for sale and transport. Charcoal represents 43% of domestic energy in Zambia (S.H. Hibajehe).

- Wood cutting by livestock farmers. Livestock breeders prune trees, cutting down the high branches of trees that make good fodder (for example acacias) to bring them within the reach of the animals. When practiced too intensely, this can kill the trees and initiate a phenomenon of reduction in vegetation cover. Therefore, livestock do not only have a direct impact on wildlife, but also degrade their habitat.

- Chopping down of trees and the use of fire to create new farmland. The demand for new agricultural land is considerable and the direct return for the producer are relatively large (around 150 000 CFA F/ha for the West African or Ugandan farmer) which makes it a much more profitable use for the land than big game hunting (30 to 88 CFA F/ha, this study). Therefore farmers have much incentive to "eat into" hunting areas. The lower the proportion of GDP that comes from big game hunting, and the higher the country's per capita GDP, the more this phenomenon can be seen. This is the case for

[41] Charcoal production is even more harmful for vegetation cover than the collection of firewood, as it requires greenwood.

Cameroon where hunting only represents 0.1 ‰ but where the GDP/capita is around 500 000 CFA F. Furthermore, this figure is close to that of agricultural revenues on the periphery of Boubajdjida national park (475 470 CFA F, Terdel). This confirms that hunting revenues are not enough to discourage the encroachment of farmland.

In this context, a joint study by the World Bank and the FAO (June 2009) recommends transforming 400 million hectares of African savannahs into farmland: only 10% of this surface area is currently exploited[42]. It is therefore a real threat to hunting areas, and has already considerably and insidiously reduced their surface areas and their hunting potential and it is not going to get any less in the future. Of course, not all hunting area land is suitable for agriculture, but the low-lands which are indispensable to wildlife and thus to hunting are, and will be colonised first. It is therefore highly likely that the 140 million hectares currently used for big game hunting will be included in the 400 million hectares targeted for farming.

This agricultural development model is the same as has been seen in Asia, where hunting areas have disappeared and where national parks, with some rare exceptions, have shrunk.

It should also be noted that the current fiscal regime, which consists for the government in taxing hunting areas (often without fulfilling its regulatory role) through a range of taxes which reduce both the income for the private sector and the local communities, does not apply to agricultural land. Farmers are rarely taxed in any African country. Therefore rural dwellers have a marked interest in transforming hunting areas into farmland, not only for their own income, but also to evade taxation. This fiscal regime which taxes natural resources is inconsistent with current global environmental policy.
The degradation of vegetation cover in a hunting area would appear to herald agricultural installation. This is the beginning of a cycle which leads to diminished wildlife densities, diminished profitability for the hunting operator and reduced development of the richer zones, to the extent that the hunting area may even prey on a neighbouring protected area because the wildlife populations are higher there.

4.1.3. Conservation of the list of animal species present in hunting areas

This indicator concerns the changes in the list of species present in the hunting area : in other terms is the list getting longer or shorter with conservation efforts (hunting area management in the current case) ? It is therefore a matter of studying the specific wildlife wealth of the areas concerned.

In countries where big game hunting has disappeared, the finding is simple: the list has shortened drastically in hunting areas. However, this is not necessarily significant because the conditions that have prevailed to lead to the lack of a hunting area are not necessarily the same everywhere. It is interesting to compare lists within the same country, between hunting areas and national parks. The main indications in this field often come from censuses and are therefore subject to the biases or shortcomings of the data collection method.

There must not be many cases where the specific wealth of hunting areas is greater than that of national parks, for the simple reason that protected areas are often created to save a species. Game farming in South Africa has played a role in saving the white rhinoceros and the bontebok, but this is a very specific case for hunting areas. In West Africa, the case of elephants in Senegal can be noted, non-existent in the ZIC of Falémé but probably still present (although on the verge of extinction) in the Niokolo Koba national park. In East Africa there is the case of the Ngorongoro (with a status similar to that of a total reserve with usage rights) which has been able to conserve its black rhinoceros while the neighbouring hunting areas have none left.

The relative specific wealth between a national park and an adjacent hunting area can also be considered when a species uses the national park more than the hunting area, for instance in the case of sporadic or seasonal use (spatial-temporal variability). For instance, this is the case of the hartebeest in West Africa, which is more abundant in Pendjari National Park than in surrounding hunting areas. In this case, the National Park is indispensable to the survival of the species, while the hunting areas only make an additional contribution to its conservation. This is fairly logical because in a large number of cases, the hunting areas constitute the periphery of the national park, which is the centre of an overall conservation block.

While uncontrolled hunting outside hunting areas has destroyed animal populations, it does not appear that there are any examples of a managed hunting area having caused a species to disappear locally, which is a

[42] www.fao.org/news/story/fr/item/21022/icode/

strong point for this activity.

In the context of relative specific wealth, the most interesting case is that of lions. Indeed, to ensure their survival lions need prey to feed on, and not to be killed by local inhabitants who do not want them there (they kill humans and livestock, and economic gains are too low). As the influence of agricultural areas encroaches into protected areas, the areas located on the periphery of a block have a lower wildlife density and a higher number of human-lion conflicts. The lion population is therefore more at risk, which can be expressed by saying that it is less well conserved in the long term.

A reputed author specialising in the study of the relationship between lions and hunting (J. Anderson, ICS consulting, 2009) even recently suggested that lions will soon not exist outside national parks. Even if there are many areas where lions are noted outside national parks, it must be recognised that their density is usually low or very low, and that the viability of the populations in these areas is often not guaranteed.

Examination of the range of species shows that there is not a great difference in lists between managed areas with or without hunting (on the condition that they are managed), but suggests the idea of a lower spatial-temporal efficiency. This supports a policy where hunting areas are linked to national parks which constitute the heart of the conservation strategy.

4.1.4. Changes in numbers of the main large animal species

a. Context

The population numbers for the main large animal species are known mainly through wildlife census taking. Unfortunately, censuses are often carried out irregularly if at all, or using unreliable methods or else are poorly carried out. For this study, we preferred to look at the figures produced by aerial methods which are the least biased: total approaches, without sampling biases, without interference with the animal observed, low cost for large animals such as those we are looking at, and which provide data for the main hunted species (the counting of carnivores requires other specific methods). The aerial methods used by an experienced team of four people are well adapted, depending on the seasons, to areas with annual rainfalls of less than 1 200 mm, which corresponds to the majority of savannah hunting areas.

The majority of the countries do not carry out aerial censuses, or else do so at irregular intervals and altering the methods used (total, sampling), the parameters or the team etc. Therefore it is often difficult to make comparisons. The sampling rates are often too low (less than 12 to 15%) to be representative due to the often modest animal densities in certain areas. Some countries that lease their hunting areas to concession holders do not comply with specifications and do not carry out the counts needed to provide a high-quality indicator of concession management performance. The data are therefore often difficult to obtain and even more difficult to interpret.

b. Examples

- Benin

The Pendjari areas are practically the only ones to benefit from aerial censuses (by sampling) every two years covering the national park and the three adjacent hunting areas. We noted (cf. section on Benin) that the national park is two to seven times richer in wildlife than the neighbouring hunting areas. In the context of strict protection, hunting area status is therefore less effective than that of national park. The same phenomenon can be noted if we compare the two hunting areas of Burkina Faso that border the national park (and entirely share its ecosystem, the national park being on the left bank of the river which is nothing more than a series of ponds in the dry season, the hunting areas on the right bank): the total census of the ecosystem carried out in 2003 (Bouché et al., MIKE), showed that the total densities of five large species of the national park were 1.5 times higher than the hunting area of Benin and four times higher than the hunting areas of Burkina Faso.

- Burkina Faso

In recent years, only the total census of 2003 (Bouché et al., MIKE) has been carried out. If we stick to the comparison of hunting areas that are adjacent to a national park:

- The hunting areas which neighbour W Park are three to seven times poorer in wildlife than

the national park,
- The hunting areas which touch Arly National Park are on average half as rich as the park.

Sector	Density/km^2
Arly Park	1.25
6 hunting areas Singou	1.68
Pendjari Park	1.98

It is interesting to note that the block (526 000 ha) made up of the six hunting areas of the Singou valley (one of the blocks there is exploited despite being officially classified as a total reserve) presents a remarkable wealth of large species with an intermediary density between that of Arly national park and that of Pendjari national park.

- Cameroon

In Cameroon, in May 2008, an aerial census was taken of almost all the savannah areas (North and part of the Adamaoua), which makes data comparison possible; The principle of total census was applied, but using a methodology which led to a considerable underestimation of the densities.

The census focused on 26 sectors: three national parks and 23 hunting areas. By descending order of density of the five largest species, the national parks are in 3rd, 8th and 15th position. It can be noted that Faro national park (15th) has never been monitored or developed, unlike the other two zones. The average density of the three national parks is 0.45 while that of the hunting areas is 0.24, in other words around half. If we only consider the two developed national parks, only two areas have a density higher than their average.

- Republic of Central Africa

The latest census of a large part of the Northern region where savannah safaris take place was carried out in 2005. A sampling method was used and three sectors were covered at the realistic rate of 16%, and on only one type of area at a time: the Manovo Gounda St Floris National Park, the Vassako Bolo total reserve and the rhino triangle which is a big game hunting sector.

We saw the results in the section on RCA, here is a recap of the main trends:
- Out of ten species considered, the hunting areas show a better evolution (1985 to 2005) than national parks for three species only: the Hartebeest, the giraffe and the Defassa Waterbuck. However, for the latter two, the populations are virtually nil, as in national parks: it is only that they had fewer of these two species than the parks in the first place.
    - As for the densities noted for these ten species, the hunting areas only have better densities for two species, the buffalo (but the density observed results from just one census) and the hartebeest: for this species the densities are close to those of Manovo (0.16 and 0.14 animals per km^2) and relatively low.

In total, and despite the fact that surveillance of national parks has been sporadic or insignificant, they have stood up well to pressure (at least until recently). Their overall performance is higher than that of hunting areas – where there is surveillance – (the epicentre of the Central African Wildlife Protection Association, APFC, which is very active in combating poaching is located in the rhino sector) except for buffalo.

The system of surveillance set in place in the hunting areas has not proven to be effective[43] and this was highlighted both in the 2008 assessment (Roulet, 2008) and in the specialist press (poaching of buffalo and other animals, *Voyages de Chasse* No. 18, 2009, *African Indaba* No. 7-3, 2009). This is also shown by the work of the IGF (2007) which revealed low abundance indexes in hunting areas, thus confirming the very low residual densities.

- East Africa

There is little ecological monitoring of hunting areas and the data are too fragmented to be able to be examined globally. However, it can be noted that for the Selous reserve, which is the largest big game hunting area in Africa, some important information has been provided:

[43] The limitations of village-led surveillance are well known. In Asia, where pressure is much higher, a national park such as that of Chitwan in Nepal, one of the bastions of the Indian rhinoceros, has one surveillance agent per km², including 800 soldiers. It has a surface area of 932 km² and 408 rhinos. The per-hectare budget is $US17 (Esmond Martin, 2009).

- The 2006 census showed a significant reduction in the populations of buffalo, hippopotamus, gnus and impalas since 2002 (UNESCO, National Commission of Tanzania, 2007).
- DNA analysis of the ivory seized in 2006 in Hong Kong and Taiwan showed that it came from Selous (Wasser & al., Scientific American, 2009). The same is probably the case for the ivory seized in Vietnam in March 2009 which had come from Dar Es Salam.
- Baldus estimated in 2005 that the rate at which lions were being killed by big game hunting was not sustainable.

This would seem to indicate that the current management of Selous reserve is not as effective as expected. This confirms the declaration of two hunting guides in Selous reserve, Ryan Wienand and Anton Turner, who have just transformed their hunting area in the Selous into a zone for safaris[44]: "*Big game hunting, in terms of conservation does not work* "[45]. This zone is managed like others in Botswana or in Kenya in the context of a modern conservation vision based on luxury tourism and local communities[46]. Their area is therefore the fifth one in Selous to be used for safaris and not for hunting any more.

Furthermore, studies by Caro (1998) have shown that the presence of hunting guides did not do much to limit poaching because their presence is too temporary: surveillance is active during the few months of the hunting season, and much lower afterwards. Therefore poachers just need to wait for the hunters to leave. As a result, hunting areas are much less effective for conservation than national parks and a certain number of species actually diminish. This is not the case in managed national parks and more generally anywhere there are men in uniform.

4.2. Socio-economic value of big game hunting

To specify the economic contribution of big game hunting following the assessment presented above, we retained the following indicators:

- Gains for the private sector: absolute value, proportion of GDP, estimation of profits,
- Gains for local communities,
- Gains for government: absolute value, proportion of national budget.

The social value is more difficult to estimate and we retained the number of jobs created as the indicator.

The statistics for the 11 countries were used (cf. the description of the big game hunting sector), and the summary of the data is presented in the table below:

11 Big game hunting countries	Total Surface area km²	Surface area hunting areas km²	% of territory that is hunting area	Surface area other protected areas km²	% of territory that is other protected areas	Total % all protected areas	Human population density (inh/km²)
Total/average	7 327 708	1 091 741	14.9	686 211	9.4	24.3	34

The average economic characteristics of these countries are as follows:

11 Big game hunting countries	Surface area (km²)	Population (million h)	Density (inh/km²)	GDP billion $US	GDP/c in $US	GDP/ha in $US	GDP/ha in CFA F
Total/average	7 327 708	248.77	34	345.53	1 389	471.5	235 769

[44] They now rent their hunting camp at $US6 700 per night for safaris.
[45] www.travelafricamag.com/content/view/1523/144/ et www.selousproject.com
[46] www.greatplainsconservation.com

4.2.1. Private Sector Turnover

Overall, the big game hunting sector in Sub-Saharan Africa makes a turnover of around $US200 million/year (SCI, 2007), in other words a contribution to the GDP of these 11 countries of 0.58‰, using 14.9% of the land. The turnover per country is as follows:

Country	Hunting turnover $USmillion	Hunting area Surface Area km^2	Turnover/ha in $US
South Africa	100	160 000	6.25
Namibia	29	94 052	3.03
Tanzania	27.6	250 000	1.1
Botswana	20	103 451	1.93
Zimbabwe	16	64 945	4.46
Zambia	5	160 488	0.31
Cameroon	2	39 830	0.5
RCA	1.4	196 035	0.07
Ethiopia	1.3	9 600	1.35
Burkina	1.0	9 340	1.07
Benin	0.4	4 000	1
TOTAL/Average	**203**	**1 091 741**	**1.86**
TOT/A without South Africa	*103*	*931 741*	*1.11*

The turnover per ha for big game hunting is around $US1.86 if we include South Africa, and without this country, for the ten other countries it is $US1.11/ha, which corresponds to the figures for Tanzania or Burkina Faso.

It should be noted that the cost of development/surveillance of one hectare of protected area (excluding tourism operating costs) can be estimated at around €1.5/ha (IUCN-PAPACO, 2009) i.e. $US2 or 1 000 CFA F per hectare. Therefore, with this turnover per hectare ($US1.1) proper development and surveillance of these areas cannot be assured under the current hunting area system (which uses a large proportion of its budget for tourism operation).

This figure remains very low with regard to the surface areas used and it is easier to understand why hunting areas cannot resist agricultural encroachment or firewood/charcoal production which make a much greater turnover: 500 times more according to the calculation of the GDP/ha, and around 300 to 600 times more when the potential agricultural income per hectare is considered.

This is all the more the case the higher the total percentage of protected areas in the country: it is difficult for a country to classify 24.3% of its land area (the average of the 11 countries) as protected areas and hunting areas, while international recommendations are for 12%. In Burkina Faso and Benin, the agricultural areas seem to have stabilised around the hunting areas with total protected areas of 11.5% of which 3.5% are hunting areas.

Country	Contribution of big game hunting to GDP ‰	Proportion of national territory in hunting area ‰
South Africa	0.39	131
Namibia	4.52	114
Tanzania	2.16	264
Botswana	1.85	230
Zimbabwe	2.89	166
Zambia	0.46	213
Cameroon	0.11	84
RCA	0.94	315
Ethiopia	0.10	8
Burkina	0.17	34
Benin	0.08	36
Average	0.59	149

The economic calculation would seem to indicate that the average of the protected areas of these 11

countries being 9.4% of the land area, it will be difficult to really conserve a further 14.9% as hunting areas. The “ideal” figure would only be around 2.6% in hunting areas, i.e. 190 000 km² classified as hunting areas to remain at around 12% in total.

The overall contribution of hunting to the GDP of these countries is very low: it is 0.06% on average, for 15% occupation of the national territory. Economically speaking it is therefore a marginal activity but one which consumes a high amount of space.

To conclude, let us reiterate the fact that Kenya, which outlawed hunting in 1977, now makes 15% of its GDP from tourism.

4.2.2. Revenues for local communities

The revenues for the local communities come from two main sources (there are also donations in kind, meat distribution etc.):

- The sums received directly (% of taxes, % of turnover),
- Salaries.

The data concerning the amounts received are fragmented and do not usually include the number of people who share that amount. The data gathered are as follows:

Country	Revenues for communities/ha $US	Revenues for communities/ha FCFA	Average number of inhabitants/ha in the country
Zambia	0.06	30	0.16
Tanzania	0.04	20	0.43
Namibia	0.16	80	0.02
RCA	0.06	30	0.07
Burkina	0.07	37	0.56
Benin	0.18	88	0.78
Average	**0.095**	**45.5**	**0.34**

On average, big game hunting distributes $US0.1 per hectare of potential village land classified in hunting area. Again on average, each inhabitant can therefore hope to receive $US0.3 per year (i.e. 150 CFA F/year). Again, it should be emphasised that this money does not always reach those for whom it is destined (cf. section on governance) and that it is usually used for community actions.

In Zimbabwe, the figures on gains from the Campfire programme are not available per hectare, due to the different uses made of them, but they are low: on average $US one million/year for the whole of the country, i.e. $US1-3/year/household (i.e. the same figure of $US0.1 – 0.3/person/year calculated above, each household containing around ten people (Campbell, 2000).

Such low gains are not motivating for the local communities. Therefore, they tend not to respect the hunting areas and poach. The informal bush meat sector is much more profitable. The poachers are therefore the primary beneficiaries of the wildlife sector:

- In Ghana, where big game hunting is just beginning, the bush meat trade makes an annual turnover of $US250 million (Conservation International, 2005),
- In Ivory Coast, where there is no more hunting, 74 000 tonnes of game are consumed per year (at the price of $US2/kg), which corresponds to an annual turnover of $US148 million,
- This phenomenon was also highlighted in Tanzania (Kideghesho, Morogoro University, 2008).

4.2.3. Government revenues

Government revenues come from the different taxes on the hunting areas, the licences and trophy fees. The data here are also often partial, but it was possible to obtain them for the following countries:

Country	Govt. Revenues $USmillion	Govt. Revenues/ha $USmillion	Proportion of national budget (‰)	Proportion of national territory (%)
Tanzania	10.00	0.40	3.30	26.4
Burkina Faso	0.52	0.50	0.23	3.4
Benin	0.16	0.41	0.06	3.6
RCA	0.55	0.01	1.50	31.5
Cameroon	2.00	0.50	0.44	8.4

On average, the contribution to the government budget for each percentage point of land classified as hunting area is 0.6 per ten thousand. It is therefore a negligible contribution. Except in RCA (where the revenues for the government are extremely low), the average is $US0.45/ha. The following comments can be made regarding these figures:

- This cost is around a quarter of that necessary to develop and manage one hectare of protected area. Therefore, with this level of taxation the government alone cannot carry the cost of development or surveillance. It should also be noted that in most of these countries these sums are not directly used to manage protected areas, but return to the general budget of the state.

- The principle of taxing natural resources is a concept that has become outdated. Today, governments are moving more towards tax breaks or subsidies for environmental protection. The taxation systems set up before independence should be reviewed in the light of forest and river basin preservation to make the most of modern financing tools (self development, carbon sinks, promotion of catchments etc.)

- In the majority of the countries in Africa, farmers do not usually pay taxes on the land they use (livestock breeding, agriculture). In the case of big game hunting, the government takes $US0.45/ha. It is therefore a tax that is in fact borne by the local communities, which cannot incite them to look favourably upon big game hunting!

4.2.4. Number of jobs created

In this field, the figures are also difficult to find. Furthermore, a lack of precision arises from the fact that hunting is a seasonal activity in most countries, generally during the dry season, i.e. for fewer than six months per year. Jobs lasting six months are often presented as permanent because they last for the whole hunting season. So jobs lasting a few weeks, for instance to open the trails at the beginning of the season, are presented as temporary.

In reality, the really permanent jobs are those of the managers and surveillance staff (when it is carried out all year, which is far from the norm). We saw that 15 200 permanent jobs are created in eight countries for 856 000 km² (i.e. 16.5% of the total surface area of these eight countries). The total population of these eight countries being 140 million inhabitants, this land only provides jobs for one person per 10 000 inhabitants. Hunting is therefore a very marginal employer.

It will be recalled, by way of comparison, that a luxury safari concession of 10 000 ha with a single camp employs almost 40 times more people than 10 000 hectares of big game hunting!

In social terms, hunting offers few jobs and these are often precarious and, it offers little economic gain. It would therefore appear that hunting, at least in its current configuration, does not play a significant developmental role. Some people even say that it hinders development, as highlighted in the NRCF study (2008) in Zambia. The large areas monopolised by the big game hunting sector, for the proportion over the 12% of protected areas recommended per country for conservation, multiply the magnitude of this effect on

development, without any real gain for conservation.

4.2.5. Social right to exist: for hunting and hunting areas

The concept of a social right to exist as seen by Westerners applies to the right to kill (Dickson, Hutton, Adams, Dublin, 2009). As seen by the local communities living around protected areas and hunting areas, the problem is different "*do protected areas/hunting areas have the right to exist on our land?*". The status of national park is "fairly" well accepted across Africa, as it is linked with the status of government land. In French-speaking Africa this is clearly visible when considering the "agricultural encroachment" indicator: monitored national parks are not colonised, unlike hunting areas, and national parks without surveillance (or that are "abandoned") are only marginally colonised (on their edges) while hunting areas may even disappear entirely.

The perception of local communities is often the following: "*why do they take away our right to use the land to give it away without involving us in the decision to do it or in the way it is attributed* (cf. governance), *to strangers* (to the country or to the region)?"

In practice, the local communities tolerate this decision to lose their right of use, but once pressure increases and they feel the need to use one or other of the resources, they will gradually take them back, regardless of central government directives. The hunting area is thus used as pastoral or agricultural land, a source of wood and non-wood products and for poaching[47].

In the Pendjari hunting area in Benin, the gathering of firewood is a significant source of income for the surrounding population: "*with an average annual income of 69 795 CFA F, it procures more revenues than sorghum, millet, manioc and ground nuts, and alone contributes more to household income than soya, cowpea and Bambara groundnut together*", Lawani[48], 2007.

The phenomenon of private sector surveillance of hunting areas has not resolved the problem. Surveillance is active during the hunting season, but absent or at best insufficient afterwards, which corresponds to the majority of the year. Therefore poachers just need to await the guides' departure (Caro 1998). The legal status of this private sector surveillance has not been resolved in practically any country, and it cannot therefore take the place of state surveillance. Uniformed men are indispensable for effective surveillance (Caro 1998). This is also a reason not to exceed a reasonable percentage of protected areas, including hunting areas, per country: the government would be hard pressed to monitor more than 12%. It cannot do more due to a lack of financial and human resources, and a lack of political motivation to go against local communities and enable foreign hunters to fulfil their passion without real socio-economic gains.

For the past few years private sector surveillance has come up against many problems in Central Africa: surveillance staff deaths (including expatriates in RCA), and deaths of poachers with suspected expatriate involvement (in Chad, Cameroon and RCA), not to mention injuries (including expatriates in Cameroon). It is now common practice for hunting companies to call upon the services of mercenaries, which is difficult to justify, in particular by governments that do not defend hunting organisers in the event of problems. The problems encountered by hunting operators stem from:

- The lack of a social right of existence for hunting areas,
- The lack of legal status of private sector surveillance,
- The "retribution" carried out by that private surveillance.

Such "retribution" includes, among others, the running off and killing of cattle, violence towards hunters, fishermen and users of natural resources. In practice, the instructions given to private surveillance staff (and reinforced by mercenaries) are simple: "*no one enters the hunting area*" (a small hunting area such as those of West Africa or Cameroon, around 70 000 ha, cannot tolerate humans on its land!). Therefore there is a strong feeling of exclusion among local communities. This sentiment is reinforced by the opacity of the sector, the lack of local governance, the impossibility of visiting the zone if you don't pay for a safari (how could a local do so?), and all that on their own land. In total, hunting areas are areas where exclusion is highest and are therefore more rejected than other types of protected area. This is one of the reasons they are less respected (limits, biodiversity).

---

[47] Poaching is indicated as omnipresent in the hunting areas of Benin (Hausser, 2009), RCA (Roulet, 2008 ; Voyages de chasse, 2009), Cameroon and elsewhere.

[48] www.notesdecologie.bj.refer.org/document.php?id=713

4.2.6. The particular case of game farms

The big game hunting sector in Africa is based on a very extensive model (more than 100 million ha). It could be an objective to improve and adapt the model to current pressure by intensifying it. This is what has been done on game farms (or game ranches if they are more extensive), mainly in South Africa, for the past thirty years or so and the results of this activity are now available. Almost all big game hunting in South Africa takes place on game farms.

As we have seen, there are around 9 000 farms in South Africa whose sole activity is game, and 15 000 that are mixed cattle and game farms. These farms receive around 6 000 foreign hunters each year. The overall turnover given by the TRAFFIC study for 2000 is $US107 million, of which 53% is thanks to resident hunters, and 18% to tourist big game hunting. Meat sales only represent 2.3% of turnover.

It should also be noted that the most expensive hunting safaris in South Africa do not take place on game farms but in open areas (or similar) for the big five: Pilanesberg National Park, and private reserves such as Sabi Sand, Timbavati, Balule, Klaserie, Phinda...

The average turnover of a farm is around $US10 663 (i.e. 5.3 million CFA F): earnings are therefore very low and are not what the game farm promoters were expecting thirty years ago. The most optimistic turnover figures for the game farm sector in South Africa, $US200 million per year (Damm, 2007), correspond to a mere $US20 000 maximum per farm per year, in other words 9.5 million CFA F. No farm can be profitable with this level of revenues.

Game farming is therefore a leisure activity with a real estate sector similar to that of second homes (remember there are 4.5 million White people in South Africa, the large majority of whom are keen “nature weekend” enthusiasts).

Furthermore, in West Africa, the only game ranch (Nazinga in Burkina Faso) is no longer just about meat production. In fact, the authorities have transformed it into a dual zone: one for safaris and one for hunting. Thirty years after the concept was launched, this game ranch is still the only “operational” one in French-speaking Africa. If the concept was lucrative, there is no doubt that in all this time other examples would have sprung up.

Several characteristics typical of West Africa are further hindrances to the profitability of a game ranch:

- Resident hunters are not ready to pay what the White residents of South Africa pay for meat because the informal sector is too well developed
- The best hunting areas (including the ranch of Nazinga with all its improvements) require 7 200 ha to shoot one trophy antelope, and considerable surface areas would be needed to have significant earnings,
- Nomadic herders of the region are not used to fences and do not like them. They tend to damage them. Then they make snares with the fence wire for poaching…

Thus there are many reasons, besides the lack of profitability, to stop and think before trying to step up big game hunting by replacing it with game farms.

Today, game farms are being adapted, in light of the economic problem and other disadvantages (presented in the section on conservancies), by regrouping them in conservancies, then if possible, annexing these to a national park or a reserve and promoting it for luxury safaris. The current trend, as for the establishment of the Greater Kruger or the enlargement of Addo National Park is therefore to take fences down, not put them up.

Wildlife management based on its economic value has not proven advantageous and wildlife should not be considered from this angle alone. This cannot change the behaviour of local communities or of the other players key to wildlife conservation. The “if it pays it stays” approach is therefore mistaken: biodiversity does not pay enough, yet it should still stay[49]! New financial tools, linked to usage, non-usage and heritage values

[49] *It is symbolic to see that the only current political leader to still use this phrase is the Zimbabwean Robert Mugabe (this is how he justifies driving out white farmers from the game ranches, because they are not profitable), thus taking the phrase of his political enemies, the majority of tourist hunters having political leanings similar to those of*

should be used to fund biodiversity conservation. The solution is therefore financial and not economic.

4.3. Governance

Governance in the big game hunting sector comprises the following aspects:

- Local governance: in the hunting areas, in terms of relations with local partners,
- Governance and the Administration: attribution of zones, compliance in terms of partnership agreements and ethics, control of hunting and monitoring of wildlife,
- Governance as regards hunting guides: licences, behaviour, advertising, promotion etc.
- Governance as regards marketing: travel agencies, advertising, litigation,
- Governance in communication: control of advertising, reports, public actions,
- Financial governance: financial controls, origin of financing.

Generally speaking, governance in the sector is weak and has led professionals (Baldus, Damm, 2006) to propose safari organiser certification against a certain number of criteria so that clients can be sure of the quality of the safari they are purchasing.

4.3.1. Local Governance

This regards management of hunting areas and the relations with other local stakeholders: local communities, local government authorities, regional authorities etc. This governance can extend to the choice of hunting operator, quotas, the setting of taxes, the use of funds, internal and external zoning and surveillance.

In practice, even if there has been progress in certain countries (Benin with the AVIGREF, RCA with the ZCV etc.), participation is reduced to surveillance and management of community funds. Communities rarely have real power and when they can legally have it, the government and operators do not encourage them to participate (Tanzania: Baldus, Nelson). Sometimes, governments set up such complicated procedures for creating community zones that the process is never completed, as in Tanzania (WMA).

The emergence of local governance is seen by the administration responsible for hunting and hunting organisers as a loss of power, and they prefer to use the “paternalistic” system they have been using since independence (Baldus, Nelson, Kideghesho), which is more favourable for them. Often, this leaves local communities with little alternative than to poach and expand agricultural activities. Therefore, the policy applied by administrations and hunting organisers seems in certain cases to be a short term policy somewhat akin to "after me, the flood".

An example of this can be seen in Tanzania where, on the periphery of the Serengeti National Park, the communities, in the context of decentralisation, chose to transform a hunting area into a safari area because the financial gain for them was better: so they signed a contract with a safari operator, while at the same time the central government attributed the same zone to a hunting operator. The Council of State eventually arbitrated in favour of the communities (Nelson, 2007).

From this point of view, the new forms of community concessions for luxury safaris that are being developed in English-speaking Africa are streets ahead of local governance in the hunting sector and are producing very good results, such as in Kenya, Namibia and Tanzania.

4.3.2. Governance and the administration

This is mainly characterised, in many countries, by its opacity (Baldus, Nelson, Kideghesho, Roulet, Patterson/TRAFFIC, Michler). To summarise: "no one really knows what is going on".

Zone attribution, which is the real crux of the matter, is at the heart of this phenomenon: a good zone, coveted by all, is rarely attributed or re-attributed by a transparent tender process, as stipulated in the legislation of most of these countries. In the majority of countries, even when this is provided for, there is no

---

ultra-conservative Americans.

assessment of the specifications and there is little ecological monitoring or monitoring of trophy quality and hunting activities in an attempt to assess the operator's conservation role. Hunting ethics are not controlled, quota extensions are accorded during the season, there is no monitoring of where animals are shot or any control of financial flows.

Many authors report corruption associated with the big game hunting sector. This is easy to understand, as it brings considerable international currency flows into poor countries, giving rise to desires that are easily satisfied.

There is also poor governance as regards certain hunting activities: hunting by car, hunting at night, exceeding of quotas, injured animals or females shot and not declared, abandoned trophies etc. Some local administration representatives make easy money out of this. They have little interest in changing the system, particularly if they have to relinquish part of their power to local communities. Certain authors (Kideghesho, 2008) consider that after poachers, it is the corrupt administration that benefits most from wildlife.

4.3.3. Governance as regards hunting guides

There are a certain number of local and national associations of hunting guides, and several international ones (SCI, IPHA, ACP etc.), which all aim at organising, establishing a code of ethics and defending the interests of hunting guides. They are effective to a certain extent. The most important role regards the attribution of professional licences (sometimes by organising exams) and as an interface with the administration.

However, some countries, have no associations or they are non-functional, or there may even be several which compete with each other. They are often ineffective at limiting disloyal competition among guides in a context where clients are rare: we saw that the market has around 1 300 hunting organisations and 3 400 guides who seek to attract the 18 500 hunters that come to Africa each year. The market is not very elastic and engenders stiff and sometimes disloyal competition.

These associations seek to establish a code of ethics in the profession, but it is never complete and many cases are reported where, after fraud or a major problem in a country, the guide slips across the border to work. Some countries have set up serious exams to obtain professional guide licences (Zimbabwe), but in many others this is a simple formality or there is not even an exam. Use of equivalences (that are sometimes impossible to verify) is frequent and facilitated by corruption.

4.3.4. Governance as regards marketing

This sector mainly concerns travel agencies which organise safaris. There is little control of their advertising beyond national legislation and quality charters. The quality of the contract that the hunter signs should in theory reflect the quality of the agency, but it is not always the case.

The frequent creation of new agencies for a fairly limited niche market clearly shows their opportunist nature. The role of hunting intermediary, paid by commission with no investment in the bush, is surely the most profitable part of the big game hunting sector. There are no safari vendor associations; indeed, this would appear difficult to envisage.

4.3.5. Governance as regards communication

This should involve controlling the advertising by agencies and guides, safari reports, activity reports from the different operators and associations and published information. Unfortunately it is virtually non-existent and much partial or biased information is in circulation. This leaves the way open to some people to promote their activities or the sector in general according to methods that are more propaganda than anything related to actual facts or real values.

An important innovation is the internet site http://www.huntingreport.com/ which publishes the reports of hunters upon their return. It is a big step towards transparency and it is thus much more difficult to formulate false advertising which would be rapidly exposed.

4.3.6. Financial Governance

This should, in theory, involve the control of financial flows. In practice, the combination of poverty, corruption, lack of transparency and the circulation of currency among countries creates the ideal conditions for poor financial governance, particularly in certain countries where the notion of the rule of law is weak. In certain countries, revenues from big game hunting are therefore difficult to manage as a public good. Local communities are also in a weak position: many countries indicate that the sums due to them are never paid. Governance needs considerable improvement in this field.

Two points should be highlighted:

- The lack of control of sub-letting of areas, in which a leaseholder obtains a lease for a standard price, but is not a professional, and sub-lets it to a foreign operator who is not eligible to hold the lease himself, for a higher price. The leaseholder makes a profit to the detriment of the local communities and the government who receive no part of the real price paid by the end operator.
- The lack of *tracfin* type controls over money laundering, which can give rise to disloyal competition among professionals.

Big game hunting has an important financial particularity: it is entirely self-financing. Indeed, it is financed by the hunters themselves. It is a considerable success that in some places the sector has managed to conserve significant areas populated with wildlife, without the help of donors, and in spite of government disinterest.

Finally, financial governance should involve the drawing up of recommendations for a more pertinent tax regime as regards national resources, less ricochet taxation of local communities and modern mechanisms for sustainable financing including new tools.

4.3.7. Certification

All the aforementioned points regarding the different types of governance could be included as part of a certification system: the hunting safari client would therefore be sure that their money would be used in an area managed according to ecological principles, attributed and controlled without corruption, that they would hunt with a guide who would follow optimal ethical guidelines, that the local communities would receive their share, that the rules of competition would be followed etc.

In this ideal context there would still be the problem of who would accord the certificate of conformity (official organisation, NGO, association etc.) and who would pay for the setting up and monitoring of the system. While the profession is aware of the need for certification to regulate the sector, it does not yet appear ready to answer these questions.

4.4. Analysis Summary

The data gathered have made it possible to analyse the pertinence of big game hunting according to conservation, socio-economic and good governance criteria.

As regards conservation, big game hunting gives mixed results: there are hunting areas that are geographically stable and which have large wildlife populations, but this is not the norm. There is great disparity in quality among zones. The conservation results for the same level of management are lower than those obtained by the neighbouring national parks. Hunting areas are less able to resist pressure from the peripheral areas than the national parks and therefore play a lesser role in future conservation strategies.

When positive results are obtained, it must be highlighted that this is with funding almost entirely provided by the hunters, without donor help and often without government support. This is an important advantage to be counted in favour of big game hunting.

As regards economic criteria, the results are very low. Land use by big game hunting does not stand up to comparison with other agricultural and farming uses. The contributions of big game hunting to the GDP and government budgets (less than 1 per ten thousand) are negligible in light of the surface areas concerned.

The amounts generated per hectare, both for the private sector and for the government do not achieve the necessary ratios for good land development. The gains for the local communities, even in the context of specific projects (such as the CBNRM) are negligible and are not able to dissuade them from poaching and expanding agricultural land. The number of jobs created (15 000 for the whole of Africa) is low in light of the 150 million people living in the eight main hunting countries and in relation to the surface areas used (16.5% of these eight countries).

On a social level, there is the local perception that hunting areas lack a social right to exist, and a lack of legal status for private sector surveillance, generating a feeling of exclusion. This feeling of exclusion is stronger than for other types of protected area because there is no local governance. It explains many difficulties experienced by hunting operators along with the poor socio-economic performance levels and lower ecological performance levels of hunting areas.

Good governance is also absent from almost the entire big game hunting sector for many countries. Those who currently have control of the system are not prepared to share that power and undertake adjustments that mean relinquishing control. They attempt, thanks to a fairly opaque system, to keep a largely exhausted management system going. This position serves individual interests, but not those of conservation, governments or local communities. This attitude presents, nonetheless, a risk that decisions, such as that taken by Botswana to close down hunting in part of its territory, will become widespread not for "anti-hunting" reasons, but for conservation, socio-economic and local governance reasons.

The conclusions of our analysis are fairly similar, if somewhat more nuanced as regards conservation, to those of the assessment of hunting areas in Zambia (NRCF, 2008), which concluded that big game hunting in Zambia does not work either from a conservation point of view or an economic or social one. The conclusions are similar to those of the 2009 book, "*Recreational Hunting, Conservation and Rural Livelihoods*" by Barnay Dickson, Jon Hutton and William M.Adams, (and Holly Dublin for the conclusion):

"There is no simple answer to the question about the impact of recreational hunting on biodiversity appropriate to all contexts. In some, recreational hunting has made a real contribution to conservation strategies. In others it has been neutral, irrelevant or sometimes useless".

"To the question: does it work? the answer is: it depends! When conditions are good, ecological and biological impacts are low and social benefits are high, when hunters are closely controlled (or self-controlled) and when governance is transparent, open and functional, then recreational hunting can contribute to conservation and can be seen as one of the components of the conservation tool box.
Under no circumstances is hunting a universal panacea, but it can work as a conservation tool if it is used intelligently and with precautions".

The conclusions of this study are more nuanced: hunting has played, and plays a role in conservation in Africa. It is not sure that it will play one in the future under the same conditions. However, it plays a minimal (if at all) economic and social role and does not contribute to good governance. Of the four fundamental criteria for Sustainable Development, big game hunting fills only one.

Choosing hunting as a conservation policy for purely economic reasons, as has been the case in several countries, has proven a strategic mistake, precisely because hunting does not have sufficient economic value. The question, however, can be summarised today as: can we do conservation better than big game hunting has up until now, in those areas where big game hunting is practiced? This is not at all sure, all the more so in that big game hunting pays for itself.

In the following part of this study, we present recommendations for improving protected areas in Africa, including for hunting.

5. RECOMMENDATIONS

5.1. The modern conservation context

There are several particularities of the modern conservation context that differentiate it from the context that prevailed thirty years ago, a time when a certain reorganisation of the protected areas network inherited from the colonial period took place.

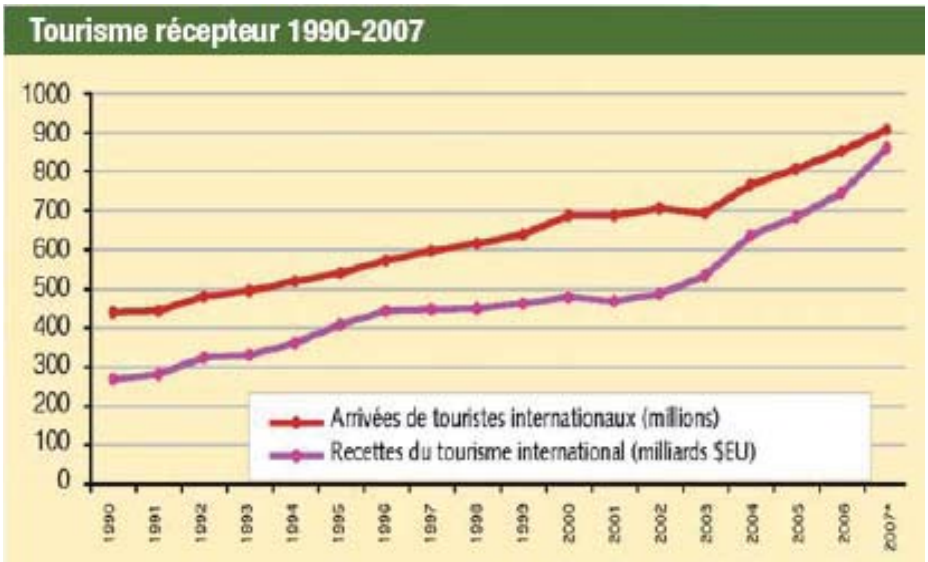
5.1.1. The demographic explosion and seeking new land for agriculture and livestock

We have discussed these points extensively, but let us reiterate some facts and figures:

- The population of the majority of African countries has quadrupled since the 1960s.
- The drought years, in the Sahel and elsewhere, modified the isohyets bringing herders into contact with farmers and leaving little space unoccupied. The notion of marginal, unoccupied land has practically disappeared.
- According to the FAO, there are 200 million people whose livelihoods are based on cattle breeding between Somalia and Senegal, of whom 40 million are pure herders, and 160 million agro-pastoralists. A mere few hundred live legally from wildlife in that same area. Herding is unavoidable here.
- Agriculture is seeking new land: the FAO and the World Bank (2009) estimate that 400 million hectares of land could be used for agriculture in Africa. These areas overlap with the majority of the hunting areas. The hunting areas of Burkina Faso, Benin and Cameroon, to cite just these, are located in the best cotton-growing areas.
- Climate change should restrict the sahelo-sudanese band even further, increasing population densities and requiring intensification of agriculture.

5.1.2. The Tourism Explosion

Tourism has become one of the mainstays of international trade. Today, international tourism is, on a global scale, the fourth largest export earner after the petrol, chemical and automobile industries. From 1950 to 2007, the number of international tourist arrivals rose from 25 million to 903 million in the world. The number of international tourist arrivals should reach one billion by 2010 and 1.6 billion in 2020.



©OMT

(Graph: Incoming tourism
Index: International tourist arrivals (millions)
Income from international tourism ($USbillion))

In Sub-Saharan Africa, the number of international tourist arrivals rose by 212.6% from 1995 to 2006, and by 7.1% during 2007, to reach 28 million.

	Arrivées de touristes internationaux (millions)						Part de marché (%)	Variation (%)		Croissance annuelle moyenne (%)
	1990	1995	2000	2005	2006	2007*	2007*	06/05	07*/06	'00-'07*
Monde	436	536	683	803	847	903	100	5,5	6,6	4,1
Europe	262.6	311.3	393.5	440.3	462.2	484.4	53.6	5.0	4.8	3.0
Asie et Pacifique	55,8	81,8	109,3	154,6	167,0	184,3	20,4	8,0	10,4	7,8
Amériques	92.8	109.0	128.2	133.4	135.8	142.5	15.8	1.9	4.9	1.5
Moyen-Orient	9,6	13,7	24,4	37,8	40,9	47,6	5,3	8,2	16,4	10,0
Afrique	15,2	20,1	27,9	37,3	41,4	44,4	4,9	11,0	7,4	6,9
Afrique du Nord	8,4	7,3	10,2	13,9	15,1	16,3	1,8	8,4	7,9	6,8
Afrique subsaharienne	6,8	12,8	17,7	23,3	26,3	28,2	3,1	12,6	7,1	6,9

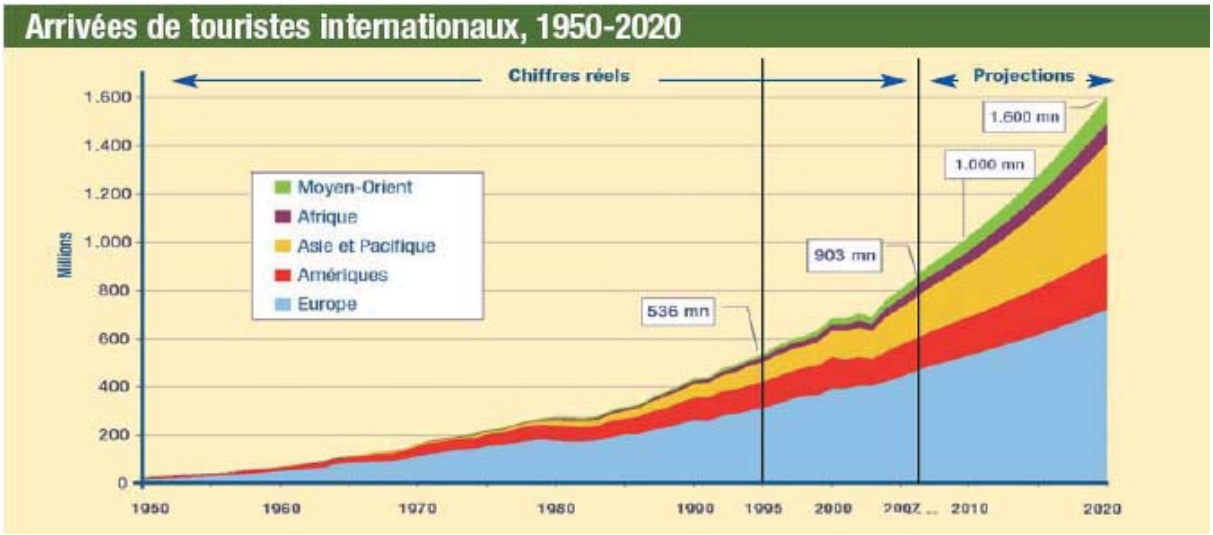
(Table: International tourist arrivals (millions) – Market share (%) – Variation (%) – Annual average growth (%)
World
Europe
Asia and Pacific
Americas
Middle-East
Africa (North Africa/Sub-Saharan Africa))

In 2006, earnings from tourism in Sub-Saharan Africa were $US15.9 billion and $US17.9 in 2007, in other words an increase in just one year of 12.6%. The highest annual increases in the sub-Saharan zone are Uganda (+19%), Malawi (+12%) and Tanzania (+10%).

In the following table, it can be noted that Tanzania has the 9th highest number of tourists, but it is the 2nd in terms of earnings (just ahead of Kenya): this corresponds to the luxury tourism. Hunting tourism in Tanzania now only represents 3% of all tourism turnover in the country. This proportion is 1.2 ‰ in South Africa. Thus, hunting tourism has become marginal. For West Africa we can note the excellent 6th and 11th places of Senegal and Ghana.

Rank	Country	Tourists (thousands)	Earnings ($USmillions)
1	South Africa	9 090	8 418
2	Zimbabwe	2 287	338
3	Botswana	1 675	546
4	Kenya	1 644	909
5	Zambia	897	138
6	Senegal	866	250
7	Namibia	833	434
8	Malawi	714	27
9	Tanzania	692	1037
10	Uganda	642	356
11	Ghana	497	861
12	Éthiopia	303	177

The growth rate over the period from 1995 to 2020 is estimated at 5.5% for sub-Saharan Africa, as against 4.1% for the world. Thus sub-Saharan Africa's share is increasing, as shown in the following graph:



© *OMT*

(Graph: International tourist arrivals, 1950-2020. Real figures – Projections
Index: Middle East
Africa
Asia and Pacific
Americas
Europe)

At the same time, the number of hunters is diminishing in certain countries of the North: in 20 years it has dropped from 2.3 million to 1.2 million in France. This does not affect the number of hunters travelling to Africa, but reduces the base potential.

It would appear that sub-Saharan Africa has considerable potential for developing tourism on the condition that profitable products in demand by tourists are on offer. As regards safaris for photographing animals, these take place mainly in luxury camps in concessions whose right of use is held by local communities and implemented by the private sector. Certain companies show great success in this field: *& Beyond*[50] manages 50 camps and more than 3000 people, *Wilderness Safaris*[51] also manages 50 camps and 2.8 million hectares. These companies have their own conservation and local support projects as well as their own foundations.

These approaches have been developed in Namibia, Botswana, South Africa, Tanzania and Kenya with much success, but are strangely absent from French-speaking Africa. And yet specialists in tourism in Southern Africa see advantages in French-speaking Africa:

- Closer to Europe,
- The best season to visit is during the European winter which is a good period for a short trip,
- It is a period when many camps in Southern Africa are closed or have reduced operations (qualified personnel, planes etc. are therefore available),
- Friendly local communities, attractive cultures and villages etc.

Few things have been done for modern tourism in French-speaking Africa, and the operators there seem disconnected from the profitable niche.[52].

5.1.3. The land-use rights and wildlife transferred to local communities: community-private sector partnership

For twenty years, many programmes (beginning with CAMPFIRE in Zimbabwe), particularly in Southern Africa, have worked on the basis of local community involvement in wildlife management. The results have been mitigated, due to the low revenues generated, disappointing local communities. Institutional provisions

[50] http://www.andbeyond.com/
[51] http://www.wilderness-safaris.com/
[52] With the exception of http://www.africas-eden.com/ in Gabon

did not usually change much with regard to the system used for government hunting areas. Indeed, communities did not have the right to choose the activity (hunting, safaris or anything else) or the operator or to set the prices. In practice, the share received by the communities is often just a part of government taxes.

The simultaneous arrival of decentralisation and community-private sector partnerships generated clear progress: the community (sometimes with the support of the decentralised local authorities) chose the activity, the operator and set the prices according to the market which usually included an annual rental fee and a share in profits (for example a tax per night per tourist), as well as a certain number of guaranteed jobs.

This system works particularly well around the national parks: the local community rents a zone (10 000 ha for instance) to a private operator who sets up a camp of luxury tents and uses the national park for visits by car, the peripheral area for safaris on foot, at night or by boat and also arranges interaction with local inhabitants and villages. In this way, the communities increase the conservation area thanks to their community area, thus establishing a peripheral zone on a voluntary basis.

This is clearly a unique example of conservation today, at a time when all conservation areas are shrinking, this approach increases them. Rather than a centripetal effect it is a centrifuge effect.

Why does this approach work? Because it is economically viable! In Botswana, a 10 000 ha concession is let out at $US100 000 per year, all of which goes to the community. The camp employs 40 staff and they receive an extra fee per night for each client (a share in profits, therefore an interest in good conservation), as well as high tips. The annual rental alone of 20 000 ha in Botswana brings in what the communities in RCA get for 3.5 million hectares. It is also more than what local communities in Burkina Faso and Benin combined get in hunting areas.
The economic and conservation potential is therefore considerable. Nonetheless, it must be set up and it takes time to build a marketable image. 15 years ago, there were no safari camps in the Okavango, only hunting camps. Today, it is the reverse.

5.1.4. The notion of services rendered by ecosystems

In the past few years, a new notion has emerged: the ecosystem renders innumerable services to its inhabitants and to the world. These services include: carbon fixing and reducing climate change, preserving water catchments and resources, combating desertification and erosion, cleaning up pollution, providing leisure activities etc. The value of these services is now recognised and mechanisms are being set in place to pay for them. The most well-known are the remuneration of carbon sinks and catchments. The different ways these can be promoted are summarised in the following table (FFRB): the paradigm based on "*if it pays it stays*" now corresponds to just one line of the table (production of wildlife) and obscures the other resources.

Usage value			**Non-usage value**	
Direct usage value	**Indirect usage value**	**Option value**	**Heritage value**	**Existence value**
Leisure activities Sustainable production Wildlife production Firewood Pasture Agriculture Genetic resources Education Research	Ecosystem services Climatic stabilisation Soil preservation Groundwater recharge Carbon sequestration Habitat Maintaining fertility Prevention of natural disasters Protection of catchments Natural services	Future information Future usage (direct and indirect)	Heritage of usage and non usage values	Biodiversity Ritual or spiritual value Cultural or heritage value for communities Landscape

Source: French Institute of Biodiversity (2003), now the French Foundation for Biodiversity Research (2009)

As the paradigm's lack of economic value has been proven, the current vision is that of preserving the environment (and the wildlife it contains) while benefiting from all its different potential advantages.

5.1.5. The emergence of sustainable financing

During the same period, different mechanisms emerged to sustainably finance protected areas. In brief, the most common model is a trust fund managed by a foundation. The trust fund is increased through careful investment, such as bonds. This type of investment guarantees annual dividends of 5%. To effectively manage a national park of 200 000 ha, a budget of €300 000 per year is needed. Therefore, a total investment of € six million is required. The national park's management budget would thus be assured for the entire time the capital remains in the bank.

Funds generated by payment for ecosystem services can be added to this fund. Protected area management, often blocked by the lack of funding, can thus be envisaged from a new and sustainable angle.

5.1.6. Environmental awakening

The advent of sustainable development, of environmental conventions such as Rio and of climate change, have given rise to an undeniable environmental awareness. Few actions are now decided upon without an environmental (and social) impact assessment. The general perception of hunting by current day public opinion is not very positive.

Two significant facts can give testimony to this environmental awakening:

- The removal of game meat from the main tourist restaurant in Kenya,
- Regulatory slaughter of elephants was stopped in South Africa before the Football World Cup in 2010 for fear of a public opinion boycott.

The problem of the social right to exist for hunting, presented in the introduction, is thus all the more acute in the present day. The general perception of hunting, which is sometimes not very positive, could affect donations that would be used to set up a trust fund for a protected area as a whole.

5.2. Summary of key points

The protected area networks were set up gradually in the past, to protect species. Today it is the ecosystem we seek to protect, so it can deliver services to the populations and at the same time help these species to survive in their original biotope. The environment is a global good which cannot be used exclusively for individual interests or those of a minority. The advent of consideration of environmental services and sustainable financing make it possible to envisage financing these networks from a new angle.

The objective of conservation is not to generate economic gains (often virtual) for a few, but that the ecosystem can continue to deliver its environmental services to all. This is a new vision and is very different from that implemented in Africa in the past.

This vision requires the restructuring of the protected area networks, and also of the big game hunting system as was requested by assessments in certain countries such as Tanzania (Baldus, 2005), Zambia (NRCF, 2009 and RCA (Roulet, 2008), unless hunting is shut down altogether as in Kenya (1977) or Botswana (2009).

The key points of wildlife conservation to be taken into account to improve protected area networks can be summarised as follows:

1. The review carried out at the beginning of this study and the subsequent analysis helped to highlight a certain number of points. These are developed below and should be kept in mind when designing protected area networks

2. National Park boundaries stand up better to external pressure than those of hunting areas or protected areas of categories IV, V or VI,

3. Wildlife densities are higher in national parks than in the surrounding hunting areas,

4. The core populations of endangered species are greater in national parks,

5. The negative impact of humans can be felt far beyond their settlements: conservation is better on large blocks than small protected areas,

6. As a result, corridors (long and narrow by definition) between protected areas are unlikely to be used by wildlife because the conditions that prevail are unsuitable, except when there is a clear migration phenomenon, of which there are only five cases in Africa[53]. Apart from these five cases, the creation of corridors is of little if any use[54] and takes time, energy and money in a context where all are rare. The example of the South African national parks in this field is worth emulating (Sanparks, 2006)[55]. In other terms: don't create migration corridors where there is no migration!

7. The objective is to preserve the ecosystem and strengthen its resilience: artificial developments are forbidden in order to optimise habitat management by natural spatial-temporal variability. As a result, the notion of load capacity is inapplicable and forbidden, as in South African national parks (Sanparks, 2006).

8. The economic viability of wildlife is a misconception and the choice of type of protected area should not be made according to its supposed economic value, but rather its conservation role and financing potential.

9. Hunting plays a very minor role in development: developments proposed to the populations generate hopes that if disappointed are counter-productive.

10. More than 12% of a country classified as protected areas can be counter productive in the long term, because development has a legitimate need for space.

11. The main role of peripheral areas is to distance the negative action of humans from the populations of the protected area (i.e. the national park): thus it is not essential for wildlife to be present in these zones, it is enough to conserve the biotope. A natural resource management area, even without wildlife constitutes a good peripheral zone and can be eligible for eco-systemic service funding.

12. Protected areas that are not managed often disappear unless they have a high conservation value IUCN rating (I or II). Management by hunting guides and community management can then be better options than government (even decentralised) management.

13. The only recent cases where a conservation area exists in an inhabited zone alongside a central core, and increases the conservation block are those of community areas for safaris with private sector-community partnerships. This option should be favoured in the context of future tourism.

14. Hunting areas should not prey on national parks, because they reduce conservation efforts and do not add sufficient socio-economic benefits. This is one of the important causes of poaching which endures and encourages agro-pastoral encroachment.

15. Due to their geographical position, hunting areas can prevent the development of tourism in community areas near national parks. They partly prevent the country from benefitting from the current tourist explosion in Africa.

---

[53] The herbivores of the Serengeti (Tanzania-Kenya), herbivores of Southern Sudan, herbivores of Barotsé (Zambia-Angola), herbivores of the Kalahari (Botswana), and the elephants of Gourma (Mali-Burkina Faso). Other movements are simply wanderings and are thus random and unpredictable.

[54] See John Bonner, *Wildlife's road to nowhere*, http://www.newscientist.com/article/mg14319393.600--wildlifes-road-to-nowhere-corridors-connecting-fragmented-islands-of-natural-habitat-are-all-the-rage-john-bonner-asks-whether-they-are-routes-to-survival-for-threatened-species-or-expensive-dead-ends--.html

[55] Corridors between parks are no longer considered due to the density of human populations and national park populations are managed as a metapopulation (a population made up of sub-units).

16. Hunting areas do not have a legitimate social right to exist and that is one of the reasons they are poorly respected, as soon as pressure increases. Poor governance and private surveillance without government control only reinforce this lack of legitimacy.

17. Community surveillance of protected areas is not enough. Private sector surveillance is not effective and often generates conflict: the government cannot have protected areas and not assume its regulatory role.

In light of these few points, what should government do first to improve their protected area networks and develop the land? The protected area manager must integrate the protected area into its human environment, not only by having it accepted by the populations but by having them live together. Ecosystemic services and their financing are essential for this.

Ecologically, the most important point is probably the constitution of blocks.

5.3. Actions for 2010 and the future

5.3.1. Define the vision

Today, the two essential questions that must be asked before setting up or adjusting a protected area network, and including big game hunting are:

1. Ecologically speaking, what to we need as a protected area?
2. What financing do we have to set it up and operate it?

It is perhaps counterproductive to want to establish a network that takes up more than 12% of the national territory. However, it is interesting to insert it into a peripheral context of sustainable agriculture. Each country has a certain number of ecosystems that it is legitimate to wish to preserve. The first objective is to have ecosystem representation in the network before multiplying the protected areas belonging to the same ecosystem.

In the long term, the national park (or natural reserve) is the best performing status and should logically be the heart of preserving the ecosystem. Ideally it should be encircled by peripheral zones to mitigate the impact of human activities on the biodiversity. These peripheral zones can be of three types:

- If there is wildlife: community areas promoted by private sector-community partnerships where safari tourism is possible[56].
- Where there is wildlife and the type of safari tourism mentioned above is not (yet) possible: hunting areas. These areas should not prey on national parks, and their governance should be improved.
- Where there is not enough wildlife to exploit: constitution of community natural resource management areas. It will always be possible to receive tourists (community managed camping for instance), or grant a few shooting licences on the basis of an objective quota.

These three types of peripheral zones are part of a wider geographical grouping applying sustainable agriculture principles. This agricultural ensemble can be contracted to private operators to develop small game hunting. This type of zoning is compatible with biosphere reserves for instance.

Once the technical areas are established, they must be financed. In so far as possible, modern financing mechanisms should be used (trust funds, carbon sinks, river basins etc). The funds required to manage a protected savannah area are around €1.5/ha per year, for the central zones.

A country like Benin, with a surface area of 112 000 km², should theoretically protect 1.34 million ha and have an annual budget of around €2 million[57]. This means having around €40 million In a trust fund at 5% interest in the bank. This figure is far from unattainable[58]. The trust fund, however, must only support the ministry or structure responsible for the environment and does not replace the government budget which

[56] It takes a long time to set up safari tourism, and it must be done with professionals who have a good portfolio of clients. This has not yet been done in French-speaking Africa.
[57] The GDP of Benin is $US4.7 billion, and the government budget is 1 230 billion CFA F.
[58] The ECOPAS project alone for W Park had a 5 year budget of €24 million.

must supplement it.

Generally speaking, the cost of environmental preservation is an infinitely profitable investment in comparison with the cost of repairing environmental damage (if it is even possible).

Finding a sustainable basis for funding should be the primary concern of the organisations in charge of the country's protected areas: it is a prerequisite for any technical choices. The power to decide upon modern technical conservation actions comes from financial solvability. This technical independence, unthinkable a few years ago due to the lack of financial solutions, is now possible in countries where there is sufficient good governance.

However, sustainable financing will not appear immediately, which means big game hunting still has some good days ahead of it – it is self financing and therefore enables small conservation actions to be implemented, even if they are insufficient in the long term. Therefore it can be estimated that big game hunting will continue in the future so long as sources of sustainable financing are not enough and governance is weak.[59].

5.3.2. Implementing this plan

Most countries know how to manage a national park. However, they often lack the political commitment to do so. If the government communicates on its environmental priorities, if it is done transparently, and if there is sufficient rule of law in the country, national park management should not pose any major problems.

Peripheral zones must meet certain conditions:

- Community safari areas must be part of a wider tourism policy that aims to bring the country onto the global tourism stage. This requires an opening up that has never happened in French-speaking Africa, where efforts were made for hunting, targeting hunting specialists[60]. This tourism policy must be complemented by institutional developments: community-private sector partnerships, rights of use, non-compete commitments from the government etc.

- The management of hunting areas must be improved. Transparency, governance and sustainability must oversee a reorganisation of the sector. One key point is the elimination of hunting areas that prey on national parks. This concerns in particular hunting areas that are on one bank of a river that can be easily crossed by animals living in the national park on the opposite bank. Hunting area perimeters must be reorganised to take this phenomenon into account, as it weakens national park management and performance levels, hinders good safari tourism and takes up land that would more naturally be community safari areas. If these areas continue to prey on parks (denounced for instance in Benin by Tello and Boulet in 2002 or Hausser in 2009), they will endanger all viable conservation actions by reducing the size of conservation blocks rather than helping to increase them by creating community safari zones.

- Community natural resource management areas must be set up through local development projects: participatory mapping, local development plan, charters and conventions for natural resource management. Furthermore, they can benefit from sustainable financing options such as carbon sinks, catchments etc. and be the site of eligible income generating activities under conservation programmes. These activities should be seen as supplementary.

- Sustainable agriculture could be set up by the appropriate structures.

Here below, we offer a very pragmatic list of the different actions that could be undertaken in the field.

a. Should new community wildlife management projects be launched?

The CBNRM projects of southern Africa, have given rise to a new fashion. The results of these projects, when they can be ascertained, do not substantiate the success announced by their proponents, far from it.

[59] Which constitutes one of the obstacles to setting up sustainable financing.
[60] Who are currently English-speaking.

In West Africa, three zones[61] (two in Ivory Coast, one in Burkina Faso) have benefitted from a large project (Geprenaf-World Bank/GEF) to set up such actions. The project cost around 2.8 million CFA F in Ivory Coast (for six years) and three billion in Burkina (for 11 years). Three biodiversity zones of around 100 000 ha each were set up on the periphery or in relation with the Comoé National Park (Ivory Coast).

In Burkina, big game hunting began ten years ago and runs at a loss: besides the set-up costs (including local development), the annual operating budget is around 75 million CFA F and at best generates revenues of 25 million CFA F/year. The problem of poaching[62] is ever present and wildlife populations are not increasing much. The managers' concern is to maintain wildlife populations, knowing that they are not receiving the hoped-for benefits (the continuation of poaching is a clear indicator of this). The main, very positive, result is that the Comoé-Léraba forest has been preserved.

In Ivory Coast, the socio-political situation that has prevailed since the end of 2002 has led to the colonisation of one of the sites while the second is still viable. However, if hunting is re-opened, the same budget/income ratio as in Burkina Faso will have to be faced, and local community motivation is difficult to maintain under such conditions.

It would appear to be more pertinent to propose natural resource management areas to the local communities, that could also receive safari tourists, small game hunters and maybe occasionally grant big game hunting licences for a limited number of animals with a reasonable quota.

b. Can new big game hunting areas be created in West Africa?

In theory, and unless there are any pleasant surprises such as the discovery of virgin territory, the answer is no. In the savannahs all areas are known and occupied either by protected areas or by people. Newly identified areas in Mali for example, are too small, too poor in wildlife and their repopulation by virtual wildlife corridors between under populated protected areas is not realistic. Furthermore, the pressure that led to the loss of their wildlife still exists, and has even increased.

In forest areas the answer is not so clear cut, because it is still possible to find areas where rare duiker can be found (but not Bongo, giant forest hog or sitatunga). However, these findings (as in Liberia in the past and in Ghana now) are occasional and are not included in the sustainable management framework (night hunting seems to be par for the course which indicates doubtful ethics).

For small game hunting the problem is different: this activity requires crops to be rotated and the lowlands preserved. In the context of sustainable agriculture, and providing there are large enough areas (professionals estimate 500 000 km^2 are required per zone to be sustainable) this activity could be proposed to generate some additional funding. Exclusive hunting areas (like the ZOVIC around Nazinga in Burkina Faso) have practically disappeared under agricultural pressure, due to a lack of profitability.

c. Could game farms be created?

These farms have proven their lack of economic viability. In the West African context it would be even worse for reasons we have already explained. Furthermore, Nazinga Ranch in Burkina Faso is not at all in line with this concept.

The ecological viability of these farms is also in question[63], and in southern Africa the trend is now to take down fences to increase the size of the blocks and connect them to a reserve or a national park in order to take advantage of the demand for luxury ecotourism.

In West Africa you need an average of 10 000 ha to shoot a single antelope, and the price of hunts is always lower in enclosed spaces than open ones. There is no profitability in this type of operation unless you release

[61] In Ghana there are also CREMA starting up : the areas available around the national parks are so small that it seems doubtful whether they can have significant results. The Campfire concept being applied has already proved to be ineffective.

[62] As in all areas with community surveillance and not enough government support.

[63] See Lindsey: The importance of conservancies for enhancing the value of game ranch land for large mammal conservation in southern Africa, Zoological Society of London (ZSL).

the game just before ("*put and take*", as described by Lindsey[64]), like releasing pheasant in Europe during hunts. The problem in West and Central Africa is that such farms do not exist and the only way to obtain such game would be to take it from the national parks.

d. What should be done with the big game hunting areas?

The first answer is: conserve them! As seen above, hunting areas have had, and still do have, a clear role to play in conservation. They also have the important advantage of being self financing.

However, the corollary is that for this to last in the long term, the sector needs to be reformed. The only advantage of big game hunting is to be able to participate, when well run, in conservation efforts. The big game hunting sector needs to adjust its stance: hunting guides need to realise that they are conservation agents and change their attitudes accordingly.

Communication with hunting guides is poor, if it exists at all. They claim to be the last bastions of African wildlife management, while many of them only have the job because they can kill the animals coming out of a nearby national park. They present themselves as the only "promoters" of wildlife (with no certified accountability of course), and often accord themselves the role of development agent, whereas, as we have seen, big game hunting is rather a hindrance to development.

Therefore, communication on big game hunting should focus on conservation to guarantee a future for the sector and thus establish sustainable financing frameworks. To restructure it must become more professional, a process which is embryonic in many countries. Governments have a primordial role to play in improving the big game hunting sector, by integrating the notions of good governance and rule of law.

The first step in restructuring would be to redefine the hunting area perimeters to include them in a block with a national park at the centre, and that the hunting areas avoid preying on it. If this is not done, big game hunting will soon disappear altogether, and eventually event the conservation block (and national park) will too.

e. Which conservation blocks can be saved in West Africa?

Uninhabited conservation blocks of around one million hectares still exist in West Africa, and they should be given priority:

- In Senegal: Niokolo Koba National Park,
- In Ivory Coast: Comoé National Park and the Taï block, consisting of nearly one million hectares with the peripheral zones.
- In Benin-Burkina Faso: the Arly-Pendjari Block,
- In Benin-Burkina Faso-Niger: The W Block,

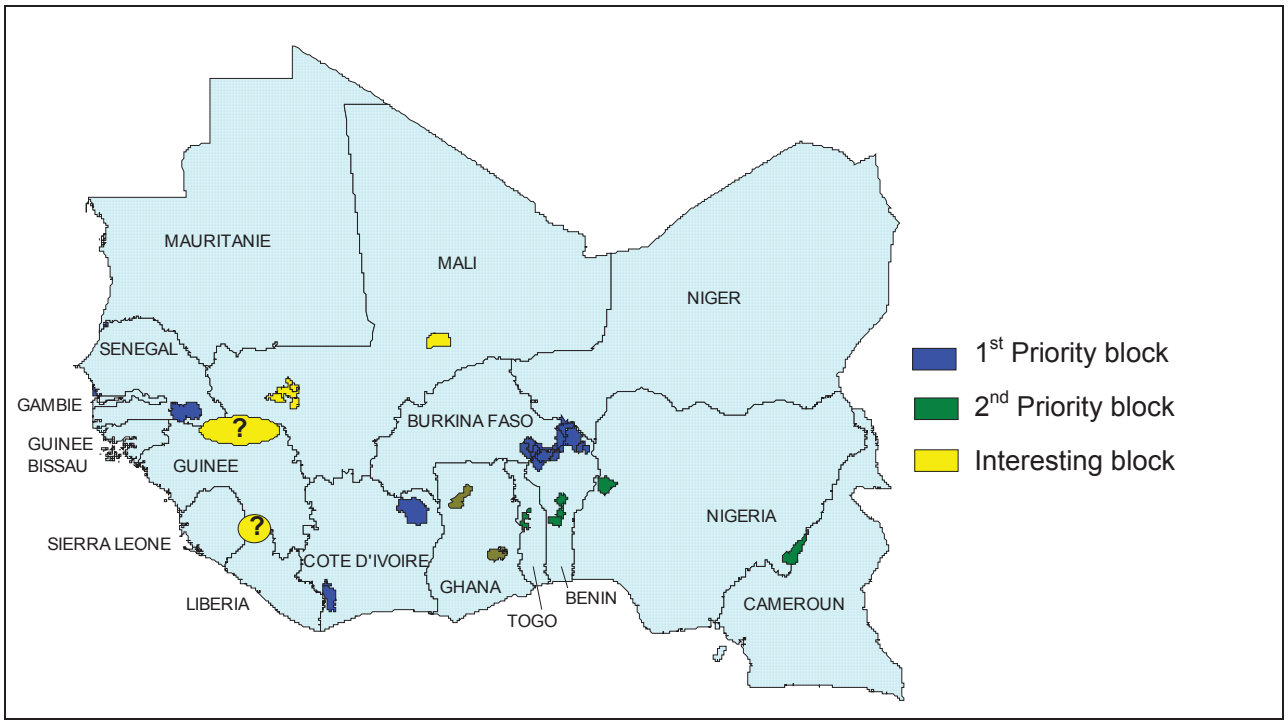
Other, slightly smaller sites, are also of interest:

- In Ghana: Mole National Park (4 840 km²), Digya National Park (3 500 km²),
- In Benin: the vast classified forests of the centre,
- In Togo: Fazao National Park block.
- In Nigeria: Borgu Game Reserve (on the border with Benin) covers 5 300 km², and on the border with Cameroon, Gashaka Gumti National Park covers (at an altitude of 450 to 2400 m) more than 6 000 km².
- Sierra Leone-Liberia: projects have begun to preserve the surviving biodiversity in the wake of the conflicts. Blocks should be identified in the context of current strategies.

Of course this list is not exhaustive. Certain inhabited zones are of clear interest for biodiversity conservation such as the Malian Gourma. If a real network were to be established with all the aforementioned protected areas, it would constitute a very impressive, and maybe effective, regional protected area network[65].

[64] Ibid
[65] And hence cross-border!

Map No. 8: Long-Term Potential Regional Protected Area Network for West Africa



f. Should these blocks be linked by corridors?

This is simply not possible. In most cases people occupy all the areas and they would need to be displaced to create a corridor. The problems created would outweigh any potential advantages. We have also seen that wild animals avoid contact with people, and if the corridors were too narrow they would not be used anyway. The majority of species do not move far away and live within a relatively modest-sized area: it is not in their nature to migrate. There are only five real migrations in Africa, only one of which is in West Africa: the Elephants of Gourma. Creating migration corridors where there is no migration is nonsensical.

Elephants are the animals that move the furthest, but the majority of their movements are not migrations, indeed it is impossible to predict when and where they will go[66]. Under these conditions, setting in place a corridor for a hypothetical use, while elephants can go everywhere also seems a waste of time.

When they do work (e.g. in certain places in India[67]), corridors pose many problems regarding conflicts between people and elephants, due to the simple fact that they have to pass through a narrow strip surrounded by crops. Finally, the genetic advantage of corridors is above all theoretical: the genetic variability of a large population through reproduction alone is much higher than that resulting from the unpredictable arrival of a few individuals. Therefore a population of 300 animals from six founders with an interval of 15 to 20 years between generations conserves 90% of heterozygosity after 200 years (Conway, 1986). This is another advantage of blocks: each species can exist in sufficient numbers from a genetic point of view and if necessary, these blocks could be managed as components of a metapopulation[68], as in South Africa.

g. How would each block be organised?

Ideally, the conservation block, placed inside an area of sustainable agriculture, is made up of four different types of protected area:

[66] Which is the definition of migration.
[67] They are usually 6 km long and 3 km wide.
[68] This can include transferring reproductive animals if necessary.

- a national park (or natural reserve) in the centre,

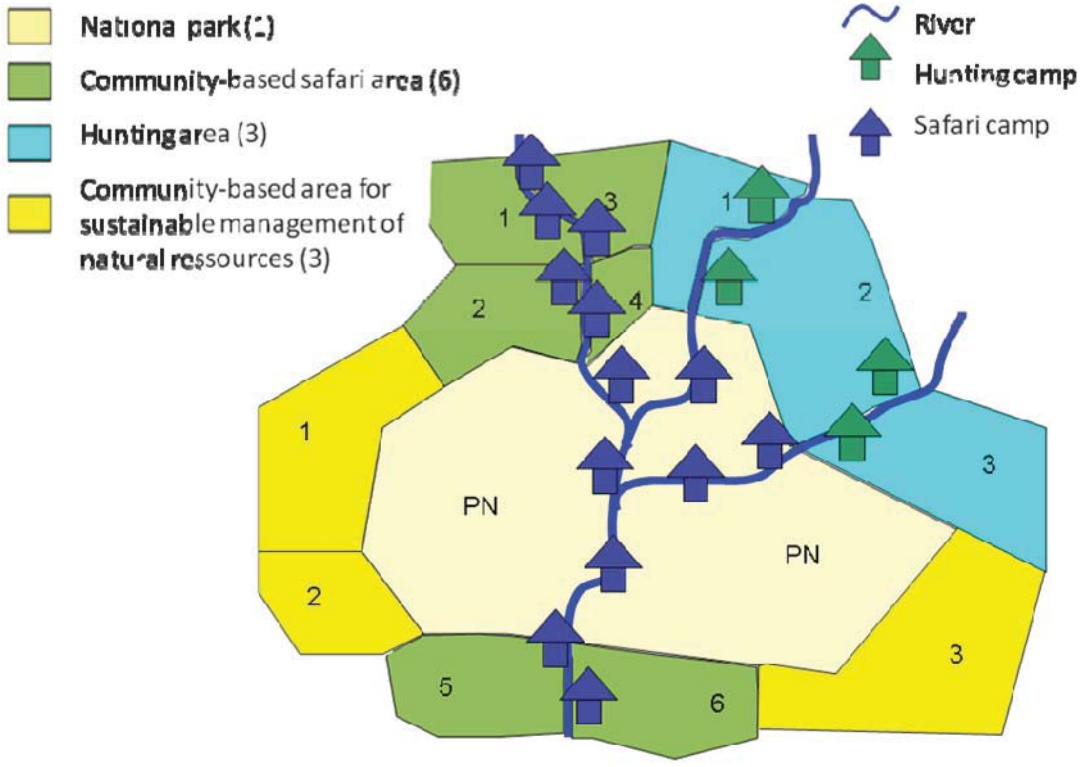
and a peripheral area made up of:

- hunting areas: community-based or government run,
- Community-based safari zones: mainly to set up small camps using ecological materials to be used for safaris on foot, night safaris, village visits and as a base camp from which to visit the national park,
- Community-based natural resource management zones: these are marginal zones where economic activity based on wildlife would be too low, but where the vegetation is worth conserving for the use of the local communities and as a periphery to the block. It can sometimes be used for hunting or safaris.

The rule is that the local ecosystem depending on a river (that is to say both banks) must be classified with the same status and be operated in the same way: in this way there are practically no predatory zones. At worst, one bank of the river can be classified as national park and the other as community-based safari zone, but never as a hunting area.

The following diagram illustrates the recommended use of space within a region of sustainable agricultural (or agro-pastoral) activity.

Map No. 9: Theoretical organisation of a conservation block



The above diagram presents a layout with three hunting areas, six community-based safari zones (smaller in size with the high possibility of developing small eco-camps) and three community-based natural resource management zones (larger in size, less favourable for wildlife in the dry season due to the lack of rivers, but that could provide habitat in the rainy season).

h. What is the private sector's place?

The private sector can ensure effective management. It is nonetheless faced with two major constraints:

- It must make a profit, however, the sector has been described as not being very profitable if at all. A non-philanthropist private operator should not therefore apply to manage a protected area. This is an important point: the difference between private sector and NGO. The difference is the source of funding. If the private sector does not have its own source of funding, and is looking for public funding, it becomes an operator (like an NGO), and the attribution of the area must be subject to the rules of good governance.

- It cannot replace the government as regards its regulatory responsibilities, the top of the list being surveillance. All the examples in Africa show that very short term success is followed by total failure in the medium term[69]. This means that if the government seeks to offload its responsibilities on the private sector, because it cannot (or does not want to) fulfil its regulatory role, conservation will not be sustainable. The primary condition therefore for the private sector to operate in a country is that there be rule of law, meaning that the government assumes its regulatory responsibilities.

Regardless of economic and governance hurdles, the private sector will also be confronted with a problem of expertise: competent, experienced human resources in the same region[70], and who are aware of the communities' expectations are not legion.

[69] A phenomenon denounced elsewhere as "environmental imperialism".
[70] Africa is so diverse that local expertise is difficult to export in the short term.

CONCLUSION

This study has made it possible to clarify the role of big game hunting in Africa, and more specifically in West Africa.

This role is negligible from an economic and social point of view, particularly in light of the considerable surface areas concerned. Therefore, big game hunting has a rather negative effect on development.

As regards conservation, big game hunting gives mixed results:

- There is great disparity between zones.
- The results of conservation, for the same level of management, are lower than those obtained by neighbouring national parks.
- Hunting areas are less able to withstand pressure from the peripheral areas than national parks.
- Hunting areas take up vast areas of land: 15% of the territory of the 11 main hunting countries (for around 18 500 tourist hunters/year), which is in addition to the 9.5% taken up by other protected areas. The total is well above the recommended 12%, which could be counterproductive and cannot be acceptable to local communities in the long term.

This means that in the future, hunting areas will play a lesser role in conservation strategies than they have in the past.

The strong point of hunting areas in terms of conservation is that they are self-financing: this is an important advantage, particularly in a context where funding is hard to come by.

Certain conservation strategies have been based on a theory developed around thirty years ago, according to which wildlife had an economic value which would convince local communities to preserve it. All the figures, maps and data consulted show that this theory is in fact untenable and that the economic value is not sufficient to generate the expected behaviour change.

It is in the interests of the big game hunting sector to change its way of thinking and communicating, and to reposition itself clearly where it can have a positive effect as conservation agent. Unless this is done within an overall strategy, reticence regarding hunting may grow, as seen in the decision taken this year by Botswana. Indeed, the socio-economic figures of big game hunting are too low to convince local decision-makers or the leaders of a country.

This conservation strategy must integrate hunting into a wider protected area network. The current networks are for the most part inherited from the colonial period and are run according to obsolete economic theories. The protected area network now needs to be defined in light of current realities:

- Demographic explosion and the legitimate search for land for agriculture and livestock,
- The global tourism explosion,
- The transfer of land and wildlife usage rights to the local communities and the creation of community-private sector partnerships
- the notion of services rendered by ecosystems
- The emergence of sustainable financing mechanisms
- Environmental awareness.

To become players in conservation, hunting areas must first of all collaborate in conservation efforts. This means that they must no longer prey on other protected areas. A change in mentality is needed because national parks are not there to produce game for local hunters.

It is therefore a priority in the context of setting up protected area networks to redefine these geographically, including hunting areas of course.

Once the conservation context is clarified, governance of the big game hunting sector must be reviewed or else this activity will gradually be relegated to surviving lawless areas before disappearing altogether, as has happened in Botswana.

In the years to come, the protected area networks must be redefined to better integrate hunting activities. This should be done on a regional level to integrate "blocks" that are large enough to guarantee the long-term preservation of biodiversity. Demographic and agro-pastoral pressure is such in West Africa these days that few countries can still constitute such blocks to be classified or managed as national parks, and it is becoming urgent to do so.

In this modern protected area network, hunting areas still have an important conservation role to play: that of financing and maintaining the peripheral zones.

APPENDIX

Non-exhaustive list of the documents consulted

- AGEFORE: Schéma directeur d'aménagement 2006-2016 de l'aire protégée transfrontalière Bafing-Falémé. Ministère de l'Environnement et de l'Assainissement du Mali, 2005.
- AGEREF Comoé Léraba: Etat d'exécution cumulée 2003-2007. MECV, 2008.
- Baldus R.: The crucial role of governance in ecosystem management. Results and conclusions of the Selous conservation programme Tanzania 1987 – 2003. Tanapa-FZS, 2006.
- Baldus R. et Cauldwell A.: Tourist hunting and it's role in development of wildlife areas in Tanzania. GTZ, 2004.
- Bouché P. et al.: Recensement aérien total de l'écosystème WAPOK, Mike. 2003.
- Bouché P. et al.: Recensement aérien total de faune dans l'écosystème naturel Po-Nazinga-Sissili. Mike, 2003.
- Bouché P. et al.: Inventaire aérien total PAGEN (Burkina Faso). MECV, 2005.
- Boulet H. et al.: Mission d'appui à la chasse touristique au Bénin. Ecopas. 2002.
- Caro T.M. et al.: Consequences of different forms of conservation for large mammals in Tanzania: preliminary analyses. Afr.J.Ecol. vol.36, 1998.
- Caro T.M. et al.: Animal breeding systems and big game hunting: models and application. Doi:10.1016/j.biocon.2008.12.018. 2008.
- Caro T. et al.: The impact of tourist hunting on large mammals in Tanzania: an initial assessment. Afr.J.Ecol. vol 36, 1998.
- Cenagref: Plan de gestion du PN de la Pendjari, 2004.
- Cenagref: Plan d'affaires du PN de la Pendjari, 2007.
- Cenagref: Dénombrements aériens de la Réserve de Biosphère de la Pendjari. 2002.
- Cenagref: Dénombrements aériens de la Réserve de Biosphère de la Pendjari. 2006.
- Cenagref: Dénombrements aériens de la Réserve de Biosphère de la Pendjari. 2008.
- Conservation Finance Alliance: Revue des expériences des fonds fiduciaires pour la conservation de la biodiversité. FFEM-AFD-KFW-CI-WWF. 2008.
- DFC: Burkina Faso: Rapport bilan de 10 années de campagne de chasse. 2006.
- DFC: Rapport d'évaluation final de 9 concessions fauniques. MECV, 2006.
- DFC: Rapport de la saison de chasse 2004-2005. MECV, 2005.
- DFIDs Rural Livelihoods Department: Wildlife and poverty study, 2002.
- Dickson B., Hutton J. et Adams W. (Ed.): Recreational hunting, conservation and rural livelihoods. ZSL, 2009.
- Direction National des Eaux et Forêts de Guinée: Stratégie Nationale de gestion des éléphants en République de Guinée. 2006.
- FFEM: gestion communautaire de la biodiversité autour des aires protégées de la région ouest du Ghana. FFEM, 2006.
- Hausser Y.: Evaluation des zones de grande chasse du Bénin. GFA. 2009.
- IGF: Comptages en action de chasse, Cameroun. Paris, 2007.
- IGF: Comptage en action de chasse, RCA. Paris, 2007.
- IGF: Validation de la méthode de comptage en action de chasse. Paris, 2007.
- IGF: Conservation status of the lion in Mozambique. Paris, 2009.
- IGF: Le tourisme de grande chasse, un outil de développement durable en Afrique sub-saharienne. Paris, 2008.
- Kideghesho J.R.: Who pays for wildlife conservation in Tanzania and who benefits? Sokoine University of Agriculture, Tanzania. 2008.
- Lindsey P.A. et al.: Economic and conservation significance of the trophy hunting industry in sub-saharan Africa. Biological conservation I 34. 2007.

- Lindsey P.A. et al.: Potential of trophy hunting to create incentives for wildlife conservation in Africa where alternative wildlife-based land uses may not be viable. Animal conservation 9, 2006.
- Lindsey P.A. et al.: The importance of conservancies for enhancing the value of game ranch land for large mammal conservation in southern Africa. Journal of Zoology 277. 2009.
- Lindsey P. et al.: Trophy hunting and conservation in Africa: Problems and one potential solution. Conservation Biology, 2006.
- Minfof Cameroun: Plan d'aménagement du Parc national de Boubandjida et de sa zone périphérique, FFEM, 2008.
- Ministère de l'Environnement et de l'Assainissement du Mali: Recueil des textes législatifs et règlementaires. 2007.
- MWH: Profil environnemental de la Guinée Bissau. Commission Européenne, 2007.
- NAMC: Report on the investigation to identify problems for sustainable growth and development in South African wildlife ranching. 2006.
- Nelson F. et al.: The evolution and reform of Tanzanian wildlife management. Conservation and Society, 5 2, 2007.
- Nelson F.: Gestion communautaire de la faune sauvage en Tanzanie. IIED, 2007.
- Nelson F.: Evolution et impacts de l'écotourisme communautaire dans le nord de la Tanzanie. IIED, 2004.
- N'golo Fanny: Geprenaf, financing of Pilot Community based natural resources and wildlife management project. 2003.
- NRCF: The impact of wildlife management policies on communities and conservation in game management areas in Zambia. 2008.
- NRCF: The real economic impact of nature tourism in Zambia. 2007.
- Omondi P. et al.: Total aerial count of elephants and other wildlife species in National Parks and adjacent hunting blocks in northern Cameroon. WWF-FFEM-Minfof, 2008.
- Owen-Smith N. et al.: A scientific perspective on the management of elephants in the Kruger National Park and elsewhere. South African Journal of science. 2006.
- Patterson C. & Patson Khosa: A status quo study on the professional and recreational hunting industry in South Africa. Traffic East/southern Africa. 2005.
- PNGT: Occupation des terroirs au Burkina Faso. 2002.
- Renaud P.C. et al.: Inventaire aérien et terrestre de la faune et relevé des pressions au Parc national du Niokolo Koba. MEPN, 2006.
- Renaud P.C. et al.: Recensement aérien de la Faune de la région nord de la RCA. MEFCPT, 2005
- République de Guinée: Code de la Chasse. 1999.
- République Islamique de Mauritanie: Code de la chasse et de la protection de la nature. 1997.
- République du Sénégal: Arrêté fixant les modalités d'exercice de la chasse au titre de la saison cynégétique 2004-2005. 2004.
- République du Sénégal: code de la chasse et de la protection de la faune. 1986.
- Roulet P.A. et al.: Le tourisme cynégétique en RCA. Ambassade de France en RCA, 2008.
- SANPARKS: Coordinated policy framework governing management plans. Pretoria, 2006
- SCI: The benefits of hunting. 2008.
- UICN Paco: Evaluation du réseau des aires protégées du Burkina Faso (Rappam). 2009.
- UICN Paco: Evaluation du réseau des aires protégées du Mali (Rappam). 2007.
- UIUCN Paco: Evaluation du réseau des aires protégées de Guinée (Rappam). 2007.
- UICN Paco: Evaluation du réseau des aires protégées du Togo (Rappam). 2008.
- UICN Paco: Evaluation du réseau des aires protégées de Guinée Bissau(Rappam). 2007.
- UICN Paco: Evaluation du réseau des aires protégées de Mauritanie (Rappam). 2007.
- UNESCO: Fiche Selous 2008.
- Wildlife Division (Ghana): A briefing document on collaborative resource management in Ghana. Forestry Commission, 2004.
- Wildlife Trust of India: Right of passage: Elephant corridors of India, 2005.
- ZAWA: Rapport annuel 2007.

PROGRAMME AFRIQUE CENTRALE
ET OCCIDENTALE
01 BP 1618 Ouagadougou 01
Tél: (+226) 50 36 49 79
Site Web: www.papaco.org
E-mail: paco@iucn.org
Burkina Faso

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

FFEM
Fonds Français pour l'Environnement Mondial

Tab 9

PAPACO STUDIES - NUMBER 2

BIG GAME HUNTING IN WEST AFRICA

WHAT IS ITS CONTRIBUTION TO CONSERVATION?

UICN – Programme Aires Protégées d'Afrique du Centre et de l'Ouest – PAPACO
(IUCN – *West and Central African Protected Areas Programme – PAPACO*)

The geographical terminology used in this study, and its presentation, are in no way an expression of any opinion on the part of the IUCN regarding the legal status or authority of any country, territory or region or on the tracing of its borders.

The opinions expressed in this publication are not necessarily those of the IUCN.

Published by: IUCN, Gland, Switzerland and Cambridge, United Kingdom.

Citation: UICN/PACO (2009). La grande chasse en Afrique de l'Ouest: quelle contribution à la conservation ? (Big Game Hunting in West Africa. What is its contribution to conservation?

ISBN: 978-2-8317-1204-8

Cover photo: Bertrand Chardonnet
Photo credit: Bertrand Chardonnet

Produced by: IUCN – PACO – Protected Area Programme (see www.papaco.org)

Available from:

UICN – Programme Afrique Centrale et Occidentale
01 BP 1618 Ouagadougou 01
Burkina Faso
Ph. (226) 50 36 49 76
E-mail: paco@iucn.org
Website: www.iucn.org/places/paco and www.papaco.org

The "études du Papaco" (Papaco Studies) series offers documented analyses which aim to stimulate reflection and debate on the conservation of biodiversity in West and Central Africa.

It sheds light on a situation or a topic, but does not claim to provide an exhaustive coverage of the subject.

Readers wishing to deepen the analysis, add ideas or share their opinions on the topics raised, are strongly encouraged to do so by sending their comments to: **uicn@papaco.org**

Pertinent contributions will be put on line at **www.papaco.org**, under the section "études du papaco" where a discussion forum is opened for each study.

The complete report used to prepare this document in the "études du Papaco" series was written by Bertrand Chardonnet, in French, with the title "Grande chasse en Afrique de l'Ouest: contribution à la conservation ?" (Big Game Hunting in West Africa. What is its contribution to conservation?)

It is also available on the website www.papaco.org under the "études du Papaco" section.

This study was carried out with the financial support of the Fonds Français pour l'Environnement Mondial (French Fund for the World's Environment).

CONTENTS

LIST OF MAPS

LIST OF ACRONYMS

Acronym	French	English
ACP	Association des Guides de Chasse Professionnels (France)	Association of professional hunting guides (France)
AFD	Agence Française de Développement	French Development Agency
AGEREF	Association de Gestion des Réserves de Faune	Wildlife reserve management association
AP	Aire Protégée	Protected area
APFC	Association pour la Protection de la Faune Centrafricaine	Association for central African wildlife protection
AVIGREF	Association Inter-Villageoise de Gestion des Ressources Naturelles et de la Faune	Inter-village wildlife and natural resource management association
CAMPFIRE	Communal Areas management Programme for Indigenous Resources	-
CBNRM	Community Based Natural Resources Management	-
CENAGREF	Centre National de Gestion des Réserves de Faune	National centre for wildlife reserve management
CREMA	Community Resource Management Area	-
CVGF	Comité Villageois de Gestion de la Faune	Village wildlife management committee
DFC	Direction de la Faune et des Chasses	Directorate of wildlife and hunting
DG	Direction Générale	General Directorate
DNCN	Direction Nationale de la Conservation de la Nature	National Directorate of Nature Conservation
FAO	Organisation des Nations Unies pour l'Alimentation et l'Agriculture	Food and Agriculture Organisation (UN)
FEM	Fonds pour l'Environnement Mondial	Global Environment Facility (GEF)
FIC	Fonds d'Intérêt Collectif	Collective interest fund
FFEM	Fonds Français pour l'Environnement Mondial	French Fund for the World's Environment
FFRB	Fondation Française pour la Recherche sur la Biodiversité	French foundation for biodiversity research
FMI	Fonds Monétaire International	International Monetary Fund (IMF)
GEPRENAF	Gestion Participative des Ressources Naturelles et de la Faune	Participative management of natural resources and wildlife
GMA	Game management Area	-
GTZ	Coopération Technique Allemande	German development cooperation agency (now GIZ)
IGF	Fondation Internationale pour la Gestion de la Faune	International foundation for wildlife management
IK	Zone d'Intérêt Cynégétique à Gestion Communautaire	Community-managed hunting interest area
IPHA	Association Internationale des Guides de Chasse Professionnels	International professional hunters' association
LRA	Armée des Rebelles du Seigneur	Lords' Resistance Army
MIKE	Monitoring Illegal Killing of Elephants	-

NAMC	Natural Agricultural Marketing Council (South Africa)	-
NCRF	Natural Resources Consultative Forum	-
OFINAP	Office National des Aires Protégées	National office of protected areas
OMT	Organisation Mondiale du Tourisme	World Tourism Organisation (WTO)
ONG	Organisation Non Gouvernementale	Non-governmental Organisation (NGO)
PAPACO	Programme Aires Protégées d'Afrique du Centre et de l'Ouest de l'UICN	IUCN's Central and West African protected areas programme
PFNL	Produits Forestiers Non Ligneux	Non-wood forest products
PIB	Produit Intérieur Brut	Gross Domestic Product (GDP)
PN	Parc national	National park
PNKK	Parc national du Niokolo Koba (Sénégal)	Niokolo Koba National Park (Senegal)
PNUD	Programme des Nations Unies pour le Développement	United Nations Development Programme (UNDP)
RCA	République Centrafricaine	Republic of Central Africa
RDC	République Démocratique du Congo	Democratic Republic of Congo (DRC)
SanParks	Parcs nationaux d'Afrique du Sud	National parks of South Africa
SCI	Safari Club International	-
TANAPA	Tanzanian National Parks	-
TRAFFIC	Wildlife Trade Monitoring Network	-
UNWTO	Organisation des Nation Unies pour le Tourisme	UN World Tourism Organisation
UICN	Union Internationale pour la Conservation de la Nature	International Union for the Conservation of Nature (IUCN)
USAID	Agence de Coopération des USA	US Agency for International Development
UTO	Unité Technique Opérationnelle	Technical operational unit
WMA	Wildlife management Area	-
WWF	Fonds Mondial pour la Nature	World Wide Fund for Nature
ZAWA	Zambian Wildlife Authority	-
ZCV	Zone Cynégétique Villageoise	Village hunting area
ZIC	Zone d'Intérêt Cynégétique	Hunting interest area
ZOVIC	Zones Villageoises de Chasse	Village hunting area

RESUME

La grande chasse occupe aujourd'hui des surfaces très importantes en Afrique sub-saharienne (approximativement 1,4 million de km²), ce qui représente 22% de plus que la surface de tous les parcs nationaux de cette région. C'est donc une composante importante des paysages ruraux de nombre de pays d'Afrique sub-saharienne. La présente étude vise à préciser le rôle de la grande chasse en Afrique, et plus spécifiquement en Afrique de l'Ouest. L'analyse des données récoltées a permis de préciser la pertinence de la grande chasse selon des critères de conservation, socio-économique et de bonne gouvernance.

Sur le plan de la conservation, la grande chasse présente des résultats irréguliers: il existe des zones de chasse qui sont stables géographiquement et dont les populations de faune sauvage sont importantes, mais ce n'est pas le cas général. Une grande disparité de qualité existe entre les zones. Les résultats de conservation, à niveau de gestion égale, sont moins bons que ceux obtenus par les parcs ou réserves qui sont leurs voisins. Les zones de chasse sont moins à même de résister aux pressions venues de la périphérie que les parcs, et jouent par conséquent un rôle moindre dans les stratégies futures de conservation. Un point positif indéniable du résultat de conservation obtenu, est qu'il l'a été avec un financement donné en quasi-totalité par les chasseurs, sans l'aide de bailleurs de fonds, et souvent sans l'engagement des Etats.

Sur le plan économique, les résultats sont très faibles. L'usage du sol par la grande chasse ne supporte pas la comparaison avec les autres usages agro-pastoraux, parfois dans un rapport très élevé. Les contributions de la grande chasse aux PIB et aux budgets des Etats sont négligeables au regard des surfaces concernées. Les sommes générées à l'ha, tant pour le secteur privé que pour les Etats n'atteignent pas les ratios nécessaires pour un bon aménagement. Les retombées pour les populations, même dans le cadre de projets spécifiques, sont négligeables, et ne peuvent pas les inciter à arrêter le braconnage et le développement des zones agricoles. Le nombre d'emploi créés (15 000 pour toute l'Afrique), est faible au regard des 150 millions d'habitants qui peuplent les huit principaux pays de chasse, et par rapport aux surfaces utilisées (16,5% de ces huit pays). Au total, le secteur est consommateur d'espace sans retour socio-économique à la hauteur.

La « gouvernance » est également absente de pratiquement toute la filière de la grande chasse pour un bon nombre de pays. Les personnes qui ont le contrôle actuel du système ne sont pas prêtes à partager le pouvoir et à se lancer dans des ajustements qu'ils ne contrôlent pas. Ils tentent, grâce à l'opacification du système, de faire perdurer un système de gestion qui est largement essoufflé. Cette position sert des intérêts particuliers, mais pas l'intérêt de la conservation, des Etats, ou des communautés locales.

La chasse a joué, et joue encore, un rôle de conservation en Afrique. Il n'est pas certain qu'elle le jouera à l'avenir dans les mêmes conditions. Par contre, elle ne joue pas de rôle économique ou de rôle social significatif, et ne contribue pas à la bonne gouvernance.

La question peut cependant se résumer ainsi: peut-on faire mieux en conservation de ces zones que ce qu'a fait la grande chasse jusqu'à présent ? Cela n'est pas sûr, d'autant plus que la grande chasse s'est autofinancée.

L'avènement de la rétribution des services environnementaux et des financements durables permet d'envisager le financement des réseaux d'aires protégées sous un angle nouveau. L'environnement est de plus en plus considéré comme un bien global qui ne peut être utilisé pour des intérêts exclusifs particuliers ou d'une minorité.
Dans les réseaux modernes d'aires protégées, les zones de chasse ont encore un rôle de conservation important à jouer: celui du financement et du maintien des zones périphériques des blocs de conservation.

SUMMARY

Today in sub-Saharan Africa, very large areas are used for big game hunting (approximately 1.4 million km²), which is 22% more than all national Parks of the region. Therefore, it is an important component of African rural landscapes. This study clarifies the role of big game hunting, with an emphasis on West Africa. The data gathered has been analysed to clarify the pertinence of big game hunting according to conservation, socio-economic and good governance criteria.

Regarding conservation, big game hunting shows mixed results. Some areas are geographically stable, and wildlife populations are significant, but this is not the norm. Large disparities are seen between areas. Where management levels are similar, the conservation results from big game hunting are lower than those of neighbouring national parks or reserves. Hunting areas are less resistant to external pressures than national parks, and thus will play a lesser role in future conservation strategies. An undeniable positive result is that the conservation results that are obtained are entirely financed by the hunters, without support from donors and often without government commitment.

The economic results of big game hunting are low. Land used for hunting generates much smaller returns than that used for agriculture or livestock breeding. Hunting contributions to GDP and States' national budgets are insignificant, especially when considering the size of the areas concerned. Economic returns per hectare, for the private sector and for governments are insufficient for proper management. Returns for local populations, even when managed by community projects (CBNRM) are insignificant, and cannot prompt them to change their behaviour regarding poaching and agricultural encroachment. The number of salaried jobs generated (15 000 all over Africa) is low considering that 150 million people live in the eight main big game hunting countries, and that hunting takes up 16.5% of their territory. To summarise, the hunting sector uses up a lot of space without generating corresponding socio-economic benefits.

Good governance is also absent from almost the entire big game hunting sector in many countries. Those who currently have control of the system are not prepared to share that power and undertake adjustments that would mean relinquishing control. They attempt, thanks to a fairly opaque system, to keep a largely exhausted management system going. This position serves individual interests, but not those of conservation, governments or local communities.

Hunting used to have, and still has, a key role to play in African conservation. It is not certain that the conditions will remain the same. Hunting does not however play a significant economic or social role and does not contribute at all to good governance.

The question, however, can be summarised today as: can we do conservation better than big game hunting has up until now, in those areas where big game hunting is practiced? This is not at all sure, all the more so in that big game hunting pays for itself.

The advent of consideration of environmental services and sustainable financing makes it possible to envisage financing these networks from a new angle. The environment is increasingly seen as a global good which cannot be used exclusively for individual interests or those of a minority.

In modern protected area networks, hunting areas still have an important role to play in conservation: that of financing and maintaining the peripheral areas around conservation blocks.

10 Summary sheets
to understand the role of big game hunting

The scale of big game hunting in Africa

The People

Around 18 500 tourist hunters go big game hunting in Africa every year. Hunts are organised by approximately 1 300 organisations that employ around 3 400 guides and 15 000 local staff. On average, a hunting safari[1] organisation will only have an average of 14.5 hunt clients per year and each guide will only take 5.5 hunters out annually.

The Places

Big game hunting areas take up huge areas of land: for the 11 main big game hunting countries, the surface area occupied is 110 million hectares, in other words 14.9% of the total land area of these countries. In addition to these hunting areas, protected areas occupy, in these 11 countries, 68.4 million hectares, i.e. 9.4% of the national territory. The sum of the hunting areas and protected areas therefore represents 24.3% of the surface area of these countries. This leaves a proportion of the country for human habitation that is difficult to reconcile with the development of these countries, the population density of which averages 34 people per km^2.

Animals Killed

Tourist hunters kill around 105 000 animals per year, including around 640 elephants, 3 800 buffalo, 600 lions and 800 leopards. Such quantities are not necessarily reasonable. It can be noted for example, that killing 600 lions out of a total population of around 25 000 (i.e. 2.4%) is not sustainable. A hunting trip usually lasts from one to three weeks, during which time each hunter kills an average of two to ten animals, depending on the country.

Financial Flows

The annual turnover for big game hunting in Africa is estimated at $US200 million, in other words around 100 billion CFA F, half of which is generated in South Africa and the rest in the other countries of Sub-Saharan Africa. The contribution to the countries' GDP is 0.06% for the 11 main big game hunting countries. The contribution to national budgets is also low: one percent of the land classified as big game hunting territory contributes 0.006% to the government budget. The contribution of hunting to the national budget is highest in Tanzania, where it is still only 0.3% and uses 26% of the national land area.

Returns per hectare in big game hunting areas

On average, big game hunting generates a turnover of $US1.1/ha in the 10 big game hunting countries (excluding South Africa), which is very low compared to agricultural use (300 to 600 times more), in a context where the peripheral zones of protected areas are already occupied. This figure does not reach the minimum ratio for the cost of developing a protected area (at least $US2/ha), and can be seen as the sole explanation for the gradual degradation of hunting areas. The local community's share is around $US0.10/ha (or 50 FCFA/ha), explaining their lack of interest in preserving hunting areas and their continued encroachment and poaching.

[1] Translators note: in this document, the term "safari" used on its own refers to safaris for spotting and photographing animals only. When the safari is for the purposes of hunting, the term "hunting safari" is used.

The scale of big game hunting in West Africa

Surface area

The big game hunting sector covers around 13 000 km^2 in West Africa, in other words 2.2‰ of its surface area (6.139 570 km^2). This is low with regard to the surface area of protected areas which cover around 10% of this territory. The potential for future extension of hunting areas is, however, very limited. In fact, hunting areas only really concern two countries (Burkina Faso and Benin), covering around 3.5% of their land area.

Economic Gain for Governments

The total big game hunting income for all countries in West Africa is 340 million CFA F per year. For the government, this income represents only 0.65 (Benin) and 2.35 (Burkina Faso) per ten thousand of the State budget. The contribution to the GDP of the countries is low with regard to the surface area concerned: 0.08‰ in Benin and 0.17‰ in Burkina Faso. It can therefore be considered that big game hunting takes up considerable areas of land in both these countries, without any real gain on a per hectare basis:

Criterion	Burkina Faso	Benin
% of the national territory	3.4	3.5
% of the State budget	0.0235	0.0065
% of GDP	0.017	0.008

The economic productivity of hunting areas is therefore negligible for these two countries.

The contribution to the socio-economic well-being of the populations

The number of jobs created is also low for the 3.5% of the national territory that is used: it is estimated at 400 permanent staff (for at least 6 months per year) and 400 temporary staff (for less than 2 months per year). It should be recalled that these countries have a total population of 19.4 million. The total return on big game hunting for all West Africa is around 80 million CFA F/year. On a per hectare basis, the average return for the population is very low: around 60 CFA F/ha used for big game hunting, while these zones are located in favourable farming land, where cotton for example would generate 150 000 CFA F/ha, in other words 2 500 times more.

West Africa in the African hunting industry

Hunting safaris here are the cheapest in all Africa (slightly higher in Benin), and at these prices it is unlikely that local operators make a profit commensurate with the investments required. In a market governed by supply and demand, this demonstrates just how unattractive the services offered are in this region. Around 370 big game hunters come to Benin and Burkina Faso per year, out of a potential of 18 500 hunters every year in Africa; in other words, 2% of the market.

The future of big game hunting in conservations strategies

Apart from Burkina Faso and Benin, the relatively poor results of the big game hunting sector and the clearly low potential in the other countries would seem to indicate that the future for conservation in West African countries does not lie in setting up big game hunting areas.

The conservation value of big game hunting

Conservation objectives and indicators

Conservation is about preserving the current ecological capital, or even increasing it. We focussed on four indicators:

- How well hunting area perimeters are preserved: this helps establish the resistance of "hunting areas" to pressure.
- How well vegetation coverage is maintained within hunting areas, that is to say how hunting areas can maintain habitat quality which helps sustain wild animals.
- To what extent the list of animal species present in the hunting area is maintained: are certain species better preserved by hunting areas than others?
- Changes in the populations of different wildlife species within the hunting areas.

Assessing management levels

These indicators are often studied in comparison with a neighbouring protected area where hunting is not allowed (national parks, reserves etc.). Such areas need to be sufficiently well-managed (including surveillance), even if not to the same level as the management of the neighbouring hunting area. Only analogous sites are compared; weighing up an abandoned protected area with a managed hunting area would not give pertinent data.

The management of hunting areas is self-financed by hunters, and therefore exists when hunting is carried out. Even if hunting area management is not ideal; at least it exists.

Large disparity in value among hunting areas

The first finding is that there is a large disparity in the quality of the different hunting areas. There are clearly hunting areas which fulfil their conservation role well, have geographically stable perimeters and have large wild animal populations, but this is not the general rule.

Comparison of hunting areas and UICN Category II "National Parks"

Hunting areas seem to have lower performance levels than national parks, for an equivalent management level:

- In the preservation of their perimeters
- In the preservation of vegetation that is found there
- National parks play a greater role in the conservation of species that are particularly sensitive to human pressure
- Hunting areas almost always have a lower animal population density than national parks

In total, for equivalent management levels, hunting areas play less of a role in conservation than national parks, which is fairly logical in light of their vocation. Hunting areas seem less well armed than national parks to deal with the future challenges that will be faced by protected areas.

What is the future of conservation in hunting areas?

Hunting areas probably have an important role to play in stabilising the peripheral areas of conservation blocks. The fact that they are self-financing also places them in an ideal position, so long as protected area networks do not have sustainable financing and would have no other option than to simply abandon the conservation block. Today, when government commitment and funding for conservation is insufficient, hunting areas represent an interesting option. It is not sure that this will be the case in the future with the increase of human pressure and the setting up, we hope, of well-functioning protected area networks.

Big Game Hunting and Demography

Big game hunting and the space required

Big game hunting requires vast areas of land to be sustainable. The 11 main big game hunting countries in Africa allocate 110 million hectares to this activity, carried out by 18 500 hunters, in other words around 6 000 ha per hunter. These hunting areas represent 14.9% of the surface area of these 11 countries which also count a total population of 250 million inhabitants for an average population density of 34 people per km^2.

The context of the demographic explosion

The population of the majority of these African countries has quadrupled since the 1960s, a period where the majority of protected areas were already classified. Furthermore, this population has been condensed due to the years of drought in the Sahel and elsewhere, which modified the isohyets and brought herders into contact with farmers, leaving, in the end, little space unoccupied. The notion of marginal or abandoned land has practically disappeared.

Areas available for big game hunting

These days, with demographic growth, the land available for hunting areas is diminishing. During this study, a statistical link was able to be made between human density and the proportion of the national territory allocated to big game hunting, whereby if the human population density of the country is 30 inh/km^2, the country classifies 16% of its land for big game hunting. When the density rate is 70 inh/km^2, the proportion of the territory falls to 6%. In the majority of the countries hunting areas are therefore threatened simply by the demographic explosion and this should be taken into account when drawing up future policy.

Demography and protected area networks

In the 11 main big game hunting countries, protected areas take up 9.4% of the national surface area, to which is added the 14.9% of hunting areas. This represents a total of 24.3% dedicated to conservation (or to the sustainable use of wildlife), a figure much greater than the 12% required by international standards. The fight against poverty, the quest for food security and the demographic explosion are not compatible with this figure of 24% that will certainly drop considerably in the future, and to the detriment of which? Protected areas or hunting areas? The protected area networks must therefore work to preserve the most useful 12%, as the rest could be counterproductive for conservation by hindering human development.

In the current demographic context, what is the use of big game hunting?

The poor socio-economic returns on big game hunting noted by this study and its lower performance levels in terms of conservation do not make it a priority solution for land use or conservation in the future. Kenya for instance has seen its population multiplied by 2.7, going from 14 million in 1977 (when hunting was stopped) to 38 million in 2008, in other words a density that has shot up from 24 inh/km^2 to 65 inh/km^2. However, this country has at the same time developed a tourism sector that is 40 times larger than the hunting sector at the time, focusing on a network of protected areas that cover 8% of the national territory.

Big game hunting can therefore be seen as a complementary conservation tool to protected areas, being one of the possible options for developing the peripheral areas of conservation blocks. It should not be used to replace protected areas.

Big Game Hunting and Gross Domestic Product

General data

An important item of data for analysing development is Gross Domestic Product (GDP): in absolute terms, per unit of surface area and per capita. The table below presents the figures for the main big game hunting countries:

Country	Contribution of big game hunting to GDP as a %	% of national territory covered by hunting areas	GDP per hectare in $US	GDP from hunting in per hectare in $US
South Africa	0.04	13.1	2092	2.1
Namibia	0.45	11.4	76	13.9
Tanzania	0.22	26.4	135	0.7
Botswana	0.19	23.0	186	12.7
Zimbabwe	0.29	16.6	142	1.4
Zambia	0.05	21.3	145	0.4
Cameroon	0.01	8.4	386	0.1
Republic of Central Africa (RCA)	0.10	31.5	24	0.3
Ethiopia	0.01	0.8	118	0.02
Burkina Faso	0.02	3.4	221	0.07
Benin	0.01	3.6	423	0.05

It can be noted that the GDP values per hectare in Benin and Burkina Faso are close to those obtained by agricultural production (around $US300/ha).

Low productivity of big game hunting

On average for these 11 countries, the surface area occupied by big game parks is 14.9% of national territory, and the contribution of big game hunting to the GDP is 0.06%. This makes the economic productivity of these hectares very low. This information shows that hunting is not a good option for land use, in particular in a context where priorities are to reduce poverty and establish food security. However, big game hunting (unlike small game hunting) is essentially carried out on land exclusively reserved for that purpose.

The least productive countries per hectare are Ethiopia (hunting areas have virtually disappeared there), Burkina Faso and Benin (where hunting trips are very cheap), Cameroon (where hunting areas are under high pressure from agriculture). These are the countries where closing down of hunting could make the biggest contribution to development by freeing-up land that is not very economically productive (but what would the consequences be for conservation?). These are also the countries where it is most difficult to change local communities' attitudes to conservation, due to the lack of any gain for them.

Find a more productive and eco-sensitive option

Those who are doing the best economically-speaking are Namibia and Botswana. And yet, Botswana decided that better value would be obtained from running safaris and they closed down hunting in the Okavango in 2009. This option should be studied in more depth in the other countries.

What is the place for big game hunting in this context?

The socio-economic contribution and the contribution to development of big game hunting are virtually nil. Therefore, the main overall interest of big game hunting lies in its value as a conservation tool. It is this value that should be increased by better integrating hunting into conservation strategies.

Big Game Hunting and Employment for local populations

Number of jobs created by big game hunting

The data relating to the number of jobs created by big game hunting are summarised in the table below:

Country	Hunting area size in km²	Number of jobs	Number of ha per job
South Africa	160 000	5 500	2 909
Namibia	94 052	2 125	4 426
Tanzania	250 000	4 328	5 776
Botswana	103 451	1 000	10 345
Cameroon	39 830	1 200	3 319
Central African Republic	196 035	670	29 259
Burkina	9 340	280	3 336
Benin	4 000	100	4 000
TOTAL	**856 708**	**15 203**	
Average			**5 635**

Job insecurity

It can be noted that these jobs are not all permanent; many of them only last for the hunting season, i.e. six months, and most are temporary jobs to open the trails at the beginning of the season (one to two months).

Summary

The 8 countries of the above table have a total population of 140 million people. Big game hunting takes up 16.5% of the territory but overall only offers one job for every 10 000 inhabitants. It is therefore a very modest employer. The average is around one permanent job for every 5 500 ha of hunting area: it is a very low figure in comparison to agriculture, and this constitutes an important incentive for the populations to transform hunting areas into farming land.

The example of Okavango (Botswana)

One of the main reasons behind the decision to stop hunting in the Okavango was to create jobs. In Botswana, a 10 000 ha safari park with a luxury camp of nine tents (18 beds) employs an average of 38 people, in other words 2.3 permanent jobs per bed. The ratio is therefore one permanent job for every 263 ha, as against one job for every 10 345 ha for hunting. In this case, safari tourism creates 39 times the number of jobs than big game hunting for an equivalent surface area.

The example of Luangwa National Park (Zambia)

In Zambia, tourism in the Luangwa National Park alone (a park that received 42 000 visitors in 2007) created 800 permanent and/or temporary jobs in Mfuwe (NRFC, 2008), which is more than the Central African Republic on 31.5% of the national territory reserved for hunting, and the double the number of jobs in the hunting sector of Benin and Burkina Faso together.

Big game hunting jobs – low contribution to social progress

The situation can be summarised by saying that the jobs proposed are precarious, few in number and are not competitive with the resources obtained from other usages of the land, including agriculture. In this, big game hunting does not effectively contribute to development despite taking up vast areas of land.

Big game hunting and economic benefits for local populations

What are the amounts that get redistributed to local communities?

- In Zambia, the economic benefits of big game hunting for the populations of all the Game Management Areas were, in 2006, one million US dollars (approximately 500 million CFA F) for 22% of the country's surface area.
- In Zimbabwe (Programme Campfire), each home (10 people) receives one to three US dollars per year (500 to 1 500 CFA F)
- In Namibia, the figure is somewhat different, because 56% of revenues come from tourism and 22% from hunting: $US1.75 million for 10.5 million inhabitants.
- In Tanzania: 42 district councils receive one million US Dollars per year for 250 000km^2.
- In RCA, the benefits for the population are 103 million CFA F for 34 714km^2 of Village Hunting areas (ZCV).
- In Benin, benefits equal around 35 million CFA F for 3 942km2 and 300 000 people.
- In Burkina Faso, the regular benefits estimated were 34.5 million CFA F in 2005 for 9 340 km^2.

Redistribution per ha used for big game hunting

Country	Income for communities per ha in $US	Income for communities per ha of hunting area in CFA F	Average number of people per ha
Zambia	0.06	30	0.16
Tanzania	0.04	20	0.43
Namibia	0.16	80	0.02
Central African Republic	0.06	30	0.07
Burkina Faso	0.07	37	0.56
Benin	0.18	88	0.78

Local communities therefore receive 20 to 88 CFA F per ha of hunting area, in other words a pittance. Tanzania is the country where local communities benefit the least from returns on big game hunting per hectare; Namibia and Benin redistribute the most.

What amounts are redistributed per person?

On average, big game hunting redistributes $US0.10 per ha of potential village land classified as a hunting area. Again, on average, each inhabitant can therefore hope to gain $US0.30 per year (in other words 150 CFA F/year). These very low figures are comparable with those of the Campfire Programme in Zimbabwe. Furthermore, it should be highlighted that this money does not always reach the beneficiaries (mediocre governance) and that it is most often used for community actions.

Do these benefits provide incentive?

Such low benefits do not motivate local communities. Therefore, it is in their “interests” not to respect the hunting area boundaries and to poach. Furthermore, this is what they do, the informal bush meat sector being much more profitable for them. Poachers are therefore the main beneficiaries of the wildlife sector in Ghana (the bush meat trade has an annual turnover of $US200 million) and in Ivory Coast, where there is no more big game but where bush meats represents an annual turnover of $US148 million. It is significant to note that the wildlife sector in Ghana has an estimated turnover per year that is higher than the entire big game hunting sector of the whole of Africa: the informal sector “works better” than the formal hunting sector and there is therefore no incentive to change the system. Unfortunately for conservation, the economic data are a strong incentive to continue poaching.

Big Game Hunting and Tourism

Alongside big game hunting, wild animals can generate safari tourism.

Sub-Saharan Tourism, a rapidly growing sector

Tourism has been growing sharply in the past 20 years, with 20 million tourists arriving in 1995, 47 million in 2010 and 77 expected in 2020. All the forecasts concur (World Tourism Organisation):

Geographical zone	Annual average % growth from 1995 to 2000	Annual average % growth from 2000 to 2010
Tanzania	10.0	9.3
Africa	6.0	5.6

West Africa is, however, largely left out of this growth, apart from coastal destinations (Senegal and Ghana).

Hunting tourism as a percentage of the overall sector

Tourism turnover has risen considerably in the past 20 years and the percentage of hunting within tourism, which was significant, has now become marginal in several countries like South Africa (1%) and Tanzania (3%) for example:

Country	% of turnover from hunting in tourism turnover	% of national land area taken up by hunting areas
South Africa	1.2%	13%
Namibia	6.6%	11%
Tanzania	2.7%	26%
Botswana	3.7%	23%
Zimbabwe	4.7%	17%
Zambia	3.6%	21%
Ethiopia	0.7%	0.8%

The ratio between hunting as a percentage of tourism and of land use

The few percentage points of tourism earnings provided by hunting require huge percentages of national land (8 to 26%). The ratio is therefore not favourable to developing big game hunting, the surface areas of which are in addition to other protected areas where most of the tourism takes place. It can clearly be seen that in countries with other vital vocations (in terms of development), big game hunting cannot maintain the position it held prior to the demographic explosion and that of tourism.

The example of Kenya

Tourism in Kenya is now approaching a turnover of $US1 billion per year (a figure that is equivalent to that of tourism in Tanzania), while the losses projected from closing hunting in 1977 were $US30 million, and are therefore minimal in comparison. Kenya has therefore clearly benefitted financially from stopping hunting, which would have diminished anyway under demographic (65inh/km^2) and agricultural pressure.

The stakes for West Africa

For West Africa the issue concerns catching up to the other countries in the global tourism race by proposing a strategy that complies with the overall values sought by tourists, along with institutional arrangements, more professionalism and real governance. This requires a greater importance being accorded to national parks and to the local communities surrounding them.

Hunting and the private sector

The contribution of the private sector

The private sector brings recognised management efficiency and procedural flexibility to the big game hunting sector. Thus, effectiveness and efficiency are greater. In the hunting field, the private sector is self-financing. This is not the case in the conservation field where it most often depends on external funding: becoming thus a simple operator.

The constraints of the private sector

The main constraint of the private sector is that is must make a profit, however, the big game hunting sector has been described as having low profitability or none at all. Furthermore, this is one of the reasons hunting areas often deteriorate, the sums allocated to management being insufficient to limit the effects of various pressures. For safaris, the niche is only beneficial under certain conditions which must be analysed beforehand. A “private” profit-seeking entity has therefore, in most cases, no interest in taking up a protected area managerial role. If the private sector does not have its own source of funding, it becomes a mere operator (as an NGO can be), and obtaining the protected area concession must then be subject to the rules of good governance.

Private Sector and the Regulatory Role

The principle is that the private sector cannot take the place of Government as regards its governing role, the primary aspect of which is surveillance. All the examples in Africa show that short term successes in replacing Government for these tasks have led to a striking failure in the medium term. This phenomenon, described as “environmental imperialism”, is, indeed, rapidly rejected by other stakeholders, first and foremost the local communities.

Implications for State Policy

This implies that if the Government seeks to offload these tasks onto the private sector because it does not want to (or cannot) fulfil its regulatory functions, conservation objectives cannot be met. The primary condition for the private sector to be able to intervene in a country is that the rule of law be upheld, and the corollary for this is that the Government fulfil its regulatory role.

Private Sector and Human Resources

Notwithstanding economic and governance-related obstacles, the private sector is then confronted with an expertise issue: competent human resources, experienced in the same region (Africa is so diverse that local expertise is difficult to export in the short term), and sensitive to the aspirations of the population are not legion…

Private Sector and Marketing

The development of modern tourism involves the private sector, as is demonstrated by the privatisation of most state-owned hotels. As for any economic activity, the quality of operators varies and governance measures need to be set in place to monitor them. These will aim at selecting the best operators, contributing thus to improving the country’s brand image. The clientele will follow if the country’s brand image and the operator are good.

The position of the local communities: Rights of use and partnership with the private sector

Experience of Community Managed Projects

Over the past 20 years, many natural resource management programmes have been based on local community involvement in managing wildlife. They have had mitigated results, as the low incomes generated have disappointed the populations. The institutional organisation set in place often did not change much with regard to the system already in place on government-run hunting areas. Indeed, the communities had neither the right to choose their activity (hunting, safari, or other), nor to choose the operator nor to set the prices.

Private Sector – Community Partnerships

The simultaneous arrival of decentralisation and community-private sector partnerships enabled notable progress to be made in this field: the community (sometimes with the support of the decentralised local authorities) chose the activity, the operator and set the price according to the market which usually includes an annual rental fee and a share of profits (for example a tourist tax per person per night), as well as a certain number of guaranteed jobs. The private sector contributed efficiency, management and clients.

A successful example around national parks

In the Okavango, a model was set up: the local community rents an area (10 000 ha for instance) to a private operator which sets up a campsite with luxury tents and uses the National Park for visits by car and the peripheral area for safaris on foot, at night or by boat and also coordinates interaction with local populations and villages. In this way, the communities increase the conservation area of their community. This of course remains an exceptional conservation case at a time when all conservation areas are diminishing, offering a way to increase them. The community then chooses the way its area shall be used – for hunting, safaris, fishing etc.

Establishing a peripheral area on a voluntary basis

Why does this model work? Because of its economic reality. In Botswana, a safari park of 10 000 ha can be rented out at $US100 000 per year, which all goes to the community. The camp employs 40 staff and the community also receives a tourist tax per night for each client (giving them an interest in the profits, therefore in ensuring good conservation), as well as high tips. The annual rent alone for 20 000 ha of community conservation zone in Botswana brings in as much as the rural communities of the Central African Republic receive for 3.5 million hectares (and even then they only see a small proportion of that). It is also more than what Burkina Faso and Benin combined redistribute to the local populations.

Prerequisites – land use rights

This arrangement requires (if it is not already the case), an institutional adjustment: the local communities must be accorded the necessary rights of use over the land (as was instigated by the law on natural resources passed in Chad in 2008). They must also have suitable land around National Parks. Whereupon another problem arises: this suitable land is currently occupied by State hunting areas.
This phenomenon can be reproduced in West Africa by supporting the creation of community areas around national parks, facilitating contact with tourism professionals (hunting or safaris) who have the know-how and a portfolio of clients, and by encouraging partnerships.

INTRODUCTION

Big game hunting is historically the main "modern" use of African wildlife. Once the colonisers discovered the variety and numbers of big animals, they started to hunt them intensively. In reaction to this excessive and uncontrolled pressure, the first hunting regulations were drawn up. Among these, were the first protected areas in Africa; reserves were created to protect animals from the pressure of hunting.

This is how two types of geographical area were identified: firstly authorised hunting areas and secondly zones where hunting was forbidden – or "reserves". In many African countries, the network of protected areas was designed to protect wildlife from the pressure of hunting rather than to protect an ecosystem and its functioning enabling the sustainable delivery of its eco-systemic services. This is one of the reasons why certain protected area networks are unsuited to the current situation and should be re-examined.

Many reserves and hunting areas were defined more than 50 years ago under the colonial regimes, at a time when the human populations represented, in terms of numbers, 20 or 25% of current figures. Therefore, it is hardly surprising that from the outset the design concept favoured the big game hunting industry to the detriment of local populations. And yet they are the ones who must endure the consequences of living nearby: loss of land use rights, destruction of crops by animals, loss of human life and livestock.

In return, the human populations exert considerable pressure on the protected areas and on hunting areas and, in many places, pressure was greater than the preservation action and regardless of its status, the area disappeared, totally or partially, or saw its biodiversity diminished.

Today, approximately 1.4 million km^2 are used for hunting in Sub-Saharan Africa, which totals 22% more than, and in addition to, the surface area of all national parks. It is therefore one of the major components of the rural landscape in many Sub-Saharan African countries.

One of the stakes of this study is to see to what extent big game hunting helps to withstand this pressure and contributes to conservation by being a part of development, in order to recommend realistic land planning measures.

In the 1970s-80s, now more than 30 years ago, under the influence of South-African wildlife management concepts of the time, wildlife management strategies were developed based on the economic value of the animals. These theories share the same vision, summarised in one sentence "if it pays, it stays", in other words, if the wildlife is economically profitable, it will be conserved. If it is not, it will disappear. Therefore strategies based on promoting the economic value of wild animals were developed: intensive or extensive farming, hunting for tourists, organisation of areas based on the notion of load capacity[2].

Organisations specialising in the promotion of these theories then instilled big game hunting (and the game farming associated with it in certain parts of Southern Africa) with multiple advantages. These include:

- Nature conservation: including the conservation of natural areas and the wild animal species that live there,
- Rural development: helping to promote marginal land and contribute to development thanks to the financial flow from countries in the North to those in the South, the creation of an export industry that generates foreign currency for the countries of the South, a source of income for the governments of the South, a driver of development for civil society, the creation of wealth to support the whole system of hunting areas, as well as socio-economic and environmental benefits.
- Poverty reduction: as a determining element of participative policies of community-based natural resource management (CBNRM) projects and by creating benefits for local communities – financial, economic (jobs) and social (schools, dispensaries, meat etc.).

[2] This is a notion that comes from livestock breeding, where the optimal number of animals that can (must) be raised per hectare is calculated. This notion disregards the principles of African ecosystems which are based on spatial-temporal variability and was officially removed from South-African national park management strategies in 2006.

The limits of the system, as presented by these specialist organisations, only pertain to the need for greater professionalism in the sector to ensure a better contribution to conservation and development. The needs for improvement listed concern:

- The Government: need for good governance (transparency), for strict financial and economic procedures (duration of contracts, guaranteed minimum quotas), devolution of responsibilities for wild animal management to decentralised stakeholders (communities, operators etc.), compliance with scientific recommendations,
- The private sector
- The community sector
- The country where the hunters come from.

These organisations highlight the fact that sustainable development through big game hunting tourism requires a stable balance satisfactory for all in the fair distribution of financial and socio-economic benefits of big game hunting tourism (IGF, 2008).

Nonetheless, 30 years after these strategies were announced, big game hunting remains a field where objective data are lacking: the same phrases are reiterated, but always without any link to the data gathered in the field. Therefore, it is difficult to say today whether or not the stated theory has been proven or disproven by the facts and 30 years of experience in the field.

Early 2009, publication of the book "*Recreational Hunting, Conservation and Rural Livelihoods*" edited by ZSL and Barnay Dickson, Jon Hutton and William M. Adams went some way to filling the data gaps.

The book looked at the economic and conservation performance of the big game hunting sector in a wider context that included the impacts and other influences caused by human activity: persistent pollutants, loss of habitat and climate change. The book considers that hunting is only one of many human pressures on wildlife populations; their combined effect is one of the key issues for conservation and ecosystem science.

Over and above big game hunting's value as a conservation tool, which remains one of the essential points, the authors looked at the issue of the population's livelihoods. Over recent years, conservationists have been called on to demonstrate just how preserving biodiversity, in particular in developing countries, contributes to reducing local poverty. Supporters of hunting pointed out that hunting as a leisure activity led to a "win-win" situation where hunting rights enable the safari industry and rural communities to thrive, through job creation and significant income levels in regions with no other income source. The book's authors sought to calculate specific figures, including subsidy amounts (from donors for example), the distribution of costs or benefits, the comparison of revenues with other rural opportunities.

They also looked at how the institutions worked and the overall governance of the system. Indeed, hunting safaris bring in a considerable amount of foreign currency and for poor countries where governance is weak, such revenues are very attractive although difficult to manage as a public good. Once again they highlight that governance problems led hunting safari operators to need certification, which generated lively interest in the world of hunting safaris.

Finally, the question of ethics was asked thus: "is it normal, with regard to animals' well-being, to kill animals for pleasure?" This question has no easy answer in today's world.

In a context marked by environmental awareness, demographic growth, the global explosion of tourism and the emergence of sustainable funding for conservation, this study takes the same approach, and seeks figures and mapped data that can help to specify the role and the place of big game hunting in the fields of sustainable development:

- conservation,
- the economy,
- social development,
- improved governance.

The data on big game hunting are presented in the first part of the report, firstly for West Africa, subsequently for the other African countries where data are available and shed further light on these figures.

The second part analyses the data gathered, presenting an overall picture of whether or not the theories

formulated on wildlife management 30 years ago have been proven or disproven.

Finally, in the last section of the document, recommendations are made for improving the network of protected areas, reorganising the big game hunting sector for the coming years and for land planning.

1. THE HUNTING SECTOR IN AFRICA

This chapter firstly summarises some general facts and figures on hunting tourism in West Africa. The aim is not to be exhaustive, but rather to give a general outline within which to situate the study, by explaining the two main types of hunting (small game hunting and big game hunting) and the way the overall sector is organised.

1.1. Small Game Hunting

This aspect concerns mainly bird shooting. The targets may be waterfowl (ducks mainly, whether sedentary or Palaearctic migratory species) or terrestrial wildfowl (francolins, pheasant, doves, sand grouse etc.). It supposes that the area where hunting is practiced is attributed to an operator so that pressure can be monitored and regulated.

Usually, each operator is leaseholder of a given area, for a specific period and has clear specifications or a technical protocol to follow. This area may be allocated by the central department in charge of wildlife, usually through a tender process. The area can also be allocated by local communities following negotiation with the operator. In the latter case, a government check is also run, usually by the regional authority.

The areas for hunting consist of:

- Lakes, rivers, rice paddies and wetlands for waterfowl,
- Bush and fields for small terrestrial game.

In the latter case the area must be large enough for the operator to make a profit without destroying the birdlife capital. Hunting is permitted in the dry season, therefore outside cultivation periods. Areas planted with cotton are not used (furthermore the use of pesticides contributes to destroying wildfowl populations) nor are those planted with maize or millet which are bare at this time of the year. Burned areas of bush are not used either. The main hunting areas are therefore in the lowlands on the edges of farming land. Professionals estimate that around 500 000 ha are required for 35 to 50 hunters (profitability threshold) to hunt without reducing the wildfowl population, in particular that of the francolin, which constitutes the game around which the hunting day is organised. Depending on the country, six to eight francolins are shot per day of hunting. Some countries, like Senegal, have instigated an official daily quota (six francolins/day/hunter and 20 birds in total). It can be noted that warthogs and sometimes duikers and oribi are classified as small game depending on the country.

These small game parks are therefore inhabited and partially cultivated. Therefore, in most cases, they cannot be considered to be protected areas, or to be associated with one of the six IUCN categories. However, these areas have a role to play in land development, as they can be used to promote sustainable agriculture and natural resource management. They also generate revenues for the local communities, usually in the form of income from daily hunting permits. For example, in Burkina Faso, villages where small game can be hunted receive 7 500 CFA F per hunter per day of hunting.

Organising small game hunting is seen as a profitable activity as the management and lease costs of these areas are lower than those for big game hunting, as are the costs of organising the hunting trip itself (groups of around six to eight hunters).

Mixed hunting is a particular aspect of small game hunting whereby a hunter, during a single hunting trip can spend a few days small game hunting and a few days big game hunting (to shoot one or several large animals, usually antelopes). The two aspects of the trip do not take place in the same park (if the organisation is truly professional), but can be in two neighbouring parks.

Small game hunting in Africa is primarily practiced by hunters from West Africa, particularly the French and Italians. These small game parks therefore hold little significance with regard to protected areas and big game preservation. This is why they are not covered by this study.

1.2. Big Game Hunting

The objective of big game hunting is to shoot large mammals. It concerns "non-dangerous" species (antelopes, zebra and swine) and the species reputed to be dangerous, grouped into the "big five" which are the elephant, the lion, the leopard, the buffalo, and the rhinoceros (the latter now sometimes replaced by the hippopotamus).

Understandably, as against hunting non-dangerous species, hunting dangerous species requires space such that the dangerous species do not come into conflict with humans. So they are pushed back into marginal areas where economic activities are less favourable.

Big game hunting therefore takes place on land exclusively dedicated to big game and to hunting, where management tends to prevent human impact that would hinder this activity. It is therefore a very "exclusive" activity and usually takes the form of a "concession" (the names vary depending on the country), which is in fact a block of bush or forest where the government or appropriate authority (regional authority, community or individual) grants hunting rights to an organiser for a given period of time.

In this sense, the hunting area can be assimilated to a protected area where the natural resource (wildlife) is managed and selectively culled. It corresponds somewhat to IUCN Category VI, but in certain cases can correspond to Category IV. This supposes however that the primary objective of the hunting area is to conserve nature, which is not necessarily the case in the field (see predatory areas below).

Furthermore, big five game parks must be vast, not only to limit conflict with humans, but also so that shooting can be sustainable. There must be sufficient animals so that ecologically some can be killed and, at the same time, enough animals must be killed to ensure the organisation reaches the profitability threshold – one of the requirements of the private sector.

People from many countries go big game hunting. In Africa overall, North Americans (USA) make up the greatest number, particularly in countries where hunting safaris are expensive (they are followed by the Spanish). In French-speaking Africa, there are many European and particularly French hunters. This is even more pronounced in West Africa. After the French, Spanish hunters are the next largest group.

Hunter nationalities (%)	French	Spanish	Other Europeans	USA
Tanzania (Selous)	13	18	26	34
Zambia		10	15	57
Central African Republic	68		8	19
Benin	70	8	5	5

1.3. The Organisation of Hunting

The organisation of hunting requires various people/organisations which make up the sector as a whole:

- *Government*: fulfils a regulatory role: legislation, allocation of parks, setting of taxes, granting of permits and setting of quotas, monitoring, justice etc. In rare cases it may fulfil a leaseholder role, when it directly manages a park (e.g. certain parks in the north of Cameroon, a part of the "hunting interest zone" (French acronym ZIC) in Senegal).
- *The Concession holder/outfitter*: acquires management of a hunting area for a given period. It may be a simple economic operator, without any knowledge of big game hunting, in which case, they may sub-let the park (legally or not) and make the most of their investment. Sub-letting often represents a loss for the Government (e.g. in Tanzania).
- *The Organiser*: is responsible for setting up the infrastructure, developments, equipment and staff required prior to, during and after the hunt. The quality of these services plays an important role in determining the price that can be asked for the hunting safari.

- *The travel agency*: is responsible for finding clients, organising their trip and bringing them to the hunt organiser. The agency is usually located in a Western country where their clients come from.
- *The guide*: is responsible for leading the hunt: welcoming guests, guiding the hunt, preparing trophies, ensuring compliance with regulations etc. He should usually know the park well, but it is no longer always the case. Before, almost all the guides lived in the country where they worked. Now, guides often move from one country to another at the request of clients/organisers/travel agencies.
- *The staff*: help the operator and the guide to run the hunt. Trackers are members of staff and have a particularly important role to play in the success of the hunt.
- *The clients:* they come to hunt, usually from abroad. The fees they pay constitute the organiser's turnover.

In some cases but not all, the roles of concession holder, organiser, agency and guide can be grouped. This was common practice (even the norm) a few dozen years ago, but has become much less frequent as the sector has become more professional.

The organisation of one single hunting trip therefore requires the intervention of many different people to guarantee the land where game will be hunted. The cost of the hunting safari must therefore be considerable if the system, based on private operators seeking a certain degree of profitability, is to function properly. Besides the private sector, two other stakeholders must also reap the benefits:

- The Government (central and/or the regional authorities) which must benefit from some of the income to cover all or part of its regulatory activities. In practice, the department in charge of wildlife is not always independent in its management, which means that the income received by the government is not always directly used to manage the sector.

- The local communities: they bear the brunt of the costs of big game hunting. They lose the rights to use part of their land to the concession holder and cannot practice their usual agro-pastoral activities. They bear the cost of lost agricultural production due to predatory wild animals (damage to crops, loss of human and animal life etc.). However, they can reap direct benefits (taxes, part of turnover etc.) or indirect benefits such as employment by the hunting safari organiser.

Furthermore, other partners are involved in the sector: those who send and import trophies, taxidermists (who prepare the trophies), hoteliers (before and after the hunting safari), airlines (international and local), specialised insurance companies, arms manufacturers, equipment manufacturers etc. Therefore, big game hunting has a wider economic impact than just the safari organiser's turnover.

2. AN OVERVIEW OF BIG GAME HUNTING IN AFRICA

2.1. West Africa

2.1.1. Senegal
a. Institutional Context

Hunting is regulated by the Code of hunting and wildlife protection of 1986. A new version of the hunting code is currently being written.
Tourist hunting must be organised through hunting area leaseholders. The latter cannot have more than 15 hunters per week per camp and must submit an annual work plan at the beginning of the season. The leashold parks are mainly for hunting small game and warthogs. The hunting areas where warthog hunting is authorised are in the *départements* of Foudiougne and Kaffrine, the regions of Tambacounda and Kolda, and small game areas where hunting rights are held according to leasehold arrangements.
Small game hunting permits give each hunter the right to shoot one warthog per week for an additional fee of 15 000 CFA F. When warthog population density is high, the authorities may allow a second warthog to be shot for a fee of 20 000 CFA F.
Big game hunting is only practiced in the south-east, in the ZIC of Falémé. It is authorised each year from 1 January to the end of April, the dates being fixed by a local bylaw. The latter also specifies the quota of

animals that can be killed, and hunting is closed once this quota is reached. The number of hunters is also limited: six per camp and per week, each hunter must be accompanied by a tracker certified by the Water and Forests Department (maximum two hunters per tracker). A big game hunting permit holder can shoot two warthogs per week at no extra cost.

However, it should be noted that legislation authorises the Director in charge of hunting to grant exceptional permits to tourists or guests in non-leased zones open to hunting. The Minister for Water and Forests can also pass bylaws to authorise shooting of a certain number of totally protected species.
A big game hunting permit is needed to shoot the following species: buffalo, roan, hartebeest, bushbuck, oribi and duikers. Each hunter may only shoot one specimen of each species. For the entire ZIC of Falémé (and therefore of Senegal), the quota authorised for the 2004-2005 season was:

SPECIES	QUOTA	SPECIES	QUOTA	SPECIES	QUOTA
Buffalo	5	**Bushbuck**	6	**Duiker**	5
Hartebeest	5	**Oribi**	4	**Roan**	6

It can be seen that between 2000 and 2005, quotas were lowered by an average of 32.6%, which most probably indicates a drop in the overall numbers.

b. Big Game Parks

The ZIC of Falémé is located in the south-east corner of the country, at the border with Mali and Guinea. It covers a surface area of around 1.3 million ha. It includes agricultural land and is also exploited by mining companies, whose prospection and operation permits are not granted in association with the Water and Forests Administration. There is therefore a problem with regard to the uses made of the ZIC, and its sustainability is in question.
Within the ZIC, a sector of around 200 000 ha was leased in 2006 to the Relais de Kédougou. It does not appear that granting of this concession led to any specific development or surveillance. There is also a project to develop wildlife management, funded by USAID, which is still at the concept stage. An initial project phase (2003-2008) was dedicated to governance issues, firewood, and non-wood forest products. The second phase (2008-2013) must include actions to improve biodiversity and seems to be focusing on developing a pilot area of 60 to 90 000 ha to promote wildlife by establishing a partnership between the Government, the private sector and local communities.

c. The price of hunting safaris

Big game hunting safaris in Falémé are fairly cheap: a six-day first-time hunt (the expected results are not comparable to those of a “big game hunting safari”) costs €2 300 (from Kédougou à Kédougou, www.safari-malaret.com), i.e. €383/day. The same trip for small game hunting costs €1 500, i.e. €250 per day.

d. Revenues for the Government

For the Government, revenues from big game hunting are minor, generated mainly by hunting permits and gun permits (€200), as well as trophy fees if the animals are shot.

SPECIES	Amount of trophy fees CFA F		Annual Quota	Maximum possible revenues in million CFA F	
Year	**03/04**	**08/09**		**03/04**	**08/09**
Buffalo	350 000	500 000	5	1.75	2.5
Hartebeest	100 000	300 000	5	0.5	1.5
Bushbuck	60 000	160 000	6	0.36	0.96
Oribi	40 000	80 000	4	0.16	0.32
Duiker	40 000	80 000	5	0.2	0.4
Roan	200 000	400 000	6	1.2	2.4
TOTAL	-	-	31	4.17	8.08

NB: figures for trophy fees for 2008/09 vary depending on the sources.

The maximum amount the government can gain in trophy fees is around eight million CFA F per year. If 30 hunters visit the ZIC of Falémé in the year, that amount is increased by 3.9 million CFA F for permits, thus reaching a total of around 12 million CFA F.

e. Remarks

Unless there is a sharp turn around, the future of the ZIC of Falémé seems compromised. The areas where big game hunting is practiced are not direct neighbours with those that are rich in wildlife in the National Park of Niokolo Koba. These areas appear to be isolated, even more so since across the border in Mali no specific protected area has been developed along the right bank of the Falémé. The ZIC is subject to fairly high pressure from agriculture and human habitation. Furthermore, it is a site for mining prospection and exploitation (iron, gold, phosphates) that are beyond the control of the Ministry of Water and Forests. Its future therefore probably depends on a regional strategy being drawn up including the Niokolo Koba National Park, based on an up-to-date map of land use and modern environmental concepts.

2.1.2. Mali
a. Institutional Context

Wildlife and hunting management is governed by the law of 1995 which lays down the conditions for managing wildlife and its habitat, in particular, the leasing of hunting areas.
Some animals are totally protected: elephants, buffalo, giant eland, leopard, Dama gazelle, Dorcas gazelle, and red flanked duiker. Big game hunting is therefore limited to lion, large antelopes (antelope, hartebeest, Defassa waterbuck), and swine (warthog and bush pig).
It should be noted that, under certain conditions, special permits can be granted to hunt totally protected species[3].
A permit to hunt big game costs a non-resident 140 000 CFA F. There is something singular in the Malian law: the existence of trophy or capture fees for totally protected species such as chimpanzees, cheetahs, African wild dog, Addax, white Oryx, giant eland, Manatee etc.

b. Hunting areas

[3] Which is original in terms of legislation, and rather inappropriate.

Tourist big game hunting is allowed in leased ZICs. Hunting leases in ZICS cost 40 francs/ha/year. The current list (according to the 2008 annual report of the National Directorate for the Protection of Nature) of these ZIC is as follows:

- ***Northern zone ("sahelo-saharian")***

These are vast areas given over to hunting as practiced by people from Arab countries. In light of the species on the protected species list, these ZICs should only be used for hunting one mammal: the red-fronted gazelle. Nonetheless, the latter is representative of the south-sahelian ecosystems, not sahelo-saharian ones. There is, therefore, an inconsistency in the legislation as regards the ZICs of the Northern zone. Bustards, however, may be hunted. Four ZICs have been created in this category:

- Two ZIC have been leased: Tidermen-Alata, in the district of Kidal, (surface area of 312 000 ha) in 2004, and North-West Azaouad (called Salam, surface area of 1 216 000 ha) in 2006. The former has a development plan (not yet approved), while the latter does not. No development or technical activities have been undertaken here, but hunting is practiced in both zones. It is therefore comparable to "mining" activity – samples are taken with no overall management.
- A ZIC was created in 2004 in the Gao/Ménaka district (Inekar) of a surface area of 180 625 ha, but it has not been leased.
- The ZIC of Tarkint (district of Bourem) was created by bylaw on 04/08/2008.

Two other ZIC are currently being created: Tin Tiss-Borna (Rharous district, 189 286 ha) and Timtagène (Tessalit district, 879 948 ha).

- ***Southern Zone ("Sudanese")***

The ZICs in this zone should permit hunting of big and small antelope, swine and also lion. The current list is as follows:

- The ZIC of Banzana (created in 2004, 44 402 ha) in the districts of Sikasso and Bougouni, has not been leased.
- The ZIC of Flawa was created in 2004 (Bafing North) and covers 73 940 ha. The leasehold is currently being negotiated with the Malian company Mali Faune Aventures (www.malifaune.org). It is quite densly populated by people and domesticated animals.
- The ZIC of Gadougou (Bafing south-west, 31 220 ha) is being created.
- The ZIC of Nienendougou, (surface area: 50 422 ha) has not been leased. It lies adjacent to the reserve of the same name (40 640 ha, classified in 2001) which was leased (with the 3 classified forests of Dialakoro, Diangoumérila and Djinétoumania (in the districts of Bougouni and Yanfolila) in 2008 to the company "Agro Industrie Développement - AID SA". Hunting is not one of the activities planned, focus will be on natural resource management, ecotourism and safaris.

Three other ZIC are also being created: Faragama (Kita district, 52 400 ha), Tomota-Kourou (Kayes district, 38 321 ha), and Morianféréla (Yanfolila district, 9 017 ha).

The total surface area of the three active ZICs in the "Sudanese" zone is currently 168 764 ha, to which we can add the 130 958 ha for the four ZICs being created. Eventually, the seven ZICs will cover a total surface area of 299 722 ha (42 817 ha on average).

c. Revenues for the Government

In 2008, 49 tourist hunting permits were granted, mainly for small game hunting in the Ségou and Niono areas. National revenue from hunting in 2008 was 10.8 million CFA F, and 1.39 million in associated transactions.

d. Remarks

Tourist hunting in Mali is a very small sector. It would appear that big game hunting professionals have not been involved in its restructuring and little economic gain seems to be achieved with the development strategy. The overall context of protected areas seems to take little account of ecological and human realities, as will be seen later on.

2.1.3. Mauritania
a. Institutional Context

Hunting is governed by the law of 1997 on hunting and the protection of nature. In particular, it allows for the creation of wildlife management associations within each district that has wildlife or hunting interests. These associations can benefit from funding generated partly through the taxes and deductions provided for under current legislation.
It also allows for the creation of ZICs that are also areas where hunting or tourism activities are organised at high cost, by individuals or companies, who are granted a management licence in accordance with the operating conditions specified by decree. Twenty percent of the revenues generated by operating ZICs are attributed to the wildlife management associations concerned. These amounts are deposited in the special fund.
At the beginning of each year, a bylaw passed by the Minister for the Environment determines, after consultation with the wildlife management associations, the dates of the hunting season, the areas open to hunting and trophy and capture fees for each Wilaya or zone, as well as all pertinent information for better wildlife management. The only mammal on the list of hunted species (partially protected species) is the warthog. All other species are totally protected.
In practice, these institutional provisions do not seem to be widely applied. There is a Mauritanian hunters association, with around 40 members, who regularly hunt warthog and waterfowl.

b. Warthog hunting area

The only area where tourist hunters regularly go to hunt warthog is on the right bank of the lower Senegal River. A Spanish agency offers the opportunity to shoot seven warthog in four days of hunting (www.sahelsafaris.com). This does not resemble managed hunting activity and raises doubts as to the ethics of the whole operation. There do not appear to be other areas or organisations that bring in tourists or that simply manage an attributed area. The impact of big game hunting is minimal and only concerns warthogs.

c. Remarks

There are not really any big game hunting areas in Mauritania. Warthog hunting there is more akin to killing than management. Big game hunting (of other species) areas cannot be developed in this country.

2.1.4. Gambia

Only small game hunting exists (birds and warthogs). The small game hunting areas are mainly in the central and eastern part of the country.

2.1.5. Sierra Leone

To date, there is no big game hunting or tourist hunting in Sierra Leone. Around twenty years ago, trips for European hunters were organised, but only for shooting waterfowl.

2.1.6. Liberia

To date, there is no big game hunting or tourist hunting in Liberia. Up until the beginning of the 2000s a big game hunting organisation existed (West African Safaris) which specialised in the hunting of forest antelope (royal antelope, Jentink's Duiker, zebra, etc.) and was somewhat successful, but it also had a doubtful ethical reputation. This company no longer operates, and since the end of the war, conservation activities have focused on restructuring national parks and mitigating the effects of the bush meat trade.

2.1.7. Guinea
a. Institutional Context

The network of protected areas in Guinea is currently under development. While there are no hunting areas or ZIC as such to date, they are provided for in the law of 1999 governing wildlife (protection of wildlife and regulation of hunting). ZICs are each governed by regulations set by bylaws of the Ministerial authority responsible for hunting to specify the terms and conditions for hunting, the destination of hunting profits and

any compensation for prejudice to other economic sectors. Without such a bylaw, hunting is forbidden in the ZIC.

Hunting areas cover all territory in the public domain that is not classified as national parks, integrated or managed nature reserves, wildlife sanctuaries, or ZICs with the exception of roads, shipping routes and built-up areas where hunting would pose a danger for public safety.

Furthermore, in a managed nature reserve, the texts pertaining to it may authorise hunting. There is a small game hunting permit and a big game hunting permit. Each year, a bylaw from the Ministerial Authority responsible for hunting sets the maximum number of animals to be killed per species. Trophy fees must be paid in advance.

Hunting tourism can only be organised by a guide who has passed the appropriate exams. He must hold a hunting guide licence, renewed annually, that authorises him to work in the area for which he (or the company for which he works) holds the lease. Areas that may be leased are ZICs and certain parts of managed nature reserves.
The sector is managed by the National Directorate for Biological Diversity and Protected Areas, which is part of the Ministry of the Environment and Sustainable Development. There are 30 conservationists working around the country.

b. Potential big game hunting areas

Several areas have been identified for developing tourist hunting:

- Kankan Reserve, 537 000 ha,
- The cross-border protected area between Guinea and Mali, with a total surface area of 26 600 km², two-thirds of which are in Guinea. The Guinean side must have the status of managed nature reserve, which combines conservation and exploitation, and is similar to IUCN Category VI. Hunting can be authorised, in particular Giant Eland and lions are found here,
- The cross-border protected area between Guinea and Guinea-Bissau, 17 000 km² in total,
- Border area with Sierra Leone, at the forest-savana interface (Mamou to Kindia areas),
- Upper-Niger: in the buffer zone around the national park of the same name, there are Western Buffon's Kob, Defassa waterbuck, yellow-backed duiker etc.

The terms and conditions for developing these hunting areas have not yet been stipulated: private sector concessions, development through donor support in the context of a pilot project, etc. As the situation stands, while development is possible, Guinea does not offer big game hunting services.

2.1.8. Guinea Bissau

a. Institutional Context

The Institute for Biodiversity and Protected Areas (IBAP, created in 2004) is responsible for managing the different protected areas. A law on wildlife was passed in 2003. This law enables better community involvement in local resource management.

There are currently two proposals for creating national parks (Cantanhez, 650 km², and Dulombi, 1 770 km²), which will diminish the areas where hunting can take place. At the same time, there is a project to create a cross-border protected area with Guinea.

There are three types of hunting permit: tourist, national and resident (traditional). In the eight tourist hunting camps, quotas are established but Hunting Department guards only accompany hunters in three of these camps. A large number of hunting establishments in Guinea Bissau belong to foreigners.

b. Big Game Parks

Hunting in Guinea Bissau mainly concerns bird shooting. The daily quota for francolin, which constitutes the basic game, is 12 birds per day, in other words double the quota permitted in Senegal. Therefore, this is an attractive destination for hunters.
During his stay, a hunter may also shoot three warthogs, a bushbuck and a duiker, which constitutes an

added advantage over other countries. Big game hunting is forbidden (buffalo, antelopes, waterbuck), therefore only the warthog (three per permit), the bushbuck (one per permit) and the duiker (one per permit) can be hunted legally.

Each camp is attributed a hunting area, and a large part of the country is covered by attributed zones..

c. Remarks

Hunting in Guinea Bissau can be considered to be mixed and covers almost the entire country, which consists mainly of agricultural land or pasture. There are some remaining populations of big game (elephants, lions, leopards, buffalo, antelope etc.).
Nonetheless, there are not really any concessions as such, in that these imply exclusive use, development and surveillance.

2.1.9. Ivory Coast
a. Institutional Context

Hunting was outlawed in 1974, and several attempts to reopen it have been made since 1994. These files are all awaiting processing since the socio-political upheavals of 2002. Nonetheless, it should be noted that, despite the ban, hunting is widely practiced informally in Ivory Coast and supplies the bush meat trade, estimated a few years ago at 74 000 tonnes annually. This figure is probably falling due to over-hunting. Big game hunting for tourists is thus forbidden, but the Geprenaf project (World Bank) has contributed, since 1997, to give it a place in the Ivorian context. The project aimed at establishing community management of natural resources around the Comoé national park, with the identification of a biodiversity area that should be developed by local communities through hunting and ecotourism.

b. Potential big game parks

The two potential areas for big game hunting are:

- Warigué: between the Comoé national park and Burkina Faso. It lies next to the Comoé Léraba area in Burkina Faso, managed according to the same principles and created by the Geprenaf project;
- Monts Tingui, bordered in the south-west by the Comoé National Park, managed by the Geprenaf project.

Each of these areas contains an area of high biodiversity of around 1 000 km^2 (the national park has a surface area of 11 500 km^2). 66 villages, representing around 65 000 inhabitants (2003), were involved in setting up these two areas.
The challenges facing these zones are the following:

- is the conservation model compatible with sustainable agriculture?
- can we maintain the communities' interest in conservation?

The project came to an end in 2003, and the instability that followed in this region of the country significantly changed the landscape in the Warigué area (immigration, agricultural development), but the Monts Tingui area has remained relatively well preserved and a private operator is interested in it as a hunting concession. At the beginning of the 2000s, a study was carried out to improve wildlife promotion in the Haut Bandama reserve, and found that the birdlife was of particular importance. This interesting area has apparently been largely degraded since, by human occupation and agriculture.

c. Remarks

There are few other possibilities for developing new hunting areas that are sufficiently large to be significant: the North-West of the country could be the most interesting, but it has low animal densities which would delay exploitation and therefore make implementation costly. For the coming years therefore, the area concerned by big game hunting in Ivory Coast totals at most around 100 000ha. Big game hunting for tourists does not, to date, contribute to the Ivorian economy, while at the same time the turnover for informal hunting is estimated at around 100 billion CFA F per year.

2.1.10. Ghana
a. Institutional Context

In Ghana, big game hunting is theoretically open and possible, but there are no classified big game hunting

areas. The approach taken is that of natural resource management by the communities themselves, in the context of the CREMA concept (Community Resource Management Area). The underlying philosophy is that if you give wildlife a value, and local communities have the right to manage it, they will be motivated to conserve and sustainably manage their natural resources. The Wildlife Division (which is part of the Forestry Commission), set up a policy of "*collaborative wildlife management and establishment of community resources management area*" in September 2000. This concept enables any member community to organise hunting for tourists in their area.
In practice, communities wishing to set up a CREMA must fulfil certain conditions (which include the drawing up of a management plan) and obtain a certificate of decentralised transmission of management rights. As regards hunting, the community then sets its own quotas (usually with technical support from the Wildlife Division), via its executive committee, which also decides the fees hunters must pay for each animal or species killed. The certificate can only be acquired in return for committing to certain conditions, for instance not hunting endangered species. At the present time, three CREMAs are fully functional, and 12 others are currently being set up and will soon be certified.

b. Location of potential CREMAs

CREMAs are currently being set up around Mole national park and will be allowed to develop hunting as there may be big game in these areas. The government allows the communities to manage, possess and use their wildlife within their own territory. Therefore, hunting fees and the different taxes are set by the CREMA itself which keeps all the profits.
In terms of tourism, a South-African operator, (www.stevekobrine.com/Ghana.htm) brings a few clients to hunt in Ghana. The game consists of small antelopes specific to the dense West-African forests: royal antelope, black-fronted duiker, Maxwell duiker. This is hunting for the specialist collector, and takes place in the south-West in the Takoradi region.

c. Remarks

There are possibilities for developing big game hunting in Ghana, but these are limited by the rapid rate at which wildlife habitats are being converted to agriculture. In Ghana, as in Ivory Coast, the bush-meat trade is highly developed; the current turnover is estimated by Conservation International at $US250 million per year (i.e. around 125 billion CFA F). It is unlikely that the small profits from game hunting could compete with these figures. The main challenge, now that the institutional foundations are in place, is to see whether sufficient wildlife and habitat resources still exist to guarantee the viability of the CREMA programme.

2.1.11. Togo

Togo has 93 habitants per km² for a surface area of only 57 000 km². Given these figures it is clear that there is not much space available for hunting areas. Until 1991 the protected area network of Togo was managed directly by President Eyadema (including hunting areas almost exclusively for presidential use), but the political problems that began at that time led to a large part of these protected areas being invaded by the people, who felt they had been robbed of their right to use the land and natural resources. Protected area network managers have targeted two areas for big game hunting:
- Galangachie (in the North), with a surface area of 7 650 ha,
- Togodo Nord (in the South), with a surface area of 10 5000 ha.

These two areas seem very small for recreational hunting and too isolated from other biodiversity areas to contain the wildlife liable to attract hunters. Another potential area is Abdoulaye Forest (in the centre of the country), with a surface area of 30 000 ha. Studies need to be undertaken to specify the respective conservation potential and actions to be undertaken.

2.1.12. Nigeria

There is no big game hunting in Nigeria, or any areas dedicated to this activity. Big animals still live in some national parks, which themselves are suffering from the effects of demographic growth (the country has 139 million inhabitants, for a population density of 150 people per km^2) and almost entirely lack peripheral areas where hunting could take place.

Big game of the savannas still exists in the Yankari Reserve (Centre-East) which itself is marginally occupied by local communities and in that of Borgu (Centre-West) where the peripheral areas are heavily used by cattle herders. The eastern border with Cameroon (from the Gashaka Gumti National Park to Cross River

National Park) is the biotope for forest species, but few animals still live outside these protected areas. Thus, the development of new hunting areas is virtually impossible, even though hunting is allowed. It should be noted that as in Ghana and in Ivory Coast, the bush-meat trade is highly developed and has considerably reduced biodiversity.

2.1.13. Niger

Like Mali, Niger has two main ecological zones: in the North a vast saharan-sahelian zone and in the South a smaller Sudanese zone.

Hunting is authorised throughout the country, but the only attributed zones are in the North, where vast areas have been set aside for hunting, mainly for hunters from Arab countries. Little information is available on these areas which are beyond the scope of this study. In the South (Sudanese zone), demographic pressure, pressure from agriculture and herding have left few areas where large animals still exist. In practice, there is only the W National Park where, of course, hunting is prohibited.

Tamou Reserve (75 600 ha) borders the park to the North and could be developed for hunting. Nonetheless, most of this reserve is endangered by the spread of agriculture and the area that could still constitute a potential habitat for big animals is limited and located on the right bank of the Tapoa river. So the animals that come there are actually from the next-door national park. To prevent it disappearing, this reserve will require an exhaustive analysis of the problems it faces and a rapid response consisting of appropriate solutions. The possible transformation into a hunting area would, in reality, come down to allowing the animals from the national park to be hunted, however, the management objectives of two adjacent protected areas must remain compatible.

Therefore, at the present time, there are no big game parks in the Southern part of Niger and therefore no corresponding economy.

2.1.14. Burkina Faso
a. Institutional Context

The institutional context for big game hunting has been described many times before, and is not covered in detail here. Big game hunting was re-opened in 1985 in Burkina Faso, and the sector has been constantly developing ever since. In 1996, a hunting reform was carried out, with the creation of concessions (for hunting or safaris) within the Wildlife Conservation Units (there are 12 across the country).
This reform enabled the private sector to invest in managing wildlife areas and to finance them directly, thus filling in a gap in state funding. Village wildlife management committees (French acronym CVGF) were also set up in order to create a Government-private-sector-local community partnership. These CVGFs should receive a share in profits and set up a public interest fund for that purpose.

From 1996 to 1998, 24 wildlife area concessions were thus attributed to the private sector: ten for big game hunting, two for mixed hunting, six for small game hunting, three game ranches and three safari parks.
The Comoé Léraba reserve was then leased to the inter-village association for the management of natural resources and wildlife of the classified forest and partial wildlife reserve of the Comoé Léraba (French acronym AGEREF) for mixed use. In addition to these areas a certain number of Village hunting areas (French acronym ZOVIC) were created by the CVGFs and are mainly for small game hunting.

In 2007, 10 big game hunting areas were reattributed via a call for tender, this time for a duration of 20 years. The wildlife areas that had experienced management problems (lack of understanding of the reality of the area, lack of wildlife, low profitability) were not resubmitted for tender. Nor were the national parks, after the creation on 9 May 2008 of the OFINAP (National Office for Protected Areas) which is henceforth responsible for managing them.

b. Location of big game parks

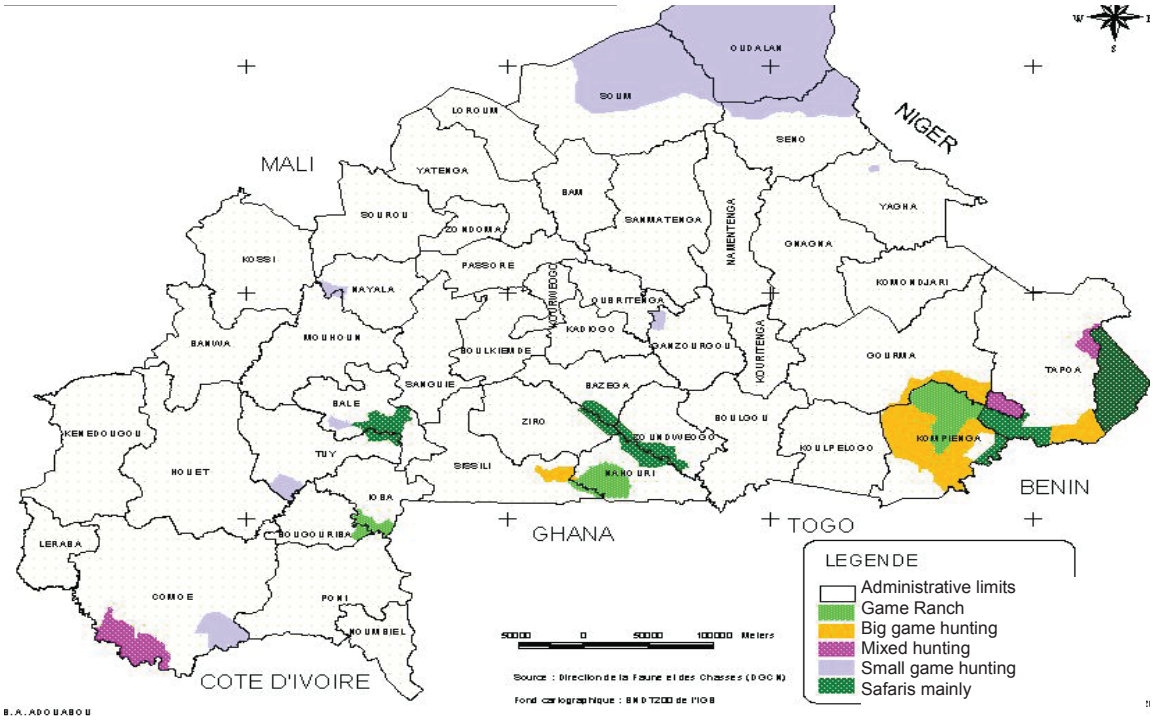
Today, the following big game parks are leased (or about to be):

Operating system	Wildlife area	Surface area (ha)	Region
Big Game Hunting	Koakrana	25 000	East
	Kondio	51 000	East
	Konkombouri	65 000	East
	Ougarou	64 426	East
	Pama centre Nord	81 452	East
	Pama centre Sud	51 774	East
	Pama Nord	81 486	East
	Pama Sud	60 762	East
	Pagou Tandougou	35 000	East
	Tapoa Djerma	30 000	East
	Sissili	32 700	Centre West
	Comoé - Léraba	124 510	Cascades
Ranch	Singou	151 800	East

Big game hunting is also practiced in another area, the Ranch of Nazinga (94 000 ha, of which around 15 000 ha is totally protected, and 78 960 ha is for hunting). Singou Ranch was not resubmitted for tender in 2007 and should now be managed directly by OFINAP, according to a yet to be specified strategy. In total, big game hunting is therefore practiced in 14 hunting areas totalling 933 870 ha:

Geographical location	Number of areas	Surface area (ha)
East	11	697 700
Centre	2	111 660
South West	1	124 510
TOTAL	**14**	**933 870**

Map 1: Situation of hunting areas in Burkina Faso



Map © Source: Directorate of Wildlife and Hunting/MECV

c. Technical and economic results of big game hunting in Burkina

The average surface area of hunting areas in Burkina Faso is 66 705 ha. Over four hunting seasons (2002-3 to 2005-6), 2 512 tourist hunting permits were granted, in other words an average of 628 per year. The average distribution over ten years of tourist hunting permits is 66% for small game hunting, 32% for big game and 2% for mixed hunting. Around 201 big game hunting permits were therefore granted during this period.

For the 2004/5 season, 615 permits were granted, of which 242 for big game hunting in the East, and a few directly granted in Ouagadougou for that zone. The 11 Eastern areas therefore hosted around 250 hunters, or an average of 22.7 per area.

Over the ten years from 1996-97 to 2005-6, the annual average number of animals killed for the main species is as follows:

Average annual number killed	Lion	Buffalo	Antelope	Hartebeest	Western Buffon's kob
East	11.9	92.2	72.8	33.4	40.8
Nazinga-Sissili	0	7.4	15.1	13.5	0.6
Comoé-Léraba	0	0.3	0.5	0.6	0.6
Total	***11.9***	***99.9***	***88.4***	***47.5***	***42***

For the main big game hunting region, the East, the annual average number of animals of the main species killed per concession is as follows (over a ten year period):

Average annual number killed	Lion	Buffalo	Antelope	Hartebeest	Western Buffon's kob
Per concession (East)	1.08	8.38	6.62	3.04	3.71

For the 2004-05 year for example, and for the Eastern region, a general idea of the success rate per species and per permit can be gained (22.7 on average per area), expressed as a percentage of the number of animals of a given species shot under permit:

Success rate per permit	Lion	Buffalo	Antelope	Hartebeest	Western Buffon's kob
Per concession (East)	6%	41%	39%	18%	22%

These success rates are fairly low: only 41% of hunters shoot a buffalo during their hunting safari. This also corresponds to a policy of selling hunting safaris according to individual animals, and not according to a trophy list. This marketing policy favours the number of hunters over the quality of the hunt itself.

It can be noted that in the Eastern region, a certain number of concession holders also organise specific small game hunting safaris. This is organised on a neighbouring sector and in addition to big game hunting helps the organiser to significantly increase their general turnover, without greatly increasing their costs. Hunting permit statistics in the Eastern region indicate that at least 150 hunters come specifically for small game hunting. The overall income for the sector is as follows:

Hunting seasons	Main stakeholders			Total
	Government	Concession holders	Communities	
2004-2005	233 391 100	1 054 137 508	47 812 300	1 340 912 808
2005-2006	235 422 050	1 189 705 338	52 177 477	1 477 304 865

When broken down according to stakeholder category, the income for the state is as follows:

Type of income/season	2004-2005	2005-2006
Hunting permit	75 112 500	68 990 000
Operating licence	22 240 000	24 475 000
Hunting guide licence	16 600 000	20 300 000
Trophy fees	90 814 200	97 453 900
Management fees	14 142 400	14 503 650
Tracking fees	4 745 000	4 446 000
Certificate of origin	760 000	1 057 000
Litigation	8 977 000	4 196 500
Total	**233 391 100**	**235 422 050**

When broken down per hectare of big game park, the government earns, in fees and taxes, around 250 CFA F per hectare. If we consider that big game hunting areas cover 3.4% of the country and bearing in mind that the Burkinabe national budget for 2009 was 1 000 billion CFA F, it is clear that per hectare, big game hunting represents little interest for the government: 3.4% of its national territory only contributes 0.23‰ of its national budget.

For the local communities, benefits for the 1996 - 2006 period were:

Type of income	Renting of a ZOVIC	Village hunting permits	Tracking fees (50%)	Management taxes (50%)	Sale of meat	Other	Total
Total	83 650 327	19 890 890	35 801 500	92 960 705	12 996 645	52 149 875	297 449 942
Annual average	8 365 032	1 989 089	3 580 150	9 296 070	1 299 665	5 214 988	29 744 994

These results are extremely low, compared to the number of inhabitants in the peripheral areas concerned (the entire Eastern region population was more than 1 million in 2004, with an average density of 23inh/km²). Even if just 100 000 people are counted as living in the areas surrounding all the country's hunting areas, the revenue per person would only be 300 CFA F per year.

The average added value therefore for local communities is 32 CFA F/ha of big game hunting area, over ten years. It is clear that such a low figure will not provide incentive for a change in mentality.

For the ten concession holders in the East having operated their area, the average income declared per area in 2004/5 is 77.7 million CFA F and the annual balance sheet reveals a deficit of 4.16 million CFA F. This overall figure seems to tally with the values calculated elsewhere: the concession holder of a big game hunting area must have a turnover of 75 to 80 million CFA F to break even. It is difficult to achieve this with big game hunting alone in light of the prices of hunting safaris and the number of animals shot in Burkina Faso.

Therefore, the expenses declared per big game hunting hectare are around 1 227 CFA F/ha (€1.87/ha), corresponding to the cost of developing and monitoring the area as well as the costs of the camp and customer service. Broken down per big game hunting client, the expenses are around €5 500 per client, which is above the average price of a hunting safari. As a result, big game hunting safaris are not sufficient to cover costs.

When calculated per hectare of big game hunting area (the figure is in fact increased by income from small game hunting that takes place alongside the big game park), concession holders' income is 1 165 CFA F/ha (but the declared result is in fact a loss of 62 CFAF/ha). Each hectare of big game hunting area therefore brings in a maximum profit of:

Currency/partner	Govt.	Concession holder	Communities	Total	Overall profits
CFA F	250	1165	32	1447	220
Euros	0.38	1.78	0.05	2.20	0.33
Percentage	*17*	*81*	*2*	*100*	-

By way of comparison, a hectare of cotton in this zone generates a turnover of 150 000 CFA F/ha. In this case, the gain per hectare for the communities is 5 000 times higher than that of big game hunting. Certain staple crops can also generate higher incomes per hectare, without requiring fertiliser.

d. The price of hunting safaris

It is difficult to establish the real price of hunting safaris for at least two reasons:

- for the large majority of them, the concession holders do not advertise the price of their safaris on their websites or in advertising, but provide them only on request. This situation is quite different from Benin for instance, where all concession holders clearly present their prices.
- The price is open to negotiation, which means that the price is lower, sometimes significantly so, to that initially quoted.

Furthermore, Burkina Faso sets itself apart from other countries by proposing different safari prices depending on which animals are to be hunted, while most countries offer six-day "buffalo" hunting safaris or 12-14-day "grand safaris" when all animals can be hunted.

The only concession holder that clearly presents the hunting safari prices (Ouagadougou-Ouagadougou price) offers:
- six-day hunting safaris: €5 150 one antelope can be shot,
- eight-day hunting safaris: €6 500 buffalo and antelope can be shot,
- ten-day hunting safaris: €7 600, again buffalo and antelope can be shot. In this case each additional day therefore costs around €500.

It can be supposed that these prices correspond to the "upper" end of hunting safari prices due to the reputation of this particular concession holder.

This hunting safari price is among the lowest in Africa for hunting of buffalo or lion. Furthermore, the price does not seem to have increased much over the past ten years. it is difficult to know why prices have not followed the general increase: reasons could be the quality of the service proposed, the fairly low success rate for the hunters (41% for Buffalo, 39% for antelope, 6% for lion), the average trophy size (little data is

available regarding the latter) etc.

e. Ecological monitoring

A census is not taken at the beginning, middle and end of a concession contract, as is the case in several countries. However, the change in animal populations is one of the key indicators for wildlife management and not having such data poses real problems for monitoring and evaluation (let alone for strategic adjustments).

The most recent overall data date from 2003, when a total aerial census was taken, which focussed particularly on elephants. Let us take the cumulative density (per km^2) of the five most important species for conservation and hunting (elephant, buffalo, antelope, hartebeest and Western Buffon's kob) as an indicator. As the objective of this study is not to assess each area, we have grouped them according to ecological zone, based on river basins (the Arly on the one hand and the Singou on the other). The areas of Kondio and Tapoa Djerma were not taken into account in the calculations and the ranches of Singou and Konkombri were counted in the Singou river basin.
The cumulative densities of these five species in 2003 (Bouché et al) are as follows:

Sector	Density/km
Arly Park	1.25
3 areas of East Arly	0.73
All Arly	0.98
6 areas of Singou	1.68

It can be seen that the hunting areas of Singou are richer (x2.3) than those of Arly and that despite being "virtually abandoned", Arly park is richer than the adjacent hunting areas (x1.7).

There is a large difference in quality among the different hunting areas in the eastern part of the country. This point is important for the rest of the study.

f. An example of community management: the Comoé-Léraba wildlife reserve

At the end of 1995, a project funded by the Global Environment Facility, began work to conserve the biodiversity of the classified forest of Comoé Léraba (South-West of the country, on the border with Ivory Coast) and to promote local development around the forest. This forest, in fact made up of two neighbouring parts, covers 124 000 ha. The project lasted until 2003 and was followed by a second one from 2003 to 2007. The first had financing of 2.45 billion CFA F, and the second 450 million CFA F (of which only 365 were spent). Nearly three billion CFA F were thus invested over 12 years.

The project supported local organisation and development and in particular established an inter-village association for natural resource and wildlife management (AGEREF) in 1999, to which the classified forest was conceded (in 2001 the forest became the Comoé-Léraba, partial wildlife reserve and classified forests). The objective of the AGEREF is to contribute to poverty reduction and improving local livelihoods through sustainable natural resource management. It is made up of representatives of the 17 neighbouring villages covering around 30 000 people.

In addition to local development (seven schools were built for instance) and many micro projects, the reserve itself was developed (527 km of trails, water sources, markers and signs, two camps etc.) and a surveillance system set in place (20 voluntary village monitors). Benefits are generated through big game hunting, safaris, fishing, beekeeping, cane rat breeding and charcoal production. The latter activities are just beginning and do not really generate revenues apart from fishing (4.4 million CFA F, of which 2.8 is for the AGEREF).

Ecological monitoring has been regularly carried out using transect walks with varying band widths, complemented by the 2005 total aerial census. Current populations are estimated at:

Species	Population according to transect walk figures	Population according to 2005 total aerial census
Buffalo	200	90
Antelope	1000 to 1500	419
Hartebeest	1500 to 2000	353
Western Buffon's Kob	300 to 500	24
Defassa Waterbuck	100 to 200	37
Bushbuck	200 to 300	-
Warthogs	3000 to 4000	43

Analysis of the data (Bouché et al., 2005) shows a drop in buffalo, antelope and hartebeest populations since 2000, and stability as regards the other species. This would seem to indicate that pressure from poaching is high in this area and reveals the limitations of the system in place. Big game hunting has taken off gradually, with test hunting safaris and is now hitting its stride thanks to a partnership with a hunting organisation that purchases part of the quota. The current quota allows shooting of four buffalo, eight antelopes, eleven hartebeests, five Western Buffon's Kob, three Defassa Waterbuck etc.

With hunting safaris being sold for €5 500 (for one buffalo, one antelope and one hartebeest in ten days) or €4 500 (seven days, one buffalo or one antelope) it is difficult to pretend that big game hunting is profitable.

It is not easy to make more than 30 million CFA F a year, and annual management costs are around 75 million CFA F, excluding depreciation on the five vehicles inherited from the projects. Until the 2006-07 season, the two best hunting seasons generated revenues of 18.3 (six safaris) and 19.3 million (seven safaris) respectively. In total, in five years (2003 – 2007), activities to develop the reserve generated benefits for the communities of around 28.9 million and 3.7 million in salaries. Generally speaking, the villages use these funds to finance their contribution to building socio-economic infrastructure in partnership with other development stakeholders.

It can be noted that the Government makes an annual contribution to operating costs by exonerating the AGEREF from paying the leasing fees (75 CFA F/ha for big game hunting, which is the minimum rate), representing a donation of 9.3 million CFA F per year at least.

Although big game hunting alone is not profitable enough to run the reserve, it should be noted that the integrity of the forest is preserved, as are the eco-systemic services.

g. Remarks

Burkina Faso has invested in promoting wildlife and hunting, but communicates little on ecological results and economic management. At the same time, it has not significantly developed its national parks which are little known or visited.

In all, big game hunting in Burkina Faso is a rather unprofitable sector: some win, some lose. The economic gain per hectare is low, as much for the government and the private operators as for the local communities, who would stand to gain more from transforming these hunting areas into farmland. The change in mentality required to promote conservation cannot take place in such a context, which calls into question the strategy being developed.

2.1.15. Benin

a. Institutional Context

After a period from 1982 to 1990 when big game hunting was forbidden in Benin, it is now practiced in five

hunting areas in the north of the country, which are either peripheral to the Pendjari National Park (three of them), or to the W national park. They cover a total surface area of almost 400 000 ha.

These zones are managed by the CENAGREF (national wildlife reserve management centre), a parastatal company that is financially independent, created in 1996 and the technical structure of which was specified in 1998. The CENAGREF is authorised to manage income generated by the wildlife sector (hunting and safaris). It is also expected that the local communities of protected areas will participate in managing these via wildlife reserve village management associations (AVIGREF).

Management is governed by the law of 2004 on wildlife. Hunting areas are leased to hunting organisers via a call for tender which took place in 2004, attributing zones for a five-year period, that can be tacitly renewed following an assessment in the 4th year (this external evaluation did indeed take place early 2009).

b. Geographical location

Big game hunting areas make up 3.5% of the country (112 622 km²).

Name	Surface area (ha)
Djona hunting area	115 200
Mekrou hunting area	102 000
Konkombri hunting area	25 000
Batia hunting area	75 000
Porga hunting area	76 500
Total	**394 000**
Average surface area	*78 840*

The average size of the zones is greater than that in neighbouring Burkina Faso (66 705 ha) by 18.2%. It would not appear to be possible to create new hunting areas in Benin, apart from the separation of Djona into two entities.

c. Technical and economic data

Income from hunting and tourism can be broken down as follows:
- 30% for AVIGREFs: 23 local villages around Pendjari and 75 local villages around W. The population concerned is around 250 000 people.
- 70% for CENAGREF: this sum is then divided between park management (70% of this sum, i.e. 49% of the total), and operations of the General Directorate (30%, or 21% of the total).

Attribution	% of total income
AVIGREF (local communities)	30%
Park management (CENAGREF)	49%
CENAGREF Management	21%

Income from hunting is as follows:

In CFA Francs	2004-05	2005-06	2006-07	2007-08	Average/year
Total	93 086 000	114 545 000	119 130 000	136 160 370	115 730 343
For the communities	27 925 800	34 363 500	35 739 000	40 848 111	34 719 103
For Pendjari park mgmnt	28 363 650	33 770 800	42 532 000	44 658 781	37 331 308
For W park mgmnt	17 248 490	22 356 250	15 841 700	22 059 800	19 376 560
For CENAGREF mgmnt	19 548 060	24 054 450	25 017 300	28 593 678	24 303 372

The average income for the local communities (250 000 people) is around 140 CFA F per person per year. The share that goes to operating Pendjari park (37.3 million), corresponds to around 14% of its annual operating budget (275 million approximately).

Per hectare, the total revenues are around 294 CFA F, of which 88 CFA F/ha are for the local communities and 206 CFA F for the government. The hunting areas of the Pendjari block contribute to the park of the same name at a rate of 211 CFA F/ha. Those of the W park only contribute 89 CFA F/ha. These benefits are similar to those in Burkina Faso (total government + communities: 282 CFA F/ha), but the proportion reserved for the local communities is greater in Benin: 30% rather than 11% in Burkina. Gains of 88 CFA F/ha for the communities is still low compared to income from agriculture.

The number of hunters coming on big game hunts in Benin has fluctuated since hunting reopened in 199-91. During the period up until 2003-4, before the latest leaseholds, an average of 99.3 permits per year were granted. Since that date, the average is 66.3 permits per year, although this is rising, with 89 permits granted during the 2007-8 season. Per concession, the annual average number of permits was 19.9 for the former period and 13.3 for the latter. The figure for the latest season is 19.8.

The number of animals killed from the main species is:

	Lion	Buffalo	Antelope	Hartebeest	Western Buffon's Kob
Annual average killed	4.2	47.8	25.2	17.8	10
Annual average per concession	0.84	9.56	5.04	3.56	2
Percentage success per hunter	6%	67%	35%	25%	14%

d. Hunting safari prices

The prices offered by the five operators are available on the Internet. A six-day hunt including the shooting of a buffalo costs between €4 500 and €5 500 (on the basis of one guide for two hunters). Mainly for the zones of Porga and Djona, a certain number of hunters go on 12-day hunts (including many Americans), for a cost of around €10 000-12 000. Overall, the average price of hunting safaris seems slightly higher than in Burkina Faso.

e. Ecological monitoring

Both national parks have a different type of ecological monitoring:

- Pendjari Park and the two associated hunting areas (Pendjari and Konkombri) are monitored via aerial census sampling carried out every two years.
- W Park is monitored annually by transect walk.

Unfortunately, as the method used in W park is based on a very small sample, it only generates a low number of contacts and does not make it possible to make a reliable calculation. Therefore, we only took into account the monitoring for Pendjari. As in Burkina Faso, we took the combined density of the five big species (Elephant, Buffalo, Antelope, Hartebeest, Western Buffon's Kob) as the indicator. The figures obtained (per km^2) are as follows:

Zones/year	2002	2003	2006
Pendjari National Park	2.25	3.06	2.37
Pendjari hunting area	0.68	0.45	0.92
Konkombri hunting area	0.48	1.41	-

NB: There are no results in 2006 for Konkombri hunting area, because the person responsible for the census considered that in light of the low number of observations made, the population for that zone could not be calculated.

We can conclude that the Pendjari Park is considerably richer than the hunting areas, indeed, depending on the year, from 2.5 to 7 times richer than the adjacent hunting areas. It can be noted that the Konkombri zone is only a thin band around 6 km wide along the right bank of the Pendjari. Ecologically speaking, this hunting area is entirely part of the river ecosystem and therefore of the national park and should, in theory, belong to the park and not be classified as a hunting area.

The total aerial census of the W-Arly-Pendjari ecosystem carried out in 2003 is the most recent one to have covered the W Park and its hunting areas. It gave the following combined densities (of the same five species) (Bouché et al., 2003):

Area	Density/km^2
W Park	0.23
Djona hunting area	0.36
Mekrou hunting area	0.82
Konkombri hunting area	1.41
Pendjari hunting area	0.45
Pendjari Park	1.98

It can be noted that:

- the ecosystem of Pendjari is much richer than that of W. W Park has a low density, but it should be borne in mind that the part in Benin is made up, for the most part, of a laterite plateau practically devoid of water and therefore fairly inhospitable for wildlife,
- The Mekrou hunting area is a transition zone for the Pendjari ecosystem and benefits from a good hydrographical network. It has a higher density than the Pendjari hunting area.
- Pendjari National Park is richer than Konkombri hunting area (which is part of its ecosystem) and almost 2.5 times richer than Mekrou hunting area and five times richer than Pendjari hunting area.

f. Monitoring of hunting

There is no system to monitor hunting as such (number of animals shot per hunter and per day of hunting, real rate of failure etc.), to locate specimens, or to monitor trophy quality (change in averages each year etc.). Only the extent to which quotas are filled is monitored, but this is not a very pertinent indicator in that the quota is not set according to any scientific basis. It would be useful to replace this indicator with the actual failure rate, which is the number of animals of a species that a hunter is allowed to kill according to the quota and to the number of hunters in the area , minus the actual number of animals of this species killed per

hunter having operated in the same area.

g. Employment in hunting areas

The employees of the five hunting areas are estimated at around 100 permanent staff (that is to say at least six months per year), plus around one hundred more temporary staff employed for one month to open the trails. On average, that means around twenty permanent jobs per zone, plus around twenty temporary jobs for one month. Taking into account the ratio of 3.5% of the country's surface area concerned by these activities, the figures are, once again, low.

h. Remarks

Benin has sought to attain a balance between national parks and hunting areas, and in the past few years has set up a functioning parastatal office for protected areas. It is currently setting up a foundation to ensure sustainable financing and communicates openly on wildlife populations and on hunting sector assessments. All these elements bode well for the future.

2.1.16. Summary of big game hunting in West Africa

The table below summarises the main data relating to big game hunting in West Africa. The data aim to highlight the spatial, economic, social and ecological importance of big game hunting areas in this sub region.

Surface area actually occupied[4]	1 328 070 ha
Attributed surface area but partially degraded[5]	1 200 000 ha
Surface area that could be used in the near future[6]	250 000 ha
Number of tourist hunters[7]	370
Number of concessions[6]	20
Number of concession holders/organisations	20
Gains for all West African local communities	80 million CFA F
Gains for the local communities per hectare dedicated to big game hunting	60 CFA F
Gains for all West African governments	340 million CFA F
Gains for governments per hectare dedicated to big game hunting	248 CFA F
Percentage of the national territory dedicated to big game hunting in Burkina	3.4 %
Percentage of the national territory dedicated to big game hunting in Benin	3.5 %
Contribution of government income (from big game hunting) to the national budget in Burkina	2.35 per 10 000
Contribution of government income (from big game hunting) to the national budget in Benin	0.65 per 10 000
Number of permanent jobs for all West Africa	380
Number of temporary jobs for all West Africa	400
Average number of lions shot per year in West Africa	15 to 20
Average number of buffalo shot per year in West Africa	180
Average number of antelope shot per year in West Africa	150
Average price for a 6-day hunting safari (including buffalo shooting)[8]	5 000 €
Average surface area of a concession in Burkina	66 705 ha
Average surface area of a concession in Benin	78 840 ha
Average number of hunters per concession in Burkina	22.7
Average number of hunters per concession in Benin	16.6
Number of hectares needed to shoot a lion	87 500 ha
Number of hectares needed to shoot a buffalo	6 500 ha
Number of hectares needed to shoot an antelope	10 000 ha
Number of hectares needed to shoot a hartebeest	16 500 ha

[4] Burkina Faso + Bénin
[5] Senegal
[6] Ivory Coast + Mali
[7] Burkina Faso + Benin + Senegal
[8] On the basis of 1 guide for 2 hunters

The big game hunting sector therefore actually covers around 13 000 km^2 in West Africa, in other words 2.2‰ of its surface area[9]. This is a low rate with regard to the surface areas of protected areas, which represent 10% of these countries. Nonetheless, possibilities for extending these hunting areas in the future are very limited. In fact, big game hunting areas really only concern two countries (Burkina Faso and Benin) for around 3.5% of their surface area.

Criterion	Burkina Faso	Benin
% of national territory	3.4	3.5
% of state budget	0.0235	0.0065
% of GDP	0.017	0.008

The productivity of hunting areas is negligible on the scale of these two countries. The number of jobs created is also low for 3.5% of the national land covered (400 permanent[10] and 400 temporary[11]) for a total population of 19.4 million.

The average gains for the local communities are very low: around 60 CFA F/ha, while these areas are located on favourable agricultural land, where cotton, for instance, would generate around 150 000 CFA F/ha, i.e. 2 500 times more.

The hunting safari prices are the lowest in Africa (with slightly higher prices in Benin) and at these prices it is unlikely that most local operators make any real profits.

Apart from for Burkina Faso and Benin, and in light of fairly low results from the big game hunting sector, and low apparent potential, it would seem that the future for conservation will not involve the setting up of big game hunting areas.

[9] 6 139 570 km²

[10] Which are in fact unstable: the majority of these jobs are for 5 months out of 12.

[11] 4 to 6 weeks per year.

2.2. Central Africa

2.2.1. Republic of Central Africa[12]

a. Institutional Context

The institutional context of big game hunting has been described in many reports (including that of Roulet) and is not covered here in detail. The legal texts in the sector are old and considered to be obsolete, as is the zoning which is now unsuited to current hunting and new land tenure issues. State administrative and financial management, carried out by the Ministry of Water and Forests, Hunting and Fishing, responsible for the environment is notable for its opacity.

Roulet's report (2008) recommends a general overhaul of the sector on an institutional level, as regards its spatial organisation, and on the organisational, technical and financial levels. This indicates a sector that has been organised for years, but where the status quo is maintained by a small group of people who benefit from it.

b. Geographical location

In theory, hunting areas represent 31.5% of the country (out of 622 984 km², for a national population of 3.9 million and a population density of 6.3 inh/km²) in other words 196 240 km², while parks and reserves occupy 11.1% of the national territory. This means that 42.6% of the country is classified as a protected area or equivalent, which constitutes a record.

Today, around 30 out of the existing 71 sectors are leased, representing 66 000 km^2. Therefore two thirds of the ZICs are not exploited. Among these sectors, those managed as village hunting areas (ZCV) represent 34.714 km^2. The Centre North has the highest concentration of hunting operators in RCA (nine): the 12 sectors and eight ZCV were rented in 2008.

A new considerable rise in land tenure conflicts can be noted, and hunting areas are faced with many problems: professional poaching, pressure from local communities hunting for their own consumption, a sharp increase in conflicts due to nomadic herding. Today, it is important that tourist hunting activities be developed in collaboration with these different stakeholders and be able to prove their ecological and socio-economic worth.

Wildlife is subject to high pressure due to the subsistence hunting carried out by the local communities in neighbouring rural areas living below the poverty level (GDP per capita is only $US350/year, 2007), and commercial hunting is practiced by people who have come in principally looking for ivory. Despite the efforts made to improve protection so good hunting safaris can be organised, many constraints persist:

- Continued "Sudanese" poaching, hunting the last of the elephants,
- High level of hunting for local consumption and trade, even on the ZCV,
- Development of new conflicts with nomadic herders.

Therefore, it would seem that the surveillance systems set up by hunting organisers are not effective enough to guarantee the sustainable shooting of animals (Roulet, 2008).

c. Technical and economic data

In 2006, 39 sectors (with an average surface area of 2 433 km²) were operated by 16 companies that hosted 198 hunters. On average, over the ten years of hunting up until 2008, it can be seen that 13.6 companies hosted 155.5 tourist hunters (i.e. 11.4 per company) exploiting 34.9 sectors, for a total surface area of 67 980 km² (i.e. 10.9% of the national territory), the sectors having an average surface area of 1 944.6 km². Therefore only one third of potential ZICs are used.

[12] The majority of the information in this chapter was obtained from the 2008 assessment on the hunting sector carried out by P.A.Roulet for the French Embassy in Bangui.

The areas along the Chadian border and in the North East are currently being abandoned and efforts are focussing on the central zones in the North. Development of the forest zones in the South East can also be observed in the areas away from the borders.

Each year, around 40 to 50 hunting guides operate in RCA: 65% of them are French, 25% Central Africans and 7% South African. It can be estimated from 2006 data that a little fewer than 500 direct jobs for six months of the year and 700 for 2.5 months (to open the trails) are generated by recreational hunting. The clients (around 200 per year in recent years) are 68% French and 19% American.

The quotas are not attributed on any scientific basis, but rather in an arbitrary manner (annual reports, operator requests, State economic interests and those of the operators). Therefore, the sustainability of hunting cannot be guaranteed, nor can the effectiveness of anti-poaching actions. The following specimens were taken in 2007:

Information	Raw Data	Average per sector
Number of animals attributed	2 376	-
Number of animals killed	831	-
Overall success rate	35%	-
Number of hunters	191	5.46
Number of animals shot per hunter	**4.4**	-
Number of Buffalo shot	181	5.17
Number of Giant Eland shot	82	2.34
Number of Lions shot	2	0.06
Number of Bongos shot	25	0.71
Number of Sitatunga (marshbuck) shot	3	0.09
Number of Antelope shot	38	1.09

It can be noted that the number of animals shot per hunter has been falling since 2002, when the figure was at 6.9. The value of 4.4 is low on an international level. The surface areas needed in 2007 to shoot an animal of a particular species are calculated as follows:

Number of hectares needed to shoot	ha
A Buffalo	37 558
A Giant Eland	82 902
A Lion	3 399 000
An Antelope	178 895

The average annual fiscal income (2002-2006) amounts to 274 million CFA F, in other words around the same amount as collected in Burkina Faso for less than one million hectares (for 6.8 million ha in RCA). This corresponds to a mere 1.5 ‰ of the State budget. This also represents a fiscal income per km^2 of 544 CFA F, while the forestry sector generates 12 682 CFA F/km², in other words 23 times more.

The 16 companies operating declared a total income of 1 billion CFA F[13], in other words around 62.5 million per company, with a high disparity between the companies. With such low turnovers, even if they are probably slightly underestimated for fiscal purposes, few companies can be making a profit.
The GDP of the RCA being 849 billion, big game hunting only represents 1.1‰ of this.

In 2006, the ZCVs had an income of 129 million CFA F (of which 103 million were for the management committees). This only represents 37 CFA F per ha. ZCVs employ around 50 people full time and 300 seasonal workers (for around six to eight weeks), for a total salary mass of around 35 million CFA F.

The price of hunting safaris is quite variable. A conventional safari (to hunt giant eland and Bongo) usually lasts 13 days, with one hunter per guide. The most expensive safaris cost €25 000 to 30 000, but a good number cost between €20 000 to 22 000. The operators with poorer reputations or those operating in less popular areas even offer hunting safaris for between €16 000 and 18 000. Six day safaris for Buffalo hunting begin at €8 500 (from Bangui, transfer to the hunting area by plane) or €6 000 without the transfer.

[13] Which is doubtless underestimated, but also reveals the fact that a considerable part of income from Safaris remains in the West. With these figures, few companies are making a profit.

d. Ecological monitoring

Wildlife is monitored sporadically by projects. In recent years two studies have given population figures:

- An aerial census in 2005 (*P.-C.Renaud, M.Fay*)

A census was taken of three blocks at a sample rate of 16%[14], which we will use for analysis. As the same method was used in 1985, the comparison 20 years later is interesting. The results of this change (from 1985 to 2005) are presented below.

In the table opposite the sectors with the highest change (even if negative) for each species are given in yellow. The rhino triangle is a hunting sector, while the two other blocks are totally protected (national park, total reserve).

It can be noted that the hunting sector has achieved "better" conservation results for only three species out of ten, even though there is active surveillance, while the other areas are almost entirely abandoned by the administration.

Sampling at 16%	Change as a % from 1985 to 2005		
Species	**Manovo Koumbala**	**Rhino Triangle**	**Vassako Bolo**
Buffalo	-43	84	304
Eland	82	-43	4
Hartebeest	-76	84	-66
Antelope	29	-10	12
WB's Cob	-57	-100	-100
D. Waterbuck	-93	-90	0
Giraffe	-87	-52	0
Bushbuck			-17
Oribi		-76	-35
Warthog	58	57	

In addition to the species conservation aspect, the census is interesting because it provides density figures which can be used to compare the zones. The densities observed per zone in n/km^2, are as follows (the areas with the best density levels are highlighted in yellow):

The hunting area has values superior to the national parks for buffalo and hartebeest.

Otherwise, the national park type zones do better than hunting areas, even if they are "forgotten" by the authorities. Vassako Bolo and the Bamingui-Bangoran national park seem even to have improved, while the neighbouring hunting areas have deteriorated considerably.

Denisties	Manovo Koumbala	Rhino Triangle	Vassako Bolo
Buffalo	0.2	1.48	0.32
Eland	0.09	0.07	0
Hartebeest	0.14	0.16	0.1
Antelope	0.07	0.06	0.07
WB's Cob	0.29	0	0
D. Waterbuck	0.01	0.01	0
Giraffe	0.01	0	0.01
Bushbuck	0	0.01	0.04
Oribi	0.02	0.01	0.01
Warthog	0.19	0.17	0.15
Total	*1.02*	*1.97*	*0.7*
Total excl. buffalo	*0.82*	*0.49*	*0.36*

In addition to the figures on population density, the problem of specific conservation arises. If the analysis is refined to consider individual species, it can be seen that huning zones have not been able to conserve the following species: Western Buffon's Kob, Defassa waterbuck, Reedbuck, Hartebeest, Giraffe, Ostrich, Lion and Elephant.

- Counting according to hunting action

This methodology, developed by the IGF, consists in noting during a hunt the animals seen and subsequently calculating the ratio of the number seen to the kilometres covered. It is therefore a kilometric quantity index. The animal encounter rate during the study in RCA (on the hunting blocks in the Centre-North, including the "rhino triangle") was fairly low, around 15 sightings per day. Due to a lack of sightings, the study could not estimate the density of lion, elephant, buffalo, giant eland, roan, Western Buffon's kob, yellow-backed duiker, blue duiker and bush pigs.

[14] Which gives an acceptably reliable sample and interval.

The number of kilometres that must be covered by car on the hunting trails to make a sighting is nonetheless an indication of the "wealth" of the zone. The following kilometres were needed during this study to sight just one specimen of the species:

Species	RCA 2007 (Bamingui – Sangba)
Hartebeest	48
Buffalo	83
Eland	725
Antelope	195
Red-flanked duiker	36
Grimme's duiker	49
Defassa waterbuck	Absent
Reedbuck	Absent
Bushbuck	68
Oribi	47
Warthog	41
Western Buffon's Kob	Absent

The comment that can be made following this study which focused on the best hunting areas in the country, is that the wildlife densities are extremely low. In which safari parks do tourists have to cover at least 36 km to see the most common animal? These figures confirm the very low densities observed by plane in 2005 and show that the current hunting area system is unable to preserve wildlife (in an extremely difficult context it must be said).

Poaching is also noted everywhere as being on the increase, including in the press by hunters back from safari. This concerns local poaching (P.Flack, *African Indaba No. 7-3*, 2009) which now also includes buffalo (Magazine *Voyages de chasse*, No. 18), but also poaching by outsiders; a culmination point was reached on 5 June 2009 with the death of six surveillance agents in the North.

e. Remarks

Wildlife has diminished considerably in RCA, and the current system of hunting areas/ZCV would appear ill-adapted to reversing the trend. Hunting results show a reduction in the average number of animals shot, with good results still obtained on the species that are least vulnerable to poaching (eland, antelope) or that live in forests with little poaching (bongo, duiker).

The socio-economic results of the hunting sector do not yet induce any hope for changing local behaviour, having an impact on their livelihoods or on their development. They are not able to prevent poaching. Thus the system set up in the north of RCA has its limitations.

2.2.2. Cameroon
a. Institutional Context

Hunting is governed by the law of 1994 on forests, wildlife and fishing, and all application texts (decrees of 1995 setting the terms and conditions of the wildlife sector). The current protected areas network covers a surface area of around 8 138 800 ha, in other words more than 17% of the national territory, and includes the following entities: 15 national parks, six wildlife reserves, three wildlife sanctuaries, three zoos, 47 hunting interest areas and 22 community-managed hunting interest zones.

Hunting areas are called hunting interest areas (ZIC), and are spread among the North (Sudanese zone), in the regions of the North and the Adamoua, and the South (Eastern region, dense forest area). There are 31 ZICs in the North and 14 in the South. Six ZICs are community-managed (ZICGC) in savannah areas and there are 16 ZICGCs in forest areas. In total, hunting areas cover more than 3 983 352 ha, in other words 84% of the country. The average surface area of a ZIC in the North region is 61 973 ha.

It shoud be noted that in the North of the country, hunting areas cover 23 332 km², in addition to the 7 300

km² classified as national park (Faro, Benoue and Boubandjida). Therefore 45% of the North region is classified as wildlife areas. However, these surface areas are theoretical, because demographic and agricultural pressure (including cotton) has reduced the surface area of a certain number of ZIC. Furthermore, there is migration into this area and certain ZIC have already lost all or part of their wildlife potential.

b. Technical and economic data

According to Terdel (2007), the population of the operational technical unit (UTO) of Boubandjida (the national park and the five adjacent ZICs) is estimated at 76 204 inhabitants (density of 10.2 inhabitants/ km²). This density is still low, but it varies from one ZIC to another. The human density in both ZICs neighbouring the Boubandjida national park is 50 inh/km², compromising the possibility of hunting. Cotton cultivation is also clearly encroaching in on this area.

The populations living around ZICs benefit from a part of the trophy fees: 40% are for the local authorities and 10% for the local populations (via development associations). For the Boubandjida UTO, the income from fees was 20.4 million CFAF in 2006-7. If half of that is distributed to the local communities (in fact the local authorities and associations), that represents 134 CFA F/person.

The following animals were killed in the 2005-06 hunting season in the savannah area:

Species	Number shot	Average per area
Elephant	18	0.82
Lion	13	0.59
Buffalo	77	3.5
Eland	61	2.77
Antelope	53	2.41
Hartebeest	80	3.64
Defassa Waterbuck	53	2.41
Western Buffon's Kob	106	4.82

To make the calculation, we considered that only 22 areas were actually operational. We can see that on average, 4.18 big animals (elephants, lions, and eland) are shot in each zone and 3.5 buffalo. It is very difficult for an operator to break even with such a low number of hunting safaris sold.

As in West Africa, we calculated the number of hectares needed to shoot an animal of a given species. For the purposes of the calculation we considered 15% of the leased areas to be unusable. The surface area used was 20 000 km²:

Species	Number of ha
Elephant	111 111
Lion	153 846
Buffalo	25 974
Giant Eland	32 736
Antelope	37 736
Hartebeest	25 000
Defassa Waterbuck	37 736
Western Buffon's Kob	18 868

c. Price of hunting safaris

As in RCA, there is considerable variability in the prices. For a 13-day hunt of giant eland, the most reputable operator markets hunting safaris at €30 000. The majority of the other operators with good reputations offer their hunting safaris for around €15 000, with a certain negotiable margin that is difficult to quantify (end price probably around €12 to 13 000). The shortest safaris for hunting buffalo (six to seven days hunting) cost around €7 000.

Forest hunting safaris always cost more, and an operator may charge up to almost double the price of their

savannah safaris. A 13-day hunt in a good quality area of Bongo costs around €28 000 to €30 000. Nonetheless, it is possible to find hunting safaris from €20 000 with certain organisers.

The share of the Cameroonian Government is around one billion CFA F. In light of the fact that the state budget is 2 276 billion CFA F, this income represents a contribution of around 0.44 ‰, produced using 8.4% of the national territory.

d. Ecological monitoring

Ecological monitoring is sporadic, but an aerial fly-over was carried out by WWF in 2008 covering a large proportion of the Northern protected areas and hunting areas. Despite imperfections in the methodology used (total census), it can be noted that out of the 22 136 km² covered, of which 7 580 are national parks, generally speaking the latter are richer in wildlife than the ZICs:

- Most of the 525 elephants (42%) were counted in the Boubandjida National Park
- Most of the buffalo were seen in Boubandjida (22%) and Bénoué (17%) National Parks
- Most of the antelopes counted were in the national parks (58%)
- The hartebeest are most concentrated in the Boubandjida National Park (27% of the total number), and 60% of hartebeests were observed in national parks.

A lot of cattle were sighted in Faro National Park (53.6% of the total cattle), which shows that this park is not managed. The same goes for human settlements, which are however, concentrated in the peripheral areas. The greatest density of cattle was noted in a ZIC. It can be noted that human activities (fields, settlements, livestock breeding) are much higher in the ZICs than in the parks. Even Faro National Park, barely managed if at all, does not have the same level of invasion as some ZICs: the effects are only noticed on peripheral areas. Overall, the status of national park, even with poor surveillance, better protects the biotope than the status of ZIC, even when it is exploited.

The latter point should be highlighted, as the local communities around national parks do not of course benefit from trophy fees, as hunting is not permitted. This shows that this low level of gain is not enough of an incentive for the communities to respect hunting areas. The national park status has a much higher influence on conservation.

Another type of ecological monitoring was carried out by the IGF foundation (as in RCA): the sightings during a hunt. For 2007 in the Faro hunting areas, the average results show that apart from buffalo, the distances that need to be covered to make a sighting are much lower in Cameroon than in RCA, indicating higher densities of wildlife[15].

2.2.3. Chad

Historically, until the 1970s, Chad was known as the best big game hunting country in French-speaking Africa. At this time, hunting was not very developed in Cameroon and was just beginning in RCA (a few elephant hunting safaris). The political and security situation led to a gradual drop in hunting and then total suspension for a long while, before starting up again, if tentatively.

Hunting safaris traditionally took place in the South-East of Chad, along the border with Central African Republic (Aouk River), and used the town of Sarh as their base. In theory, big game hunting areas covered 6.75% of Chad's national territory. Many hunting blocks were defined in the Aouk domaine, covering a surface area of around 11 850 km², of which 5 000 km² were still used for hunting until 2006. A part of the Salamat reserve was classified as the "hunting area" of Iro lake, representing a further 10 000 km² to the North-East of the Aouk domaine.

Towards the end of the 1990s, new areas were created, in particular for hunting Kudu in the West (Melfi, Goz Beïda) and Barbary sheep (Ennedi). Furthermore, in the 2000s, at the instigation of the German cooperation agency (GTZ), a pilot village hunting area was created in the west on the periphery of the Binder Léré reserve (around 40 000 ha). Unfortunately, the minimal gain generated by hunting did not prevent encroachment by agriculture and grazing.

In 2009, none of the areas in the Aouk are being operated any more, nor is the community hunting area.

[15] Also indicated by P. Flack, African Indaba n°7-3, 2009

Only the Melfi hunting area (4 260 km^2, to the north of the Siniaka Minia reserve) is leased and operated, mainly for Kudu hunting (half a dozen hunters per year).

Therefore, tourist hunting is mainly confined to the Lake Chad area, where two small game hunting concessions (mainly for duck shooting) receive from 100 to 200 tourists per year for a week's stay.

2.2.4. Other countries of Central Africa

Big game hunting is closed in Congo, Equatorial Guinea and in Gabon. In the latter country, hunting in enclosed areas is practiced for forest game (mainly Sitatunga), at the Lékedi Ranch. It is a "pilot" operation, which is not advertised on the agency's website.

In DRC, hunting is theoretically open and there are a certain number of classified hunting areas. Over the past ten years several test-safaris have been organised, but have been mostly unsuccessful, due to a lack of game. It is nonetheless possible that in the future a certain number of opportunities may arise.

2.3. Eastern and Southern Africa

2.3.1. Tanzania
a. Institutional Context

Tanzania is considered to be the number one country in Africa for big game hunting. It has an extremely vast network of protected areas:

- Parks and reserves where hunting is prohibited cover 134 881 km², in other words 14.1% of the country,
- Hunting areas of various types: hunting reserve, Game Controlled Areas, Open Areas blocks, WMA (Wildlife Management Area) and community managed areas cover 250 000 km², i.e. 26.4% Of the national territory.

Protected areas are governed by two entities:
- hunting areas are governed by the Wildlife Division, of the Environment Ministry, which accords concessions for five-year periods and sets quotas.
- national parks and reserves without hunting are governed by Tanzania National Parks (TANAPA), a parastatal organisation.

Resident hunters have the right to hunt in open areas only. Resident permits give the right to shoot the common species: Buffalo, impala, hartebeest, topi etc. Trophy fees are low and few people pay them. The gains from hunting by residents are minimal.

b. Location of hunting areas

In all, 40.5% of the country is classified as some form of protected area. The Selous reserve, which is in fact a grouping of around fifty hunting areas, is the largest hunting area in the country (in Africa even). It covers 50 000 km².

c. Technical and economic data[16]

Tanzania is the largest African country for hunting the big five: in 2004, 1 650 foreign hunters spent around 20 500 days hunting and it is estimated that more than 7 000 animals were shot (note that in Tanzania a hunter may take several permits, which means that the number of permits is not an exact reflection of the number of hunters).

In 2003, the average number of animals shot per hunter in Selous was 7.8. It is estimated that every year recreational hunters shoot around 35 elephants, 2 000 buffalo, 250 lions and 300 leopards (Lindsey, 2007). For the Selous reserve alone these figures are 30, 800, 80 and 100. It is without a doubt the African country that has the best results for these animals.

In total, 141 concessions are leased to 42 safari companies and the three largest groups hold 51 concessions (i.e. 36% of the total). The turnover from big game hunting was estimated in 2004 at $US27.7 million. The local communities (42 district councils) received $USfive million from 2001/2 to 2004/5 (Kayera 2005), i.e. around $US one million/year for 250 000 km^2, or $US0.04/ha, equivalent to 20 CFA F/ha. The revenues generated for the local communities are therefore very low under the current system. The legislation on WMAs and the new hunting policy have made improvements in these areas, but they are infrequently or never applied.

The turnover per hectare made by the different types of management structure are approximately as follows:

- All hunting areas in Tanzania: $US 0.40/ha,
- Hunting areas in the Selous reserve: $US 0.70/ha
- Safari tourism in the Selous reserve: $US 1.30/ha.

In Selous, the income for the Wildlife Division from the best concession is $US108 000 per year and the least effective brings in $US29 000 per year. The variations in quality among the zones are considerable and

[16] Most of the data comes from the work of Baldus, 2004.

the differences are due to factors such as wildlife accessibility or density.

Buffalo, leopard and lion are the mains species for big game hunting and generate 42% of the trophy fees for the Wildlife Division. Buffalo make the largest contribution with 22.1% of trophy fees and 13.3% of the total income of the Wildlife division. Each hunter shoots on average 1.5 buffalo during a hunt in the Selous Reserve. The viability of hunting areas therefore depends mainly on having a good buffalo population. Certain species such as lion are affected by hunting pressure, but this is not the case for most species. The wildlife populations have diminished in many areas due to the increase in human settlements and the bush meat trade, but not from recreational hunting.

The success rates per hunter for the main animals are given in the following table:

Species	% of the contribution to the total amount of trophy fees	% of success per hunter	% to which quota is filled
Buffalo	21,5	150	83
Leopard	10,4	25	69
Lion	9,4	20	52
Elephant	7,6	9	N/A
Zebra	7,0	50	65
Hartebeest	6,0	100	76
Hippopotamus	5,7	33	68

d. Analysis of the hunting sector by Baldus (2004)

Baldus made a precise analysis of the hunting sector in Tanzania which noted a certain number of problems:

- The lack of control by the Wildlife Division,
- The lack of professionalism of hunting guides,
- Poor ethical practices and a lack of standards in the field,
- Adjustments made to the quotas,
- Failure to comply with environmental standards (in particular for camps),
- The decline in wildlife populations[17],
- The influence exerted by safari organisations and manipulation of high government officials,
- The lack of interest in changing the current organisation and applying WMA policy.

Baldus estimates that the pressure exerted by local communities on protected areas will not stop. The concept of community management of WMAs seeks to counterbalance this pressure and encourage development of the peripheral areas. The concept is easier to implement where the communities are small and the protected area's peripheral zone is vast with a high density of wildlife.

Many of these protected areas are under high and constant pressure from resource exploitation and wildlife populations are affected even if they can still withstand organised recreational hunting. A certain number of hunting areas are no longer viable and the situation is fragile for others. The cost of protecting and managing these zones is increasing, while the income from the zone cannot keep up. There is a clear decline in the number of hunting areas and the viability of most of them. The new policy and recreational hunting management plan recommend:

- Open calls for tender for the attribution of each concession
- A control of sub-letting of zones, which could be a natural follow-up to the preceding point
- That local communities have decision-making power over the allocation of concessions and establishing quotas in their area, and that they receive and manage the funds generated.

e. Ecological monitoring

There is no real ecological monitoring of hunting areas in Tanzania, or of hunting activities and trophies collected. This is carried out sporadically by projects (e.g. GTZ), and is not exhaustive. The data are therefore partial and difficult to interpret. Projects have tried to set up monitoring systems, but these have not been implemented by the Wildlife Division. However, the 2006 census showed the drop in numbers of some

[17] Even in Selous, the 2006 census (UNESCO, 2006) showed a drop in the population of buffalo, hippopotamus, gnus and impala.

species, including buffalo.

f. Price of Safaris

The price of safaris in Tanzania has risen significantly over the past ten years. Legislation has also evolved, and it is now compulsory to hunt for 21 days to shoot a lion or an elephant. The prices shown in 2009 by three different operators lead to the following average prices (excluding trophy fees) according to the species that can be hunted:
- 21 day hunting safari (Elephant, Lion): (one hunter/one guide) = €40 000 to 60 000
- 16 day hunting safari (Leopard, buffalo): (one hunter/one guide) = €25 000 to 40 000
- 7 day hunting safari (buffalo): 7 500 € (two hunters/one guide) = €7 000 to 18 000

2.3.2. Zambia

a. Location of hunting areas

In Zambia, big game hunting areas are classified as Game Management Areas (GMA). GMAs are protected wildlife areas on land that belongs to the local communities, in which animals are protected and mainly used for organised hunting and tourist safaris.

The GMAs of Zambia cover 170 000 km², i.e. 22% of the country's surface area. They are organised into categories according to the wealth of wildlife. In 2007, there were 42 GMAs, of which 13 were in the first category, 16 in the second, 7 in the wildlife depleted category and three in the specialised hunting category (rare antelope). These GMA, as the other protected areas, are managed by the *Zambian Wildlife Authority* (ZAWA), a parastatal body.

b. Technical and economic data

ZAWA's hunting revenues are high, in 2007 they were $US3 621 132 distributed as follows:
- Trophy fees: $US2 295 202 (63% of the total)
- Concession fees: $US1 270 974 (35%)
- GMA permits: $US81 150 (2%)
- Small game permits (birds): $US36 806 (1%)
- 57% of hunters came from the USA and 10% from Spain. Furthermore, hunting is open to residents in 24 blocks and in standard areas.

c. Price of safaris

As in Tanzania, prices of hunting safaris have increased significantly in the past ten years. The prices on offer in 2009 vary depending on the operator:
- 21 days (Lion, Leopard, buffalo): (one hunter/one guide): from € 35 000 to 60 500;
- 21 days (Lion, buffalo): (one hunter/one guide): from €30 000 to 51 000
- 14 days (Leopard, buffalo): (one hunter/one guide): from €12 000 to 28 000
- 7 days (buffalo): (two hunters/one guide): from €4 600 to 11 500

It can be seen that the difference is considerable between areas and operators. The prices in the upper range are similar to those in Tanzania.

d. Analysis of the big game hunting sector: NRCF Study

We present here the results of the study carried out in June 2008 by the Natural Resources Consultative Forum: "*The impact of wildlife management policies on communities and conservation in game management areas in Zambia*". This study makes a complete analysis of the big game hunting sector in Zambia.

This report shows that GMAs in Zambia are caught in a downward spiral of economic, sociological and ecological degradation, despite the real efforts and commitments made by ZAWA, local communities and various partners.

Ten years ago, the Government implemented the 1998 Zambia Wildlife Act, as it realised that without

sustainable natural resources future generations would have to face up to an increased risk of food insecurity and poverty, which would force them to overexploit already degraded natural resources. The new national parks and wildlife policy in Zambia instigated the concept of local community management of natural resources.

Today, it appears that governance of the GMAs, through community institutions such as community natural resource committees or village action groups, does not achieve the GMA objectives. In particular, the objective of setting up a buffer zone around national parks to protect wildlife and its habitat has not been achieved. It is therefore impossible to set up a sustainable wildlife tourism industry that would make a significant contribution to the national economy and to improving livelihoods in the GMA.

This report encourages the Zambian government to launch a national review of GMA management in order to design and adopt a new wildlife management policy framework in the wider context of protected areas and natural resource management.

- GMA commercial performance levels: analysis of the use of the main hunted species ("top species": lion, leopard, black antelope, roan and buffalo) in the hunting safaris on offer shows a downward trend, as for the trophy quality of the main hunted species.
As a result, the proportion of revenues paid to the natural resource management committees was 3.7 billion Kwacha[18] per year from 2004 to 2006, and 5.15 billion in 2007. This equals around $US one million per year and per hectare revenues of $US0.059, in other words 28 CFA F/ha for the communities. In Zambia, the average population density is 13 inh/km².

- GMA ecological performance levels: the validated quantitative data suggest that in more than half the GMAs of Zambia, the animal populations have declined, mainly due to poaching. In some GMAs the wildlife status is unknown. Many hunting blocks are affected. Four GMAs have thus been downgraded from the first category to the second, and 12 other GMAs are in a critical state of wildlife degradation.

Furthermore, an aerial photographic study shows that the natural habitats available for wildlife in the GMAs are decreasing throughout the country due to human settlements, agriculture, legal claims to traditional land and poorly coordinated planning by the governmental departments.

- GMA sociological performance levels: the local communities living in the GMAs are characterised by a high level of poverty. The monthly expenditure per person is estimated at $US14. This is $US22 in rural areas in general, and $US49 in urban areas. Compared to other rural communities, the well-being of GMA residents is 30% lower than that of the national rural average.

- Factors affecting GMA performance levels: for all GMAs, the most important problems are poaching, increased human settlements, bushfires, deforestation, subsistence agriculture and illegal fishing. Food insecurity is high. A very small proportion of the funding is allocated to resource protection and only 3 GMAs really reach the minimum management criteria.

Thus, this report describes an alarming situation in the GMAs. Natural habitats and wildlife are diminishing at an alarming rate in most GMAs. The communities living in GMAs are poorer than the other rural communities of Zambia and 31 GMAs out of 36 do not reach the minimum management effectiveness requirements.

e. Game farms in Zambia

Game farms are for breeding game. They are called farms when they have a small surface area and a ranch when they are larger. They are usually enclosed. In 2008, Zambia[19] had 112 game farms, for a total surface area of 112 769 ha (average per farm: 1 007 ha). The number of animals present is 21 546 (average: 192 animals per farm). If we consider that the hunting quota for antelope is 2.5%, an average of five animals per big game farm can be shot, i.e. 560 animals in total. In reality, in 2007, tourist hunters only shot 113 animals on the private properties of game farms. It is therefore a limited market.

[18] $US1 = 5 175 Kwacha in June 2009
[19] ZAWA 2007 Annual Report.

2.3.3. Kenya

Kenya closed hunting in 1977. Since then, several unsuccessful attempts to reopen it have been made. The context in Kenya has changed much over 30 years with:

- The demographic explosion which multiplied the population by 2.7, going from 14 million inhabitants in 1977 to 38 million in 2008, in other words a population density that went from 24 inh/km^2 to 65 inh/km^2,
- The Somalian conflict which modified the movements of semi-nomadic herders,
- Increased aridity in certain zones

The zoning established for hunting in the 1950s, when there were five million inhabitants in Kenya could not last.

Wildlife today, as in all countries with a high population density, is concentrated in protected areas, although seasonal movements are noted outside of them (particularly due to their old design). In areas where livestock breeders culturally tolerate cohabitation with cattle, the presence of species such as gazelles, zebra and impala etc. can be noted. Big animals, whose hunting could be lucrative, are practically only found in protected areas. The creation of *conservancies*[20] can be noted, particularly in the Centre-North of the country (Laïkipia, Samburu, Matthews Range, etc.).

There are a few game ranches, but their main source of revenues has dropped considerably since "The Carnivore" restaurant has taken wild game off its menu under pressure from "conservationists". Only farmed crocodile and ostrich meat remain. This is an example of how difficult it is to combine trophy hunting with modern tourism.

2.3.4. Uganda

Hunting was suspended in 1979 after Idi Amin's presidency. Hunting areas before this era were practically all colonised by agriculture and livestock: the country now counts 105 inh/km². The North of the country is still subject to troubles (LRA rebellion).

Legislation on hunting was changed in 1996. An operation to reopen hunting was carried out around the Lake Mburo National Park from 2001. This operation focused on an area used for cattle farming. The first phase consisted in an operation to hunt impalas for meat ("cropping"). The income was insufficient (quota of 100 impala per year, i.e. a turnover of $US5 500 per year), the cropping option was abandoned and recreational hunting was developed.

A zone of 100 km^2 on the border of the national park was retained and a quota set (2 to 3% of the population of hunted species) including ten buffalo, seven eland, ten waterbucks etc. Between 2001 and 2005, the average annual turnover was $US34 000 and 65% of this figure was paid to the local communities.

The economic potential of the different forms of land use around Lake Mburo was studied, a rare occurrence in Africa. The income per hectare and per year is:

- Mixed agriculture: $US281.4 (= 140 700 CFA F)
- Cattle raising: $US5.8 (= 2 900 CFA F)
- Poaching: $US3.6 (= 1 800 CFA F)
- Recreational hunting: $US1.7 (= 850 CFA F)

The revenues from recreational hunting ($US170 /km²) are much higher than those noted in Tanzania by Lamprey ($US21 to 29 /km², 1995) or by Baldus ($US40 to 70 /km², 2004). They are, nonetheless too low to be competitive with agriculture. In that, Uganda is no different from the other African countries where big game hunting is not of sufficient worth to compete with agriculture.

To make hunting viable, more and larger hunting areas are needed, but in the land tenure context of the country, this is not possible, unless some reserves are declassified, as there are no big animals outside these reserves.

[20] See below

2.3.5. Ethiopia

Hunting in Ethiopia was a large sector until the DERG came to power (1974 - 1991). Demographics and the socio-political context led to hunting areas being overrun by agriculture and livestock breeding. The latter is highly developed (Ethiopia has 43 million head of cattle, the highest in Africa and 6th highest in the world) and counts for 19% of the GDP.

Today, about half a dozen hunting organisers still exist (around fifteen guides), whose main objective is to hunt Mountain Nyala, for which a quota of around thirty is set each year. All hunting areas are inhabited and livestock farming widely practiced in them. They are often the seat of interethnic conflict and automatic arms are abundant. Wildlife densities are not high and the species present have often adopted nocturnal behaviour, which does not facilitate hunting.

2.3.6. Rwanda

Since the genocide (1994), big game hunting is no longer possible in Rwanda. Before this time, it was only practiced on the western border of the Akagera National Park at Gabiro (Mutara hunting domain), in particular for African buffalo that are large trophies. This domain, as well as a good part of the national park, is now occupied by agriculture and livestock farming and there are no longer any big game hunting areas in the country.

2.3.7. Zimbabwe and Mozambique

We did not particularly focus on these two countries for two different reasons:

- In Zimbabwe, the wildlife sector has collapsed over recent years (except for national parks and government hunting areas, which were better able to resist the socio-political upheavals than the private sector). Few data are available for recent years.

- In Mozambique, the situation is just the opposite: after years of closure following the civil war which began in 1975, big game hunting in Mozambique is expanding, after a demining campaign in certain areas. In 2006, 352 tourist hunters went to Mozambique, generating income for the Government of 12.2 million new *meticals* (i.e. $US425 000), up 25% on 2005. Many South African operators and guides are working there, and many South African hunters who hunted in Zimbabwe ("regional residents" counted as tourists in the statistics) now go to Mozambique. The big game hunting sector is currently being restructured (French Development Agency funding[21]).

In this, Mozambique appears to be out of sync with its neighbour Zambia, which is reorienting the hunting sector towards tourism and with Botswana, which has just closed hunting in the Okavango.
Hunting areas represent 19.6% of the country, in other words a surface area of 157 000 km². The latter corresponds to the surface area of hunting areas in Zambia and is well above those of neighbouring Zimbabwe (65 000 km²). Some are government zones (*Coutada*) and some are managed by the local communities.

The quality of hunting safaris is not yet very high in Mozambique. Only nine lions were shot in 2007 and 14[22] in 2008, i.e. respectively 17 and 13% of the quota set by the administration. This indicates low densities and therefore a limited potential business in high-end hunting safaris. Differences in declarations between hunting safari organisers and the government reveal problems with sector governance (IGF, 2009). Furthermore, the quality of hunting guides operating in Mozambique does not seem to be the best, two of them (including one Frenchman) were arrested in June 2009 for elephant poaching[23].

For the statistics of the study, we used the figures from Zimbabwe (as in publications used as a basis for our study: Lindsey, 2007), which were known, but it is probably more accurate to consider them today as those of Zimbabwe + Mozambique.

[21] http://www.afd.fr/jahia/webdav/site/afd/users/admimozambique/public/projets/AT-faune-mai09.fr.pdf
[22] In other words, respectively one lion shot per 11 215 km²: a result around 16 times worse than West Africa.
[23] http://allafrica.com/stories/200907070963.html

2.3.8. South Africa

In South Africa, almost all big game hunting is carried out on game farms, which justifies the importance given to this activity in this study. Other safaris take place in private reserves or even in national parks (Pilanesberg National Park etc.).

Game farms have been presented by some as "the" solution to conservations problems in Africa. The data below, and the desire expressed by some to see these develop into larger entities that respect ecosystem values (conservancies), show that this is not at all the case.

a. General Data

The majority of the data presented in this chapter are those provided by the following studies:

- Study carried out for TRAFFIC by Claire Patterson and Patson Khosa: study of professional and recreational hunting in South Africa (2005),
- Study on hunting and game farming in South Africa[24] carried out by the National Agricultural Marketing Council (NAMC), a consultative committee of the South African Ministry for Agriculture.

The overall success of the sector is spoiled by the persistence of unsustainable management practices, in particular as regards quota setting and attribution of hunting concessions. It is important to encourage improvement in these practices. Currently, the demand for big game hunting in Southern Africa exceeds supply, and unethical practices have become a problem due to the intense competition that reigns.

At the end of the 1990s, the direct turnover of big game hunting tourism reached $US28.4 million in South Africa, in other words 7.5 billion CFA F. During the 2003/4 hunting season, the big game hunting sector in South Africa saw 5 to 6 000 hunters come through. These hunters shot 53 453 animals, representing a combined value of $US40.7 million[25].

By way of comparison, the sale of 21 000 head of live game in 2004 was valued at $US12 million. In addition to these foreign hunters, it is estimated that there are 200 000 resident hunters in South Africa. This sector is valued at around $US290 million[26], or $US1 450/resident hunter.

Around 9 000 farms are totally dedicated to game farming and a further 15 000 farms practice mixed activities (cattle and wildlife farming). This industry generates jobs for 5 to 6 000 people and it is estimated that 63 000 jobs are created by secondary industries such as tourism.

In 2004, 23 455 animals were killed for meat production. The marketing of live animals constitutes a relatively large proportion of the industry with a turnover of $US8.7 million in 2001. By way of comparison, in 2003, six and a half million people visited South Africa bringing in $US5.4 million in foreign currency.

During a study of game farms in the Limpopo province, 30% of the people surveyed replied that they had a game farm primarily for their own pleasure and 27% said that it was their own contribution to nature conservation. 24% of them were not financially dependent on the game farm revenues (van der Waal and Dekker, 2000).

b. Data analysis

An analysis of game farm statistics for 2000 in South Africa shows:

- There are 9 000 farms that only raise game (for this calculation the 15 000 mixed game/livestock farms are not counted, which would lower the figures given). Their average surface area is 2048 ha.
- There are 6 000 foreign hunters, i.e. 0.66 potential hunters per game farm,
- The average length of a hunting trip: seven days per client, i.e. 4.5 potential days per farm, at a daily cost of $US300/day, or $US1 350 potential annual revenues per farm from hunting days by foreign

[24] Report No. 2006-03
[25] i.e. $US6 800/hunter, which appears plausible.
[26] i.e. 7 times more than tourist hunting: South Africa is the only country in this situation in Africa, where resident hunting reaches such values and is part of the formal sector.

hunters.

- Eight animals killed per hunter, i.e. five per farm, and around $US750 per animal (which constitutes an optimistic average value) of fees paid, in other words an annual potential of trophy fees per farm of $US3 750.
- furthermore, 21 000 live animals are sold each year, in other words an average of 2.3 per farm and per year, at an average price of 2 000 Rand (excluding rhinoceros/buffalo which are an exception for farms), representing a potential annual income of $US460.

In total, the average annual income for a game farm from tourist hunting and the sale of live animals is at the most, $US5 560. At best, this corresponds to an average turnover for a game farm of 9 million CFA F: game farming is not an economically profitable market. This figure corresponds, for 10 000 farms, to around 180 million dollars in turnover, which is indeed similar to the figures given by other sources.

The estimated value of the entire wildlife industry in South Africa in 2000 is presented in the table below. It is currently estimated at around one billion Rand (= $US100 million), (Damn, 2005).

Source of revenue	Revenue (ZAR)	Percent
Biltong hunters (resident)	450,000,000	52.8
Trophy hunters (foreign)	153,000,000	17.9
Taxidermy[1]	10,000,000	1.2
Live game sales	180,000,000	21.1
Eco-tourism	40,000,000	4.7
Game meat sales	20,000,000	2.3
Total	**853,000,000**	**100**

Source: Eloff, 2002; Anon, 2000

The share of the total value of the industry generated by tourist hunters is around 18% of turnover, while resident hunters contribute 53%. The rest stems from taxidermy, live game sales, ecotourism and game meat sales.

In 2005, the average price for a day of hunting for a tourist hunter was around $US250 to 400 per day, rising to $US900 for “dangerous” game. Therefore these prices are low when the farm does not propose dangerous game hunting, but are also low compared to big game hunting in other countries and to luxury safaris.

The expenditure by resident hunters (2005) is estimated at 1.2 billion Rand ($US120 million) and additional expenditure (arms, ammunition, vehicles etc.) is estimated at 1.735 billion Rand.

c. Investment and profitability of game farms[27]

Considerable capital outlay is required to set up a game farm. The price of land has increased significantly in recent years. It is estimated that the initial development costs at least double the price of the land. Expenditure covers mainly fencing, infrastructure (animal handling, water sources, observation platforms, roads, buildings and staff housing), vehicles and various equipment and the purchase of the initial stock of wild animals.

The investment cost for a small game farm is around 2.5 million Rand, and for a large game ranch this figure can rise to 15 million Rand. In the Lowveld, the hectare costs between 3 000 and 6 000 Rand, depending on the size and the geographical location. The potential for developing ecotourism activities can be an essential factor in determining the price.

A large ranch in the Lowveld with the big five, costs around 85 million Rand, but a similar sized ranch in the

[27] The data come from an on-line university course: www.wildlifecampus.co.za

Kalahari will cost around 15 million Rand. The price of infrastructure rarely exceeds 15% of the total investment cost. This is due to the high cost of game and land, but also to the depreciation over time of the fence, the buildings and the vehicles.

For the investment to be profitable, the land would need to cost less and the game would need to be sold for a higher price than is currently the case. A farm only produces a limited number of trophy animals, especially if it is small. Therefore the revenue from recreational hunting is usually low.

Regarding the economic profitability of game ranching,[28], a major game farm agent in South Africa warns his potential clients on his website: "*Game farming is a glamorous business and people enter the game farming industry for more than purely economical reasons - therefore a game farm's income doesn't compare favourably against it's price...Don't try to convince investors to invest in a game farm... figures and business plans don't sell a game farm.*"

Game farm revenues are 80% from hunting, 10% from live game sales and 10% from tourism. According to the overall sector figures, income never covers expenditure on operations and investment, and the capital can never be recovered.

.

The final word goes to the same real estate agent: "*you can, like most game farm owners, use it purely as a 'rich man's toy*!'"

d. Conservancies[29]

Conservancies appeared several years ago as a solution to game farm problems. From a conservation point of view, game farms pose several problems such as the persecution of predators, exceeding of load capacity, the introduction of exotic species and genetic manipulation of hunted species[30]... The majority of these problems could be resolved by encouraging the setting up of conservancies: these are simply neighbouring ranches that remove their internal fences to create an area dedicated to wildlife, and where the owners work together[31].

These larger areas enable the whole range of species that make up the original biodiversity to be reintroduced and promote high added value forms of hunting and ecotourism, unlike the farms which kill a high number of specimens of low value species. The contractual joint management of conservancies better meets conservation objectives than an isolated ranch.

Furthermore, conservancies offer financial advantages: the different usage options produce more profits and joint management enables economies of scale to be reached. The land used for conservancies is worth more and better able to attract financing. Conservancies are ideal sites to develop partnerships with local communities and investors, and this can increase the socio-political sustainability of game ranching[32].

Indeed, game ranching does not only have positive effects on conservation: there is little monitoring of the ecological impact of game ranching and the development options taken. Furthermore, the game ranching industry has emerged without any suitable regulation. Game ranches are guilty of doubtful ethical practices, including what is called "canned hunting", where the animals are shot in small enclosures, with no possibility for escape, or "put and take hunting"[33], where good trophy animals are released onto the ranch just before the hunter arrives.

In South Africa, the average game farm size is only 820 to 4 920 ha depending on the province (Bothma,

---

[28] Data soruce is the internet site of the game farm real estate agency: www.gamefarmnet.co.za

[29] Data source is the article: "*The importance of conservancies for enhancing the value of game ranch land for large mammal conservation in southern Africa*", par P. A. Lindsey, S. S. Romanach & H. T. Davies-Mostert.

[30] For example, white, golden and black springboks can be found

[31] In Namibia these are simply areas jointly managed by the communities or different owners.

[32] In particular when local communities claim their legal right to recover land that belonged to their ancestors, which constitutes a major post-colonial problem.

[33] There are no other solutions on a game farm than to practice trophy hunting : their own production is always insufficient, in light of the size of the farm to be profitable. This is why there are many game transport and marketing companies in South Africa.

2002): enclosed game ranches are often overloaded with animals, causing similar ecological degradation to that seen on cattle ranches. In these small enclosed game farms the lack of large species limits their use to low value game hunting (common antelope), biltong (traditional dried meat), and the sale of live animals. Conservancies however, have larger surface areas and larger and more charismatic species can be reintroduced, enabling uses more oriented towards ecotourism and high value trophy hunting (with shooting limited to 2-5% of the male animal population). Under these conditions, the predators make a positive contribution to ecotourism and trophy hunting revenues and are therefore actively reintroduced.

The presence of the “big five” (buffalo, leopard, lion, elephant and rhinoceros), also enables tourist operators to sell the day at almost triple the price of ranches without them: $US277/night on average, as against $US88/night (P.A. Lindsey, unpublished). Similarly, in recreational hunting areas where the big five can be found prices are higher:

- $US600 – 1 300 per day in addition to trophy fees for big species,
- $US100 – 400 per day, with lower trophy fees for antelope hunting (Lindsey, 2006).

Furthermore, thanks to the economies of scale in the conservancies, management fees may well be lower than those of a game ranch of a similar size. The higher wildlife populations in the conservancies requires fewer operations of genetic management or in response to changes in environmental conditions. On small ranches, in the case of drought, it is often necessary to intervene to prevent animals dying (extra water, food, culling, capture to move them, and reintroduction when the conditions return to normal).

Finally, there are real socio-political benefits from conservancies: they offer more opportunities for local communities to get involved in the wildlife industry. They offer an appropriate institutional framework for interaction between the government and the community structures and are likely to have more political influence than ranches. Furthermore, with existing wildlife resource sharing mechanisms, a private conservancy can easily be extended to incorporate land belonging to the communities.

3. THE INDUSTRY OF BIG GAME HUNTING SAFARIS

In this section we present some data from different sources that can be used to characterise the big game hunting sector in Africa.

3.1. Some overall data

Baldus (2004) revealed the following figures concerning turnover in the main big game hunting countries:

- Tanzania: $US27.6 million
- Zimbabwe: $US22 million, which represents the ceiling reached in 1998, but which has been dropping ever since. The game ranch component has practically disappeared.
- Botswana: $US15 million
- Namibia: $US5 million.

The Safari Club International (SCI, 2008) estimates that 18 500 tourist hunters come to Africa (to 23 countries) each year, generating an annual turnover of $US200 million. It estimates that recreational hunting has a turnover of:

- In Botswana: $US20 million (and more than 1 000 jobs),
- In Namibia: in 2004, it is estimated that the turnover for hunting by tourists was $US28.5 million, representing 14% of revenues from tourism and 2.3% of the country's GDP. In 2003, local communities classified a surface area of 74 000 km^2 in 29 conservancies, i.e. 75% of the country's hunting land.
- In Zimbabwe, from 1989 to 1994 the CAMPFIRE system collected $US6 million, i.e. $US one million per year.
- In South Africa: $US100 million in turnover from tourist hunters in 2000 (Anderson 2003) (Damm, 2004)[34].
- In Tanzania: recreational hunting employs around 3 700 people, of which 2 282 are permanent jobs and 2000 temporary (www.tanzania.go.tz/)

The surface areas used for big game hunting are huge:

- 250 000 km² inTanzania[35] (Baldus & Cauldwell, 2005),
- 82 250 km² in Mozambique (Hatton, Couto & Oglethorpe, 2001)[36],
- 65 000 km² in Zimbabwe (Booth, 2002),

In Kenya, recreational hunting was forbidden in 1977 due to over hunting and corruption, causing a loss in potential earnings of around $US20-40 million/year for the country.

During the 1970s, recreational hunting existed on a large scale in Ethiopia, but with the increase in human population, in agriculture and political instability, 95% of hunting areas have been lost.

The following data come from the article: *Economic and conservation significance of the trophy hunting industry in sub-Saharan Africa*, by P.A. Lindsey, P.A. Roulet, S.S. Romanach. The table summarises the hunting statistics per country:

[34] i.e. $US16 600 hunter, a figure much higher than observed in reality!
[35] i.e. $US4 /km² of benefits for local communities
[36] Figure increased after instigation of community hunting areas: 157 000 km² (IGF)

Country	Number of operators	Number of hunting guides	Number of clients	Number of hunting days	Turnover in $USmillion	Number of animals shot/year	Number of jobs
South Africa	1 000	2 000	8 530	74 000	100	53 885	5 500
Namibia		505	5 363	15 540	29	22 462	2 125
Tanzania	42	221	1 654	20 500	27,6	7 034	4 328
Botswana	13		350	5 570	20	2 500	1 000
Zimbabwe	149	545	1 874	19 646	16	11 318	
Zambia	22		250		5	5 436	
Cameroon	23	47	175		2	960	1 200
RCA	19	41	150		1.4	738	900
Ethiopia	4	15	50		1.3	300	
Burkina	14		300		1.0	994	280
Benin	5		90		0.4	200	100
Chad	1	1	10				
TOTAL	**1 292**	**3 375**	**18 796**	**135 256**	**203**	**105 827**	**15 433**

- The high number of hunting operators and guides compared with the number of hunters can be noted: a hunting safari organisation usually only has an average of 14.5 clients per year, and each guide only guides an average of 5.5 hunters.
- The lowest results are those of South Africa, where an organisation will only have an average of 8.5 hunting clients per year, and each guide has 4.2 clients. This highlights that this is a prestige activity and a hobby, and that these hunting guides and organisations have other sources of revenue besides hunting.
- For the rest of the African countries (except for Namibia), the average is 16.8 hunters and 5.6 hunters per guide. Bearing in mind the costs, these figures are too low for these organisations or guides to be able to make a living from this activity

The following table summarises the number of hunting days per client, the animals shot and the amounts spent:

Country	Number of hunting days per client	Number of animals shot/hunter	Expenditure/hunter $US
South Africa	8.68	6.32	11 723
Namibia	2.9	4.19	5 314
Tanzania	12.39	4.25	16 687
Botswana	15.91	7.14	57 143
Zimbabwe	10.48	6.04	8 538
Zambia		10.06	20 000
Cameroon		5.49	11 429
RCA		4.92	9 333
Ethiopia		6	26 000
Burkina		3.31	3 333
Benin		2.22	4 444

These statistics are doubtless not always in line with the reality (for the amounts spent in particular), but they highlight a particularity of hunting safaris in Namibia : many hunters, for an average of only three days hunting. This is due to the fact that apart from the kudu and the Gemsbok not many other interesting trophy animals are available.

These hunters shot the following animals:

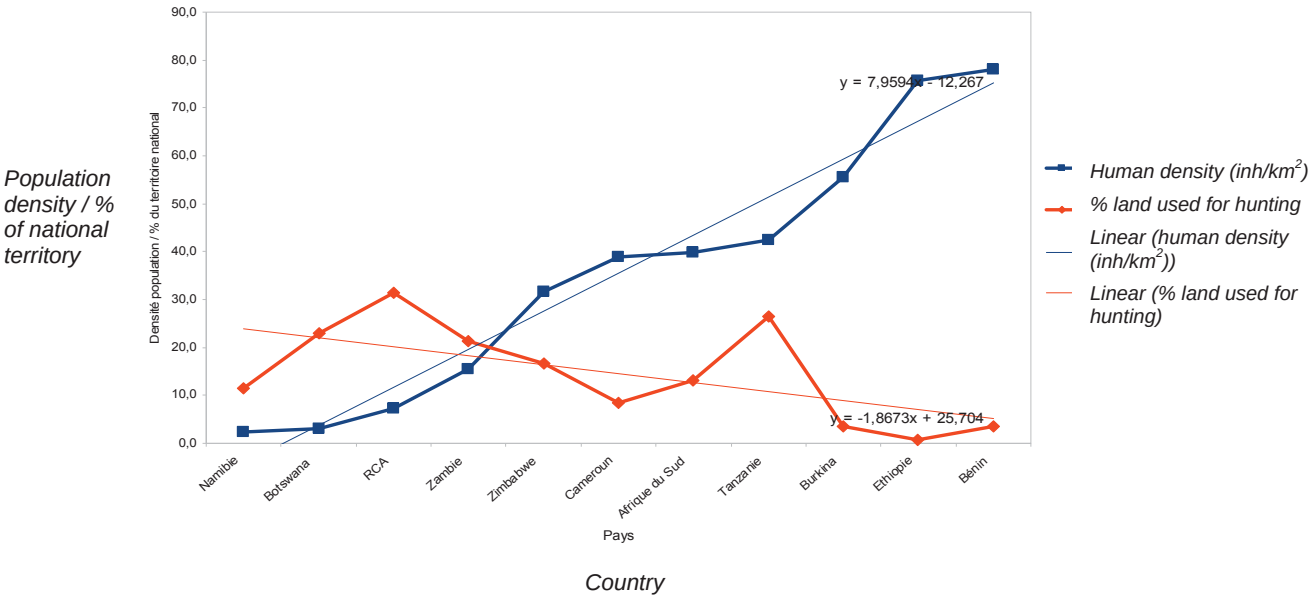
Country	Elephant	Buffalo	Lion	Leopard
Tanzania	35	2000	250	300
Botswana	270	160	0	32
Zambia	0	180	50	
Zimbabwe	243	853	89	303
South Africa	31	179	190	45
Namibia	36	20	7	121
RCA	0	180	2	16
Cameroon	25	80	12	0
Burkina	0	120	12	0
Benin	0	60	2	0
TOTAL	**640**	**3 832**	**614**	**817**

3.2. Big game hunting and demographics

The surface areas required to organise these hunting safaris constitute key data: with demographic growth, available hunting areas are getting smaller. In this section, we looked at hunting areas and other types of protected areas, and both of them together, as shown in the following tables. The surface areas used (in km^2) by big game hunting, the surface areas of other types of protected areas and the human population density are presented in the following table (Lindsey, modified):

Country	Surface Area	Hunting area surface area	% hunting	Surface area other protected areas	% other protected areas	Total % protected areas	Human population Density
South Africa	1 219 912	160 000	13.1	56 500	4.6	17.7	39.8
Namibia	825 418	94 052	11.4	107 125	13	24.4	2.4
Tanzania	945 087	250 000	26.4	134 841	14.1	40.5	42.5
Botswana	581 726	103 451	23	104 120	18	41	3.1
Zimbabwe	390 580	64 945	16.6	49 418	12.7	29.3	31.7
Zambia	752 614	160 488	21.3	59 451	7.9	29.2	15.5
Cameroon	475 440	39 830	8.4	43 000	8.7	17.1	38.8
RCA	622 984	196 035	31.5	68 918	11.1	42.6	7.2
Ethiopia	1 127 127	9 600	0.8	32 403	2.7	3.5	75.6
Burkina	274 200	9 340	3.4	22 000	8.1	11.5	55.7
Benin	112 620	4 000	3.5	8 435	7.5	11.1	78.1
TOTAL	**7 327 708**	**1 091 741**	**14.9**	**686 211**	**9.36**	**24.26**	**33.9**

If we present the curves in relation to human population density and the proportion of hunting areas in a given country, the following graph is obtained:

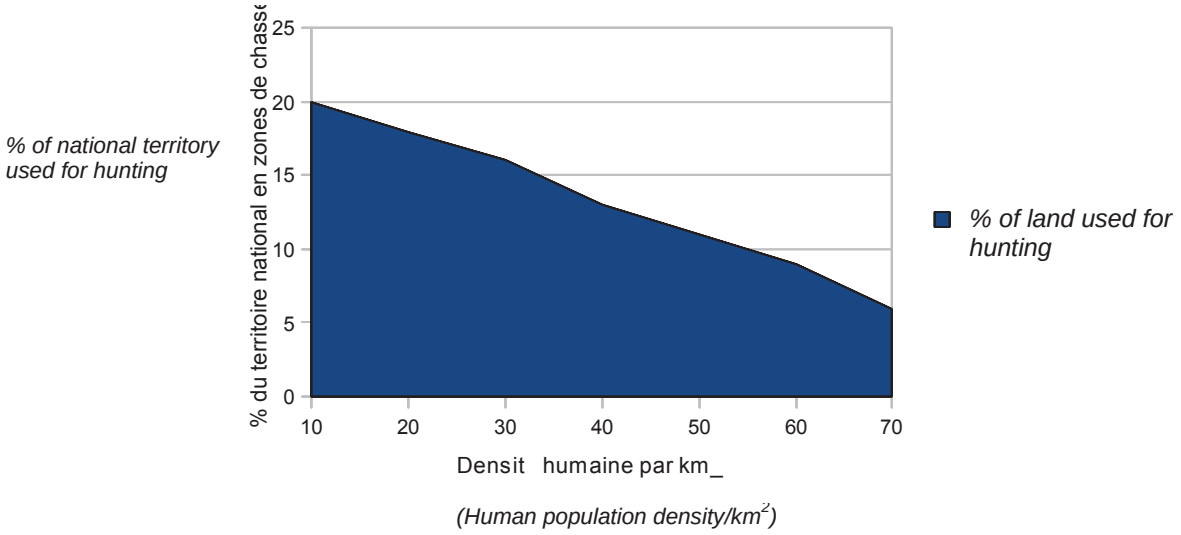


It can be noted that Tanzania has a high proportion of hunting areas compared to its population density, which is probably due to its high surface area.

The trend curves are:

- Population increase: f (x) = 7.96x – 12.27
- Reduction of hunting surface areas: f(x) = -1.87x + 25.7

Presented another way, the following graph shows the highly logical fact that the higher the population, the less room there is for big game hunting areas. This corresponds to the following relationship between population density and existence of hunting areas:
The value of the regression curve is: f(x) = - 2.32 x + 22.57. This gives indicative values of land available for hunting areas as a function of human population density.



We can thus extrapolate that Kenya, which has a current population density of 65 inh/km^2, could only have 7 to 8% of its territory dedicated to hunting if that activity were to be permitted, in other words 43 700 km^2, which is equal to around 20% of hunting areas in Tanzania.
The same estimation would thus give us a turnover of 20% of Tanzania's $US30 million (if quality were equal, which is not necessarily the case), in other words $US6 million, or 0.6% of the turnover Kenya makes

from tourism.

Population density inh/km^2	% of national territory dedicated to hunting areas
10	20
20	18
30	16
40	13
50	11
60	9
70	6

3.3. Big game hunting and Gross Domestic Product (GDP)

An important statistic for development is the Gross Domestic Product (GDP) : absolute, per unit of surface area and per capita. The table below presents the values[37] for the main big game hunting countries (and Kenya, for comparative purposes):

Country	Surface Area	Population	Density	GDP $ billion	GDP/capita in $	GDP/ha $US	GDP/ha CFA F
South Africa	1 219 912	48.5	39.76	255.15	5 384	2091.54	1 045 772
Namibia	825 418	2	2.42	6.31	3 084	76.45	38 223
Tanzania	945 087	40.2	42.54	12.79	335	135.33	67 666
Botswana	581 726	1.8	3.09	10.81	6 869	185.83	92 913
Zimbabwe	390 580	12.38	31.7	5.54	472	141.84	70 920
Zambia	752 614	11.67	15.51	10.94	922	145.36	72 680
Cameroon	475 440	18.47	38.85	18.37	1 002	386.38	193 189
RCA	622 984	4.5	7.22	1.49	355	23.92	11 959
Ethiopia	1 127 127	85.2	75.59	13.31	177	118.09	59 044
Burkina	274 200	15.26	55.65	6.06	451	221.01	110 503
Benin	112 620	8.79	78.05	4.76	625	422.66	211 330
Kenya	582 647	38	65.22	23.19	681	398.01	199 006

If these figures are lined up with those of the hunting sector, the following is obtained:

Country	GDP $ billion	turnover $ million	Contribution of big game hunting to GDP ‰	Proportion of country in hunting area %	Contribution to GDP/capita in $US	Contribution to GDP/capita in FCFA
South Africa	255.15	100	0.39	13.1	2.11	1 055
Namibia	6.31	29	4.52	11.4	13.93	6 965
Tanzania	12.79	27.6	2.16	26.4	0.72	361
Botswana	10.81	20	1.85	23	12.71	6 354
Zimbabwe	5.54	16	2.89	16.6	1.36	682
Zambia	10.94	5	0.46	21.3	0.42	211
Cameroon	18.37	2	0.11	8.4	0.11	55
RCA	1.49	1.4	0.94	31.5	0.33	167
Ethiopia	13.31	1.3	0.10	0.8	0.02	9
Burkina	6.06	1.0	0.17	3.4	0.07	37
Benin	4.76	0.4	0.08	3.6	0.05	26

On average for these 11 countries, the country's surface area taken up by hunting areas is 14.9%, and the contribution of big game hunting to the GDP is 0.59 ‰. These are therefore fairly unproductive hectares for

[37] Source: IMF, 2007, surface area in km², population in millions of inhabitants

these countries. The least productive countries on a per hectare basis are Ethiopia (hunting areas have practically disappeared there), Burkina Faso and Benin (hunting safaris are not expensive there) and Cameroon (hunting areas are under strong pressure from agriculture). Those who do the best are Namibia and Botswana. And yet, Botswana has decided that more value can be had from promoting safari tourism than hunting and closed the Okavango to hunting in 2009.

3.4. Big game hunting and tourism

In parallel to big game hunting, the same wildlife can be used for safaris. Tourism has been growing steadily for the past 20 years and the figures given for some countries by the UNWTO (UN World Tourist Organisation) are as follows for 2007:

Country	Hunting turnover $USmillion	Tourism turnover $USmillion	% hunting in tourism turnover	% country in hunting area	% other protected areas
South Africa	100	8 418	1.19	13.1	4.6
Namibia	29	434	6.57	11.4	13
Tanzania	27.6	1 037	2.66	26.4	14.1
Botswana	20	546	3.66	23	18
Zimbabwe	16	338	4.73	16.6	12.7
Zambia	5	138	3.62	21.3	7.9
Cameroon	2			8.4	8.7
RCA	1.4			31.5	11.1
Ethiopia	1.3	177	0.73	0.8	2.7
Burkina	1.0			3.4	8.1
Benin	0.4			3.5	7.5
Kenya		909			

The turnover from tourism has increased considerably over the past twenty years, and the proportion attributable to hunting, which used to be significant, is now marginal in several countries: 1% in South Africa, 3% in Botswana, Tanzania and Zambia for instance.
At the same time, these four countries dedicate a large proportion of their national territory to big game hunting: 13, 23, 26 and 21% respectively. The ratio is not favourable to the development of big game hunting, which requires additional surface areas to those of other protected areas where most tourism takes place.

The case of Tanzania is interesting, because tourism has risen more there than in the rest of Africa (UNWTO, 2007):

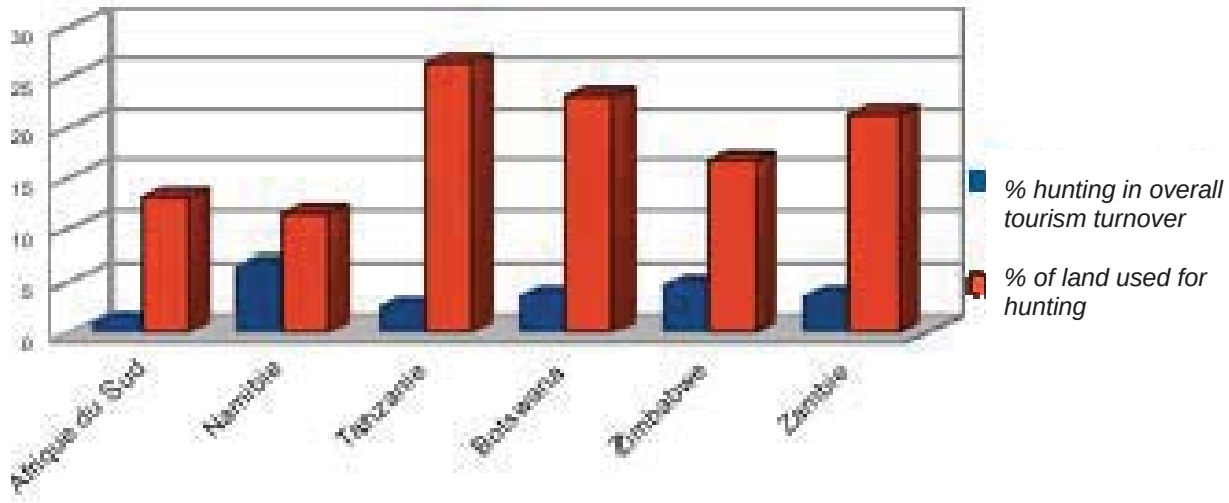
Geographical area	Average annual growth from 1995 to 2000 given as a %	Average annual growth from 2000 to 2010 given as a %
Tanzania	10.0	9.3
Africa	6.0	5.6

In 15 years tourism has changed completely in Tanzania, and there is a real demand to transform hunting areas into safari areas (five safari parks now exist in Selous, and others in Masaïland).

It can be noted that a country like Kenya is approaching $US one billion in tourism turnover (a figure as high as that of Tanzania for tourism) and that the losses mentioned from the closing of hunting in 1977 ($US30 million, SCI 2008) are minimal in comparison. Kenya has therefore benefitted financially by investing in safari tourism and closing hunting, which, in any case, would have diminished due to demographic (65 inh/km²) and agricultural pressures.

The following graph compares the percentages of hunting in the overall turnover for the tourism sector, and the hunting surface areas as a percentage of total national territory. It would appear that hunting requires vast spaces which are not made the most of and that safari tourism is much more profitable in that regard.

The biggest difference (that is to say the lowest profitability) is in Tanzania, while the smallest difference (or highest profitability) is in Namibia.



It can be noted that countries with intermediary values have had negative hunting sector assessments : Zambia (NRFC, 2008) and Botswana (where hunting has been stopped in the Okavango).

3.5. Big game hunting and employment

The number of jobs created by big game hunting is summarised in the table below:

Country	Hunting area surface area in km²	Number of jobs	Number of ha per job
South Africa	160 000	5 500	2 909
Namibia	94 052	2 125	4 426
Tanzania	250 000	4 328	5 776
Botswana	103 451	1 000	10 345
Cameroon	39 830	1 200	3 319
RCA	196 035	670	29 259
Burkina	9 340	280	3 336
Benin	4 000	100	4 000
TOTAL	**856 708**	**15 203**	
Average			**5 635**

The countries with vast hunting areas (RCA, Botswana) create proportionally fewer jobs. The average is around one permanent job for 5 500 ha of hunting area.

In the Okavango, a safari concession of 10 000 ha in which there is a luxury camp of nine tents (18 beds), employs on average 38 people, including five guides and five trackers, i.e. 2.3 permanent jobs per bed[38]. The ratio is therefore one permanent job for 263 ha, as against one per 10 345 ha with hunting. In this case, safari tourism creates 39 times more jobs than big game hunting for equivalent surface areas. This is one of the explanations for the choice to stop hunting in the Okavango (and in five sectors of the Selous in Tanzania).

[38] There are never more than 16 people for 18 beds, as they are all singles

In Zambia, tourism in the Luangwa national park alone (which had 42 000 visitors in 2007) created 800 permanent and temporary jobs in Mfuwe (NRFC, 2008) which is more than RCA[39] where 31.5% of the national territory is dedicated to hunting areas, and double the jobs for the hunting sector in Benin and Burkina Faso together. Furthermore, the tourism sector in Zambia, despite being of average size (176 000 tourists visit for the country's natural environment each year), employs 19 000 people, i.e. more than all the hunting areas in the whole of Africa. With current tourism growth rates, it is expected that in 2010 there will be 30 400 jobs, a turnover of $US304 million (50% more than the annual figure for big game hunting in all Africa), and a contribution to GDP of around 5%: it was 3.1% in 2005.

3.6. Big game hunting and the benefits for local populations

The following figures were taken from documents listed in the bibliography or identified during this study:

- In Zambia, benefits for local communities from all GMAs were, in 2006, 3.6 billion Kwacha, for 170 000 km², i.e. 22% of the country. This sum corresponds to around $US one million. Per hectare, the benefits for the population are $US0.059.
- In Zimbabwe (Campfire), each household receives one to three US dollars per year.
- In Namibia, the figure is slightly different because 56% of revenues come from "joint venture tourism", 22% from hunting. The level of income is higher: $N14 million, which is around $US1.75 million for 10.5 million ha (i.e. $US0.16 /ha).
- In Tanzania: with the current system, 42 district councils received $USfive million for five seasons 2000/1-2004/5 (Kayera, 2005). This corresponds to $US one million per year for 250 000 km², or $US0.04/ha.
- In RCA, the benefits for the communities are 103 million CFA F for 34 714 km² of ZCVs, i.e. 30 CFA F/ha (or $US0.06 /ha).
- In Benin, they are around 35 million CFA F for 3 942 km², i.e. 88 F/ha, or $US0.18 /ha.
- In Burkina Faso, the regular benefits were 34.5 million in 2005 for 9 340 km², i.e. 37 CFA F/ha ($US0.07).

It is difficult to calculate the income per person as there are not usually precise figures for the populations concerned by big game hunting areas. To give a general idea, the following summary table gives the average number of inhabitants per hectare in the country.

Country	Income for local communities per ha in $US	Income for local communities per ha in CFA F	Average number of inhabitants per hectare.
Zambia	0.06	30	0.16
Tanzania	0.04	20	0.43
Namibia	0.16	80	0.02
RCA	0.06	30	0.07
Burkina Faso	0.07	37	0.56
Benin	0.18	88	0.78

The countries in this list whose local communities benefit the least from gains per hectare given over to big game hunting is Tanzania. Those who redistribute the most are Namibia and Benin. In Namibia, where the human population density is 35 times lower than that of Benin the local communities are liable to be better involved in wildlife management.

[39] Where jobs are not completely permanent.

4. ANALYSIS

The data gathered and presented in the first sections of this study are now analysed in order to clarify:

- The conservation value of big game hunting, looking particularly at the conditions in which these results are obtained,
- The social and economic value of big game hunting : these two aspects were examined together as they are closely linked,
- Participation and good governance (including financing).

4.1. Conservation value of big game hunting

Conservation is about preserving current ecological capital or even increasing it. We looked at four indicators, the first is geographical, the second concerns vegetation cover and the last two relate to wildlife biodiversity, one being qualitative, the other quantitative. These indicators are:

- How well hunting area perimeters are preserved: this helps establish the resistance of "hunting areas" to pressure.
- How well vegetation coverage is maintained within hunting areas, that is to say how hunting areas can maintain habitat quality which helps sustain wild animals.
- To what extent the list of animal species present in the hunting area is maintained: are certain species better preserved by hunting area than others?
- Changes in the populations of different wildlife species within the hunting areas.

These indicators are often studied in comparison with a neighbouring protected area where hunting is not allowed (national parks, reserves etc.). Such areas need to be sufficiently well-managed (including surveillance), even if not to the same level as the management of the neighbouring hunting area. Only analogous sites are compared; weighing up an abandoned protected area with a managed hunting area would not give pertinent data.

4.1.1. Preserving hunting area perimeters

Demographic growth, soil degradation, the expansion of cash crops in the context of poverty reduction and the quest for food security are all factors that lead to the expansion of agricultural land, in particular at the expense of protected areas which constitute a veritable stock of land.

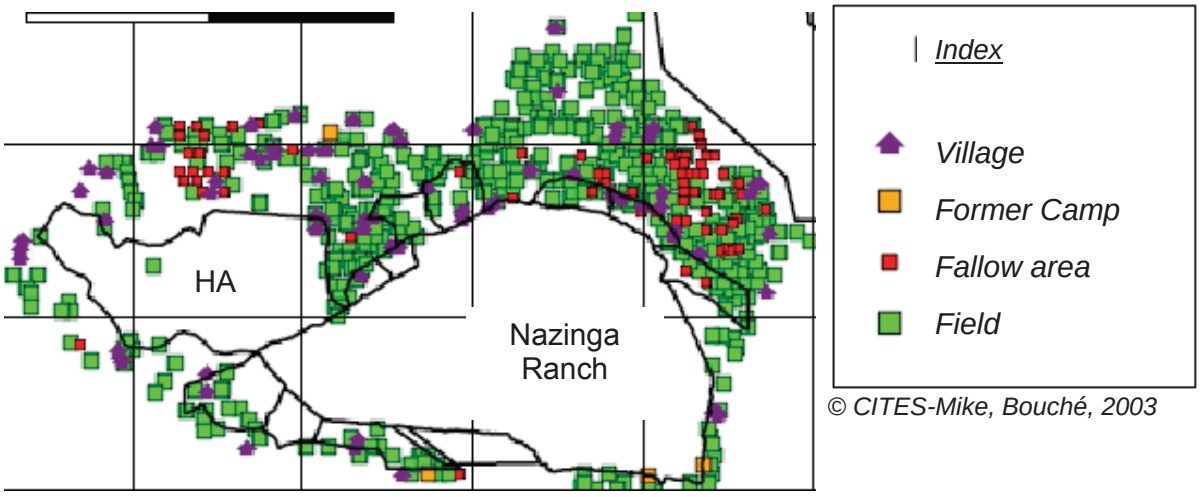
a. Examples

In the more densely populated countries, hunting areas have already disappeared (Nigeria, Malawi[40], Rwanda, Burundi, and the more populated areas of many others) and even national parks are under pressure from farmers. It is difficult to find up-to-date maps of land occupancy but data taken from aerial flyovers during wildlife census taking constitute an excellent basis for study. A few examples illustrating the pressure on hunting areas in the West-African region are given below.

In Burkina Faso, the peripheral area around the Nazinga Ranch, which is actually a state-run safari and hunting area (the only protected area in the country which receives consistent Government attention), is subject to considerable pressure and the different protected areas respond in different ways (Bouché et al.,2003). It can be noted that the ranch itself, under state management, is not colonised by fields, the leased hunting area is slightly colonised by agriculture and the community zones (ZOVIC) are practically entirely farmland and can only be used for small game hunting.

[40] In July 2009 hunting started up again in Malawi on one fenced game farm of a few hundred ha.

Map No. 2: Human pressure on Nazinga Ranch in 2003

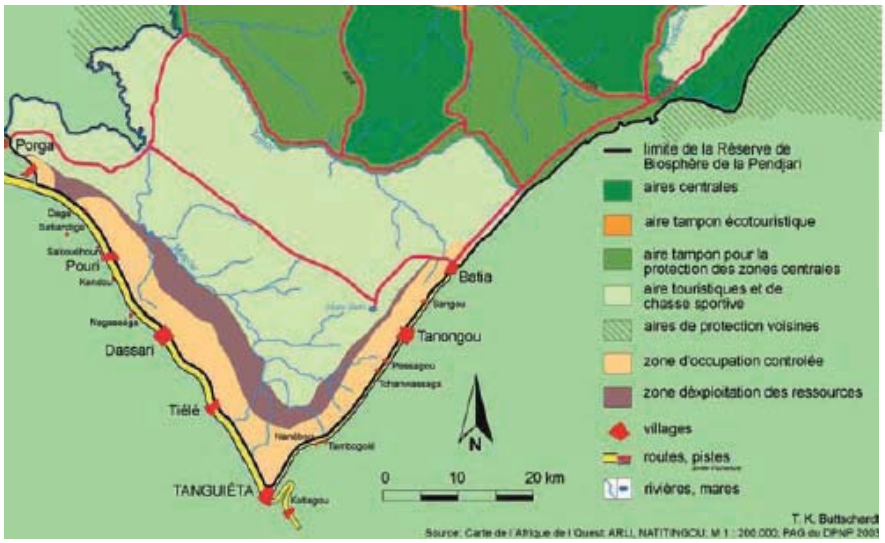


© CITES-Mike, Bouché, 2003

The entire area constitutes a practically isolated wildlife management zone, an island. This situation will be very difficult to change, as ZOVICs only work to preserve the original biotope. Furthermore, local communities regularly complain that they receive few benefits: in this case agriculture will continue to encroach on the peripheral area.

In Benin, the hunting area that borders the Pendjari National Park to the south lies next to villages that have begun to encroach on this land to the south and the east. The managers have therefore created a controlled occupation zone along its edges and an exploitation zone further inside, thus reducing the surface area of the hunting area.

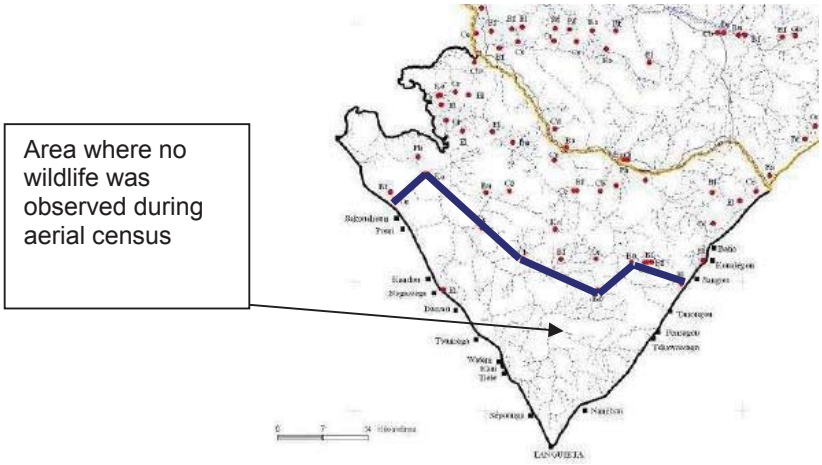
Map No. 3: Internal zoning of Pendjari hunting area



Index: Limits of the Pendjari Biosphere reserve
Central areas
Ecotourism buffer zone
Buffer zone to protect central areas
Tourism and recreational hunting area
Neighbouring protected areas
Area of controlled occupation
Area of resource exploitation
Villages
Roads, tracks
Rivers, watering holes

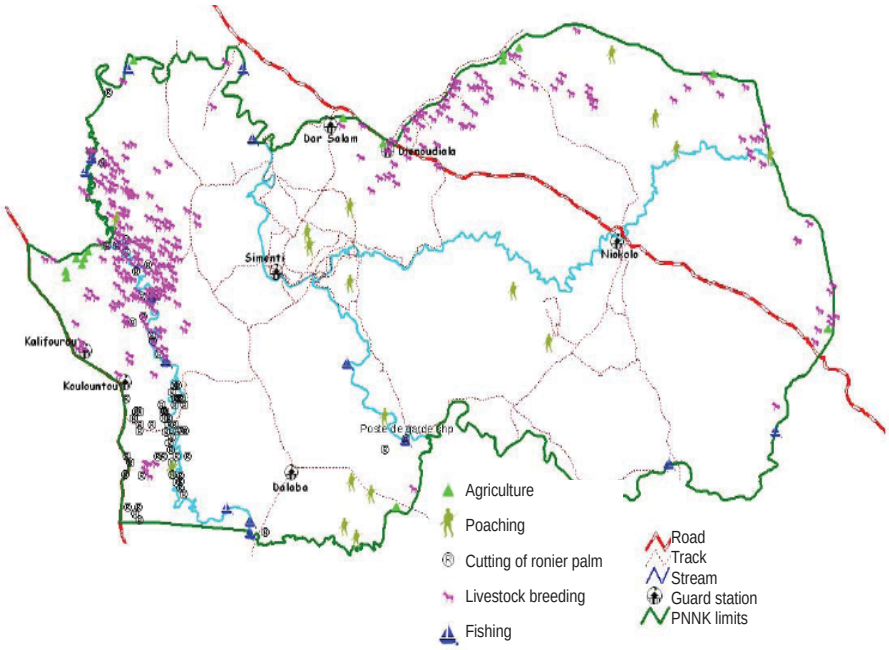
Observations made during the census of 2006 show that the negative influence of humans on the animals can be felt well beyond the area that is cultivated and used.

Map No. 4: Distribution of wildlife during 2006 aerial census (Pendjari Hunting area)



This area of human influence extends beyond the permanent settlements and fields and is clearly visible on the 2006 aerial census of the Niokolo Koba National Park in Senegal:

Map No. 5: Distribution of human activities in Niokolo Koba National Park (May 2006)

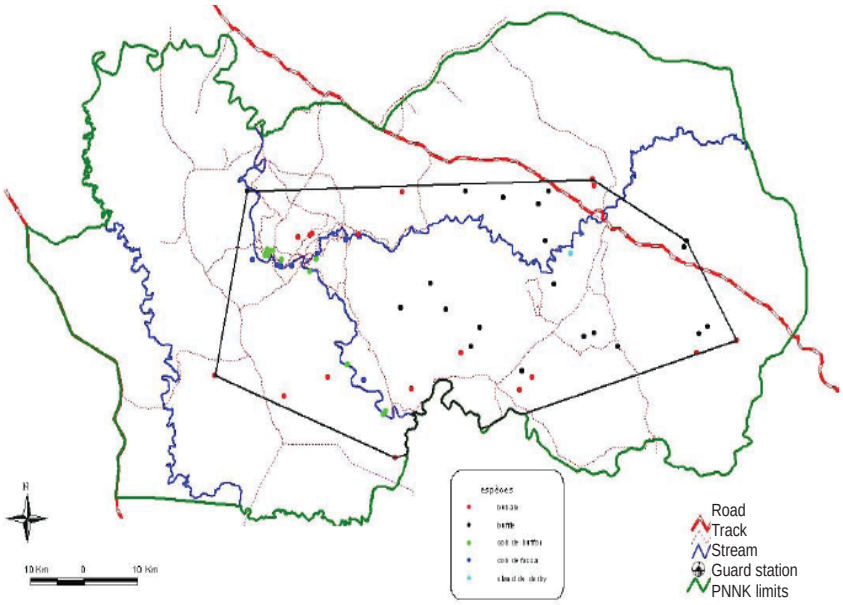


©MEPN, AP, PC. Renaud

The map of illegal human activities shows the lack of fields, apart from a small enclave of farmland to the west, but there are temporary human activities (livestock grazing etc.). The map of the distribution of wildlife (excluding antelope) shows a concentration in the centre of the park, far from pressure, in a polygon of 3000 km^2, representing around one third of the park. In this case the type of management means that the buffer zone is inside the park when it should be outside: there is no peripheral zone but the National Park's boundaries remain intact and wildlife density is graduated within the park.

More to the east of this National Park is the Falémé ZIC of which two thirds is now colonised by people. This ZIC, managed without a lease and without investment has resisted less well than the national park.

Map No. 6: Distribution of big animals (except antelope) in the KKNP: Minimal convex polygon (with 100% of the points)



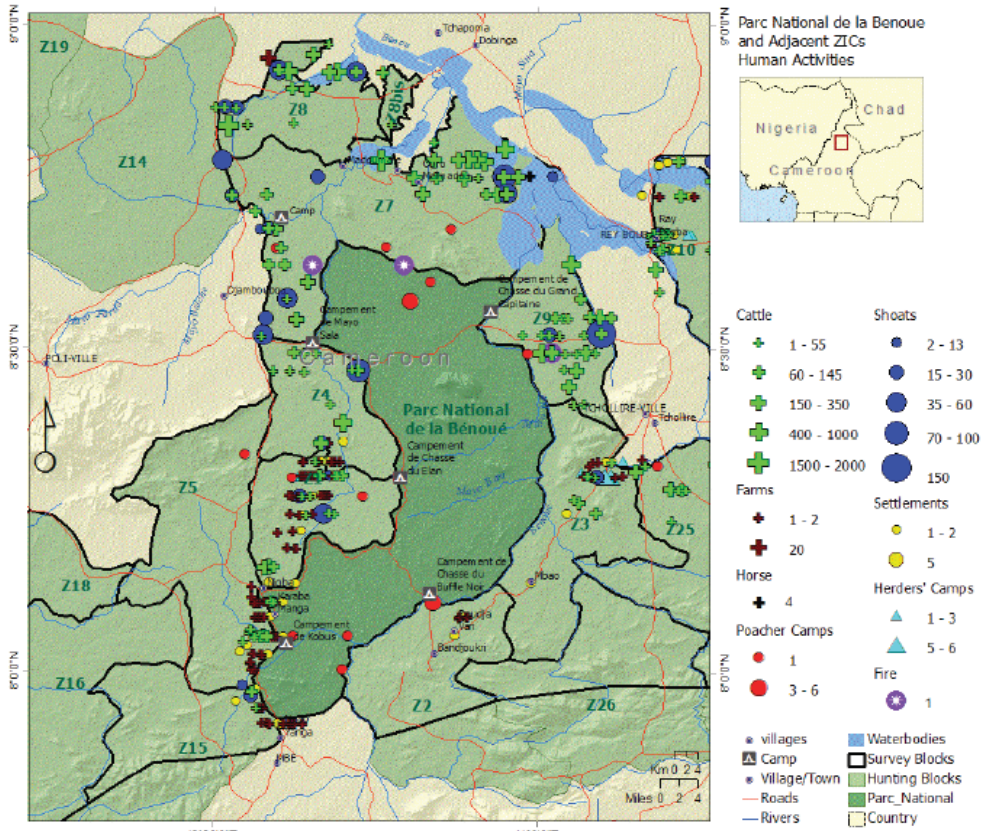
©MEPN, AP, PC. Renaud

This illustrates the importance for national parks to have a peripheral zone that can guarantee preservation of the entire national park area from the influence of human activities. These results were confirmed by Caro (1998) in Tanzania: the animal distribution factor is correlated to the lack of human settlement. In central Africa, the distribution of forest elephants is linked to the lack of roads (Blake, 2007).

In Niger, the Tamou reserve, to the north of W Park is now three quarters colonised by agriculture, illustrating the fact that a weaker protection status than that of national park (category II) has less resistance to pressure. The neighbouring hunting area in Burkina Faso is largely colonised by agriculture, while the national park is not (aerial flyover, Mike, 2003).

The following map of the central part of the Northern region of Cameroon (May 2008) clearly shows that hunting areas are more colonised than the Benoue national park, which is, however, weakly protected. National park status (under government authority) is therefore also better respected here than that of hunting areas, despite the latter being leased and active.

Map No. 7: Illegal human activity around the Benoue National Park



© *WWF/FFEM/Minfof*

Around the neighbouring national park of Boubandjida, two adjacent active hunting areas contain almost 50 inhabitants per km² and more than half of the surface area of one of them is farmland. A third zone further to the west has practically no more large animals. The national park itself is not affected.

In Chad, in unsafe areas linked to the socio-political situation, hunting areas of the Aouk domain have resisted less well than Zakouma National Park, which is still very rich in wildlife, while the domain is practically empty, invaded by cultivated fields to the west and by livestock in the centre and east.

In Zambia, we saw that the surface area of GMAs diminished under pressure from human activity. The same can be said for certain areas of Tanzania that are more exposed to demographic impacts and agriculture (Baldus, 2004).

b. Remarks

In practically all the countries, hunting areas are colonised before national parks. This is not only because they are on the periphery of the parks: in Cameroun they are not, nor are they in Zambia or in certain areas of Tanzania. One of the key problems is probably that for wildlife, human influence can be felt well beyond the borders of human settlements. If wildlife density diminishes, the private leaseholder also lowers development expenditure so as not to lose too much money, thus giving free range to human expansion.

The status of national park would appear to be well respected everywhere, even when the park is virtually abandoned by the government. The status of “government land” is certainly a factor, which is not the case for a hunting area which “seems to belong to a foreigner”.

The administrations in charge of wildlife have few data on the state of agricultural encroachment into hunting areas. This can also be explained by the fact that hunting areas are often leased by the hectare and

recognising a reduction in surface area would mean lowering the income for the government.

It can be noted that where the percentage of hunting areas in relation to the national territory is reasonable (e.g. in Benin and Burkina Faso, with 3.5%), the hunting areas seem more stable and less under threat. But it must be recognised that there are only 4 000 km^2 of hunting area left in Benin and that it is not possible to create more as all the land is occupied. In this case, a phenomenon of intensification of agriculture on cultivable land can be noted, which exerts an influence from afar on wildlife densities and distribution. Therefore, in the east of Burkina, agriculture is intensifying more on the eastern border of the hunting area block than on its western edge and the wildlife densities are also lower there.

This is probably an indication that immense hunting areas (representing 10 or 20% of a country) are difficult to manage. The private sector has difficulty in finding solutions to respond to this pressure, as it must turn a profit.

It can be noted that in countries where pressure is highest, wildlife has only really been preserved in national parks (or similar such reserves). In West Africa this is the case for Senegal, Ivory Coast, Ghana, Togo, Niger and Nigeria. In certain countries that have not set up "effective" wildlife conservation zones, wildlife is under serious threat: Mauritania, Gambia, Guinea Bissau, Guinea. In Central Africa, this is also the case for the far North of Cameroon, for Chad, DR Congo and the northern part of the Sudan, where wildlife only exists in national parks. In East Africa this is the case for Uganda, Rwanda, Burundi and to a lesser extent Kenya and Ethiopia. In Southern Africa it is the case for Malawi and Swaziland and to a lesser extent Angola.

It can be noted that it is also the case for the major part of South-East Asia, where the same significant pressure has been exerted for longer and where big game hunting disappeared around fifty years ago.

4.1.2. Maintaining vegetation cover within hunting areas

Vegetation cover within hunting areas is mainly subject to three types of pressure:

- Woodcutting for construction and energy. The socio-economic importance of wood as an energy source must be emphasised: in Benin, it generates direct annual revenues of 70 000 CFA F/year as against 140 CFA F per person (in fact for the community) generated by big game hunting (cf. section on Benin). As it is a profitable activity and easy to export from the rural sector to the urban sector, the production of firewood uses up vast natural areas. In Tanzania, it is estimated that charcoal production[41] destroys 330 000 ha of forest per year (Tanzania Association of Oil Marketing Companies, 2002), in other words, an annual rate of loss of 0.73% of forests per year. The annual consumption per person is estimated at 160 kg/year, and seven kg of greenwood are needed to make one kg of charcoal. 73% of Tanzanians use charcoal as their only domestic energy source, and 94% use it as a mixed source. The use of forest products represents 10 to 15% of the GDP of Tanzania: big game hunting only counts for 2 ‰ while taking up 26% of the land. The *Miombo* zones (rich in *Brachystegia sp.* and *Julbernardia sp.*) are particularly concerned.

  In Zambia, it is estimated that charcoal creates 42 000 full time jobs in rural areas and 4 500 more for sale and transport. Charcoal represents 43% of domestic energy in Zambia (S.H. Hibajehe).

- Wood cutting by livestock farmers. Livestock breeders prune trees, cutting down the high branches of trees that make good fodder (for example acacias) to bring them within the reach of the animals. When practiced too intensely, this can kill the trees and initiate a phenomenon of reduction in vegetation cover. Therefore, livestock do not only have a direct impact on wildlife, but also degrade their habitat.

- Chopping down of trees and the use of fire to create new farmland. The demand for new agricultural land is considerable and the direct return for the producer are relatively large (around 150 000 CFA F/ha for the West African or Ugandan farmer) which makes it a much more profitable use for the land than big game hunting (30 to 88 CFA F/ha, this study). Therefore farmers have much incentive to "eat into" hunting areas. The lower the proportion of GDP that comes from big game hunting, and the higher the country's per capita GDP, the more this phenomenon can be seen. This is the case for

[41] Charcoal production is even more harmful for vegetation cover than the collection of firewood, as it requires greenwood.

Cameroon where hunting only represents 0.1 ‰ but where the GDP/capita is around 500 000 CFA F. Furthermore, this figure is close to that of agricultural revenues on the periphery of Boubajdjida national park (475 470 CFA F, Terdel). This confirms that hunting revenues are not enough to discourage the encroachment of farmland.

In this context, a joint study by the World Bank and the FAO (June 2009) recommends transforming 400 million hectares of African savannahs into farmland: only 10% of this surface area is currently exploited[42]. It is therefore a real threat to hunting areas, and has already considerably and insidiously reduced their surface areas and their hunting potential and it is not going to get any less in the future. Of course, not all hunting area land is suitable for agriculture, but the low-lands which are indispensable to wildlife and thus to hunting are, and will be colonised first. It is therefore highly likely that the 140 million hectares currently used for big game hunting will be included in the 400 million hectares targeted for farming.

This agricultural development model is the same as has been seen in Asia, where hunting areas have disappeared and where national parks, with some rare exceptions, have shrunk.

It should also be noted that the current fiscal regime, which consists for the government in taxing hunting areas (often without fulfilling its regulatory role) through a range of taxes which reduce both the income for the private sector and the local communities, does not apply to agricultural land. Farmers are rarely taxed in any African country. Therefore rural dwellers have a marked interest in transforming hunting areas into farmland, not only for their own income, but also to evade taxation. This fiscal regime which taxes natural resources is inconsistent with current global environmental policy.
The degradation of vegetation cover in a hunting area would appear to herald agricultural installation. This is the beginning of a cycle which leads to diminished wildlife densities, diminished profitability for the hunting operator and reduced development of the richer zones, to the extent that the hunting area may even prey on a neighbouring protected area because the wildlife populations are higher there.

4.1.3. Conservation of the list of animal species present in hunting areas

This indicator concerns the changes in the list of species present in the hunting area : in other terms is the list getting longer or shorter with conservation efforts (hunting area management in the current case) ? It is therefore a matter of studying the specific wildlife wealth of the areas concerned.

In countries where big game hunting has disappeared, the finding is simple: the list has shortened drastically in hunting areas. However, this is not necessarily significant because the conditions that have prevailed to lead to the lack of a hunting area are not necessarily the same everywhere. It is interesting to compare lists within the same country, between hunting areas and national parks. The main indications in this field often come from censuses and are therefore subject to the biases or shortcomings of the data collection method.

There must not be many cases where the specific wealth of hunting areas is greater than that of national parks, for the simple reason that protected areas are often created to save a species. Game farming in South Africa has played a role in saving the white rhinoceros and the bontebok, but this is a very specific case for hunting areas. In West Africa, the case of elephants in Senegal can be noted, non-existent in the ZIC of Falémé but probably still present (although on the verge of extinction) in the Niokolo Koba national park. In East Africa there is the case of the Ngorongoro (with a status similar to that of a total reserve with usage rights) which has been able to conserve its black rhinoceros while the neighbouring hunting areas have none left.

The relative specific wealth between a national park and an adjacent hunting area can also be considered when a species uses the national park more than the hunting area, for instance in the case of sporadic or seasonal use (spatial-temporal variability). For instance, this is the case of the hartebeest in West Africa, which is more abundant in Pendjari National Park than in surrounding hunting areas. In this case, the National Park is indispensable to the survival of the species, while the hunting areas only make an additional contribution to its conservation. This is fairly logical because in a large number of cases, the hunting areas constitute the periphery of the national park, which is the centre of an overall conservation block.

While uncontrolled hunting outside hunting areas has destroyed animal populations, it does not appear that there are any examples of a managed hunting area having caused a species to disappear locally, which is a

[42] www.fao.org/news/story/fr/item/21022/icode/

strong point for this activity.

In the context of relative specific wealth, the most interesting case is that of lions. Indeed, to ensure their survival lions need prey to feed on, and not to be killed by local inhabitants who do not want them there (they kill humans and livestock, and economic gains are too low). As the influence of agricultural areas encroaches into protected areas, the areas located on the periphery of a block have a lower wildlife density and a higher number of human-lion conflicts. The lion population is therefore more at risk, which can be expressed by saying that it is less well conserved in the long term.

A reputed author specialising in the study of the relationship between lions and hunting (J. Anderson, ICS consulting, 2009) even recently suggested that lions will soon not exist outside national parks. Even if there are many areas where lions are noted outside national parks, it must be recognised that their density is usually low or very low, and that the viability of the populations in these areas is often not guaranteed.

Examination of the range of species shows that there is not a great difference in lists between managed areas with or without hunting (on the condition that they are managed), but suggests the idea of a lower spatial-temporal efficiency. This supports a policy where hunting areas are linked to national parks which constitute the heart of the conservation strategy.

4.1.4. Changes in numbers of the main large animal species

a. Context

The population numbers for the main large animal species are known mainly through wildlife census taking. Unfortunately, censuses are often carried out irregularly if at all, or using unreliable methods or else are poorly carried out. For this study, we preferred to look at the figures produced by aerial methods which are the least biased: total approaches, without sampling biases, without interference with the animal observed, low cost for large animals such as those we are looking at, and which provide data for the main hunted species (the counting of carnivores requires other specific methods). The aerial methods used by an experienced team of four people are well adapted, depending on the seasons, to areas with annual rainfalls of less than 1 200 mm, which corresponds to the majority of savannah hunting areas.

The majority of the countries do not carry out aerial censuses, or else do so at irregular intervals and altering the methods used (total, sampling), the parameters or the team etc. Therefore it is often difficult to make comparisons. The sampling rates are often too low (less than 12 to 15%) to be representative due to the often modest animal densities in certain areas. Some countries that lease their hunting areas to concession holders do not comply with specifications and do not carry out the counts needed to provide a high-quality indicator of concession management performance. The data are therefore often difficult to obtain and even more difficult to interpret.

b. Examples

- Benin

The Pendjari areas are practically the only ones to benefit from aerial censuses (by sampling) every two years covering the national park and the three adjacent hunting areas. We noted (cf. section on Benin) that the national park is two to seven times richer in wildlife than the neighbouring hunting areas. In the context of strict protection, hunting area status is therefore less effective than that of national park. The same phenomenon can be noted if we compare the two hunting areas of Burkina Faso that border the national park (and entirely share its ecosystem, the national park being on the left bank of the river which is nothing more than a series of ponds in the dry season, the hunting areas on the right bank): the total census of the ecosystem carried out in 2003 (Bouché et al., MIKE), showed that the total densities of five large species of the national park were 1.5 times higher than the hunting area of Benin and four times higher than the hunting areas of Burkina Faso.

- Burkina Faso

In recent years, only the total census of 2003 (Bouché et al., MIKE) has been carried out. If we stick to the comparison of hunting areas that are adjacent to a national park:

- The hunting areas which neighbour W Park are three to seven times poorer in wildlife than

the national park,
- The hunting areas which touch Arly National Park are on average half as rich as the park.

Sector	Density/km^2
Arly Park	1.25
6 hunting areas Singou	1.68
Pendjari Park	1.98

It is interesting to note that the block (526 000 ha) made up of the six hunting areas of the Singou valley (one of the blocks there is exploited despite being officially classified as a total reserve) presents a remarkable wealth of large species with an intermediary density between that of Arly national park and that of Pendjari national park.

- Cameroon

In Cameroon, in May 2008, an aerial census was taken of almost all the savannah areas (North and part of the Adamaoua), which makes data comparison possible; The principle of total census was applied, but using a methodology which led to a considerable underestimation of the densities.

The census focused on 26 sectors: three national parks and 23 hunting areas. By descending order of density of the five largest species, the national parks are in 3rd, 8th and 15th position. It can be noted that Faro national park (15th) has never been monitored or developed, unlike the other two zones. The average density of the three national parks is 0.45 while that of the hunting areas is 0.24, in other words around half. If we only consider the two developed national parks, only two areas have a density higher than their average.

- Republic of Central Africa

The latest census of a large part of the Northern region where savannah safaris take place was carried out in 2005. A sampling method was used and three sectors were covered at the realistic rate of 16%, and on only one type of area at a time: the Manovo Gounda St Floris National Park, the Vassako Bolo total reserve and the rhino triangle which is a big game hunting sector.

We saw the results in the section on RCA, here is a recap of the main trends:
- Out of ten species considered, the hunting areas show a better evolution (1985 to 2005) than national parks for three species only: the Hartebeest, the giraffe and the Defassa Waterbuck. However, for the latter two, the populations are virtually nil, as in national parks: it is only that they had fewer of these two species than the parks in the first place.
    - As for the densities noted for these ten species, the hunting areas only have better densities for two species, the buffalo (but the density observed results from just one census) and the hartebeest: for this species the densities are close to those of Manovo (0.16 and 0.14 animals per km^2) and relatively low.

In total, and despite the fact that surveillance of national parks has been sporadic or insignificant, they have stood up well to pressure (at least until recently). Their overall performance is higher than that of hunting areas – where there is surveillance – (the epicentre of the Central African Wildlife Protection Association, APFC, which is very active in combating poaching is located in the rhino sector) except for buffalo.

The system of surveillance set in place in the hunting areas has not proven to be effective[43] and this was highlighted both in the 2008 assessment (Roulet, 2008) and in the specialist press (poaching of buffalo and other animals, *Voyages de Chasse* No. 18, 2009, *African Indaba* No. 7-3, 2009). This is also shown by the work of the IGF (2007) which revealed low abundance indexes in hunting areas, thus confirming the very low residual densities.

- East Africa

There is little ecological monitoring of hunting areas and the data are too fragmented to be able to be examined globally. However, it can be noted that for the Selous reserve, which is the largest big game hunting area in Africa, some important information has been provided:

[43] The limitations of village-led surveillance are well known. In Asia, where pressure is much higher, a national park such as that of Chitwan in Nepal, one of the bastions of the Indian rhinoceros, has one surveillance agent per km², including 800 soldiers. It has a surface area of 932 km² and 408 rhinos. The per-hectare budget is $US17 (Esmond Martin, 2009).

- The 2006 census showed a significant reduction in the populations of buffalo, hippopotamus, gnus and impalas since 2002 (UNESCO, National Commission of Tanzania, 2007).
- DNA analysis of the ivory seized in 2006 in Hong Kong and Taiwan showed that it came from Selous (Wasser & al., Scientific American, 2009). The same is probably the case for the ivory seized in Vietnam in March 2009 which had come from Dar Es Salam.
- Baldus estimated in 2005 that the rate at which lions were being killed by big game hunting was not sustainable.

This would seem to indicate that the current management of Selous reserve is not as effective as expected. This confirms the declaration of two hunting guides in Selous reserve, Ryan Wienand and Anton Turner, who have just transformed their hunting area in the Selous into a zone for safaris[44]: "*Big game hunting, in terms of conservation does not work* "[45]. This zone is managed like others in Botswana or in Kenya in the context of a modern conservation vision based on luxury tourism and local communities[46]. Their area is therefore the fifth one in Selous to be used for safaris and not for hunting any more.

Furthermore, studies by Caro (1998) have shown that the presence of hunting guides did not do much to limit poaching because their presence is too temporary: surveillance is active during the few months of the hunting season, and much lower afterwards. Therefore poachers just need to wait for the hunters to leave. As a result, hunting areas are much less effective for conservation than national parks and a certain number of species actually diminish. This is not the case in managed national parks and more generally anywhere there are men in uniform.

4.2. Socio-economic value of big game hunting

To specify the economic contribution of big game hunting following the assessment presented above, we retained the following indicators:

- Gains for the private sector: absolute value, proportion of GDP, estimation of profits,
- Gains for local communities,
- Gains for government: absolute value, proportion of national budget.

The social value is more difficult to estimate and we retained the number of jobs created as the indicator.

The statistics for the 11 countries were used (cf. the description of the big game hunting sector), and the summary of the data is presented in the table below:

11 Big game hunting countries	Total Surface area km²	Surface area hunting areas km²	% of territory that is hunting area	Surface area other protected areas km²	% of territory that is other protected areas	Total % all protected areas	Human population density (inh/km²)
Total/average	7 327 708	1 091 741	14.9	686 211	9.4	24.3	34

The average economic characteristics of these countries are as follows:

11 Big game hunting countries	Surface area (km²)	Population (million h)	Density (inh/km²)	GDP billion $US	GDP/c in $US	GDP/ha in $US	GDP/ha in CFA F
Total/average	7 327 708	248.77	34	345.53	1 389	471.5	235 769

[44] They now rent their hunting camp at $US6 700 per night for safaris.
[45] www.travelafricamag.com/content/view/1523/144/ et www.selousproject.com
[46] www.greatplainsconservation.com

4.2.1. Private Sector Turnover

Overall, the big game hunting sector in Sub-Saharan Africa makes a turnover of around $US200 million/year (SCI, 2007), in other words a contribution to the GDP of these 11 countries of 0.58‰, using 14.9% of the land. The turnover per country is as follows:

Country	Hunting turnover $USmillion	Hunting area Surface Area km^2	Turnover/ha in $US
South Africa	100	160 000	6.25
Namibia	29	94 052	3.03
Tanzania	27.6	250 000	1.1
Botswana	20	103 451	1.93
Zimbabwe	16	64 945	4.46
Zambia	5	160 488	0.31
Cameroon	2	39 830	0.5
RCA	1.4	196 035	0.07
Ethiopia	1.3	9 600	1.35
Burkina	1.0	9 340	1.07
Benin	0.4	4 000	1
TOTAL/Average	**203**	**1 091 741**	**1.86**
TOT/A without South Africa	*103*	*931 741*	*1.11*

The turnover per ha for big game hunting is around $US1.86 if we include South Africa, and without this country, for the ten other countries it is $US1.11/ha, which corresponds to the figures for Tanzania or Burkina Faso.

It should be noted that the cost of development/surveillance of one hectare of protected area (excluding tourism operating costs) can be estimated at around €1.5/ha (IUCN-PAPACO, 2009) i.e. $US2 or 1 000 CFA F per hectare. Therefore, with this turnover per hectare ($US1.1) proper development and surveillance of these areas cannot be assured under the current hunting area system (which uses a large proportion of its budget for tourism operation).

This figure remains very low with regard to the surface areas used and it is easier to understand why hunting areas cannot resist agricultural encroachment or firewood/charcoal production which make a much greater turnover: 500 times more according to the calculation of the GDP/ha, and around 300 to 600 times more when the potential agricultural income per hectare is considered.

This is all the more the case the higher the total percentage of protected areas in the country: it is difficult for a country to classify 24.3% of its land area (the average of the 11 countries) as protected areas and hunting areas, while international recommendations are for 12%. In Burkina Faso and Benin, the agricultural areas seem to have stabilised around the hunting areas with total protected areas of 11.5% of which 3.5% are hunting areas.

Country	Contribution of big game hunting to GDP ‰	Proportion of national territory in hunting area ‰
South Africa	0.39	131
Namibia	4.52	114
Tanzania	2.16	264
Botswana	1.85	230
Zimbabwe	2.89	166
Zambia	0.46	213
Cameroon	0.11	84
RCA	0.94	315
Ethiopia	0.10	8
Burkina	0.17	34
Benin	0.08	36
Average	0.59	149

The economic calculation would seem to indicate that the average of the protected areas of these 11

countries being 9.4% of the land area, it will be difficult to really conserve a further 14.9% as hunting areas. The “ideal” figure would only be around 2.6% in hunting areas, i.e. 190 000 km² classified as hunting areas to remain at around 12% in total.

The overall contribution of hunting to the GDP of these countries is very low: it is 0.06% on average, for 15% occupation of the national territory. Economically speaking it is therefore a marginal activity but one which consumes a high amount of space.

To conclude, let us reiterate the fact that Kenya, which outlawed hunting in 1977, now makes 15% of its GDP from tourism.

4.2.2. Revenues for local communities

The revenues for the local communities come from two main sources (there are also donations in kind, meat distribution etc.):

- The sums received directly (% of taxes, % of turnover),
- Salaries.

The data concerning the amounts received are fragmented and do not usually include the number of people who share that amount. The data gathered are as follows:

Country	Revenues for communities/ha $US	Revenues for communities/ha FCFA	Average number of inhabitants/ha in the country
Zambia	0.06	30	0.16
Tanzania	0.04	20	0.43
Namibia	0.16	80	0.02
RCA	0.06	30	0.07
Burkina	0.07	37	0.56
Benin	0.18	88	0.78
Average	**0.095**	**45.5**	**0.34**

On average, big game hunting distributes $US0.1 per hectare of potential village land classified in hunting area. Again on average, each inhabitant can therefore hope to receive $US0.3 per year (i.e. 150 CFA F/year). Again, it should be emphasised that this money does not always reach those for whom it is destined (cf. section on governance) and that it is usually used for community actions.

In Zimbabwe, the figures on gains from the Campfire programme are not available per hectare, due to the different uses made of them, but they are low: on average $US one million/year for the whole of the country, i.e. $US1-3/year/household (i.e. the same figure of $US0.1 – 0.3/person/year calculated above, each household containing around ten people (Campbell, 2000).

Such low gains are not motivating for the local communities. Therefore, they tend not to respect the hunting areas and poach. The informal bush meat sector is much more profitable. The poachers are therefore the primary beneficiaries of the wildlife sector:

- In Ghana, where big game hunting is just beginning, the bush meat trade makes an annual turnover of $US250 million (Conservation International, 2005),
- In Ivory Coast, where there is no more hunting, 74 000 tonnes of game are consumed per year (at the price of $US2/kg), which corresponds to an annual turnover of $US148 million,
- This phenomenon was also highlighted in Tanzania (Kideghesho, Morogoro University, 2008).

4.2.3. Government revenues

Government revenues come from the different taxes on the hunting areas, the licences and trophy fees. The data here are also often partial, but it was possible to obtain them for the following countries:

Country	Govt. Revenues $USmillion	Govt. Revenues/ha $USmillion	Proportion of national budget (‰)	Proportion of national territory (%)
Tanzania	10.00	0.40	3.30	26.4
Burkina Faso	0.52	0.50	0.23	3.4
Benin	0.16	0.41	0.06	3.6
RCA	0.55	0.01	1.50	31.5
Cameroon	2.00	0.50	0.44	8.4

On average, the contribution to the government budget for each percentage point of land classified as hunting area is 0.6 per ten thousand. It is therefore a negligible contribution. Except in RCA (where the revenues for the government are extremely low), the average is $US0.45/ha. The following comments can be made regarding these figures:

- This cost is around a quarter of that necessary to develop and manage one hectare of protected area. Therefore, with this level of taxation the government alone cannot carry the cost of development or surveillance. It should also be noted that in most of these countries these sums are not directly used to manage protected areas, but return to the general budget of the state.

- The principle of taxing natural resources is a concept that has become outdated. Today, governments are moving more towards tax breaks or subsidies for environmental protection. The taxation systems set up before independence should be reviewed in the light of forest and river basin preservation to make the most of modern financing tools (self development, carbon sinks, promotion of catchments etc.)

- In the majority of the countries in Africa, farmers do not usually pay taxes on the land they use (livestock breeding, agriculture). In the case of big game hunting, the government takes $US0.45/ha. It is therefore a tax that is in fact borne by the local communities, which cannot incite them to look favourably upon big game hunting!

4.2.4. Number of jobs created

In this field, the figures are also difficult to find. Furthermore, a lack of precision arises from the fact that hunting is a seasonal activity in most countries, generally during the dry season, i.e. for fewer than six months per year. Jobs lasting six months are often presented as permanent because they last for the whole hunting season. So jobs lasting a few weeks, for instance to open the trails at the beginning of the season, are presented as temporary.

In reality, the really permanent jobs are those of the managers and surveillance staff (when it is carried out all year, which is far from the norm). We saw that 15 200 permanent jobs are created in eight countries for 856 000 km² (i.e. 16.5% of the total surface area of these eight countries). The total population of these eight countries being 140 million inhabitants, this land only provides jobs for one person per 10 000 inhabitants. Hunting is therefore a very marginal employer.

It will be recalled, by way of comparison, that a luxury safari concession of 10 000 ha with a single camp employs almost 40 times more people than 10 000 hectares of big game hunting!

In social terms, hunting offers few jobs and these are often precarious and, it offers little economic gain. It would therefore appear that hunting, at least in its current configuration, does not play a significant developmental role. Some people even say that it hinders development, as highlighted in the NRCF study (2008) in Zambia. The large areas monopolised by the big game hunting sector, for the proportion over the 12% of protected areas recommended per country for conservation, multiply the magnitude of this effect on

development, without any real gain for conservation.

4.2.5. Social right to exist: for hunting and hunting areas

The concept of a social right to exist as seen by Westerners applies to the right to kill (Dickson, Hutton, Adams, Dublin, 2009). As seen by the local communities living around protected areas and hunting areas, the problem is different "*do protected areas/hunting areas have the right to exist on our land?*". The status of national park is "fairly" well accepted across Africa, as it is linked with the status of government land. In French-speaking Africa this is clearly visible when considering the "agricultural encroachment" indicator: monitored national parks are not colonised, unlike hunting areas, and national parks without surveillance (or that are "abandoned") are only marginally colonised (on their edges) while hunting areas may even disappear entirely.

The perception of local communities is often the following: "*why do they take away our right to use the land to give it away without involving us in the decision to do it or in the way it is attributed* (cf. governance), *to strangers* (to the country or to the region)?"

In practice, the local communities tolerate this decision to lose their right of use, but once pressure increases and they feel the need to use one or other of the resources, they will gradually take them back, regardless of central government directives. The hunting area is thus used as pastoral or agricultural land, a source of wood and non-wood products and for poaching[47].

In the Pendjari hunting area in Benin, the gathering of firewood is a significant source of income for the surrounding population: "*with an average annual income of 69 795 CFA F, it procures more revenues than sorghum, millet, manioc and ground nuts, and alone contributes more to household income than soya, cowpea and Bambara groundnut together*", Lawani[48], 2007.

The phenomenon of private sector surveillance of hunting areas has not resolved the problem. Surveillance is active during the hunting season, but absent or at best insufficient afterwards, which corresponds to the majority of the year. Therefore poachers just need to await the guides' departure (Caro 1998). The legal status of this private sector surveillance has not been resolved in practically any country, and it cannot therefore take the place of state surveillance. Uniformed men are indispensable for effective surveillance (Caro 1998). This is also a reason not to exceed a reasonable percentage of protected areas, including hunting areas, per country: the government would be hard pressed to monitor more than 12%. It cannot do more due to a lack of financial and human resources, and a lack of political motivation to go against local communities and enable foreign hunters to fulfil their passion without real socio-economic gains.

For the past few years private sector surveillance has come up against many problems in Central Africa: surveillance staff deaths (including expatriates in RCA), and deaths of poachers with suspected expatriate involvement (in Chad, Cameroon and RCA), not to mention injuries (including expatriates in Cameroon). It is now common practice for hunting companies to call upon the services of mercenaries, which is difficult to justify, in particular by governments that do not defend hunting organisers in the event of problems. The problems encountered by hunting operators stem from:

- The lack of a social right of existence for hunting areas,
- The lack of legal status of private sector surveillance,
- The "retribution" carried out by that private surveillance.

Such "retribution" includes, among others, the running off and killing of cattle, violence towards hunters, fishermen and users of natural resources. In practice, the instructions given to private surveillance staff (and reinforced by mercenaries) are simple: "*no one enters the hunting area*" (a small hunting area such as those of West Africa or Cameroon, around 70 000 ha, cannot tolerate humans on its land!). Therefore there is a strong feeling of exclusion among local communities. This sentiment is reinforced by the opacity of the sector, the lack of local governance, the impossibility of visiting the zone if you don't pay for a safari (how could a local do so?), and all that on their own land. In total, hunting areas are areas where exclusion is highest and are therefore more rejected than other types of protected area. This is one of the reasons they are less respected (limits, biodiversity).

---

[47] Poaching is indicated as omnipresent in the hunting areas of Benin (Hausser, 2009), RCA (Roulet, 2008 ; Voyages de chasse, 2009), Cameroon and elsewhere.

[48] www.notesdecologie.bj.refer.org/document.php?id=713

4.2.6. The particular case of game farms

The big game hunting sector in Africa is based on a very extensive model (more than 100 million ha). It could be an objective to improve and adapt the model to current pressure by intensifying it. This is what has been done on game farms (or game ranches if they are more extensive), mainly in South Africa, for the past thirty years or so and the results of this activity are now available. Almost all big game hunting in South Africa takes place on game farms.

As we have seen, there are around 9 000 farms in South Africa whose sole activity is game, and 15 000 that are mixed cattle and game farms. These farms receive around 6 000 foreign hunters each year. The overall turnover given by the TRAFFIC study for 2000 is $US107 million, of which 53% is thanks to resident hunters, and 18% to tourist big game hunting. Meat sales only represent 2.3% of turnover.

It should also be noted that the most expensive hunting safaris in South Africa do not take place on game farms but in open areas (or similar) for the big five: Pilanesberg National Park, and private reserves such as Sabi Sand, Timbavati, Balule, Klaserie, Phinda...

The average turnover of a farm is around $US10 663 (i.e. 5.3 million CFA F): earnings are therefore very low and are not what the game farm promoters were expecting thirty years ago. The most optimistic turnover figures for the game farm sector in South Africa, $US200 million per year (Damm, 2007), correspond to a mere $US20 000 maximum per farm per year, in other words 9.5 million CFA F. No farm can be profitable with this level of revenues.

Game farming is therefore a leisure activity with a real estate sector similar to that of second homes (remember there are 4.5 million White people in South Africa, the large majority of whom are keen “nature weekend” enthusiasts).

Furthermore, in West Africa, the only game ranch (Nazinga in Burkina Faso) is no longer just about meat production. In fact, the authorities have transformed it into a dual zone: one for safaris and one for hunting. Thirty years after the concept was launched, this game ranch is still the only “operational” one in French-speaking Africa. If the concept was lucrative, there is no doubt that in all this time other examples would have sprung up.

Several characteristics typical of West Africa are further hindrances to the profitability of a game ranch:

- Resident hunters are not ready to pay what the White residents of South Africa pay for meat because the informal sector is too well developed
- The best hunting areas (including the ranch of Nazinga with all its improvements) require 7 200 ha to shoot one trophy antelope, and considerable surface areas would be needed to have significant earnings,
- Nomadic herders of the region are not used to fences and do not like them. They tend to damage them. Then they make snares with the fence wire for poaching…

Thus there are many reasons, besides the lack of profitability, to stop and think before trying to step up big game hunting by replacing it with game farms.

Today, game farms are being adapted, in light of the economic problem and other disadvantages (presented in the section on conservancies), by regrouping them in conservancies, then if possible, annexing these to a national park or a reserve and promoting it for luxury safaris. The current trend, as for the establishment of the Greater Kruger or the enlargement of Addo National Park is therefore to take fences down, not put them up.

Wildlife management based on its economic value has not proven advantageous and wildlife should not be considered from this angle alone. This cannot change the behaviour of local communities or of the other players key to wildlife conservation. The “if it pays it stays” approach is therefore mistaken: biodiversity does not pay enough, yet it should still stay[49]! New financial tools, linked to usage, non-usage and heritage values

[49] *It is symbolic to see that the only current political leader to still use this phrase is the Zimbabwean Robert Mugabe (this is how he justifies driving out white farmers from the game ranches, because they are not profitable), thus taking the phrase of his political enemies, the majority of tourist hunters having political leanings similar to those of*

should be used to fund biodiversity conservation. The solution is therefore financial and not economic.

4.3. Governance

Governance in the big game hunting sector comprises the following aspects:

- Local governance: in the hunting areas, in terms of relations with local partners,
- Governance and the Administration: attribution of zones, compliance in terms of partnership agreements and ethics, control of hunting and monitoring of wildlife,
- Governance as regards hunting guides: licences, behaviour, advertising, promotion etc.
- Governance as regards marketing: travel agencies, advertising, litigation,
- Governance in communication: control of advertising, reports, public actions,
- Financial governance: financial controls, origin of financing.

Generally speaking, governance in the sector is weak and has led professionals (Baldus, Damm, 2006) to propose safari organiser certification against a certain number of criteria so that clients can be sure of the quality of the safari they are purchasing.

4.3.1. Local Governance

This regards management of hunting areas and the relations with other local stakeholders: local communities, local government authorities, regional authorities etc. This governance can extend to the choice of hunting operator, quotas, the setting of taxes, the use of funds, internal and external zoning and surveillance.

In practice, even if there has been progress in certain countries (Benin with the AVIGREF, RCA with the ZCV etc.), participation is reduced to surveillance and management of community funds. Communities rarely have real power and when they can legally have it, the government and operators do not encourage them to participate (Tanzania: Baldus, Nelson). Sometimes, governments set up such complicated procedures for creating community zones that the process is never completed, as in Tanzania (WMA).

The emergence of local governance is seen by the administration responsible for hunting and hunting organisers as a loss of power, and they prefer to use the “paternalistic” system they have been using since independence (Baldus, Nelson, Kideghesho), which is more favourable for them. Often, this leaves local communities with little alternative than to poach and expand agricultural activities. Therefore, the policy applied by administrations and hunting organisers seems in certain cases to be a short term policy somewhat akin to "after me, the flood".

An example of this can be seen in Tanzania where, on the periphery of the Serengeti National Park, the communities, in the context of decentralisation, chose to transform a hunting area into a safari area because the financial gain for them was better: so they signed a contract with a safari operator, while at the same time the central government attributed the same zone to a hunting operator. The Council of State eventually arbitrated in favour of the communities (Nelson, 2007).

From this point of view, the new forms of community concessions for luxury safaris that are being developed in English-speaking Africa are streets ahead of local governance in the hunting sector and are producing very good results, such as in Kenya, Namibia and Tanzania.

4.3.2. Governance and the administration

This is mainly characterised, in many countries, by its opacity (Baldus, Nelson, Kideghesho, Roulet, Patterson/TRAFFIC, Michler). To summarise: "no one really knows what is going on".

Zone attribution, which is the real crux of the matter, is at the heart of this phenomenon: a good zone, coveted by all, is rarely attributed or re-attributed by a transparent tender process, as stipulated in the legislation of most of these countries. In the majority of countries, even when this is provided for, there is no

---

ultra-conservative Americans.

assessment of the specifications and there is little ecological monitoring or monitoring of trophy quality and hunting activities in an attempt to assess the operator's conservation role. Hunting ethics are not controlled, quota extensions are accorded during the season, there is no monitoring of where animals are shot or any control of financial flows.

Many authors report corruption associated with the big game hunting sector. This is easy to understand, as it brings considerable international currency flows into poor countries, giving rise to desires that are easily satisfied.

There is also poor governance as regards certain hunting activities: hunting by car, hunting at night, exceeding of quotas, injured animals or females shot and not declared, abandoned trophies etc. Some local administration representatives make easy money out of this. They have little interest in changing the system, particularly if they have to relinquish part of their power to local communities. Certain authors (Kideghesho, 2008) consider that after poachers, it is the corrupt administration that benefits most from wildlife.

4.3.3. Governance as regards hunting guides

There are a certain number of local and national associations of hunting guides, and several international ones (SCI, IPHA, ACP etc.), which all aim at organising, establishing a code of ethics and defending the interests of hunting guides. They are effective to a certain extent. The most important role regards the attribution of professional licences (sometimes by organising exams) and as an interface with the administration.

However, some countries, have no associations or they are non-functional, or there may even be several which compete with each other. They are often ineffective at limiting disloyal competition among guides in a context where clients are rare: we saw that the market has around 1 300 hunting organisations and 3 400 guides who seek to attract the 18 500 hunters that come to Africa each year. The market is not very elastic and engenders stiff and sometimes disloyal competition.

These associations seek to establish a code of ethics in the profession, but it is never complete and many cases are reported where, after fraud or a major problem in a country, the guide slips across the border to work. Some countries have set up serious exams to obtain professional guide licences (Zimbabwe), but in many others this is a simple formality or there is not even an exam. Use of equivalences (that are sometimes impossible to verify) is frequent and facilitated by corruption.

4.3.4. Governance as regards marketing

This sector mainly concerns travel agencies which organise safaris. There is little control of their advertising beyond national legislation and quality charters. The quality of the contract that the hunter signs should in theory reflect the quality of the agency, but it is not always the case.

The frequent creation of new agencies for a fairly limited niche market clearly shows their opportunist nature. The role of hunting intermediary, paid by commission with no investment in the bush, is surely the most profitable part of the big game hunting sector. There are no safari vendor associations; indeed, this would appear difficult to envisage.

4.3.5. Governance as regards communication

This should involve controlling the advertising by agencies and guides, safari reports, activity reports from the different operators and associations and published information. Unfortunately it is virtually non-existent and much partial or biased information is in circulation. This leaves the way open to some people to promote their activities or the sector in general according to methods that are more propaganda than anything related to actual facts or real values.

An important innovation is the internet site http://www.huntingreport.com/ which publishes the reports of hunters upon their return. It is a big step towards transparency and it is thus much more difficult to formulate false advertising which would be rapidly exposed.

4.3.6. Financial Governance

This should, in theory, involve the control of financial flows. In practice, the combination of poverty, corruption, lack of transparency and the circulation of currency among countries creates the ideal conditions for poor financial governance, particularly in certain countries where the notion of the rule of law is weak. In certain countries, revenues from big game hunting are therefore difficult to manage as a public good. Local communities are also in a weak position: many countries indicate that the sums due to them are never paid. Governance needs considerable improvement in this field.

Two points should be highlighted:

- The lack of control of sub-letting of areas, in which a leaseholder obtains a lease for a standard price, but is not a professional, and sub-lets it to a foreign operator who is not eligible to hold the lease himself, for a higher price. The leaseholder makes a profit to the detriment of the local communities and the government who receive no part of the real price paid by the end operator.
- The lack of *tracfin* type controls over money laundering, which can give rise to disloyal competition among professionals.

Big game hunting has an important financial particularity: it is entirely self-financing. Indeed, it is financed by the hunters themselves. It is a considerable success that in some places the sector has managed to conserve significant areas populated with wildlife, without the help of donors, and in spite of government disinterest.

Finally, financial governance should involve the drawing up of recommendations for a more pertinent tax regime as regards national resources, less ricochet taxation of local communities and modern mechanisms for sustainable financing including new tools.

4.3.7. Certification

All the aforementioned points regarding the different types of governance could be included as part of a certification system: the hunting safari client would therefore be sure that their money would be used in an area managed according to ecological principles, attributed and controlled without corruption, that they would hunt with a guide who would follow optimal ethical guidelines, that the local communities would receive their share, that the rules of competition would be followed etc.

In this ideal context there would still be the problem of who would accord the certificate of conformity (official organisation, NGO, association etc.) and who would pay for the setting up and monitoring of the system. While the profession is aware of the need for certification to regulate the sector, it does not yet appear ready to answer these questions.

4.4. Analysis Summary

The data gathered have made it possible to analyse the pertinence of big game hunting according to conservation, socio-economic and good governance criteria.

As regards conservation, big game hunting gives mixed results: there are hunting areas that are geographically stable and which have large wildlife populations, but this is not the norm. There is great disparity in quality among zones. The conservation results for the same level of management are lower than those obtained by the neighbouring national parks. Hunting areas are less able to resist pressure from the peripheral areas than the national parks and therefore play a lesser role in future conservation strategies.

When positive results are obtained, it must be highlighted that this is with funding almost entirely provided by the hunters, without donor help and often without government support. This is an important advantage to be counted in favour of big game hunting.

As regards economic criteria, the results are very low. Land use by big game hunting does not stand up to comparison with other agricultural and farming uses. The contributions of big game hunting to the GDP and government budgets (less than 1 per ten thousand) are negligible in light of the surface areas concerned.

The amounts generated per hectare, both for the private sector and for the government do not achieve the necessary ratios for good land development. The gains for the local communities, even in the context of specific projects (such as the CBNRM) are negligible and are not able to dissuade them from poaching and expanding agricultural land. The number of jobs created (15 000 for the whole of Africa) is low in light of the 150 million people living in the eight main hunting countries and in relation to the surface areas used (16.5% of these eight countries).

On a social level, there is the local perception that hunting areas lack a social right to exist, and a lack of legal status for private sector surveillance, generating a feeling of exclusion. This feeling of exclusion is stronger than for other types of protected area because there is no local governance. It explains many difficulties experienced by hunting operators along with the poor socio-economic performance levels and lower ecological performance levels of hunting areas.

Good governance is also absent from almost the entire big game hunting sector for many countries. Those who currently have control of the system are not prepared to share that power and undertake adjustments that mean relinquishing control. They attempt, thanks to a fairly opaque system, to keep a largely exhausted management system going. This position serves individual interests, but not those of conservation, governments or local communities. This attitude presents, nonetheless, a risk that decisions, such as that taken by Botswana to close down hunting in part of its territory, will become widespread not for "anti-hunting" reasons, but for conservation, socio-economic and local governance reasons.

The conclusions of our analysis are fairly similar, if somewhat more nuanced as regards conservation, to those of the assessment of hunting areas in Zambia (NRCF, 2008), which concluded that big game hunting in Zambia does not work either from a conservation point of view or an economic or social one. The conclusions are similar to those of the 2009 book, "*Recreational Hunting, Conservation and Rural Livelihoods*" by Barnay Dickson, Jon Hutton and William M.Adams, (and Holly Dublin for the conclusion):

"There is no simple answer to the question about the impact of recreational hunting on biodiversity appropriate to all contexts. In some, recreational hunting has made a real contribution to conservation strategies. In others it has been neutral, irrelevant or sometimes useless".

"To the question: does it work? the answer is: it depends! When conditions are good, ecological and biological impacts are low and social benefits are high, when hunters are closely controlled (or self-controlled) and when governance is transparent, open and functional, then recreational hunting can contribute to conservation and can be seen as one of the components of the conservation tool box.
Under no circumstances is hunting a universal panacea, but it can work as a conservation tool if it is used intelligently and with precautions".

The conclusions of this study are more nuanced: hunting has played, and plays a role in conservation in Africa. It is not sure that it will play one in the future under the same conditions. However, it plays a minimal (if at all) economic and social role and does not contribute to good governance. Of the four fundamental criteria for Sustainable Development, big game hunting fills only one.

Choosing hunting as a conservation policy for purely economic reasons, as has been the case in several countries, has proven a strategic mistake, precisely because hunting does not have sufficient economic value. The question, however, can be summarised today as: can we do conservation better than big game hunting has up until now, in those areas where big game hunting is practiced? This is not at all sure, all the more so in that big game hunting pays for itself.

In the following part of this study, we present recommendations for improving protected areas in Africa, including for hunting.

5. RECOMMENDATIONS

5.1. The modern conservation context

There are several particularities of the modern conservation context that differentiate it from the context that prevailed thirty years ago, a time when a certain reorganisation of the protected areas network inherited from the colonial period took place.

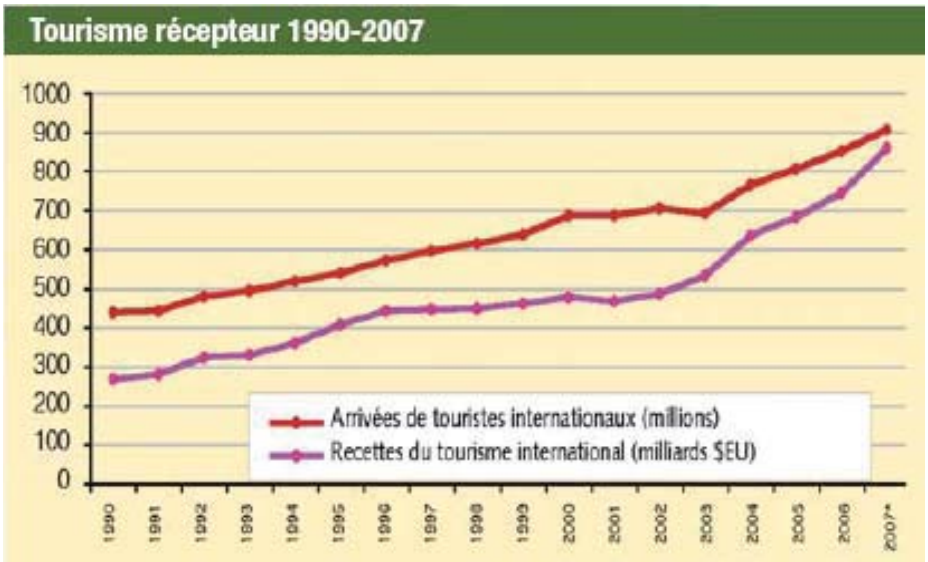
5.1.1. The demographic explosion and seeking new land for agriculture and livestock

We have discussed these points extensively, but let us reiterate some facts and figures:

- The population of the majority of African countries has quadrupled since the 1960s.
- The drought years, in the Sahel and elsewhere, modified the isohyets bringing herders into contact with farmers and leaving little space unoccupied. The notion of marginal, unoccupied land has practically disappeared.
- According to the FAO, there are 200 million people whose livelihoods are based on cattle breeding between Somalia and Senegal, of whom 40 million are pure herders, and 160 million agro-pastoralists. A mere few hundred live legally from wildlife in that same area. Herding is unavoidable here.
- Agriculture is seeking new land: the FAO and the World Bank (2009) estimate that 400 million hectares of land could be used for agriculture in Africa. These areas overlap with the majority of the hunting areas. The hunting areas of Burkina Faso, Benin and Cameroon, to cite just these, are located in the best cotton-growing areas.
- Climate change should restrict the sahelo-sudanese band even further, increasing population densities and requiring intensification of agriculture.

5.1.2. The Tourism Explosion

Tourism has become one of the mainstays of international trade. Today, international tourism is, on a global scale, the fourth largest export earner after the petrol, chemical and automobile industries. From 1950 to 2007, the number of international tourist arrivals rose from 25 million to 903 million in the world. The number of international tourist arrivals should reach one billion by 2010 and 1.6 billion in 2020.



©OMT

(Graph: Incoming tourism
Index: International tourist arrivals (millions)
Income from international tourism ($USbillion))

In Sub-Saharan Africa, the number of international tourist arrivals rose by 212.6% from 1995 to 2006, and by 7.1% during 2007, to reach 28 million.

	Arrivées de touristes internationaux (millions)						Part de marché (%)	Variation (%)		Croissance annuelle moyenne (%)
	1990	1995	2000	2005	2006	2007*	2007*	06/05	07*/06	'00-'07*
Monde	436	536	683	803	847	903	100	5,5	6,6	4,1
Europe	262.6	311.3	393.5	440.3	462.2	484.4	53.6	5.0	4.8	3.0
Asie et Pacifique	55,8	81,8	109,3	154,6	167,0	184,3	20,4	8,0	10,4	7,8
Amériques	92.8	109.0	128.2	133.4	135.8	142.5	15.8	1.9	4.9	1.5
Moyen-Orient	9,6	13,7	24,4	37,8	40,9	47,6	5,3	8,2	16,4	10,0
Afrique	15,2	20,1	27,9	37,3	41,4	44,4	4,9	11,0	7,4	6,9
Afrique du Nord	8,4	7,3	10,2	13,9	15,1	16,3	1,8	8,4	7,9	6,8
Afrique subsaharienne	6,8	12,8	17,7	23,3	26,3	28,2	3,1	12,6	7,1	6,9

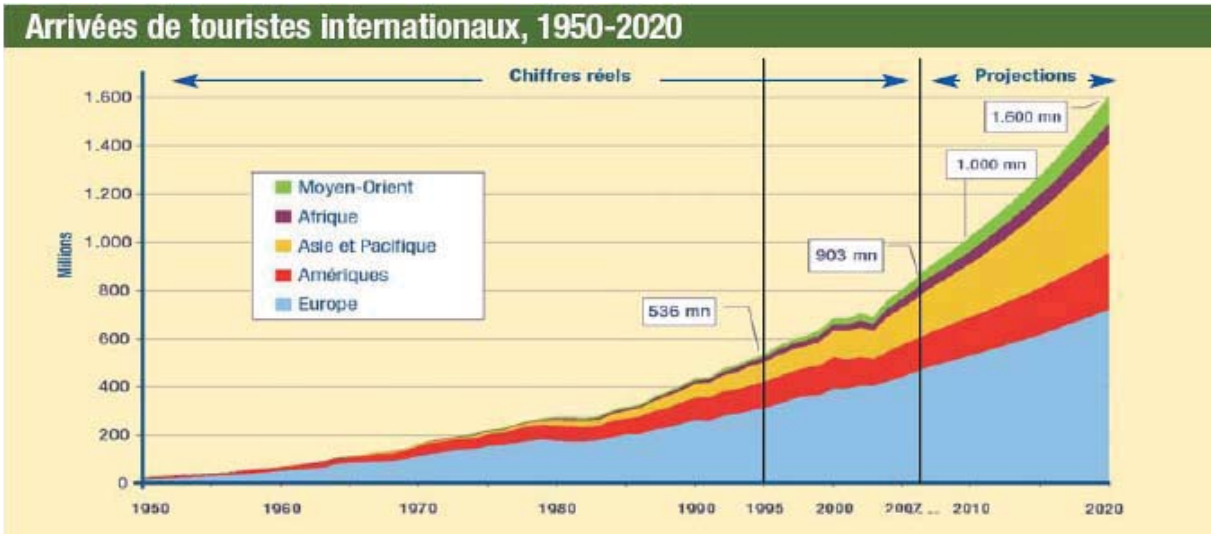
(Table: International tourist arrivals (millions) – Market share (%) – Variation (%) – Annual average growth (%)
World
Europe
Asia and Pacific
Americas
Middle-East
Africa (North Africa/Sub-Saharan Africa))

In 2006, earnings from tourism in Sub-Saharan Africa were $US15.9 billion and $US17.9 in 2007, in other words an increase in just one year of 12.6%. The highest annual increases in the sub-Saharan zone are Uganda (+19%), Malawi (+12%) and Tanzania (+10%).

In the following table, it can be noted that Tanzania has the 9th highest number of tourists, but it is the 2nd in terms of earnings (just ahead of Kenya): this corresponds to the luxury tourism. Hunting tourism in Tanzania now only represents 3% of all tourism turnover in the country. This proportion is 1.2 ‰ in South Africa. Thus, hunting tourism has become marginal. For West Africa we can note the excellent 6th and 11th places of Senegal and Ghana.

Rank	Country	Tourists (thousands)	Earnings ($USmillions)
1	South Africa	9 090	8 418
2	Zimbabwe	2 287	338
3	Botswana	1 675	546
4	Kenya	1 644	909
5	Zambia	897	138
6	Senegal	866	250
7	Namibia	833	434
8	Malawi	714	27
9	Tanzania	692	1037
10	Uganda	642	356
11	Ghana	497	861
12	Éthiopia	303	177

The growth rate over the period from 1995 to 2020 is estimated at 5.5% for sub-Saharan Africa, as against 4.1% for the world. Thus sub-Saharan Africa's share is increasing, as shown in the following graph:



© *OMT*

(Graph: International tourist arrivals, 1950-2020. Real figures – Projections
Index: Middle East
Africa
Asia and Pacific
Americas
Europe)

At the same time, the number of hunters is diminishing in certain countries of the North: in 20 years it has dropped from 2.3 million to 1.2 million in France. This does not affect the number of hunters travelling to Africa, but reduces the base potential.

It would appear that sub-Saharan Africa has considerable potential for developing tourism on the condition that profitable products in demand by tourists are on offer. As regards safaris for photographing animals, these take place mainly in luxury camps in concessions whose right of use is held by local communities and implemented by the private sector. Certain companies show great success in this field: *& Beyond*[50] manages 50 camps and more than 3000 people, *Wilderness Safaris*[51] also manages 50 camps and 2.8 million hectares. These companies have their own conservation and local support projects as well as their own foundations.

These approaches have been developed in Namibia, Botswana, South Africa, Tanzania and Kenya with much success, but are strangely absent from French-speaking Africa. And yet specialists in tourism in Southern Africa see advantages in French-speaking Africa:

- Closer to Europe,
- The best season to visit is during the European winter which is a good period for a short trip,
- It is a period when many camps in Southern Africa are closed or have reduced operations (qualified personnel, planes etc. are therefore available),
- Friendly local communities, attractive cultures and villages etc.

Few things have been done for modern tourism in French-speaking Africa, and the operators there seem disconnected from the profitable niche.[52].

5.1.3. The land-use rights and wildlife transferred to local communities: community-private sector partnership

For twenty years, many programmes (beginning with CAMPFIRE in Zimbabwe), particularly in Southern Africa, have worked on the basis of local community involvement in wildlife management. The results have been mitigated, due to the low revenues generated, disappointing local communities. Institutional provisions

[50] http://www.andbeyond.com/
[51] http://www.wilderness-safaris.com/
[52] With the exception of http://www.africas-eden.com/ in Gabon

did not usually change much with regard to the system used for government hunting areas. Indeed, communities did not have the right to choose the activity (hunting, safaris or anything else) or the operator or to set the prices. In practice, the share received by the communities is often just a part of government taxes.

The simultaneous arrival of decentralisation and community-private sector partnerships generated clear progress: the community (sometimes with the support of the decentralised local authorities) chose the activity, the operator and set the prices according to the market which usually included an annual rental fee and a share in profits (for example a tax per night per tourist), as well as a certain number of guaranteed jobs.

This system works particularly well around the national parks: the local community rents a zone (10 000 ha for instance) to a private operator who sets up a camp of luxury tents and uses the national park for visits by car, the peripheral area for safaris on foot, at night or by boat and also arranges interaction with local inhabitants and villages. In this way, the communities increase the conservation area thanks to their community area, thus establishing a peripheral zone on a voluntary basis.

This is clearly a unique example of conservation today, at a time when all conservation areas are shrinking, this approach increases them. Rather than a centripetal effect it is a centrifuge effect.

Why does this approach work? Because it is economically viable! In Botswana, a 10 000 ha concession is let out at $US100 000 per year, all of which goes to the community. The camp employs 40 staff and they receive an extra fee per night for each client (a share in profits, therefore an interest in good conservation), as well as high tips. The annual rental alone of 20 000 ha in Botswana brings in what the communities in RCA get for 3.5 million hectares. It is also more than what local communities in Burkina Faso and Benin combined get in hunting areas.
The economic and conservation potential is therefore considerable. Nonetheless, it must be set up and it takes time to build a marketable image. 15 years ago, there were no safari camps in the Okavango, only hunting camps. Today, it is the reverse.

5.1.4. The notion of services rendered by ecosystems

In the past few years, a new notion has emerged: the ecosystem renders innumerable services to its inhabitants and to the world. These services include: carbon fixing and reducing climate change, preserving water catchments and resources, combating desertification and erosion, cleaning up pollution, providing leisure activities etc. The value of these services is now recognised and mechanisms are being set in place to pay for them. The most well-known are the remuneration of carbon sinks and catchments. The different ways these can be promoted are summarised in the following table (FFRB): the paradigm based on "*if it pays it stays*" now corresponds to just one line of the table (production of wildlife) and obscures the other resources.

Usage value			**Non-usage value**	
Direct usage value	**Indirect usage value**	**Option value**	**Heritage value**	**Existence value**
Leisure activities Sustainable production Wildlife production Firewood Pasture Agriculture Genetic resources Education Research	Ecosystem services Climatic stabilisation Soil preservation Groundwater recharge Carbon sequestration Habitat Maintaining fertility Prevention of natural disasters Protection of catchments Natural services	Future information Future usage (direct and indirect)	Heritage of usage and non usage values	Biodiversity Ritual or spiritual value Cultural or heritage value for communities Landscape

Source: French Institute of Biodiversity (2003), now the French Foundation for Biodiversity Research (2009)

As the paradigm's lack of economic value has been proven, the current vision is that of preserving the environment (and the wildlife it contains) while benefiting from all its different potential advantages.

5.1.5. The emergence of sustainable financing

During the same period, different mechanisms emerged to sustainably finance protected areas. In brief, the most common model is a trust fund managed by a foundation. The trust fund is increased through careful investment, such as bonds. This type of investment guarantees annual dividends of 5%. To effectively manage a national park of 200 000 ha, a budget of €300 000 per year is needed. Therefore, a total investment of € six million is required. The national park's management budget would thus be assured for the entire time the capital remains in the bank.

Funds generated by payment for ecosystem services can be added to this fund. Protected area management, often blocked by the lack of funding, can thus be envisaged from a new and sustainable angle.

5.1.6. Environmental awakening

The advent of sustainable development, of environmental conventions such as Rio and of climate change, have given rise to an undeniable environmental awareness. Few actions are now decided upon without an environmental (and social) impact assessment. The general perception of hunting by current day public opinion is not very positive.

Two significant facts can give testimony to this environmental awakening:

- The removal of game meat from the main tourist restaurant in Kenya,
- Regulatory slaughter of elephants was stopped in South Africa before the Football World Cup in 2010 for fear of a public opinion boycott.

The problem of the social right to exist for hunting, presented in the introduction, is thus all the more acute in the present day. The general perception of hunting, which is sometimes not very positive, could affect donations that would be used to set up a trust fund for a protected area as a whole.

5.2. Summary of key points

The protected area networks were set up gradually in the past, to protect species. Today it is the ecosystem we seek to protect, so it can deliver services to the populations and at the same time help these species to survive in their original biotope. The environment is a global good which cannot be used exclusively for individual interests or those of a minority. The advent of consideration of environmental services and sustainable financing make it possible to envisage financing these networks from a new angle.

The objective of conservation is not to generate economic gains (often virtual) for a few, but that the ecosystem can continue to deliver its environmental services to all. This is a new vision and is very different from that implemented in Africa in the past.

This vision requires the restructuring of the protected area networks, and also of the big game hunting system as was requested by assessments in certain countries such as Tanzania (Baldus, 2005), Zambia (NRCF, 2009 and RCA (Roulet, 2008), unless hunting is shut down altogether as in Kenya (1977) or Botswana (2009).

The key points of wildlife conservation to be taken into account to improve protected area networks can be summarised as follows:

1. The review carried out at the beginning of this study and the subsequent analysis helped to highlight a certain number of points. These are developed below and should be kept in mind when designing protected area networks

2. National Park boundaries stand up better to external pressure than those of hunting areas or protected areas of categories IV, V or VI,

3. Wildlife densities are higher in national parks than in the surrounding hunting areas,

4. The core populations of endangered species are greater in national parks,

5. The negative impact of humans can be felt far beyond their settlements: conservation is better on large blocks than small protected areas,

6. As a result, corridors (long and narrow by definition) between protected areas are unlikely to be used by wildlife because the conditions that prevail are unsuitable, except when there is a clear migration phenomenon, of which there are only five cases in Africa[53]. Apart from these five cases, the creation of corridors is of little if any use[54] and takes time, energy and money in a context where all are rare. The example of the South African national parks in this field is worth emulating (Sanparks, 2006)[55]. In other terms: don't create migration corridors where there is no migration!

7. The objective is to preserve the ecosystem and strengthen its resilience: artificial developments are forbidden in order to optimise habitat management by natural spatial-temporal variability. As a result, the notion of load capacity is inapplicable and forbidden, as in South African national parks (Sanparks, 2006).

8. The economic viability of wildlife is a misconception and the choice of type of protected area should not be made according to its supposed economic value, but rather its conservation role and financing potential.

9. Hunting plays a very minor role in development: developments proposed to the populations generate hopes that if disappointed are counter-productive.

10. More than 12% of a country classified as protected areas can be counter productive in the long term, because development has a legitimate need for space.

11. The main role of peripheral areas is to distance the negative action of humans from the populations of the protected area (i.e. the national park): thus it is not essential for wildlife to be present in these zones, it is enough to conserve the biotope. A natural resource management area, even without wildlife constitutes a good peripheral zone and can be eligible for eco-systemic service funding.

12. Protected areas that are not managed often disappear unless they have a high conservation value IUCN rating (I or II). Management by hunting guides and community management can then be better options than government (even decentralised) management.

13. The only recent cases where a conservation area exists in an inhabited zone alongside a central core, and increases the conservation block are those of community areas for safaris with private sector-community partnerships. This option should be favoured in the context of future tourism.

14. Hunting areas should not prey on national parks, because they reduce conservation efforts and do not add sufficient socio-economic benefits. This is one of the important causes of poaching which endures and encourages agro-pastoral encroachment.

15. Due to their geographical position, hunting areas can prevent the development of tourism in community areas near national parks. They partly prevent the country from benefitting from the current tourist explosion in Africa.

---

[53] The herbivores of the Serengeti (Tanzania-Kenya), herbivores of Southern Sudan, herbivores of Barotsé (Zambia-Angola), herbivores of the Kalahari (Botswana), and the elephants of Gourma (Mali-Burkina Faso). Other movements are simply wanderings and are thus random and unpredictable.

[54] See John Bonner, *Wildlife's road to nowhere*, http://www.newscientist.com/article/mg14319393.600--wildlifes-road-to-nowhere-corridors-connecting-fragmented-islands-of-natural-habitat-are-all-the-rage-john-bonner-asks-whether-they-are-routes-to-survival-for-threatened-species-or-expensive-dead-ends--.html

[55] Corridors between parks are no longer considered due to the density of human populations and national park populations are managed as a metapopulation (a population made up of sub-units).

16. Hunting areas do not have a legitimate social right to exist and that is one of the reasons they are poorly respected, as soon as pressure increases. Poor governance and private surveillance without government control only reinforce this lack of legitimacy.

17. Community surveillance of protected areas is not enough. Private sector surveillance is not effective and often generates conflict: the government cannot have protected areas and not assume its regulatory role.

In light of these few points, what should government do first to improve their protected area networks and develop the land? The protected area manager must integrate the protected area into its human environment, not only by having it accepted by the populations but by having them live together. Ecosystemic services and their financing are essential for this.

Ecologically, the most important point is probably the constitution of blocks.

5.3. Actions for 2010 and the future

5.3.1. Define the vision

Today, the two essential questions that must be asked before setting up or adjusting a protected area network, and including big game hunting are:

1. Ecologically speaking, what to we need as a protected area?
2. What financing do we have to set it up and operate it?

It is perhaps counterproductive to want to establish a network that takes up more than 12% of the national territory. However, it is interesting to insert it into a peripheral context of sustainable agriculture. Each country has a certain number of ecosystems that it is legitimate to wish to preserve. The first objective is to have ecosystem representation in the network before multiplying the protected areas belonging to the same ecosystem.

In the long term, the national park (or natural reserve) is the best performing status and should logically be the heart of preserving the ecosystem. Ideally it should be encircled by peripheral zones to mitigate the impact of human activities on the biodiversity. These peripheral zones can be of three types:

- If there is wildlife: community areas promoted by private sector-community partnerships where safari tourism is possible[56].
- Where there is wildlife and the type of safari tourism mentioned above is not (yet) possible: hunting areas. These areas should not prey on national parks, and their governance should be improved.
- Where there is not enough wildlife to exploit: constitution of community natural resource management areas. It will always be possible to receive tourists (community managed camping for instance), or grant a few shooting licences on the basis of an objective quota.

These three types of peripheral zones are part of a wider geographical grouping applying sustainable agriculture principles. This agricultural ensemble can be contracted to private operators to develop small game hunting. This type of zoning is compatible with biosphere reserves for instance.

Once the technical areas are established, they must be financed. In so far as possible, modern financing mechanisms should be used (trust funds, carbon sinks, river basins etc). The funds required to manage a protected savannah area are around €1.5/ha per year, for the central zones.

A country like Benin, with a surface area of 112 000 km², should theoretically protect 1.34 million ha and have an annual budget of around €2 million[57]. This means having around €40 million In a trust fund at 5% interest in the bank. This figure is far from unattainable[58]. The trust fund, however, must only support the ministry or structure responsible for the environment and does not replace the government budget which

[56] It takes a long time to set up safari tourism, and it must be done with professionals who have a good portfolio of clients. This has not yet been done in French-speaking Africa.
[57] The GDP of Benin is $US4.7 billion, and the government budget is 1 230 billion CFA F.
[58] The ECOPAS project alone for W Park had a 5 year budget of €24 million.

must supplement it.

Generally speaking, the cost of environmental preservation is an infinitely profitable investment in comparison with the cost of repairing environmental damage (if it is even possible).

Finding a sustainable basis for funding should be the primary concern of the organisations in charge of the country's protected areas: it is a prerequisite for any technical choices. The power to decide upon modern technical conservation actions comes from financial solvability. This technical independence, unthinkable a few years ago due to the lack of financial solutions, is now possible in countries where there is sufficient good governance.

However, sustainable financing will not appear immediately, which means big game hunting still has some good days ahead of it – it is self financing and therefore enables small conservation actions to be implemented, even if they are insufficient in the long term. Therefore it can be estimated that big game hunting will continue in the future so long as sources of sustainable financing are not enough and governance is weak.[59].

5.3.2. Implementing this plan

Most countries know how to manage a national park. However, they often lack the political commitment to do so. If the government communicates on its environmental priorities, if it is done transparently, and if there is sufficient rule of law in the country, national park management should not pose any major problems.

Peripheral zones must meet certain conditions:

- Community safari areas must be part of a wider tourism policy that aims to bring the country onto the global tourism stage. This requires an opening up that has never happened in French-speaking Africa, where efforts were made for hunting, targeting hunting specialists[60]. This tourism policy must be complemented by institutional developments: community-private sector partnerships, rights of use, non-compete commitments from the government etc.

- The management of hunting areas must be improved. Transparency, governance and sustainability must oversee a reorganisation of the sector. One key point is the elimination of hunting areas that prey on national parks. This concerns in particular hunting areas that are on one bank of a river that can be easily crossed by animals living in the national park on the opposite bank. Hunting area perimeters must be reorganised to take this phenomenon into account, as it weakens national park management and performance levels, hinders good safari tourism and takes up land that would more naturally be community safari areas. If these areas continue to prey on parks (denounced for instance in Benin by Tello and Boulet in 2002 or Hausser in 2009), they will endanger all viable conservation actions by reducing the size of conservation blocks rather than helping to increase them by creating community safari zones.

- Community natural resource management areas must be set up through local development projects: participatory mapping, local development plan, charters and conventions for natural resource management. Furthermore, they can benefit from sustainable financing options such as carbon sinks, catchments etc. and be the site of eligible income generating activities under conservation programmes. These activities should be seen as supplementary.

- Sustainable agriculture could be set up by the appropriate structures.

Here below, we offer a very pragmatic list of the different actions that could be undertaken in the field.

a. Should new community wildlife management projects be launched?

The CBNRM projects of southern Africa, have given rise to a new fashion. The results of these projects, when they can be ascertained, do not substantiate the success announced by their proponents, far from it.

[59] Which constitutes one of the obstacles to setting up sustainable financing.
[60] Who are currently English-speaking.

In West Africa, three zones[61] (two in Ivory Coast, one in Burkina Faso) have benefitted from a large project (Geprenaf-World Bank/GEF) to set up such actions. The project cost around 2.8 million CFA F in Ivory Coast (for six years) and three billion in Burkina (for 11 years). Three biodiversity zones of around 100 000 ha each were set up on the periphery or in relation with the Comoé National Park (Ivory Coast).

In Burkina, big game hunting began ten years ago and runs at a loss: besides the set-up costs (including local development), the annual operating budget is around 75 million CFA F and at best generates revenues of 25 million CFA F/year. The problem of poaching[62] is ever present and wildlife populations are not increasing much. The managers' concern is to maintain wildlife populations, knowing that they are not receiving the hoped-for benefits (the continuation of poaching is a clear indicator of this). The main, very positive, result is that the Comoé-Léraba forest has been preserved.

In Ivory Coast, the socio-political situation that has prevailed since the end of 2002 has led to the colonisation of one of the sites while the second is still viable. However, if hunting is re-opened, the same budget/income ratio as in Burkina Faso will have to be faced, and local community motivation is difficult to maintain under such conditions.

It would appear to be more pertinent to propose natural resource management areas to the local communities, that could also receive safari tourists, small game hunters and maybe occasionally grant big game hunting licences for a limited number of animals with a reasonable quota.

b. Can new big game hunting areas be created in West Africa?

In theory, and unless there are any pleasant surprises such as the discovery of virgin territory, the answer is no. In the savannahs all areas are known and occupied either by protected areas or by people. Newly identified areas in Mali for example, are too small, too poor in wildlife and their repopulation by virtual wildlife corridors between under populated protected areas is not realistic. Furthermore, the pressure that led to the loss of their wildlife still exists, and has even increased.

In forest areas the answer is not so clear cut, because it is still possible to find areas where rare duiker can be found (but not Bongo, giant forest hog or sitatunga). However, these findings (as in Liberia in the past and in Ghana now) are occasional and are not included in the sustainable management framework (night hunting seems to be par for the course which indicates doubtful ethics).

For small game hunting the problem is different: this activity requires crops to be rotated and the lowlands preserved. In the context of sustainable agriculture, and providing there are large enough areas (professionals estimate 500 000 km^2 are required per zone to be sustainable) this activity could be proposed to generate some additional funding. Exclusive hunting areas (like the ZOVIC around Nazinga in Burkina Faso) have practically disappeared under agricultural pressure, due to a lack of profitability.

c. Could game farms be created?

These farms have proven their lack of economic viability. In the West African context it would be even worse for reasons we have already explained. Furthermore, Nazinga Ranch in Burkina Faso is not at all in line with this concept.

The ecological viability of these farms is also in question[63], and in southern Africa the trend is now to take down fences to increase the size of the blocks and connect them to a reserve or a national park in order to take advantage of the demand for luxury ecotourism.

In West Africa you need an average of 10 000 ha to shoot a single antelope, and the price of hunts is always lower in enclosed spaces than open ones. There is no profitability in this type of operation unless you release

[61] In Ghana there are also CREMA starting up : the areas available around the national parks are so small that it seems doubtful whether they can have significant results. The Campfire concept being applied has already proved to be ineffective.

[62] As in all areas with community surveillance and not enough government support.

[63] See Lindsey: The importance of conservancies for enhancing the value of game ranch land for large mammal conservation in southern Africa, Zoological Society of London (ZSL).

the game just before ("*put and take*", as described by Lindsey[64]), like releasing pheasant in Europe during hunts. The problem in West and Central Africa is that such farms do not exist and the only way to obtain such game would be to take it from the national parks.

d. What should be done with the big game hunting areas?

The first answer is: conserve them! As seen above, hunting areas have had, and still do have, a clear role to play in conservation. They also have the important advantage of being self financing.

However, the corollary is that for this to last in the long term, the sector needs to be reformed. The only advantage of big game hunting is to be able to participate, when well run, in conservation efforts. The big game hunting sector needs to adjust its stance: hunting guides need to realise that they are conservation agents and change their attitudes accordingly.

Communication with hunting guides is poor, if it exists at all. They claim to be the last bastions of African wildlife management, while many of them only have the job because they can kill the animals coming out of a nearby national park. They present themselves as the only "promoters" of wildlife (with no certified accountability of course), and often accord themselves the role of development agent, whereas, as we have seen, big game hunting is rather a hindrance to development.

Therefore, communication on big game hunting should focus on conservation to guarantee a future for the sector and thus establish sustainable financing frameworks. To restructure it must become more professional, a process which is embryonic in many countries. Governments have a primordial role to play in improving the big game hunting sector, by integrating the notions of good governance and rule of law.

The first step in restructuring would be to redefine the hunting area perimeters to include them in a block with a national park at the centre, and that the hunting areas avoid preying on it. If this is not done, big game hunting will soon disappear altogether, and eventually event the conservation block (and national park) will too.

e. Which conservation blocks can be saved in West Africa?

Uninhabited conservation blocks of around one million hectares still exist in West Africa, and they should be given priority:

- In Senegal: Niokolo Koba National Park,
- In Ivory Coast: Comoé National Park and the Taï block, consisting of nearly one million hectares with the peripheral zones.
- In Benin-Burkina Faso: the Arly-Pendjari Block,
- In Benin-Burkina Faso-Niger: The W Block,

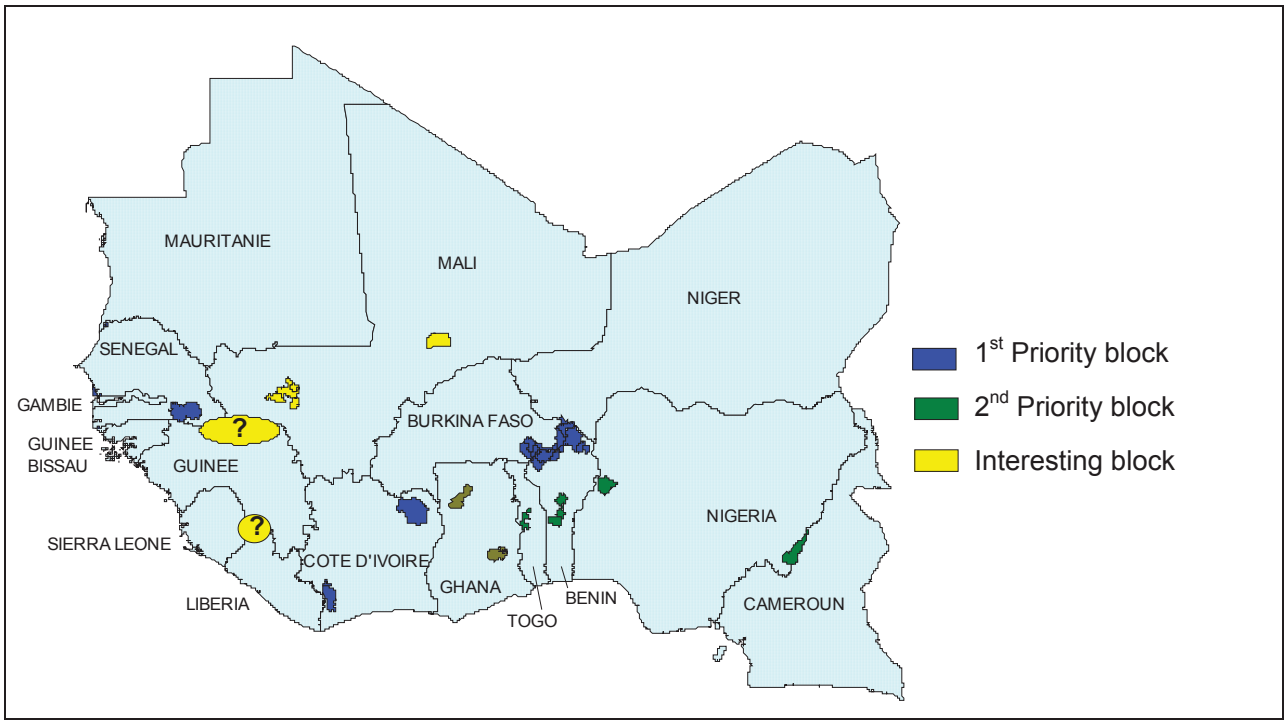
Other, slightly smaller sites, are also of interest:

- In Ghana: Mole National Park (4 840 km²), Digya National Park (3 500 km²),
- In Benin: the vast classified forests of the centre,
- In Togo: Fazao National Park block.
- In Nigeria: Borgu Game Reserve (on the border with Benin) covers 5 300 km², and on the border with Cameroon, Gashaka Gumti National Park covers (at an altitude of 450 to 2400 m) more than 6 000 km².
- Sierra Leone-Liberia: projects have begun to preserve the surviving biodiversity in the wake of the conflicts. Blocks should be identified in the context of current strategies.

Of course this list is not exhaustive. Certain inhabited zones are of clear interest for biodiversity conservation such as the Malian Gourma. If a real network were to be established with all the aforementioned protected areas, it would constitute a very impressive, and maybe effective, regional protected area network[65].

[64] Ibid
[65] And hence cross-border!

Map No. 8: Long-Term Potential Regional Protected Area Network for West Africa



f. Should these blocks be linked by corridors?

This is simply not possible. In most cases people occupy all the areas and they would need to be displaced to create a corridor. The problems created would outweigh any potential advantages. We have also seen that wild animals avoid contact with people, and if the corridors were too narrow they would not be used anyway. The majority of species do not move far away and live within a relatively modest-sized area: it is not in their nature to migrate. There are only five real migrations in Africa, only one of which is in West Africa: the Elephants of Gourma. Creating migration corridors where there is no migration is nonsensical.

Elephants are the animals that move the furthest, but the majority of their movements are not migrations, indeed it is impossible to predict when and where they will go[66]. Under these conditions, setting in place a corridor for a hypothetical use, while elephants can go everywhere also seems a waste of time.

When they do work (e.g. in certain places in India[67]), corridors pose many problems regarding conflicts between people and elephants, due to the simple fact that they have to pass through a narrow strip surrounded by crops. Finally, the genetic advantage of corridors is above all theoretical: the genetic variability of a large population through reproduction alone is much higher than that resulting from the unpredictable arrival of a few individuals. Therefore a population of 300 animals from six founders with an interval of 15 to 20 years between generations conserves 90% of heterozygosity after 200 years (Conway, 1986). This is another advantage of blocks: each species can exist in sufficient numbers from a genetic point of view and if necessary, these blocks could be managed as components of a metapopulation[68], as in South Africa.

g. How would each block be organised?

Ideally, the conservation block, placed inside an area of sustainable agriculture, is made up of four different types of protected area:

[66] Which is the definition of migration.
[67] They are usually 6 km long and 3 km wide.
[68] This can include transferring reproductive animals if necessary.

- a national park (or natural reserve) in the centre,

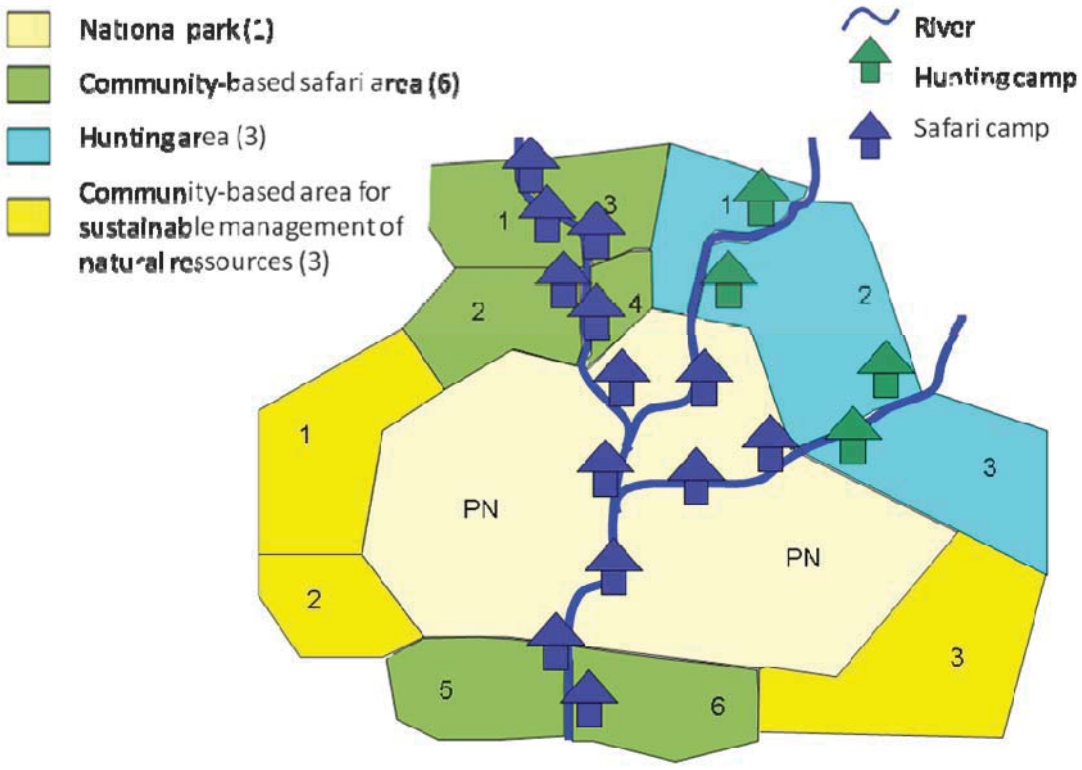
and a peripheral area made up of:

- hunting areas: community-based or government run,
- Community-based safari zones: mainly to set up small camps using ecological materials to be used for safaris on foot, night safaris, village visits and as a base camp from which to visit the national park,
- Community-based natural resource management zones: these are marginal zones where economic activity based on wildlife would be too low, but where the vegetation is worth conserving for the use of the local communities and as a periphery to the block. It can sometimes be used for hunting or safaris.

The rule is that the local ecosystem depending on a river (that is to say both banks) must be classified with the same status and be operated in the same way: in this way there are practically no predatory zones. At worst, one bank of the river can be classified as national park and the other as community-based safari zone, but never as a hunting area.

The following diagram illustrates the recommended use of space within a region of sustainable agricultural (or agro-pastoral) activity.

Map No. 9: Theoretical organisation of a conservation block



The above diagram presents a layout with three hunting areas, six community-based safari zones (smaller in size with the high possibility of developing small eco-camps) and three community-based natural resource management zones (larger in size, less favourable for wildlife in the dry season due to the lack of rivers, but that could provide habitat in the rainy season).

h. What is the private sector's place?

The private sector can ensure effective management. It is nonetheless faced with two major constraints:

- It must make a profit, however, the sector has been described as not being very profitable if at all. A non-philanthropist private operator should not therefore apply to manage a protected area. This is an important point: the difference between private sector and NGO. The difference is the source of funding. If the private sector does not have its own source of funding, and is looking for public funding, it becomes an operator (like an NGO), and the attribution of the area must be subject to the rules of good governance.

- It cannot replace the government as regards its regulatory responsibilities, the top of the list being surveillance. All the examples in Africa show that very short term success is followed by total failure in the medium term[69]. This means that if the government seeks to offload its responsibilities on the private sector, because it cannot (or does not want to) fulfil its regulatory role, conservation will not be sustainable. The primary condition therefore for the private sector to operate in a country is that there be rule of law, meaning that the government assumes its regulatory responsibilities.

Regardless of economic and governance hurdles, the private sector will also be confronted with a problem of expertise: competent, experienced human resources in the same region[70], and who are aware of the communities' expectations are not legion.

[69] A phenomenon denounced elsewhere as "environmental imperialism".
[70] Africa is so diverse that local expertise is difficult to export in the short term.

CONCLUSION

This study has made it possible to clarify the role of big game hunting in Africa, and more specifically in West Africa.

This role is negligible from an economic and social point of view, particularly in light of the considerable surface areas concerned. Therefore, big game hunting has a rather negative effect on development.

As regards conservation, big game hunting gives mixed results:

- There is great disparity between zones.
- The results of conservation, for the same level of management, are lower than those obtained by neighbouring national parks.
- Hunting areas are less able to withstand pressure from the peripheral areas than national parks.
- Hunting areas take up vast areas of land: 15% of the territory of the 11 main hunting countries (for around 18 500 tourist hunters/year), which is in addition to the 9.5% taken up by other protected areas. The total is well above the recommended 12%, which could be counterproductive and cannot be acceptable to local communities in the long term.

This means that in the future, hunting areas will play a lesser role in conservation strategies than they have in the past.

The strong point of hunting areas in terms of conservation is that they are self-financing: this is an important advantage, particularly in a context where funding is hard to come by.

Certain conservation strategies have been based on a theory developed around thirty years ago, according to which wildlife had an economic value which would convince local communities to preserve it. All the figures, maps and data consulted show that this theory is in fact untenable and that the economic value is not sufficient to generate the expected behaviour change.

It is in the interests of the big game hunting sector to change its way of thinking and communicating, and to reposition itself clearly where it can have a positive effect as conservation agent. Unless this is done within an overall strategy, reticence regarding hunting may grow, as seen in the decision taken this year by Botswana. Indeed, the socio-economic figures of big game hunting are too low to convince local decision-makers or the leaders of a country.

This conservation strategy must integrate hunting into a wider protected area network. The current networks are for the most part inherited from the colonial period and are run according to obsolete economic theories. The protected area network now needs to be defined in light of current realities:

- Demographic explosion and the legitimate search for land for agriculture and livestock,
- The global tourism explosion,
- The transfer of land and wildlife usage rights to the local communities and the creation of community-private sector partnerships
- the notion of services rendered by ecosystems
- The emergence of sustainable financing mechanisms
- Environmental awareness.

To become players in conservation, hunting areas must first of all collaborate in conservation efforts. This means that they must no longer prey on other protected areas. A change in mentality is needed because national parks are not there to produce game for local hunters.

It is therefore a priority in the context of setting up protected area networks to redefine these geographically, including hunting areas of course.

Once the conservation context is clarified, governance of the big game hunting sector must be reviewed or else this activity will gradually be relegated to surviving lawless areas before disappearing altogether, as has happened in Botswana.

In the years to come, the protected area networks must be redefined to better integrate hunting activities. This should be done on a regional level to integrate "blocks" that are large enough to guarantee the long-term preservation of biodiversity. Demographic and agro-pastoral pressure is such in West Africa these days that few countries can still constitute such blocks to be classified or managed as national parks, and it is becoming urgent to do so.

In this modern protected area network, hunting areas still have an important conservation role to play: that of financing and maintaining the peripheral zones.

APPENDIX

Non-exhaustive list of the documents consulted

- AGEFORE: Schéma directeur d'aménagement 2006-2016 de l'aire protégée transfrontalière Bafing-Falémé. Ministère de l'Environnement et de l'Assainissement du Mali, 2005.
- AGEREF Comoé Léraba: Etat d'exécution cumulée 2003-2007. MECV, 2008.
- Baldus R.: The crucial role of governance in ecosystem management. Results and conclusions of the Selous conservation programme Tanzania 1987 – 2003. Tanapa-FZS, 2006.
- Baldus R. et Cauldwell A.: Tourist hunting and it's role in development of wildlife areas in Tanzania. GTZ, 2004.
- Bouché P. et al.: Recensement aérien total de l'écosystème WAPOK, Mike. 2003.
- Bouché P. et al.: Recensement aérien total de faune dans l'écosystème naturel Po-Nazinga-Sissili. Mike, 2003.
- Bouché P. et al.: Inventaire aérien total PAGEN (Burkina Faso). MECV, 2005.
- Boulet H. et al.: Mission d'appui à la chasse touristique au Bénin. Ecopas. 2002.
- Caro T.M. et al.: Consequences of different forms of conservation for large mammals in Tanzania: preliminary analyses. Afr.J.Ecol. vol.36, 1998.
- Caro T.M. et al.: Animal breeding systems and big game hunting: models and application. Doi:10.1016/j.biocon.2008.12.018. 2008.
- Caro T. et al.: The impact of tourist hunting on large mammals in Tanzania: an initial assessment. Afr.J.Ecol. vol 36, 1998.
- Cenagref: Plan de gestion du PN de la Pendjari, 2004.
- Cenagref: Plan d'affaires du PN de la Pendjari, 2007.
- Cenagref: Dénombrements aériens de la Réserve de Biosphère de la Pendjari. 2002.
- Cenagref: Dénombrements aériens de la Réserve de Biosphère de la Pendjari. 2006.
- Cenagref: Dénombrements aériens de la Réserve de Biosphère de la Pendjari. 2008.
- Conservation Finance Alliance: Revue des expériences des fonds fiduciaires pour la conservation de la biodiversité. FFEM-AFD-KFW-CI-WWF. 2008.
- DFC: Burkina Faso: Rapport bilan de 10 années de campagne de chasse. 2006.
- DFC: Rapport d'évaluation final de 9 concessions fauniques. MECV, 2006.
- DFC: Rapport de la saison de chasse 2004-2005. MECV, 2005.
- DFIDs Rural Livelihoods Department: Wildlife and poverty study, 2002.
- Dickson B., Hutton J. et Adams W. (Ed.): Recreational hunting, conservation and rural livelihoods. ZSL, 2009.
- Direction National des Eaux et Forêts de Guinée: Stratégie Nationale de gestion des éléphants en République de Guinée. 2006.
- FFEM: gestion communautaire de la biodiversité autour des aires protégées de la région ouest du Ghana. FFEM, 2006.
- Hausser Y.: Evaluation des zones de grande chasse du Bénin. GFA. 2009.
- IGF: Comptages en action de chasse, Cameroun. Paris, 2007.
- IGF: Comptage en action de chasse, RCA. Paris, 2007.
- IGF: Validation de la méthode de comptage en action de chasse. Paris, 2007.
- IGF: Conservation status of the lion in Mozambique. Paris, 2009.
- IGF: Le tourisme de grande chasse, un outil de développement durable en Afrique sub-saharienne. Paris, 2008.
- Kideghesho J.R.: Who pays for wildlife conservation in Tanzania and who benefits? Sokoine University of Agriculture, Tanzania. 2008.
- Lindsey P.A. et al.: Economic and conservation significance of the trophy hunting industry in sub-saharan Africa. Biological conservation I 34. 2007.

- Lindsey P.A. et al.: Potential of trophy hunting to create incentives for wildlife conservation in Africa where alternative wildlife-based land uses may not be viable. Animal conservation 9, 2006.
- Lindsey P.A. et al.: The importance of conservancies for enhancing the value of game ranch land for large mammal conservation in southern Africa. Journal of Zoology 277. 2009.
- Lindsey P. et al.: Trophy hunting and conservation in Africa: Problems and one potential solution. Conservation Biology, 2006.
- Minfof Cameroun: Plan d'aménagement du Parc national de Boubandjida et de sa zone périphérique, FFEM, 2008.
- Ministère de l'Environnement et de l'Assainissement du Mali: Recueil des textes législatifs et règlementaires. 2007.
- MWH: Profil environnemental de la Guinée Bissau. Commission Européenne, 2007.
- NAMC: Report on the investigation to identify problems for sustainable growth and development in South African wildlife ranching. 2006.
- Nelson F. et al.: The evolution and reform of Tanzanian wildlife management. Conservation and Society, 5 2, 2007.
- Nelson F.: Gestion communautaire de la faune sauvage en Tanzanie. IIED, 2007.
- Nelson F.: Evolution et impacts de l'écotourisme communautaire dans le nord de la Tanzanie. IIED, 2004.
- N'golo Fanny: Geprenaf, financing of Pilot Community based natural resources and wildlife management project. 2003.
- NRCF: The impact of wildlife management policies on communities and conservation in game management areas in Zambia. 2008.
- NRCF: The real economic impact of nature tourism in Zambia. 2007.
- Omondi P. et al.: Total aerial count of elephants and other wildlife species in National Parks and adjacent hunting blocks in northern Cameroon. WWF-FFEM-Minfof, 2008.
- Owen-Smith N. et al.: A scientific perspective on the management of elephants in the Kruger National Park and elsewhere. South African Journal of science. 2006.
- Patterson C. & Patson Khosa: A status quo study on the professional and recreational hunting industry in South Africa. Traffic East/southern Africa. 2005.
- PNGT: Occupation des terroirs au Burkina Faso. 2002.
- Renaud P.C. et al.: Inventaire aérien et terrestre de la faune et relevé des pressions au Parc national du Niokolo Koba. MEPN, 2006.
- Renaud P.C. et al.: Recensement aérien de la Faune de la région nord de la RCA. MEFCPT, 2005
- République de Guinée: Code de la Chasse. 1999.
- République Islamique de Mauritanie: Code de la chasse et de la protection de la nature. 1997.
- République du Sénégal: Arrêté fixant les modalités d'exercice de la chasse au titre de la saison cynégétique 2004-2005. 2004.
- République du Sénégal: code de la chasse et de la protection de la faune. 1986.
- Roulet P.A. et al.: Le tourisme cynégétique en RCA. Ambassade de France en RCA, 2008.
- SANPARKS: Coordinated policy framework governing management plans. Pretoria, 2006
- SCI: The benefits of hunting. 2008.
- UICN Paco: Evaluation du réseau des aires protégées du Burkina Faso (Rappam). 2009.
- UICN Paco: Evaluation du réseau des aires protégées du Mali (Rappam). 2007.
- UIUCN Paco: Evaluation du réseau des aires protégées de Guinée (Rappam). 2007.
- UICN Paco: Evaluation du réseau des aires protégées du Togo (Rappam). 2008.
- UICN Paco: Evaluation du réseau des aires protégées de Guinée Bissau(Rappam). 2007.
- UICN Paco: Evaluation du réseau des aires protégées de Mauritanie (Rappam). 2007.
- UNESCO: Fiche Selous 2008.
- Wildlife Division (Ghana): A briefing document on collaborative resource management in Ghana. Forestry Commission, 2004.
- Wildlife Trust of India: Right of passage: Elephant corridors of India, 2005.
- ZAWA: Rapport annuel 2007.

PROGRAMME AFRIQUE CENTRALE
ET OCCIDENTALE
01 BP 1618 Ouagadougou 01
Tél: (+226) 50 36 49 79
Site Web: www.papaco.org
E-mail: paco@iucn.org
Burkina Faso

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

FFEM
Fonds Français pour l'Environnement Mondial