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Evolution of Biodiversity Conservation and Impacts of Laws on the Conservation of African Elephants in the Democratic Republic of the Congo

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Abstract: The evolution of biodiversity conservation and the impact of the laws for the conservation of the Congolese's elephants is a study conducted to understand how the elephants of the Democratic Republic of the Congo (DRC)are protected and what are the risks associated with its conservation. Some protected areas regularly make inventories， the proof is the availability of the results of the inventories carried out in its protected areas. While we also have certain protected areas which, through the troubles and permanence of armed groups within these protected areas, weakens and discourages that these protected areas have to finance for the work of inventories even if they, of course, contain the elephants. In the DRC it is difficult to strictly respect the nature conservation, although under national law, it is easy to find everywhere workshops for the processing and sale of ivory are visible in the sight and knowledge of everyone evens the large ivory market of Kinshasa works without worry of the urban authorities. Weakness of the Congolese State promotes impunity by ignoring the strict applications of conservation laws, but also the weakness of state power by ensuring no security in the protected areas of the country which facilitates the worsening of Poaching.

Keywords: Protected Areas, Democratic Republic of Congo (DRC), Conservation Laws, Elephant.

INTRODUCTION

Problematic

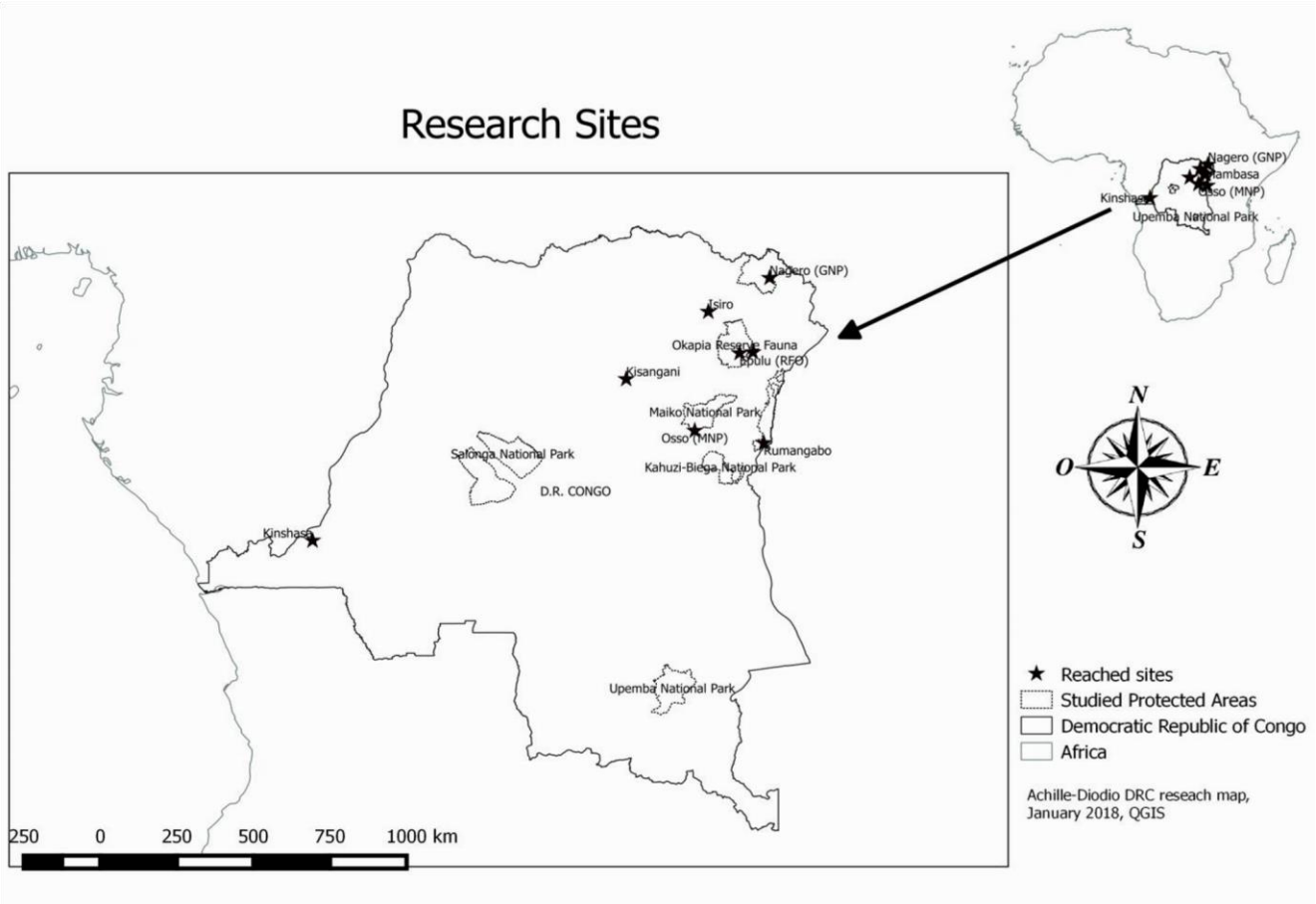
The word nature conservation is an embodiment of the old regular practice of black Africa, people who proudly knew how to protect their forest using different traditional activities (Fairhead and Leach, 1995). Although the African forests are accustomed to drought or bushfire that burn the leaves of trees, the latter found the neoflowering just a few months after the end of the dry season, at the beginning of the rainy season (Chevalier, 1933). Conservation in Africa has already existed since pre-colonial times (50 000 to 40 000 BC), these practices of cultural norms have been used to protect African forests and the animals that are there until today (Kingdon, 1990). These forest areas lacked a forest individualist spirit for community use (Fairhead and Leach, 1995; Laburthe-Tolra, 1981). However, these territories could share certain relationships through the survival transaction, the social and cultural transaction. The forest is in equilibrium if and only if it is inhabited by a combination of animals which, the loss of those last can cause a dysfunction of ecological and evolutionary processes, and which may lead over time to an empty forest (Emmons, 1989; Nasi et al., 2011; Redford, 1992). The flagship species and group of large animals of a forest or protected area are of paramount importance because their disappearance or extermination can lead to a disproportionate impact of the ecosystem compared to the loss of other animals (Campos-Arceiz and Blake, 2011; Fragoso, 1997; Keuroghlian and Eaton, 2009) as has always been the preference of hunters once these animals are available. As elephants but also ungulates (Campos-Arceiz

and Blake, 2011) have a great role to play in modifying vegetation modification structure, composition and dynamics through their feeding habits and movements in the forest (Beck, 2006; Fragoso, 1997; Keuroghlian and Eaton, 2009). Poaching is a premium on the poverty and corruption of local communities, or the insecurity caused by weak governance in land management (Duffy and St John, 2013); However, there is a great economic force and Southeast Asia social that manages and dominate the illegal trade in wildlife in the region.

The studies carried out by Rain-Forest UK in 2014 in several Protected Areas (PAs) in the Congo Basin region, it was found that 20 cases of conflicts on the 24 PAs of the regions, between the local communities and the managers of PAs (Yobo and Ito, 2016). The growing population needs space for housing, agriculture and the need for bushmeat (Amare, 2015); This makes the population reduce the areas allocated to PAs. These difficulties are due to overpopulation (Ogutu et al., 2016), which leads to armed conflicts, poaching, etc. (Agger and Hutson, 2013; Titeca, 2013). The Local Population (LP) of PAs that have been driven from their ancestral forest, and who almost do not receive anything from the management of PA, use force for conservation of failure (Kümpel et al., 2015)anyway possible (case of massive loss of Okapi , Reserve Fauna of Okapi (RFO), DRC). African elephants are the most prominent among animals killed because of their mostly ivory and meat, to feed the growing demands throughout the world (Lawson and Vines, 2014). Thus, between 1979 and 1989, the period during which the ivory trade was not controlled resulted from a loss of half (1.3 million to 600 000) (Born Free, 2007) of elephants in Africa. The catastrophe that led to the abolition of the ivory trade, approved by CITES in 1989.The Congo basin is filled with an immense amount of wild animal species, which remains the most accessible, allowing the population of the region to supply animal protein (Nasi et al., 2011). Nevertheless, the production and marketing of bushmeat form a real pillar that generates substantial incomes for both the local population and other economic actors (Van Vliet et al., 2017). The Democratic Republic of the Congo (DRC) is a country of immeasurable animal wealth, which is often located in different protected areas (PAs) and even outside PAs. It is difficult, according to the PAs traveled, to find a protected area (PA) that would be entirely under the control of conservation officers. Many PAs managers recognize that they only have a part of PA under their control; also some say they have the inability to work because the majority of the PA is managed directly by the various armed groups that reside in the PA. This would be the case of the Maiko National Park (MNP) where the rebels residing in this forest of the park before the creation of the park in 1970. It is true that in the majority of African countries, hunting is regulated by legal instruments, with harvests controlled by licenses and quota systems (Heus and en Evolutie; Lindsey et al., 2013). It is true that there is a conservation law in the DRC and that it formally prohibits the commercialization or exploitation of elephants in all its forms in the DRC (Mashini, 2017). But it is very surprising to find everywhere throughout the city of Kinshasa and in the interior of the country and workshops of transformation and commercialization of ivory in sight of everyone.

Study Area

In the DRC, about 11 percent of the national territory is covered by networks of protected areas. It encompasses diversified landscapes, ranging from high, dense and humid forests, to savannah areas, and includes five world heritage sites. The DRC's PAs are generally representative of the ecosystems of the region (UICN/PACO, 2010). Despite the strong pressures, biodiversity is very rich and still contains emblematic species such as the Okapi, the gorilla, the Congolese Peacock, the Bonobo, the giraffe, etc.



Methods

The present research entitled Evolution of biodiversity conservation and the impact of conservation laws on the elephant in DRC is a research effort to collect data on elephants. However, two data collection techniques have enabled us to achieve our results; we had the literature review and research questionnaires.

Literature Review

The literature review alluded to collecting the possible information related to the elephants of the DRC. Some data were found on the Internet such as articles and other Non-Government Organization (NGO) publications and reports. The Congolese Institute for the Conservation of Nature (ICCN) has made it much easier for us to collect data because, from its general direction, we have managed certain data and also at the level of its offices which are located in different areas where we have gone to collect data from their annual and semi-annual reports.

Research Questionnaire

We had had to submit certain questions to different groups of people, depending on their contributions or influence on conservation. These people were subdivided into three groups that are: the local population (LP) of some protected areas (PAs), the market bush meat sellers and conservation agents in the DRC. The LP had answered some questions concerning the conservation of PAs located in their environment; the relationship between this population and the PAs conservation officers; etc. Only adult persons (active or elderly) who have got at least 20 years old or above have been questioned; because they are people who cannot afford to obtain news and conservation difficulty in their environment. The issues that conservation agents have answered are multiple; these issues are related to conservation in general and the state of elephant's conservation to their workplace in

particular; etc. The bush meat sellers have answered some of the questions that are well defined in the research questionnaire. These questions were always related to their daily activities; to know how long they have been doing this job; at which period they had a facility to get goods; how they refuel their merchandise; From where; etc.

Results and discussions

The presentation of the results is done in four steps in accordance with the objectives pursued by this study. Each step develops its different points according to the data analyses and according to the methodology applied for the data collection.

Results of the inventories of certain protected areas of the DRC

It should be noted that complete biological inventories are not frequent in many protected areas (PAs) in the Democratic Republic of the Congo (DRC). This is due to the lack of financial resources and the insecurity on the extent of PAs in particular. It is true that some PAS only makes inventories to secured areas of their PAs. This one is because the majority of PAS in the DRC is occupied by armed or a rebel group (*personal comment of Mr. BojiDieudonné, curator of MNP*) such is the case of Maiko National Park.

Inventories are generally done with a ten-year cycle nonetheless, for certain protected areas that have sufficient funds and staff, it's possible for them to do inventory every five or three years depending on whether their program is established and depending on the workplace stability (*Personal comment of Mr. Mwinyi Ali Robert, head of WCS/RFO*).

Garamba National Park (GNP).

The Garamba National Park is one of the DRC's PAs which is very well organized where one finds a usual succession of data of the biological inventories made into the park since 1976 to our days and these data are always available to who go there for his research.

It is since the years 2005 that the GNP has been managed in private partnership between the conservation NGO African Parks Network (APN) and Congolese Institute of Nature Conservation (ICCN) the state authority for Conservation of Nature (Mònico, 2014). GNP has a good potential for the conservation of key species: Northern White Rhinoceros (*Ceratotheriumsimumcottoni*) (momentarily declared extinct), giraffe of Congo (*Giraffacamelopardaliscongoensis*), Elephant (*Loxodonta africana*).

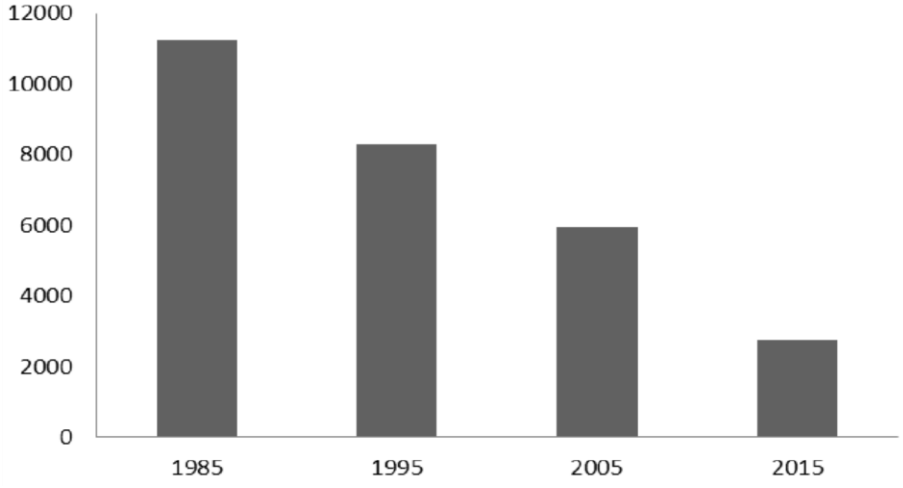


Fig.3-1 Density of GNPElephants

Sources :(Savidge et al., 1976) **;** (Hillmann-Smith, 1989)**;** Amube 2007; (Bolaños, 2012) ;(Mònico, 2014).

Data from the GNP inventories show a decrease in the present day compared to the number of elephants inventoried over time; sure by aggregating the averages of the elephants inventoried in a period of 10 years of interval. The averages show us that during the period from 1995 to 2005 period when the loss to the number of elephants was a little moderate but still great with 2341 elephants lost during a ten-year course as an interval. But the last 10 years from 2005 to 2015 there has been a very large loss of elephants whose figure amounts to up to 3208 elephants disappeared. The annual and seasonal reports of GNP clearly show that the last 10-year interval (2005-2015) is the hardest that the park has suffered for the survival of the elephants; It has just replaced the great period of the 1996-1998 rebellion which predominantly destabilized by this in the major loss of elephants.

This is due to the permanent presence of the armed groups (Lord's Resistance Army (LRA), Libyan and Sudanese) who work there permanently in the protected area (PA) especially the northern part, the party under their control and where the inventories are not often made because of the insecurity of this Part that borders the DRC and South Sudan.

Salonga National Park (SNP)

The Salonga National Park is the last, on the five World Heritage sites conceded by the DRC (Garamba National Park (GNP), Virunga National Park (ViNP), Kahuzi Biega National Park (KBNP) and Reserve Fauna of Okapi (RFO)), to be included in the list of World Heritage in danger 1999 at the request of the ICCN to International Union for Conservation of Nature (IUCN) following many difficulties for conservation of this park (UNESCO, 2017). The Conservation Committee of the SNP had submitted in 2012 a report for the removal of SNP from the list of World Heritage in danger; but the answer after the studies in 2016 was not acceptable the request because there was still a lot for the conservation of this protected area (PA) (UNESCO, 2017). An agreement was signed in August 2015 between ICCN and World Wildlife Funds(WWF) as a comanagement for the contribution, development, and management of SNP. The SNP is filled with key species such as Bonobo (*Pan paniscus*), Congolese Peacock (*Afropavocongensis*) forest elephant (*Loxodonta africana cyclotis*).

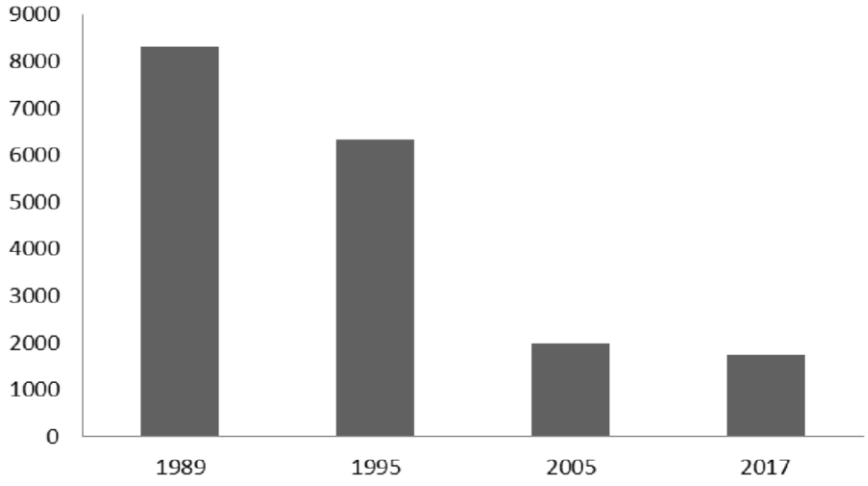


Fig.3-2 Density of SNP Elephants

Sources: Blake 2005; Hart 2010; UNESCO 2017.

The results here show sufficient evidence of a dramatic decrease of more than half of the number of SNP elephants during a period ranging from 1995 to 2005 where a very large loss of 4330 missing elephants. But also there is a good rigorous conservation work with only a small decrease of 262 elephants for a period ranging from 2005 to 2017.

Virunga National Park (ViNP)

The ViNP is a PA that abounds with many potentials both African and global since its creation in 1925 from where first African park. By its specific richness, it retains many key species such as large mountain Gorilla mammals (*Gorilla beringei beringei*) and plain Gorillas (*Gorilla beringei graueri*), hippos (*Hippopotamus amphibious*), and elephants (*Loxodonta africana*).

The park possessed few large numbers of elephants during its genesis, but today there are only a few heads in the recovery of its workforce, although the park has had to undergo too much anthropogenic pressure in the last 2 decades seen the wealth It's full of wildlife as well as geological.

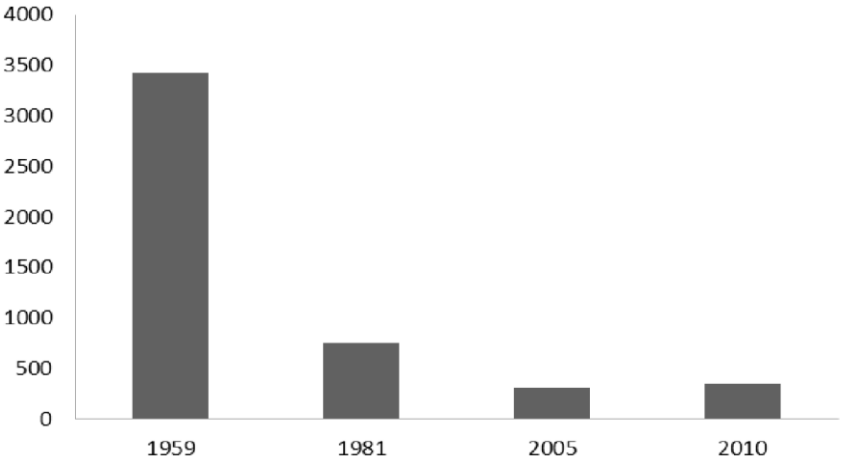


Fig.3-3Density of ViNP Elephants

Sources :(Hart, 2010); UNESCO 2014

Virunga National Park is a PA that is not known to a large number of elephants since its creation as shown in the graph. The park has undergone a strong pressure on the acrobatic reduction of its elephants during the period from 1959 to 1981 where an alarming loss of 2674 elephants was recorded, which constituted almost two-thirds of the elephant population since the first Inventory of 1959, due to high anthropogenic pressure. It should also be noted that half the number of elephants of 1981 was still reduced in 2005, but during the interval from 2005 to 2010, there is a slight increase of 37 elephants which is a good progression for the restoration of the number of elephants or the conservation of elephants dedicated park. This is also approved by the report submitted on 13 February 2017 tothe United Nations Educational, Scientific and Cultural Organization(UNESCO), which attests that thanks to the telemetry collars that have been placed on elephants, it has been possible to see a slight increase in the number of individuals (UNESCO, 2017).

The Reserve Fauna of Okapi (RFO).

The RFO since its creation in 1992 was counted among the PAs with huge reserve in numbers of elephants in the DRC. RFO is known for its key species such as Okapi (*Okapia johnstoni*), Forest Elephant (*Loxodonta africana cyclotis*), Chimpanzee (*Pan troglodytes schweinurthii*).

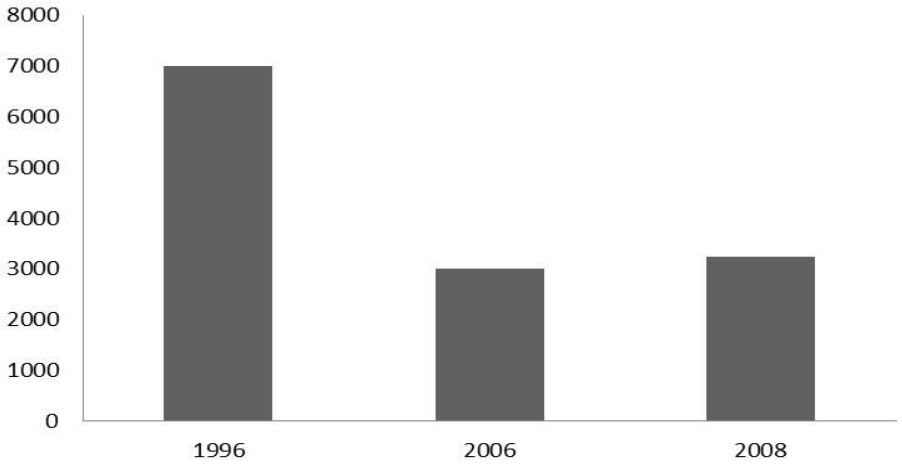


Fig.3-4 Density of RFO Elephants

Sources:(Grossmann, 2006);(Hart, 2010)

Elephants at the Okapi Wildlife Reserve have really suffered an increased decline in population, around 55% of its population has declined at a 10-year interval of 1996 to 2006; This is a very large loss and affects the number of elephants in that reserve. While in 2008 there was a slight stability and a number increase of 250 elephants.The reports produced by the Non-government organizations (NGOs) in this reserve showed that the major loss of elephants in this protected area (PA) is due to military occupation during the various political crises experienced by the DRC from 1996 to 2005. During this period conservation suffered enormously because the military or armed groups refuged or occupied the PA and this turned into elephant poaching for the commercialization of ivory.

Kahuzi-Biega National Park (KBNP)

Kahuzi-Biega National Park is a park that has a lot of potential for animal resources in the DRC. This PA was the reserve of many large mammal species as key species: Grauer gorilla (*Gorilla beringei graueri*), Elephant (*Loxodonta africanacyclotis*), Chimpanzee (*Pan troglodytes schweinfurthii*) and endemic species of the Albertan Rift. But, what is surprising is that since the years 2005 no trace of the elephant is possible according to the work done on site as shown in the graph below.

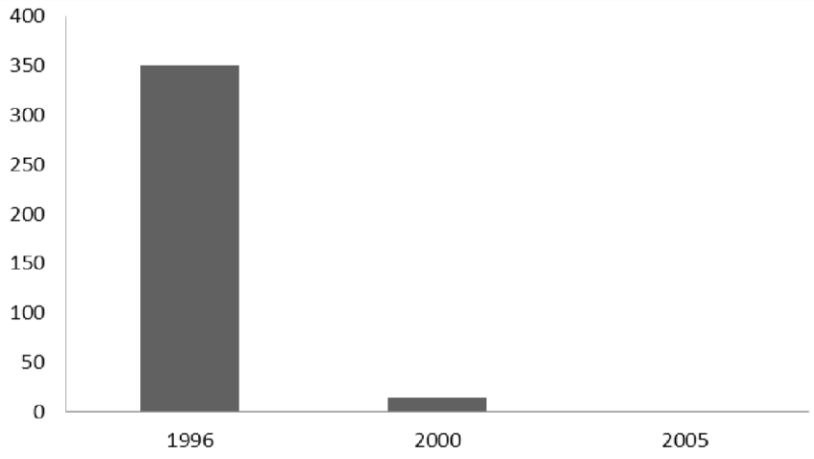


Fig.3-5Density of KBNP

Source: UNESCO, 2005

Elephants have had serious problems surviving in this PA view the results of the above inventories. Before the rebellion (war) that the country experienced in 1996, the number of elephants was estimated at 350 elephants. The period of rebellion was a period of Calvary for the existence of the park because it was invaded in full see even after the rebellion in 2000 the park had only 5% of its part which was under control of conservation officers where the sporadic inventory showed that Some traces estimated at 15 elephants. A note that the results of inventories conducted by the Wildlife Conservation Society (WCS) of 2004 were sanctioned by a slight increase in the number of gorillas in Grauer, but also the total absence of elephants on the inventoried parts of the PA (UNESCO, 2017). Therefore no traces of elephants have been visible that worries the conservation agents; Pending the results of 2017 inventories which we had not had.

Parks with irregular or sporadic inventories

In this group, we will present certain parks that do not have a regular inventory cycle or only carry out some sporadic inventories in view of the insecurity that exists in the PA and which does not allow to make an inventory Biological. These parks have only one or two elephant inventory data.

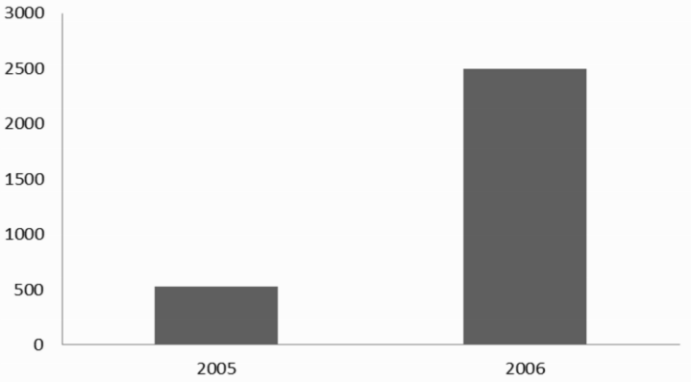


Fig.3-6 Density of MNP Elephants

Source: Amsini 2005; Hart & Nixon 2006; Hart 2010

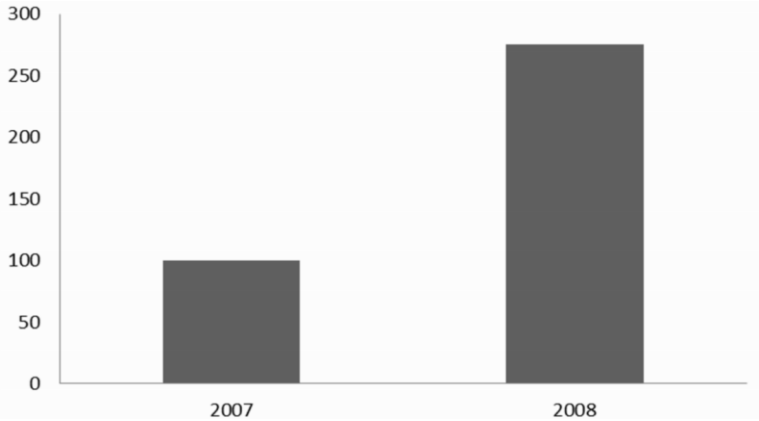


Fig.3-7 Density of UPN Elephants

Source: (Hilde et al.)

The Maiko National Park (MNP) and the Upemba National Park (UNP) are parks that have had much potential both faunal and floristic since the period of their creation but, this wealth have escaped for some decades already to control conservation agents and what creates the inactivity of the occasional activities of biological inventories over the entire scope of these protected areas (PAs). However, there are sporadic inventories that occur in more secure areas as illustrated by the graphs of which 530 elephants for the (sporadic) inventory in the northern part of the MNP; and similarly, sporadic inventories yielded results of 100 elephants in 2007 and 275 elephants in the report produced on 22 June 2008 by Molulwa at the money patrol post (Hilde et al.).

Table3-1. Protected areas in the result of the unique inventory of elephants

PAs	Year	Elephants	Sources
Bili – Gangu	2006	2000	Hicks et al 2006 in Hart 2010
Lomami	2009	625	Hart 2009 in Hart 2010
Tumba - Ledima	2009	150	Inogwabini 2009 in Hart 2010

The data from this table show that in some PA of the DRC, there is a good number of elephants that exceed even others PAs well known of good consideration and permanent financing for conservation of nature in the DRC. This is the case of the Bili – Gangu reserve which had an estimate of around 2000 elephants in 2006. The new park in gestation National Park of Tshuapa Lomami Lualaba (TL2) is a PA that is still in creation, but whose presence of elephants is already visible from the work of Hart in 2009 which gives more than 625 elephants in the new park. Even for the reserve of Tumba-Ledima which has around 150 elephants within it.

Real and Alleatoires estimates of the number of elephants in the DRC.

The research questionnaire that was submitted to conservation agents also proposed an aleatory estimate of the number of elephants in their protected area (PA). Everyone was free to answer that question. Nevertheless, as shown by the table2, some agents were able to help us by answering the question according to their private estimation of the number of elephants in their PA. It should be noted that these estimates made by conservation agents could or could not be the real nature of the actual biological inventory data. But it has served us to understand the knowledge of these agents of what they claim to have as a role to preserve these species with a voice of disappearance because the potentiality of an agent is also to know and understand what are his responsibilities.

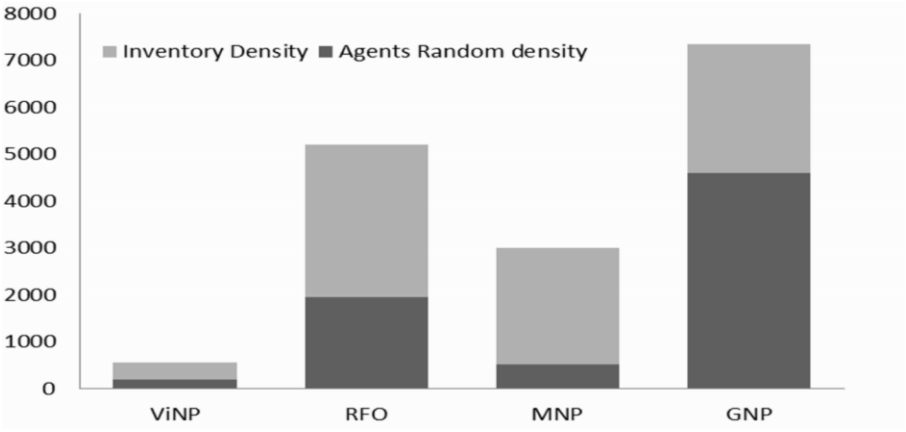


Fig.3-8Comparison of the elephants estimation density by the Conservation Agents and the results of the inventories.

Starting from the average of the elephant number estimates of the agents of each protected area compared to the average of the last inventory results as presented for each protected area, we find that there is a significant difference to the Reserve Fauna of Okapi (RFO), Maiko National Park (MNP), and Garamba National Park (GNP); The difference is not significant at Virunga National Park(ViNP). Unlike other PAs agents, where agents confirm a diminution of léléphants according to their estimates, GNP agents still believe that there are still many more elephants in their park than the actual results of inventories. This could also be explained by the lack of information of the inventory results that are being done in their park. But at the level of MNP, the difference explains the desolation and deterioration of the conservation activities in the park, it can be also because that PA is subdivided by armed groups who live there longtime ago others even before the creation of the park.

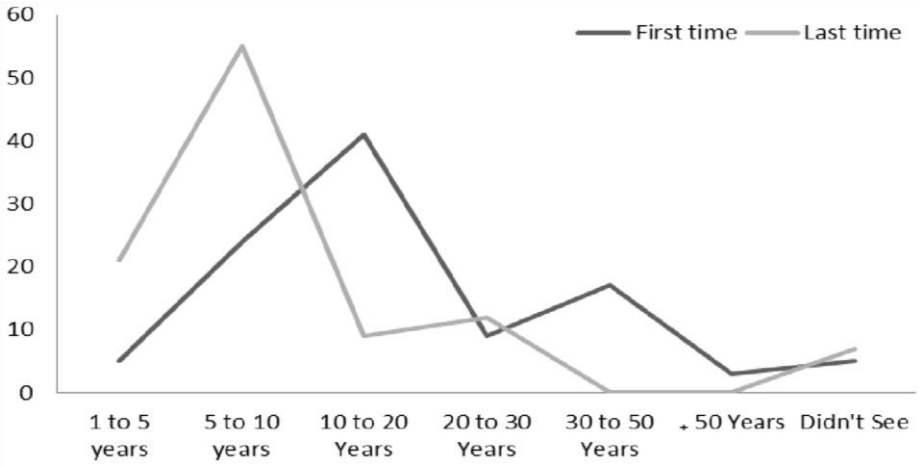


Fig.3-9 Variation of the elephants ' glimpse by the local population

It is true that the glimpse of the elephant by the LP depends on the mobility of it at the favorite places of passage of the elephants. These above results show us that the majority of the LP consulted, admitting to having glimpsed for the first time in their lives the elephants are in the range of 10 to 20 years. While the majority of the population with the last glimpse of elephants is between 5 and 10 years old. Without ignoring that the LP having first glimpsed the elephants during a period of 30 to 50 years was well represented but also those of more than 50 years of overview.It should be noted that the latter population (30 to 50 years) is mainly represented by the Pygmies who are destined to live with the resources of their forests; stopping also increases the last glimpse of recent years like 1 to 5 years and even 5 to 10 years. But also, this observation gives a sufficiency supports the argument of the elephants in these PAs.

Congolese conservation laws – Impacts on the traffic and conservation of elephants in the DRC.

Conservation laws in DRC

The Democratic Republic of the Congo (DRC) is full of important natural and biological resources. These resources are governed by Congolese conservation laws and those ratified internationally by the DRC.At the national level, conservation of nature in the DRC had two conservation laws from its genesis. It is that of *ordinance-law No. 69041 of 22 August 1969* (Republic of Zaire) which has been in force since 22 August 1969 and which will end on 11 February 2014, the date where the second law shall enter into force by *ordinance-law No. 14/003 of 11 February 2014* on the Conservation of nature up to the present day.Parliament has motivated

its argument on the recent law (Law 11 February 2014) of conservation as the law of Conservation of 22 August 1969 suffered from a lack of prevention of enforcement measures which made it difficult to enforce the law. Unlike the old one, the conservation law of 2014 has more innovation with regard to the current state of conservation as stipulated in the said law, "this law is in the will expressed by article 202, paragraph 36, subparagraph; of the Constitution. It also incorporates the provisions of articles 203 (18) and 204 (23) concerning competencies recognized in central and provincial jurisdictions. In addition, in accordance with the provisions of article 36 of Act No. 111009 of 09 July 2011 laying down fundamental principles for the protection of the environment, it clarifies certain rules relating to the conservation and sustainable management of Natural resources, biological diversity, ecosystems, sites, and monuments located in the national territory".

Conservation and sanction according to the law.

In the Democratic Republic of the Congo, the elephant is classified in the category of fully protected species see ministerial *no020/CAB/MIN/ECN-EF/2006* on the approval of the list of the DRC protected species; hence the prohibition of any use with respect to the elephant (Mashini, 2017).

Art. 14

It is forbidden to:

1) To deliberately collect, hunt, fish, capture, harass or kill specimens of protected species;

2) Intentionally disturb these species, particularly during the period of reproduction, dependence, hibernation or migration;

3) Destroy, damage, remove, collect or change the position of the eggs of these species;

5) To hold, transport, exchange, sell or buy, offer or give free of charge the specimens or any part of these species collected in the wild;

6) Hold, assign, sell, buy or transport any product whose packaging or advertisement contains specimens belonging to one of the protected species; 7) Exhibit these specimens in public places.

Art. 14 of 14/003 on 11 February 2014

It is clear from this article 14 of the aforementioned law that the conservation of fully protected species must not suffer from any misunderstanding because the texts are very clear banning the hunting, holding, buying, selling, even the exposure of the said species including their various products in public places. This proves the strict conservation of these species in the DRC, as envisaged by the Congolese legislator.

Art. 71

Is punished by a penal servitude of one year to three years and a fine of one hundred thousand to one million five hundred thousand Congolese francs or of one of these sentences only, any person who, in the integral nature reserves, national parks and reserves of Biosphere:

1) introduces firearms and other hunting Instruments;

2) Holds or transports species of live wild Fauna and flora, their skins or other remains;

4) Practice a fishing activity of any kind;

6) Destroys, by any means whatsoever, biotopes, species of Wild Fauna and Flora, or other

natural biological or genetic resources.

Art. 78

Is punished by a penal servitude of one year to ten years and a fine of five million to twenty million Congolese francs or one of these sentences only, any person who kills, injures, captures or holds a specimen of a wildlife species, except in the case of legitimate defense, or cutting and/or uproots a specimen of a fully protected species of wild flora referred to in

sections 7 and 13 of this Act.

Art. 79

Is punished by a penal servitude of five years to ten years and a fine of twenty-five million to one hundred million Congolese francs, any person who carries out the activities of international trade of specimens of species of wild Fauna and flora in full Protected and their products in violation of the provisions of this Act and the decree regulating international trade in Endangered Species of Wild Fauna and flora.

Art.71, 78 and 79 Sanctions

The DRC legislation has provided for sanctions according to the activity or fault committed; these are defined by certain articles above.

- Anthropogenic activities committed by certain individuals are punishable by penal servitude (Art. 71). This is also the case for the illicit occupation of protected areas, which are safeguarded and supported by the legislation of the DRC. There are also penalties for people who do various activities such as the transport of a protected species and even one of its parts only.
- Except for the case of legitimate defense; Killing, capturing, injuring, or holding a specimen of an entirely protected species is a poaching (Art. 78), which is sanctioned according to the defines of Congolese legislation.
- Illegal trade or trafficking (ART. 79) of fully protected species refers to criminal servitude as is well defines by the DRC legislation. This refers to the international trade in specimens of the said species, both faunal and floristic, in violation of the provisions governing Congolese legislation.

3.2.3. Impact of the laws on the conservation of elephants in the DRC.

It is true that before the first conservation law of the DRC, that of 22 August 1969, the inventories of the elephants were almost not feasible. Except only the first park to be created in the DRC had an estimate of the elephants they contained. This is the case of ViNP, which had an estimate of 3425 elephants in 1959 (UNESCO 2014).

Elephants RDC

1989 2010

Fig.3-10. Total Estimation of the DRC elephants.

Sources: (Barnes et al., 1995; Blake, 2005; Hart, 2010)

The former conservation law of the DRC (22 August 1969) did not really serve for the conservation of elephants in the DRC because the figures show a catastrophic decrease in the number of elephants during 1989 to 2010 according to the studies of the estimation Elephant population were made. These studies have shown that there has been a loss of 57 500 elephants or 80% of its population has disappeared during the time interval from 1989 to 2010. Knowing well that this time interval was 20 years after the law came into force and 4 years before the new current conservation law (11 February 2014).

Table3-2: Results Research Questionnaire in certain markets in DRC-bushmeat of elephants

Cities	Kg	Price $	Provenance	Transport
Kinshasa	15	9	Equateur province, Kisangani, Bandundu province,	Boat, Bus
Kisangani	-	-	Ituri road, Ubundu road, Lubutu road, WanieRukula road.	Bus, Motorcycle, etc.
Lubutu	30	6	Walikale road, Nearby villages	Motorcycle
Isiro	10	3	Mungwere Road, market, and nearby villages	Motorcycle and Bike

Nevertheless, we managed to find in 4 cities according to whether we had brought our investigation as well mentioned in the table2. An amount of 55 kg of elephant meat was listed in our survey of targeted markets on the research questionnaire without forgetting that in Kisangani the seller did not know how many Kg he had.

At 2002 already the study of the bushmeat of the Kisangani market showed that 55% of the goods sold to the market came from Lubutu (van Vliet et al., 2012). Bushmeat sold at the market was mainly rodents, ungulates, etc. including no mention of elephant smoked meat on the market; Although the majority of goods came from Lubutu to Kisangani. This would just not be our case because we managed to inventories an elephant smoked meat salesman in Lubutu and another in Kisangani.

3.3. Poaching of elephants in DRC

Table3-3. Poaching and the Nature of poachers Research questionnaire results

Protected Areas	Conservation Agent Poaching (Yes)	Armed Groups	FARDC	Local Population	Total C.P.	Local Population Poaching (Yes)	Armed Groups	Total C.P.
Rumangabo (VNP)	23	15	11	20	**24**	40	33	**43**
Osso (MNP)	20	20	15	20	**20**	20	20	**20**
Nagero (GNP)	19	19	6	13	**20**	20	20	**20**
Epulu (RFO)	20	4	19	19	**20**	20	20	**20**

VNP: Virunga National Park; **MNP**: Maiko National Park; **GNP**: Garamba National Park; **RFO**: Reserve Fauna of Okapi; **P.C.**: Contacted Persons; **FARDC**: Congolese Armed Forces

It is true that poaching exists in these protected areas consulted, the preservatives identify three categories of character poacher evolving in their terroir including armed groups, FARDC, and the local population. 100% of

the agents confess to poaching by the armed group and local population groups in MNP; But also 95% declarations against armed groups, FARDC, and local population respectively in GNP and RFO.

Table3-4: Different armed groups in protected areas

Protected Areas	Army Groups	Testimony Conservation Agents
	LRA	17
	Libyans	15
Garamba	Sudanese	16
	Mbororo	8
	CAR	4
	Simba	16
Maiko	Mai-Mai	10
	FDLR	13
Virunga	FDLR	15
	Mai-Mai	15

LRA(Lord's Resistance Army), CAR (Central African Republic), FDLR (Democratic Forces for the Liberation of Rwanda).

The presence of armed groups transformed into poachers, of different nature and origin (country of origin), in these PAs pose a huge loss of elephants that are killed days and nights by more sophisticated techniques like by helicopter to PNG for example And so many others. This resulted in a recorded loss of more than 1908 elephants killed in the DRC. These 1908 elephants killed only for a period of 14 years (2002 to 2016) which shows a loss of 136 elephants per year (Amboya, 2004; Hart, 2010); and UNESCO (2005, 2016). This number could be larger if and only if we were lucky enough to have the poaching reports of all APs as expected.

3.4. Conservation and the local population

The conservation within protected areas (PAs) in the DRC as everywhere in the world has always suffered serious difficulties with the PL of the place where is PA. The LP always needs to enjoy its ancestral forest for different activities such as hunting, drawing, water points, farms and many other human activities (Okello, 2012)which are still problematic for the good conservation of a PA. In the DRC, although there are times of serious problems at the level of some PA between local population (LP) and the manager part of PAs, there is also a good relationship where the LP takes full advantage of the conservation in their forest. This is due to the results obtained from research Questionnaire on the 4 PAs namely PNG, SLP, RFO and ViNP where on 104 LP with whom we spoke, 40% of the population confirms to have a good relationship with the manager of the reserve. This is supported by the arguments of the LP for certain benefits derived from the management of their forest by the managers of PA. It's like Homeland Security by eco-guards against the rebel group of the LRA around GNP. But also the local population is concerned by the lack of access to the management of their PA, to say that the conservation agents are all imported from other cities to come to work at home, in disfavor of the children of the village who are not

always committed to being Among the PA managers; Even if they are capable and competent, this is the example of the local population of RFO. Despite the confirmation of the LP to support and little confidence that they give to managers of PAs of these forests, the managers of these PAs unworthy the behavior of the LP by the direct or indirect way (by complicity) of the destabilization of the good PAs Management. This shows the confirmation of 80% of the conservation officers contacted to respond to the various concerns posed by the research questionnaire.

3.4.1. Argument accusing the local population by Conservation Agents

- Prohibition of hunting or poaching in the Park (reserve).
- Illegal Occupation in the area protected by the local population by carrying out illegal activities such as deforestation, fishing, mining, etc.
- Boundary conflict of the protected area, the threat of overflow for agriculture.
- MNP was created in 1970 while the Rebels Simba had already occupied the forest since 1964 (before the creation of the park). They claim to be the owner of this forest;
- Nevertheless, in view of the negotiation, they agreed to come out peacefully, but only the government did not invest in the performance of their specifications;
- Weak communication system between the local population and the managers of protected areas.

3.4.2. Arguments accusing conservation agents by the local population

- Lack of employment for the local population while only foreigners come to work here.
- No scholarship to the local population.
- ICCN's lie for non-compliance with a signed load book prior to the creation of the protected area.
- No awareness of different projects existing in the protected area to the local population.
- More space for the local population to make agriculture.
- No good treatment and no esteem to the pygmies as humans.
- Use of the local population as non-contract workers.
- Predation of crops by wild animals.
- Lack of social and health support.
- Granting of employment according to knowledge or affinity.

3.4.3. Solutions proposed by Conservation Agents

- ✓ Intensifying agriculture and livestock farming for the riparian population.
- ✓ Create and increase employment for the local population.
- ✓ Application of participatory Conservation (community).
- ✓ Creation of alternative activities as an initiation and adaptation to a new life of the local population.
- ✓ Sincere Collaboration between the local population and conservation agents.
- ✓ Educating the riparian population about the importance of the protected area, providing services and environmental education.
- ✓ Increase in the number of eco-guards.
- ✓ Government's involvement in the management and security of protected areas.
- ✓ Rigor on the law of Conservation.
- ✓ Creation of a hunting field that helps the local population to obtain meat.
- ✓ Supplies of medicine at the hospital.

✓ Only the neutralization of the activities of armed groups can help to ensure the conservation of the protected area.

✓ The Government must implement the load book signed by rebel Simba for their peaceful exit into the park concession.

✓ Closure of all mining quarries in the protected area.

✓ Political stability will solve all the problems.

3.4.4. Solutions proposed by the local population

❖ Scholarship for the children of the riparian villages.

❖ Give the local population a list of certain hunting animals.

❖ Reforestation (for the local population around VNP).

❖ Sincere Collaboration between the population and the conservation agents.

❖ Create the work for the local population and not only import the workers from elsewhere.

❖ The practice of participatory conservation (community).

❖ Authorization and free access to the Pygmies in their ancestral forest and good consideration, equality as a human being.

❖ Government's replication of the management and security of protected areas.

❖ Create and increase employment for the local population.

❖ Creation of alternative activities such as initiation and adaptation to a new life of the local population.

❖ Revision of the boundaries of protected areas as these limits has never had an agreement from the local population, which is lacking in space for agriculture because of overpopulation.

❖ Increase the construction of the Health Centre and secondary schools in the villages for the local population. Conservation in the Democratic Republic of the Congo would be a good thing if and only if managers of different protected areas are able to raise the awareness of the local population and seek to respond to their demand a little while the Ancestral owner of this forest that houses the protected area. Without ignoring also that cases differ from one protected area to another, depending on the relationship between the management agents of protected areas weave with the resolution of problems and demands of the local population; as explained by different ideas above on either side of two sides. It is true that the local population (LP) of Central Africa essentially lives or the majority of their income comes from the products of the hunt. This is why a good way to sustainable protected areas (PAS) management is essential, leaving the opportunity for the LP to hunt non-vulnerable animals outside PAS. But maintaining strict rigor on vulnerable species and PAs (Van Vliet et al., 2017). The Durban agreement, held in 2003, referred to the "new model for Protected areas", which, through international agreement, was asked to involve the rights and interests of local people in the conservation objectives (Pyhälä et al., 2016). But conservation policy in the Congo Basin, many years later, is far from the current logic of conservation as requested in the Durban agreement; because local communities and indigenous peoples always consider protected areas to be a threat to their rights and livelihoods. This explains the weakness of the success of conservation objectives in this region.

Conclusion

This study was able to present the analyses of different points according to whether the objectives were assigned to it. This on the evolution of the conservation of elephants in some DRC PAs; the State of involvement or contribution of conservation laws for the conservation of elephants; the involvement of poaching for the reduction of elephants, the nature, and origin of these poachers; and finally, the possible relationship exists between LP and PAs managers. With regard to the evolution of the conservation of elephants in some PAs, some PAs that regularly make inventories, while others do not because of the insecurity, troubles, and permanence of the armed groups within these PAs, etc. With regard to conservation laws on elephant trafficking, it is illegal both under national law, including *Act No. 14/003 of 11 February 2014* on nature conservation. Everywhere in the DRC, both urban and local authorities agree to contradict these conservation laws by the presence of the workshops of processing and sale of ivory are visible in the sight and knowledge of everyone. This is also the case for certain markets, when studying through research questionnaires, we met in 4 cities including Kinshasa, Kisangani, Lubutu and Isiro with respectively 15kg, 30kg and 10kg with different prices depending on the city's positioning (see Table 2).Three categories of poacher characters evolving in PAs including armed groups, FARDC and PL. The nature and origin of these armed groups are different. We have LRA poachers, Libyan poachers, Republic Central Africa poachers, Sudanese poachers, Mbororo, FDLR, Simba, and Mai-Mai. The figure of 1908 elephants killed for a period of 14 years which shows a loss of 136 elephants per year. Despite the confirmation of the local population to support and little confidence that they give to the managers of PAs of their village, the managers of these PAs unworthy the behavior of the LP by the direct or indirect way (by complicity) of the Destabilization of the good management of PAs.

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References

Agger, K., and Hutson, J. (2013). "Kony's Ivory: How Elephant Poaching in Congo Helps Support the Lord's Resistance Army."

Amare, A. (2015). Wildlife Resources of Ethiopia: Opportunities, Challenges and Future Directions: From Ecotourism Perspective: A Review Paper. *Natural Resources***6**, 405.

Barnes, R., Blom, A., and Alers, M. (1995). A review of the status of forest elephants Loxodonta africana in Central Africa. *Biological Conservation***71**, 125-132.

Beck, H. (2006). A review of peccary-palm interactions and their ecological ramifications across the Neotropics. *Journal of Mammalogy***87**, 519-530.

Blake, S. (2005). Forêts d'Afrique centrale: rapport final sur les relevés démographiques d'éléphants (2003-2004). *WCS, Washington*.

Bolaños, N. C. (2012). Aerial animal census 2012.

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

Chevalier, A. (1933). Le territoire géo-botanique de l'Afrique tropicale nord-occidentale et ses subdivisions. *Bulletin de la société botanique de France***80**, 4-26.

Duffy, R., and St John, F. (2013). Poverty, Poaching and Trafficking: What are the links?

Emmons, L. H. (1989). Jaguar predation on chelonians. *Journal of Herpetology***23**, 311-314.

Fairhead, J., and Leach, M. (1995). False forest history, complicit social analysis: rethinking some West African environmental narratives. *World development***23**, 1023-1035.

Fragoso, J. M. (1997). Tapir-generated seed shadows: scale-dependent patchiness in the Amazon rain forest. *Journal of ecology*, 519-529.

Hart, J. (2010). Congo's Elephants today: Development of a Conservation Strategy for Elephants in the Democratic Republic of Congo. 11.

Heus, M., and en Evolutie, G. Conservation management of wildlife parks.

Hilde, V., Philippe, H., Cyril, P., WCS, M. D., and Arnaud, G. LARGE MAMMALS & HUMAN IMPACT LARGE

MAMMALS & HUMAN IMPACT SURVEY UPEMBA & KUNDELUNGU National Parks KUNDELUNGU National Parks Democratic Republic of Congo Democratic Republic of Congo, November, November.

Hillmann-Smith, K. (1989). "Ecosystem Resource Inventory, Garamba National Park." Internal Report to IZCN, IUCN, WWF, FZS & Unesco.

Keuroghlian, A., and Eaton, D. P. (2009). Removal of palm fruits and ecosystem engineering in palm stands by whitelipped peccaries (Tayassu pecari) and other frugivores in an isolated Atlantic Forest fragment. *Biodiversity and Conservation***18**, 1733.

Kingdon, J. (1990). "Island Africa: the evolution of Africa's rare animals and plants," Collins London.

Kümpel, N. F., Quinn, A., Queslin, E., Grange, S., Mallon, D., and Mapilanga, J.-J. (2015). Okapi (Okapia johnstoni): Conservation Strategy and Status Review. *Gland, Switzerland: IUCN and Institut Congolais pour la Conservation de la Nature*, 58.

Laburthe-Tolra, P. (1981). "Les seigneurs de la forêt," Université René Descartes.

Lawson, K., and Vines, A. (2014). "Global impacts of the illegal wildlife trade: The costs of crime, insecurity and institutional erosion."

Lindsey, P. A., Balme, G., Becker, M., Begg, C., Bento, C., Bocchino, C., Dickman, A., Diggle, R. W., Eves, H., and Henschel, P. (2013). The bushmeat trade in African savannas: Impacts, drivers, and possible solutions. *Biological Conservation***160**, 80-96.

Mashini, M. C., Mabita, M.C., Shabani A.N. (2017). Le marché de l'ivoire d'éléphant à Kinshasa, RD Cocgo: 20152016. *TRAFFIC DRC*, 46.

Mònico, M. (2014). Aerial Survey March 2014, Parc National de la Garamba, République Démocratique du Congo. 42.

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

Ogutu, J. O., Piepho, H.-P., Said, M. Y., Ojwang, G. O., Njino, L. W., Kifugo, S. C., and Wargute, P. W. (2016). Extreme wildlife declines and concurrent increase in livestock numbers in Kenya: What are the causes? *PloS one***11**, e0163249.

Okello, M. M. (2012). The contraction of wildlife dispersal areas by human structures and activities in Mbirikani Group Ranch in the Amboseli Ecosystem, Kenya. *International Journal of Biodiversity and Conservation***4**, 243-259.

Pyhälä, A., Osuna Orozco, A., and Counsell, S. (2016). Protected areas in the Congo basin: failing both people and biodiversity. *Rainforest Foundation-UK, London*.

Redford, K. H. (1992). The empty forest. *BioScience***42**, 412-422.

Savidge, J., Woodford, M., and Croze, H. (1976). "Report on a Mission to Zaire FAO W." K1593 KEN/71/526–ZAI/70.

Titeca, K. (2013). "Out of Garamba, into Uganda. Poaching and trade of ivory in Garamba National Park and LRAaffected areas in Congo." Universiteit Antwerpen, Institute of Development Policy and Management (IOB). van Vliet, N., Nebesse, C., Gambalemoke, S., Akaibe, D., and Nasi, R. (2012). The bushmeat market in Kisangani, Democratic Republic of Congo: implications for conservation and food security. *Oryx***46**, 196-203.

Van Vliet, N., Nguinguiri, J. C., Cornelis, D., and Le Bel, S. (2017). Communautés locales et utilisation durable de la faune en Afrique centrale.

Yobo, C. M., and Ito, K. (2016). Evolution of policies and legal frameworks governing the management of forest and National Parks resources in Gabon. *International Journal of Biodiversity and Conservation***8**, 41-54.

Born Free, 2007 'Ivory trade, worldwide': visited December 20th, 2017http://www.bornfree.org.uk/animals/africanelephants/projects/ivory-trade/

UNESCO: World Heritage Centre: visited January 15th, 2018.http://whc.unesco.org/