



Convention on Biological Diversity

Distr.
GENERAL

UNEP/CBD/SBSTTA/20/INF/46
17 April 2016

ENGLISH ONLY

SUBSIDIARY BODY ON SCIENTIFIC,
TECHNICAL AND TECHNOLOGICAL ADVICE

Twentieth meeting
Montreal, Canada, 25-30 April 2016
Item 9 of the provisional agenda*

SUSTAINABLE WILDLIFE MANAGEMENT: A REVIEW OF INFORMATION IN RESPONSE TO DECISION XII/18 PARAGRAPH 13

Note by the Executive Secretary

I. INTRODUCTION

1. In order to address different aspects of sustainable wildlife management, the Conference of the Parties in decision XII/18, encouraged Parties to develop or amend, as appropriate, their regulatory systems to differentiate among subsistence uses, illegal hunting, and domestic and international trade of specimens of wild species and products. Parties were also encouraged to assess, minimize and mitigate the impacts of illegal hunting on the subsistence hunting and livelihoods of indigenous peoples and local communities. In addition, Parties and other Governments were called, accordingly, to strengthen the capacity of indigenous peoples and local communities to exercise their rights and responsibilities in relation to the sustainable management of wildlife and to review, and, as appropriate, reform, incentives that might encourage unsustainable consumption of bushmeat.

2. Further to that decision, in paragraphs 13 (a) and (b), Parties requested the Executive Secretary, working with the Collaborative Partnership on Sustainable Wildlife Management, to prepare technical guidance on the role of sustainable wildlife management for the implementation of the Strategic Plan for Biodiversity 2011-2020, and an analysis of the impacts of subsistence use of wildlife on the survival and regeneration of wild species, in the context of growing human populations and pressures on wildlife resources.

3. This report presents in sections II and III the problematique and an overview of the role of subsistence hunting in human societies. Impacts of subsistence hunting and other causes of the problem are further addressed in sections IV and V, respectively. An analysis based on the theory of common pool resources is presented in section VI, with possible solutions captured in section VII, and conclusions in section VIII. Information was drawn from a review of scientific literature, Parties' national reports and national biodiversity strategies and action plans (NBSAPs), as well as from the responses to notification 2015-048, presented in information document (UNEP/CBD/SBSTTA/20/INF/47).

* UNEP/CBD/SBSTTA/20/1/Rev.1.

II. SCOPE

A. Definitions

4. Bushmeat¹ harvesting is defined as the harvesting of wild animals in tropical and sub-tropical forests for food and non-food purposes, including medicinal uses. The intended focus is on non-domesticated terrestrial mammals, birds, reptiles and amphibians harvested for food or other purposes. While invertebrates can be locally important dietary items, it is the larger vertebrates that constitute the majority of the terrestrial wild animal biomass consumed by humans. Thus insects, crustaceans, grubs, fish and molluscs are excluded from the bushmeat definition used.

5. Hunting is defined as the extraction of any wildlife, from the wild, by whatever means and for whatever purpose. Wildlife is hunted for food, body parts (furs, skins, bones, antlers, etc.), medicines and other traditional uses; for trophies²; or for the collection of live animals (as pets; for rearing, ranching or breeding; for sheering, dehorning).

B. Problematique

6. Unsustainable hunting of bushmeat in tropical forests and other terrestrial ecosystems for subsistence purposes is largely the result of an unmanaged common resource being unsustainably harvested due to weak governance, inadequate policy frameworks, and limited data and knowledge. In the absence of other livelihood choices, wildlife hunting is a readily available source of income.

7. Since the underlying causes of the bushmeat crisis are complex, they require a comprehensive understanding of various interconnected factors, including the role of bushmeat species for income, nutrition, and in cultural practices.

8. In many cases, bushmeat hunting is part of the customary sustainable use of biodiversity to fulfill nutritional needs, although it is also done for economic gain with meat sold in markets, legally or not. The relative amounts of bushmeat consumed by families versus sold varies considerably from 0 to 90% by country and depends on alternative sources of income and food³. In the case of Colombia, most studies have highlighted the importance of wildlife harvest in diverse regions of the country⁴, but only very recent research has been able to quantify the trade. Quiceno et al. (2014) suggest that 43% of the catch from hunters in Puerto Nariño (Amazon region in the border with Peru) is used for commercial purposes. The most representative taxa traded are mammals (60%), birds (26%) and reptiles (14%)⁵.

9. Population declines of hunted species have critical consequences for vital ecological processes that support biodiversity. Leaving the situation unmanaged will trigger irreversible changes in ecosystems, with resultant direct and indirect pressures on human societies. Defaunation or empty forests are often cited as the most evident impact of over-hunting, while prey depletion is suggested to increase human-wildlife conflicts and more subtle ecosystem changes may, over the long-term, also become obvious. These changes eventually can greatly alter ecosystem functions, including the provision of ecosystem goods and services.

¹Wildlife hunted in tropical forests for food is often referred to as “bushmeat”, “wildmeat”, and/or “game meat”.

²The CITES definition of “hunting trophy” in Resolution Conf. 12.3 (Rev. CoP16), Section I: A whole animal, or a readily recognizable part or derivative of an animal, specified on any accompanying CITES permit or certificate, that:

1) is raw, processed or manufactured; 2) was legally obtained by the hunter through hunting for the hunter’s personal use; and 3) is being imported, exported or re-exported by or on behalf of the hunter, as part of the transfer from its country of origin, ultimately to the hunter’s State of usual residence.”

³Nasi, R., Taber, A., and Van Vliet, N. 2011. Empty forests, empty stomachs? Bushmeat and livelihoods in the Congo and Amazon Basins. *Inter. Forestry Rev.* 13: 355-368.

⁴Vargas-Tovar, N. 2012. Carne de Monte y seguridad Alimentaria: Consumo, valor nutricional, relaciones sociales y bienestar humano en Colombia. In: RESTREPO, S. (ed.) Carne de monte y seguridad alimentaria: Bases técnicas para una gestión integral en Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. 108 pp.

⁵Van Vliet, N., Gomez, J., Quiceno-Mesa, M.P., Escobar, J.F., Andrade, G., Vangas, L.A., and Nasi, R. (2015). Sustainable wildlife management and legal commercial use of bushmeat in Colombia: the resource remains at the cross-road. *International Forestry Review* Vol.17(4).

10. Despite hunting pressures over many years, there are a few bushmeat species that continue to maintain resilient and healthy populations in natural and modified habitats. Thus, high harvesting pressure should not always be equated with local extinction, and can sometimes be sustainable, depending on the species and local conditions. These relatively few positive examples should not be viewed in isolation, however, as the vast majority of bushmeat species are declining.

III. ROLE OF SUBSISTENCE HUNTING IN HUMAN SOCIETIES

Income, nutrition, culture and health

11. In many tropical countries, bushmeat is used to satisfy basic subsistence requirements, but very often bushmeat is hunted for sale. For subsistence hunters, the distinction between subsistence and commercial use is not clear, with meat from the forest supplementing both diets and incomes. A study of the drivers of bushmeat consumption in the Tarangire-Manyara ecosystem of Northern Tanzania found that consumption is mainly driven by it being readily available and of low cost⁶. The amount of bushmeat consumed by families compared to what is sold varies considerably by country and depends on alternative sources of income and food⁷.

12. In Central Africa, rural consumption of bushmeat ranges from 14.6 to 97.6 kg/capita/year and hunting provides between 30-80% of the overall protein intake of rural households and nearly 100% of animal proteins. Bushmeat consumption figures range from 20% of the animal protein among rural people living in Nigeria's rainforest areas, to 75% in rural Ghana, and to as much as 80-90% in Liberia.

13. In South America, total rural consumption of bushmeat is believed to equal about 150,000 tons/year in the Amazon, which is equivalent to a consumption of about 63-88 kg/capita/year. Indigenous peoples, who represent 5% of the Amazonian population and total approximately one million people, maintain traditional lifestyles and rely on hunting and consumption of bushmeat as an important part of their livelihood strategy⁸. Overall, more than 5 million tons of meat feed millions in Neotropical (0.15 million tons) forests and Afrotropical (4.9 million tons) forests annually^{9,10}.

14. In many cases, hunting plays a role in alleviating rural poverty, acting as a social safety net, or complementing farming activities. Hunting to meet livelihood needs can be legal or illegal, but it is mostly seen as a legitimate activity by the societies where it is practiced. In Colombia, over 140 species of wild fauna are used by indigenous communities for food¹¹. Recent research quantifying the use of wildlife in Colombia revealed that 43% of the catch from hunters in Puerto Nariño is used for commercial purposes. Mammals are mostly traded (60% of reports), followed by birds (26%) and reptiles (14%). The main reason people hunted wildlife was for subsistence, either for food or money to buy other food related products¹². Around 31% to 53% of bushmeat is sold by indigenous communities. Social norms

⁶ Kiffner, C., Peters, L., Stroming, A., and Kioko, J. (2015). Bushmeat Consumption in the Tarangire-Manyara Ecosystem, Tanzania. *Tropical Conservation Science*, 8(2).

⁷ Nasi, R., Taber, A., and Van Vliet, N. (2011). Empty forests, empty stomachs? Bushmeat and livelihoods in the Congo and Amazon Basins. *Inter. Forestry Rev.* 13: 355-368.

⁸ CPW Bushmeat e-sourcebook: <http://www.fao.org/forestry/wildlife-partnership/bushmeat-sourcebook/en/>

⁹ Fa J.E. and Peres, C.A. (2001). Game vertebrate extraction in African and neotropical forests: an intercontinental comparison. In: Reynolds, J.D., Mace, G.M., Redfort, K.H. and Robinson, J.G. (eds.) *Conservation of exploited species*. Cambridge University Press, Cambridge. 203-241 p.

¹⁰ Fa, J.E., Peres, C.A. and Meeuwig, J. (2002). Bushmeat exploitation in tropical forests: an international comparison. *Conservation Biology* 16(1): 232-237.

¹¹ Nasi, R., Taber, A., & Vliet, N. V. (2011). Empty forests, empty stomachs? Bushmeat and livelihoods in the Congo and Amazon Basins. *International Forestry Review*, 13(3), 355-368.

¹² Van Vliet, N., Gomez, J., Quiceno-Mesa, M. P., Escobar, J. F., Andrade, G. I., Vanegas, L., & Nasi, R. (2015). Sustainable wildlife management and legal commercial use of bushmeat in Colombia: the resource remains at the cross-road. *International Forestry Review*, 17(4).

such as taboos have also been found to have a greater influence on the number of wild species a person would eat, rather than the illegality of hunting¹³.

15. Bushmeat hunting operates from providing meat for local consumption and trade, up to providing meat for urban and international markets^{14,15}. Hence, issues of the bushmeat crisis, aside from declining wildlife populations, are related to food security for the people who rely on these species for daily nutrition and productive livelihood alternatives.

16. Poor households, especially, could suffer nutritional deficiencies if wildlife was removed from their diet because of their daily reliance on it. For example, in Madagascar if access to bushmeat was removed, the members of the village's poorest households would be three times as likely to develop anaemia compared to the middle- and high-income households¹⁶. Additionally, less than 5% of bushmeat is sold with the remaining used entirely for subsistence purposes¹⁷. The study also showed that 95% of respondents have eaten at least one protected species (and nearly 45% have eaten more than ten). While it was once considered taboo to eat some species this is now changing.

17. Social functions of hunting relate predominantly to the development and maintenance of social capital and respect, prestige and status. In some cultures, women exhibit a preference for hunters, further emphasizing the social capital associated with the practice. Hunting is sometimes a culturally important activity and has important bonding functions by providing opportunities for camaraderie through what is sometimes both a physically demanding and dangerous pursuit.

18. Hunting for ceremonies, festivities or zotherapy (*the treatment of certain diseases with wild animal products*) is another category of hunting with specific characteristics. For example, the Canelos Kichwa indigenous people of the Ecuadorian Amazon hunt for ceremonial purposes as part of their hista festival¹⁸. In Gabon, bushmeat is also associated with rituals and ceremonies. In Central Africa, some species are considered to have magical or medicinal properties that increase their value, while others are taboo. Similarly, in the Amazon Basin, certain bushmeat species have significant importance within native culture and may even be worshipped as deities in traditional belief systems. There are also prohibitions or taboos for hunting certain species, for instance the brocket deer by the Ayoreo People of Bolivia and Paraguay¹⁹.

19. Wildlife body-parts are often used for traditional medicines and cultural practices, and the sale of these items can increase considerably the profitability of bushmeat hunting. Demand for various wildlife body parts remains significant in certain Asian countries.

20. Bushmeat use is linked to human health in different ways. While bushmeat plays an important role through its use in zotherapy, it could also increase the transmission of various pathogens and the emergence of new infectious diseases from wild animals. It is estimated that approximately 60% of all human pathogens are zoonotic, with some 75% emerging from wildlife. Over one billion cases of human zoonotic disease are estimated to occur annually. For example, the United States has examined how bushmeat from primate and rodent species (including baboons, chimpanzee, mangabeys, guenons, green

¹³ Morsello, C., Yagüe, B., Beltreschi, L., van Vliet, N., Adams, C., Schor, T., ... & Cruz, D. (2015). Cultural attitudes are stronger predictors of bushmeat consumption and preference than economic factors among urban Amazonians from Brazil and Colombia. *Ecology and Society*, 20(4), 21.

¹⁴ Brashares, J., Goldena, C., Weinbauma, K., Barrettc, C., Okello, G., (2011). Economic and geographic drivers of wildlife consumption in rural Africa. *Proc. Natl. Acad. Sci.* 108: 13931–13936.

¹⁵ Barnett, R., (2000). Food for Thought: The Utilisation of Wild Meat in Eastern and Southern Africa. TRAFFIC East/Southern Africa, Nairobi.

¹⁶ Nasi, R., & Fa, J. E. (2015) The role of bushmeat in food security and nutrition. Paper presented at the XIV World Forestry Congress, Durban, South Africa, 7-11.

¹⁷ Howard, B. C. (2011). Bushmeat from Endangered Animals Feeds Hungry: Study. Retrieved from <http://voices.nationalgeographic.com/2011/11/21/bushmeat-feeding-children-madagascar/>

¹⁸ CPW Bushmeat e-sourcebook: <http://www.fao.org/forestry/wildlife-partnership/bushmeat-sourcebook/en/>

¹⁹ CPW Bushmeat e-sourcebook: <http://www.fao.org/forestry/wildlife-partnership/bushmeat-sourcebook/en/>

monkey, cane rat, and rat) smuggled into the country served as reservoirs for retroviruses (simian foamy virus) and/or herpes viruses. Zoonoses from African apes to humans, and vice versa, are also known to be common because of the physiological similarities between the groups and could lead to outbreaks of human diseases (such as Ebola or HIV)^{20, 21, 22}.

21. The risk of contracting a disease depends on several factors but may occur even in mosaic landscapes of farms and fragmented forests where human–wildlife interaction is generally indirect or incidental. Researchers have increasingly worked to assess the origins and worldwide trends in emerging infectious diseases. The bushmeat trade can act as a conduit for pathogen spread and increase exposure and risk of transmission of different zoonoses²³.

IV. IMPACTS OF SUBSISTENCE HUNTING

A. Direct impact on exploited species

22. The lack of good data precludes a firm understanding of the relative impacts of subsistence hunting and market-based bushmeat hunting, but most data suggest that commercial hunting far outweighs subsistence hunting for impacts on bushmeat species. Disentangling the effects of subsistence from market hunting is difficult because both commercial and subsistence hunting occur together and represent a continuum from local consumption to trade. Hunters will provide meat locally to communities, but also sell bushmeat commercially, although the bulk of bushmeat is sold in markets. Many local subsistence hunts persist, but data on effects are scarce. For example, conservative estimates of game yields in the Brazilian Amazon Basin alone have demonstrated that as many as 23.5 million game vertebrates, equivalent to 89,224 tons of bushmeat with a market value of US\$190.7 million, have been consumed each year by the rural population of the State of Amazonia. This has suggested an enormous effect of subsistence hunters on tropical forest wildlife communities, as subsistence game hunting can adversely impact species diversity and the size and structure of vertebrate assemblages.²⁴ This highlights the importance of implementing monitoring and game management programs²⁵.

23. How animal populations respond to harvesting can vary greatly depending on their social structure, reproductive strategies, dispersal patterns and the quality and intactness of habitats. For example, species with low intrinsic reproduction rates are more vulnerable to over-harvesting than those with high rates, as are species with particular mating, nesting, predictable predator avoidance strategies or social behavior that allows for their easy location (e.g., group-living species that travel in herds, live in open habitats, and species that breed communally, especially in open areas). In Equatorial Guinea, the black colobus (*Colobus satanas*) was found to be very vulnerable to over-hunting because of its relative inactivity and large body size. Similar patterns have been recorded in the Amazon with declining white-lipped peccary (*Tayassu pecari*) populations being accompanied by increasing density and larger group sizes for collared peccaries (*Pecari tajacu*). Moreover, extirpations of tapirs and white-lipped peccaries at heavily hunted sites in the Brazilian Atlantic forests have shown that in forest remnants encroached by people, hunting exacerbates the effects of fragmentation. Thus loss of habitat and fragmentation in

²⁰ Karesh, W.B., Cook, R.A., Bennett, E.L., Newcomb, J. (2005). Wildlife trade and global disease emergence. *Emerging Infectious Diseases*, 11(7), 1000-2. PMC3371803.

²¹ Kilonzo C., Stopa T. J. and Chomel B. (2013). Illegal animal (bush) meat trade associated risk of spread of viral infections, in Singh S. K. (ed.) *Viral Infections and Global Change*. John Wiley & Sons, Inc, Hoboken, NJ. doi: 10.1002/9781118297469.ch10

²² Leroy M., Rouquet P., Formenty P., Souquière S., Kilbourne A., Froment J.M., Bermejo M, Smit S., Karesh W., Swanepoel R., Zaki S.R., Rollin P.E. (2004). Multiple Ebola Virus Transmission Events and Rapid Decline of Central African Wildlife. *Science*, vol. 303 (5656), 387-390, DOI: 10.1126/science.1092528

²³ CPW Bushmeat e-sourcebook: <http://www.fao.org/forestry/wildlife-partnership/bushmeat-sourcebook/en/>

²⁴ Peres, C. A. (2001). Synergistic effects of subsistence hunting and habitat fragmentation on Amazonian forest vertebrates. *Conservation Biology*, 15(6), 1490-1505.

²⁵ Peres, CA. (2000). Effects of Subsistence Hunting on Vertebrate Community Structure in Amazonian Forests. *Conservation Biology*, 14: 240–253.

combination with hunting are likely leading factors in emptying forests of large species over the short-term²⁶.

24. The demand for bushmeat in West and Central Africa could be as much as four times greater than that in the Amazon Basin²⁷. Around 178 species, the majority of which are mammals, are hunted and used in the wild meat industry in Central Africa. Over half of these species are threatened by subsistence hunting²⁸.

25. In the Congo basin up to five million metric tons of bushmeat is traded annually²⁹. In West and Central Africa the commercial trade is causing the decline of vultures and other large raptors³⁰. There have also been major population declines of Gorillas due to the commercialisation of hunting along with fragmentation of their habitat from agriculture expansion, mining and deforestation.

26. A reduction in prey species from over harvesting can also have a negative impact on the predator species that depend on them. For example, there has been a decline in Leopards, an apex predator, in Central African Forests, due to a reduction in their prey from over hunting, rather than them being targeted directly. In Central Africa, forest elephants can represent between 33 and 89 percent of the animal biomass of intact Central African forests, and diurnal primates up to 30 percent. Hunting of these species will have cascading effects on the ecosystem³¹.

27. The commercial bushmeat trade, for instance, is threatening wildlife in Cameroon and is carried out in violation of prohibitions exemplified by the 2012 massacre of more than two hundred pachyderms in Bouba Ndjida. The illegal commercial trade is causing declines of critically endangered gorillas, chimpanzees, forest elephants, and other species. The wildlife law in Cameroon prohibits the sale and trafficking of endangered species, however the size of the area and the number of people involved in the illegal trade make law enforcement virtually impossible³².

28. Impacts of bushmeat hunting in African savannahs found that wildlife populations in Central and West African savannas are collapsing. In Zambia, wildlife populations have been depleted in 70% of game management areas (166,000 km²), largely through excessive bushmeat hunting.

29. Bushmeat hunting appears to be a more severe threat than habitat loss, but the two issues often act synergistically, with severe ecological effects³³. Declining populations are reflected by reduced occurrences of these species in bushmeat markets³⁴. Impacts of bushmeat hunting are exacerbated by the use of fire by hunters, which force wildlife from protected areas in search of food. Again, the lack of good data precludes an overall assessment of the extent of declines, but it is suspected that case studies available represent a much more serious global issue.

²⁶ CPW Bushmeat e-sourcebook: <http://www.fao.org/forestry/wildlife-partnership/bushmeat-sourcebook/en/>

²⁷ Wolfe, N. D., Daszak, P., Kilpatrick, A. M., & Burke, D. S. (2005). Bushmeat hunting, deforestation, and prediction of zoonotic disease. *Emerging Infectious Disease*, 11(12), 1822-1827.

²⁸ Abernethy, K. A., Coad, L., Taylor, G., Lee, M. E., & Maisels, F. (2013). Extent and ecological consequences of hunting in Central African rainforests in the twenty-first century. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, 368(1625), 20120303.

²⁹ Nellemann, C., I. Redmond, J. Refisch (eds). 2010. *The Last Stand of the Gorilla – Environmental Crime and Conflict in the Congo Basin. A Rapid Response Assessment*. United Nations Environment Programme, GRID-Arendal.

³⁰ Buij, R., Nikolaus, G., Whytock, R., Ingram, D. J., & Ogada, D. (2015). Trade of threatened vultures and other raptors for fetish and bushmeat in West and Central Africa. *Oryx*, 1-11.

³¹ Abernethy, K. A., Coad, L., Taylor, G., Lee, M. E., & Maisels, F. (2013). Extent and ecological consequences of hunting in Central African rainforests in the twenty-first century. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, 368(1625), 20120303.

³² Cameroon NBSAP, pg 59 and 60.

³³ Wilkie, D.S., Bennett, E.L., Peres, C.A., Cunningham, A.A. 2011. The empty forest revisited. *Ann.N.Y.Acad.Sci.* 1223: 120–128.

³⁴ CPW Bushmeat e-sourcebook: <http://www.fao.org/forestry/wildlife-partnership/bushmeat-sourcebook/en/>

B. Consequences for the ecosystem

30. Just as overfishing causes imbalances in the whole marine system, terrestrial ecosystems depend on a sustainable use of wildlife species and their habitats. Preventing further loss of wild species and promoting recovery of those species most in decline by effective spatial zoning and wildlife management is therefore critical for the ecosystem and for human well-being.

31. For example, while close to 80–96% of all woody plant species in tropical forests produce vertebrate-dispersed fleshy fruits, the reality is that many large-bodied frugivore populations in tropical forest regions have already been severely overhunted³⁵, probably resulting in functionally empty forests with subsequent disruptions in seed dispersal mutualisms³⁶. Altered phytodemographics (*recruitment bottlenecks resulting from replacement of seedlings from species dispersed by large frugivores with those dispersed by wind, small birds, and bats*) established in many parts of the humid tropics, could be impacting the ecosystem even further.

32. Large-bodied frugivores that disperse viable seeds provide a critical ecosystem service, by maintaining large-seeded, heavy wooded tree populations. The hunting of bats for consumption as bushmeat and medicine is a serious problem in Africa, Asia, the islands of Oceania and lesser so in Central and South America. It has impacted at least 167 species of bats (or c. 13 % of the world's bat species). The large-bodied fruit bats of the Old World tropics, where half (50 %, 92/183) the extant species in the family Pteropodidae are most commonly hunted and are six times more likely to be Red Listed as threatened³⁷. The loss of these species may pose consequences for tree species' diversity, including long-term aboveground forest biomass and carbon storage in tropical forests worldwide. In the Malaysian tropical forest communities of Sarawak, overhunting has caused persistent changes in tree population spatial structure and dynamics, leading to a consistent decline in local tree diversity³⁸.

33. For example, the Micronesian Imperial-Pigeon (*Ducula oceanica* in Palau), is threatened by poaching and loss of habitat throughout its range in Micronesia. It is a keystone species that disperses fruit, seeds and other propagules of forest trees. A reduction in Imperial-Pigeons has been known to cause forest tree diversity to gradually decrease in other Pacific localities³⁹. Traditional methods that would limit the harvest rate are not used anymore. In addition, people are increasingly collecting or harvesting resources for monetary income rather than solely for local subsistence uses⁴⁰.

34. Defaunation can also cause cascading negative effects on other species and on ecosystem functions. Elephants, tapirs and peccaries, for example, play a major role in modifying vegetation structure, composition and dynamic through their feeding habits and movements in the forest. Population declines of such species could result in altered ecosystem dynamics, triggering indirect and long-term impacts on the ecosystem as a whole⁴¹. In addition, the loss of top predators can also result in trophic

³⁵ Peres, C.A, and Palacios E. (2007) Basin-wide effects of game harvest on vertebrate population densities in Amazonian forests: Implications for animal-mediated seed dispersal. *Biotropica* 39(3):304–315.

³⁶ Redford, K .H. (1992) The empty forest. *Bioscience* 42(6):412–422.

³⁷ Mildenstein, T., Tanshi, I., and Racey, P. A. (2016). Exploitation of bats for bushmeat and medicine. In *Bats in the Anthropocene: Conservation of Bats in a Changing World* (pp. 325-375). Springer International Publishing.

³⁸ Harrison, R.D. et al. 2013. Consequences of defaunation for a tropical tree community. *Ecology Letters* doi: 10.1111/ele.12102.

³⁹ Palau 5th NR (2014), pg 24

⁴⁰ Palau 5th NR (2014), pg 12

⁴¹ Campos-Arceiz, A. and Blake, S. (2011). Megagardeners of the forest – the role of elephants in seed dispersal. *Acta Oecologica* 37:542-553.

Keuroghlian, A. and Eaton, D. (2009). Removal of palm fruits and ecosystem engineering in palm stands by white-lipped peccaries (*Tayassu pecari*) and other frugivores in an isolated Atlantic Forest fragments. *Biodiversity and Conservation* 18: 1733–1750.

cascades, even causing ecosystems to change states (regimes) or lose productive capacity to the point of collapse⁴².

35. Unsustainable bushmeat hunting can disrupt several other ecosystem processes bearing consequences for ecosystem functions and forest development. Studies have suggested that the total forest area degraded by unsustainable hunting in the largest remaining tropical forest regions may exceed the combined extent of deforestation, selective logging, and wildfires^{43,44}. Official forest reserves in remote areas have also succumbed to population declines and local extinctions of large vertebrates^{45,46}. At any rate, the effects of extensive defaunation processes to the persistence of tropical forest ecosystem services require greater examination.

C. Consequences for socioeconomic dimensions

36. Declines in world prices for some agricultural crops and increased costs of living have also driven many farmers to seek alternative sources of income. The reality in many countries is that hunting is accessible and profitable.

37. Unregulated and over-exploitation of wild species not only damages ecosystems, but also undermines good governance and the rule of law, threatens security, and reduces revenue from economic wildlife-based land uses, including wildlife based tourism and sustainable utilization common in some tropical regions⁴⁷. In South Africa, for example, legal hunting is estimated to support 70 000 jobs and generates R1 billion a year from trophy hunting fees, taxidermy, accommodation and bushmeat⁴⁸.

38. Impacts on food security through the loss of a potentially sustainable source of meat protein and the loss of wildlife heritage from over-exploitation can also lead to other challenges, including social conflicts⁴⁹.

V. THE PROBLEM OF DECLINING BUSHMEAT SPECIES: OTHER CAUSES

A. Reduction of the resource due to increased deforestation and other pressures

39. Bushmeat hunting is but one of many causes for species' declines. Other increased anthropogenic impacts include deforestation, infrastructure expansion, climate change, pollution, and effects of invasive species. A lack of livelihood and productive alternatives, and a national and international market for bushmeat and animal parts are further causes of the over-harvesting of bushmeat species. Hence, wildlife managers must consider which factors are most important to manage for specific species and which factors require coordination with other parts of government, the productive sectors, local stakeholders, as well as inter-governmentally on a bilateral and multilateral basis.

40. In tropical forest fragments, declines of species richness and abundance can be attributed to a combination of biological and anthropogenic processes. Biological processes cause extirpation of small

⁴² Schmitz, O.J., P.A. Hambäck, and A.P. Beckerman. (2000). "Trophic Cascades in Terrestrial Systems: A Review of the Effects of Carnivore Removals on Plants". *The American Naturalist* 155: 141–53.

⁴³ Peres, C.A., Barlow, J., Laurance, W.F. (2006) Detecting anthropogenic disturbance in tropical forests. *Trends Ecol Evol* 21(5):227–229. Milner-Gulland EJ, Bennett EL (2003) Wild meat: The bigger picture. *Trends Ecol Evol* 18(7):351–357.

⁴⁴ Milner-Gulland, E.J., Bennett, E.L., (2003). Wild meat: The bigger picture. *Trends Ecol Evol* 18(7):351–357.

⁴⁵ Peres, C.A., Lake, I.R. (2003). Extent of nontimber resource extraction in tropical forests: Accessibility to game vertebrates by hunters in the Amazon basin. *Conserv Biol* 17(2): 521–535. 10.

⁴⁶ Harrison, R.D. (2011). Emptying the forest: Hunting and the extirpation of wildlife from tropical nature reserves. *Bioscience* 61(11):919–924.

⁴⁷ P.A Lindsey et al. (2013). *Biological Conservation*. 160 80-96

⁴⁸ South Africa NBSAP (2006), pg 19 and 20.

⁴⁹ P.A Lindsey et al. (2013). *Biological Conservation*. 160 80-96

populations through loss of genetic variation, demographic instabilities, and impacts of local catastrophes⁵⁰.

41. However, it is anthropogenic activities, like deforestation and over-harvesting that trigger most of the impacts. Over-harvesting of wild species may also contribute to increased emissions from forest degradation and indirectly impact ecosystem goods and services. However, the role of species interactions in stabilizing tropical forest dynamics and maintaining the flow of ecosystem services, including long-term forest carbon pools, remains poorly understood⁵¹.

42. Introduction of invasive species by wildlife traders or buyers also influences declines in wildlife populations, as invasive species prey on or compete with native species and are a major threat to ecosystems. For example, the pet industry has expanded trade in Burmese pythons which upon escaping or being freed, have now become major pests in Florida's everglades while wild pigs (wild boar) have become a global problem.

43. Incidental killing of non-target species is another factor that threatens species survival. For example, equipment such as crude traps and snares set for musk deer or duikers cause injury and death to a variety of animals besides those intended.

B. Increased demand on the resource due to population growth, infrastructure and new hunting methods

44. Rise in human population density and food insecurity has led to increased pressure on the use of wildlife resources. For example, in Africa, population is expected to double by 2050, adding further pressures to the governance of natural resources, including bushmeat. South Africa and Tanzania, for instance, attributed the unsustainable use of wildlife to poverty⁵², population growth, urbanization, weak local governance and an increase in infrastructure, such as roads, railways, and other transport means⁵³. These pressures also contribute to increased immigration and settlements in new, formerly undisturbed areas. This may also lead to forest degradation, increased hunting pressures and greater transport of bushmeat to markets.

45. In Zambia, unplanned human settlement in game managed areas and encroachment in national reserves is one of the main threats to wildlife. Mining and farming expansion has also impacted wildlife species and their habitats. Most human settlements are located close to protected areas and due to the high unemployment rate there is a greater demand for bushmeat. Large mammals are mostly targeted because of the large amounts of wild meat protein they provide for commercial purposes. Of the various methods used in poaching, snaring of wild animals still remains common in buffer zones around national parks⁵⁴. In Nigeria and Cameroon the proportion of bushmeat species sold in markets was greater as road density and human settlements increased⁵⁵.

46. During times of civil unrest in the Democratic Republic of Congo, the sale of protected species in urban markets increased fivefold. After military officers fled, species became open access. However, rural markets remained stable because of the continued authority of the village chiefs. Knowledge of the

⁵⁰ Broadbent, E.N, Asner, G.P, Keller, M., Knapp, D., Oliveira, P., and Silva, J. Forest fragmentation and edge effects from deforestation and selective logging in the Brazilian Amazon. (2008). *Biological Conservation* 141 (2008) 1745–1757

⁵¹ www.pnas.org/cgi/doi/10.1073/pnas.1516525113

⁵² South Africa, NBSAP (2014), pg 21.

⁵³ Tanzania 5th NR (2014), pg 20

⁵⁴ Zambia 5th NR (2015), pg 24.

⁵⁵ Fa, J. E., Olivero, J., Farfán, M. Á., Márquez, A. L., Duarte, J., Nackoney, J., and Macdonald, D. W. (2015). Correlates of bushmeat in markets and depletion of wildlife. *Conservation Biology*, 29(3), 805-815.

bushmeat commodity chain is therefore useful in controlling harvest rates. In addition, working with traditional villagers is important for bushmeat management⁵⁶.

47. In Cameroon poaching activities are increasing together with logging development. The demand for bushmeat is rising due to growing human populations in cities, forest logging concessions and mining camps. Bushmeat also can be sold for a higher price as new urban markets are established, stimulating increased trade. There is a lack of awareness of the scale of the trade and the consequences of such unsustainable wildlife exploitation⁵⁷.

48. In some countries bushmeat is regarded as a luxury and a status symbol, and thus is widely consumed by people of all educational levels, including high-income and high-status individuals. In these cases, bushmeat is used as a way of communicating prestige and obtaining social leverage, resulting in the high demand for rare species. Lemurs, for example, have been killed and sold as a delicacy to luxury consumers, reducing already endangered populations, found only in Madagascar, even further⁵⁸. This demand for bushmeat and other products will increase over time as a consequence of population and income growth in many emerging economies. This will result in greater pressures on scarce natural resources fueling lucrative illegal wildlife markets, potentially undermining rural livelihoods and food security.

49. The evolution from small caliber firearms to highly powerful weapons, which in some instances have become easily available, decreases the probability that unregulated hunting will be sustainable due to an increase in hunting area, more frequent opportunities and a rise in fatal injury rates. The low cost and wide availability of certain hunting technology also reduces obstacles for engaging in hunting activities. For example, the low cost and high availability of steel wire snares, the most common technique for capturing bushmeat species, increases rates of indiscriminate harvest. More than a decade of research of bushmeat hunting in Equatorial Guinea saw the main method of capture moved away from trapping to shotguns. As a result the quantity of species and types of taxa captured with shotguns increased significantly, particularly for the endangered monkey fauna⁵⁹.

50. Further, commercial forest development opens roads and increases access to bushmeat species. Loss of habitat along with increased hunting, shifting cultivation and other factors, have triggered massive declines in bushmeat and other species ranging from extinctions of some species like the Quagga, Western Black rhino, and Bluebuck, to endangering hundreds of others including the African forest elephant, Asian elephant, Sumatran rhino, and Addax, to name a few.

VI. ANALYSIS

51. Declining numbers of bushmeat species is an issue in all tropical forest areas, with a suite of often inter-dependent causes that are exacerbated by a lack of knowledge about the hunted species themselves, in terms of both basic ecology and vital rates on which a management program could be based. The problem is further enhanced by strong commercial interests in some species, making the selling of illegal game common and easy to accomplish. Often, top-down regulation imposed and enforced on local communities in the absence of collaborative management approaches, results in local resentment and continued illegal harvesting. Enhanced community involvement, awareness-raising programmes, and improved communications are often required to enable the possibility for sustainable wildlife management. Also needed are increased resources for enforcement and monitoring of species populations

⁵⁶ De Merode, E., & Cowlishaw, G. (2006). Species protection, the changing informal economy, and the politics of access to the bushmeat trade in the Democratic Republic of Congo. *Conservation Biology*, 20(4), 1262-1271.

⁵⁷ Cameroon NBSAP, pg 59 & 60.

⁵⁸ Barrett, M.A., and Ratsimbazafy, J. (2003). *Nature* 461: 470.

⁵⁹ Cronin, D. T., Woloszynek, S., Morra, W. A., Honarvar, S., Linder, J. M., Gonder, M. K., ... & Hearn, G. W. (2015). Long-term urban market dynamics reveal increased bushmeat carcass volume despite economic growth and proactive environmental legislation on Bioko Island, Equatorial Guinea. *PloS one*, 10(7), e0134464.

and harvests, with a better understanding of the role of species interactions in stabilizing tropical forest dynamics and maintaining the flow of ecosystem services.

52. Lack of awareness of the socioeconomic, cultural and nutritional context of subsistence hunting of bushmeat species⁶⁰ and inadequate policing can penalize individuals hunting for subsistence. The tendency to criminalize such activities could also undermine customary sustainable use practices. Despite initiatives towards sustainable use models, public environmental policies have frequently resulted in the criminalization of bushmeat hunting and trade. Instead of leading to a reduction of impacts on the environment, it has triggered concealed and illegal wildlife trade chains, which are not controlled by governmental authorities⁶¹.

53. However, a concern in legalising the trade is that this could encourage more people to hunt without the adequate regulation, declining wildlife populations even further. The lack of accountability and transparency in wildlife managed areas, and incomplete devolution of control over wildlife to indigenous people and local communities can also reduce the effectiveness of sustainable use practices. Under such situations, indigenous peoples and local communities control less and are excluded from the benefits of conservation.

54. Often when indigenous peoples and local communities do not play a role in wildlife management and where it generates no benefits, strong incentives for illegal use are likely to exist. Even the most focused and well-resourced enforcement efforts, which few countries can afford and/or have the political will to implement, will struggle to effectively control the bushmeat crisis or broader wildlife-related crimes in the face of strong incentives for complicity by local people⁶². For example, in an attempt to reduce bushmeat consumption on Bioko Island, Equatorial Guinea a ban was placed on primate hunting. Due to various reasons, the hunting ban was not enforced, resulting in an increase of bushmeat hunting compared to rates before the ban⁶³.

55. In Colombia it is legal to hunt bushmeat species for subsistence use, but the sale of game to cover basic needs or to buy other food items is not allowed. This is since the latter is considered commercial hunting and is not part of the provisions allowing for subsistence bushmeat hunting under Colombian law. As of 2000, legal commercial use of wildlife can be carried out with a legal permit, but obtaining the permit can be difficult for rural communities. The hunter must present an Environmental Impact Study (EIS) that includes a management plan and other rigorous scientific and technical documents. This has forced subsistence hunters to develop strategies to evade the law⁶⁴.

56. Given the role that bushmeat plays in Colombia to meet food security, family economy and cultural identity, several Colombian institutions, with support from the Center For International Forestry Research, came together to organize in October 2015 an international workshop entitled “Sustainable use and trade of bushmeat in Colombia: Operationalization of the legal Framework”. The workshop underscored that commercial hunting regulations need to legally distinguish between large-scale commercial hunting and the sale of surplus game by subsistence hunters in rural communities. These two types of commercial hunting differ in the scale of action, the governance systems in place and the way

⁶⁰ Grande Vega, M., Carpinetti, B., Duarte, J., & Fa, J. E. (2013). Contrasts in Livelihoods and Protein Intake between Commercial and Subsistence Bushmeat Hunters in Two Villages on Bioko Island, Equatorial Guinea. *Conservation biology*, 27(3), 576-58.

⁶¹ Nasi, R., Brown, D., Wilkie, D., Bennett, E., Tutin, C., Van Tol, G. and Christophersen, T. 2008. Conservation and use of wildlife-based resources: The bushmeat crisis. Technical Series No.33. Bogor, Indonesia: Secretariat of the Convention on Biological Diversity, Montreal, and Center for International Forestry Research (CIFOR).

⁶² Beyond enforcement: communities, governance, incentives and sustainable use in combating wildlife crimes, February 2015

⁶³ Cronin, D. T., Woloszynek, S., Morra, W. A., Honarvar, S., Linder, J. M., Gonder, M. K., ... & Hearn, G. W. (2015). Long-Term Urban Market Dynamics Reveal Increased Bushmeat Carcass Volume despite Economic Growth and Proactive Environmental Legislation on Bioko Island, Equatorial Guinea. *PloS one*, 10(7).

⁶⁴ Van Vliet, N., Gomez, J., Quiceno-Mesa, M. P., Escobar, J. F., Andrade, G. I., Vanegas, L., & Nasi, R. (2015). Sustainable wildlife management and legal commercial use of bushmeat in Colombia: the resource remains at the cross-road. *International Forestry Review*, 17(4).

that benefits are equitably distributed among different stakeholders. The workshop recommended that the Colombian regulatory framework should adopt flexible management processes for the local development of sustainable management rules, for instance, a list of tradeable species, quotas, open season, as well as monitoring and evaluation systems. Such an approach would allow for the identification of specificities of each socioecological context, rather than imposing a national-wide framework that could likely not be fitting, given the country's diverse biological and cultural characteristics⁶⁵.

57. A study on the bushmeat trade in Tanzania revealed that patrolling and fines had little influence on a hunter's decision to trade in bushmeat. The attribute that most affected the decision to hunt was earning a salary with an alternative occupation⁶⁶. Thus, enforcing strict laws that do not recognize the needs, cultural practices or that do not generate benefits to local people will have little effect at reducing illegal hunting.

58. In the absence of acknowledging indigenous peoples user rights, a transfer of rights away from the poor and vulnerable can occur, leading to the loss of traditional lifestyles. This usually means that traditional territories (e.g., those belonging to certain traditional groups) and hunting methods (e.g. hunting zone rotations) are abandoned, leading to a loss of the sense of ownership of land and wildlife. This could allow open access to the resource and concentration of hunting, thereby resulting in a loss of sustainability. Further, when property rights are insecure, local people do not take into account the cost of their actions on the future availability of the resources because they have no stake in wildlife beyond what they can take today.

59. Elinor Ostrom suggested principles for managing common pool resources which are applicable to the management of many bushmeat common resources⁶⁷. Among these principles, there should be:

1. Clearly defined boundaries. Individuals or households who have rights to withdraw resource units from the common pool must be clearly defined, as must the boundaries of the common pool resource itself.
2. Congruence between appropriation and provision rules and local conditions. Appropriation rules restricting time, place, technology, and/or quantity of resource units are related to local conditions and to provision rules requiring labour, material, and/or money.
3. Collective-choice arrangements. Most individuals affected by the operational rules can participate in modifying the operational rules.
4. Monitoring. People are appointed as monitors to actively audit common pool resource conditions and appropriator behavior, and are accountable to the appropriators or are the appropriators.
5. Graduated sanctions. Appropriators who violate operational rules are likely to be assessed with graduated sanctions (depending on the seriousness and context of the offence) by other appropriators, by officials accountable to these appropriators, or by both.
6. Conflict-resolution mechanisms. Appropriators and their officials have rapid access to low-cost local arenas to resolve conflicts among appropriators or between appropriators and officials.

⁶⁵ Van Vliet, N., Gomez, J., Quiceno-Mesa, M. P., Escobar, J. F., Andrade, G. I., Vanegas, L., & Nasi, R. (2015). Sustainable wildlife management and legal commercial use of bushmeat in Colombia: the resource remains at the cross-road. *International Forestry Review*, 17(4).

⁶⁶ Nielsen, M. R. (2015). Tanzania: Managing the bushmeat trade: is law enforcement the answer?. *Nwfp Update*, (5).

⁶⁷ Ostrom, E. (2008). The challenge of common-pool resources. *Environment: Science and Policy for Sustainable Development*, 50(4), 8-21.

7. Minimal recognition of rights to organize. The rights of appropriators to devise their own institutions are not challenged by external governmental authorities.

For common pool resources that are parts of larger systems:

8. Nested enterprises. Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises.

60. Common pool resources for which individuals or communities have use, non-use, or transfer rights are usually applied more responsibly given that such users no longer need to maximize benefits before another removes the resources. Therefore, sustainability is generally enhanced if Governments recognize and respect the right or stewardship authority, responsibility and accountability to the people who use and manage the resource. To reinforce local rights or stewardship of wildlife and responsibility for its conservation, the resource users should participate in taking decisions about the resource use and have the authority to carry out actions arising from those decisions.

VII. POSSIBLE SOLUTIONS

61. Depending on the country, the State, land owners, or communities may have ‘property rights’ to bushmeat species. Managing bushmeat species to alleviate and reverse species declines can be accomplished through a variety of mechanisms and policies, and most countries have various forms of regulations. However, bushmeat hunting is very often illegal under such regulations⁶⁸.

62. In many tropical and sub-tropical regions, bushmeat use is regulated through various mechanisms that act at different levels of governance, from the local to the international level. At the individual, group or community levels, traditions may regulate the use of bushmeat through taboos and beliefs. At the community level, customary rights still regulate hunting and bushmeat use. However, formal regulations at the national level often recognize customary rights and their use only to a certain degree, thus limiting the potential for traditional knowledge to play a role in stemming the population decline of many species or curbing illegal trade of wildlife.

63. In decision XII/12 B, the Conference of the Parties endorsed a Global Plan of Action on Customary Sustainable Use of Biological Diversity with the objective to promote, within the framework of the Convention, the implementation of Article 10(c)⁶⁹ at the local, national, regional and international levels and to ensure the full and effective participation of indigenous and local communities at all stages and levels of its implementation.

64. Following are some suggested approaches and examples to improving the management of bushmeat species.

A. Collaborative management and community based strategies

65. Wildlife is an integral part of the culture and traditions of indigenous peoples and local communities, and on the reverse, traditional knowledge plays an influential part in wildlife management. It is through the customary use of biological diversity that indigenous peoples and local communities constantly influence the ecological systems that surround them. Community-based management approaches to wildlife management therefore can encourage regulated uses of wildlife, provide livelihood opportunities, and minimize costs, while increasing the sustainability of the resource. There have been significant efforts to integrate communities into sustainable wildlife management, such as in Zimbabwe’s implementation of the Communal Areas Management Programme for Indigenous Resources

⁶⁸ Lindsey et al. (2013). *Biological Conservation*. 160: 80-96.

⁶⁹ Under article 10 (c) of the convention, each Contracting Party shall, as far as possible and as appropriate: Protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements.

(CAMPFIRE), established as a means of extending the benefits of wildlife use on community lands to the people occupying those areas. Integrated conservation projects have also been successful, for example in Thailand and Cambodia in association with the Emerald Triangle transboundary reserve project under the ITTO/CBD Joint Initiative on Tropical Forest Biodiversity, where support for developing sustainable small local industries has helped to alleviate considerable pressures on forests.

66. Further examples of governance models covered in national reports are presented below with focus on those that empower local communities to manage wildlife sustainably, by reducing trade in endangered species of animals and generating social and economic community based benefits:

i. Community conservation areas coined as “Conservancies” in Kenya created in pastoralist areas in the southern and central part of the country provide a range of local values, including local land tenure arrangements over pasture and grazing areas, and a legal structure for communities to enter into third-party joint ventures with tourism investors to generate local revenue from wildlife.

ii. Namibia’s community-based natural resource co-management model in Bwabwata National Park plays an important role in devolving ownership to local resource users, providing legal and institutional management and devising a governance framework to meet local needs and conditions. Community based natural resource management generated over N\$58.3 million for local communities in 2012 and created 6,477 jobs and 99 enterprises. The consumptive and non consumptive use of wildlife generated N\$ 700 million (or 2.1 per cent of Gross National Product) in 2004 of which 19 per cent was from hunting tourism.

iii. Brazil’s local communities extractive reserves grants the use of public lands to local communities to promote conservation in tropical rainforests and other threatened ecosystems, with exclusive user rights. Based on a progressive socioeconomic concept that was developed by Chico Mendes and the National Council of Rubber Tappers, Brazil has established 88 Extractive Reserves between 1990 and 2014, to protect the rights of forest and wetland dependent communities.

iv. Indigenous Protected Areas (IPAs) in Australia have been integrated into the country’s protected area systems. IPAs provide for managing resources without the loss of autonomy. These areas also accord public recognition of the natural and cultural values of indigenous territories and the capacity of indigenous peoples to protect and nurture those values. The first network of Indigenous Protected Areas was formally proclaimed in 1998, over an Aboriginal owned property called Nantawarrina in the northern Flinders Ranges of South Australia. There are now more than 20 declared IPAs in Australia.

v. Community-based forest and participatory protected area management program in Nepal benefit millions of households by promoting income generating activities and providing access to resources for local people, directly empowering rural women, the poor and other disadvantaged groups. In June 2013, 18,133 community forest user groups involving 2.24 million households were reported managing 1.7 million hectares of forestland under the program. Recovery of the tiger population after 2009 is a notable achievement, credited to the expansion of protected areas, the implementation of anti-poaching plans, and joint public and community efforts to curb illegal trade of wildlife parts. Reinvesting 50% of the revenues from national park visits and ecotourism to local communities has also helped to curb illegal trade, as has trans-boundary cooperation.

vi. The creation of incentives for local communities in South Africa has resulted in an annual growth rate of approximately 6% for the southern white rhino population. A century ago the species was at critically low numbers but revenue earned from the sale of the animals has meant the species was protected. Hunting on game farms also contributes to the economic viability of these enterprises and provides an economic incentive for the conservation of this species and its habitat

B. Development, revision and enforcement of legal frameworks

67. Designing natural resource policies in countries where the use of wildlife is most commonly practiced requires a focus on property rights, as well as clear management and enforcement approaches.

For example the recovery of the vicuna in western South America was only accomplished through the development of protected areas and dedicated resources to effective enforcement of the no-hunting laws⁷⁰. In Namibia the strict permit and quota system in place has proven effective in regulating the use of wildlife resources⁷¹. While regulations were seen as important controls for hunters in the Philippines, lack of enforcement allows hunting to continue with impunity⁷². Whilst in the Congo Basin trans-boundary collaboration in law enforcement has assisted in preventing the decline of critically endangered mountain gorillas in and around the Virunga National Park⁷³. Expanding enforcement to outside protected areas to control all border crossings has limited illegal extraction of resources which has been one of the main drivers of the hunting of gorillas. A study from the Serengeti National Park indicated that policy makers can use economic levers such as taxation or supply reduction strategies, through better law enforcement to change demand for wildlife, helping to regulate exploitation and reduce the risk of irreversible loss of wildlife species⁷⁴. The challenge is that policy and legal frameworks for sustainable use of wildlife are seldom site specific, and thus difficult to operationalize in remote rural areas⁷⁵. To be effective, regulations and policies need to be implemented together with a combination of other educational, income generating and alternative livelihood measures.

68. A successful programme at the demand end of the spectrum has been implemented by the Malaysian state of Sarawak. In this region, wildlife populations had been severely depleted for the past 50 years due in large part to hunting. For example, banteng and Sumatran rhinoceros are extinct; hornbills are rare due to hunting for their feathers and meat; the ranges and numbers of both proboscis monkeys and orangutans have shrunk dramatically. Many rural people depend on hunting for their subsistence, so the Government, with technical support from Wildlife Conservation Society (WCS), developed and implemented a comprehensive wildlife policy document. The wildlife master plan covered all steps needed by all sectors to conserve wildlife in the State, and balanced it with development needs. A core focus was reducing hunting to sustainable levels, while still allowing rural people to hunt for their own subsistence. This resulted in passing of the Wild Life Protection Ordinance in 1998, which banned all commercial sales of wildlife taken from the wild. Rural people who needed to hunt for their food could still do so, but the commercial trade was stopped. It was supported by rural community leaders as it protected their resources from being lost to outside hunters and to external trade.

69. The Ordinance was put into effect by the Government through major publicity and education programmes. In urban areas, government workers explained the law to traders and consumers, focusing on the reasons why the law was needed and the penalties for breaking it. In rural areas, the programme explained the benefits of maintaining wildlife populations in the forest in order to provide a continuing food supply for future generations. The law was also vigorously enforced throughout the State, with additional measures to control firearms and ammunition. Regulations were also implemented to ensure that logging roads were not used for hunting and transporting bushmeat. All these measures combined limited hunting only to those who depend on it for subsistence. This reduced hunting to more sustainable levels, conserving the wildlife resource for its own sake, and also for the people who depend on it.

⁷⁰ Bulte, Van Kooten and Swanson. (2003). Economic Incentives and Wildlife Conservation. Report to CITES.

⁷¹ Namibia 5th NR (2014), pg 41.

⁷² Scheffers, Corlett, Diesmos and Laurance. (2012). Local demand drives a bushmeat industry in a Philippine forest preserve. *Tropical Conservation Science* 5 (2):133-141

⁷³ Nellemann, C., I. Redmond, J. Refisch (eds). (2010). The Last Stand of the Gorilla – Environmental Crime and Conflict in the Congo Basin. A Rapid Response Assessment. United Nations Environment Programme, GRID-Arendal.

⁷⁴ Wilkie, D. S., Starkey, M., Abernethy, K., Effa, E. N., Telfer, P. and Godoy, R. (2005), Role of Prices and Wealth in Consumer Demand for Bushmeat in Gabon, Central Africa. *Conservation Biology*, 19: 268–274.

⁷⁵ Secretariat of the Convention on Biological Diversity (2011). Livelihood alternatives for the unsustainable use of bushmeat. Report prepared for the CBD Bushmeat Liaison Group. Technical Series No. 60, Montreal, SCBD, 46 pages.

C. Monitoring measures

70. Estimating existing hunting yields and maximum sustainable harvest rates presents considerable difficulties to management agencies due to various methodological issues and limited data. Nevertheless, the widespread and unmanaged harvesting of bushmeat is widely acknowledged and the sustainability of many species is clearly threatened under present conditions.

71. Basic population vital statistics (births, deaths, population size, etc.) are essential for sustainable wildlife management, for use in establishing sustainable harvest levels. In the absence of such information, various indicators such as tracks, numbers in markets, number of incidental sightings, traditional knowledge of numbers and population trends, among others can be used to guide decision making. Nevertheless, the best global examples of successful wildlife management programs have at least some well-researched knowledge of population changes.

72. The monitoring of exploited wildlife populations, their habitats and sources of mortality are essential components of a wildlife management program. Aside from governance and legal frameworks, the absence of information is one of the major impediments to successful bushmeat species' management. Involving indigenous peoples and local communities in monitoring can provide invaluable information and can help to address the lack of capacity available to monitor protected areas in developing countries.

VIII. CONCLUSIONS

73. Unsustainable hunting of wildlife in tropical forests and other terrestrial ecosystems for subsistence purposes is largely the result of an unmanaged common resource being unsustainably harvested due to inadequate governance and policy frameworks. Wildlife is a readily available source of income in the absence of other livelihood choices, especially in light of increased costs of living.

74. Bushmeat hunting is a traditional subsistence activity, but the bulk of the harvesting is done for economic gain with meat sold in markets, legally or not. The underlying causes of the bushmeat crisis are complex and require a comprehensive understanding of various interconnected factors, including the role of bushmeat species for income, nutrition, and in cultural practices. A lack of livelihood alternatives, increased anthropogenic impacts, like deforestation, introduction of invasive alien species, incidental killing of animals, and infrastructure expansion, are further causes fueling the decline of bushmeat species.

75. The impacts on species and ecosystems can be considerable. Studies have suggested that the total forest area degraded by unsustainable hunting in the largest remaining tropical forest regions may exceed the combined extent of deforestation, selective logging, and wildfire. Moreover, severe depletion of large frugivores can negatively affect the recruitment, relative abundance, and population growth rate of large-seeded trees. Leaving this situation unmanaged will trigger irreversible changes in ecosystems and species diversity, resulting in both direct and indirect pressures on human societies.

76. The sustainable harvesting of bushmeat could be considered as an option compatible with biodiversity conservation, local livelihoods, food security and food self-sufficiency. Banning and strictly enforcing measures against the sale of endangered or at risk species in urban markets, but allowing the continued sale of resilient species may work in certain situations. However, data for a vast number of bushmeat species is still lacking.

77. This presents a major challenge for wildlife managers and conservation biologists, especially where no baseline data exist against which to measure past declines or future management successes. The challenge also lies in the relatively limited examples of sustainable use of bushmeat species showcased by countries, nor related pilot projects that can be promoted to ensure adequate governance measures. However, as many countries have no clear national policy frameworks that provide a legal path for sustainable wildlife management, including the commercial use of bushmeat, it is very difficult to up-scale small scale/short term wildlife management pilot projects into national policies with clear strategies.

78. Exploitation levels need to be assessed to allow for status, trends and comparability of the bushmeat trade for subsistence purposes and commercial purposes. Further work is also needed to

document the international trade in bushmeat, as well as the relative importance of legal versus illegal trade. Given the illicit nature of international bushmeat trade, it is often difficult to accurately assess and monitor the volumes and species involved to identify the key actors in supply and demand markets. Moreover, it is challenging to fully understand existing and potential impacts on economies, wildlife populations, and human health, and to develop appropriate mitigating measures, without an adaptive management approach.

79. In some, but not all cases, a strict permit and quota system can sustain wildlife populations. In Namibia where trophy hunting is practiced, the use of strict permit quota and monitoring of wildlife populations has generated revenues paid to local communities and financial self-sufficiency. In many cases, policies promoting alternative livelihoods may be needed including domesticated meat production, small-scale breeding, tourism, and game breeding. In other situations, efforts should be directed at both enhancing community based conservation and reducing the trade in endangered species of plants and animals.

80. At a landscape level, a key aspect for the survival of bushmeat species involves large protected areas, involving indigenous peoples and local communities, effective enforcement measures, adequately planned buffer zones, political support and educational campaigns. While better enforcement is required, deterrence alone cannot solve the bushmeat problem that has its roots in tradition, poverty, lack of livelihood alternatives and a willing national and international market for bushmeat and animal parts. Examples of wildlife management from different regions can provide guidance in co-management, community management, monitoring and other related tools. An exchange of knowledge, expertise and best practices of practical experience involving local people should be further promoted among countries and regional organizations.

81. Wildlife management interventions that prevent further large-bodied frugivore defaunation or promote the recovery of depleted populations, through community-based game management programs, for example, could yield significant social-ecological benefits. Among these, greater attention should be drawn to animal species contributions to deterring future floristic transitions affecting local carbon stocks.

82. Therefore, as a biodiversity mainstreaming issue, sustainable wildlife management requires close interaction with other sectors, in particular forestry, agriculture, public health and fisheries (for the semi-terrestrial species). Strategic planning, implementation and monitoring among agencies and departments within governments will be critical to the achievement of the Strategic Plan for Biodiversity 2011-2020 and the 2030 Agenda for Sustainable Development. Efforts by the international community to enhance policy coherence on wildlife management are urgent, since unsustainable use of wildlife and continued decline of wildlife populations will hinder progress at all levels.

83. The increased attention to wildlife conservation and management by the United Nations can be witnessed through the UN General Assembly, resolution 314, adopted at its 69th session in 2015 which recognizes that “*the protection of wildlife must be part of a comprehensive approach to achieving poverty eradication, food security, sustainable development, including the conservation and sustainable use of biological diversity, economic growth, social well-being and sustainable livelihoods.*” In addition, the 2030 Agenda for Sustainable Development, also adopted by the United Nations General Assembly in September 2015, has raised further political attention to the critical role of indigenous peoples and local communities in promoting biodiversity conservation and to the importance that wildlife plays in enhancing livelihood opportunities⁷⁶. Taking advantage of these international frameworks will be important for the Collaborative Partnership on Sustainable Wildlife Management to support further alignment between biodiversity and development objectives.

⁷⁶The 2030 Agenda for Sustainable Development Goal 15, target 15.7: “Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products” and Target 15.c: “Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities.”

84. In all cases, a lack of knowledge of bushmeat species hinders management planning. Management plans should combine traditional knowledge with science and include active wildlife population recovery interventions. Increased knowledge of individual species can only be gained by supporting research programs, starting with the most affected species.

85. Overall, multidisciplinary approaches are needed to combine better knowledge of the use and trade of bushmeat, the strengthening of legal frameworks, the use of incentive structures, the provision of food and livelihood alternatives and the sustainable use of wildlife. There is no single solution and none of these measures alone appear to be able to solve the bushmeat crisis. However, most successful wildlife management approaches incorporate a mixture of measures in bushmeat management tools, demonstrating that there is potential to achieve a more sustainable use of wildlife.
