Universitat Autònoma de Barcelona

Ethnoecology of hunting in an empty forest. Practices, local perceptions and social change among the Baka (Cameroon)

Romain Duda

Ethnoecology of hunting in an empty forest.

Practices, local perceptions and social change among the Baka (Cameroon)

PhD Dissertation

Romain Duda

Under the supervision of:

Dr. Victoria Reyes-García Dr. Serge Bahuchet

PhD Programme in Environmental Science and Technology
Institut de Ciència i Tecnologia Ambientals, ICTA
Universitat Autònoma de Barcelona, UAB

June 2017

British English spelling and conventions are used in this work.

ACKNOWLEDGMENTS

I first wish to express my sincere gratitude to Professor Victoria Reyes-García. Being supervised and supervised and encouraged by such an experienced scientist was a real chance. Thanks to her patient guidance, I overcame all the shortcomings of a fairly hybrid university cursus, and learned with her the codes of the academic writing and analytical methods. I am grateful to her for having accepted me thank the LEK project and, at the end, for reading and correcting so many proofs of this work until the last moment.

Special thanks should be given to Professor Serge Bahuchet. This thesis highly benefited from his great experience, and his advice has always been useful. Spending a year in his country house, amid his memories and things, between the wooded souls of Central Africa and the fragile Japanese prints and pots, was an enormous source of inspiration for me.

To be supervised by these two directors was both a chance and a challenge, namely to concile two very different and sometimes antagonistic approaches to anthropology. I hope I have succeeded at least in part, and that they both find in this manuscript some source of satisfaction.

I am obviously grateful to Sandrine Gallois, who was in a way the third co-director of this thesis. What we shared together in Cameroon was life-changing. Your courage, your sensitivity and your strength are outstanding and I could not have completed this thesis without you and your unflinching support.

I would like to thank my research assistants and translators (but above all friends) in Cameroon. Ernest Isidore Simpoh for having invested so much energy in our research work, his tenacity, his desire to learn and his spirit of initiative will no doubt make him a reference person in the area for many other researchers. You are the ideal mediator and advocate for the Baka and Nzime cause. Thanks to Appolinaire Ambassa, "l'Ambassadeur" who learned so quickly to leave his cassava and his snare traps to conduct interviews and share his own knowledge with us.

My stays on the field would not have been possible (or not as pleasant), without the help of Alain Fezeu, IRD driver. I will always remember the morning when, trembling with tears, you pushed me into the Land Rover, because after a 12 months of attachment you knew that one must leave quickly, without looking back, without saying goodbye, since you knew well before me that with the Baka people one does not leave, one only comes back. It is a just a matter of seasons.

My most intimate gratefulness goes toward this end of the route, to this warm forest unknown to all but where part of the heart of the world is beating with so little means. Where tirelessly every night falls into the lament of the Hyraxe and the women's songs, where tomorrow, for people, exists only so little. In these moments of voluntary exile one relies more on other humans than on protocols, the cultural distance reduces and one discovers and constructs a bond one once thought impossible. I thank this village where I was in spite of myself both "le Père" and the child of each person. I thank the old sages. First of all Papa Mpina, whom I knew very well that from his Momban encampment he protected me from all the spells that threatened me. I thank Akpangui and Noni, Hine and Libala, Andopa, Akpakua and Camille, Ina and Mekpa, Aloh, Wulo, Mathurin and David, elsewhere: Jean Ambassa, Janvier and Alamba. I would never forget the place they gave me and their daily protection. An emotional thought for those who left this world in my absence: Moyunda Martin the old chief, Soma great holder of all the knowledge, Yan the 'Old White'. My life on the spot would obviously not have been sustainable without the welcome and protection of some good people from the Nzime village, especially His Highness Ebeh Antoine for accepting my presence in his village, Alexandre Tjoélé for his kindness and his enthusiasm to share with me his knowledge on history and local culture, Laïs, Beng Basile and Rosalie. Finally, a big thank you to Mother Madeleine, who considered me as her own son, and whose generosity has earned her the nickname "La Mère".

I would like to express my gratitude those who took the time to read parts of my thesis, and provided insightful comments, an essential step of confidence-building, in chronological order: Ana Catherina Luz, Álvaro Fernández-Llamazares, Kelly Hopping, Marine Robillard, Aili Pyhälä, Matthieu Salpetteur, Camille Oloa Biloa and Camille Manfredi. Thanks to my friend Christophe Révillon who, although worlds apart, helped me make these maps. I obviously have a friendly thought for those with whom I have been living for these past few months: Nastassia Reyes, Anouck Bessy, with who I share the torments of the writing marathon. Thank you to all those who accompanied me during the different stages of this work, who listened to me and helped me so gracefully: Adèle de Palaminy, Pauline Laval, Vanessa Cholez, Julie Scapino, Clément Garineaud, Maya Leclerc, Victor Narat, and Marine Legrand.

I have a special thought for the remarkable LEKipo team whose members support each other whether they be in Borneo rainforests or along the Maniqui river in Bolivian Amazon. Merci Álvaro Fernández-Llamazares, Isabel Diaz-Reviriego, Tezza Napitupulu, Aili Pyhälä and Maximilien Guêze. Thank you for all those moments we shared in Barcelona, in Betesa or in the Bhutanese Himalaya.

I am grateful to the members of the Ethnobiology and Eco-anthropology laboratory, this welcoming home in which I have been growing up since my M.A. I notably thank Richard Dumez, Jeanne Le Duchat, Françoise Aubaile and Alain Froment. I especially wish to thank Alain Epelboin whose enlightening comments in the mystical and nebulous atmosphere of his office have steered my vision of field anthropology, observation in sharing, practice of the 'baguenaude' and floating observation, as well as fuelled my curiosity and encouraged me to challenge the way one looks at the world. My taste for images made sense to him, who also considers film as a necessary avatar of the observer's gaze. Without him, I would not have exhumed hours of film and found in this medium a tool that speaks more than anything else. His assistance with film editing was simply decisive.

Other great researchers provided me insightful help at different stages of the thesis. In Yaounde, Patrice Levang help me feel confident in Cameroon, as well as all the CIFOR and IRD team. A special thank to Edmond Dounias for his help during the last month of writing.

Throughout these past five years, Marine Pouvreau has to be warmly thanked, she was present at a distance. I thank Kelly Hopping for sharing so much with me, from Bhutanese mountains and bridges to the plains of Colorado. My Northern friends, Vianney (now for us serene plains and valleys), Camille, Lou and Vincent, among plenty of others, who made me put this academic work into perspective with the joy of living. My friends from Brittany also deserve my gratitude for this full year of peace and silence spent in the Vau d'arz eden in Morbihan: Julie, Anthony, Christophe, Anne, Anne-Lyse and Timy. Thanks also to Yann Jézequel and Camille Seynhaeve who made me see the field differently by joining me in the Baka village. I thank my parents, Roseline and Michel and my brothers, for believing in me, for supporting me in this unexpected adventure, who accepted ~~for long~~ my aversion for sedentary life. So happy that you came to the village Baka to share with me the plain cassava, the mosquitoes and the delicious elephant and monkey meat... Thank you for offering me, tirelessly, year in, year out, world atlases whose contemplation when I was a child, gave me the desire to leave everything behind, in short to see elsewhere how to turn the world'.

Finally, a warm "thank you" to Lydia Sevette for her love, her daily support, and her patience especially during the last months of this thesis. You endured, sometimes more than I did, the tremendous daily life of the Ph.D student in the home stretch.

CONTENTS

LIST OF TABLES

List of figures

PREFACE

This thesis has been developed within a five-year research project entitled "The adaptive nature of culture: a cross-cultural analysis of the returns of Local Environmental Knowledge in three indigenous societies" based at the Institut de Ciència i Tecnologia Ambientals of the Universitat Autònoma de Barcelona (UAB), in Spain. The thesis was funded during three years by a Starting Grant of the European Research Council (FP7-261971-LEK) to Dr. Victoria-Reyes-García, director of the thesis. Complementary fieldwork was later funded by the Laboratoire d'Ethnoécologie & Eco-anthropologie (UMR 7206) of the French Museum of Natural History (Musée de l'Homme) where I have been host during the last 18 months of this work under the supervision of Dr. Serge Bahuchet, co-advisor. This work included 14 months of fieldwork in southeaster Cameroon, divided in three periods, one of them a one year stay. The thesis is composed by six chapters, of which four are research chapters, including one published in a scientific journal. Two more scientific publications derived from this work are in preparation. Additional publications complementary to this Ph.D. project are listed in the Appendices.

Abstract

As other tropical forest areas, Central Africa shelters both a high biodiversity and many local communities who depend on it for their subsistence. However, conservation policies enforced in such contexts rarely succeed to conceal human development and ecosystem sustainability. Conservationists consider subsistence hunting as a major hurdle to wildlife conservation, but for local populations hunting is deeply embedded in cultural identity, diet, economy, and social and symbolic practices. In this context, this thesis examines the tensions between subsistence hunting and defaunation. Defaunation of Central African forests is driven by a multiplicity of factors including the complex entanglement of wildlife in a wide range of apparently incompatible values and priorities. Beyond Western concerns regarding ecosystems sustainability and the intrinsic value of animal species, defaunation also generates concerns related to food security, public health (epizootics), indigenous rights, and even national security (in relation to ivory trafficking). Despite these tensions, the understanding of the human and social dimensions of the "bushmeat crisis" remains underexplored.

This thesis explores the socio-cultural aspects of hunting and wildlife crisis through data collected during 14 months of fieldwork in two Baka villages of southeaster Cameroon. The Baka live in a context polarized by conservation measures on one side and economic incentives for bushmeat trade on the other. This thesis provides a broad view of how the Baka society reacts to a fast changing context where fauna has become a major stake. To do so, I analyse the way Baka hunt, consume, and commercialize wild meat, but also how they interpret environmental changes and their potential impacts on social structure and wellbeing. Through the different chapters of the thesis, I using an ethnoecological approach and combine data collected through qualitative and quantitative methods. Specifically, I used systematic surveys to collect data on informants' (n=269) socio-economic characteristics, hunting outputs, hunting knowledge, status, and meat consumption. These data are associated with information from semi-structured interviews and from insights generated during long periods of participant observation.

For the Baka, the acquisition and sharing of wild meat remains a critical symbolic and social practice, although the context of hunting seems to have changed to what was previously described. Nowadays, the Baka hunt and consume mostly small mammals, notably rodents, in a landscape seemingly depleted due to past over hunting. Hunting is not equally practiced by all the Baka: while most Baka have relatively low hunting outputs, some others –pushed by economic incentives and the unregulated presence of shotguns in the area- seem to be largely involved in bushmeat trade. Variations in hunting practices relate to variations in hunting knowledge and skills, which in turn are reflected on different social status. Previous patterns of status attribution to hunters are, however, being altered arguably because of the decrease in bushmeat sharing, notably by elephant hunting specialists. Finally this thesis shed light upon Baka perceptions on wildlife changes and conservation measures, a process that is mostly negatively perceived by the Baka, who express feelings of marginalisation and fear due to the use of force and abuses from conservation agents.

This thesis is the first to provide a deep analysis of hunting in the current context of Baka populations. It highlights intracultural variations on social aspects related to hunting, such as diet, status, income, and social perceptions. At the applied level, this work suggests that current conservation policies critically need a full understanding of local people's cosmovisions, reactions to changes, and the consequences of both defaunation and imposed conservation measures on their social, economic and cultural frameworks.

Resumen

África Central, al igual que otras áreas de bosques tropicales, alberga una alta biodiversidad, así como diversas comunidades indígenas que dependen de estos bosques para su subsistencia. Sin embargo, hasta la fecha, las políticas de conservación en esta región raras veces han logrado conciliar el desarrollo humano y la sostenibilidad de los ecosistemas. Los conservacionistas consideran la caza de subsistencia como el principal obstáculo para la conservación de la fauna silvestre. Sin embargo, para las comunidades locales, la caza es importante para aspectos relacionados con su identidad cultural, su dieta, su economía, y sus prácticas sociales y simbólicas. En este contexto, esta tesis examina las tensiones entre la caza de subsistencia y la defaunación. La defaunación en los bosques de África Central se debe a una multiplicidad de factores que incluyen el complejo entramado de la fauna salvaje en valores y prioridades aparentemente incompatibles. Más allá de las preocupaciones occidentales sobre la sostenibilidad de los ecosistemas y del valor intrínseco de las especies animales, la defaunación genera también preocupaciones relacionadas con la seguridad alimentaria, la salud pública (epizoótica), los derechos indígenas, e incluso la seguridad nacional (en relación al tráfico de marfil). Pese a estas tensiones, no son muchos los estudios que abarcan las dimensiones sociales y humanas de la crisis de la defaunación.

Esta tesis explora aspectos socio-culturales de la caza y de la crisis de la fauna silvestre con datos recolectados durante 14 meses de trabajo de campo en dos pueblos Baka en el sureste de Camerún. Los Baka viven en un contexto polarizado entre, por un lado, medidas de conservación, y por el otro, incentivos económicos del mercado de la carne de animales silvestres. La tesis ofrece una visión general de cómo la sociedad Baka responde ante un contexto de cambios rápidos y en el que hay un gran interés por la fauna silvestre. Para ello, se analiza la manera en que los Baka cazan, consumen y comercializan carne de animales silvestres, pero también cómo interpretan los cambios ambientales y sus efectos sobre la estructura social y el bienestar. Usando una perspectiva etnoecológica, esta tesis combina datos recolectados con métodos cualitativos y cuantitativos. Se emplean encuestas sistemáticas para la toma de datos sobre las características socioeconómicas, los resultados de las cacerías, los conocimientos de caza, el estatus, y el consumo de carne de 269 informantes. Esta serie de datos está apoyada con entrevistas semi-estructuradas y observación participante de larga duración.

Para los Baka, adquirir y compartir carne silvestre sigue siendo un objeto social y simbólico de crucial importancia. Los Baka cazan y consumen principalmente pequeños mamíferos, específicamente roedores, en un paisaje aparentemente defaunado debido a las altas presiones de caza. La caza no es practicada de la misma forma por todos los Baka: mientras que la mayoría de las personas ejercen una baja presión de caza sobre la fauna local, otros parecen haberse especializado en esta actividad debido a los incentivos económicos y la falta de regulación sobre las armas de fuego en el área. Las variaciones individuales en las prácticas de caza se relacionan con variaciones en los conocimientos y prácticas de caza, que a su vez se reflejan en un estatus social diferente. Los patrones tradicionales en la atribución de estatus social se ven alterados por las percepciones locales y la disminución del intercambio y la distribución de carne de caza en la sociedad Baka, específicamente por parte de los especialistas en la caza de elefantes. Finalmente, esta tesis da voz a las percepciones de los Baka acerca de los cambios en la fauna salvaje y las medidas de conservación, medidas percibidas negativamente por los Baka quienes expresan sus sentimientos de marginalización y miedo debido al uso de la fuerza y los abusos de los agentes encargados de la conservación.

Esta tesis es la primera en hacer un análisis profundo de la caza en el contexto actual de las poblaciones Baka, resaltando las variaciones intraculturales de los aspectos sociales relacionados con la caza, tales como la dieta, el estatus social, los ingresos y las percepciones sociales. A un nivel más amplio, esta tesis sugiere que las políticas actuales necesitan de un entendimiento crítico y completo de las cosmovisiones, y las reacciones a los cambios de las poblaciones locales, así como de las consecuencias de la defaunación y las medidas de conservación en el marco social y cultural.

Résumé

A l'instar d'autres zones de forêts tropicales, l'Afrique Centrale abrite à la fois une importante biodiversité et de nombreuses communautés locales dont la survie dépend de l'équilibre de cet écosystème. Cependant, les politiques de conservation qui y sont appliquées réussissent rarement à concilier les impératifs du développement humain et de l'équilibre de l'écosystème. Les acteurs de la conservation considèrent la chasse de subsistance comme un des obstacles à la conservation de la faune tandis que les pratiques de chasse sont, pour la population locale, inextricablement liées à leur identité culturelle, leur mode de subsistence, leur économie ainsi qu'à des pratiques sociales et symboliques. Dans ce contexte, cette thèse se propose de s'interroger sur les tensions qui existent entre la chasse de subsistance et la réalité du déclin de la faune. Le déclin de la faune dans les forêts d'Afrique Centrale est la conséquence de multiples facteurs, notamment de l'imbrication de la faune dans une diversité de valeurs et de priorités apparemment imcompatibles. Au-delà des préoccupations occidentales, principalement orientées vers la durabilité des écosystèmes et la valeur intrinsèque des espèces animales, la réalité du déclin de la faune génère des préoccupations liées à la sécurité alimentaire, à la santé publique (épizooties), aux droits des populations autochtones et même à la sécurité nationale (concernant le trafic d'ivoire en particulier). La compréhension des dimensions humaines et sociales de la «crise de la viande de brousse» reste sous-explorée, en dépit de la réalité de ces tensions.

Cette thèse se propose d'étudier les aspects socio-culturels de la crise qui concerne la chasse et la faune sauvage au travers de données collectées au cours d'un terrain de 14 mois dans deux villages Baka du Sud-Est du Cameroun. Les Baka évoluent dans un contexte polarisé entre les mesures de conservation d'une part et les avantages économiques liés au commerce de viande de brousse d'autre part. Cette thèse offre un aperçu général des réactions de la société Baka face à un contexte changeant, où les enjeux autour de la faune sont devenus majeurs. Pour ce faire, j'y analyse les pratiques de chasse des Baka, la consommation et la commercialisation de viande sauvage, mais également leur interprétation des changements environnementaux et de ses effets potentiels sur l'organisation sociale et le bien-être. J'emploie une approche ethnoécologique en alliant des données collectées à l'aide de méthodes qualitatives et quantitatives. Les enquêtes systématiques ont été réalisées auprès de 269 informateurs des données concernant leurs caractéristiques socio-économiques, rendements de chasse, savoir et savoir-faire, statut social et consommation de viande. Ces données sont associées à des informations issues d'entretiens semi-directifs et de longues périodes d'observation participante.

Bien que le contexte de la chasse a récemment enduré d'importants bouleversements, l'acquisition et le partage de la viande sauvage demeure pour les Baka un pratique hautement symbolique et sociale. De nos jours les Baka chassent et consomment essentiellement de petits mammifères, notamment des rongeurs, dans un environnement vraisemblablement appauvri par de fortes pressions de chasse. La chasse n'est pas pratiquée de la même manière par tous les Baka : alors que la plupart des Baka ont des rendements de chasse relativement bas, d'autres – poussés par des motivations économiques et l'absence de réglementation concernant les fusils de chasse dans la région – semblent être largement impliqués dans le commerce de gibier. La variabilité des pratiques de chasse est liée aux savoirs et aux aptitudes de chasse, qui se reflètent à leur tour dans différentes formes de statuts sociales. Cependant, les anciens schémas d'attribution des statuts accordés aux chasseurs ont vraisemblablement été modifiés par le déclin des pratiques de partage du gibier, concernant en particulier les spécialistes de la chasse à l'éléphant. Enfin, cette thèse fait la lumière sur la perception qu'ont les Baka des modifications de la faune sauvage et des mesures de conservation, un processus perçu généralement négativement par les Baka, qui expriment leur crainte et leur sentiment de marginalisation dûs à l'usage de la force et aux abus commis par les agents en charge de l'application des réglements sur la chasse.

Il s'agit de la première étude à fournir une analyse approfondie de la chasse que pratique les Baka dans le contexte actuel. Elle met en évidence les variations intra-culturelles concernant des aspects sociaux tels que le régime alimentaire, le statut social, les revenus et les perceptions. Ce travail suggère la nécessité cruciale pour les politiques de conservation actuelles d'accéder à une pleine compréhension des cosmovisions et des réponses des populations locales face aux changements, ainsi que des effets des mesures de conservation sur leur organisation sociales, économiques et culturelles.

Acronyms and abbreviations

AAPPEC : Association pour l'autopromotion des peuples de l'Est Cameroun
BIR : Bataillon d'intervention Rapide
CBD : Convention on Biological Diversity
CED : Centre pour l'Environnement et le Développement
CFA : Communauté Financière Africaine
CHZ : Community hunting Zone
CITES : Convention on International Trade in Endangered Species of Wild Fauna and Flora
CPF : Comité Paysans-Forêts
CVV : Comité de Vigilance Villageoise
DRC : Democratic Republic of Congo
ECOFAC : Ecosystèmes Forestiers d'Afrique Centrale
ERC : European Research Council
GIZ : German Cooperation Agency (previously GTZ, Gesellschaft für Technische Zusammenarbeit)
ILO : International Labour Organization
IUCN : International Union for Conservation of Nature
LEK : Local Ecological Knowledge
MINEF : Ministère de l'Environnement et des Forêts
MINFOF : ministre des Forêts et de la faune
NGO : Non-gouvernmental Organisation
NP : National Park
NTFP : Non Timber Forest Product
NZ : Nzime
PPP : Purchasing Power Parity
SI : Survival Internatinal
SNV : Stichting Nederlandse Vrijwilligers (Dutch Development Organisation)
TRIDOM : Trinational Dja - Odzala - Minkebe
UNEP : United Nations Environment Programme
WWF : World Wide Fund for Nature

FOREWORD

I report local names in phonetic typography, using as reference the dictionary made by Robert Brisson (2010). Baka terms appear in NL3 font (New Lacito 3). The following tables present the different sounds in the Baka language (Fitzgerald, 2011).

Baka consonants

	Bilabial		Dental alveolar		Palatal	Velar		Labio-velar		Pharyngeal	Glottal
Nasal		m		n	ɲ		ŋ				
Plosive		b	t	d		k	g	kp	gb		'
Fricative	ɸ	w	s		J					h[23]	
Affricative				dz							
Prenasalized		mb	nd	ndz			ng		ŋgb		
Lateral											
Trill				(r)[24]							
Implosive		ɓ		ɗ							

Baka vowels

	Front	Central	Back
Closed	i		u
Half closed	e		o
Half open	ɛ		ɔ
Open		a	

In addition, Baka language owns three different tones: the high tone: **é**; the low tone: **è**; and the mid tone: left **e** in the text.

Terms in Baka language are noted in bold, excepted terms that appear regularly in the manuscript : tuma, kobo, nganga.

The Baka language presents numerous cases of lexical borrowing. Loanwords are mainly Bantu terms, and specially ko-nzime, but are sometimes of non identified origin. They will be notified and followed by (nz).

Introduction

1. Background, rationale, and objectives

1.1. Background and motivations

The last decades have seen the preservation of biodiversity becoming a crucial and unprecedented challenge. This awareness has been driven by contemporary concerns to maintain biodiversity intrinsic value, but also its functional balances and the ecosystem services from which humans, among other species, benefit. Because of the diversity of ecosystems and the multiplicity of drivers of biodiversity loss, the environmental crisis has a wide variety of forms and scales.

In Central Africa hunting constitutes one of the major challenges for biodiversity conservation (Wilkie et al., 2011). This is so, largely because hunting is a two-sided coin. On one side, overhunting – and notably the illegal wildlife trade - has made the conservation status of some game species alarming (Taylor et al., 2015), to the point that researchers and conservation NGOs have typically referred to the rapid defaunation in the area as the "bushmeat crisis" (Bowen-Jones & Pendry 1999), potentially leading to a situation of creating "empty forests," void of large mammals (Redford, 1992; Wilkie et al., 2011). On the other side, wild meat consumption remains an essential component of local peoples' livelihoods and culture (Bennett & Robinson, 2000), a main source of protein in an environment unsuitable for animal husbandry (Kümpel et al., 2010), and also an occasional source of income (Angelsen et al., 2014). Consequently, the unsustainable harvest rates of wild animals in the area might -ultimately- lead to socio-ecological perturbations (Robinson & Bennett, 2004; Brashares, et al., 2011) potentially even compromising food security and local livelihoods (Nasi et al., 2011).

With the aim to halt this unprecedented biodiversity loss, large conservation initiatives and measures have been put into place, notably since the Convention of Biological Diversity (CBD, 1992). However, top-down enforcement of conservation models based on western view shows strong limitations in tropical regions (Cooney et al., 2016), where areas of high biodiversity are often overlapping with local peoples' territories. For example, if the establishment of protected areas has often allowed to slow down biodiversity decline, the new forms of regulations, territorial zoning, and use of force to enforce the law have however generated negative social impacts at the local scale (Joiris et al., 2014). the growing awareness of the need to take action at the community-level seen over the last decades is encouraging, but at of today even this model do not seem to be efficient in Central Africa. For some authors, a better reflection about local empowerment, incentives, costs and benefits-sharing will be part of effective responses (Cooney et al., 2016).

One major hurdle to address defaunation in the Congo Basin is the deep antagonism existing between the way local people appropriate and relate with their environment and western views of nature, i.e., views of tropical forest areas either as a reservoir of biodiversity that must be protected or as a reservoir of resources that must be exploited to favour economic development. In addition, the way in which conservation measures are implemented in some areas (i.e., using force to restrict rights, hunting grounds, methods and species targeted) might have severe impacts on local livelihoods, already affected by environmental problems (Ichikawa et al., 2016). The use of force to implement conservation regulations also generates negative reactions and animosity toward conservation ideas. Very recently, the problem has been fuelled by the broadcasting of local people's testimonies of abuses from ecoguards in charge to enforce anti-poaching (Survival International, 2016; see also Matsuura, 2017; Lewis, 2016). This situation reflects the harmful side effects of a "war for wildlife" (Duffy, 2014), but also polarized the advocacy discourses between human rights on one side or animal rights advocacy on the other (Remis & Hardin, 2009; Sanderson & Redford 2003).

In this sensitive context, concealing wildlife conservation with the maintenance of local livelihoods has become an urgent dilemma both for the sustainability of the Central African forests and the wellbeing of their local populations. Understanding the local perceptions of ongoing changes, notably by focusing on hunting, is thus critically required to anticipate future social and ecological changes and to construct a more sustainable economy and a more viable environmental policy that preserve both human wellbeing and the maintenance of species and ecosystem diversity.

In addition of being a conservation issue, bushmeat hunting, trade and consumption are also prominent subjects in terms of public health. The poor regulation of the growing bushmeat trade might lead to the non-respect of food safety practices at several levels: wild animals killed, butchering, preparation, transport, and consumption (van Vliet et al., 2017). Zoonosis transmission might then occur at several stages of the bushmeat chain, by –for example- putting people in contact with animal body fluids, and not only by meat consumption (Le Breton et al., 2006). In addition to bacterial and parasite infections, several viruses can be transmitted from animals to humans (Wolfe et al, 2004), concerning mostly primates, apes and chiropters. As an example, since 1994, in Gabon and then in Congo, and in 2012-2014 in Western Africa, epizootics decimating gorilla and chimpanzee populations have triggered human epidemics of Ebola haemorrhagic fevers. Such epidemics have warned conservationists, scientists, and authorities who have mobilized against apes' hunting and consumption (Epelboin et al., 2012). Interestingly, this situation has also been used as a Trojan horse

to achieve wildlife conservation ends (Pooley et al., 2015). Sanitary crises have ultimately succeeded to shed light on the importance to take into account the socio-cultural dimension of hunting and the local representation of wildlife (Epelboin & Fomenty, 2011).

1.2. Rationale

Over the last two decades, ecologists and conservation biologists have dominated research on the relations between hunting practices and wildlife. Studies on the "bushmeat crisis" led to an enormous amount of scientific work seeking to understand the impacts of over-hunting on ecosystems, its social and economic origins, or attempted to define sustainability thresholds by measuring hunting rates (Milner-Gulland & Bennett, 2003; Ripple et al., 2016). However, research on the relations between hunting practices and wildlife has rarely taken into account the human context, i.e. the interactions between cultural and ecological dimensions, bringing in the social or the anthropological perspective (Hardin et al., 2008; van Vliet & Nasi, 2008; Nasi et al., 2011; Lescuyer, 2013). In other words, such research has often reduced hunting practices and human presence to one more pressure on the ecosystem, thus neglecting the sociocultural aspects leading to prey choices, the intracultural variations in foraging decisions, or the social representations of wildlife.

For societies living in daily interaction with the environment, the core of their practices, knowledge and perceptions might be inherently dependant on wildlife. Therefore, an ethnoecological reasoning would lead to questioning how over-hunting and defaunation might alter the functioning of the society at all its levels, including its social organization, its economy, its relation to the environment, its worldview, and the like. At some other scales, we might also consider in this "changing environment" the intrusion of external economic and political systems, which might bring new rules, norms or values in a society. Consequently, the question also arises as to how environmental policies might affect social organization and cultural representations.

As many forest areas, Central African forests are a challenging territory where economic, political, and environmental perspectives meet (Hardin, 2005). In this very diverse ecological system current environmental policies attempt to deal with different cultural practices and values. The case is particularly relevant for the enforcement of hunting regulations, as hunting carries locally a strong social and cultural legitimacy (Lescuyer, 2013). Among the 150 distinct ethnic groups living all across the Congo Basin, some are more deeply related to wild animals and meat given their hunting and gathering traditions and way of thinking, and consequently a focus on these societies match well with the motivations of this dissertation.

This is the case for the Baka who form a society of (formerly strict) hunter-gatherers characterized by a strong attachment to forest, a high mobility based on a flexible residency pattern, and a vision of resources based on an egalitarian system, notably food sharing (Bahuchet, 1990, 1992). The Baka bear complex and dense knowledge on forest environment (Ichikawa et al., 2001), and their hunting practices are known to be at the core of social and ritual events (Joiris, 1998). Not culturally isolated, they are anciently related to other ethnic groups more involved in a slash-and-burn

farming subsistence. Relations between the Baka and their neighbours have evolved in time and might still be extremely changing from place to place given the societies in contact.

While they experienced important changes, the Baka seem to adapt by keeping priorities to their own social norms and purposes. While they adopted agriculture in the course of the 1960-1970s, they still manage to combine it with a very mobile lifestyle (Leclerc, 2012). Moreover, monetization seems not to have aliened their economy, as money appears to be handled and appropriate within their own social conception of the exchange and sharing (Kölher, 2005). The most significant changes in Baka environment are, surely, related to land uses. The increasing logging (and mining) exploitation, and the imposition of a legal framework have restricted Baka access to forest and their subsistence practices, and affected their freedom of moving, their customary land-use, and their wellbeing; moreover, this imposition reinforces a pre-existing marginalisation and stigmatisation (Ichikawa, 2014). In the same line, the western conservation paradigm has imported new regulation norms hindering the traditional Baka way of hunting and the evolution of socioeconomic conditions has affected Baka social structure in which hunting is embedded. Today, the most knowledgeable hunters are solicited in an unprecedented way to provide wild meat and ivory to a booming market from which they rarely benefit.

1.3. Objectives and aims of the thesis

This thesis aims to understand the socio-cultural responses to wildlife crisis within a society of hunter-gatherers, the Baka of south-eastern Cameroon, who is now at the core of a tension between biodiversity conservation and economic development. It attempts to understand how the current context is shaping social and individual reactions, practices and uses, notably related to hunting, a central element of traditional social organization. Within this main overarching question, this thesis has multiple objectives which reflect the equally multiple functions of hunting and meat among the Baka. The specific goals of this thesis are:

- To examine individual variations in the hunting strategies employed by the Baka. The hunting strategies described in the literature do not allow evaluating individual differences, and thus hide potential variations in the society. Since groups are not socially uniform, I question, on the basis of individual variations, the technical choices of Baka hunters according to their socio-economic profile (Chapter 4).

- To question the place given by the Baka to wild meat. Hunting and consumption patterns are difficult to separate and are governed by social, cultural, and individual avoidances and preferences. The thesis will examine how the perception of the animal can affect hunting practices and inversely if current hunting practices undermine meat consumption (Chapter 5).

- To explore changes in social status associated to hunting. Hunting is a matter of knowledge and skills and some types of hunting are performed only by knowledgeable and skilful specialist, who, in hunter-gatherer societies, often enjoy more prestige than others. The thesis questions the

recent social and economic changes on the social structure of the Baka and in particular changes on the status and prestige given to great hunters (Chapter 6).

- To understand the Baka's perceptions of current changes in the wildlife regime. Large mammals are said to be profoundly dwindling around human settlements due to over-hunting. The thesis attempt to evaluate the knowledge of the Baka regarding such an environmental change, and how they perceive and explain the changes (Chapter 7).

- To explore how the implementation of conservation policies affects the organisation of the society, and how the Baka respond to coercive measures of hunting regulations (Chapter 8).

2. Theoretical background

An *ethnoecology of hunting* is necessarily an interdisciplinary enterprise that calls for different scientific discourses on various aspects of the human-environment relation. This section provide a summary account of how hunting dovetails with various wider issues and scientific debates about the relation between indigenous people and resources use and conservation, and the role of culture in mediating these relations.

2.1. Society and environment: emergence in sciences

The second half of the twentieth century saw the progressive interest of anthropology toward ecological issues in general and the relation between societies and local environments in particular. This movement led to the creation of multiple sub-disciplines, generally grouped under the wide term of 'environmental anthropology'. The relations between societies and their environment have firstly been the core of the cultural ecology, initiated by Steward (1955) who highlighted the human adaptation in terms of adjustment to the local environment through the flexible agent of culture (Bahuchet, 1985). In the 1960s, some scholars started to refine the lens by refocusing the unit of analysis on the ecosystem (Ellen, 1988). Thus, following Steward's line, Harris founded the 'ecological materialism' broading the elements of adaptive responses to the social field, mobilizing biology to explain certain cultural phenomena. Although the explanatory rationality of social and cultural facts has long marked certain anthropological schools of thought (see optimal foraging theory below), social and cultural anthropology has progressively attached itself to the search for universal categories and principles as well as the understanding of local categorization and classifications (Lévi-Strauss, 1962; Berlin, 1974; Friedberg, 1974; Brown 1977). The field of ethnoecology emerged in this context of search for the ethnosciences (Bahuchet, 1985; Toledo, 1992).

Ethnoecology is the paradigm that investigates thoughts of local people about environmental phenomena (Barfield 1997:138). It aims to understand the cognitive principles, the local knowledge and perceptions in their *situated* environmental context (Nazarea, 1999). But ethnoecology is also a science of the practices, whose programme also includes the understanding of the relations between cognition and behaviour, between knowledge and know-how, as forming whole cultural system (Bahuchet, 2012). Born with the aim to document or understand traditions, ethnoecology is now mobilized to evaluate changes in those traditions, and how those changes relate to broader changes in the social-ecological environment. More recently, the interweaving of the local structures with global changes (ecological or economic) gave to ethnoecology in particular, and environmental anthropology in general, a new and wide field of studies.

2.2. BIOCULTURAL DIVERSITY AND ENVIRONMENTAL CONSERVATION

In the last decades of the 20th century, the interconnection of the political and economic spheres with an unprecedented acceleration of globalization saw the emergence of large-scale scientific and political issues. The growing concern over the environment since the 1990s has led to the emergence of new questions, new political issues of territories, identity and rights. Rapidly, environmental considerations have been faced with interest in the development of, often poor, populations living within, or at the periphery of so-called sensitive, protected areas. Moreover, in parallel with these environmental concerns, there has also been a shift in the way the environment is valued in general and with the status accorded to animals in Western society in particular. According to this new value system, animals are regarded as real agents operating in the political arena, endowed with conscience and culture, a concern that has lead some NGOs to consider them as full citizens (e.g., Gorilla).

Awareness of the international communities about environmental issues has also emerged in parallel to that of indigenous peoples. Indeed, indigenous people's rights and future have rapidly become a scientific, ecological and political issue deeply related to environmental questions. Indeed, the fate of indigenous peoples and the environment are *de facto* inherently linked. It is a fact that a large part of the indigenous peoples live on territories also recognized for their richness in biodiversity (Toledo, 2001), and that areas of high biodiversity overlap with areas of linguistic and cultural diversity (Harmon, 1996). However, this constitutes also a major challenge in terms of priorities given either to environmental preservation or to human development and rights. The obvious need to embrace these two aspects as a whole has led to the emergence of the concept of biocultural diversity.

Over the last decades, indigenous peoples have received the attention of scientists and international institutions because of their resource management and knowledge systems . Their corpus of knowledge, based on a fine and constant observation of the environment, has been alternatively defined as comparable or incomparable with scientific knowledge and it has recently been recognized by a large slew of studies as being able to contribute significantly to the development of local adaptation strategies (e.g. Salick and Byg 2007; Boillat and Berkes 2013). Indigenous peoples should, therefore, be part of the overall effort to sustain resources and ecosystems. These local environmental

knowledge (LEK) defined as: "a cumulative body of knowledge, practice and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment" (Berkes et al. 2000:1252), is considered an adaptive strategy of human groups (Turner et al., 2000; Quave & Pieroni, 2015; Reyes-García et al., 2016b) (but see Dickman et al., 2015 for a diverging view based on moral relativism).

2.3. Indigenous people and ecology: scientific debate

Indigenous peoples relations with the environment, and their potential role in biodiversity conservation has been judged in various ways by scholars. Results from this research have resulted in divergent and polarized opinions in the literature (Smith & Wishnie, 2000). On one side, some authors have presented a romantic view of small groups living in harmony with their environment (Nadasdy, 2005). This view has been particularly attributed to hunter-gatherers, who unlike sedentary farmers, have often been considered as having an ethic (expressed in informal institutions such as or belief systems or food taboos) that imposed them a respect of their environment, a sustainable and wise use of resources, and a propensity to conservation. .

On the other side, some other authors argue that the sustainability of local and indigenous practices and land uses is rather a side effects of low population densities, low performance weapons (technological constraints), lack of external markets (Redford, 1991; Smith & Wishnie, 2000), and traditional political systems and mobility (Colchester, 1994). In the same line, some scholars have also suggested that their mythological believes, and notably the existence of mystical force managing the living beings, might have « blinded » them regarding the possibility of animal depletion, nourishing in them an idea of abundance and unlimited bounty/environment (Richardson, 2008).

Yet other researchers argue that little correlation exist between beliefs prescribing certain practices and the actual behaviour observed (Colchester, 1994). Moreover, some scholars thus doubt about the existence of an indigenous ethic (Bulmer, 1982), or affirm that people favour an economic maximisation of foraging rather than a logic of habitat or wildlife conservation (Alvard, 1995; Bodmer et al., 1997; Bennett et al., 2002; Wilkie et al., 2011). At the extreme, some authors do not hesitate to claim that traditional knowledge systems and local uses might be unsteady or maladaptive, and consequently harmful for ecosystems (Hardin, 1968; Diamond, 1992; Redford, 1991; Bennett et al., 1997).

The question of whether people intentionally preserve their environment has deeply marked the study of hunter-gatherer populations, notably regarding how hunting is perceived and analysed. In the 1970-1980, human ecologists started to attempt to deconstruct the image of the « ecologically noble savage » (Redford, 1991; Alvard, 1993). Researchers using perspectives from evolutionary and biological ecology have tend to prove that people, as all predators, tend to optimize their harvest on wild resources. The "optimal foraging theory", as it is called, analysed the cost-benefit relations, notably in hunting, and the will of the hunter to optimize his profit and fitness, i.e., choosing prey or

resources which maximized the balance between effort involved (energy cost) and the biomass provided (energy intake) (see Pyke, 1984 for a review). Such formal models allowed them to predict the potential behaviour of a forager under given external conditions. According to optimal foraging theory, the strategy involves a rotation alternating phases of high foraging pressure on a precise spot with phases of resources reconstitution (de Planhol, 2004).

The optimal foraging theory has been highly criticized by cultural and social anthropologists for being based on a utilitarian view, and an etic perspective that neglects the social and cultural accounts that might interfere with foraging decisions (Bahuchet et al., 1991), notably the knowledge of the individual that might affect decisions and the variations within the group (Ingold, 1987; Kelly, 1995, in Puri 1997). For Tim Ingold, analysing foraging behaviour in terms of rationality and optimization induce a "naturalisation" of the hunter-gatherers in which human and cultural domains of society are seen as external normative biases that may cause behaviour to deviate from the "optimum" (Ingold, 2000: 29).

2.4. Food taboo, prey choice, and conservation

Another scientific debate of interest for the work developed here is the consideration of food as natural resource. While the cultural significance of wild food (notably meat) in hunter-gatherer societies has long been stressed, the forms of non-consumption, prohibitions, avoidance, or taboos have largely attracted anthropologists. With the biodiversity crisis and the scrutinising of local practices, food avoidance has also become an object of research in the context of a search for "convergence with common ecological objectives" (Artaud, 2014). Hunting, food consumption, and biodiversity conservation are indeed deeply related as potentially prey choice might be influenced by taboos and cultural food preferences (Alvard, 1993).

However, the analysis of the link between wildlife conservation and taboos is not recent. Rather, since the 1960s, researchers from cultural materialism school and other ecologically-oriented anthropologists have used biological arguments to justify the existence of sch cultural practices that remained until there unexplained (Harris, 1979; Ross, 1978; Rappaport, 1968). For these scholars, taboos mainly served ecological adaptations and they were analysed through an utilitarian perspective, as a simple functionalist response to a series of adaptive adjustments. Later, this position emphasizing how culture was determined by the environment became less popular (Whitaker, 2005) and has been highly discussed for long by social scientists (e.g. Levi-Stauss, 1962; Foale et al., 2011). From this perspective, taboos are seen as social regulators based on magico-religious motives and/or related to cultural schemes of classifications (Douglas, 2005 [1966]).

The utilitarian intention of taboos has been subject of reinterpretation in the last decades. This interpretation has been done at the light of the recent environmental stakes, notably with the view that taboos might be directed to protect particularly vulnerable species, which might signal an indigenous ecological awareness. Even if taboos and avoidances might have real effect on natural resources, the core of the debate is more in the intentionality given to the application of taboos, and their finality and

rationality in terms of ecological efficiency (Alvard, 1998; Artaud, 2014). For some authors, food taboos are unintentionality directed to environmental balance, or rarely originate from this will (Colding & Folke, 1997; Berkes, 2004). However they might be thought as a tool of traditional management or an adaptive strategy to maintain subsistence (Johannes, 1981), and might be incorporated as new forms of resources management (Colding & Folke, 2001; Colding, Folke & Elmqvist, 2003).

In any case, it might simply be the case that the wide diversity of food taboos found in the world (Meyer-Rochow, 2009) can not be explained by a single reason, but rather that each food taboo highly depends on the society and the specific context (Johannes, 1993). The same can be probably said for the propensity of local knowledge to fit with conservation goals, as the diversity of realities encountered on the planet might reflect a variety of situations that might highly differ according to social and ecological context of each group (Smith & Wishnie, 2000). A group living on a very delimitated space, such as an Pacific island (Johannes, 1993), does not necessarily carry the same view of the limits of natural resources than a mobile Pygmy group accustomed in living in a large area with a bounty of resources such as the Congo basin rainforest (Lewis, 2008).

3. Terminology

3.1. Hunting in anthropological studies

Hunting is generally described as an activity consisting in pursuing, capturing, and killing animals. However, beyond the act of hunting in itself, i.e. the hunting expedition until the animal is slaughtering, hunting can, or must -from an anthropological point of view- be considered as a whole, as a « *fait social total* » in the sense of Mauss (1950 [1923]). Indeed, hunting remains for many hunter-gatherer societies (even in transition) a keystone element of traditional social organizations. Consequently, hunting for that point of view includes preparation for hunting (learning, motivations, propitiatory remedies, rituals, weapons making), hunting in itself (ethological and ecological knowledge, pursuit), butchering, and networks of game distribution and consumption. Hunting also often includes a wide set the social rules surrounding the practice (taboo or avoidance in particular) that might allow to structure social relations (gender, age, status) and identity.

This thesis examine hunting in its broad context of cultural aspects and social motivations, in a continuity with previous definitions of hunting provided from environmental anthropology scholars (Bulmer, 1968; Dwyer, 1985; Ellen, 1991; Bahuchet, 1985; Puri, 1997; Ingold, 2000). Historical and cultural accounts are also critical to understand hunting techniques and knowledge as groups living in similar environments may adopt different strategies given their past or present contact with other groups (Bahuchet, 1978). From a technical point of view, hunting also includes a variety of forms; therefore I will use hunting in its broader sense of a set of animal capture techniques. Given its

impotence in the study area, trapping, although considered a passive hunting technique, will also be included in this definition, which will refer to both active and passive ways to capture animals.

3.2. Naming local people

Naming human groups using inclusive terms always requires a reduction of a diverse reality to the limits of these categories. Categories might indeed be stigmatizing, out-of-date, or reductive. The human group concerned by this thesis cumulated all the difficulties of these categorization processes. This section aims to briefly enlighten the terminological choices done, the reasons why terms are used or avoided, or used despite of other choices.

Are the Baka "hunter-gatherers"?

The concept of hunter-gatherers popularized by the 1960s anthropology and the congress 'Man the Hunter' has been widely discussed. This category conveys a certain reality in the facts. Indeed, groups labelled as such from all over the world objectively share, or have shared, relative commonalities: a high dependence on hunting and gathering, a high mobility, the lack of strong leaders, the absence of food storage, a strong link to forests environment, gender and age egalitarianism, extensive sharing, high fertility and high mortality, small camp size, and seldom engage in warfare (Lee & Devore, 1968; Woodburn, 1982; Hewlett & Fancher, 2011).

Thought to be representative of the first ages of human evolution (Lee & Devore, 1968), essentialist symbol of isolation and harmony with nature, this concept is however nowadays consider by some scholars as inadequate to describe the variability of the groups so-called as such (Ellen, 1991; Bird-David, 1992). Today, many of the societies, previously strictly depending hunting and gathering for their subsistence combine these economic activities with agriculture and wage labour. Among the so-called Central African Pygmies hunter-gatherers, the terminological problem is even larger. Some Pygmies are fishers (the Batwa of Zambia, Robillard & Bahuchet, 2012), while some others farm as much as their neighbour (the Bakoya of Gabon, Soengas, 2012; Betch, 2012). For these reasons, some scholars propose to call them "former hunter-gatherers" (Lewis, 2014). In parallel to a focus on subsistence strategies as a criteria, several researchers prefer mobilize the concept of hunter-gatherers in reference to a specific mode of thoughts, such as egalitarian values, extensive sharing, immediate-return economy, individual autonomy (Ingold, 2000; Barnard, 2002; Hewlett, 2014). For Rupp (2011), hunter-gatherer should be perceived more as social reality and a designation of an identity rooted in place, the forest, and determined by descent (such as ethnicity), rather than simply an analytic tool.

As I will develop in this thesis, even if the adoption of agriculture has brought deep changes in the Baka livelihood, it seems that some of the criteria that were previously used to define 'hunter-gatherers' (such as mobility, sharing, egalitarian organization) have been altered but are still relatively observable. Thus, we might think the adoption of agriculture is not enough to stop using the concept

hunter-gatherers for the Baka of the studied area. In the following chapters, the term hunters-gatherers will be used in its broad acceptation and understood as a former way of subsistence (still highly relying on hunting and gathering but not strictly), which still influence the current mode of thoughts and social relations.

Shall we call them "Pygmies" ?

The term "Pygmy" has a long history, dating back from the 19th century explorers who used that term in reference to a Homerian myth (Bahuchet, 1992). The term might easily be considered as pejorative and derogatory, as its etymology emphasizes the short stature and a historical archetype of a wild primitive. For instance, when employed by their neighbours, the term might convey an infantilizing image, typical of the ordinary racism, subservience, and discrimination people referred to with this name undergo (Epelboin, 2012). Because not all Pygmies are hunter-gatherers and not all them live in the rainforest (Bahuchet, 2012), the term Pygmies remains today, at some points, the most appropriated term to refer, as a whole, to the diversity of groups formerly living on a strict hunting and collecting basis through the forested Congo Basin. This term is, however, one of the human groups's names most actively debated (see Epelboin, 2012; Robillard & Bahuchet, 2012; Hewlett, 2014), also being employed with different meanings dependant on the context. In some context, the term is however valued in Western countries with positive connotations, and even by some of their representatives, when it refers to a form of pride of their indigeneity (Köhler, 1998; Epelboin, 2012). Thus, the term pygmy has been even employed by indigenists advocacy NGOs, as it has the advantage to be clear and widely recognized by the public, notably for non-initiated readers who ignore the ethnic names of the different groups who are named Baka, Bagyeli, Bayaka, Bambendjele, Babongo, Batwa, Bacwa, Basua, or Efe. However, the limitation is that it might also give the impression that under that term only one single culture exists (Hewlett, 2014). In the thesis, I will mostly use it for reason of convenience, when discussing about cross-cultural researches and commonalities between groups (notably the most studied Aka, Baka, Efe, Mbuti ; such in the chapter 2).

Naming the "others": Bantu, villagers, neighbours

While naming the different Pygmy groups is complex, it is also a challenge to name the "others", or the groups historically bounded with them through social relations, and material and immaterial exchanges. According to Leclerc (2012), missionaries, administrators, ethnologists, and linguists have used around fifty different terms to name the village communities of south-eastern Cameroon. This is partly due to the complex process of assimilation, change of names, tongue borrowing, cohabitations, and migrations.

The term "Bantu" is frequently used in the literature when talking about ethnic groups living close to Pygmies. In Cameroon, this term is commonly used locally by bantu-speakers themselves. However, this use consists more in a local category than the employment of the scientific meaning

which related to a linguistic definition. Besides, the majority of Pygmy groups throughout Africa are in fact Bantu-speakers. As Bantu refers only to a linguistic family, it is highly inappropriate to name social groups; the term, when used locally, is rather used in a opposition manner, referring to all those who are not "Pygmy". The terms "villagers" and "farmers", although still used in the current literature, are not appropriated anymore, as the Baka now also live in villages and farm. In other words, these terms are based on an opposition in function of the habitat that do not exist anymore (Robillard & Bahuchet, 2012). Opposite terms of villagers would be respectively "campers", and hunter-gatherers, which has been discussed above.

Simply because the Bantu-speaking population concerned by this study belongs to only one group, I will logically use as often as possible the ethnonym of this group: the Nzime (speaking the ko-nzime language). I will however interchangeably use that term with "neighbours" or "non-Baka" in reference to the Nzime. Although not perfect, "neighbour" is appropriate as both groups have coexisted as neighbours in various relations of mutual support and cooperation as well as tension and competition for nearly two centuries (Rupp, 2001; 2011). Non-Baka will be rather used to include both Nzime people and extra-local agents, e.g. merchants from different parts of the country.

BAKA AUTOCHTHONY AND INDIGENEITY

The term "autochtony" (and to a lesser extend the term "indigenous people") is an expression used from the 1990s, which progressively replaced such terms as first people, tribal or native people (Epelboin, 2012). However, semantically, the notions of indigeneity or autochtony are problematic and controversial in Africa (Pelican, 2009), notably because it hints a "primary settlement". However this term does not define the historical scale of the supposed anteriority, which might be expressed in terms of centuries or millions of years (Epelboin, 2012; Verdu, 2012). Thus, as the Congo Basin is characterized by an ancient human settlement, a long history of movements, migrations, and assimilation, almost all the ethnic groups might claim to be indigenous at some points. Beyond that, the tension around the notion of indigeneity is mostly based of its polysemic nature, and its linkage between identity and territoriality, which makes this concept is highly political tool, often mobilized as such. Thus, its definition might largely differ between the local view and the international institutions, as well as between scholars[1]. According to the UN Declaration on the Indigenous Peoples Rights, the term indigenous is related to discrimination and marginalization. However in the Declaration, the notion of indigeneity is said to be 'self-proclaiming', i.e., it is up to the people to claim themselves as being indigenous. The Baka, and the Pygmies in general, do not naturally claim to be indigenous, except in a process of reproducing of a Western discourse. Rather, the autochthony of the Baka is essentially born of the actions of indigenous NGOs (of which *Survival International* is the best example) by transferring to Africa the struggle of native peoples from the American continent, where the question of indigeneity is less problematic. Today the recognition of the Pygmies as the only indigenous people in the forest zone raises an enormous problem of positive discrimination because it leads to concentrate all the means of cooperation for development on them and thus generates the jealousy of the neighbouring populations. Although the marginalization of the

[1] Cf. debate around the Kuper's publication in Current Anthropology: Kuper, 2003; Kenrick & Lewis, 2004.

Baka, and the Pygmies in general, is real, the lens of the indigeneity does not allow acting at a regional level taking into account the social reality of the local polyethnic systems (Robillard, 2010). Rather it conducts to an "ethnicisation" of the politic (as described by Bayard et al., 2001). Although being an essential political concept to discuss questions of Baka identity (such as Robillard, 2010; Rupp, 2011), the use of this term will be limited in this dissertation.

4. Study area

4.1. Vegetation, wildlife, and landscapes

The Congo Basin is the second largest "stand" of tropical forest in the world, after the Amazon, covering more than 198 million hectares in six countries, including Cameroon (Topa et al., 2009). It represents 20% of the world remaining moist tropical forest reserve, and counts with the most biologically diverse ecosystems in Africa. South-eastern Cameroon landscapes are characteristic of the Congo Basin lowland forests ecological features. The area has a Guinean-type equatorial climate based on two dry seasons: one longer from mid-December to late March and one shorter from mid-July to mid-August. These periods contrast with the wetter months of the short rainy season (March to June) and the great rainy season (August to November). This shift in moisture results in a vegetation divided in two categories of forest: sempervirent and semi-deciduous (Letouzey, 1968). In general, tropical forests are defined by the ecologists as a generalized ecosystem, i.e. bearing a very large diversity of species with a very low density, which implies a wide individual dispersion among each species, or resources. This structuration requires a great spatial mobility for foraging, either for humans or other animal species.

Uses of this forest are multiple, from local and subsistence needs to intensive logging and national and international exports. Vegetal diversity is affected by legal and illegal logging, either industrial or artisanal, that targets valuable tree species. Timber is one of the main resources exploited in the south-eastern Cameroon, the county being the bigger timber producer of Central Africa (Eba'a Atyi et al., 2009), but cuts rarely benefit local people (Lewis & Nelson, 2006). A share of tree species is illegally exploited (Lewis, 2007).

In the past decades, the Central African rainforests, and the Cameroon forest area in particular, have met an increasing pressure on NTFP for trade. Currently, more than 150 NTFP from animal and vegetal origin are traded in the different markets all across Central Africa (FAO, 2002). Among them, only six of them are largely commercialized: the Cola nut (*Cola nitida* and *Cola acuminata)*, wild mango nut (*Irvingia gabonensis*), *Gnetum africanum* leaves, Red Palm's nut (*Elaeis guineensis*), seeds of *Ricino dendronheudelotii*, and the fruits of *Dacryo desedulis* (Tabuna, 2007). In addition to meat, other animal products are traded, for example the scales of pangolin, which is the wild animal most traded worldwide, whose scales are used in Eastern Asian pharmacopeia (Aisher, 2016). The exploitation and commercialization of NTFP is perceived as a strategy to increase

household revenues but whose monetization might lead to frenetic harvest, and does not warranty a sustainable management (Mbolo, 2006).

The tropical humid dense forest ecosystem of Cameroon represents 35% of the country (de Wasseig et al., 2009). It shelters a very diverse flora, around 9.000 species, including 176 endangered plants according to IUCN Red list. The area is also home for a high faunal diversity (340 species of mammals, 920 species of birds and 274 species of reptiles). It notably supports many representatives of the region's mammals, including the charismatic lowland and Cross River gorillas, chimpanzees, forest elephants, buffalos, and bongos with the following species considered endangered: Pohle's fruit bat, Black Rhinoceros, Pennat's red colobus, Preuss's guenon, Gorilla, drill, chimpanzee (Republic of Cameroon, 1994). Over the last decades, it has been shown that large mammals are highly vulnerable to the increase of hunting pressure that has been acknowledged as unsustainable (Bowen-Jones 1998; Wilkie et al., 2011). Thus, the conservation status of such species has rapidly reached an alarming point, and they have been classified from 'near threatened' to 'critically endangered' by the IUCN (2016), and in three protection classes (A, B, C) by the 1994 Forest & Wildlife Law (hereafter Forest Law) (Republic of Cameroon, 1994). Moreover, smaller species, although more abundant, also seem to suffer from overhunting (Bennett & Robinson 2000). The duikers, forest antelopes (*Cephalophus* spp.)[2], are the most frequently hunted species of the area, as well as one of the most abundant and widespread mammals group (Yasuoka, 2006; Bobo et al., 2014). A total of 25% of the dense forest area is under the status of protected area, including 13 national parks, 4 wildlife sanctuaries, 48 hunting zones and 26 community hunting zones. Specifically, the study area is surrounded by the Dja reserve, the Nki and Boumba-Bek National Parks, and the newly decreted Ngoyla-Mintom wildlife reserve, where areas of forest swampy clearings, typically used by large and endangered mammals to forage (elephants, gorilla, bongo, buffalo), are found.

4.2. Human settlement and ethnolinguistic diversity

Fieldwork was conducted in the East region of Cameroon. This region is the least densely populated of Cameroon (7.1 hab/km2 in 2005) although this density has more than doubled between 1976 and 2005. In 2005, the Haut-Nyong department counted 218,000 inhabitants, in an area of 36,384 km^2 (Institut National de la Statistique, 2010). The area is of relatively easy access (except in the rainy season) due to the dirt roads maintained by the different logging companies working in the area. In the Lomié and Messok district, the population lives mainly in rural area rather than in subprefectures[3]. The population is mainly concentrated along the dirt roads, but a less visible population occupies and moves in the inner forest, where they perform either subsistence or cash generating activities.

The population in the area is diverse and of ancient origin, composed by slash-and-burn agriculturalists and hunter-gatherers, who both have managed the ecosystem according to their past needs and techniques (Bahuchet 1993). We observe a regional cultural diversity based on two

[2] The references used for scientific denominations is the IUCN Red List (2016). See Annex 2 for a non-exhaustive list of animal species known by the Baka with vernacular denomination.
[3] In 2005, Lomié district counted 19.952 inhabitants (4,266 urbans, 14,686 rurals) and Messok district 11,213 inhabitants (1,627 urbans/9.,586 rurals) (Institut National de la Statistique, 2010)

ethnolinguistic communities living in close relations: the Baka, formerly strict hunters-gatherers, Ubangian speaking people, and a mosaic of at least 17 ethnolinguistic groups settled besides them (i.e., the Njem, the Bajue, the Kako, the Fang, the Maka, the Konambe and the Nzime), all belonging to the Bantu linguistic group, and all slash-and-burn agriculturalists cultivating cassava, plantain, groundnuts, and cacao, although they complete their subsistence with hunting, gathering and fishing (Bahuchet, 1992; Leclerc, 2012).

The Nzime are the principal ethnic group present in the Messok and Lomié districts concerned by my study. Compared to the Nzime, the Baka show a more diversified way of subsistence, mixing cassava cultivation, hunting, and gathering, according to a specific calendar based on mobility between forest camps and village settlements (Leclerc, 2012). However, both -the Baka and the Nzime- are largely dependent on forest space and resources for construction, diet, and material culture and on bushmeat for proteins (Nasi et al., 2011).

Additionally to the Nzime and Baka groups, other actors can be found in the area, including foreigner economic agents, principally Bamiléké or Bamoun traders from the Western region, and Muslim merchants (Fulbé) from the Northern Cameroun. Highly involved in forest resources exportation (ebony, ivory, bushmeat, seeds), they either live in the area for years (being mobile or managing small shops) or come back-and-forth to the forest following seasonal production and exportation cycles.

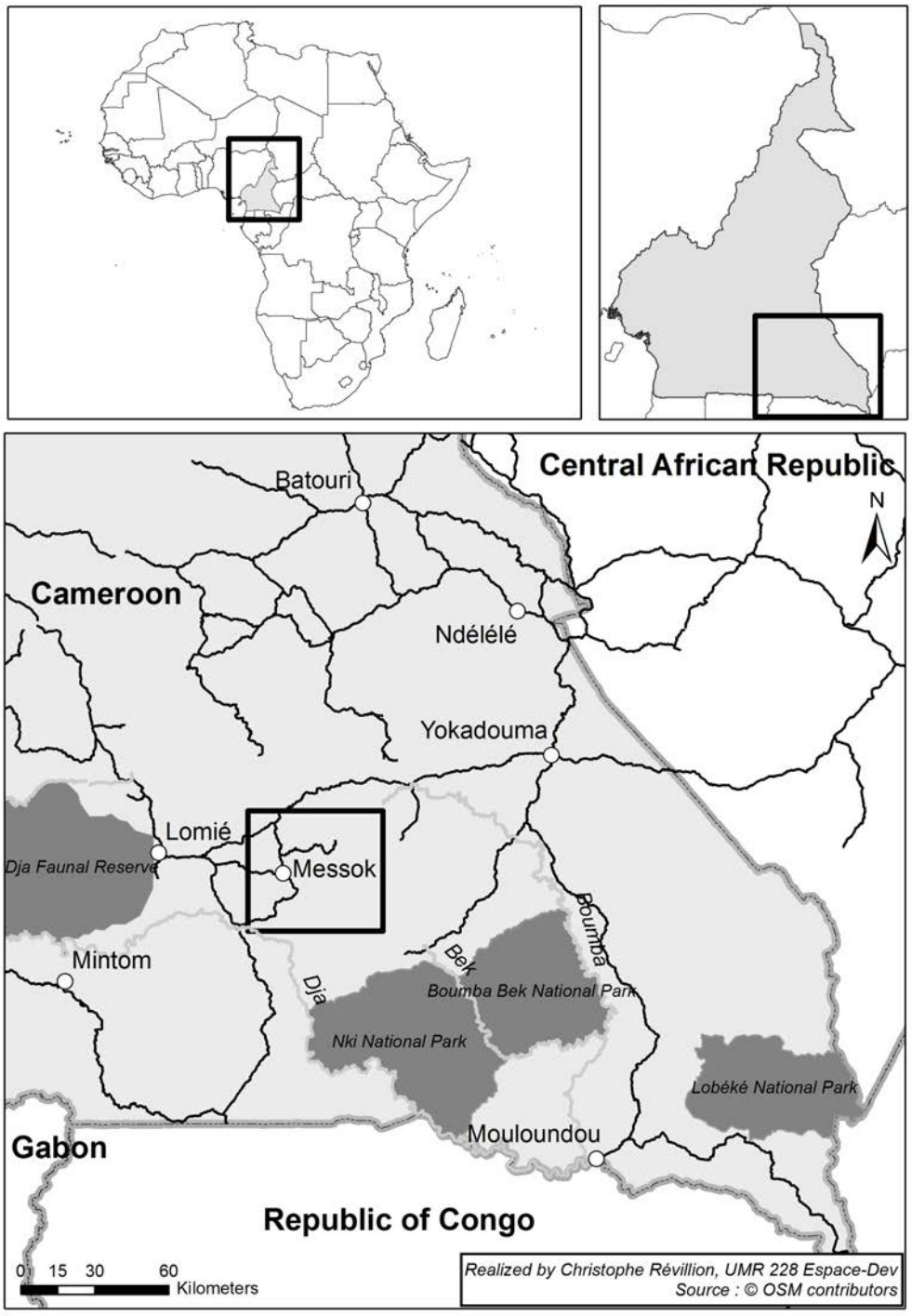

Figure 1. Map of the study area

5. Methodological approach

5.1. Study context and fieldwork

This thesis has been developed within the research project entitled "*The adaptive nature of culture: a cross-cultural analysis of the returns of Local Environmental Knowledge in three indigenous societies*"[4]. This project benefited of an ERC grant (2010-2015; FP-7-261791-LEK) attributed to Dr. Victoria Reyes-García. This multi-fields project aimed to test the individual returns to culturally-evolved and environment-specific knowledge as a pathway through which cultural knowledge might enhance human adaptive strategy (Reyes-García et al., 2016b)

The framework project involved extensive and long-term data collection in six villages settled in tropical forest areas in three countries (i.e., the Punan in Indonesia, the Tsimane' in Bolivia, and the Baka in Cameroon). Data collection lasted about 18 months and focused on gathering information at the individual level about knowledge and productivity or outcomes of four subsistence domains (agriculture, hunting, gathering and medicine). Data were also collected on integration into the market economy, socio-demographic characteristics, and households' economy. This quantitative dataset was based on culturally-specific survey protocols constructed from the ethnographic observations and surveys carried out in the first phase of the project, prior to the beginning of this thesis (in the case of Cameroon, the preliminary fieldwork was realized by Sandrine Gallois from February to May 2012). The protocols were then adjusted as needed in the early stages of data collection.

I started my PhD in July 2012, left to Cameroon in mid-July. A long presence on the field for data collection allowed me to realize this thesis in parallel to different task I assumed in this project with the other members of the team: data collection, data entry, co-writing articles and policy briefs. My late arrival in the research project (replacement of a colleague) has involved an early installation in the studied village for 13 months, after a short phase devolved to the reflection of the methodology. The maturation of the problematic was partly built on the field.

Sandrine Gallois and I were present in two separate Baka villages from two different districts separated by two hours motorbike (MB village, in Messok district and EL village, in Lomié district[5]). I spent 13 continuous months in the Haut-Nyong department (July 2012 - August 2013), most of the time in MB. Additionally, I did more than fifteen visits (between 2 and 4 days) to EL, and around 20 visits (one day each) to a dozen of other Baka villages to collect additional data and ethnographic information. Round-trips to town (Lomié or Yaoundé) for communication with other team members occurred every month or two months. This long stay was dedicated to the main data collection for the research project and the thesis. Most of the time was spent collecting systematic and individual-level data to feed the large project database. Over the course of the months, time was freed to devote more time to the collection of data supporting this thesis. Table 1 details the type of data collected in each

[4] See the project website :http://icta.uab.cat/Etnoecologia/lek/
[5] Villages' names have been anonymized to protect informant's confidentiality.

period.

During these reciprocal visits, S. Gallois and I helped each other in data collection, discussed about fieldwork issues and applicability of the protocols. Also, during our stays out of the studied villages (in Lomié, Messok, or Yaoundé), we conducted interviews with national and local institutions and NGOs.

The second stay (March – April 2014) was oriented to complement data collection for both the project and the thesis, verify interpretation, and return preliminary results to the communities. The last stay in the studied area (April – May 2015) was devoted to a final complement of data collection for specific aspects of the thesis that had emerged in the course of data analysis and writing.

As the house where I lived was non-equipped (weak solar panel, no communication possible with outside, no phone connection), most of the data were entered and coded during my stays in Lomié, in Yaoundé or during my returns to Europe, between September 2013 and February 2014.

Table 1. Fieldwork periods

Periods	Types of data collected
July 2012 to August 2013	• Socio-demographic census • Pilot testing and adjustment of the LEK project data • Data collection (knowledge, outcomes, economic variables, thesis data : hunting and ethnozoological survey and interviews)
March to April 2014	• Retribution to communities • Verification of the first interpretation • Completing missing data • Thesis data (social status, hunting knowledge, wildlife conservation)
April to May 2015	• Thesis data (social status, hunting knowledge, wildlife conservation)

5.2. DATA COLLECTION

This thesis is based on a partial use of data from the LEK project and data specifically collected for this thesis:

1) The large corpus of individual variables S. Gallois and I collected for the LEK project and from which I mainly used those related to hunting productivity, dietary diversity, income, census, and wealth.

2) A diverse set of qualitative and quantitative data specifically collected to answer the objectives of the thesis focusing on hunting strategies, techniques, social organisation, and relation to bushmeat and external agents.

Addressing the problematic related to perceptions of wild meat consumption, animal species, wildlife changes, social status, and conservation discourses obviously require an in-depth understanding of informants' reactions, feelings, and viewpoints, which are better capture with interviews. However, quantitative data were required to estimate meat consumption, economic variables, hunting rates, or at some points intracultural variations in perceptions.

5.3. Field team

Daily, on the field I teamed up with native Cameroonian translators. With S. Gallois we alternatively lived and worked with one of the two assistants selected, permuting every week or every 10 days. One of the translators, Appolinaire Ambassa, was a Baka man living in the Bosquet. The other, Ernest Isidore Simpoh, was a Nzime (Bantu-speaker) young man originated from Messok, living in Lomié. They progressively took a role of research assistant, able to lead surveys in autonomy (notably systematic data collection). Both of them were literate, and have occupied, in the previous years a teaching position within private school for Baka children. For a matter of trust, two additional Baka translators from the village host were occasionally employed in order to access to different information, more difficult to get with assistants external to the village. Towards the middle of the fieldwork, a level of mastery in Baka language allowed me to lead discussion and basic interviews with village informants.

5.4. Choice and description of the villages

The studied villages were chosen according to the requirements of the LEK project and prior to my arrival. My colleague Sandrine Gallois had done this work during the preliminary fieldwork. It emerged that the choice of MB village for my main study village was highly relevant. Indeed, chosen as the most « remote » village out of the two studied villages in the Cameroonian site (located further from Lomié subprefecture than EL), MB was a relevant place to study hunting at both the village scale but also in relation with regional agents. MB is situated in an area that appears as a hotspot for commercial hunters who reach this place to access bushmeat and ivory more easily than in Lomié and Messok district. MB is a large village, with a one of the biggest populations of the Messok district and MB's hunters are frequently employed or coopted by external agents. In addition, the low distance between MB and Messok allows to easily selling the meat to next intermediaries.

6. Field research policy

In this section, I describe my *policy of field research* (*sensu* Olivier de Sardan, 2008), understood as a set of strategies mobilised on the field to produce data, taking into account the particular characteristic of the case study and the specific relation created between the researcher and the informants.

6.1. Merging methods and approaches

One of the methodological aims of this dissertation was to merge different approaches on the field. Qualitative investigation was constantly alternated with quantitative methodologies. Qualitative information is the foundation of the socio-anthropological study. It involves various types of interactions with the informants: structured and unstructured interviews, informal discussions, and participant observation (Barnard, 2005). It aims to be closer to the "natural situations" of the subjects, daily life, conversations, and routines (Olivier de Sardan, 2008: 41). According to Lévi-Strauss (1987:2), the strength of qualitative information lies in taking into account the context. On the other side, the statistical questionnaire (or '*survey*') aims to collect systematic information on the basis of reasoned samples and given criteria of statistical representativeness, in a situation of interrogatory (Olivier de Sardan, 2008: 41). The strength of data collected through surveys is that is replicable and can be used to test hypotheses.

The combination of these two methodological approaches implied to combine emic data (discursive data which allow to access informants' representations) with etic data (data constructed by a process of observation or measure by questionnaire). In the field, the application of both methods created divergent types of relations with informants, which might have affected researchers' posture on the field and consequently the collection of data. During surveys, the Baka showed themselves relatively inhibited by directive and narrow questions (such knowledge test or free-listing). In addition, some repetitive surveys (scan activities, diet surveys) might have generated feeling of exasperation, or annoyance explicitly expressed, a situation that did not occur during interviews. However, Baka generally do not support long timing interviews (20-25 minutes is often a maximum). According to the informants or the time of the day, I have rather used informal discussions about routine (whose hunting is finally an integral part) to create a more comfortable atmosphere and enhance trust (see below).

6.2. Socio-demographic census

I benefited from a preliminary socio-demographic census collected by my colleague Sandrine Gallois during the fieldwork in early 2012. Once arriving in the field, I devolved time to carefully complete the census: names, lineages, age estimation, or household composition. Realizing a census of the Baka

became a real challenge. Indeed, the notion of households is sometimes blurred given the importance of the system of "visit" (**yelè**), which is one of the characteristics of the Baka high mobility. Such familial visits imply non-regular trips of individuals visiting relatives to other villages or forest camps. Allowing the maintenance of good relations with in-laws and distant lineages members, visits might last a day up to one or two months. This particularity implies a constant reconfiguration of the village composition. In addition, the existence of forest camps, more or less remote from the village, adds to this mobility through a constant, but mostly seasonal, back-and-forth movement. These forest camps are not part of the village in spatial terms, but people who live there, sometimes permanently, claim to be village inhabitants.

6.3. Participant observation

Given the long presence in one village studied, a background posture was the daily confrontation with reality and the participant observation, the core method of cultural anthropology (Barnard, 2005). In the sense of studying from the "inside", the notion of observation and participation are inevitable. My participation to hunting activities was however often restrained by the Baka themselves for two reasons: the unwillingness to bring me into a hunt that presents a legal risk to me in case of ecoguard control and my presupposed indiscretion in terms of displacement in the forest.

During sessions of participant observations and passive observation, information and knowledge acquired were systemically noted, thus ensuring that the minutiae of observations was not forgotten, through this "translation" information are transformed into *data*, later organised in *corpus*, and in all cases helps in terms of *impregnation* and understanding (Olivier de Sardan, 2008). Moreover, long-term life in the field allowed a kind of familiarisation with daily relationships, cultural codes, social stakes, or underlying conflicts that helped in the analysis of other types of data collected.

.

6.4. Life in the field

For the realization of a 12 months fieldwork in the tropical zone, some arrangements were made before of my arrival on the ground, such as negotiations with the Baka villagers, with the Nzime chief (on which administratively depends the Baka settlement), and the construction of a house in the village, similar to the Baka habitat.

The everyday's dawns and mornings were devolved to individual and systematic surveys for the project, either for the weekly scans observations targeting to meet all the adults of the village, or for the periodic individual data collection, notably knowledge survey, household income, and diet. From 9-10 am the village emptied progressively, as men and women leave their house to the forest or the Nzime or their own plots for work. Departures as the returns are often unplanned. Between 11am and 4pm, only few adults remain in the village (mostly elders). These adults and numerous children are often the same persons and were rapidly over-interviewed by the researcher. From 4pm, the Baka

who went outside start to come back, notably women -in groups- with large baskets full of manioc or plantain, which are often their payment for a day work in Nzime field. Men returns are more discreet when coming back from the forest or on the contrary often drunk when they are back from Nzime fields where they are paid in alcohol. Between 4pm and the dusk (6pm), most of people feel tired and are often unwilling to answer to questions. This evening time was more devoted to informal discussion, either in my house, in the collective men's area (**mbanjo**) or during households' visits.

6.5. Doing long-time research and strengthening trust

This important time devoted to informal exchanges was critical to gain the confidence of the community, to identify the allies, and to anticipate the possible conflicts initiated by my presence. The relationship of trust with the Nzime villagers (who daily interact with the Baka community) was not easy to gain for several reasons: rumours of Baka informants' about cash retributions, feeling of positive discrimination for the benefit of the Baka, jealousy not to be the subject of study ("*the Whites only work with the Baka*"), or critics that courtesy visits to the Nzime notables were not regular enough. A mistrust relationship led to some conflicts at mid-term fieldwork that could have threatened my presence. From this period, my informal presence in the Nzime village became necessary in order to maintain a fragile harmony with both communities[6].

The trust and familiarity began also from the moment I started to leave to researcher's habit, notably by spending long time with people purposely without notebook, pen and recorders, asking no questions. These times contrasted clearly with the morning of systematic surveys (usually standing 5 minutes per household), and allowed other form of relations and sharing. Trust was also gained through my progressive understanding of the reciprocal sharing rules, which are supposed to bind the society together, including me. It implied more wild meat to share with my co-residents; the understanding of the related jealousy (gifts and meat has to be hidden); the understanding of the social, interethnic and kinships stakes of my presence in this hamlet and not in others. The Baka also appreciated the efforts done to cross cultural rules, for example the consumption of foods usually rejected by Western people, such as larvae, caterpillars, gorilla, elephant or chimpanzee. A kind of "protection" of the informants involved in the illegal ivory as well as the adaptation of my political discourse on such issues also allowed gaining confidence from the community. Moreover, I tried to alternate translators (Nzime/Baka) as much as possible – notably when the interviews topic was sensitive - in order to minimize the reporting bias that might occur in translation. The Baka hunters were obviously more confident talking about hunting or other sensitive issues when the intermediary was a Baka himself.

A long-time fieldwork requires making choices in posture by building relations with certain people, agents or networks and not others. These variations of distance proximity generated a risk of "enclicage" (*sensu* Olivier de Sardan, 2008, Naepels, 1998). It refers to the bias, irreducible in anthropology, to be assigned- despite itself - to a camp or a side, and when complicity with a group

[6]At mid-fieldwork, a medical intervention I performed on an highly appreciated Baka hunter who was about to die surprisingly made me gain the definitive 'absolution' of the Nzime notables, because I had '*saved one of our brothers*'.

restrains the access to other groups' view. In my case, this phenomenon occurred given my "belonging" to a Baka village. In the eyes of NGOs, the administration, and Nzime villagers, my presence has often generated suspicion and doubts. Living most of my time in the village rather than in town created more confidence from the Baka of the entire district than from authorities and NGOs located in town.

7. Structure of the thesis

This thesis is structured as a hybrid between a monographic ethnographic thesis and articles based thesis. In this sense, some parts (mainly the sections related to the case study description, the methodological approach and the data collection tools) are presented in different sections.

In Chapter 1, I detail the context of wildlife conservation context in Central Africa and Cameroon, with a specific focus on the Forest Law and the hunting regulations promulgated by the Cameroonian government in 1994.

Chapter 2 provides a complete review of the scientific literature related to the Pygmy groups in general and the Baka in particular through historical and anthropological lenses. By detailing the history of Baka settlement in south-eastern Cameroon, I describe the commonalities with others Central African hunter-gatherers, and Baka specificities relations with neighbouring populations. The second part of this chapter provides ethnographic data coming from a literature review on the social, economic and ethnoecological aspects of the Baka daily life.

Chapter 3 describes the Baka hunting strategies and techniques, which alternate subsistence and commercial-orientated practices. In this chapter, I detail Baka current involvement in a regional hunting economy, notably through the use of shotgun and their participation in elephant hunting through their cooptation in the illegal ivory market.

Chapter 4 explores individual variation in hunting. It asks: to what extend hunters are differentially involved in hunting in terms of hunting technology choices? Are these variations in practices and productivity related to socioeconomic attributes or profiles? This chapter has been published in June 2017 in *African Study Monographs* under the title "Hunting techniques, wildlife offtake and market integration. A perspective from individual variations among the Baka (Cameroon)."

In Chapter 5, I describe the importance of wild meat in the Baka daily life. I detail the cultural and symbolic role of wild meat, analyse its current place in the Baka diet and its economic prevalence in terms of income. The chapter combines qualitatve information with individual level data on food diversity intake and meat selling. The chapter also describes different aspects related to meat sharing and consumption.

In Chapter 6, I develop the idea that beyond the nutritional importance of bushmeat, hunting has also a symbolic importance, as it is embedded in strong social and culturally-constructed patterns. Among former forager populations, hunting is known for being source of status and prestige (Heinrich & Gil-White, 2001; Gurven & von Rueden, 2006). Therefore, I ask: do this relation between status and hunting skills and knowledge is still as pregnant as in the past? Given the changing economic context and loss of traditional practices, are hunters still highly valorised among the Baka? I raise these questions in general, but also specifically in relation to the tuma, the master-hunter, specialist of the traditional elephant hunting.

Chapter 7 examines the perceptions of the Baka regarding the changes in fauna composition and abundance. It describes the way in which the Baka perceive changes in wildlife and discuss their perceived causality embedded in both conflictual relations with poachers and in cosmological representations of forest, sharing, luck, and resources abundance.

Finally, Chapter 8 integrates previous results in the overall context of conservation policies on one side and illegal bushmeat trade and poaching on the other to examine how the Baka respond to different pressures. This last empirical chapter thus analyse the tension existing between wildlife conservation policies and the Baka views and describes how the Baka perceive hunting regulations, the agents they enforce these regulations, and the overall repressive context in favour of biodiversity conservation.

The conclusion details the different contributions brought by the thesis, notably at theoretical and methodological levels, as well as the limitations of this work. The thesis ends outlining a few policy implications and recommendations.

Chapter 1

Bushmeat crisis, wildlife conservation, and local people: From the African context to the Cameroonian Forest Law

1. The bushmeat crisis: Consequences and drivers

For several decades, the issue of wildlife decline due to the increasing pressure of hunting has warned international institutions, NGOs, and scholars. The problem is most obvious in the Congo Basin where, in 2010, the bushmeat extraction was estimated to 5 million tons, compared to the 1.3 million tons extracted in the Amazon Basin (Nasi et al. 2011). In Central Africa, more than 40% of the mammal species are harvested at an unsustainable rate (Nasi et al., 2008), which presents a threat to the survival of several species and the whole ecosystem, but also to human wellbeing as local livelihoods heavily depend on wild meat (Brown, 2003; Abernethy et al., 2013). The level of unsustainability of this dynamic is worth the term « crisis » in the literature.

The notion of « bushmeat crisis » was launched for the first time by a primatologist (Rose 1996) and then popularized by the grouping, in 1999, of several North-American conservation NGOs under a lobby labelled « Bushmeat Crisis Task Force ». For this group, the bushmeat crisis is « largely due to an increase in commercial logging, with an infrastructure of roads and trucks that links forests and hunters to cities and consumers »[7].

From the 2000s, research on the bushmeat crisis has been directed towards the understandings of its drivers, notably in order to better tackle the issue and guide policy interventions. For the conservation scholars, unsustainable hunting rates are not related to technological shift towards more efficient hunting techniques (i.e., firearms) but rather to commercial trade pushed by the increasing

[7] Bushmeat Crisis Task Force website (consulted the 8th April 2017): http://www.bushmeat.org/bushmeat_and_wildlife_trade/what_is_the_bushmeat_crisis

demand of bushmeat in urban areas (Bowen-Jones & Pendry, 1999). The growing attention directed to this issue has brought new elements to the discussion and, today, it is widely accepted that the bushmeat crisis is the result of a conjunction of social, demographic, cultural and economic factors, notably 1) the urban demand of bushmeat and 2) population growth.

The urban demand for bushmeat is often thought to be the main driver of the crisis (Bowen-Jones & Pendry, 2002). Although urban dwellers consume ten times less bushmeat per capita than rural people (Wilkie & Carpenter 1999), it has a huge impact as it correlates with the growth of the urban population in Central African cities, with the rural to urban migration, and with the deeply-rooted preference for bushmeat by urban dwellers (van Vliet & Mbazza, 2011). For town people (often migrants from rural areas who have lost contact with the forest), bushmeat is culturally perceived as a symbol of wild power, a power that can not be obtained from domesticated animals (Ichikawa, 2006). Bushmeat is then considered as a luxury good and sold at much higher prices than beef, pork or chicken.

The increasing urban demand is also related to the demographic boom in Central Africa. Since the early 1990s, Central African countries observed an increase of the human populations by an average of >2% per year (Wilkie et al., 2011). The Congo Basin presents a high population growth rates (2-3%) and the population of the area is expected to double between 2005 and 2050 (UN, 2006). Moreover, the urban growth is also coupled with an increasing density in rural regions. It has been shown that under low demographic pressure the trade of certain species might be sustainable (Stromayer & Atanga 1991), although we know that economic drivers might rapidly change the situation and escalate bushmeat extraction (Fa et al., 1995). Coad (2007) highlighted that even a small human density increase in in rural areas might generate unsustainable hunting rates.

Bushmeat hunting and consumption in Central Africa have attracted not only NGO's, but also scientists' attention (Nasi et al., 2008). Research on the topic first focused on documenting the impacts of unsustainable hunting rates and then moved to understanding its drivers (Coad, 2007). Although often handle and dominated by conservation scholars, the issue also concerns other scientific fields and has been analysed through various lenses, including the economic and the ecological, but also from the perspective of food security and social aspects (Brashares et al., 2014; Nasi et al., 2008; Abernethy et al., 2013).

Conservation researchers have rapidly emphasized the effects of rapid faunal depletion on the functioning of the whole ecosystem (Harrison, 2011; Nasi et al., 2011; Abernethy et al., 2013). A plethora of studies have thus analysed biomass and faunal growing rates to estimate the sustainability of commercial hunting (e.g., Fa et al., 1995; Muchaal & Ngandjui 1999; Colishaw et al., 2005; Kümpel et al., 2010). Based on these results, scientists have advanced the threat that will represent an « empty forest », a situation in which the removal of large part of the food web would generate critical cascading effects that will deteriorate the overall fauna and flora structure (Redford, 1992). Indeed, in Central Africa, half of the 178 mammal species are on the IUCN red list and the survival of half of them is presumed threaten by hunting (IUCN, 2012; Abernethy, et al, 2013). Among them the large-bodied mammals are the most endangered, largely due to the increasing use of firearms for hunting, their slow reproductive rates, and their high market values.

Game depletion also represents a serious threat for human wellbeing and food security of rural people in Central Africa as it deprives them of a source of proteins they highly depend on (Brown, 2003; Nasi et al., 2008). Moreover, bushmeat has always been a means of exchange, notably for hunter-gatherers. Previously mostly bartered with agricultural products, bushmeat is now widely commercialized, becoming a main source of income for rural people (de Merode et al. 2004; Kümpel et al. 2010; Brashares et al. 2011; Nasi et al. 2011). Given its increasing demand, bushmeat has even become the basis of a well-organized and very lucrative trade along a commodity chain (Milner-Gulland & Bennett, 2003; Wilkie et al., 2005; Van Vliet et al., 2014). Developing alternatives to meat consumption (for urban dwellers) or for meat as source of income (for rural people), for example by promoting crops, bee or livestock farming, has been considered as a part of the solution (Robinson and Bennett 2002; Nasi et al. 2011). However, researchers have highlighted the ineffectiveness of such alternatives (Wicander & Coad, 2014), which are often incompatible with local socio-cultural characteristics and deeply-rooted dietary preference for wild meat (Van Vliet, 2011).

2. Specificity of the forest elephant crisis and the ivory trade

Parallel to bushmeat crisis, elephant poaching is today a global concern for scientists, conservationists, and the civil society. The African forest elephant (*Loxodonta africana cyclotis*) is indeed under a serious threat (Burn et al., 2011; Maisels et al., 2013; Wittemyer et al., 2014; CITES, 2016). For example, between 2002 and 2011 the African forest elephant population declined by 6% and the taxon lost 30% of its geographical range (Bennett, 2011). The poaching rate is now superior to the renewal rate of the species, threatening seriously its survival (Blake, et al., 2005).

While elephant meat is highly sought and valued, the ivory is nowadays the primary goal of elephant poaching (Stiles, 2012). Ivory is a luxury product traded for almost two centuries and its exploitation has triggered the decline of elephant population since the 1800s (Milner-Gulland & Beddington, 1993). In the last two decades, however illegal ivory trade has escalated given the increasing demand from East Asia (Milliken et al., 2012). Although the ivory trade was banned in 1989 by the CITES, the poaching rate remained the same after the ban (Randolf & Stiles, 2011), and the trade has even more than doubled since 2007 (CITES, 2013).

While the elephant issue is at some point related to the bushmeat crisis, the major loss of the largest terrestrial representative of the animal kingdom represents a special case at several levels:

1) First, elephant hunting is a particular concern for local communities who live on the same territory than elephants. All across Africa, people maintain specific relations with elephants, which hold cultural significance and social roles (Kopnina, 2016). This is typically the case for the Baka

who, beyond an economic interest, maintain deeply-rooted social and symbolic bounds with elephants expressed through several rituals (Joiris, 1996; see chapter 6).

2) The motivation in elephant hunting is based on an international demand, and not related to local needs. The commodity chain of ivory differs from the bushmeat market. Among the Congo Basin, south-eastern Cameroon is a major place for elephant hunting and some small towns of the studied area (such as Messok) are considered export point of ivory[8]. From Cameroon, the ivory is exported raw or semi-processed by air to China or Vietnam (via Brussels airport) or by sea (from Douala harbour) hidden in wood cargo or coal shipments (Milliken et al., 2009). According to G.E. (World Wide Fund for Nature, WWF), Chinese companies settled in Cameroon are always directly or indirectly related to ivory trade[9], and the arrival of Chinese workers on Cameroonian worksite always correlates with an increase in ivory trade.

3) The high-value of the ivory generates an unprecedented corruption, which in return impacts conservation outcomes (Smith et al., 2015; Bennett, 2014). Indeed, regulations of ivory hunting and trade are highly compromised by the collusion between corrupt officials and conservation practitioners with the smuggling of ivory from the source (forest area) to consumer states (Stiles, 2012).

4) The particular social role of elephants confers them with a special status. Indeed, the global concern around the elephant fate is mostly based on the fascination of western people for large emblematic mammals (such as gorilla, chimpanzee, and elephant) often labelled as flagship, umbrella and iconic species (White et al., 2014). Strategies to protect those species have often implied a "green militarization" (Lunstrum, 2014), with the provision of rigorous military training, the deployment of paramilitary ranger forces, eco-guards, and national armies to halt their hunting. Reponses are increasingly punitive or even lethal against suspected poachers (see chapter 8; Duffy, 2014, Corry, 2015. For a similar situation in Eastern and Southern Africa see Makoye, 2014; Konopo, 2016). This situation has transformed a conservation issue on a “war” or a battle to save Africa’s elephants (Duffy, 2014). According to Neumann (2004), the progressive discursive elevation of elephants into the human moral community has allowed legitimizing the international interventionism and the use of force to protect elephants. The urgency to protect elephants has also been used to legitimise to secure national borders, connecting the ivory trade to terrorism and transnational organized crime networks (Groo, 2014).

[8] P.D., Nki National Park conservator, interviewed in march 2014.

[9] If the assumption is correct, the deep-water port of Kribi (South region), currently under construction by a Chinese company, might raise the fear of a boom of illegal exports. However, the unexpected and recent ivory trade ban by China in November 2016 have plummeted the wholesale price of ivory in Chinese markets. According to the NGO Save the Elephants, in early 2014, the average wholesale price of tusks was $2,100 per kg, while this price had fallen to $730 per kg, in February 2017 after the announcement of the ban and the closing of its legal ivory carving factories (Vigne & Martin, 2017)

3. Local people & biodiversity conservation: from conventions to enforcement

3.1. The emergence of biodiversity conservation in Africa

As in other areas of the world, the first and main conservation measure in Africa was and is still the establishment of protected areas. The first protected area in the region was established in South Africa in 1908 when the Sabi Game Reserve became the Krugger Park. Wildlife reserves for recreational or hunting purposes were subsequently created all across the continent until the 1920s. From 1934, protected areas were created by the French colonial administration. Establishing in parallel to areas devoted to extractive or productive activities (forestry, mining, cocoa, rubber), protected areas contributed to the compartmentalization of the territory according to its use (Binot, 2010). In general, local populations were excluded from protected areas, the only persons authorized to enter them being a community of conservation professionals (Rodary, 2003). Thus, in the context of the colonization of Africa, the establishment of protected areas translates into a top-down control of resources, without involving or respecting the rights of local people (Colchester, 1994). Conservationist measures in Africa have passed through the imposition of the western environment view of the *wilderness*, and especially through a symbolic appropriation of wildlife by white settlers (Binot, 2010), and opposing "noble" uses to "wild" or destructive local practices (Rodary, 2003). Following an international trend, after World War II and the decolonization period that followed, Africa knew a conservation boom (Neumann, 2002). Thus, helped by the African Conference on Nature Conservation and Natural Resources in Alger in 1968 and the CITES signed in 1973, an international pressure prompted African leaders to create their own parks and reserves, following the western "fortress conservation" and National Park model (Hutton et al., 2005; West et al., 2006). Soon after, in the 1970s, scholars started to highlight the negative impacts of this conservation model on local population.

3.2. People and protected areas

Already in 1975, a IUCN resolution[10] stated the need to take into account local people's needs and rights (Colchester, 2004). From the 1980s, conservation policies were increasingly promoted and supported by NGOs and international institutions such as IUCN, UNEP and WWF, which pointed out the need to take into account the social impacts of conservation actions. Thus, legislative advances and the integration of development objectives for rural communities have marked the last two decades of the 20th century, with the emergence of the community-based conservation (Western & Wright, 1994), and notions of empowerment and benefits to communities (Brosius et al., 2005).

[10] Kinshasa Resolution on the Protection of Traditional Ways of Life.

Indeed, the recognition of local people and their integration into biodiversity management was been placed at the forefront of the international arena with the Article 8 (j) of the CBD in 1992. This article stipulates that contracting Parties shall "*respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity*"[11]. This advancement of indigenous rights regarding natural resources echoes with the advancement of Indigenous rights in general. In 1989, the Indigenous and Tribal Peoples Convention of the International Labour Organisation[12] recognized indigenous people's right to exist as distinct people, acknowledging their land and property rights, equality and autonomy.

The concept of sustainable development has been critical in the shift from a social-exclusive to a more inclusive approach (Adams & Hulme, 2001). However, the reduced social and ecological impact of these inclusive approaches has rapidly been emphasized by social scientists and conservationists (Blaikie & Jeanrenaud, 1997; Brosius, 2006; Agrawal & Gibson, 1999; Igoe et Brockington 2007; Adams et al. 2004), specially in Africa, where participatory management implemented through a local environmental governance is generally considered a failure (Adams & Hulme, 2001; Joiris et al., 2014).

In addition, the application of different conservation strategies continues to create intense conflicts at the local level (Brashares et al., 2014). Because conservation relates to human rights, land tenure, access to resources, and the role of the State, it is highly political (Adams & Hutton, 2007). The issue is also highly anthropological, as it brings face-to-face different representations of nature (see chapter 7 and 8). Biodiversity conservation is often perceived locally as a brake to development, especially for communities that are banned from using natural resources in their territory. Indeed, even in the presence of inclusive strategies, the protected area model remains based on zoning, hence on a process of exclusion, either in terms of presence or in terms of regulating practices, and on a coercive approach directed by managers toward local or indigenous residents (Colchester 1997, 2002).

However, the concrete integration of local people into conservation strategies often comes up against complex political, economic and social contexts. As mentioned by Alcorn (1993), the integration of local people's views in conservation inevitably involves recognition of their status as a stakeholder within discussions about the development of strategies, as well as the characterization of their practices as beneficial, rather than harmful.

[11] Convention on Biological Diversity, Art. 8 (j), https://www.cbd.int/traditional/
[12] ILO Indigenous and Tribal Peoples Convention 169 (1989): http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_INSTRUMENT_ID:312314

4. The Cameroonian Forest Law and the hunting regulation

Cameroon presents a relevant case study to emphasize the advancements and the limits of conservation strategies. I describe here how the Cameroonian state have established a Forest Law and how it is implemented in the field. Given the content of this thesis, my specific focus is on hunting regulation face to local uses and constraints.

4.1. The 1994 Forest Law: an innovative policy face to local realities

As in many African countries, after the decolonization in the 1960s, the protection of the environment in Cameroon has been mainly pushed by international non-governmental organizations, which replaced progressively the colonial institutions in charge of preserving the natural heritage. The first significant steps were taken by the African Convention on the Conservation of Nature and Natural Resources in 1968[13], and by the CITES convention in 1973. The same year, the Cameroonian state enacted a first Forest Law that was subsequently replaced in 1981. At the beginning of the 1990s, while the forest policy was still highly centralized, the government initiated a phase of democratization and liberalization giving priority to privatization and economic growth over biodiversity conservation (Nnah, 2008). The economic crisis and the structural adjustments of the late 1980s and the devaluation of Francs CFA in 1994 accelerated forest conversion to increase its economic value. A very large part of land previously used and occupied by local populations was given by the government to logging and mining companies which benefited from the low cost of production and export. Biodiversity conservation organizations, in rapid expansion, warned the international opinion about the effects of rapid deforestation generated by the liberal economic policies in place.

The Rio Earth Summit and its Convention on Biological Diversity in 1992 progressively drove the Cameroonian state to take measures of protection of the forest ecosystem and its immense tropical biodiversity. Under the influence of this convention and of international institutions (notably the World Bank), the Cameroonian government created a Ministry of Environment and Forests (MINEF) in 1992[14] and started a deep reform of its 1982 Forest Law which led in 1994 to the adoption of the "*Law No. 94/01 of January 20, 1994 on the Regime of Forestry, Wildlife and Fisheries*" implemented by a decree in 1995 (Cerruti & Tacconi, 2008 ; Republic of Cameroon, 1994; 1995). The 1994 Forest Law commits to protect 30% of the Cameroonian territory—one of the highest proportions anywhere in the world (Topa et al., 2009), and targets a sustainable management of forest resources, concealing

[13] Signed at Alger and revised in 2003 at Maputo.
[14] This Ministry has been later renamed Ministry of Forests and Fauna (MINFOF)

conservation and production (Cerutti et al., 2008). Beside this ambition, this law is also among the firsts in the world to give to local populations some responsibilities over the management of natural resources, responding hence to the will of democratization initiated few years before (Egbe, 2001). The 1994 Forest Law accords local people usage rights, namely the right to exploit all forest products (except protected species, and only for non-commercial use). Two other significant elements of this legal framework are a zoning plan and a decentralization process of resource management.

The zoning plan is the central instrument of the Cameroonian Forest Law. It classifies the forest in permanent and non-permanent domains (art. 20, Republic of Cameroon 1994). Permanent forest domains comprise protected areas (national parks and faunal reserves) and logging concessions. Non-permanent domains include other forest uses such the agroforestry land-use areas adjacent to villages, Community Forests, and Community Hunting Zones (CHZ). This system is based on an economic optimization that cuts the territory in patches according to its vocation (Karsenty, 1999), and operates from the state to the parcel level. Local communities are consequently excluded from high-value forest reserved for protection or logging purposes. As mentioned by Robillard (2010), the management logic of this zoning plan is founded on specialization but also on exclusion. The zoning process and the attribution of permanent or non-permanent status were mainly based on the differentiation between farming lands and secondary forests on one side and "virgin" areas on the other through remote sensing (Hoare 2006; Robillard, 2010; Yasuoka et al., 2015; Lewis 2012). The creation of the protected areas legally prohibits any intervention that might alter the composition and the natural evolution of the forest (Yasuoka, 2015), under the assumption that human management has had no role in shaping the current status of forest. In the same line, this prohibition does not consider past interventions of local populations on the forest cover and their current uses of the forest resources, imposing them a strong restriction in use and mobility (Ichikawa, 2006).

Resource management decentralization is the other cornerstone of the Cameroonian Forest Law (Oyono, 2004). Indeed, the 1994 reform distinguishes itself from others in the world as it was among the first to enhance conservation strategies integrating the local populations within the process of participatory management (Joiris and Bigombe Logo, 2010). For this reason, it has been considered by the World Bank as a "laboratory" of innovation in central Africa (Karsenty, 2002). This innovative legal framework implemented a redistribution of taxes paid by logging or mining companies, of which a part is -theoretically- paid to local communities (Cerutti et al., 2010). It also implies a transfer of powers to manage the forests from central to local authorities and gives responsibilities to village communities to manage Community Forests. However, although the terms "narrow collaboration" and "active participation" are present all through the text of the law, the idealistic notion of participatory managing and the reality of its implementation on the field has been the object of large critics (Karsenty & Marie, 1997; Bigombe Logo, 2006; Karsenty, 2002), notably in the specific case of the Community Forests.

The system of Community Forests allows village members to manage their forest on their own, with the possibility to gain benefits in marketing timber resources. They result in a management convention between the villagers and the administration and a management plan written by community members. Legally, the state remains the landowner, and the communities only benefit from the usufruct of the available resources. While the communities might chose to develop activities based on the exploitation of Non Timber Forest Products (NTFP), most of them favoured timber

exploitation (Ezzine de Blas et al., 2009; Lescuyer et al., 2012). According to the law, revenues resulting from timber transactions must be invested in community development and infrastructure projects. Since 1994, 267 Community Forests have been created covering about one million hectares (Rainforest Alliance, 2015). However, all across Cameroon, as well as across all Central Africa, no areas affected by participatory reforms have shown convincing results (Joiris et al., 2014). Among the plethora of studies that have been led on Community Forests all of them noticed the very weak advancements in terms of development provided by such system (i.e., Bigombe Logo et al., 2010; Vermeulen et al., 2006; Oyono et al., 2006b).

There are several potential reasons for this lack of success, and most notably the definition of "community" (Karsenty, 2008). Indeed, the implementation of the Community Forests system is not adapted to the complexity of village social structures that might, indeed, be destabilized by such new arena of power (Bigombe Logo, 2007). Village communities are often heterogeneous, dispersed, and sometimes conflictive (notably in cases of "Pygmies/Farmers" relations), and carrying strong inequalities of status. Such inequalities exist notably between lettered and marginalized people, men and women, or elders and the new generations, and might engender a power recovery by local elites or exogenous agents, local conflicts or funds embezzlement (Oyono et al., 2006a). In that sense, Bahuchet & de Maret (2000) note the necessity to build a community management of forests on a better understanding and legibility of the functioning of local societies.

Face to problems and gaps encountered by the implementation of the Forest Law, in 2007 the Cameroonian government started a revision of such law. The Ministry itself acknowledged numerous limitations of the initial version, notably regarding notions of property rights within the zoning process or the potential impacts on subsistence underwent by people living around protected areas. It also points out the necessity to align the law along more recent evaluations regarding social development and biodiversity, as well as the need to obtain better adherence from local communities (Koutou, 2010). A non-official and preliminary draft of the revised law I accessed in April 2017 shows several changes related to hunting:

- Acknowledgment of the "customary right", now distinguished from "usage right";
- Inclusion of the sacred forests, recognizing the cultural importance of the land;
- Abandon of the term "traditional hunting" which is substituted by "subsistence hunting"; and
- Prohibition of use of steel-wire snare.

However, in 2017, ten years after the revision was initiated, no definitive version has been published yet.

4.2. Forest conservation and external supports in the South-east Cameroon

Non-governmental organizations, such as the WWF, have played an influential role in the redaction of the Forest Law, notably by pushing the Government to establish protected areas. According to the zoning plan, the creation of protected areas became a prerogative for the state. However, face to the lack of capacity building and sufficient financial means to manage protected areas, the implication of NGOs (WWF and GIZ[15]) immediately became vital (Robillard, 2010). The number of protected areas (national parks, wildlife sanctuaries, wildlife reserves, and other conservation areas) increased rapidly in the late 1990s and 2000s, to the point that in 2009 they covered more than 15% of the national territory, and 20% of its forest surface (3.9 million hectares) (Topa et al., 2009).

As an illustrative example of the role of international organizations in implementing conservation initiatives in Cameroon, I describe here the role of WWF in the study site. I focus in this organization, because as I will explain in Chapter 8, it has impacted local perceptions towards external interventions on resource management[16].

The creation of national parks in the south-eastern Cameroon is inseparable from the presence (institutional and on the field) of WWF. In the 2000s, this region was marked by the increasing support of WWF in terms of funding, presence, and decision-making concerning resource use. According to G.E.[17], the specific role of WWF in the area is to bring a support to the management plan of these national parks, providing support to management, conducting ecological surveys, and anti-poaching controls. Outside the parks, but still in the permanent forest domain, the role of WWF is rather to *"supervise the human interventions*", such as support good logging practices, help in the certification process, support community initiatives (such as Community Hunting Zones) and local governance, as well as verify whether the communities wisely use the forest royalties and analyse the impact of these royalties on the villages.

WWF arrived to south-eastern Cameroon in 1998. The same year, the NGO started a project called *Jengi*[18] with the aim to promote sustainable logging, ensure a certified forest management, and support the creation of the national parks planned in the area by the Forest Law. Working in collaboration with the Ministry of Forestry, WWF pushed the government to the classification of large parts of the permanent estate into three national parks: Lobeke (2001), Boumba-Bek (2005), and Nki (2005)[19], and intervened subsequently as an executive agent for their implementation. The ambitious goal of these NPs was to conceal biodiversity conservation, economic development (notably logging), and maintenance of local livelihood, while impelling new forms of local governance, in respect of the law (Bigombe Logo et al., 2005). In the 2000s, WWF began to push

[15] German Cooperation Agency (previously GTZ).
[16] Indeed, the villages where the study took place are not included in nor adjacent with any protected areas, but the presence of major protected areas and the push for a conservation-inspired regulation in the region has obviously created new stakes for all the Baka in south-eastern Cameroon.
[17] Executive director of WWF-Ngoyla, interviewed the 28th April 2015 in the Ngoyla WWF base.
[18] The name of the main Baka forest's spirit.
[19] The creation and future management of these national parks were funded by a number of foreign institutions, the most prominent being the World Bank, European Union, CARPE program of USAID and WWF.

transnational protected areas management with the creation of the Tridom complex linking Dja Reserve (Cameroon), Odzala NP (Republic of Congo), and Minkébé NP (Gabon), and then enlarged to Boumba-Bek and Nki National Parks. While before 2010, WWF was mostly active on the periphery of the national parks, the establishment of two new local branches in 2010 considerably enlarged the area covered by the NGO which passed to include the "forest block" of Ngoyla-Mintom (943.000 ha), which connects the Dja Reserve and the Boumba-Bek/Nki NP. In 2014, a decree established that a significant part of this area was to become a new protected area[20]. In sum, through these different stages of extension, WWF has extended its action field to large areas more populated and whose legal status highly differ from protected areas.

4.3. Hunting regulations and their enforcement

This section describes how the Forest Law is translated on the field, which is mainly done in terms of anti-poaching regulations and controls. I detail how hunting is defined by the law, the different agents involved in is application, and the regime prohibiting specific hunting techniques and the capture of protected species.

Agents locally involved in hunting regulations

A diversity of agents are mobilized in the forest area in direct or indirect relation to hunting regulations. In total, four types of actors are involved in anti-poaching in the studied area:

The ecoguards are sworn officers employed by the MINFOF (also called "*les Eaux et Forêts*") and whose mission is to ensure the enforcement of the Forest Law and notably the hunting regulations, to watch over any protected species that are hunted as well as any illegal circulation of meat and ivory. They seize weapons used illegally (wire cable and shotgun used without permit) and game hunted without authorization.

The WWF local agents, whose mission is to provide logistical and technical support to ecoguards and visit villages for environmental sensitization (although this activity was not observed). In practice, it consists mostly of drivers transporting MINFOF ecoguards to remote areas of a park in a WWF car.

The Ecofac agents are numerically few and mostly present in the Dja reserve and its periphery. Their mission is similar to ecoguards but is funded by the European Union through the WWF, which is the local partner and fund distributor.

The BIR (*Bataillon d'Intervention Rapide*) is an elite corps depending on the Cameroonian Ministry of Defence and commanded directly by the President of the Republic,created to secure the national borders and seize illegal firearms. This elite corps especially targets elephant hunting expeditions and

[20]At the time of the finalizing this chapter, the limits of the protected area have been designed and local populations are being consulted.

camps where war weapons might be found. This corps benefits of advanced technology armaments and is entirely funded by the National Society of Hydrocarbons.

Hunting and threatened species in the Forest Law

Beyond banning hunting in certain zones (protected areas), the Forest Law also shows a strong will to conserve wildlife by strictly regulating the extraction of the most threatened species and by implementing a severe prohibition regime on certain hunting methods. For local people, hunting is not forbidden but regulated under strict conditions. The enforcement decree on hunting regulation defines hunting as "*all activities aiming to pursue, kill or capture a wild animal, or guide expedition for this purpose, as well as all the actions aiming to photograph or film wild animal for commercial purposes*" (art. 85, Republic of Cameroon, 1994). This definition aims to embrace all the motivations and types of agents that might be concerned by the regulation of fauna resource use.

Classification of species and protection status

The Cameroonian legislation defines a special regime regulating the modalities of extraction of wildlife, beyond the simple case of threatened species. Indeed, the lists enumerating the species protected by decree (14th August 1998) present the singularity to include all the animal species existing in the territory. Class A comprises the most vulnerable species profiting of an absolute protection regime. Species in this list can not be slaughtered under any circumstance. Class B includes the species partially threatened, which might be slaughtered under certain conditions. Class C gathers the rest of animal species not included in the Class A and B. Class C animals benefit from partial protection regulating their capture or slaughtering in order to "*maintain their population dynamics*"[21]. The legislation requires updating the list of protected species every five years to be in accordance with the up-to-date animal diversity situation, however, the government has never updated the classification that is consequently scientifically obsolete (Nguiffo & Talla, 2010), contrarily to wider evaluation such IUCN database.

Poaching and penalization

According to the law, the term 'poaching' refers to a hunting activity practiced in violation with the applicable law, or more precisely, a hunting activity practiced in unauthorized areas, during closures of hunting seasons, without hunting permit, or with banned hunting weapons (Talla, 2010). Several points of the law present some particularities. First, the law does not respect the principle of presumption of innocence: any individual found in possession of a protected species will be considered as the person who killed it. Secondly, the text does not stipulate any quantities; the infringement concerned the whole as well as a part of the animal. Any small piece of ivory or skin is

[21] The juveniles of the three classes and eggs of Class A and B fall into the protection regime of the Class A.

concerned by the penal procedure[22]. To enforce the law, ecoguards can search for and seize protected species illegally obtained in any place of the territory, although they cannot enter in private properties without a search warrant delivered by the territorial representative of the public prosecutor. Contraveners who have poached or captured an animal from Class A or B face prison, with a sentence of between one and three years, and a fine of between 3.000.000 to 10.000.000 francs CFA (4.600 to 15.000 €), in addition to confiscation of the weapon used and the animal hunted. Co-authors and accomplices are punished by the same sentence (art. 98 of Penal Code). This fact is of critical importance in the south-eastern Cameroon, and specifically in relation to the shotgun sharing system and hunting-on-command practiced by the Bantus with the Baka (see chapter 3).

The use of weapons

The Forest Law recognizes only two types of hunting: traditional hunting and sport hunting and prohibits hunting methods that can result in massive destruction of animal species or compromise their sustainability (i.e., automatic weapons, chemical products, fire hunting, modern net hunting, poison, and explosives). War weapons, i.e., the armament of armed and police forces, are also banned for hunting. Nocturnal hunting helped by enlightening devices is also prohibited.

Traditional hunting of local faunal resources (game and fish) other than protected species from Classes A and B is allowed to local residents (art. 8.1, Republic of Cameroon, 1995). Local residents also have the freedom to carry out hunting activities with traditional methods throughout the territory (except in protected areas). In addition to restrictions concerning protected species and areas, game obtained from traditional hunting must not circulate and has to be kept for personal use, forbidding any commercial transaction. The main issue concerning this clause is the complete absence of a definition or examples of what is considered as a "traditional" hunting method (Nguiffo & Talla, 2010).

Sport hunting is practiced in Cameroon by the Western elite. The activity has been formalized by the government as an opportunity for a co-management of resources and a leveller for social and economic rural development through the payment of taxes to local communities. Sport hunting is allowed in specific areas planned in the zoning plan and allocated to professional hunting guides (Bigombe Logo & Roulet, 2010). In 2013, the area allocated to sport hunting in Cameroon covered almost 6 million of hectares (Lescuyer, 2013). Sport hunting can be performed with modern weapons and targeting all animals of Class C and B if an authorization is obtained (derogation). A collection permit can also be issued by the administration in charge of wildlife for safari hunters desiring to keep trophies or remains. The cost of these permits is obviously unreachable for local residents[23]. Moreover, far from contributing to rural development, sport hunting generates conflicts about the

[22] This fact is notified by several Baka of the studied villages when they explain why they do not possess anymore the traditional "sawala", small bag containing the essentials to make a fire in forest (oakum, flint and a piece of metal) which was traditionally made with chimpanzee's skin. There have replace by duiker's skin or modern Chinese pouches.

[23] Ranging from 50 € for one feathered game for a national hunter (170 € for a tourist) to 200 € for a large mammal (650 € for a tourist) (Talla, 2010).

legitimacy of hunting and tends to reproduce social hierarchies in the institutions created to manage these new spaces, where male Bantu-speakers often dominated (Bigombe Logo & Roulet, 2010).

*

Before entering into the details of hunting from an inner case study perspective, this chapter brought some insights on the legal framework and history of African conservation policies, allowing to better capture the regulatory context in which Baka hunting occurs. This chapter globally shows the enforcement of a complex and severe law regarding access and usage rights in order to protect the Cameroonian forests and its wildlife. It also highlights how conservation measures have had little or no regard for the local people in spite of its theoretical interest on community-based approaches to conservation.

Chapter 2

"Pygmies" and Baka: Historical and ethnographical accounts

Any study focusing on the Baka should be placed within the context of previous studies among others Central African hunter-gatherers. Indeed, several decades of research among Central African hunter-gatherer groups have created a corpus of "Pygmies' studies", in which academic exchanges and debates have encouraged the comparison of research findings resulting from studies conducted with different groups. The literature on the Central African hunter-gatherers, although unbalanced in terms of number of studies per group, emphasizes cultural commonalities between groups but also a high cultural and linguistic diversity, as well as some level of biological (genetic) variations (see Bahuchet, 2014 for a complete state-of-the-art). Commonalities and specificities of each group can be easily related to their respective history of settlement in the Congo basin, which has deeply influenced their mobility, their relations with others groups, their subsistence patterns, and their identity (Bahuchet, 1992). Consequently, the aims of this chapter are 1) to summarize previous research on the origins and the diversity of the Central African hunter-gatherers and 2) to describe the recent history (i.e., 20th century) of Baka settlement in relation to social and economic changes.

1. Populations in the Congo Basin: A complex patchwork

1.1. Origin and specificities of human settlement in Central Africa: Research in linguistics and genetics

Belonging to around 15 ethnolinguistic groups, Central African hunter-gatherers, also known as "Pygmies", constitute the largest remaining ensemble of mobile hunter-gatherers on Earth (Hewlett & Fancher, 2011). There are no reliable assessments of the actual number of Central African hunter-gatherers: while some estimate them between 250,000 and 350,000 individuals (see Table 2.1) (Hewlett, 2014), a recent study provide a very wide estimation of around 900,000 (Fa et al, 2016a). Central African hunter-gatherers are found in the tropical forest ecosystems of the Congo Basin and in its margins[24], in several areas around the equator. Their population lives in eight countries ranging from Cameroon and Gabon on the West to Rwanda on the East (see Figure 1.1). The largest groups are the Aka, the Baka, the Mbuti, the Twa, the Efe, and the Kola. The Baka population of Cameroon is estimated around 40,000 individuals, with a low population density (1 inhabitant/km^2, against 7-10 inhabitants/km^2 for their farming neighbours) (Froment, 2014).

Researchers have questioned in different manners the unicity and the diversity of the « Pygmies » population. Why are Pygmies found in several and distant parts of the Congo Basin? What are the links between different Pygmy groups? Why not all of them speak the same language? Do they have a common origin? Why are similar cultural traits found in distant populations? First answers have been brought by linguistic and more recently by genetic studies.

[24] Few groups, numerically small, live in less forested ecosystems such as the Tikar in Central Cameroon, and others in Angola (Bahuchet, 2012)

Table 1.1. Central African hunter-gatherers ethnolinguistic groups[25]

Ethnic group	Other names	Country, region	Approximate population	Linguistic family
Aka	Bayaka, Biyaka, Babinga, Bambenga BaMbenzele (for western groups)	Northern Congo, Southwestern Central African Republic	35,000	Bantu
Asua	Mbuti	Democratic Republic of Congo (DRC)	3,000	Sudanic
Efe	Mbuti	Northeastern DRC	10,000	Sudanic
Baka	Bangombe, Bibayak, Babinga	South-eastern Cameroon, northern Gabon, northern Congo, CAR	40,000	Oubanguian
Bofi		Northern Congo, and Southwestern CAR	3,000	Oubanguian
Bongo	Akoa, Rimba	Central Gabon and central Congo	2,000	Bantu
Kola	Gyeli	Southwestern Cameroon, Equatorial Guinea	3,500 – 4,000	Bantu
Mbuti-Sua	/	Northeastern DRC	7,500	Bantu
Bedzan	Medzan, Tikar Pygmies	Western Cameroon	250-500	Bantu
Nsua	/	Ugunda	1,000	Bantu
Twa	/	Uganda, Rwanda, Burundi, Northeastern DRC (Ituri forest): divided in Efe, Asua, BaSua (or BaMbuti strictly speaking).	10,000	Bantu

[25] Source : own elaboration based on Hewlett & Fancher, 2011 and Bahuchet, 2014

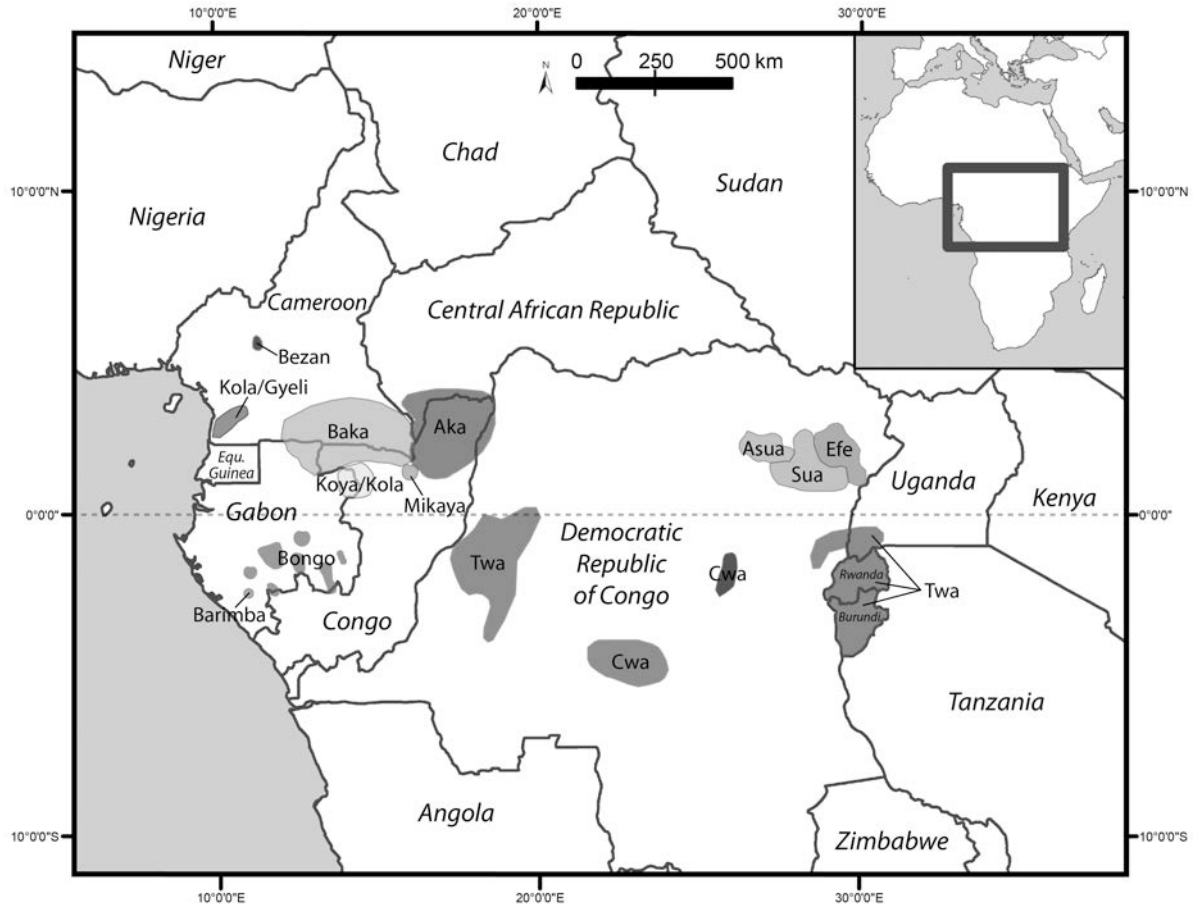

Figure 1.1.Distribution of Central African hunter-gatherer groups[26]

Serge Bahuchet was the first to examine the Pygmy settlement at the Central African level. The singular fact that two of the largest Pygmy groups speak a different language from the one spoken by their neighbours was the spark that encouraged him to employ ethnolinguistic methods to examine the history of human settlement in that part of the Congo basin (Bahuchet, 1992; 1993; 2012). According to his theory, the hunter-gatherer populations originally constituted a single group that latter split into « western » and « eastern » Pygmies. Within the "western Pygmies", a group he named *Baakaa was subsequently separated into two distinct groups: the Baka and the Aka. Bahuchet's theory is based on the sharing of certain specific cultural traits (i.e., yodeling, wild yam digging, honey collection) and on similarities in a specialized vocabulary concerning techniques related to these cultural traits and notably fauna (88% in common) (Bahuchet, 1996: 109). Recent phylogenetic analysis confirms this theory, further stating that group divergence probably started around 20.000 BP (Verdu et al. 2014; Verdu et al. 2009; Patin et al. 2009). Furthermore, the same phylogenetic analysis also suggests that there is a common origin between contemporary hunter-gatherer populations and others populations

[26] Source: P.Verdu for Bahuchet (2012)

in the region, which started to diverge between 54.000 and 90.000 years BP, long before farming which emerged in Central Africa around 5.000 BP.

All the tongues spoken by Central African hunters-gatherers are related to other African languages, which does not support the idea that there was a unique Pygmy linguistic family (Bahuchet, 2014). Linguistic features of Pygmy groups are, in fact, intimately related to Pygmy circulation across Central Africa through time. It appears that the Aka, a Bantu-speaking population, initially lived beside Bantu-speaking farmers, while the Baka, Ubanguian speakers, initially lived to the East, besides Ubanguian speaking groups. The complex population movements in the last centuries have led those two groups to settle nearby populations speaking a tongue from another linguistic family: the Baka besides Bantu-speakers and some Aka partly besides Ubanguian-speakers. Consequently, nowadays the Baka language show no common ancient past with any of 18 different tongues which surround the area where the Baka are now settled (Helwett, 2006), but it presents linguistic and cultural similarities with groups of kindred tongues, from which they nowadays live far.

1.2. Research timeline of cultural diversity among Central African hunter-gatherers

First descriptions and monographs

Among all the African ethnolinguistic groups, hunter-gatherers from the Congo Basin have attracted the largest scientific curiosity. For a long time, these groups have stirred up the fascination of explorers and the general public leading to fanciful descriptions and interpretations (Bahuchet, 1993a). They have also attracted a plethora of academic research, especially in the 20th century. At the turn of the ninetieth century, explorers produced descriptive accounts of these groups, rarely scientifically objective (Du Chaillu, 1863; Crampel, 1880; Cottes, 1911). Those accounts were followed by missionaries' reports or descriptions in the 1930s-1940s (Trilles, 1932; Betaut, 1943; Ternay, 1948; Verhille, 1949; Dhelemmes, 1985). In the last 50 years, scientists have added to this literature. For example, in the 1940s, two savants from the French Museum of Natural History, Vallois and Marquer, were the first to conduct a systematic data collection within a Pygmy group, the Baka (Vallois & Marquer, 1954; Vallois, 1935, 1948), while the ethnologist and missionary Paul Schebesta provided a deep description of the Mbuti (Schebesta, 1938; 1941; 1952). Interest in the various groups has been, however, unequal. Currently, the Aka, the Baka, the BaMbuti and the Efe are the most documented groups, providing 86% of all the publications related to Congo basin hunter-gatherers (Bahuchet, 2014). Smaller groups such as the Gyeli, the Twa, the Cwa, the Bongo, the Medzan or the Koya, less mobile and socio-economically closer to farmer groups, have apparently attracted less academic research (Bahuchet, 2012).

The first real ethnographic research aiming at an in-depth understanding of the African hunter-gatherers was conducted among the Mbuti of the Ituri forest (DRC) in the late 1950 by Colin Turnbull, whose books *The Forest People* (1961) and *Wayward Servants* (1965) have popularized the « Pygmies » worldwide.

First debates and perspectives

In the 1970s, Japanese researchers from the Kyoto University started to collect data in cultural ecology and human ecology among the Mbuti of the Ituri forest (Harako, 1976; Ichikawa, 1978, 1981; Tanno, 1976; Terashima, 1983, 1985). During the early 1980s, the American Robert Bailey studied subsistence practices and time allocation among the Efe (Bailey, 1991; Bailey & Peacock, 1988), and about the same time Barry Hewlett started research among the Aka focusing on allomaternal care and childhood (1988, 1989, 1991). Among French researchers, Simha Arom focused on ethnomusicology (Arom, 1987), while Jacqueline Thomas initiated a linguistic study, followed by Serge Bahuchet who focused on ethnozoology and ethnolinguistic. Bahuchet wrote the first monograph on the Aka (Bahuchet, 1972; 1985), a work soon followed by other in-depth studies among the Aka in ethnobiology (Motte, 1980; Bahuchet, 1985) and material culture (Demesse, 1978; 1980). Faithful to their ethnographic and encyclopaedic traditions, at the end of the 1970s, French researchers started to gather anthropological and linguistic data with the aim to publish a gorgeous and exhaustive encyclopaedia of the Aka (Thomas et al. 1981-2015).

In general, Pygmy studies have been notably marked by the question of their subsistence in tropical areas, or what is known as the « Wild Yam Question », an issue that became central in the anthropological literature of the late 1980s. The core of this question is whether subsistence in tropical forests is possible without access to domesticated food (Bailey & Headland, 1991). This question led to an intense debate (Bailey et al. 1989; Bahuchet et al., 1991) recently still enriched with additional work (Dounias, 2001; Sato, 2001; Yasuoka, 2006), which stimulated numerous and insightful ecological studies in the Congo Basin and gave a historical perspective to the relation that hunters-gatherers maintain today with farmers.

Indeed, during the last decades numerous studies have examined « forager-farmer » relations. The first works on the topic were mainly ecological and biological studies (Hart & Hart, 1984; Tanno, 1976, 1981; Cavalli-Sforza, 1986; Schlutz, 1991) or ethnographical accounts (Turnbull, 1965a, 1965b; Bahuchet & Guillaume, 1982); one also focused on inter-marriage (Terashima, 1987). Forager-farmer relations have been alternatively described as a mutually beneficial symbiosis (Turnbull, 1965; Terashima, 1986) and as a relation of dominance, ownership, "clientage" or even slavery (Joiris, 2003; Lewis, 2001; see Robillard & Bahuchet, 2012 for a review). As on today, the literature globally acknowledges that there are different levels of interdependence between the two groups. Interdependence is based on material and immaterial exchanges which also form multidimensional relations (social, economic, ritual) (Bahuchet, 1992; Hewlett, 1991; Ichikawa, 1983; Joiris, 2003; Robillard, 2010; Takeuchi, 2014). Moreover, the relations between the two groups are complex in terms of identity (Rupp, 2003; Kölher & Lewis, 2002).

Given their way of subsistence, research among Central African hunter-gatherers has often mobilized the ethnoecological/ethnobiological approaches. This line of research was initiated by French and Japanese researchers, which examined hunter-gatherers relations with the environment. For example, Bahuchet provided a general ethnoecological monograph of the Aka and the Baka (1992), while Dounias studied many aspects of the Baka ethnobiology such as wild yams consumption (Dounias, 2001a; 2001b; 1993) and honey gathering (2015). Studies on the relations Pygmies maintain with animals include an analysis of the status of birds among the Ituri's foragers (Terashima 2007; Ichikawa 1998), an overall analysis of the relations between plants, animals and humans (Terashima 2001, 2003), a discussion of food avoidances (Ichikawa, 2007), and a description of the relation between the Baka and the gorilla (Oishi, 2014) and the elephant (Joiris, 1998; Köhler, 2000).

Research on the Baka

Research specifically focusing on the Baka was piecemeal until the late 1980s. Prior to this date, only studies based on short-term research were available (Althabe, 1965; Vallois & Marquer, 1954; Philippart de Foy, 1984), although there was also a very complete linguistic data set (Brisson & Boursier, 1979; Brisson, 1984, 2010), and a list of vernacular plants names by Letouzey (1975; 1976). The Baka only started to capture researchers' attention from the 1990s, notably with the work of Sato (1992; 1998), Bahuchet (1992) and Hayashi (2000) on subsistence, Dounias on plant uses (1993; 1995; 1996), Joiris on rituals (1998; 2003), Leclerc on agriculture (2001), Rupp on cultural identity (2003), and Bundo (2001), Tsuru (1998) and Fürniss (2005) on music and rituals.

In the last ten years, research conducted among the Baka has addressed new topics and diverse issues, such as intercultural relations and cultural identity (Rupp, 2011), conservation policies (Robillard, 2012), ethnobiology (Oishi, 2014), impact of logging (Lewis & Nelson, 2006), and health (Dounias & Froment, 2011). Childhood has recently been addressed in the PhD work of Gallois (2015; 2016; 2017), and Sonoda (2014).

Without giving a complete ethnography of the Baka, previous work provides an overview of the traits that differentiate the Baka from neighbouring Bantu-speaking groups. Essentially, these traits (shared with other western Pygmies such as the Aka and the Mbendjele) are linked to a subsistence economy related to the exploitation of wild resources. Specifically, the Baka are characterized by

i) A very high seasonal mobility associated to a specific forest habitat type, a mobility that is now maintained by shifting between settlement and forest camp-life (Dounias & Leclerc, 2006; Leclerc, 2012; Gallois, 2015);
ii) A diversity of hunting techniques bound to their social structure and rituals (Joiris, 1998; Hayashi, 2008; Duda et al., 2017; Yasuoka, 2014; 2006a);
iii) An important dietary dependence on resource gathering and collection (Bahuchet, 1992; Gallois & Duda, 2016; Yasuoka, 2006); 4) a unique use and symbolic system of wild yam gathering consisting in the voluntary reburial the tuber's head after harvesting,

without killing the plant (Dounias, 2001; Yasuoka, 2009); and 5) a close association with sedentary swidden agriculturalists with whom they maintain complex social, economic, and symbolic relations (Joiris, 2003 ; Rupp, 2003).

2. Population movement, trade of resources and settlement

2.2. Colonization, slavery, and ivory trade in the 19th century

Slaving and population dynamics

The human settlement of the Congo Basin - and particularly of south-eastern Cameroon - is marked by a troubled history. Indeed, it is difficult to reconstruct human settlement history in the area during the two last centuries given the different processes of cohabitation, migration, and assimilation that took place. Successive waves of flight from slavery and the permanence of interethnic conflicts have resulted in very important population movements in the south-eastern part of the country (Leclerc, 2012). Additionally, the colonial period, with the introduction of the system of concessionary companies, caused serious changes in the relations between societies, leading to a major social and spatial recomposition. As the Congo Basin population is highly diverse, home to more than 150 ethnolinguistic groups, including 17 in south-eastern Cameroon, this history has determined the present situation.

In the course of the 19th century, Congo basin populations were the object of an important slave trade. Trade consisted in exporting ivory and slaves from the eastern forest area to the coast trading posts (Joiris, 1998). This system rapidly established a hierarchy between the different social groups, each of them playing a different role within the economy, some exploiting, some being exploited. This context is particularly relevant in the political and commercial context of Cameroon between 1850 and 1890, as this period seems to have had a considerable impact on the circulation and the spatial distribution of a dozen of farming societies (Dounias & Leclerc, 2006). Indeed, before the arrival of the Germans, the region was constantly marked by abductions, which constituted a dynamic escape toward forest areas. In this context, the Nzime - the largest farming population in the study area - seem to have employed razzias and abductions, supplying the coast with slaves through Bulu and Badjué people living further west (Leclerc, 2012). It is also during this period (between 1850 and 1890) that the Baka entered the present boundaries of Cameroon (Bahuchet, 1993b), a little before the arrival of the Germans (Leclerc, 2012). Coming from the east and knowing well the forest, the Baka seem to have helped populations threatened by the slave trade by guiding them towards inner forests,

developing better relations with some groups than with others (Leclerc, 2012). According to Leclerc (2012), this fact explains why the highest density of Baka populations is still found today in the extreme east of Cameroon, in a Bangango settlement area, nearby groups having been exploited in the 19th century by the Nzime, the Bulu, and the Fang.

Resources trade and regional effects

French and Germans entered in the forest block of south-eastern Cameroon between 1885 and 1890. As European colonization was mostly an economic enterprise, territories were considered as reservoir of resources. Concessionary societies were then created to exploit rubber, resins, palm oil, ivory, and skins (Owono, 1996). Trading posts were established in the inner land to buy these resources to villagers in exchange of fabric, firearms, gunpowder, or western bauble (Robineau, 1967). However, although the trade was done through non-Baka villagers, Westerns were, in most cases, acquiring products collected upstream by the Baka. This was particularly the case for ivory (Bahuchet, 1992).

Pushed by concessionary companies, ivory trade grew extremely rapidly, becoming the most valuable trading item in the area between 1901 and 1905 (Bruel, 1918 cited in Bahuchet, 1979). Elephant populations knew a first severe decline in the second half of the 19th century. At this period, ivory was a trading currency for local people. The expansion of firearms in forest areas was marked by two booming periods: first the arrival of firearms through coastal trading posts, and then, at the beginning of the 20th century, the establishment of colonial concessionary companies within forest blocks. The expansion of firearms led to major feedback loops on ivory trade. With more firearms, the ivory offtakes increased rapidly allowing more exchanges and therefore more firearms imports in the area. From 1908, the ivory trade started to decrease as a consequence of the severe decline of the elephant population in the area.

After World War I, the French colonial administration pushed the development of cacao cultivation (introduced by the Germans), which was on the rise around 1925-1930 (Leclerc, 2012). This new economic activity highly favoured the development of a road network that subsequently contributed to the installation of Bantu-speakers cultivators along these axes with the aim to better export their production. During World War II, the wartime economy forced farmers of south-eastern Cameroon to increase their production, which led to a specialization of roles within their families, with women specializing in subsistence crops and men working primarily in cacao plantations. Bantu-speaking villagers became a real working force for export production (rubber, cacao), lacking labour force in their own subsistence crops. Some scholars find that this economic situation during colonial times generated an unbalance between farmers and the Baka who, because they were not mobilized by the French government for the war, started to be employed to help in villagers' fields (Joiris, 1992; Demesse, 1978).

2.3. 20TH CENTURY BAKA MOBILITY AND CURRENT SETTLEMENT PATTERN

AGRICULTURE AND ROAD SETTLEMENT

Until the mid-twentieth century, the Baka were living in small groups of 30-40 individuals (Bahuchet, 1992). The adoption of agriculture and their settlement along roads are most likely the two most important events in Baka live during the 20th century. These phenomena are often stereotypically depicted as imposed by colonial administration or missionaries, but such attempts have rapidly failed and both adoption of agriculture and semi-sedentary lifestyle were rather voluntary (Froment, 2014). However, the two events are the result of a more complex situation. Some authors have emphasized that the changing economic relations of the Baka with their neighbours might be at the origin of their settlement, while others have highlighted factors more related to internal social dynamics. In all cases, while drivers of Baka settlement are numerous, most of them indirectly relate to colonization, social restructuration, and resources trade.

According to Althabe (1965), who first observed Baka farming around 1955, the Baka started cultivating plantain to limit their dependence towards their neighbours. This author also supposed that the Baka might have also been forced by their neighbours to cultivate their own fields in order to limit their regular thefts. However, for Leclerc (2012) more than the adoption of farming, the most important change in Baka life was the extremely rapid clustering along roads in 1969-1970, occurring simultaneously in different distant areas. Indeed, Leclerc notes that the massive clustering occurred several years before the effective implementation of the "development assistance" programs[27] initiated by the State after independence (1960). Leclerc analysed the reasons driving road settlements, arguing that it was more an enthusiastic response of the Baka to the call for "going out of the forest" peddled by the missionaries and the relative correspondences between Baka and the Christian monotheism[28]. In addition, Leclerc argues that the decline in elephant populations resulting of the 19th trade affected their hunting efficiency and consequently led to a reorganization of the Baka social units and the spatial relation between clans, which had been very dependent on elephant hunting events.

[27] « Opération Mille Pieds » from 1960, « Projet Pygmées Est-Cameroun » in 1968 ; Gouvernemental program « Intégration Socio-économique des Pygmées » in the early 1980s' in collaboration the Dutch organisation SNV , which became later « Association pour l'Auto-promotion des Peuples de l'Est Cameroun » (AAPPEC).

[28] This situation is particularly relevant regarding the clustering around two different villages Salapoumbé (1969) and Le Bosquet (1972). In 1972-1973, more than 1.000 Baka coming from different forest settlement got together to form a village *ex-nihilo*, called Le Bosquet, around a health centre created by a Catholic Sister, who was also aiming to break Baka dependence toward Nzime (Dhelemmes, 1985, cited by Leclerc, 2000). The village population increased from 0 in April 1972 to 700 individuals in December 1972, surprising even the Sisters. They were somehow duped by a fortuitous correspondence between their own mythology and the Christian monotheism (Bahuchet, 1993; Leclerc, 2012; Robillard, 2010). The village currently reaches around 2.000 individuals, being the most populated Baka settlement in the region

Present distribution of the Baka

Today, the Baka live in the west of the Congo Basin in an area estimated at 100.000 square kilometres. Administratively, they are located at the crossroads of several national borders, occupying four regions: northern Gabon (Woleu-Ntem province), northeast of the Republic of Congo (Sangha region), a small part of the south-western of Central African Republic (Sangha Mbaere prefecture), and almost the totality of the south-eastern Cameroon, where their population is the largest. In Cameroon, the Baka live in the departments of Boumba-Ngoko, Haut-Nyong, Dja, Lobo, and Kadey. Their geographical distribution is not homogenous, but rather related to the way they have spread on Cameroonian territory over time, arriving from the south-east. There are two distinct axes of settlement: 1) the axis Yokadouma-Mouloundou, densely populated, which accounted for more than 40% of the Baka population in the last census made by Dhelemmes (1960-1986) and where the Baka predominate over other ethnic groups, and 2) a less densely populated area corresponding to the settlement front on the West. This second area, notably the Lomié and Messok districts, presents cases of highly populated villages (more than 200 individuals) typical of the grouping of the past decades. This is, for example, the case for MB village, where most of this research was conducted, which counted with 278 individuals in the 1980s (Leclerc, 2012), and with 410 according to my census of 2012. Based on Vallois & Marquer's data (1954), Bahuchet obtained an average of 32 individuals per village (Bahuchet, 1992), while Leclerc obtained an average of 61 individuals per village from Dhelemmes census. In total, combining the census made by Tsuru (1998) and SNV (1988), Leclerc obtained an updated number of 26.000 Baka living in 2001 along the roads in Cameroon, distributed in 410 villages. However, this number is certainly underestimated given the difficulty to capture such a mobile population.

3. Baka ethnographical settings

As emphasized in the previous section, research conducted in the past fifty years among the Baka, while growing, still presents important two important gaps. First, the Baka have never been the subject of a complete ethnography. And second, the significant intracultural variations have not been studied. In that sense, the particularities of the Baka living nearby the Nzime people of the Haut-Nyong region might present important variations with reports from Baka living in proximity to the Bangando of the Boumba-et-Ngoko region. For that reason, the present literature review based on previous studies will be, at some point, complemented with my own observations from the study area.

3. 1. Situation, mobility, seasonality

Demography and situation of the studied villages

In Cameroon, Baka settlements are officially under the administrative control of the neighbouring Bantu-speakers' village, where the village's name comes from. Consequently Baka and Bantu villages constitute a single administrative unity. Most of the data for this thesis was collected in the village of MB, one of the largest Baka villages of the Messok district, with a population estimated at 410 individuals (208 children, defined here as people under 16 years of age). A good deal of information also comes from the village of EL, which counts with 264 individuals, including 145 children. MB is located at about 12 kilometres from Messok, where some administrative and health centres are found. Consequently, people from MB are closer to health and administrative services than people from EL, which is settled about 35 kilometres from the city of Lomié and 2 kilometres away from the Bantu speaking village with whom they relate. Contrarily, MB is situated directly in the prolongation of the Nzime village, both being separated only by a soccer field and the public school. Given this geographical distribution, the relations between Nzime and Baka are more frequent in MB than in EL, where households are more dispersed. In both main villages studied, there are several households, which are considered part of the village even if they do not have a permanent house in the settlement along the road. These households mostly live in forest camps situated at varying distances (from 1 kilometre from the village up to several walking hours away). This diversity of living places raises the question of how similar are the mobility patterns and life choices made by the different households.

Mobility between village and forest camps

For the Baka, mobility is inherently linked to seasonal organization. Bahuchet (1991) briefly described Baka traditional spatial organization, which related to a social structuration established around the socio-economic unit, the camp, meetings between camps, and the flow of visits. According to this description, a domestic group occupies several habitations, with seasons and activities being the main criteria for camp location and composition and for mobility between habitations. Given the important changes affecting the Baka in the last decades, this organization seems to have been reoriented around two poles: the village settlement and the forest camp. As already described by Joiris (1998), while villages along roads gather several lineages, forest camps are more homogenous regarding the patrilineal kinship.

It worth noticing that Baka sedentarisation does not necessarily equates to mobility reduction (Leclerc, 2012)[29]. Indeed, I rapidly observed that the presence of houses at the edge of roads does not mean that they are inhabited continuously, or inhabited by the same people all the time. The Baka have kept a great mobility, based on frequent round-trips between the village and the forest camps. Round trips can last days and weeks, but they can also last months or seasons. During long absences, returns to the village can be made in certain occasions, such as funerals, agricultural preparations

[29] As also highlighted by Kölher for Baka of Congo (1999), and Biesbrouck for the Gyeli (1999).

during dry seasons, or to work in Nzime plots. Conversely, while in the village, trips to forest camps can be made to visit hunting traps (a trip that can last from one day to a week), to visit the family living in camps, or to engage in salaried work carried out on cacao plantations, often situated far from the villages. Mobility patterns seem to differ importantly between households, while some households tend to stay in the village and largely depend on the Nzime economy (men and women working in Nzime plots), some others live almost permanently in forest camps, usually established nearby Nzime cacao plantations.

The general and complex spatial organization implies that the Baka divide their time between two main types of habitats: the huts (or other vegetal made houses) and the houses. In forest camps (but also in village) are typically found dome-shaped huts made with leaves of Marantaceae (*Megaphrynium macrostachyum* or *Ataenidia conferta*), rectangular houses in one-pan mats in raphia leaves, with raphia leaves walls, or rectangular houses with bark-made walls, depending of the purpose of the camps (snaring camps, cacao camps). The Baka village' houses are made of clay with roofs of *Raphia* sp. leaves, copying the architecture of neighbouring populations. However, several traits allow to distinguish Baka and Nzime villages. For example, huts can be found in Baka but not in Nzime villages. Moreover, Baka houses are smaller in size than Nzime houses, and the hamlets (corresponding to lineages) appear to be less demarcated and isolated in Baka than in the Nzime villages. The maintenance of the houses and the management of wild vegetation around the habitats are also characteristic of Baka villages. Thus, around Nzime dwellings vegetation is constantly cleaned and land swept, while surrounding vegetation is less cleaned in Baka villages, especially due to the absence of certain families from the village during several months. This distinction shows a clear difference in relation to the domestication of space.

A SEASONAL CALENDAR DEPENDENT ON WILD RESOURCES

Despite the critical changes described, most Baka continue to subsist by combining hunting and gathering, work for their neighbours, and cultivation of manioc and plantains (Robillard and Bahuchet, 2013). This hybridization of activities implies a specific seasonal calendar in which mobility, NTFP collection, and own and neighbours agricultural needs have to be combined.

-At the beginning of the major dry season (**yaka**; December to March) most Baka live in their forest camps, collecting NTFP, notably **mbalaka** (*Pentaclethra macrophylla)* and fishing (Gallois & Duda, 2016). Toward the end of this period, they return to the village where they open new plots or work in farmers' fields, an activity that typically takes them half day and which is combined with fishing.

- In March, the minor rainy season (**èlanga** lasting from March to mid-June) starts. At this time, the Baka, particularly women, invest most of their time either in their neighbours' fields, planting groundnuts or on their own plots. Within **èlanga,** Baka differentiate another period often called **sɔkɔ̀-pekè** (lit. "*Irvingia gabonensis'* season*"*). During that period, the Baka devote much time to the gathering of **pekè (***Irvingia gabonensis)* and **payo** *(Irvingia excelsa*). This is also an important period for honey collection and hunting.

- The minor dry season (also called **èlanga,** as the Baka acknowledge only three seasons) begins mid-June and ends at the end of August. During this season, the Baka are employed by their neighbours to harvest groundnuts, although some households also invest in slashing new and smaller plots for themselves. Women practice fishing. This season is also characterized by caterpillar collection and the extraction of the oily seed of moabi (**mɑɓɛ**, *Baillonella toxisperma*).

- The major rainy season (**sɔkɔ̀-dùngà**, literally "season of the rain", from September to December) is marked by high mobility, as during this time the Baka generally leave the village to go to forest camps. In forest camps, the Baka organize large hunting expedition and set up snare traps, collect honey, mushrooms, and other NTFP. The major rainy season is also the period of cacao harvesting for which farmers actively recruit young Baka men and adolescents for several weeks, often far from their villages.

3. 2. Subsistence strategies

In this section, I detail the relevant literature on the Baka practical relations to environment in terms of the subsistence strategies they carry, ranging from agriculture to the various uses of forest resources (fishing, gathering). Hunting will not be developed here as it will be the focus of the next chapter.

Agriculture

As other Central African hunter-gatherer populations, the Baka have cohabited with local agriculturalists for a few thousand years (Bahuchet et al., 1991), although - as noticed above – the terms of this relation have evolved over time. Agricultural practices and knowledge were adapted by the Baka from their neighbouring cultivators, as the examination of the lexical domain of terms used for crops reveals a large proximity with them (Leclerc, 2012).

The Baka in the studied area practice a slash-and-burn farming, where the most common cultivated crops are plantain (*Musa spp.),* cassava (*Manihot esculenta*), tannia/yautia (*Xanthosoma sagittifolium*), and domesticated yams (*Dioscorea spp*.) (Reyes-García et al., 2017 *in press*). The blue taro (**langa** *Xanthosoma sagitifollium*) tubers and leaves are gathered around the household. After 3-4 years, plantain fields are let in fallow during 15-20 years before the area is slashed again. The Baka, as their neighbours, often manage a house garden in which they grow tobacco and chili, and sometimes cannabis. Some households cultivate maize and groundnuts but in a much lesser extent than their Nzime neighbours, whose agricultural system is largely based on the association of a diversity of crops. Agricultural knowledge is not equally distributed among the society, showing difference between men and women and between households (Reyes-García et al., 2017 *in press*).

The Baka adopted plantain and banana from their neighbours in the 1960s. Other crops introduced later by the government or by development NGOs have not achieved large success and

have been progressively abandoned for diverse reasons (including the difficulty of conserving groundnut seed and the decline in cacao prices from mid-1980s to mid-1990s). In both studied villages, only a few households continue growing cacao. Most households prefer to work in their neighbours' cacao plantations, notably for the harvest during the months of October-November[30]. In that sense, several authors have highlighted that the Baka prefer the immediate return of receiving cash for working in other people's fields, than the delayed return obtained when working in their own agricultural fields (Oishi, 2012; Kitanishi, 2003).

In the studied villages, Baka engagement in agriculture includes work in their own plots and work for wage in Nzime fields (either for subsistence or commercial crops). When Baka move to work in Nzime fields they are often paid in cassava, cassava leaves, or plantain (this displacement for food supply is called **mbèngò)**, which consists of giving to the worker (mostly women in that case) a part of the crop in which she or he has worked during the day. Nowadays such work might also be paid in cash. Scholars have shown that an important share of starchy food consumed by the Baka comes from neighbour's fields (Leclerc, 2012; Gallois, 2015), although the situation might be rapidly changing as the recent work of Gallois and colleagues (2016) highlights that agriculture is a predominant economic activity for the Baka and that they engage in their crops and in the Nzime fields equally in terms of time distribution.

GATHERING

Baka gathering knowledge and practices have not been studied in detail, the topic being overshadowed by the lively debate on the wild yam question (Bahuchet et al., 1991). Scholars, however, do highlight the importance of gathering for Baka subsistence and for organizing their activities' calendar (Bahuchet, 1992; Gallois et al., 2017).

During my time in the field, I observed a wide diversity of products collected, including nuts, mushrooms, leafy vegetables, honey, wild yams, termites, snails, fruits, larvae, and caterpillars. Gathering is often a collective activity, practiced all year around, although the products gathered vary by season. The diversity of wild edibles gathered and gathering techniques seem to compensate constraints posed by products seasonality and geographical dispersion. Gathering expeditions might last from one or two hours, when they are intended to provide the daily meal (i.e. for *Gnetum africanum* leaves), to one full day when the gatherers aim to reach a specific gathering spot (honey, yams, mushrooms), or to several days, in case of gathering seasonal resources (caterpillars). Children particularly show a wide knowledge and involvement in gathering activities (Gallois et al., 2017).

The most commonly gathered products are the leaves of *Gnetum africanum* (**kɔkɔ**), highly appreciated and daily consumed to complement starches. The gathering of these leaves involves expeditions led by women, kids and young girls ranging from half an hour to half-day. The Baka have

[30] Cacao plantations are often situated in remote area, constituting autonomous small settlements inside forest, composed with Nzime mud-wall houses surrounded by Baka huts. Merchants occasionally visit or settle in these camps to sell alcohol, salt, rice, soap, and cigarettes. In that context, the Baka are often paid in cash as a contract, at the end of the harvest season.

a large use of oily nuts and seeds, notably red palm oil tree (**mbílà** *Elaeis gabonensis*) the main nut used for making cooking oil, the African oil bean (**mbalaka** *Pentaclethra macrophylla*), **kanà** (*Panda oleasa*), and "wild mangos" (**pekè** and **payo** *Irvingia* sp.). *Irvingia*'s kernels are often conserved by drying, roasting, and pounding them to make a storable moulding cake used in stews. Nowadays, certain species, such as *Irvingia* sp.*, Pentaclethra* sp.*,* njangsa's kernel (*Ricinodendron heudelotii*), and **kɔkɔ**'s leaves (*Gnetum africanum*)*,* are also collected for commercial purposes, to the extent that the mobility of the Baka is now influenced by the seasonnality of these products (Gallois et al., 2017). Other wild edible are not sought on purpose, but eaten when found in forest, as it is the case of many fruits.

Wild yams - vines producing starchy tubers and mostly belonging of the genus *Dioscorea* - have been considered as the main source of carbohydrate for Central African hunter-gatherers (Bahuchet et al. 1991; Hladik & Dounias, 1993). Out of the 17 wild yam species recorded in Cameroon, the Baka know 14, of which seven are dig (Bahuchet, 1992; Dounias, 2001). The ethnobiological specificity of wild yams lies in the « paracultivation » of three species *D. semperflorens, D.praehensilis and D. mangenotiana*, their social importance with specific rules of access (Dounias, 2001), and the keystone role of *D. mangenotiana* in the Baka cosmogony, interacting as a symbolic food with men, elephants, and the forest spirit **jengi** (Joiris, 1996; 1998). However, today, wild yams seem to hold a less important role in Baka daily diet, as they are have been rarely cooked or consumed in village settlements and in forest camps, now often surrounded by plantain plots, a crop considered easier to be managed than wild yams.

Honey gathering holds a high cultural importance for the Baka. This activity is considered by elders as an important milestone for boys to become a man. The complexity of the ethnobiological vocabulary and the numerous references of honey in the mythology (Brisson, 1999) point out to the great importance of honey and honey gathering in Baka culture. The most appreciated honey, called **pɔkì**, is produced by *Apis mellifera* (**tòngyà**). Other honeys produced by stingless bees (meliponines) are also appreciated, notably the ones called **dàndù** and **mòlèngì**. These later types of honey include different types of ground honeys actively sought by children. Honey collecting can be carried out throughout the year, although it picks between February and May (Dounias, 2009, 2015). This activity is a domain of (male) specialist requiring fine ethnobiological knowledge in spotting the swarm, identifying the types of bee, and climbing the tree to extract the honey.

The gathering of animal products also holds a non-negligible importance for the Baka, and we might suppose the non-negligible protein intake it represents. Caterpillars **(kɔ́pɔ́),** of which the Baka consume up to 15 species, are highly appreciated, as well as the larvae of raphia weevil (**pɔsè** *Rhynchophorus phoenicis*), and termites (**ɓàndi**), which are mostly sought in July and August. African giant snails (**bembe** *Achatina achatina*) and terrestrial turtles (**kùnda** *Kinixis erosa*) are found and collected directly on the ground. The Baka, mostly girls, also collect mushrooms. Indeed, Brisson (2010) identified 25 mushroom names, and I recorded almost 30 mushrooms vernacular names.

Overall, during my field work, I identified more than 100 wild edibles known, and actually recorded the consumption of 62 different species. However, in an environment highly diverse, the Baka use also plants for a plethora of non-food purposes. Hattori (2006) mentioned that the Baka

consider useful 497 out of 653 plants species locally present. This author recorded 602 ethnobotanical lexemes known by the Baka, among which 36% were used in material culture and 60% were used for medicinal purposes (Hattori, 2006). The most used plants are the stems and leaves of *Raphia laurentii,* regularly used for construction, and the leaves of species in the Marantaceae family. The strong leafstalk and large leaves of species in the Marantaceae family, notably the species **ngòngò** (*Megaphrynium macrostachyum*) and **bòkɔ̀kɔ̀** (*Ataenidia conferta*), are intensively employed for a wide range of purposes that range from crafting single-use containers to building huts.

Fishing

Often hidden by the reductive denomination of "hunter-gatherers", fishing has been largely neglected by researchers studying the Baka. Although fishing is mentioned in some publications (Dounias, 2011; Oishi, 2014), the diversity and social role of fishing practices have been examined only recently (Gallois & Duda, 2016). The predominance of dam fishing is worth noticing for several reasons. Firstly, it provides a non-negligible amount of protein for household consumption. Moreover, dam fishing is a women's collective fishing technique which bears a specific place in Baka society, creating a specific space where, in the absence of men, women create social cohesion through exchanges and sharing. Dam fishing expeditions also allow the transmission of ethno-ichthyological knowledge and other aspects of cultural knowledge that shape the early gender differentiation between boys and girls. Dam fishing coexists along with other rarer fishing techniques, such as fishing with ichtyotoxics or hook.

3.3. Social and cultural accounts

Kinship and social structure

Baka social organisation might be described at different levels: the camp, the lineage, the clan, and the village. Baka family nuclei are embedded within the camp organization, which constitutes Baka basic socio-economic unit (Joiris, 1998; Leclerc, 1999). The camp is a group composed by households belonging on the same extended family (including in-laws) and represents, at the same time, a place to live (**bala**) and a materialisation of a community (Bahuchet, 1992). Although social organization is less visible in the village, where segmentation is less geographically marked, the organization of camps in forest allows to remark the complexity of kinship relations at different levels and the close link between spatial and social space and consequently between social and spatial organisation (Leclerc, 2012). Indeed, the mobility between forest camps, or between camps and the village, is characterized by the system of visits (**yelè**). Of great social importance, visits allow the Baka to maintain good relations by spending time with family members, notably in-laws and distant clan relatives during periods that vary from a day to several weeks. People who claim to be "from this village" might be, in fact, absent from the village during six months, living in another village or visiting a forest camp's family.

Every individual belongs to a lineage, called **yée-**, following a patrilineal system of inheritance. Referring to an animal, a plant species, or a traditional item (Brisson, 2010), the name of the lineage is generally related to an episode of the life of the ancestor founder of the clan (Bahuchet, 1992). However, the Baka almost never know precisely the context and story giving raise to the name, thus the term "clan" can be highly discussed[31]. In previous studies in the south-eastern Cameroon, scholars numbered more than thirty lineage names (Leclerc, 2012; Brisson, 2010; see Chapter 5). Lineage belonging shapes the relations between individuals of the same **yée-** who consider themselves part of the same family because of the exogamic rule, even when the biological filiation is high distant.

Baka kinship rules are based on a Hawaiian kinship terminology. The Baka terminology is very classificatory. Uncles and aunts will be name « father » and « mother » by ego. Marriage of ego with someone from father or mother's clan is not permitted. The presence of sororate and levirate reinforces parental bond. The pattern of residence observed is neolocal, with a preference for matrilocality at the beginning of marriage. Marriage payment consists in bride service, previously paid in small gifts, notably honey and meat (Vallois & Marquer, 1954; Bahuchet, 1978), but which nowadays, at least in the studied villages, is partially replaced by market items (e.g., loincloth, tools, alcohol, and money[32]).

Baka social organisation is also marked by a sex-oriented division of labour (Joiris, 1998; Leclerc, 1999). In a couple, the man is expected to bring to the household wild meat and honey, as well as to buy modern items (cooking items, metal tools, clothes) (Köhler, 2005), whereas the woman is expected to provide smaller but daily yields, i.e. staple starchy food, fishes, caterpillars. However, the division of labour is not as strict as highlight in the literature. In this study, we have observed a higher engagement in gathering by women than by men (Gallois et al., 2016). Generally, men are more involved in gathering commercial products and honey, while women more often collect wild edibles for daily consumption. Overall, women are more involved in agriculture than men (Reyes-García et al., 2017 *in press*). However, when working in the same plot, men deal with cutting trees with an axe and women weed and harvest with a machete. Men appear to be growingly involved in the cultivation of cacao as a cash crop, as reported by Oishi (2012) and in logging.

The gender division of labour is particularly significant in the hunting social context and is related to the different forms of power hold by men and women in relation to big hunting. If women's power lies in a symbolic efficiency (through ritual propitiatory singing), the success in big hunt should be complete by the technical efficiency carried by men through their knowledge and skills (Leclerc, 2012). This complementarity gives women a critical role and responsibility in hunting and consequently in maintaining the social balance (Joiris, 1992). In terms of offtakes, although hunting is largely associated to men, Baka women often bring meat acquired collectively with machetes or by

[31] While the term "clan" is widely used in the literature about the Baka, I think the term lineage is more relevant. The standard anthropological definition of a clan is a group of individuals claiming to belong to the same mythical and often zoomorphic ancestor; and the definition of a lineage is a group of individuals claiming to belong to the same historical and anthropomorphic ancestor (Rivière, 1999). Contrarily to the term lineage, the term 'clan' consists in a heterogeneous assemblage of different lineages of different origins, independent from a genealogical point of view and linked only by an ideological kinship (Augé, 1975: 28). This is not the case for the Baka, where the yé- is uniquely related to biological inheritance.

[32] Between 75 and 150 € in the studied area (my observations).

smoking rodents out of their burrows (see Chapter 3). Fishing is a women-oriented activity, considered as the « women hunting » (Gallois & Duda, 2016). However, as mentioned above, sexual division is not completely strict. Thus, although hunting is acknowledged as a male activity, women often hunt (see chapter 4 and 5), sometimes knowing to set up snares and use spear. In the same sense, although fishing is known as a "women activity", men are not forbidden to fish.

As it has been reported in other Central African hunter-gatherers groups (Lewis, 2008; Bahuchet, 1992), we observed rules for proper sharing, which promoted an egalitarian ethic (Joiris, 1998). Accumulation of goods is not socially rewarded and does not allow to exert authority on others. However, as early as the 1950s, Althabe (1965) observed a modification of social relations associated with power and status and linked to settlement enlargement. Increasing integration into market economy seems to have further impacted traditional Baka social organization, as I will further explain in chapter 6 (see also Townsend, 2015). Indeed, the role of the three figures that capture social prestige and respect among the Baka (i.e., the master-hunter tuma, the diviner-healer nganga, and the elders) seems subject to change. Although Baka social structure and decision-making process seem to be independent from Bantu-speaking village leaders, nowadays both the Baka and external agents have started to acknowledge a chief, or an intercessor between the community, the Bantu-speakers, and the external world (see chapter 6).

Sharing rules and social cohesion

Egalitarianism among small-scale societies is commonly associated to extensive sharing of resources. As mentioned above and described among others egalitarian hunter-gatherers (Woodburn, 1982; Blurton-Jones, 1987; Ichikawa, 2005; Lewis, 2015; Widlok, 2017), the Baka system for distribution of consumable goods follows specific rules of demand sharing. Demand sharing is a central practice of many egalitarian societies, where the potential recipient might demand shares of belongings or products harvested by someone else, and it is the donor's duty to give, a refusal being considered offensive (Lewis, 2008). The practice of sharing among the Baka is constructed as a way to consolidate alliance between groups, lineages, and families-in-law. The practice of sharing is combined among the Baka with gifting, which referred more to voluntary and unintended gift to friend or in-law (Köhler, 2005). Chapter 6 will go in more detail on changes in sharing practices.

The resource most typically shared is wild meat. If meat from small-game is only shared in small - and often symbolic - quantities, elephant meat was known to feed an entire village, sometimes even circulating into the neighbouring villages. As other forms of food sharing, elephant meat sharing is a multistage phenomenon; it follows the three levels of sharing described by Bahuchet for the Aka Pygmies (Bahuchet, 1990). The hunter, being the one who "acquires" the elephant meat cannot eat the meat and is responsible of a first-level sharing within the task group. In this first-level sharing, those who have encircled the animal, have participated in the expedition, or have helped to carry the meat receive a part. Then, when they are back to the village, the hunters initiate a second-level of sharing within their family, giving away part of the raw meat they obtained from the first-level sharing to those who did not participated in the hunt. Finally, after cooking, a third level of sharing occurs among the consumer group (see chapter 6).

Ritual system and cosmology

Robert Brisson (1981-1984, 1999) and Christa Killian-Hatz (1989) compiled a large amount of tales and stories which allow us to understand Baka cosmology, and particularly the structure of their animist thought through the personification of animals and the existence of spiritual entities guided by the master-entity **komba** and of which the most culturally important is the spirit of the forest, **jengi** (Joiris, 1996; Joiris, 2015; Lewis et al., 2015). Researches focusing on Baka rituals emphasize the complex relation of the Baka with the forest, the invisible, and the animals that are embodied in the ritual system. During collective ceremonies devoted to **jengi**, organized by the elders, women hold a critical role with their polyphonic singing. Indeed, singing and communal music-making are perceived as keystone elements of cultural transmission and social cohesion (Fürniss, 2006; Lewis, 2013). Joiris provided an in-depth study of the complex ritual around hunting (Joiris, 1998). Several other researchers have also identified the social relations and the local variations in ritual repertoires (Bundo, 2001; Tsuru, 1998, 2001), described the specificities of the Baka music and songs (Fürniss, 2005, 2012; Fürniss & Joiris, 2011; Fitzfgerald, 2011; Olivier & Fürniss, 1999), and analysed the borrowing of a ritual corpus: the circumcision ritual linking the Baka and their neighbours Nzime through a co-initiation (Fürniss, 2008). Recently, several scholars have noticed that integration into market economy and alcohol availability at night bars where modern music is played threaten the role of rituals in terms of social cohesion and egalitarianism (Townsend, 2015; Lewis, 2013; Oishi & Hayashi, 2014) as well as the transmission of traditional ecological knowledge (Gallois, 2015).

Relations with neighbours

I have shown how the relations between Baka and non-Baka were historically influenced by economic stakes. Even today, the most visible relations maintained by Baka with people from others groups remain characterized by an employer-employee relationship in which the Baka work for their Bantu-speaking neighbours in agricultural fields or hunting for them. Such economic relations were originally based on bartering: Baka provided bushmeat and other wild resources to farmers in exchange of agricultural and manufactured products such as iron tools, salt, and clothes (Bahuchet, 1993b, Althabe, 1965). These exchanges are now replaced by a wage system, according to which Baka are paid in kind or in cash. Interestingly, despite having -at least partially- adopted farming, the Baka continue to work in neighbouring fields, a situation that has been explained because of Baka attraction to modern items (e.g., loincloth, clothes, cooking pots, or money) (Althabe, 1965) and because of their preference for a more flexible way of living (Yasuoka, 2012), as not maintaining their own fields -but rather working in Nzime's fields- gives them immediate returns (Oishi, 2012) and allows them to maintain mobility (Leclerc, 2012). The monetization of exchanges and the acquisition of material items from the western world have interested some researchers who showed that manufactured objects, as well as money, have rapidly been integrated in the traditional form of sharing and considered for their exchange and symbolic value (for example by entering in the bridewealth) rather than a real value of personal enrichment (Köhler, 2005; Kitanishi, 2006).

However, the bounds linking the Baka and their neighbours cannot be reduced to a work relationship and material exchanges (Rupp, 2001), or to a relation of subordination and domination. Rather, the relations developed between the Baka and their neighbours allow for a multiplicity of partnerships. Characterized as pseudo-kinship bounds these different types of alliances might have originated in past blood pacts (Joiris, 1998; Rupp, 2003), ritual friendship between two individuals exchanging goods and services, or solitary between co-initiates in circumcision, or **bèkà** (Joiris, 2003; Fürniss, 2008).

The polymorphism and the dynamism of these inter-ethnic relations have also been highlighted in the last years through the scope of identity (Rupp, 2011). Thus, over the last decade, several scholars have highlighted that the relation between the Baka and their neighbours is now much more characterized by confrontation and conflicts than it used to be (Bigombe Logo, 2007; Robillard, 2012). This evolution toward more conflictual relations might be driven by a higher proximity of the settlements allowing more regular employment, but also by the new forms of local governance in which the non-Baka are more involved than the Baka (Robillard, 2010, 2014; Bigombe Logo & Roulet, 2010). Also, the increasing economic relations between the two groups, inherently mixed up with local power relations, have reinforced the non-Baka in their role of local middlemen keeping the control of the means of production and affirming their efforts to keep the Baka in relations of dependence (Kölher, 2005).

Recent changes and relation with newcomers

Given the rapidly changing context of the forest areas of Central Africa, a large part of the Baka literature written during the last two decades has centred on how they are affected by new international, national or regional stakes (e.g., the opening to market economies, defaunation, deforestation, and mining).

As developed in the previous chapter, the effects of the Cameroonian Forest Law and its inadequacy with local priorities have been largely stressed notably because of the restriction they represent to Baka access and use of forest resources (Ichikawa, 2006; Vermeulen et al., 2009; Lewis & Nkuintchua, 2012; Joiris et al., 2014). On the other hand, co-management initiatives in the area have initiated new forms of governance, such as Community Forests, that generated new power relations and conflicts at local scale (Robillard, 2010).

The arrival of newcomers and new economic opportunities has opened up the local territory and economy to the globalized market. The arrival of western items and ideas, even to the remotest areas, has also rapidly monetized local exchanges (Kitanishi, 2006; Kölher, 2005b; Townsend, 2015; Oishi & Hayashi, 2014). Nowadays many Baka men are involved in wage labour for farmers, ivory trade, or even anti-poaching squads for which they are paid in cash. Besides the work in logging companies, the development of small-scale artisanal logging (legal or illegal, within community forest or not) is more and more a source of cash income for men, being paid for transporting wood planks or to spot ebony tree for ebony trader (see picture 1).

Picture 1 - Artisanal logging (ebony tree on the top image) a source of cash income for the Baka

Köhler (2005), Kitanishi (2006) and Oishi (2012) have examined the place given to cash in the Baka economy and how Baka use money. According to Kitanishi (2006), the Baka seem to endure inequality of revenue due to the large amount of cash flow from logging companies (Kitanishi, 2006) or ivory trade (see Chapter 6). Differently, Köhler (2005) found that the monetarization of the Baka economy did not break down the traditional economy of sharing as every amount of money, even large, is often immediately spent in gifting and sharing.

The monetization of the Baka economy has happened at the same time than a large influx of merchants –often small entrepreneurs from the western or northern Cameroon - have penetrated into the forest to attract this new clientele (Kitanishi, 2006; Oishi, 2016a). The improvement of roads and bridges by logging companies has obviously motivated the settlement of these small traders in Baka villages, where they can sell modern items and buy NTFP and wild meat to subsequently resell these products thus making a plus-value. As in the past, the Baka nowadays continue to maintain their role as producer/extractor of resources traded by other intermediated ethnic groups. For newly settled merchants, the sale of spirits (strong alcohol dose in *sachet*) is often the main source of revenue, although the also benefit from reselling high-value products such as bushmeat, ivory, or gold (depending of the area) (Townsend, 2015; Oishi, 2016a).

Finally, school education, promoted by government programs and notably supported by development NGOs has encouraged Baka children school attendance. In the area, private schools managed by missionaries have also initiated new forms of education adapted to the Baka. However, scholars highlight the difficulty to conciliate different forms of knowledge acquisition with both a regular school attendance and the perpetuation of mobile way of life, in which children are regularly mobilized by their parents as their contribution to their own and household subsistence activities is non-negligible (Gallois, 2015; Kamei, 2001).

4. Conclusion

This chapter aimed to trace, through the dense though incomplete literature, the background of the Baka of south-eastern Cameroon, from their ancient history to recent changes at the globalisation time. The large body of knowledge stressing differences but mainly commonalities between western Pygmies constitutes a strong base to emphasize cross-regional issues. Having said so, regional economic and cultural particularities should also be considered. The particularities of current Baka livelihood seem to be based on a complementary between different modes of subsistence, which allow to benefit both forest and village resources, combining both new sources of income and subsistence with traditional forms of production. Such diversity of activities allows the Baka to keep a relative mobility. In spite of important changes related to integration into market economy and exploitation of their resources and lands by external agents, the Baka still maintain a strong dependence on the forest. The diversity and change in their reliance to wildlife through hunting is examined in the next chapters.

Chapter 3
Diversity of Baka hunting strategies

1. Introduction

Hunting presents a wide variety of forms and contexts depending on the prey targeted and the constraints of the ecosystem and the seasonal, but also depending on the hunter social behaviour and cultural choices. Thus, hunting can be categorized in numerous ways. Anthropologists have distinguished two categories of techniques aiming at animal offtake: active and passive hunting (Leroy-Gourhan, 1945) or direct and indirect hunting (Bahuchet & Pujol, 1975). Active/direct hunting, or hunting *stricto sensu*, implies hunter's use of a weapon (e.g., spear, knife, cross-bow, bow and arrows, firearm, and hand) to capture a prey. Direct hunting also involves a clear intentionality by the hunter to capture the prey through tracking, pursuing, stalk hunting, or hide hunting. Passive/indirect hunting consists in trapping and snaring. Differently than in active hunting, in passive hunting the hunter is passive at the moment of the capture, the distance between the hunter and its prey being large.

The Baka, as other Central African groups (i.e. Pagezy, 1982; Ichikawa, 1996; Takeda & Sato, 1996), satisfy their protein needs primarily through hunting. The variety of hunting strategies used by the different Pygmy groups has been early emphasized in the ethnographic literature. For example, the the Efe of eastern DRC are specialist of bow hunting (Turnbull 1965, Terashima 1983), and the Aka are known to be net hunting specialists. The Baka do not use nets[33], are rather rely on the use of spears (Bahuchet, 1992), either employed in individual hunting with dogs or in cooperative expeditions targeting hogs or elephants. However, all through the Congo Basin, migrations and socio-political relations between ethnic groups have led to technical changes in hunting practices since the

[33] Except the small fringe of Baka, called Bangombe, living at the border of Central African Republic (Pedersen et al., 1991)

beginning of the twentieth century, notably in the southern Cameroon (Dounias, 2016). The contacts with other ethnic groups have thus led to adoption of other techniques: net hunting for the Aka, bow hunting for the Efe, crossbow for monkey hunting for the Aka and Baka, and shotgun with spear in the barrel for the Baka (Bahuchet, 1992). Moreover, the main Pygmy groups (i.e., the Aka, the Baka, the Mbuti, and the Efe) have in common the targeting of elephants; some groups even sharing a common vocabulary about this practice, a vocabulary that is not shared between Pygmy and non-Pygmy (Bahuchet, 2003).

In the recent years, social-ecological changes are pushing hunters from all the Congo Basin to adopt more efficient hunting techniques, such as steel cable snares and 12-gauge shotguns (van Vliet & Nasi 2008; Kümpel et al., 2009; Yasuoka, 2014) although the use of these technologies is forbidden by the Cameroonian Forest Law. While Pygmies populations rarely own firearms, shotguns are commonly circulated and are often lent to them by neighbours who contract them to hunt for commercial purposes (Riddell, 2013). In general non-Baka, and more generally non-Pygmy groups, present different hunting strategies. For example, even if they use the same techniques their social and economic motivations are different, which consequently might lead to different pressures on wildlife (Fa et al., 2016). However, Baka and non-Baka hunting strategies often interweave for diverse reasons: weapon acquisition, co-optation and hiring of Baka hunters, sale of meat, or even mixed hunting groups.

This chapter aims to describe the diversity of hunting techniques currently mobilized by the Baka of both studied villages. I first give an overview of the main information available about Baka hunting in the scientific literature, which to date remained piecemeal or out-of-date. Secondly, to better understand the context of the Baka hunting within the local cultural diversity, I briefly describe the various types of hunters, non-Baka agents, who hunt in the same area, often with different motivations. Thirdly, I detail the modes of acquisition of hunting knowledge and techniques developed during childhood and adulthood, in order to highlight the early embedment of hunting in the life of the Baka men and women. Finally, the main part of this chapter is devoted a description of the current hunting practices. Specifically, I focus on i) spear and other traditional hunting techniques; ii) snares; iii) shotgun hunting – detailing Baka dependence on firearms from their neighbours, and iv) the current organization of elephant hunting and Baka involvement in ivory trade.

2. METHODS

The present chapter is based on a wide corpus of field notes, in-depth observations and qualitative – formal and informal – interviews gathered during the three fieldwork periods in MB and EL villages. It includes information from more than 20 systematic interviews on the evolution of hunting practices (including three with Nzime hunters), 14 interviews on firearm exchange system, and numerous formal and informal discussions led during visits to informants in their house, when they visited me, or when I joined them during displacement in forests. I accompanied Baka hunters in forest for two

snares setting up, six snare visits, two shotgun hunts, and 4 porcupines' hunts. My participation to shotgun hunting expeditions – because illegal - was challenging for two reasons 1) the wish of the Baka to protect me and avoid the possibility I end up involved in an anti-poaching raid; and 2) the low trust of Baka hunters about my ability to walk several hours and move silently in forest.

Given their length, their illegality, and the danger involved in them, I was not invited to participate to elephant hunting expeditions. Ethnographic information concerning elephant hunting have been collected among Baka women and men (specialized or not in elephant hunting) and three Nzime men. Two interviews were also conducted with two local merchants who occasionally trade ivory. Several discussions with one allogeneic Muslim trader, known as one of the main ivory dealer of the area, also allow having another viewpoint about Baka involvement in elephant hunting. This issue was also widely addressed during interviews with local forest chiefs and with the G.E., the local WWF head.

3. Baka hunting: A literature review

To date, the literature about Baka hunting has remained piecemeal given the recent and rapid changes (e.g., sedentarisation introduction of new techniques, conservation issues, or defaunation). Scholars, however, have well-described all the types of techniques used in the past. Thus, we know that, although the Baka have traditionally relied on a diversity of hunting techniques depending on social, seasonal and ritual circumstances, they were mainly spear hunters. The use of spear took diverse forms: for collective hunting targeting large-mammals (i.e., elephant, gorilla, and hogs), or coupled with the use of a hound to corner small duikers and rodents. In addition, early scholars and Baka elders have also mentioned the use of short spears introduced in the shotgun's barrel to be projected toward elephants (Koch, 1913; Bahuchet, 1992). However, this technique has fallen into disuse with the democratization and the easier access to cartridges in the area. The presence of dogs, or hound, for hunting within Central African hunter-gatherers settlements is ancient and was mentioned in the early literature (Schebesta, 1938; Turnbull, 1961 ; Singer, 1978 ; Bahuchet, 1992).

The adoption of a more sedentary lifestyle has had a non-negligible impact on hunting strategies for the Baka, who now use more individualistic techniques, such as snares and shotguns, with the consequent reduction of collective hunting.

Snare trapping is nowadays known as the main hunting techniques used by the Baka (Hayashi, 2008; Yasuoka, 2014 ; Hattori, 2014), as well as the main hunting strategy used in all Central Africa (Kümpel, 2006). The success of this introduced technique is due to the fact that, as shotguns, it provides higher returns for less effort (Damania et al, 2005), and targets a wide diversity of terrestrial species, such as duikers and rodents (Noss 2000; Wilkie & Carpenter 1999). Studies on trapping techniques and behaviour have been mainly led among farming groups (Kumpel, 2006; Coad, 2007; Muchaal and Njangui, 1999). Among the Baka, only Yasuoka (2014) has recently provided an insightful study on snare hunting, comparing this with other techniques from others areas

and assessing the relation between share hunting and wildlife structure.

Contrarily to hunter-gatherers of the East side of Congo Basin, such as the Mbuti (Twa and Efe) (Turnbull, 1965; Pagezy, 1975; Terashima, 1983), the Baka are not bow or crossbow hunters (Bahuchet, 1992). Bow and crossbows generally target monkeys, toughly reachable with other means. According to Bahuchet, the bow has never been a prevalent hunting technic in the western Congo Basin, as it was rapidly been replaced by the development of crossbow, introduced by Portugese around the 16th century and slowly spread from western Africa as a war weapon (Roth, 1992; Du Chaillu, 1863 cited by Dounias, 2016). In turn, crossbows were replaced by the early expansion of firearms, which were more efficient in killing monkeys.

Scholars have reported the increasing use of shotguns[34] by the Baka (Kitanishi, 2006; Hayashi, 2008). Firearms have an ancient history in the Congo Basin, as they seem to have been use for the first time around 1840 (Savorgnan de Brazza, 1888, cited in Dounias, 2016). Shotguns were massively imported and spread at the end of the 19th century, when they became popular in trading posts. Firearms highly interested local chiefs and warriors, which attributed to them a symbolic power of authority. In south-eastern Cameroon, flintlock and caplock shotguns were early used by farmer populations, who lent them to the Baka in exchange of hunting offtakes (Regnault, 1911; Koch, 1913). Farmers sometimes also offered old or broken firearms to the Baka in exchange of few ivory tusks (Crampel, 1890). Even nowadays, shotguns are mostly in possession of the villagers who continue to lend them to the Baka, considered as expert hunters, tributary of their neighbours for gun-hunting. However the conditions of this exchange and its impact in Baka culture have never been described in-depth.

Elephant hunting is one of Baka archetypical hunting practices, having been described as the hunt by excellence (Bahuchet, 1992). As all hunt of large mammals, elephant hunting requires specific social and technical organization (Joiris, 1998), and carries the highest social and symbolic importance, although smaller and less ritualized hunts are of primary importance for daily food supply (Bahuchet, 1992). Elephant hunting has been widely described through the lens of the mythological and spiritual relations between humans and elephants in the Baka emic system (Kölher, 2000; Joiris, 1996). In the past, elephant hunting took place at a specific time and involved the clustering of different lineages for several weeks or months in the forest in a social and spatial formation called **mòlɔngɔ** (Bahuchet, 1992; Lerclerc, 2012). If elephant meat is highly appreciated, it is especially the symbolic aspect of its hunt, the quantity of meat, and the specific relation between elephants and forest spirits that gives to this activity a great cultural and social importance. Supplying more than one tone of meat per animal (Fargeot, 2013), killing an elephant represents a festive event of uncommon sharing, which allows to form a tight-knit group (Leclerc, 2006). Elephant hunting is performed by a specific category of hunters: the tuma. The courage necessary for the person in charge of slaughtering, but also his lack of fear, his knowledge of animal behaviour, his mastery of the hunting remedies, give rise to a form of social recognition. The specific funtion of the tuma gives him a special status of which I would detail the specificities and the recent evolutions in Chapter 6.

[34]Shotguns used for small-game hunting (using cartridges), differ from powerful rifles (using .458 and .375 caliber) employed for elephant hunting (see section 4.3 and 4.4)

Taking into consideration the linguistic studies of Bahuchet (1992), it is evident that the Baka have hunted elephants for many centuries, at least since the time when the Baka formed a single group with the Aka. It is also evident that hunting is both a major event for the community and a highly developed area of knowledge due to the complexity of local taxonomic terminology. The absence of any ritual linked to elephant hunting in neighbouring populations seems to confirm this. However, some authors do not hesitate to indicate that elephant hunting must have developed strongly with the first imports of firearms and then with the establishment of concessionary companies in the 19th century, when ivory was quickly a popular article of the western people. Since two decades, the high demand for ivory from the Eastern Asian markets has obviously had an impact on the organization and motivation to hunt elephants.

4. Baka hunting techniques

In the Baka villages studied, five main hunting strategies co-exist: 1) The use of spear, often coupled with dog; 2) Unearthing rodents, and capturing them by hand or crossbow (but rare); 3) Trapping; 4) Shotgun hunting and; 5) Riffle hunting.

4.1. Spear and other traditional techniques

> *The man is stronger than the elephant because he has the spear, but without the spear man is nothing* (L.B., male, MB village)

The spear

The spear - **mbéngà** - is considered by the Baka a Baka attribute, and therefore it carries an identity value. It is the Baka weapon by excellence, both for symbolic and technical reasons. Men hunters take enormous care of their spear, which they neatly store, hidden, under the leaf roof of their house. At the social level, it is the main attribute and hallmark, and men hunters are supposed to walk with them during forest displacement (Hayashi, 2008). The first spear an adolescent carries is always made by his father or grandfather. From the moment he is given a spear, the adolescent will be able to accompany other adults in forest expeditions carrying his own proper tool. The gift of a spear also activates a transmission of knowledge, since after an adolescent is offered a spear, he is invited to observe how to forge their own spears and axes. If spear hunting is often the object of fabulous tales, hunting stories, and storytelling, shotgun is not valorised in the same way.

A spear is usually around two meters long; the pole is made of light wood, generally from *Drypetes sp.* (**kpàyà**). While in the past Baka acquired the iron for the point of the spear from their neighbours, the blade is now always made by the Baka themselves with an old machete, chiselled in cold conditions, and fixed to the pole without ligation, contrarily to past technique (Vallois, 1976;

Bahuchet, 1992). When a spear (or axe) cannot be forged from a blacksmith relative, they are bought from a specialist (usually 200 francs CFA – 0.30 €). Picture 2 presents the most usual form of spear-head (**mbéngà**), but other types exists notably arrow-shaped (**nkama**), and a specific and very large and long spatula-shaped spear-head (**mbòso**), which is use when aiming elephants.

Picture 2 - Spear head made with a machete (top image) and metal stem

During short stays in forest, hunters carrying a spear might lure small duikers by imitating their distressed call. Attracted animals are then cornered by dogs and killed with the spear (sometimes also with a machete). When using a spear, the hunter who has spotted an animal approaches his target as much as possible to avoid missing the target if throwing the spear from a too far distance. Indeed, when not used as a pike, the throwing distance never exceeds two or three meters as the thickness of the forest undergrowth, masking the animals, does not allow either throwing a spear over a larger distance. The spear also has an important role as a protection/self-defence weapon, because it allows to chase away large mammal such as gorilla or leopard unexpectedly attacking. It also allows to give the final blow to an animal corned by hound, during small hunting led in combination with dogs, or to kill an aggressive animal trapped in a snare.

sèndɔ: The traditional collective spear hunting

sèndɔ was a typical Baka hunting practice. It consisted of a collective spear hunting targeting large-mammals such as hogs, gorillas, or elephants. The most known was the one aiming Red River Hogs (*Potamochoerus porcus*). Described in details by 30-40 years-old informants, this practice has fallen into disuse in the studied area in the past decades but is said to be still practiced in others Baka territories. It is worth describing it to better understand the recent evolution of hunting practices, i.e., from past collaborative techniques to current more individualist techniques.

sèndɔ was mostly practiced during the rainy seasons, when conditions allow to better spot animal paths. It required between three and 10-12 persons, all equipped with a spear. **sèndɔ** always started from a forest camp (**bala**) where both men and women were settled. While some men hunt, the women gather, and other men seek honey and wild yams and build houses. The hunters move all together for a minimum of three days, towards an already known feeding place or a place designated by the nganga diviner. The first night a base camp, consisting on a light and half-open shelter made on raphia leaves (**lòbèmbè**), is established. From this camp, hunters walk seeking for animal paths, mostly large-bodied mammals, thus while **sèndɔ** might be organized to target gorillas, giant pangolins (*Smutsia gigantea*), or buffalos (*Syncerus caffer nanus*), the hogs are often the most common targets. When the hunters approach the feeding places, they track the footpaths let by the hogs. When a hunter spots a print, he whistles to warn the others, who gather to follow the animals' path, sometimes during hours, until they identify the sounds of hogs' herd feeding. Then, the second dispersal occurs, this time aiming to encircle the animals (**ndèmbà**). If a dog accompanies the expedition, the dog has to be with the hunter who follows the footsteps to the herd. Once one of the hunters is close enough to the animals to launch his spear, he seeks to kill the biggest, as the hogs try to scape, other hunters can kill some others.

According to the Baka, the growing interest in shotgun shown by the young generation and the increased distance needed to reach the hogs' feeding areas are the main reasons explaining the disinterest of this generation in **sèndɔ** hunting. In addition, according to Dounias (2016), such collective hunts were inherently related to socio-political considerations and thus became obsolete with the end of ancestral mobility

The dog

Among the Baka, as well as among others populations in the area, dogs used for hunting belong to the Basenji breed or to a genetically-related race. The basenji is reputed to be an ancient breed, indigenous from old growth forest of the Congo basin, adapted to this ecosystem and to the use given by humans to them (notably net hunting) (Boyko et al., 2009). Populations of Central Africa have therefore used basenji dogs for long time to assist hunting. Due to their commensalities with humans, Bansenjis share commonalities with pariah-dogs. For example, they are always in bad conditions, skinny, living mainly on waste from human settlements and often beaten. Paradoxically, they might

be held in high respect during hunting where they often benefit from a part of the prey as a reward (specific organs and blood). The use of the dog by the Baka is indispensable during spear hunting led in solitary or by a couple. Success of such hunt is indeed conditioned by the presence of the dog which tracks, flushes out, and corners the prey or retrieve it from burrows. In order to locate them in the forest, dogs often wear a bell (**gala**) made of a seed. Dogs often also accompany gathering trips aiming to collect NTFP.

Despite the value of dogs, only a few Baka hunters possess one and many of them regret not to have their own hound to be more efficient in hunting. Indeed, puppies are a highly valuable asset, and while they might be bought, I observed that they are also used as an exchange item, often entering in bridewealth transactions and social bargaining, as also reported in other Southern Cameroon groups (Dounias, 2016). For the Baka, hunting efficiency is closely linked to the care the owner has taken in the formation of the puppy, a condition that is primarily related to remedies and medicines administrated to the dog in order to improve its sense of smell and to increase its aggressiveness toward the game.

Unearthing and hand capture

Beyond the weapons specially designed for hunting, the Baka employ various other tools to catch small preys, often during opportunistic encounters. In such events, the Baka use the tools they always carry during forest displacements to capture the prey, i.e., machete, fire, wooden stick, or just their hands. When feeling human or dogs approaching, some animals, such as Brush-tailed porcupines (*Atherurus africanus*), pangolins, lizards, or varans ecape to find refuge in the first hole or cavity they meet. In those cases, the Baka smoke the holes to asphyxiate the animal (see Picture 3), then they either open the tree cavity with machete to get the prey, or wait for the animal to escape and slaughter it with machete or spear. Contrarily to spear hunting and snare trapping, which are highly gendered specialized, fire smoking, rat hunting and hand capture are practiced both by men and women, in mixed-groups (i.e. couple) or not.

Picture 3 - Smoking a porcupine cornered in a tree cavity

The most common situation of unearthing is the hunt of Emin's pouched rat (*Cricetomys emini*). This technique is not gendered and might be either practiced by a group of men, a group of

women, or in couple. This practice requires a profound knowledge of the rat ecology and its habitat. A network of underground galleries characterizes the Emin's pouched rat's habitat. It is composed by a principal access and secondary accesses which mostly serve as escape route in case of danger. The Baka insert an arm into the main tunnel, and are able to identify - by feeling the heat - whether the galleries are inhabited or they have been abandoned, as well as to locate the different « rooms »[35]. The hunt consists in closing the secondary exits to avoid the escape of the rodents. The main entrance is digged to reach the animal (see picture 4). Otherwise, one person fill the burrow with smoke from a small fire made at the entrance of the remaining hole, and waits for the animal on the only exit opened, sometimes with a machete or a spear, but most commonly with a dog, and kills the animal as it tries to escape from that only opening.

Picture 4 - Hole digged to excavate an Emin's pouched rat.

Aardvark (*Orycteropus affer*) and Giant pangolin unearthing are more complex given the size of the animals and the specificity of their burrow. Aardvark hunting technique is a collective hunt, which tends to disappear with the rarefaction of the species. Once the aardvark hole is spotted, one of the hunters enters in it by crawling, and tries to block it towards the end of its burrow. Once he is able to touch the animal with his foot, he knocks on the ground above him to warn the other hunters

[35] An analogy is made with human habitat, the Baka being able to identify the complete structure of the galleries divided in « living-room », pantry, bedroom…

outside. These hunters dig the ground and kill the animal with spears. The Baka consider this hunt as dangerous as the man entering inside the hole is helpless face to an animal that bears powerful claws.

In the trees, hornbills might also be killed directly in their nest. To do so, the Baka take advantage of one the most original behavioural traits of this bird. During nesting, which occur inside a tree hallow, the male hornbill encloses the female with their eggs by making a clay wall. Once the nest is found, the hunter climbs the tree, opens the nest by removing the clay and smokes the nest to asphyxiate the female.

Harvest of slow terrestrial animals might be captured with hands and are consequently not strictly considered as hunting: terrestrial turtle (**kùnda** *Kinixis erosa*) or the tree pangolin (**kokòlo** *Phataginus tricuspis*).

The bows and crossbows

Nowadays, the bows (**ndòlò**) have been relegated to the status of children's play. However, some adults recognize to use bow and arrows, of a bigger size, for a specific bird hunting called **ésésé**. This technique, although rarely performed, implies the making of a small, temporary and makeshift hut, not exceeding one meter high, rapidly made with African ginger leaves (**njiyì** *Aframomum* sp.*)*. The hunter, alone, takes position inside the hut and uses calling stimuli or shakes the leaves to attract birds that are shot with arrows. Both arboreal and ground birds might be killed this way.

In the studied villages, only few individuals - often elders - own crossbows (**mbànɔ̀**). Hunting with crossbows is always an individual undertaking, aiming at monkeys, hornbills and potentially duikers. It is practiced during the day, and generally at the beginning of the rainy season when abundant fruits attract monkeys and birds. Crossbow hunting always requires the use of a poison applied on the arrowhead, as the arrows used are too thin to kill the prey instantly. The seed of the vine *Strophantus gratus* (**nea**) is the most commonly poison used, or occasionally **mɛ̀ntíì** (undet.).

4.2. Steel-wire snares

According to the informants, snare trapping seems to have been used by the Baka for long. Steel-wire snares on their side seem to have been introduced by the French during - or right after - the Second World War, and to have arrived to south-eastern Cameroon between 1950 and 1960, first used by farmer populations and then adopted by the Baka. As such, snaring was not unknown for local people, as raphia ropes were traditionally used for snaring in forest and around the fields to avoid intrusion of animals attracted by crops. However, snares with vegetal materials were apparently not very resistant, and so they were not commonly used. Informants mentioned that trapping was most common among Nzime than among Baka. In the same line, Nzime elders interviewed mentioned a wide diversity of

ancient techniques of snaring including pitfall traps and trunk crush trap targeting mice, rats and bigger rodents.

Today, trapping continues to be the main hunting practice of the Nzime. Some of them only practiced wire-snare trapping to provide meat for household consumption, occasionally selling their surplus of meat. Some others might purposively set up a large number of snares to sell the meat captured. In that case, small groups (2 to 5 individuals) go for a long stay (for 5 days up to two weeks) in remote parts of the forest, spending nights in specific forest camps, and splitting to visit their respective snares every day. Considered the real "poachers" by the Baka, some Nzime might set up to 200 snares in the forest (while a Baka sets up rarely more than 30 snares).

Snares are mostly set up in the rainy season, when the humid ground allows to better spot the animals' paths. Choosing a good place to set up a snare requires good technical skills, as well as knowledge of the environment, the local ecology and the behaviour of the species targeted. Snares are typically located around crops, or in trap lines in the forest, either few kilometres from the village, or around a satellite forest camp specially devoted to snaring.

Snaring around the village is the most common practice. After one to three hours walking, the hunter reaches the beginning of his trapping line and visits all his traps. Snares are distributed at about 10 to 50 meters from each other, which allows hunters to visit snares in one day and alone. Related hunters might leave together the village and then separate to visit their trap lines.

sàkɔ is the name of a hut made of raphia leaves and a type of satellite forest camp devoted principally to snaring and where only men, typically belonging to the same family, go. Once they reach the camp, men stay overnight for two to four/five days, each day visiting their trap lines. In the specific case of MB village, such satellite snaring camps are sometimes situated far into the forest. As this village is located at the beginning of a road leading to very few populated areas occupied by logging areas and national parks, the Baka now to employ the logging truck to reach their snaring area faster.

Snaring around the fields is quite rare among the Baka (compared to the Nzime), although they seem to have adopted this technique from their neighbours to avoid intrusion and damage probably as much as to obtain bushmeat. The preys caught around fields are mostly rodents and ground birds. As meat is most valuable and desired product, the reticence of the Baka in setting snares around crop fields is mostly based on the fear of thief.

Today, the snares most commonly use among the Baka (called **mòlingɛ̀**) consists on a wire-steel loop, locally called **waya** (an alteration of the term « wire »). Contrarily to mice-snares employed by children, the adult way of snaring does not used bait but rather snares are placed on the animal path. Although a diversity of traps still known by locals was used in the past, only two types of snaring are frequently mobilized nowadays. The most common trap is a foot-snare set up in animal paths, and called **anjassi (nz)**. For this trap, the wire is tied to a sapling tree (usually using a branch of *Rinorea* sp. **ngindi**) and the loop is placed horizontally on a piece of bark (from trees *Musanga cecropioides* **kòmbò** or *Polyalthia suaveolens* **botunga**), which hides a hole dug in the ground. The trap - camouflaged by leaves - is actioned by the passage of the prey walking on the wooden board,

releasing the peg and springing the trap. A second common method is the neck-snare (called **attention** or **a pe kulo**), where the loop is placed vertically (see picture 5). The snare is triggered when the animal passes though the loop and knocks a branch placed below the loop. This system can be set up on the ground, but more frequently is placed on a fallen trunk, as rodents and pangolin commonly used those in their displacement. Around the fields, this snare can be set along a wall made of palm leaves, a method mostly used by the Nzime.

Picture 5 - Neck-snare set up on fallen trunk

Snares mainly target duikers and small mammals. Foot-snare can trap a wide variety of species, more than neck-snare that is limited to small animals able to pass through the loop. In addition, the size of the wire might condition the size of the prey targeted. Indeed, the steel-wire bought on the market is composed of six strands. The Baka untwist the wire and re-twist them using only two strands to target blue duikers (*Philantomba monticola*) and small-sized carnivores and three strands to target large duikers (Cephalophus spp.) or hogs. Three strands traps might catch leopards. In that sense, although every passive hunting is to some degree independent of the hunters' prey choices and decisions, the often described as indiscriminate nature of snare has to be relativized, as hunter's decision concerning the location of the snare and the type of snare used do affect the potential preys captured with the snares.

4.3. Shotgun hunting and exchange system with neighbours

Presence of firearms in the studied area

The most common firearms used in the studied villages are single barrel 12-gauge shotguns, industrial or locally crafted (see Picture 6). Called **ngalè**, industrial shotguns are French- (*Simplex,* from *Manufrance* brand) or Russian-made (*Baykal* brand, locally called "*marque-russe*"). Possession of these weapons is legal only for those who own a very costly permit, which has been afforded only by a handful of Nzime in the studied area. Some Baka recognize that the prohibitive cost of the permit has an unintended and paradoxical effect on wildlife because a Nzime in possession of this license will hunt more intensively than others in order to reimburse the expenses incurred by the permit. The other type of firearm used is the hand-made shotgun, called **gumta (nz)**. These artisanal firearms are all produced by local blacksmiths, or imported from neighbouring countries. The butt of the gun is carved out of wood and the metal parts are adapted from vehicles pieces. Such guns, when new, rival those imported (Nchanji, 2005). Their production is clandestine and their possession is illegal even in the presence of a permit.

Picture 6 - Types of shotgun used in the studied area

BAKA ACQUISITION OF FIREARMS

The main limiting factor of gun hunting is obviously gun acquisition, and the procurement of the cartridges[36]. Gun availability and the investment required to buy the firearm and cartridges explain why gun-hunting is less frequent than snares. In general, for gun-hunting Baka are still highly dependent of their wealthier neighbours' from which they borrow guns.

On their side, the Nzime men frequently hunt, both for subsistence and as a source of monetary income. However, the place of hunting in Nzime society appears as mainly economic and less symbolic than in Baka society. Nzime who own (or have access to) a shotgun might practice night hunting or several day expeditions in small groups. When performed for commercial purposes, Nzime men often lean on Baka hunters to join the group to increase productivity and efficiency (as porters or hunters). Nzime owning a firearm often lend it to their Baka "associate", as part of a rifle-to-game exchange. Such exchanges relations are often detrimental to the Baka, who relate regular cases of abuses referring to the wage received for their participation in the hung. I explain below the rules of exchange between owner and user.

The possession of shotgun by the Baka is a rare, but not insignificant, fact and seems to be on the rise. Baka acquisition of shotguns may originate in a long-term loan, an alliance, an in-kind income from long work with a Nzime (i.e., during the cacao season), or more rarely as a result of a purchase with money from elephant hunting, meat selling, or wage salary obtained from working with logging companies. In any case, all shotguns the Baka possess are old weapons, many times spotted and often posing serious security problems. The numerous accidents (important injuries or deaths) that took place with badly repaired shotguns have marked the consciences and some Baka hunters refuse to use firearms for this reason.

Borrowing a shotgun mainly depends on the proximity with a Nzime settlement, (including villages or permanent forest camps). For example, Nzime farmers cultivating large cacao plots in inner forests often stay several weeks in such forest camps. Some Baka families often establish their camps beneath them, as it might constitute a seasonal source of revenue. In that case, the Nzime almost systematically have a shotgun that they lent to Baka men.

Gun borrowing depends on good relations with a gun owner. Indeed, while some Baka acknowledge using any shotguns present in the Nzime village, others prefer to borrow always from the same Nzime, and vice-versa. This is so, because Baka and Nzime are often linked by a pseudo-kinship bound, according to which some develop a long term relation of trust. Some Baka mentioned to prefer borrowing shotguns only within the Baka communities (to a Baka owner) to avoid problems and because gun sharing between two Baka does not involve monetary transactions, but just meat sharing. In all the cases, only if the hunter who borrows the gun is successful would the gun lender receive meat in return. Good hunters are consequently valorised in such exchanges, and their demand to borrow a shotgun is rarely refused. Moreover, they are also more solicited by gun owners who wish to "command" a hunt.

[36]A locally-made shotgun costs approximately between 40,000 and 50,000 CFA. One cartridge costs 600 CFA if purchased in a small village store, 500 CFA in the subprefecture (Lomié), and 300-400 CFA in Yaoundé.

The terms of the exchange

The situations of gun-hunting among the Baka can be classified in three main circumstances according the terms of the trade: 1) paid-hunting, 2) gun-renting, and 3) gun-borrowing.

1) Paid-hunting (see Figure 3.1): In this scenario, a Baka hunter is employed by a villager to hunt for him. The gun-owner provides the weapon and a given number of cartridges. Both parts discuss the payment, which typically consists in money, a share of the meat brought, or a small number of cartridges (generally between one and three). While paid-hunting is decided before the hunt, the amount of the in-kind payment (meat or cartridges) is evaluated according to the harvest, at the return. If he can, the hunter buys one or two cartridges more with which he might kill a supplementary prey for himself (in that case he will keep the biggest for him). Except the preys he killed with his own shot, all the preys brought to the village belong to the owner for the weapon, who will be responsible for sharing or selling the meat.

2) Gun-renting from Nzime: A Baka hunter might wish to leave for a hunt for his own benefit, desiring to get some meat for his household. In that case, the hunter buys his own cartridges, and go to rent a shotgun in the Nzime village. He has to pay the shotgun owner before the hunt (usually 1000 Cfa for a full-night or a full-day), as Nzime often fear the Baka will be back with no meat to share while he might have hide the preys killed.

3) Gun-borrowing between Baka (see Figure 3.2): In case of presence of shotguns within the Baka village, renting often occur between people from the same family or family-in-law. In that case, a hunter might buy cartridges and borrow a shotgun from another Baka, and the gun is lent without tacit counterpart: the game systematically belongs to the owner of the cartridges. However, after returning to the village, the hunter will systematically give a share of meat to the gun-owner to thank him.

Gun-hunting is a constant source of tensions between Nzime and Baka. The number of cartridges given, used, and justified are a frequent objet of conflicts and abuse of trust. Baka constantly mentioned they were not paid as committed or not paid enough, while the Nzime regularly accused the hunters to lie, telling they did not kill any prey or miss their shots, while they were actually hiding the prey killed for their own benefit.

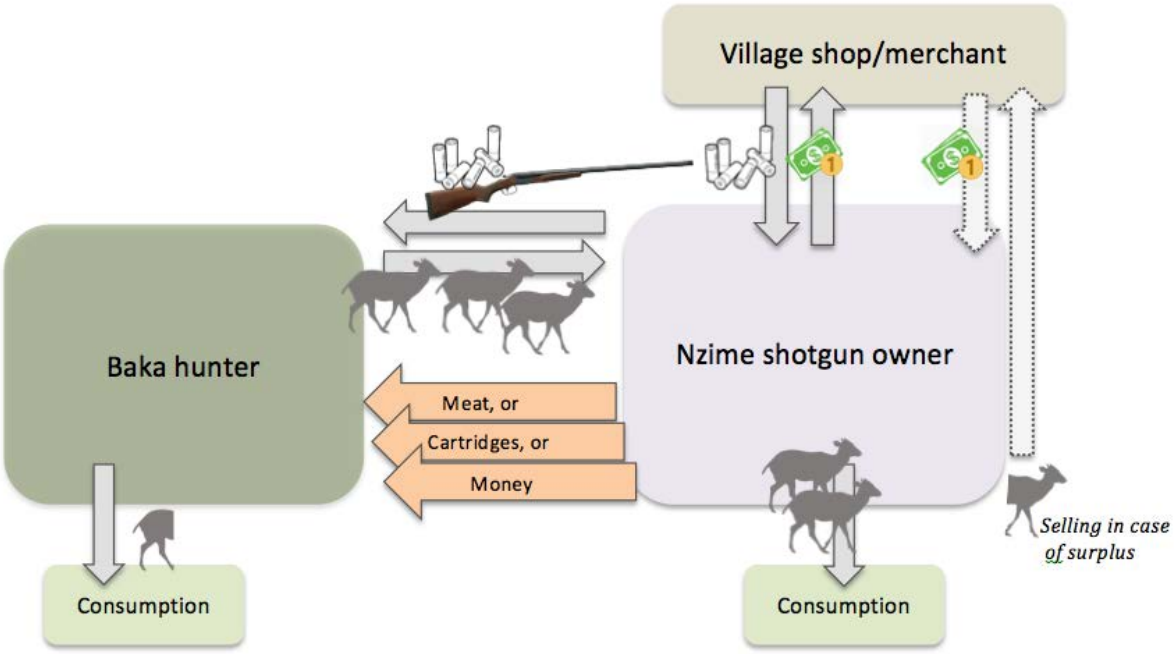

Figure 3.1. Paid hunting system between villagers and Baka hunters

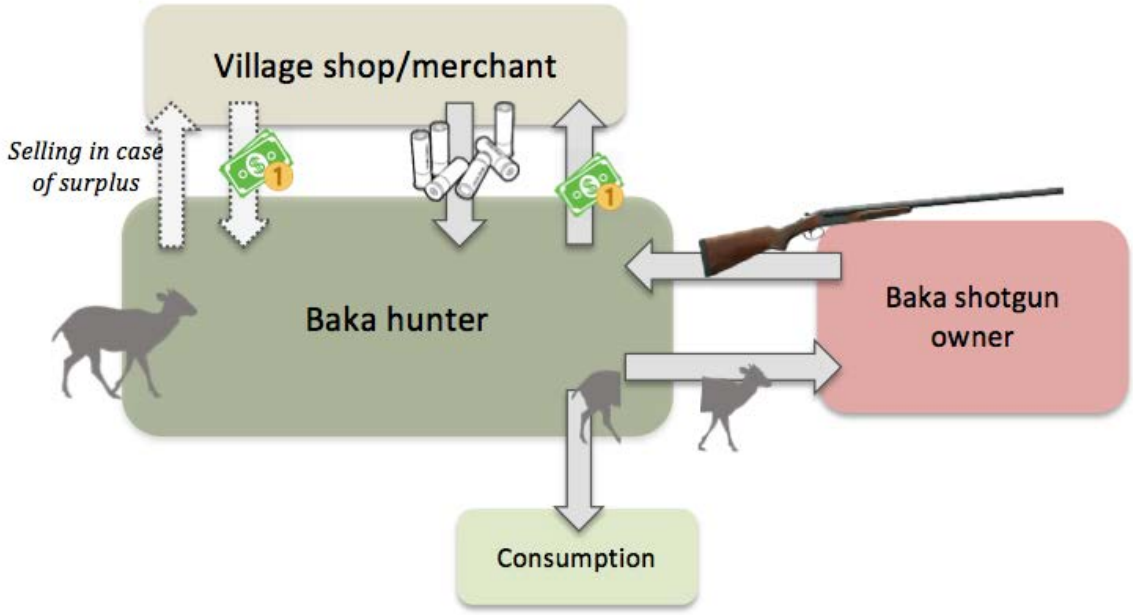

Figure 3.2. Gun borrowing between Baka hunters

ORGANIZATION OF SHOTGUN HUNTING

Shotgun hunting is mainly performed at night, which implies that shotgun hunting is also conditioned to obtain headlamps and batteries. Most often hunters depart at night and return in the early morning. Hunts can also last several days, requiring the use of porters. In this case, the owner of the weapon provides the crew with food, tobacco, and a few sachets of alcohol.

Before the departure, the hunter always "treats" the weapon. Two reasons were mentioned for this. The first one is the cleaning of the tool: because the gun is, to some extent, communalized a hunter never know what the previous hunter did with the gun. Cleaning the weapon helps to prevent bad effects due to what is often presented as the "memory of the weapon". The gun might also be treated to bring luck. I observed a reproduction of a treatment typically used with spears (i.e., with the same plant) to threat a shotgun. Similarly to the spear's hunter propitiatory remedy, scarification and plants are administered on shotgun hunters.

Hunting expeditions with shotgun are composed of one to three persons. When composed of a duo, it is often a good hunter accompanied by a brother in-law or a younger man or boy (sometimes a son or a nephew) who will assist and carry the food. This assistant will take advantage of this occasion to train at shooting if a proper situation happens.

The use of the shotgun on the area produce harmful effects on monkeys specially target with firearms, and which were previously threatened only by the occasional use of the crossbow but which are increasingly hunted (Mittermeier 1987). Shoguns allowed the development of night hunting and consequently increased the harvest rate and the number of targeted species, having a significant impact on large and medium game. Equipped with a frontal torch, the hunter with the gun can blind and immobilize most of te terrestrial species,in order to better shoot them down. Duikers are highly vulnerable to night hunting as they can easily be hypnotized by the headlamp, in addition to the retina facilitates their detection (Dounias, 2016).

Apart from the fact that it is more nocturnal, hunting with shotgun requires very similar techniques to those used while hunting with the spear (i.e., tracking of traces, hunting from a hide, luring). The main difference, however, is that the firing distance can be significantly increased with shotgun. However, while hunters who hunt with shotguns are often recognized as good hunters, the elders systematically criticize young people preference for this technique and their lack of interest in spear hunting, which for elders cause fewer problems, especially with the Nzime. An old Baka man said:

> *"In my past days we used to hunt with spear and with the spear you had to be an expert to kill. Now with a gun, even if you do not know how to set the traps, even if you do not know hunting with the spear, you can take the gun and come back with something".* [G.M. male, 68 years old, MB village]

However, this same man seems to make a particular case the master-hunters, the tuma, in comparison with other hunters:

"The people who hunt well with guns are those who hunted first well with the spear. So, it is the spear that is important (...). The tuma masters all the techniques of hunting, shotgun, spear.... They have no competitors/rivals. "

4.4. Elephant hunting: New economic stakes and Baka implication

Prevalence and historical involvement of elephant hunting in Baka villages

In the two studied villages, I recorded seven hunters currently practicing elephant hunting. I recorded two Baka hunters who acknowledged being full-time elephant hunters, while the other five, probably as other occasional elephant hunters, combine elephant hunting with other subsistence activities (commercial and subsistence agriculture).

Elders interviewed recall their parents exchanged elephant tusks against a small amount of money (500 francs CFA, or 0.76 €) or against tobacco leaves. In the pre-colonial period, tusks were also given to the Nzime who, in exchange, prepared a large meal for their hunting partners. Besides their exchange value, the Baka do not seem to have had much interest in ivory, as the only use that the elders remember was as a hammer to soften the bark used to make clothes (**akpàa/ayété**). In the colonial period, western people raised the demand for ivory. To increase the supply, they distributed shotguns and Pygmies started to hunt elephant for ivory export until elephant populations rapidly declined and markets move to other resources, such as rubber in the turn of the 1930s. Today, in a third phase of ivory exchange, the Baka elephant hunters are involved in well-structured illegal ivory trade chains, build around an increasing demand from Asian countries, and pushed by the rising cost of ivory. Nowadays the Baka participate, or lead, expeditions only in favour of local middlemen or outsider traders by whom they are coopted.

Changes in weaponry used in elephant hunting

According to available information and interviews, in the last century elephant hunting has been conducted using four different techniques, although all of them are characterized by a long period of tracking and approaching the elephants. The first technique systematically resorts to the remedy of invisibility, **mònjòyì**, which protects the tuma armed with a large spear with the wide iron (**mbòso**). Thus protected, the tuma approached the elephant until he lied under it and inserted the spear in the lower belly, piercing where the skin is the thinnest. With the intestines falling to the ground, the animal breaks up and typically flees several meters, but sometimes kilometres, before collapsing. The second technique is related to the expansion of the shotgun and pushed the Baka to conceive a short and specific spear (**sala**) to insert into the barrel of a firearm and more efficiently kill elephant at close range (Nchanji, 2005). Thirdly, nowadays, single-shot rifles (.458 and .375

calibre) are used, as calibre for shotguns is not powerful enough to kill an adult elephant. Finally, in the recent years, some AK-47 automatic rifles seem to be used in the area for elephant killing, although none of the hunters from the studied villages had ever used one. The use of automatic rifles completely changes the hunting techniques and the potential offtakes as the use of rifles allows the hunter to slaughter a whole herd in a few seconds. Military firearms are said to have been diverted from national army, brought by soldiers or high-ranking officials themselves or imported from Central African Republic and Republic of Congo where the end of the civilian conflicts has led to an influx of military weapons into ivory trade network (Berman & Lumbard, 2008).

Baka hunters, ivory dealers, and middlemen

According to Nki NP conservator, the WWF local director, Baka hunters, and ivory dealers themselves, elephant hunting expeditions performed in the Lomié, Messok and Ngatto Ancien districts are now only sought for ivory. Given the prohibitive cost of these guns and ammunitions, all Baka hunters use a gun and ammunition supplied by the ivory dealer (hereafter *commanditaires*) ordering the hunting expedition. Indeed, this trade is organized by a complex network managed by non-local elites and involving different levels of middlemen, transporter and local authorities. The *commanditaires* are mostly foreign to Eastern Cameroon. Several profiles have been identified: Muslim merchants from northern Cameroon, soldiers in permission, Central African or Congolese merchants. These *commanditaires* are often in direct relation with ivory buyers (mostly Chinese or Nigerians) located in Yaoundé or Douala, who will be in charge of the export. According to his relations and trust, the *commanditaire* either commissions a Nzime middleman who will send Baka hunters, or hires a Nzime lead hunter who will, in turn, leave with two Baka trackers and porters. More rarely, the *commanditaire* organize the hunt directly with the Baka lead hunter (tuma). The *commanditaire* tries to gain the trust of all of his partners, and notably the Baka hunters, by promising them gifts in exchange of their trust and loyalty. At this stage, the *commanditaire* is the only funder, he will provide to the hunter the ammunitions, food and others supplies necessary for the expedition. As in many other situations, the Nzime villagers maintain here a role of intermediaries between the Baka and the outsider. In the studied villages, Nzime middlemen were mostly invisible in the village but present in cacao forest camps, where the gun is kept, from where the hunting parties leave, and where the ivory is stored and the payment to the hunters and porters is done.

The elephant hunting expedition

Nowadays, elephant hunting trips are composed by a reduced number of people, usually 2 to 4 men. It is up to the tuma to choose his hunting team, which is usually composed of a secondary/assistant hunter and one or two porters. Sometimes a Nzime hunter - which might be the middleman – participates on the hunting party, in order to avoid that meat is brought to the village and to ensure that the exact number of tusks is declared. The role of the secondary hunter is mostly to hunt small game to feed the team, and particularly the tuma, who must respect the food avoidance on the

elephant meat that he kills. Among the Baka, a rule states that the tuma carries nothing but his weapon during the expedition.

The number of participant is said to be much lower than before, when the Baka organized elephant hunting for themselves, during their seasonal migration called **mɔ̀lɔ́ngɔ́**. At that time, the number of porters was large in order to bring the maximum amount of meat to the camp or the village. This change relates to the motivation of the hunt. Indeed, according to Randolph & Stiles (2011), until 2005, the objective of the hunting expeditions in south-eastern Cameroon included selling the ivory, but also consuming the meat. Expeditions are now ivory-exclusive. As the anti-poaching battle becomes more present, *commanditaires* want to reduce the risk of betrayal. One way to do so is to reduce the number of participants and to prohibit hunters to bring elephant meat back to the village.

As the objective of such operations is to kill 2 to 5 « heads », the expeditions usually last from one to four weeks. The *commanditaire* cover the needs by providing hunters with necessary supplies for this period: ammunitions, alcohol, tobacco, food (rice or cassava), cigarettes, and rain tarpaulins. In others area, the *commanditaire* might provide the head hunter with satellite phones to call and arrange a pick up location (Randolph & Stiles, 2011).

The hunters usually spend the first days to reach the forest clearing (*bai*) where elephants forage. The hunters might also be brought closer to remote forests by being dropped along the roads by logging trucks or motorbikes. From there, they reach the forest clearings and spend several days spotting the elephant paths in adjacent forests or wait for elephants to enter in clearings. To spot and shot the elephants, some Baka hunters acknowledge using a lookout tower situated within the Nki NP and constructed and used by WWF to observe and count wildlife. Hunters might also chose to hunt around the artificial salt pans placed in the sport hunting zones to attract elephants.

Once the elephants are killed, the tusks are rapidly retrieved, as well as -if allowed- a few lumps of meat for themselves and their households. The tusks are delivered to the middleman who is either based in his permanent forest camp of cacao cropping, or in the village (in that case ivory is discretely brought at night). At this moment, the hunter and his porters are paid according to the committed contact and the harvest. The ammount locally announced is generally 100.000 francs cfa (150 €) for the tuma and 30.000 francs cfa for other participants. However, situation of misleading by the Nzime are frequently reported, intermediaries are said to cheat the Baka by disrupting the scale used to weight the tusks or not paying the commited price. On their side, to rebalance this frequent situation, the Baka might occasionally announce a underestimate harvest and secretly keep two tusks in order to sell them directly to a upper level local dealer to gain more money, as price per kilo is more advantageous. In 2012-2013, *commanditaires* of the studied area were buying between 50.000 and 150.000 francs cfa per kilo according to the total weight of ivory brought (see Table 3.1)[37]. In February 2017 the prices were on the rise, being of 100.000 to 150.000 francs cfa/kg when 10 kg was provided.

[37] Containing ivory as well, molar teeth can also be sold. Their price in 2013 was 5.000 francs cfa when sold locally to a ivory dealer (see Picture 7).

Table 3.1. Prices of ivory paid by dealers in the Lomié and Messok district in 2013

Total weight provided	Price paid per kilo (in francs cfa)
<5kg	50,000 / kg
5-10 kg	70,000 – 80,000 / kg
10-15kg	100,000 – 120,000 / kg
> 20kg	150,000 / kg

Picture 7 - Elephant molar teeth and elephant meat

THE FATE OF ELEPHANT MEAT: FROM SHARING TO DECAY

The fate of elephant meat has considerably changed under the influence of two phenomena: sedentarisation and conservation policies. As already mentioned, elephant meat was previously consumed locally. Whole camps would move to the place of slaughter following the return of one hunter bringing back the tail of the animal or a lump of meat as a sign of success. People staying at the village also received large lumps of meat, which could then be divided and shared to neighbouring villages where related kin or in-laws lived. Thus, the meat of an elephant, smoked on a large smoking rack, would feed a large number of households for many days.

Nowadays, hunting expeditions with collective departure of families in **mòlɔ̀ngɔ̀** are not performed anymore, and the return of the hunters is now not as much expected by the community as before. Today, everone who stay in the village might know that an elephant hunting has been successful, however the fact that only a minority (or even nobody) will receive meat is the base of a whole social issue that will be developed in Chpater 6. Indeed, the tuma only brings a small amount of meat for his restraint household, and to families situated in forest camps on the way back to the village[38].

As in other hunting situations, the game belongs to the owner of the weapon. The elephant meat, which was previously owned by the tuma using his spear, now belongs to the owner of the rifle. This change implies a concrete dispossession of a subsistence resource by an external agent who decides the future of the meat (at least if he is present). With the increasing anti-poaching controls, middleman often prefer to let the meat decay and force the Baka not to carry any, to avoid ecoguards noticing the kill due to the betrayal from village people, or just perceiving the meat-smoking when patrolling in forest. Some Baka have reported hunting expeditions where the middlemen accompanying the hunt watered the freshly felled carcass with gasoline to avoid its consumption[39].

Nonetheless, when the elephant-butchering place is within one day's walking distance from the village or a forest camp, the families might be called by a porter and asked to reach that place and eat the meat there, without the knowledge of the middlemen or *commanditaires*. This situation might imply the move of several families for a couple of days to the butchering place or to the camps neighbouring it. However, in the studied area, the elephant killing – always realized within or around the Nki and Boumba-Bek NPs - are too far from the village, and the carcasses and meat are often abandoned to rot right after retrieving the tusks.

[38] The advantage of consuming meat (elephant or other) with less risk is often presented as the main argument by the Baka who have decided to live all year long in their forest camps.
[39] The social consequences of this non-sharing will be examined in the Chapter 6.

Figure 3.3 summarizes all the people involved in the ivory trade, from the forest hunter to the international buyer. All these people are named « partners » by the ivory dealers I met on the field. In most cases, the main and regular contact of the Baka hunters is a wealthy Nzime middlemen, who often live during long periods in a forest camp with cacao cropping as a hedging activity. After having weight the tusks and pay the hunters, the ivory reach the Nzime village and wait for the ivory dealer to come. Ivory *commanditaires,* typically being the riffle providers, are the central partner in the trade, as they exert power all through the chain and make the link, between the forest area and Yaounde or Douala for export.

All along that way, the ivory is hidden in many different ways: either in sacks of cacao, or other agricultural goods, placed between logs on logging trucks, enrolled in mattresses and transported in a motorbike (my observations), or according to Randolph & Stiles (2011), inside the truck driver's door frame or the engine. Transporters never buy ivory and are only paid to transport it. The transport of ivory is often ease by collaboration between middlemen or *commanditaires* and local authorities (police, politician, military, prefect, law enforcement officers, ecoguards) benefiting of a pass-through, or even using their official cars, in exchange of a part of the benefit.

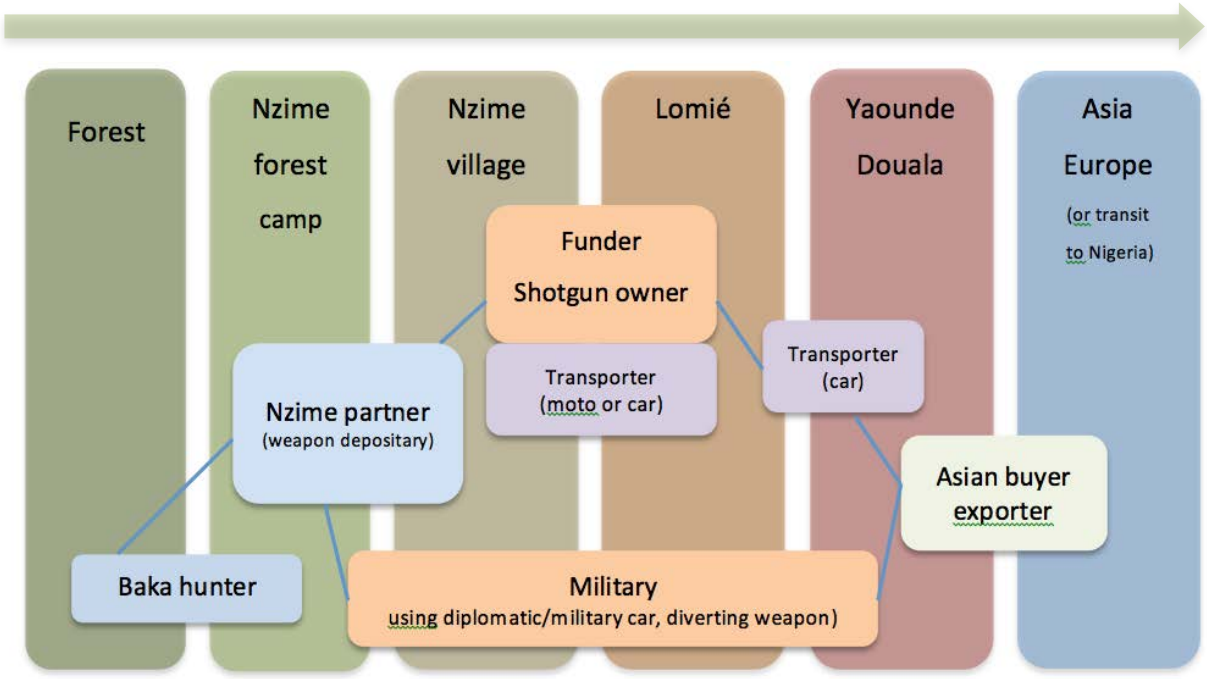

Figure 3.3 - Circulation of ivory from the killing to the final destination (consumers)

5. Conclusion

This general overview of the hunting strategies currently mobilized by the Baka show a clear diversification of practices as a way to answer to different purposes and needs. Given their historical situation - in constant contact with other ethnolinguistic groups - the Baka seem to have always been prompt and able to shift between hunting techniques according to the social or economic contexts. In all cases, the Baka seem to continue to maintain the status of local hunting specialists, a status which is nowadays exploited by neighbours and foreign agents who seek high benefit of revenue complement in the blooming wildlife trade. The in-depth description of shotgun exchange system and the elephant hunting gives important elements to understand the local economy of meat and ivory commercialization. Such present-day description is far from the image of hunter-gatherers isolated in the depth forest, hunting only for subsistence pourposes. Today, the Baka might take advantage of their reputation, knowledge and skills to be employed in a blooming hunting economy, from which they might benefit in obtaining cash income or individual status. However, the global and regional market economy around hunting might also accentuate their marginalization and the unbalanced relations they maintain with non-Baka, be them local shotgun owner or ivory dealers.

Chapter 4

Hunting techniques, wildlife offtake and market integration. A perspective from individual variations

This chapter corresponds to the article : Duda R., Gallois S. & Reyes-García V. 2017. Hunting techniques, wildlife offtake and market integration. A perspective from individual variations among the Baka (Cameroon). *African Study Monographs*. 38(2): 97-118

1. Introduction

In the last decades, unsustainable hunting practices have largely increased driven by factors such as access to improved technology (Robinson et al., 1999), better road access to previously remote areas (Brodie et al., 2015), and the growth in demand for bushmeat, mostly from the fast expanding African urban centers (Brashares et al., 2011) which has risen the monetary incentives for local people to engage in hunting (Robinson et al., 1999).

In this dynamic context linking people's livelihood, monetary incentives to hunt and ecological effects of over-hunting, research addressing the complexity of the interactions between ecological, socio-economic and cultural aspects of bushmeat hunting is critically needed (van Vliet et al., 2010; Nasi et al., 2011). Hunting techniques and practices of local people are more and more debated and taken into consideration. Previous research on the topic has determined harvest rates to assess whether levels of exploitation are sustainable (e.g. Fa & Brown 2009; Bobo et al. 2015), and has estimated the importance of bushmeat for urban markets (Fa et al., 2006; Kümpel et al., 2010) and rural livelihoods (Wilkie & Carpenter 1999; Bakarr et al., 2001).

Anthropologists have often studied subsistence hunting as a cultural practice in which skills and knowledge are acquired and reproduced within a social context (Gurven et al., 2006). But research also suggest that hunting practices also vary according to individual characteristics such as for instance education level - as schooling might allow people to acquire new skills, change their behaviours, beliefs, or their roles in society (Luz et al., 2015) - or other characteristics such as monetary income or the frequency of travel to a market town (Koster et al., 2010; Brashares et al., 2011; Reyes-García et al., 2016b). However, we still lack a complete understanding of the interactions

between the ecological, socio-economic and cultural aspects of bushmeat hunting. One potential way of addressing this issue is to study the relations between hunters' socio-economic characteristics and their choices of hunting techniques (see for example Kümpel et al., 2009; Gill et al., 2012).

In this chapter, I analyse the relation between Baka individual socio-economic features (i.e. schooling, cash income, and visits to the market town) and the choice of different hunting strategies (i.e., the weapon used, the game hunted, and the hunting efficiency). Specifically, I i) describe hunting offtake and techniques used by the Baka, ii) analyse the individual variations in hunting practices categorizing hunters in different profiles, and iii) study the socio-economic characteristics associated to such profiles. With this chapter, I aim to contribute to the understanding of the relationship between the socio-economic and cultural contexts of the bushmeat crisis and the impact of different hunting strategies.

2. Materials and methods

2.1. Data collection

Data were collected between July 2012 and August 2013. Intensive fieldwork was conducted in two Baka villages, with a population varying between 200 and 300 individuals, depending on the season. The two sampled villages were settled along the logging roads, at 51 and 65 kilometres from the main town in the area, Lomié. With my colleague Sandrine Gallois, we sampled all adults (>= 16 years of age) present in both villages during at least six of the 12 months of fieldwork (n=269), and identified the hunters (n=100) defined here as any men or women reporting at least three hunting trips during the study-period. Most data collection was helped by a Nzime or a Baka translator. To reduce reporting bias, much effort was put in establishing relations of trust with the informants, including learning Baka language and ensuring participants' anonymity.

2.2. Assessment of hunting behaviour

We conducted weekly recalls of the main activities performed by individuals in the sample such as hunting, house construction, domestic work, gathering, small or large scale agriculture, etc. I used scan observations, an anthropological technique developed for non-literate, foraging societies (Reyes-García et al., 2009). Each week, on a day chosen at random I visited each household and asked each adult about the main activity performed during the two previous days. When hunting was not reported as the main activity, I specifically asked whether the person went hunting during those two days (either as complementary or as opportunistic activity). For each hunting expedition we recorded the Baka name of game killed, the sex and age-category of the animal (juvenile/adult), the estimated time invested in the expedition, the number of people participating in it, and the weapons used. To avoid double counting, for any hunted animal, I carefully noted who had caught the prey and attributed each

prey only to one hunter. Baka names were matched with scientific names based on zoological references (mostly Gautier-Hion et al., 1999; Kingdon 2001). The hunting duration was estimated by informants using as a bench mark sun's positions or events occurred during the reporting period, with a maximum duration assigned of 48 hours.

2.3. Measurement of hunter's socio-economic characteristics

We also conducted a census to collect information on hunter's i) age, ii) sex and iii) schooling (maximum school grade completed). As most Baka cannot recall their birth date, we traced the kinship relations of people living in different households in the village and used the information to estimate informants' ages. The level of schooling was coded from 1 to 5 according to the maximum school grade completed. No one in the sample had completed any school grade beyond 5th grade.

I used different socio-economic proxies to characterize hunters: i) wealth, defined as the monetary value of a set of 10 commercial items owned or not by the subject, and representative of the wealth variations in the villages (radio, large cooking pot, machete, torch, petrol lamp, wire snares, chicken, bag, toothbrush, sheet/bed linen) ; ii) income from sales of wild meat, agricultural and forest products; iii) income received from wage labour; and iv) number of visits to the market town in the last month. For the two measures of income (sales and wage labour), we asked for all inputs received in the 15 days previous to the survey. I considered both cash and in-kind income, this latter being converted to their monetary equivalent. Income data and frequency of visits to the market town were collected every three months, and then averaged to obtain a single measure for each individual. The economic values, recorded in Cameroonian currency (US$ 1 = 602.5 XAF, July 2014) were transformed into PPP value (Purchasing Power Parity; 251 XAF: 1$ppp according to Word Development Indicators website).

2.4. Data analysis

I calculated hunting efficiency or catch-per-unit-of-effort (CPUE) as the amount of game (in weight) killed per hour invested in hunting. As it was not possible to weight all the preys reported I used published data to estimate animal's weight according to the age category and the sex of the animal[40] (Gautier-Hion et al., 1999; Kingdon, 2001). Juveniles' weight varies rapidly, so I assigned the value of half the weight of the male adult to any juvenile reported. To understand the structure of game community captured by the Baka, I followed Peres (2000) and Luz (2012) and used weight estimations to classify game species in four biomass classes: small species (<1kg), medium species (1-5 kg), large species (5-15 kg), and very large species (>15 kg) (Table 4.1).

[40] In absence of the direct recording the actual weight of each animal, these results might be biased as they are based on secondary literature not taking into account the local variations that might exist for the same species. Thus, some weights might be underestimated and other overestimated.

Table 4.1. Game community captured according to biomass classes

Small species (<1kg)	Squirrels, mice, forest hinge-back tortoise.
Medium species (1-5 kg)	Giant pouched rat, blue duiker, red flanked duiker, brush-tailed porcupine, marsh mongoose, tree pangolin, black-footed mongoose, african palm civet, tree hyraxe, crowned monkey, moustached monkey, white-thighted hornbill, black-casqued hornbill, plumed guinea fowl, great blue turaco.
Large species (6-15 kg)	Mantled guereza, grey-cheeked mangabey, agile mangabey, putty-nosed monkey, water chevrotain, nile monitor, rhinoceros viper.
Very large species (>15 kg)	Bay duiker, Peter's duiker, yellow-back duiker, red river hog, gorilla

I first analysed the frequency, percentage, and body-weight of catches across prey genera and family. I then used information from scans to describe hunting expeditions based on the main technique brought for the hunt. Thus, I generated four categories, two related to modern weapons (shotgun and snare made of steel wire) and two corresponding to traditional techniques (the use of fire for smoking out preys and "others" including machete, spear, barehanded catch, bow, crossbow and mice trap). For each category I computed i) the total number of observations and kills reported, ii) the mean number of game caught per hunting trip, iii) the mean weight of each prey caught, iv) the total and mean duration in hours, and v) hunting efficiency of the technique (CPUE in kg/hours).

In a second step, I classified hunters in three categories based on their use of technology. I first identified the techniques most frequently used by each hunter in weekly scans: shotgun, snare traps, or traditional techniques (merging smoking out, spear, machete, catapult, mouse trap, or bow); hunters who have used a technique in 50% or more of the reported hunting events were assigned to a category. I only used data of people who had reported at least three hunting expeditions.

Lastly, I analysed differences across those hunter's profiles in terms of i) socio-demographic characteristics, ii) economic characteristics, and iii) hunting offtake measurements using analysis of variance (one-way ANOVA) with a Bonferroni adjustment with $\alpha = 0.005$ for post-hoc comparisons among groups. For statistical analysis I used Stata 11 for Windows.

3. Results

3.1. The prevalence of wildlife hunting among the Baka

I collected weekly information from 269 individuals (156 women, 113 men, average number of interviews: 17; SD=0.6; min = 1; max =39) for a total of 4,506 observations, where an observation is defined as a structured interview about a person's main activities during the two days before the interview. As observations include a two-day recall, I recorded data for a total of 9,012 person/days. Hunting, either successful or not, was reported as the main activity in 580 person/days (6.4%). Compared to other activities, hunting appears as the fourth most frequent activity reported, after agricultural work (36.1%), gathering (10.3%), and leisure/resting (9.8%). Hunting is more prominent for the sample of men, for which is the third most frequent activity (14%), after agriculture (25%) and leisure/resting (17%).

I recorded information from 719 hunting events (563 for men, 156 for women). From the 269 people interviewed at least once, 99 individuals did not report any participation in hunting events (84% of them were women). All added, the total duration of hunting events is of 3,878 hours, including opportunistic encounters with animals during forest wandering and hunting expeditions lasting several days. The average time devoted to one hunting trip was of 5.4 hours (SD=0.16; min=0.25; max=24).

3.2. Prey species

A total of 579 animal catches were reported during scans (17% juvenile; 44% female) corresponding to 32 species. Some species were caught more frequently than others (Table 4.2). Thus, 56% of the preys harvested belong to two species: giant pouched rat (28% of the catches) and blue duiker (28%). Other species commonly hunted include the brush-tailed porcupine (9%) and monkeys (an aggregated category representing 12% of catches). Some animals traditionally hunted by the Baka (Bahuchet, 1992) are marginally represented in the dataset. For example, the medium-sized duikers (or "red duikers", *Cephalophus spp*.) represent only 6 % of the catches and red river hogs less than 1%.

Table 4.2. Game species harvested, body-weight cumulated and conservation status during a twelve-months period in two Baka villages

English name	Latin name	Baka name	Individuals catched		Cumulated weight (kg)	Class in hunting regulation[41]	IUCN status [42]
			Frequency	%			
Artiodactyles							
Blue duiker	*Philantomba monticola*	dɛ̀ngbɛ̀	160	27.63%	692.9	C	LC
Peter's duiker	*Cephalophus callipygus*	ngɛ̀ndì	28	4.84%	556.9	B	LC
Bay duiker	*Cephalophus dorsalis*	ngbɔmù	9	1.55%	198	B	LC
Yellow-back duiker	*Cephalophus sylvicultor*	bèmbà	3	0.52%	170	A	LC
Bate's dwarf antelope	*Neotragus batesi*	ekù	2	0.35%	3.9	C	LC
Water chevrotain	*Hyemoschus aquaticus*	gɛkɛ	1	0.17%	6	A	LC
Red river hog	*Potamochoerus porcus*	pàmɛ̀	3	0.52%	270	B	LC
Total Artiodactyles			**206**	**35.58%**	**1897.7**		
Rodents							
Brush-tailed porcupine	*Atherurus africanus*	mbòke	50	8.64%	132	C	LC
Gambian pouched rat	*Cricetomys emini*	gbè	161	27.81%	347.2	C	LC
Mice	n.det. (category)	bílì	40	6.91%	30	C	-
Squirrels	n.det. (category)	sende	3	0.52%	0.4	C	-
Total Rodents			**254**	**43.88%**	**509.6**		
Hyraxes							
Western tree hyraxe	*Dendrohyrax dorsalis*	yòka	2	0.35%	9	C	LC
Pholidotes							
Tree pangolin	*Phataginus tricuspis*	kokòlo	16	2.76%	38	C	NT
Primates							
Lowland gorilla	*Gorilla gorilla*	èɓoɓo	2	0.35%	240.5	A	CE
Guereza colobus	*Colobus guereza*	kàlu	1	0.17%	11.4	A	LC
Putty-nosed monkey	*Cercopithecus nictitans*	kɔyì	22	3.80%	107.6	C	LC
Crested mona monkey	*Cercopithecus pogonias*	màmbè	8	1.38%	27	C	LC
Moustached guenon	*Cercopithecus cephus*	gbɛlèkɛsɛ̀	4	0.69%	12.5	C	LC
Agile mangabey	*Cercocebus agilis*	tamba	2	0.35%	14.6	A	LC
Grey-cheeked monkey	*Lophocebus albigena*	gaja	2	0.35%	14	C	LC
Monkeys	n.det. (category)	kémà	30	5.18%	169.2	/	-
Total Primates :			**71**	**12.27%**	**596.8**		

[41] Class regulations correspond to the Forestry, Wildlife and Fisheries Regulations Law Government of Cameroon (1994). A=Totally protected, B=Protected, C=Partially protected.

[42] LC : least threaten ; NT : near threaten ; VU : vulnerable ; CE : critically endangered , DD : data deficient (IUCN, 2016)

Carnivores							
African palm civet	*Nandinia binotata*	mboka	8	1.38%	13.9	B	LC
Black-footed mangoose	*Bdeogale nigripes*	ɓùsɛ̀	1	0.17%	2	C	LC
Marsh mongoose	*Atilax paludinosus*	nganda	7	1.21%	9	C	LC
Total Carnivores :			**16**	**2.76%**	**24.9**		
Birds							
Crested guinea fowl	*Guterra plumifera*	kangà	1	0.17%	1.13	C	LC
White-thighted hornbill	*Bycanistes albotibialis*	kàta	1	0.17%	1	C	LC
Great blueturaco	*Corythaecola cristata*	kulungu	2	0.35%	1.9	C	LC
Yellow-casqued hornbill	*Ceratogymna atrata*	mángɔ	1	0.17%	1	C	VU
Small-sized birds	n.det. (category)	nu	1	0.17%	0.1	C	-
Total Birds :			**6**	**1.03%**	**5.13**		
Reptiles							
Rhinoceros viper	*Bitis nasicornis*	diàko	1	0.17%	10	C	DD
Forest hinge-back tortoise	*Kinixys erosa*	kùnda	5	0.86%	4.3	B	DD
Nile monitor	*Varanus niloticus*	mbambè	2	0.35%	16	B	LC
Total Reptiles :			**8**	**1.38%**	**20.3**		
Total :			**579**	**100%**	**3101.4**		

Game harvested by the Baka is dominated by medium-size species (78% of all preys). Other body-weight categories appear secondarily: small species represent 8.6% of the overall harvest, whereas large species represent 6.4%. Very large species represent 7% of the preys harvested. In terms of biomass, the catches reported amounted to 3,111 kg, with duikers contributing with a larger biomass 1,622 kg, followed by rodents (porcupine, rat, mice) with 509 kg, and arboreal monkeys with 356 kg. The report of two gorillas raised the primates' contribution to 597 kg. Despite low individual body-weight, the giant pouched rat represents the third highest contribution in terms of biomass harvested (11%), after the blue duiker (22%) and the Peter's duiker (18%).

Species integrally protected by current hunting regulations (Class A) total 1.39% of individual preys caught and 14% of the biomass. From participant observation, I also know that a few elephants (Class A) were hunted during the study period. However, as hunters did not voluntarily report such catches during scans, I do not include them in the analysis. Wildlife species under partial protection (Class B) represent 9.50% of the catches and 34% of the biomass.

3.3. Hunting techniques and efficiency

Snare trapping was the most frequent technique reported (47.6% of the hunting events), followed by the use of fire to smoke out the preys (24.2%), and "other" techniques (including spear, machete, catapult, mouse trap) (16.3%); shotgun hunting was reported in 12% of the hunting events (Table 4.3).

Table 4.3. Characteristics of Baka hunting techniques

	Shotgun		Trapping		Smoking out		Others		Total	
Observations reported	87	12%	341	47.6%	174	24.2%	117	16.3 %	719	100%
Total values	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Duration of hunts (hrs)	866	22.5	1829	47	661	17	521	13.5	3878	100
Animals killed	192	33.2	188	32.5	134	23.1	65	11.2	579	100
- Small-size species	0	0	25	13.3	0	0	25	38.5	50	8.6
-Medium-size species	152	79.2	131	69.7	134	100	34	52.3	451	78
- Large-size species	26	13.5	6	3.2	0	0	5	7.7	37	6.4
- Very large-size sp.	14	7.3	26	13.8	0	0	1	1.5	41	7
Cumulated weight of animals killed (kgs)	1528	49	1112	36	291	9	178	6	311	100
Average values	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
Duration (hrs/trip)	10.1	0.75	5.4	0.20	3.8	0.22	4.4	0.28	5.4	0.16
Animals killed per trip	2.60	0.32	0.58	0.04	0.94	0.74	0.66	0.10	0.90	0.05
Weight killed (kgs/trip)	8	1.31	5.9	0.54	2.2	0.06	2.8	0.70	5.37	0.48
Efficiency (kg/hr)	1.8	0.07	0.6	0.09	0.4	0.05	0.3	0.14	0.8	0.04

I found important variations in the time invested and type of animal caught depending on the hunting technique used. Trapping is the technique with the largest accumulated duration (1,829 hours). Indeed, the maintenance of snare traps implies regular visits to collect any potential catch or reset the traps. Although such visits are mostly completed in a few hours (the mean duration of such trips is of 5.4 hours), they need to be done frequently. This contrasts with the average duration of hunting expeditions with shotguns, which typically involve longer trips (mean duration 10 hours) but occur less frequently. Shotgun use appears second in terms of accumulated duration (total 866 hours). Traditional hunting techniques appear as the activities with shorter duration (661 hours for smoking out, 521 hours for other techniques).

Regarding the number of kills, shotgun hunting yielded 33.2% of the catches (n=192) and snare traps 32.5% (n=188). Each technique was used to target different groups of species. Firearms

slaughtered heavier preys (mean=7.96 kg) than those captured with traditional methods (2.2kg for smoking out; 2.8kg for other techniques). As a non-selective method, trapping might result in the harvest of game in all body-size categories; however, data suggest that trapping indeed captures mainly medium size species (69.7% of game killed with snare) and a few small (13.3%) and very large species (13.8%) (with an average of 5.9 kg harvested per snaring expedition). Among all the preys captured with snare, 50% are duikers, 35% blue duiker, and 15% medium-sized duikers. Rodents represent 39% of the catches done with snares. Smoking out appears as a monospecific method, as it targets mainly giant pouched rats (95% of the catches). The Baka do not seem to target very large species with shotguns (7% of the catches), rather, shotguns are mostly used to target medium-size mammals (80% of the prey), in which blue duikers (48%) and primates (35%) represent the main catches. Animals captured with "other" techniques mainly belong to the categories of small and medium species (birds, rodents, small duikers and small carnivores). However, the contribution of such catches is not trivial (2.76 kg per catch).

Hunting trips using shotguns result in an average of 2.6 catches per trip whereas hunting trips with snare and traditional techniques (smoke and others) seem less successful (i.e., less than 1 catch/trip). In brief, shotgun hunting displays the largest efficiency (CPUE: 1.8 kg/hr) as compared to all other techniques (0.6 kg/hr for trapping; 0.4 for smoking out; and 0.3kg/hr for "others").

3.4. Hunters' profiles

Half of the people who reported at least three hunting trips fall into the category of trapper (n=48 ; 49.5%), defined as people who used snare trapping in more than half of their reported hunting events. The second largest profile corresponds to hunters preferably using traditional techniques (n=38; 39.2%). Shotgun is the preferred weapon for only a reduced part of the sample (n=11; 11.3 %). Three individuals did not have a predominant technique and have been excluded from further analysis.

When comparing the socio-demographic characteristics of hunters falling in each of the three profiles, I found that all shotgun hunters and 92% of snare trappers are men, whereas 47% of the traditional hunters are women (p=<0.0001). The profiles of those who prefer shotguns seem to correspond to younger hunters (avg. age 29.2 vs. 36.3 years for trappers and 32.2 years for traditional), although differences are not statistically significant. Shotgun users also show higher average values for education and travel to town more frequently than hunters in other profiles, although, again, the differences do not appear to be statistically significant (Table 4.4).

Table 4.4. Analysis of variance across hunters' profiles in a) socio-demographic characteristics, b) economic characteristics, and c) hunting data. Avg (SD)

	Shotgun hunters	Snare hunters	Traditional hunters	F	p
N (%)	11 (11.3%)	48 (49.5%)	38 (39.2%)		
Socio-demographic variables					
Male	1 (0)	0.9 (0.04)	0.47 (0.08)	20.12	<0.0001
Age (in years)	29.2 (2.72)	36.3 (1.63)	32.2 (1.99)	1.62	0.1894
Education level (in years)	2.18 (0.4)	1.58 (0.17)	1.65 (0.18)	0.38	0.6817
Travel to town (times per month)	3.1 (1.16)	1.8 (0.38)	1.39 (0.38)	0.77	0.4672
Economic variables (in $ ppp)					
Income from sales of game	7.1 (2.5)	1.6 (0.4)	0.64 (0.24)	11.05	<0.0001
Income from all sales	10.8 (3.85)	3 (0.44)	2.28 (0.47)	10.15	<0.0001
Income from wage labour	11.3 (4.6)	6 (1.0)	7.8 (1.19)	3.59	0.0315
Total income	28.7 (4.7)	9.2 (1.1)	10.08 (1.29)	27.07	<0.0001
Wealth	69.9 (15.33)	49.3 (4.7)	47.05 (5.83)	1.80	0.173
Hunting variables					
Total duration of hunts (hours)	66.2 (12.46)	37.2 (2.98)	22.32 (2.00)	19.07	<0.0001
Number of preys caught	15.8 (3.2)	4.6 (0.53)	3.29 (0.64)	24.57	<0.0001
Total weight of game (in kg)	135.4 (37.7)	22 (2.77)	8.34 (1.94)	34.66	<0.0001
Hunting efficiency (in kg/hr)	2.1 (0.4)	0.6 (0.07)	0.33 (0.05)	31.69	<0.0001

I found several statistically significant differences in the economic characteristics of informants on different hunting profiles (Table 4.4). Namely, shotgun hunters have larger income from the sale of game than hunters in any of the other categories (7.1 $US PPP vs. 1.6 $US PPP for trappers and 0.64 $US PPP for traditional). Shotgun hunters also have higher income from wage and higher total income than hunters in the other categories. All differences in income across hunters' profiles are statistically significant ($p<0.0001$). Interestingly, those differences do not reflect in accumulated wealth ($p=0.173$).

Regarding the characteristics of hunting events, shotgun hunters seem to invest more time on hunting (66.2 hours), catch more preys (15.8 preys) and more biomass (135.4 kg) than hunters in any of the other categories. Consequently, the hunting efficiency of shotgun hunters is significantly higher than the efficiency of hunters in other profiles ($p<0001$). Between the two modern techniques, snare trappers show a lower labour-input and a lower return rate (hunting efficiency) than shotgun hunters.

4. Discussion

The main finding of this chapter shows that the current use of shotgun by the Baka seems to relate to the emergence of a specialized and highly efficient type of hunter with a clear market orientation. This finding goes together with two secondary outcomes: contemporary Baka mostly hunt midsize species (small duikers, rodents) and non-traditional hunting techniques, especially shotgun, have a larger impact on game than traditionally used techniques. The progression of the discussion attempts to interpret how the decline in large game population might lead to the expansion of shotgun hunting through different incentives exerted on hunters.

4.1. Game composition and hunting pressure

The study of Baka hunting shows a predominance of short hunting events, targeting a low diversity of relatively abundant species such as small duikers, porcupines and rats, and a relatively low share of large game. Those patterns contrast with the historical importance of a hunting strategy based on collective expeditions targeting large mammals (Bahuchet, 1992; Joiris, 1998), but match with recent ecological studies which also show game structure compositions dominated by ungulates, rodents and primates, the three most important taxa for human consumption in the Congo basin (Muchaal & Ngandjui, 1999; Bennett & Robinson, 2000; Fa & Brown, 2009).

Assuming variations in human population densities and resource exploitation between areas, my data provide new insights regarding hunting pressure and local faunal composition. For instance, while the giant pouched rat represents an important part of the catches in my study area, this species is rarely caught by Baka living hundred kilometres to the east (Ngatto-Yokaduma area) (Ichikawa pers. comm. 2014). In the same sense, other species such as medium-sized duikers have been more frequently reported in the Ngatto-Yokaduma area (Hayashi, 2008; Yasuoka, 2014), a less populated area. Two recent studies have argued that such local variations in game structure are related to the distribution of human activities, and emerging in areas more densely populated by humans and consequently enduring higher levels of hunting pressure (Bobo et al., 2014 ; Yasuoka, 2015). Seen through the lens of these two studies, the prominence of blue duikers over medium-sized duikers in my data could be interpreted as a side effect of the high human density in the area leading to a replacement of medium-sized duikers, which might have been highly targeted and hunted in the past decades, by blue duikers. This hypothesis fits with ethnographic information from Baka elders who report that blue duikers live now closer than medium-sized duikers and are easier to hunt than they were in the past.

The analysis on prey composition also shows a relative absence of large mammals despite cultural diet preferences for such species (for notably hogs and giant pangolin) and social importance of large game hunting (Bahuchet, 1992). There are several potential explanations for this finding. First, the decline of local game populations has obviously reduced the encounter rate, resulting in a higher cost of capture for large mammals. Accessing areas favourable for large game species (like the swampy clearings forests or the remote National Parks) is too costly, in terms of time and money, from

permanent settlements. The technology required to capture such game might also be difficult to access (for monetary reasons or for social closeness with riffle/shotgun owners). Consequently, and as already shown for Neotropical forest (Jerozolimski & Peres, 2003), subsistence hunters might become less selective and progressively change their preference in terms of hunting practices and diet. Also, the regularity of access to meat might be valued more than the type of animal. Thus, according to Ichikawa (2007), animal density seems to play a higher role biomass for Pygmy groups. This author states than rather concentrate their efforts on small-sized mammals as they allow more regular catch. Second, acquiring, trading and consuming the meat of highly protected species entails legal risks regarding anti-poaching controls that Baka hunters prefer to avoid. It should be noted that my data does not seem affected by the under-reporting bias caused by the fear of the denunciation concerned only to elephants. Finally, I may also presume that a progressive loss of knowledge or the absence of social-ritual conditions favourable to engage in collective hunts targeting large mammals might also explain the relative absence of large species in the game composition reported.

4.2. From spear to shotgun: shift in hunting techniques

In comparing my data with reports of traditional hunting techniques, I observe a shift in hunting patterns among the Baka: from the traditional use of spear to the prevalence of snare traps and shotgun. These new hunting patterns might correlate with the local decline of some species, notably large mammals. Rarefaction of large species might have implied a loss of cost-effectiveness of the collective hunting expeditions and consequently a larger adaption of individualistic techniques.

This change could also be seen as a cultural adaption to social and spatial changes. Fifty years ago, Althabe (1965) already proposed that the reduction of hunt duration and the focus on small and medium-sized catches by the Baka could relate to sedentarisation. As Baka modify their mobility pattern and engage in new economic activities (i.e., agriculture, wage labour), they might see a reduction in the time they can devote to hunting, as well as in the area covered during hunting expeditions. This reduction implies hunting closer to the village, where large game, vulnerable species, and forest specialists might be less abundant now due to past overhunts and habitat modification (Nasi et al., 2011). In parallel, previous studies have shown that few taxa (generally smaller species) may remain unaffected by overhunting or even be enhanced by hunting, as well as tolerant to fragmented habitat (Isaac & Cowlishaw, 2004).

The shift towards shotgun use constitutes one of the main threats for wildlife in Central Africa as it allows an easier access to large animals with critical conservation status (Kümpel et al., 2009). Intensive shotgun use also represents a threat for diurnal monkeys which are likely to decline due to their low intrinsic rates of population growth (Linder & Oates, 2011). In this sense, I noted that the share of monkeys caught is surprisingly high; especially given that the Baka are not traditionally monkey hunters (the only weapon allowing to kill arboreal species being the crossbow, employed in the past by Nzime hunters). The high share of monkeys caught might relate to the increasing importance of shotgun hunting, as 94% of small diurnal monkeys were killed with shotguns, but it might also indicate the decline in large-sized ungulates in the study area, and consequently a change in the preys targeted.

4.3. Socio-economic drivers and the emergence of shotgun hunters

An important result of this work relates to the differences between shotgun hunters compared to hunters falling in other profiles. While snare trappers resemble traditional techniques users in terms of economic features, labour inputs and pressure on wildlife, the profile of a shotgun hunter corresponds to a young male, highly involved in market economy, investing more time for more efficient hunts (bigger prey, more game by trip). Interestingly, and despite its high efficiency, shotgun hunting is regularly used by only a reduced part of the population. In order to discern further dynamics in hunting patterns and sustainability, the potential drivers and the limiting factors of shotgun use among the Baka need to be examined.

Economic incentives: We might assume that involvement in shotgun hunting is driven by economic incentives in bushmeat commercialization. Damania and colleagues (2005) have shown that the rise of bushmeat prices might drive a technology shift away from cheaper and less efficient technologies (as snares) to more expensive and more efficient practices, such as shotgun. For the Baka, the involvement in wage labour might increase their capacity to buy cartridges, or eventually their own shotgun, a situation that starts to be observed in the studied area. Surprisingly, economic gains provided by the commercialization of bushmeat do not seem to be linked to higher individual possessions, as I find no significant relation between profile classes and wealth level. In such small-scale societies, the low availability of valuable material items and the fact that not many items are needed for production is a first brake to material accumulation. However, wealth variations exist, although they do not seem related to income level. We might think that the importance of sharing norms play a critical role in the redistribution of monetary gains acquired by hunters making profits. The Baka egalitarian economy is based on the mechanism of demand-sharing (as studied by Peterson, 1993; Ichikawa, 2005). Gains of all kinds are often rapidly distributed within the enlarged family and to anyone who overtly manifest a need. Additionally, the person making the profit endures more frequently pressure from the community aiming to avoid social demarcation and respect the social and political egalitarianism. It is also possible that this form of wealth balancing is linked to the question of social status and prestige that good hunters might seek. Among the Baka, I observed that the acquisition and accumulation of items do not seem to generate prestige. Contrarily, sharing meat appears as an important condition to acquire status. Money from bushmeat commercialization is often rapidly spent in food for the household and for the family-in-law, as well as in cigarettes and alcohol, extensively distributed. Individuals who earn money but rarely shared are badly perceived. It is now an open question to see whether, as the consumption of market goods becomes more general, material wealth might become a source of status for the Baka, as other authors have seen in other societies (von Rueden et al., 2011 ; Hill &Hurtado, 1996).

Cultural and social incentives: Hunting in foraging societies often confers a special social status (Wiessner, 1996; von Rueden et al., 2011). Similarly, among the Baka, shotgun hunters are often considered “the best hunters” because they master all techniques (a good shotgun hunter is said to first have been a good spear hunter). They are perceived as more efficient, being able to kill larger and more culturally significant species (see Reyes-García et al., 2016a). Consequently, prestigious

shotgun hunters clearly exercise a powerful fascination over young men and adolescents who seem to neglect traditional weapons. Thus, the emergence of specialized hunters with a higher integration into the local market economy might be seen as a viable and socially recognized alternative livelihood for young Baka. In that sense, they might attempt to be acknowledged by the community through the strong symbolic status of meat, and/or outside of the community, in terms of friendly and trusting relationships with Nzime or foreigner poachers and meat traders.

Limiting factors: However, access to shotgun by the Baka is limited by strong social and economic factors. The cost of a firearm is often too high for the Baka, the small number of shotgun possessed by them in the area consists on damaged, and often dangerous, firearms obtained through local partners in exchange of work in elephant hunting or in cacao plantations. Then, most Baka hunters remain highly dependent on non-Baka people for the use of shotguns, which they typically borrow in exchange of money or meat. In addition to this dependence, multiple barriers to adopting shotgun hunting are mentioned by the Baka: fear of anti-poaching controls (using shotgun without permit being forbidden by the hunting regulations), fear of conflicts with the lender (dishonesty, lack of trust), physical risks (accidents with old weapons), and lack of skills and experience. Those limiting factors are evidently a significant trait to consider in the needed differentiation between Baka hunters and non-Baka hunters in terms of their pressure on local wildlife.

5. Conclusion

This study shows the relevance of studying variations in hunting practices in relation to individual variations of economic, social and technological characteristics. Among the Baka, snare trappers and traditional hunters have a relatively low hunting efficiency, which might result in low impacts on wildlife. On the other side, shotgun hunters, encouraged by external economic incentives that drive them to provide bushmeat for the illegal bushmeat trade, have a higher hunting efficiency for which they are potentially more harmful for local wildlife. Neither shotgun nor wire snare are new hunting techniques for the Baka, although their relative generalization and their interlocking with the booming bushmeat trade is. However, the changes in hunting patterns have to be perceived as part of a cultural adaptation of the Baka communities, a perpetual recomposing including new technical and economic stakes rather than a break and a discontinuity in the evolution of Baka culture, as already proposed by Leclerc (2012) for the case of agriculture. As commercial hunting is spreading extensively in the Congo Basin, it is legitimate to ask how new practices, concerns and individual status are integrated within the society without bringing deep changes in the social organization.

The complexity of economic and symbolic relations between ethnic groups in the study area needs to be taken into account in further studies. Such distinctions might imply strong variations in the hunting patterns and pressures as a recent study highlights the importance of differentiate “Pygmy” and “non-Pygmy” groups in their hunting pressure and species targeted (Fa et al. 2016). While some conservation policies in the Congo Basin have been drawing attention towards subsistence hunting, it would be also important to focus on the differentiated impact of the various techniques used and how they relate to different levels of market integration. Understanding local perceptions of hunting and individual variations in uses of resources might allow improving efforts for sustainable hunting practices.

Chapter 5

Between consumption and trade: The importance of wild meat for the Baka

1. Introduction

In anthropology, food knowledge and practices are considered a « *fait social total* » (Mauss, 1950 [1923]) as they capture social, cultural, economic, and ritual elements of a society (Garine, 1972). In that sense, the analysis of food culture might provide critical elements to understand sociocultural dynamics. Food knowledge and practices are not only of biological and nutritional importance, but they also allow to satisfy psycho-cultural well-being, as foodstuffs are elements good to eat as much as to think (Lévi-Stauss, 1962: 128). Given the strong social and symbolic value that Central African populations - and notably hunter-gatherer societies such as the Baka - attribute to wild meat, wild meat can be certainly studied from such perspective.

In the Congo basin, food is an everyday concern and its acquisition and transformation often structures many of the activities of a human group (Bahuchet et al., 2000). Agriculture provides the basis starchy food (calories), while forests provide proteins and other important elements of the diet such as micronutrients. Meat of wild animals, commonly referred to as bushmeat, represents the main source of protein for local people in the region (Froment et al., 1996; Bachuhet & Ioveva, 1999; Cawthorn & Hoffman, 2015) and plays an important role in terms of dietary diversity (van Vliet & Mbazza, 2011) and health (both for its zoo-therapeutic uses and for symbolic and cultural reasons) (Motte-Florac et al., 1996; Ichikawa et al., 2016; van Vliet et al., 2017). The subsistence strategies are also based on the types of food selected, i.e. on cultural preferences, and the complementary between agricultural and wild products (Garine, 1993).

Beyond local consumption, wild meat products are increasingly becoming a vital component of the regional and national economy, their sale becoming a growing source of income (Coad et al.,

2010). However, the increase of bushmeat consumption and more efficient hunting practices have pushed the harvest of wild animals to unsustainable levels, generating a "bushmeat crisis" (Nasi et al., 2008) that will undoubtedly threat food security in the future (Fa et al., 2015). The growing demand for bushmeat has created strong pressures and a lure of profit on all groups of southern Cameroon to engage in (illegal) bushmeat commercialization. As local people become involved in bushmeat commercialization, cash income from the sale of wild meat becomes a non-negligible source of revenue, being considered a safety net for forest populations (van Vliet et al. 2010) or a way to cover punctual needs, such as school fees, party, funerals (Fa & Brown, 2009; Allebone-Webb, 2008). However, scholars have shown that, at least for the Baka, money is also largely spent in very cheap and low-quality alcohol, with growing cases addiction (Oishi & Hayashi, 2014; Townsend, 2015). Finally, the commercialization of bushmeat might be affecting local diets in two different ways. First, it might be reducing the amount of protein consumed, as meat sold away does not enter in the household diet. Second, it might allow the incorporation of new elements in the diet, as income from meat trade might be transferred for expenses in new types of foods.

Previous research has already focussed in different aspects of Baka food resources: the adoption of agriculture and its impact in Baka social organization (Leclerc, 2010; Kitanishi, 2003; Dounias & Froment, 2011), the wild yams management (Yasuoka, 2009; Bahuchet, et al. 1991; Dounias, 2001) or the dietary cultural norms (Joiris, 1996). However, if data exists for other Pygmy groups (Dounias, 1987; Bahuchet, 1988; Bahuchet, 1990; Koppert et al., 1996), the specific role of bushmeat in Baka diet and income has not been so deeply explained. Moreover, nowadays, the topic needs to be examined within the current context of rapid change. Changes such as the adoption of agriculture, changes in mobility patterns (Leclerc, 2010), local defaunation (Fa & Brown, 2009; Bobo et al., 2014), and the arrival of monetary exchanges have impacted Baka practices and uses, including the introduction of a cash economy (i.e., cash crop, commercial hunting, and wage labour) and new forms of expenses (non-local or industrial food, or alcohol and cigarettes) (Kitanishi, 2006; Oishi & Hayashi, 2014). This chapter attempts to look at Baka relation to wild meat using an ethnoecological perspective and bringing together the sociocultural value of meat and its economic importance.

1.1. The cultural value of wild meat in the Congo Basin

Wild meat is the most valued food in Central Africa (Ichikawa et al., 2016). As mentioned, the transfer of wild meat from rural areas to cities is an important driver of the bushmeat crisis. Meat of wild animals, notably mammals, is highly appreciated both in rural and urban areas and among all social classes (Nasi et al., 2011). Considered as a symbol of power and prestige, wild meat is highly demanded by city dwellers who through its consumption keep a symbolic relation with the forest (Ichikawa et al., 2016). Wild meat is also an element of prestige, notably for ruling classes who, in important meetings, require the presence of this highly-valued meat, which sometimes include protected species illegally obtained (Bennett, 2009). The symbolic status of wild meat slightly differs in rural areas, where it is more available. In rural areas, the association to wild meat is rather related to the relation between animals and forest spirits and to the social norms of sharing. The high symbolic

value conferred to meat is reflected in the fact that in most Central African languages the terms for « wild animals » and « wild meat » are the same (Chardonnet, 1995).

Bushmeat consumption also contributes to mental wellbeing. In Central African rainforests, the local diet is characterized by the absence of a lean period, but researchers have documented a qualitative modification of the diet along the year (Garine, 2000) with a psychological trauma corresponding to periods characterized by « meat hunger » (Pagezy, 1982; see also Bahuchet, 1985; Thomas, 1987; Garine & Pagezy, 1990). In southeastern Cameroon, every group has its own term to refer to "meat hunger": **kbokaku** among the Bangando (Kimura et al., 2012), **zoo** among the Bakwelé (Oishi, 2010), and **pene** among the Baka (Bahuchet, 1992; Brisson, 2010). "Meat hunger" is an interesting phenomenon linking culture and physiology, through which the cultural perception of lack of meat negatively influences wellbeing by generating stress, tiredness, or depression (Garine & Pagezy, 1990; Pagezy, 1982).

1.2. Meat avoidances among Central African hunter-gatherers

In the current context of wildlife conservation, there is a need to understand whether social institutions such as food taboos contribute to wildlife intentional or unintentional preservation (Colding & Folke, 2001; Alvard, 1993). Among the Baka, food avoidances, understood as personal decision to not consume some foods, are common. On the contrary, food prohibitions, understood as the social pressure to not consume some foods and typically associated to some form of punishment for those who do not obey, are less common.

Food avoidances have been studied among different hunter-gatherer groups of the Congo Basin (e.g., the Mbuti, the Efe, the Aka, and the Baka), several of them being widely shared (Ichikawa, 1987; Terashima, 2001; Takeuchi, 2013). Most food avoidances concern wild animals, and notably mammals, and systematically link specific conceptions of animal power and human health and reproduction. Thus, for many African human groups, the consumption of certain wild animal species is associated to severe illnesses (Garine & Hladik, 1989). Among the Baka, the Aka, and the Mbendjele meat proscriptions are referred to through the notion of **kìlà** (Lewis, 2008; Bahuchet, 1985; Thomas et al., 1993-2014) and through the notion of **kuweri** among the Mbuti (Ichikawa, 1987; 1996). Food avoidances allow for the establishment of a complex system of individual and group care (Motte-Florac et al., 1996). Meat avoidances are structured around 1) the species and its representation, avoidances being often based on a metaphoric or metonymic logic relative to animals' phenotypical or behavioural attributes (Levi-Strauss, 1962) and 2) the characteristics of the individual who must avoid the consumption (i.e., life stage, activity, or biophysical state such as pregnancy). Avoidances can be either temporary or permanent, and although only few animals are systematically refused, most animals considered as edible might be avoided at some point (Ichikawa, 1987; Bahuchet, 1985; Motte-Florac et al., 1996).

This chapter is structured in three parts following the three interconnected components of wild meat for the Baka. In the first part, I detail the social and cultural relevance of wild meat in Baka society through the existence of social norms regarding avoidances and preferences. In a second part, I give an overview of how different species of wild meat are differently consumed by individuals. And in the last section, I place meat in the broader local context of the economy of hunting and the bushmeat market, analysing the way in which the Baka sell bushmeat and how this activity contributes to their economy.

2. METHODS

2.1. INTERVIEWS AND OBSERVATION

I conducted semi-structured interviews to gather information on meat avoidances and preferences. I asked 20 people to report any animals they personally refuse to eat and the reasons why. The open question was asked as follow: "What are the game you personally don't eat?" [43]. Once the person finished listing, for each animal reported I asked "why you don't eat X?" I specifically asked about animals "*that you don't eat*" rather than about animals *"that the Baka do not eat"* to obtain a more personal appreciation of the relation between the concepts 'animal' and 'meat'. I also asked about meat preferences using the question "Which game do you prefer to eat?"[44] Results were analysed using the free-listing methods. I used the Saliency Index to examine the significance of each species through their occurrence. Finally, I also interviewed 10 hunters regarding their implication in local meat trade, market exchanges, way of selling, local prices of bushmeat, seasonality of trade, and use of money received from bushmeat selling. During fieldwork particular attention was put on bushmeat cooking and consumption. It consisted notably of open discussions and observation of animal butchering, meat sharing, and practices associated to specific species or animal parts.

2.2. SYSTEMATIC DATA COLLECTION AND ANALYSIS

From August 2012 to August 2013 Sandrine Gallois and myself collected dietary diversity data twice a quarter. We asked each adult in the sample to report all the food items eaten the day before the interview, from the first thing consumed in the morning to the last thing consumed before sleeping. After having obtained the information related to the two main meals, we asked them to recall any small amount of food consumed between meals (e.g., fruits, seeds, drinks, alcohol, or sweets). We also asked for the condiments composing the meals (e.g., chilly, salt, aromatics). We did not ask about the quantities, but we recorded whether the food items had been bought or acquired without trading or

[43] **né te nOO so ke, nga mO, mO nde a jO ?**
[44] **na kambia so, nga mO, mO a yé a jO ?**

from sharing. For each meal including meat, we asked to report the animal species[45]. Although we recorded all food items consumed, for the scope of this research I only analyse animal products.

Data consisted on 2,377 days of observation collected among 266 adults ranging from 16 to 75 years of age (mean 34,8 year). Among them we recorded data for 149 women and 117 male, with an average of 5 observations per individual. I calculated the share of days that an individual consumed meat from the total number of days the person was observed. I did the same calculation for fish, just for comparative purposes. To have an estimation of meat consumption by age, I generated seven age categories (16-24, 25-34, 35-46, 45-54, 55-64, and 65 years old and above). Meat consumption was also analysed according to seasonality. As hunting and fishing are highly gendered among the Baka (Gallois & Duda, 2016), I analysed the share of meat and fish in diet separately for men and women.

We also collected data on cash income obtained from the sale of products, including game. Once a quarter, we visited each household and asked each adults about all revenues obtained in the two weeks prior the interview from selling, and the description of the products sold (e.g., species). We asked informants to report the value of each product sold, and aggregated the value of products into the following categories: bushmeat, wild plants (e.g., seeds, leaves), crops (e.g., plantain, cassava, cacao), ivory tusks and pangolin scales, traditional items (e.g., baskets, axe, mats), modern items (e.g. alcohol, cigarettes), domestic animals (e.g., puppies, hens), honey and mushrooms.

3. Results & Discussion

3. 1. The socio-cultural components of bushmeat consumption: Avoidances and preferences

In this first part, I describe and examine the social and cultural components of wild meat as part of the Baka diet by focusing on two criteria that might possibly affect diet composition: (1) meat avoidances and (2) personal preferences and taste perception.

3.1.1. A juxtaposition of avoidances

The Baka consume most animal species they can find in the forest, except a few nocturnal birds and the leopard. However most edible species might also be subject to temporary or permanent

[45] Meat bought and monkeys (often reported under the categoric name **kémà**) were difficult to identify at the species level.

restrictions. Temporary avoidances, mostly related to an individual life stage, health status, or hunting activity affect individuals' dietary choices, whereas permanent restrictions are related to the lineage totemic identity. Beyond the already well-studied avoidances linking pregnancy/new-born and animal transmitted illnesses among other Pygmies groups (Thomas et al, 1993-2014; Terashima, 2001; Lewis, 2008), several other forms of avoidances co-exist.

Table 5.1 lists the species most often avoided by the interviewees. Interestingly, the most avoided species are apes, chimpanzee, and gorilla, followed by a wide diversity of species, from buffalo to otter and crocodile. The reasons invoked for avoidances range from similitude of the animal with humans, to disgust of their bad smell, or relation with sorcecy or spirits. Drawing on my own observations and informal discussions as well as some information found in the literature (Terashima, 2001), I argue that circumstantial avoidances are the most recurrent and concern a large number of mammals, however reflecting the question asked to the informants ("What are the games you personally don't eat?"), Table 5.1 does not present animal species avoided for circumstantial reasons related to life stage, called **kìlà** (or **mòkìnda)**, nor strict taboo, but rather the animas that people not to eat, in order to evaluate other forms of avoidances.

Table 5.1. Ranking of avoided species[1] and reasons for avoidance

Rank	English name	Scientific name	**Vernacular name**	**Number of reports**	**Saliency Index**	**Reasons for avoidance**	% of catches in hunting survey (12 months)
1	Common chimpanzee	*Pan troglodytes*	seko	11	0.405	Human-like apparence	0
2	Lowland gorilla	*Gorilla gorilla*	ebobo	7	0.263	Human-like apparence	0.35
3	Domestic pig	*Sus scrofa domesticus*	pame na gba	6	0.221	domestic / eat human wastes	(domestic)
4	Yellow-back duiker	*Cephalophus sylvicultor*	bemba	5	0.158	bad smell	0.52
5	Aardvark	*Orycteropus afer*	kpinya	5	0.153	"bad animal", human-like skin	0
6	Servalin genet	*Genetta servalina*	jama	3	0.038	bad smell	0
7	African buffalo	*Syncerus caffer*	mboko	3	0.083	bad smell	0
8	Spotted-neck otter	*Lutra maculicollis*	londo	3	0.088	bad smell	0
9	Blackfooted mangoose	*Bdeogale nigripes*	buse	2	0.027	bad smell + resemblance with dog	0.17
10	Bosmans potto	*Perodicticus potto*	katu	2	0.050	bad smell + illness if pregnant or new born	0
11	Gabon Talapoin	*Miopithecus ogouensis*	kema na ngo	2	0.070	illness if pregnant or new born	0
12	Nile crocodile	*Crocodylus niloticus*	mokwakele	2	0.058	cause illness	0
13	All night owls	(category)	esukuli	2	0.088	"bad animal", sorcery	0

3.1.2. Representations of illness transmission: pregnancy and new-born vulnerability

Among the Baka meat is indeed eaten with prudence and anxiety given that consumption of animals might be considered as dangerous and causing specific illnesses. Names of illnesses are often referred to as "illness of the [name of the species]", e.g., **kò na kùnda** (illness of the turtle). The circumstantial avoidances are hallmarks in individual life stages and collective life. Temporary avoidances mostly concern young couples in reproductive age and the fœtus or the new-born, as more proscriptions are in place between pregnancy and the end of weaning. Walking children and postmenopausal couples are less subject to meat avoidances. Among the trio husband/wife/new-born, this latter is the most vulnerable, as it is considered that a new born has not accumulated enough energy to eat wild meat. This reason added to the reproductive factor, makes that the elders are the least threatened by the potential danger of meat eating and they eat almost all species. Everyone is free to respect or not these prohibitions, as transgressing them only implies a risk for the individual or the couple with the baby. Arrangements with social norms might always be found, and similarly to the Aka (Thomas et al., 1993-2014), the Baka keep a little piece of the animal eaten (skin, bones, feathers) to prepare a remedy in case an illness attributed to the consumption of the species occurs.

Proscriptions are often related to behavioural or morphological analogies between the animal and the illness's symptom, following a metaphorical causality. Thus, eating an animal with spotted skin, such as the genet, might cause skin problem in children, and eating a crawling animal might cause problems in learning to walk. Hunter's behaviours and hunting techniques are also concerned by these analogies principles. Thus, a woman's difficulties during delivery might be explained by the consumption of an animal trapped in a neck-snare. In the same line, during his wife pregnancy, a hunter should not introduce his hand in the nest of a hornbill, as in doing so he breaks the mud wall that the male hornbill made to enclose the female during the brooding. This might cause problems during delivering, or abnormalities of the baby. The relation between the animal ethology or morphology and the hunter's behaviour is justified by the Baka by the fœtus' and the new-born's capacity of imitation and propensity to copy. The following example provided by a Baka man supports this idea.

> *« When the baby is in the belly of the mother he/she is able to see everything and he/she mimicries it. That is why the rat has to be pulled out of its hole by the head and not by the tail, otherwise the baby will see that and will come out in the wrong position during delivery »* [A.S., male, 37 years old, MB village].

3.1.3. Apes "complicated meat"

Half of the 20 individuals interviewed about food avoidances reported not eating chimpanzee nor/or gorilla. However, the reasons of this avoidance did not constitute a strict social norm, as others members of the community (both old and young, men and women) referred to these animals as their

favourite meat (Table 5.3). Contrarily to most other mammals, no illness seems to be attributed to chimpanzee or gorillas (Sato, 1998; my observations). Rather, people refusing to eat apes invoke these animals' propinquity to humans, stating they are person-like both in shape and behaviour. Talking about the chimpanzee, some Baka reported that *« it has hands like humans »* or that *« it has the same skin as humans».* Moreover, the Baka consider the gorilla and the chimpanzee as clever as humans, being able to use tools and even to lure, trick and attack humans.

More than any other species, apes are linked with humans because of behavioural and morphological similarities. As already observed in the literature referring to other societies of southeastern Cameroon (Kölher, 2005; Giles-Vernick & Rupp, 2006; Oishi, 2013), the gorilla and the chimpanzee are special animals because they are thought to be related to humans through reincarnation. While the Baka have the possibility to reincarnate into chimpanzee after death, and the gorilla might be a reincarnation of a Nzime (similarly to other areas: for Bakwele see Oishi, 2013; and for the Njem and Fang see Köhler, 2005). Also, both groups use the terms gorilla and chimpanzee to represent eachother negatively while they teasing. However, refusing to eat apes does not mean not killing them.

> *« I do not eat chimpanzee nor gorilla, they can be humans, you never know. When I killed a chimpanzee, I ate the intestines and sold the flesh to the Nzime. Sometimes when a person dies, before burying the body, the person becomes a chimpanzee and flees into the forest. I saw that already* ». [V.K. 46 years old, MB village]

If apes are the animals with most proximity with humans, the consumption of other animal species is also avoided because of the proximity of one of their physical attributes with humans. For example, the consumption of the Aardvark (*Orycteropus affer*) is reportedly avoided because to the resemblance of its skin's texture with human's skin (pale yellowish-grey with short hair). Similarly, mangooses consumption is sometimes refused due to their resemblance with the dog. Some people also refuse to eat birds whose singing reminds the human voice, such as parrots, because of their supposed relations with spirits.

3.1.4. Illnesses and personal "allergies"

Meat avoidance might also be caused by a personal experience after which the individual decided to stop eating a certain type of meat. For example, an adult might refuse to eat an animal species not eaten during childhood. After weaning, most parents often give to their children a large diversity of meats to seek for specific reactions between the child and the animal. Adults might then avoid eating species they did not taste during childhood as they consider that this consumption might generate illness in a form of symbolic rejection, such as vomiting. The fact that parents test different types of meat to assess children's reactions is believed to create a symbolic immunity. During adulthood, the individual who gets sick might explain the illness by an absence of reaction test during childhood. This phenomenon of avoidance is interesting by its similitude with what Colin Turnbull remarked among the Mbuti and describe as a type of personal allergies (Turnbull, 1965).

3.1.5. Taboo, disgust, and animal symbolism

Animals considered as « bad animals » (“*siti so”*) are permanently avoided. This is the case of the night owl, considered a sorcerers’ tool and the « bad animal » par excellence, along with the leopard. Seeing or hearing a night owl might be a sign of death.

Animals considered as bad and generally avoided are such because they appear as “anomalies” in the local classifications systems (Ichikawa, 2007, see also Sperber, 1975). For example animals having a bad or strong smell, tend to disgust people who conside that as an anomaly. For this reason, mangooses, yellow-back duikers, genets, otters, and buffaloes are not really appreciated and are rather often avoided. As among the Aka (Thomas et al., 1993-2014), among the Baka the materialist justification of this avoidance (i.e., the bad smell) originates in the idea that the animal smell might be a potential source of illness transmission through aerial contamination. Anomalies might also be morphological or behavioral and related to spirits, such in the case of the aardvark, the otter or the crocodile (Table 5.1), which are living, such as spirits, at the interface of two spaces (water and ground, or ground and underground). This is also the case for animals whose categorisation is often blurred (such as bats, and flying squirrel for instance)[46]. As reported by Ichikawa (2007), the animals are mediators between humans and the spirits world, they therefore carrying in themselves this duality, and whose the “bad” aspects are feared by the Baka to be ingested during their consumption.

3.1.6. Domesticity

Domestic animals are excluded them from the category of animals “good to eat” precisely because of their spatial proximity to humans. In a way, domestic animals are not wild enough to be eaten. This representation often implies a conception of purity in which forests are opposed to villages, where human waste accumulates and might be a source of food for straying domestic animals. The pig[47] is the animal most systematically refused for such symbolic and sanitary reasons (see Table 5.1), but other animals such as goats, sheeps, and cows are also avoided. Although the Nzime and other non-Baka peopledo not refuse the consumption of domestic animals, they contribute very little to the daily diet and are mainly reserved to social and festive events (e.g., the visit of a guest, a dowry payment, or meeting for mourning or wedding) (Bahuchet, 2000). The chicken is the only domestic animal to have such role for the Baka, often being given or received in the context of mourning or funerals to the family of the deceased. Hens are also part of Baka wealth, as they might be used for exchanges with non-Baka. Indeed, all across south-eastern Cameroon, before the generalization of money payment, local populations had to pay offenses against the customary laws by giving chicken (or muttons). This

[46] In parallel, the mythical animals, are in the Baka thought precisely hybrids, it is especially the case of the **yoli**, a mythical serpent attacking humans with the aid of a dart of bee, bearing a crest of cock and living near the water.
[47] Pigs are said to have arrived in the Messok district in 1963-1964 by a clerk coming from Abong-Mbang.

practice is still in use. I identified several gifts of chickens as payment of the fines imposed by the traditional Nzime *chefferie,* by the eco-guards, or by the police. In such context, what might look like a form of corruption is in fact locally perceived as an adaptation to the lack of cash. However, hens are more consumed by young people, whereas elders continue the avoid the consumption of domestic animals[48].

3.1.7. Lineage's names and "totemic" avoidance

Among all the types of food avoidances studied by anthropologists, the totemic avoidance, a permanent avoidance, is the easiest to isolate. Among the Baka, everyone belongs to his or her father's lineage, called **yée-**, whose name makes reference to a non-human being. Lineage belonging often implies the prohibition of consuming this species.

A total a 14 lineage names were collected in the studied villages. Adding the lineage's names reported by Robert Brisson (2010), we count 35 lineage names in south-eastern Cameroon[49]. In Table 5.2, I examine the meaning of the lineages' names according to their potential impact on food restrictions. A wide diversity of life forms is represented ranging from mammals, to lianas and insects. Some lineage names also refer to valued cultural objects (e.g., knife, honey basket or drum). In sum, among these names, 14 names correspond to animals (including 11 mammals), 8 to plants, 4 to honey gathering techniques, 4 to material culture, and 4 to others elements. Before all, the fact that not all lineage names correspond to natural resources suggests that this social norm might not have been created to preserve specific species from extraction.

An important consideration to be made is whether animals that name lineages are consumed by Baka outside the lineage. When contrasting the names of the lineages with information from hunting interviews (see Chapter 4), it appears that lineage animals are not the most frequently killed. I identified four species whose named a lineage while they might be consumed at some point: the bongo, the Gabon viper, the Marsh mangoose, and the Crest mona monkey, however, except the latter, these lineages were not present in the studied villages. Also, two names correspond to specific categorisation of culturally important species but not the entire species: **yée-ndonga** (referring to solitary male gorilla) and **yée-koambé** (referring to solitary male elephant).

I observed no rituals nor specific practices or beliefs related to the **yée-** name When looking at the meaning of each lineage's names, taking into consideration that the few edibles species mentionned are finally rarely consumed, the effect of lineage's name over people's behaviour seems null. Moreover, according to interviews it appears that there is no consensus about strict avoidance animal naming a lineage. Finally, people also reported that there are always remedies to prevent potential harmful effects of the consumption of a species that should have been avoided.

[48] To celebrate my returns or visits to forest camps, a hen was sometimes specially killed for the meal, but I remained the only one to eat some.
[49] Obviously, some patrilineages are more represented in certain areas than others.

Table 5.2. Patrilineage's name and potential effects on diet

	Lineage name	Meaning	Category	Impact on diet	Reason
Lineages present in the studied villages	yée-mboko	African forest buffalo	Mammal	Reduced	Rarely hunted
	yée-koambe	Male elephant who walk alone	Mammal	No	Rarely hunted
	yée-likemba	Mushroom **tokpoli**	Mushroom	No	Rare
	yée-macombo	Umbrella tree **kòmbò**	Tree	No	Not consumed
	yée-mambe	Crested mona monkey	Mammal	**Yes**	Hunted
	yée-mombito	Fruit of **maakpa** (undet.)	Fruit	No	Not consumed
	yée-mongbelé	Pollen of the honey **dandu**	Honey gathering	No	Not consumed
	yée-njembé	Liana similar to **kusa** (undet.)	Liana	No	Not consumed
	yée-ndonga	Solitary gorilla	Mammals	No	Rarely hunted
	yée-ndumu	Traditional Baka drum	Material culture	No	Object
	yée-ndongo	Other name of **ndumu drum**	Material culture	No	Object
	yée-esilo	Liana	Liana	No	Not consumed
	yée-wala	Mice	Mammals	No	Rarely hunted
	yée-yanjì	Fire packet for bees	Honey gathering	No	Object
Additional lineages collected by Brisson (2010)	yée-bombi	(Unidentified)	-	-	-
	yée-basala	Other name of the big bat ngbee	Mammals	No	Not hunted
	yée-guga	Tree *Alstonia boonei*	Tree	ND	ND
	yée-kémà	Category for monkeys	Mammals	**Yes**	hunted
	yée-kusa	Liana *Manniophyton fulvum*	Liana	No	Not consumed
	yée-kpotolo	"who fear the ground"	Other	No	-
	yée-làmbà	Knife's edge	Material culture	No	Object
	yée-mokumù	Other name of the snake **ngeke**	Reptile	ND	ND
	yée-mopanjé	Insect (undet.)	Insect	No	Not hunted
	yée-mbongo	Antelope bongo	Mammals	**Yes**	Hunted
	yée-mbùmà	Gaboon viper	Reptile	**Yes**	Hunted
	yée-nganda	Marsh mangoose	Mammals	**Yes**	Hunted
	yée-ngila	Stick used to beat people	Material culture	No	Object
	yée-pendi	Honey basket	Honey gathering	No	Object
	yée-polo	Demidoff's galago	Mammals	Occasional	Not hunted
	yée-esolo	Natural spring	Environment	No	Not hunted
	yée-sua	Leopard	Mammals	No	Not hunted
	yée-tondo	Fruit of African ginger **njiyì** *Aframomum sp.*	Fruit	Yes	Not consumed
	yée-tòngyà	Bee *Apis mellifera*	Honey gathering	No (indirect)	Not eaten
	yée-wondo/mbunù	Groundnut	Crop	**Yes**	Consumed
	yée-yoli	Mytical snake	Reptile Mythology	No	Mythical species

3.1.8. Taste preferences

Table 5.3 lists the favourite animal species reported by a sample of 20 Baka (average length of the list: 5; number of items elicited: 19). Small-sized mammals, such as the brush-tailed porcupine, the tree pangolin and the blue duiker are the most preferred and the most hunted (Chapter 4).

Three species were listed as appreciated, but were almost never hunted in the studied villages: the red river hog, the giant pangolin, and the elephant. Informants reported that they appreciated these three species because of the amount of fat in their bodies, notably the red river hog and the elephant. However, although the elephant is recognized by the Baka as the game « by excellence », it is not considered as the best meat, moreover, most informants mentioned that they do not have the opportunity to eat this meat anymore. Moreover, when probing about their favourite meat, people seem to think first to the commonly available meat. This tendency has already been reported by Kümpel (2007) who found that bushmeat preferences are largely related to availability.

Table 5.3. Ranking of preferred species[1]

Rank of preferred species	English name	Scientific name	Vernacular name	Number of report in preference lists	Saliency index of preference lists	% of catches in hunting survey
1	Brush-tailed porcupine	*Atherurus africanus*	mboke	17	0.620	8.64
2	Tree pangolin	*Phataginus tricuspis*	kokolo	11	0.394	2.76
3	Red river hog	*Potamocherus porcus*	pame	11	0.372	0.52
4	Blue duiker	*Philantomba monticola*	dengbe	9	0.311	27.63
5	Peter's duiker	*Cephalophus callipygus*	ngendi	8	0.278	4.84
6	Giant pangolin	*Smutsia gigantea*	kelepa	8	0.190	0
7	Forest elephant	*Loxodonta cyclotis*	ya	6	0.164	0
8	Bay duiker	*Cephalophus dorsalis*	ngbomu	5	0.135	1.55
9	Lowland gorilla	*gorilla gorilla*	ebobo	4	0.089	0.35
10	(all monkeys)	/	kema	3	0.043	11.92
11	African buffalo	*Syncerus caffer*	mboko	2	0.058	0
12	Water chevrotain	*Hyemoschus aquaticus*	akolo	2	0.034	0.17

3.2. Meat consumption

With its social and cultural importance, the value of meat for the Baka is also nutritional and economic. After obtaining some meat, both household heads evaluate and decide its fate according to the household's needs,: keep the harvest for consumption, distribute it as gift, or sell it (Bahuchet, 2000; Bahuchet & Ioveva, 1999). The numbers of animals obtained and their size usually condition how meat is divided among these three possibilities. As food sharing will be analysed in Chapter 7, here I will focus on wild meat for household consumption (this section) and sale (following section).

3.2.1. Seasonality in meat consumption

Along the year, adults consumed meat 25 % of the days observed. The big dry season (from December to mid-March) is the period when meat in diet peaks (meat reported in 31% of the diet observations), while the big rainy season (from September to November) and the short dry season (from July to August) are the periods with lowest meat in the diet (21% in both cases). According to the seasons, the share of meat bought slightly varies (from 2.63% of the total during the short dry season to 6.73% during the big dry season). However, the variation of meat coming from the market follows the overall variation of meat consumption (Fig. 5.1).

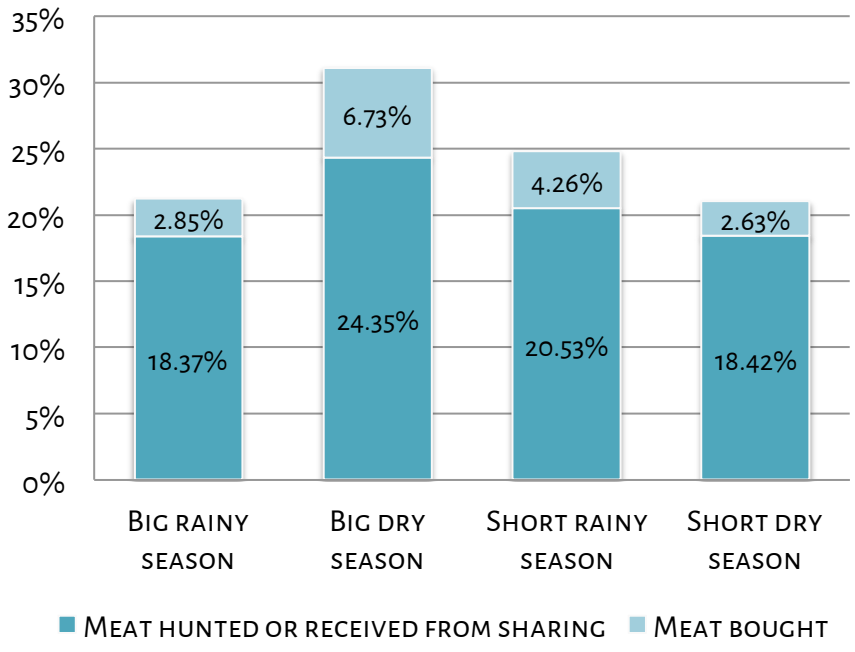

Figure 5.1. Percentage of days in which meat was consumed, by season

3.2.2. Gendered variations in meat and fish consumption

There is a gendered variation in meat consumption (Fig. 5.2). Globally, men report eating meat more often than women (reported in 28 % of the observations for men and in 22 % for women). These numbers however vary differently for men and for women across age categories. Adolescent and young men reported meat consumption more often than adolescent and young women (until 35). Between 35 and 54 years old, the trend is inverted, and men tend to have less share of meat than women in their diet.

Altough interesting in terms of general tendency, highlights potential viariations between age groups, these results are however difficult to discuss given they do not take into account the quantity of meat consumed, but considering only the fact of having eating some meat, whatever the quantity.

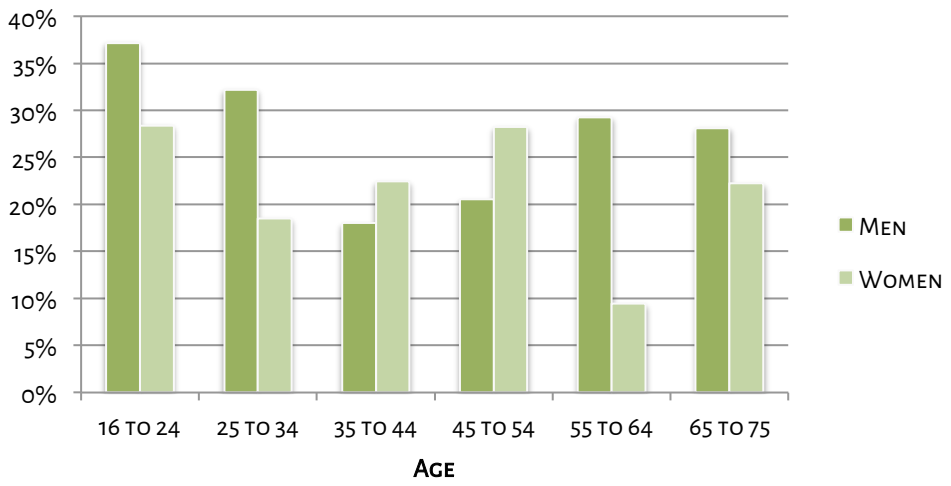

Figure 5.2. Percentage of observations in which meat was reported, by age and sex

I however compare these results with the consumption of fish and shellfish by men and women (Fig. 5.3). The overall number of days when fish was reported is much lower than meat (11%). Women reported having eaten fish in 12% of the observations compared to 10% for men. While the present results also show the limit not to consider quantity eaten, we might however observe that fish consumption other types of variations between men and women of different age categories. Notably, we observe an important decrease of fish consumption among men between 45 and 64 years old. The older people are interestingly the one who reported having eaten fish most often.

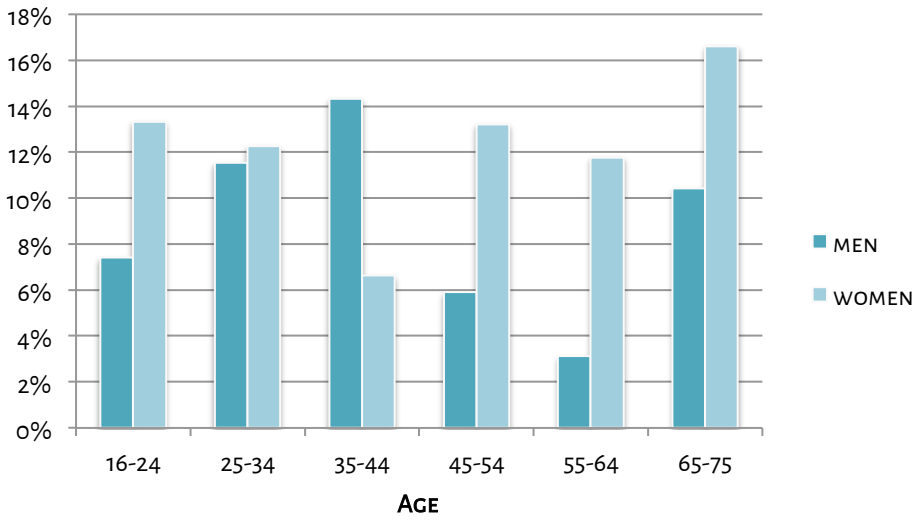

Figure 5.3. Percentage of fish and shellfish reported in observations/days according to age and sex

3.2.3. Species consumed

The analysis of adults' meat consumption suggests that the Baka consume a large diversity of species (see Fig. 5.4). Specifically, I report 19 species[50], ranging from the mouse to the elephant (Table 5.4). However, there is a great variation in the number of times each species appears. The most reported species is the giant-pouched rat (reported in almost 35% of the observations) and the blue duiker (16%). Thus, 90.6% of the animals reported belong to three taxa: rodents (rats, porcupines, and mice: 48.4%), ungulates (35.2%), and monkeys (7%), which, indeed, are known to be the three most important taxa consumed by populations of the Congo basin (Bennett & Robinson, 2000; Fa & Brown, 2009; Nasi et al. 2011). Species belonging to other groups are diverse but rarer, having been reported only between 1 and 5 times over the studied period.

The two most surprising results of the consumption data are the important share of rodents consumed, specially the giant-Pouched rat, but also the high frequency of mice consumption - a meat considered by the Baka as a "children meat" (Gallois, 2015) - in adult's diet. Interestingly, some of the most appreciated species (Table 5.3), such as the common pangolin, the giant pangolin, the red river hog, or the elephant are almost never consumed. Chicken is the only domestic animal consumed, although its consumption remains trivial compared to bushmeat.

[50] Mice species have not been determined and are included here as a one category.

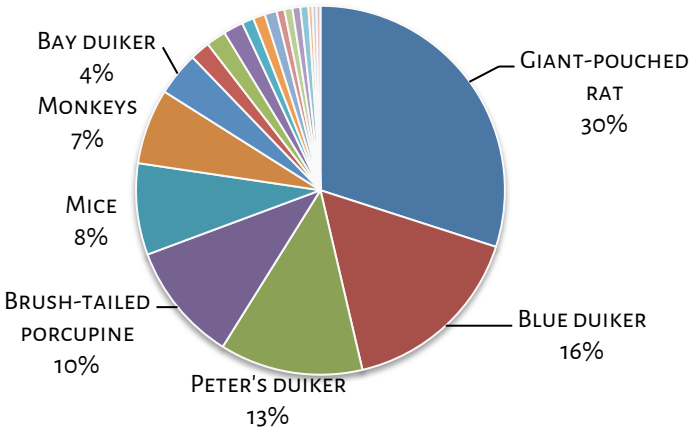

Figure 5.4. Share of species consumed by adults (except meat bought)

The Emin's pouched rat is consumed very frequently, something that has not been previously reported in the literature. Indeed, a comparison of data across the two villages shows that EL village counts for 76% of the total Emin's pouched rat consumed. This variation might be explained by differences in geographical location across the two villages: EL village is located closer to the regional market town (Lomié) and show a hunting harvest structure typical of highly degraded environment (high offtake of small-sized mammals, notably rodents), for which we might suppose that the importance of rodents in EL village's diet is the result of a higher hunting pressure in the past years. In contrast, in MB village the results might differ due to geographical location. Even if the share of small resilient mammals with high reprodutive rates (porcupine, blue duiker, rat) is high, hunters of this village have the possibility to go hunting in more remote area (better road access, displacement with logging trucks), and more with shotgun due to the proximity of the Nzime village. These conditions might explain the difference in hunting offtake and meat consuption between both villages.

Table 5.4. Frequency of consumption of animal species and hunting rates

English name of the species	*Baka name*	*Consumption frequency*	*Hunting rates*
Giant-pouched rat	gbè	86	27.81%
Blue duiker	dɛ̀ngbè	47	27.63%
Peter's duiker	ngèndì	36	4.84%
Brush-tailed porcupine	mbòke	30	8.64%
Mice (cat.)	bílì	23	6.91%
Monkeys (cat.)	kémà	19	11.92%
Bay duiker	ngbɔmù	11	1.55%
Tree hyraxe	yòka	5	0.35%
Marsh mangoose	nganda	5	1.21%
Situtunga	mbùlì	5	0.00%
African palm civet	mboka	3	1.38%
African Forest elephant	ya	3	0.00%
Hinge-back tortoise	kùnda	3	0.86%
Snail	bambe	2	0.00%
Tree pangolin	kokòlo	2	2.76%
Yellow-back duiker	bèmbà	2	0.52%
African civet	liabò	2	0.00%
Chicken	kòkò	1	/
Gabon vipera	mbumà	1	0
Lowland gorilla	eɓoɓo	1	0.35%

Picture 8 - Examples of species consumed by the Baka (Brush-tailed porcupine, Cercopithecidae, African Palm civet)

3.3. Traded meat: Baka involvement in bushmeat market

In this section, I focus on meat selling. I first describe the share of cash obtained from selling meat and the importance of different species in this trade. I then provide in-depth explanations on the functioning of the economy of meat characterized by various social and economic incentives influencing both hunting and economic decisions.

3.3.1. Prevalence of bushmeat in the Baka monetary economy

I obtained 722 observations from the two weeks recall of income sources. In 36% of the observations, informants reported at least one item sold in the past two weeks. Figure 5.6 represents the percentage of the total value provided by each category of products (sum of cash income per category).

For the Baka, bushmeat represents the main source of income from sales: 80% of the monetary value of products sold by the Baka corresponds to the sale of wild products, and 40% correspond to wild meat. The Baka reportedly sold 12 different game species[51], detailed in the next section. Income from bushmeat is followed by income from plants products, mainly *Pentaclethra macrophylla,* **mbalaka,** seeds and of *Gnetum africanum,* **kɔkɔ,** leaves. Ivory tusks and pangolin scales, two products sold for export, represent 5% of the income (although ivory contribution is surely underestimated). The sale of farming products and "other wild products", such as honey and mushrooms) does not contribute much to total income. The sale of domestic animals only include trivial sales of puppies and hens.

Figure 5.7 presents the contribution, in monetary value, of the different species sold over the studied period[52]. Duikers contribute the most (67%) to the total income from bushmeat sales. The Blue duiker, the most hunted duiker species, is the species that provides the most important monetary income for the Baka, followed by the Bai duiker, the Peter's duiker, and the Brush-tailed porcupine. Monkeys, all aggregated, contribute to 7% of cash income from the sale of bushmeat. Chimpanzee, although very rarely hunted, contributed to 5% of bushmeat sales, which is explained by its high value on the market. However, several informants reported that when a protected species has been killed, it is preferably consumed directly because of the difficulty to sell protected species on the market (notably the case for gorilla, giant pangolin and chimpanzee).

[51] Arboreal monkeys have been aggregated as some observations could not be identified at the species level.
[52] Game killed in the context of hunting "job" (i.e. hunting activity against wage and firearm lending) are not counted here as not consider as a sale of game, but as wage labour.

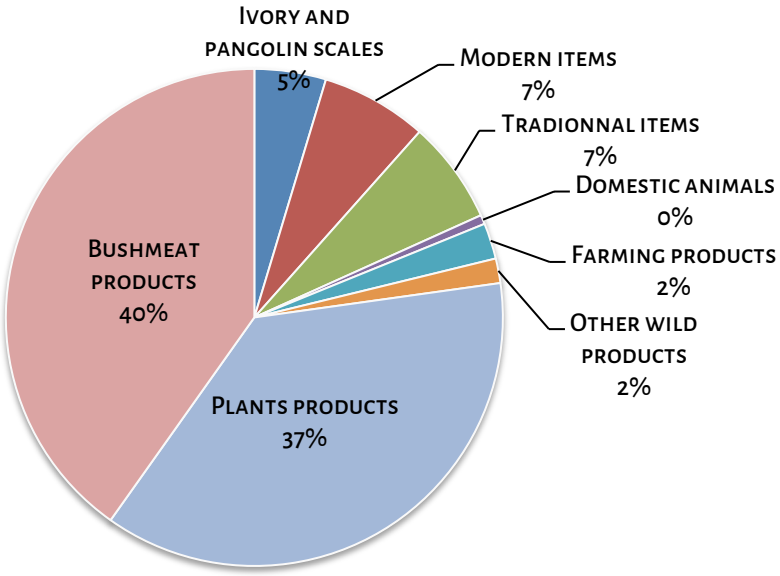

Figure 5.5. Contribution of bushmeat to income from sales, compared to others products

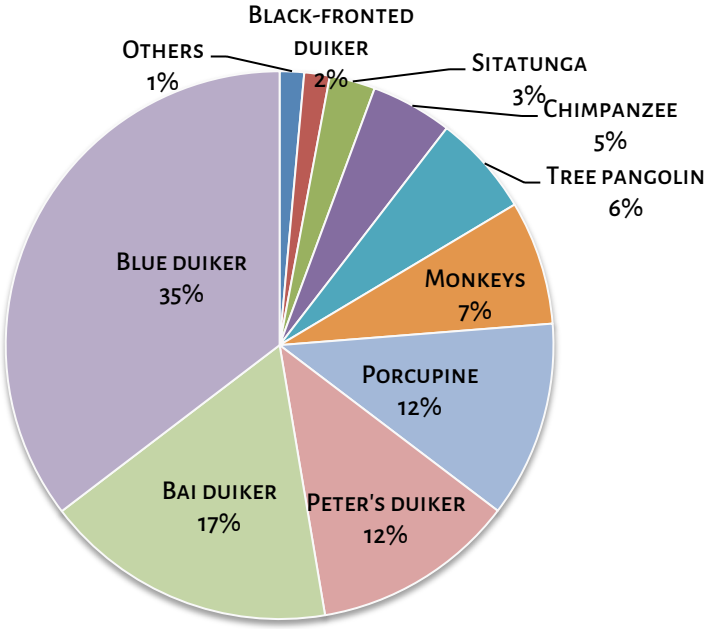

Figure 5.6. Share of income from bushmeat selling, by species

3.3.1. Hunting motivations: subsistence and economic needs

A hunting trip is often decided from one day to another, according to immediate needs and possibilities. Figure 5.8 summarizes the potential decisions a hunter and his household might take prior the hunt according to the motivation, i.e. hunting to either procuring 1) meat or 2) money. Typically, the weapon and the way the meat is procured systematically differ according to the motivation. This is specifically the case for shotgun hunters, who - according to the numbers of cartridges brought - have an idea of the number of potential game they might kill.

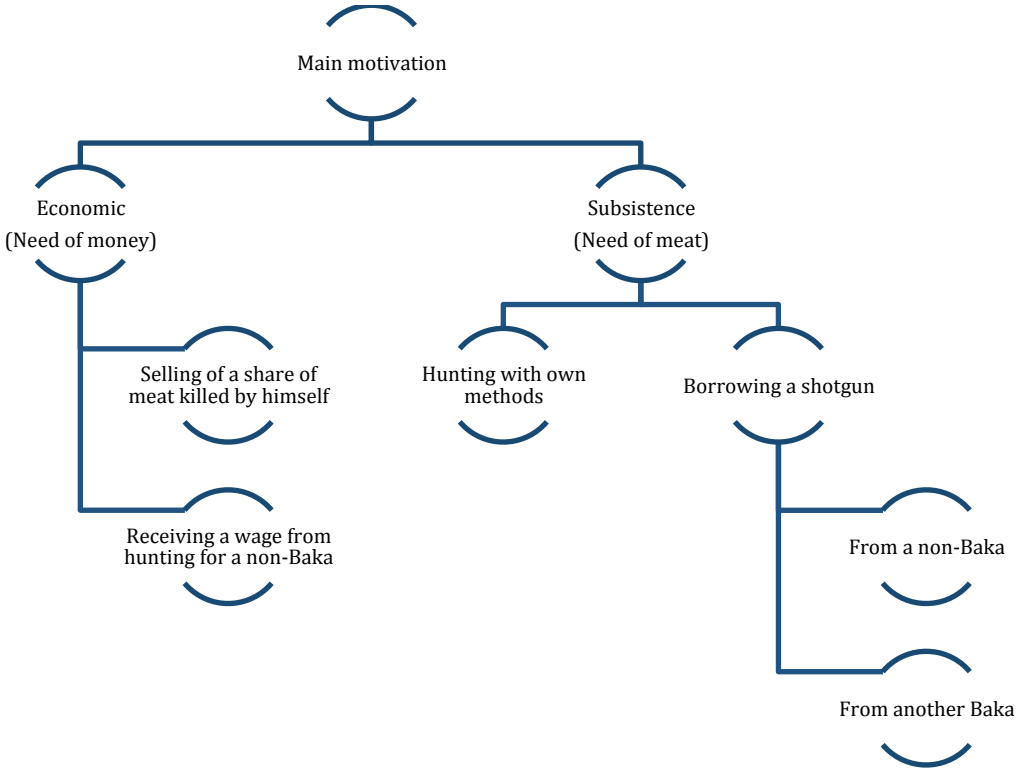

Figure 5.7. Hunting decisions from the Baka perspective according to motivations

1) When hunting for subsistence, the hunter can use his own weapons (spear, visiting snare traps, and more rarely shotgun) or borrow a gun either from a Baka co-resident or from a Nzime ally. The decision, however, is not always individual, and might be affected by social pressure and demand, notably by women who push the adult males to fulfil their role of "meat providers".

2) When hunting to acquire money to satisfy punctual expenditures (e.g., school fees, funeral, cooking items, debt payment), hunters typically hunt for someone, usually a Nzime or merchants gun owner, who will provide him with a shotgun and cartridges in exchange of a wage (usually 1.000 Cfa -1.5 euro- for a day or a night).

The situation might be different for a hunter who goes for visiting snare traps, as in such case unsuccessful visits are frequent and hunters are most likely to decide the fate of the game once they are back to the village. In this common situation, the hunter would decide to sell a share of a game hunted according to the size or the number of animals brought. Informants also often mentioned the feasibility of actually selling the meat in the village as an important factor in deciding the fate of the meat. Overall, selling meat was easier in MB than in EL, given the proximity of the Nzime village and the higher number of merchants. Indeed, the high value of bushmeat was a large incentive to many local people to make rapid deals by buying meat at a cheap price to the Baka and sell it at a higher price further away on the road. As the Baka often say: "*meat always finds buyers*". Therefore, face to punctual needs of money and pushed by the high value of meat, most Baka divide their harvest between household consumption and sale. Such sharing depends on the size of the game hunted. Depending on the quantity of meat harvested, the raw meat can either be entirely sold, or divided (in halfs or quarters) and rapidly smoked, or divided in smaller parts and cooked to be sold as ready-to-eat pieces (i.e., **jejep**, see below). Generally, when the size of the animal allows it, the most common system is to split it in halves, one half for household consumption and the other for sale. Figure 5.9 provides a general summary of the fate of different types of game brought to the household[53], how are they generally divided, and what the household generally buy with money received if a share is sold.

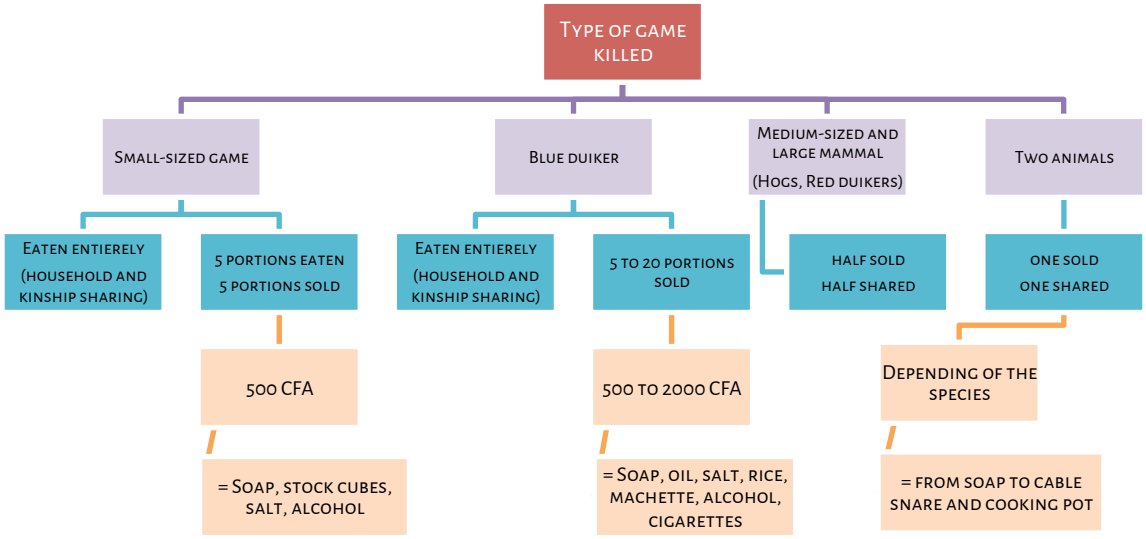

Figure 5.8. Economic choices generally made by Baka households after game harvest

[53] Observations made for the average household size, composed by 3 adults and 4-5 children.

3.3.3. The "jejep": An opportunist market of meat

From all the observations of meat consumed, 17% correspond to small portions bought in the village. This meat consists of already cooked (boiled) portions of meat sold at affordable prices. This form of meat consumption is known as **jejep**, a name that comes from the fact that the presence of meat for sale is announced by adolescents or children who walk on the roads with a pot on the head shooting "**jejep**! **jejep**!". Mainly practiced by the Nzime, the Baka are increasingly adopting it, as a way to compensate the increasing difficulty to obtain meat from hunting or sharing. Its popularity comes from the fact that it allows the household to keep a variable portion of the harvest (depending of the number of individuals in the household or relatives-receivers) and sell the rest. The size of portion is largely established. Thus, for instance a blue duiker gives 40/45 shares, and a monkey 30 portions. Moreover, this type of trade is not considered as illegal regarding the law (familial consumption or inner-village trade is defined as *chasse vivrière*).

Although the possibility of buying meat is reduced for the Baka, who generally have low levels of income, this trade is directed to them as much as it is directed to the Nzime. Given its low price, 100 Cfa (0.15 euros) the portion, most Baka can afford to buy one or two pieces of meat in case of meat-hunger, to nourish children, or as a gift for guests or family-in-law.

The phenomenon of Baka buying meat is interesting as it shows to which extend the meat-hunger, related to the wildlife decline in the area, might push the Baka to punctually buy meat on the market. It highlights a relative imbalance between subsistence and market economy, as well as a relative decline of extensive meat-sharing norms and demand-sharing system that previously allowed counteracting the temporal lack of meat underwent by some households. The phenomenon might also lead to the paradoxical situation when a Baka hunter might buy a cooked piece of an animal he has hunted himself for the count of a Nzime (in exchange of money), and which the Nzime decide to sell through **jejep** in the Baka villages.

3.3.2. Meat sales in a context of jealousy and anti-poaching

Besides **jejep** selling, the way in which the Baka sell meat reveals the social relations within the society and with neighbours. When a game is brought to the household, a child is sent to the Nzime village (notably to the house of the hunter's Nzime partner house) to communicate that meat is on sale. Contrarily to their neighbours, the Baka never hang the game in front of their house to signal the sale, as they fear of repression from ecoguards and, most of all, the jealousy from others village members who might criticize the hunter for selling rather than sharing the meat. Nzime and village-based merchants living close to Baka settlements typically buy the meat to the Baka. Hunters who regularly bring large amounts of meat might be also directly approached by Nzime and merchants who ask if wild meat is available or when will it be. They might also ask a hunter to go for a shotgun hunting for them. Nzime people might visit Baka households at dawn to ask if meat is available.

These opportunistic sales represent, in fact, most Baka meat trade, who recognizes that selling meat is now much easier and more profitable than in the recent past (10 years ago).

> *"Today it's hard to kill, but on the other hand there are more buyers than before because meat is rare. There are sometimes several buyers for a piece".* [I.B., male, 41 years old, EL village]

4. Conclusion

For the Baka wild meat is vital for sociocultural, nutritive, and economic reasons. Understanding how animals are perceived and local consumption rules also inform about the Baka system of norms and morality, defining what is good or not for both the individual wellbeing and for the cohesion of the group. In that sense, this chapter has stressed how health perceptions, and notably the causalities of illnesses, are inherently related to perceptions of the relations between wildlife and diet. The wide diversity of illnesses are explained by the Baka through the diversity of the animal forms. The Baka believe that illnesses might be caused by food intake through the transmission of energies (either bad or good) by ingestion,. This causal-effect system shows how the Baka conceive a relative power of the animals, and globally of the natural world, over the fragility of the humans, which might be explained by the dual nature of the animals, embedded in both humans and spirits world. I have shown that the diversity of situations of meat avoidances is adaptive according to individuals and their situations, they related more cultural perceptions, personal unwillingness and fear of harmful effects than to a strict social norms of prohibition. However, this rich system of representations and knowledge has been developed in a context of abundance and diversity of wildlife. Thus, the current defaunation presumably leads to reduced interactions of the Baka with certain species, hence, if it might certainly alter their dietary diversity, it might also affect their own representations of health and wellbeing and feelings of security and protection. However, at the present times, meat avoidances seem to poorly affect the diet. Indeed, as already mentionned by Ichikawa (2007), if the different forms of avoidances concern a very wide diversity of species, they are mostly "secondary" species. Whereas most of species hunted and eaten rather belong to a reduced number of species less embedded in negative representation and potential harmful effects.

Some aspects of this chapter would need to be better developped in further research, notably with more accurate methods focusing on individual variations of meat consumption, i.e. taking account the quantities eaten and the process of sharing between ages groups and genders. Such studies are required to better estimate what fringe of the population is more dependant or in demand of wild meat. This chapter has however showed that the Baka mainly consume small-sized mammals, known to be easily found in the village surroundings. Despite of their preference and cultural importance in the representation of hunting, large-sized species almost did not appear in the consumption reports. A

more sendentary life, increasing commercialisation, and large-game depletion are presumably three convergent factors that might affect the current place of wild meat in Baka diet.

Meat selling is nowadays a critical component of Baka economy, bushmeat constituting the most sold product. Although the sale of meat and other wild products is not a new deal for the Baka, which have a long history of trading exchanges, this source of income constitutes a critical financial complement and the main source of monetary income for many households. The sale of bushmeat is often the easiest way to satisfy punctual needs , however, it raises the question to which point the sale of bushmeat is done at the expenses of the household own diet, quality of life, and maintenance of social and cultural aspects such as sharing or psychosocial well-being. Wild meat holds this double role by providing the vital and valued food and an important source of cash income. As the Baka are increasingly stepping into the market economy, the balance between the two aspects might be critically altered.

Chapter 6

The social duty of the master-hunter: Changes in social status and hunters' prestige

1. Introduction

'Hunter-gatherer' is a complex concept that has raised numerous debates (Reyes-García & Pyhälä, 2016). Social organization has been a key characteristic used to define hunter-gatherer groups, as most of them display an allegedly egalitarian or non-stratified organization (Lee & Daly, 1999; Woodburn, 2005). However, across continents a wide diversity of cases exists and researchers have shown that there are variations in the social organization of hunter-gatherers. For example, some hunter-gatherers groups, called "complex hunter-gatherers," show social hierarchies and forms of inherited leadership[54], thus differing from the typical non-stratified organization of most hunter-gatherers (Price & Brown, 1985; Woodburn, 1998). Moreover, even in the most -supposedly- egalitarian societies asymmetries are found in terms of social status (Boehm, 1993).

Social status is generally defined in sociology and anthropology as a recognized social rank or position held by an individual within the society. It often refers to a social role or social function and is recognized by the whole society for which it makes sense (Brym & Lie, 2007). However, anthropologists have defined status in various ways, some defining status as respect Hardy & Van Vugt, 2006), other as importance (Reyes-Garcia et al., 2008) or as a general influence (Anderson & Kilduff, 2009). In all cases, social status can be either ascribed (i.e., inherited) or achieved (i.e., acquired through the lifetime). Achieved status often reflects exceptional knowledge, expertise, or advanced skills in some valued domain of activity, such as hunting or medicine (Henrich and Gil-White 2001; Reyes-García & Gallois 2014; Stearman, 1989) and it often leads to a form of expertise and authority in the related domain. Researchers have shown than in egalitarian societies, prestige and

[54] Such organisations are mainly found on north-western coast of North America.

dominance are dissociated, and diffently affect the attribuation of status (von Rueden et al., 2008; Heinrich & Gil-White, 2001). As noted by Heinrich & Gil-White (2001), the notion of prestige contrasts with the notion of dominance or power, which relate to the ability to control resources or to have a better access to them but which is not always linked with social status. Prestige is rather a freely conferred deference, a situation that also translates in signs of respect and esteem from the others, and is often rooted in admiration (Plourde, 2008; Reyes-Garcia et al, 2009; Cheng & Heinrich, 2010). Prestige has also been linked to socially appreciated behaviours and qualities, either material or symbolic, like eloquence or generosity in sharing (von Rueden et al., 2011).

In most hunter-gatherer groups, even in the absence of a leader, some individuals hold higher status than others (Barkow, 1975; Wiessner, 1996). Additionally, some members of a community might, at some point, seek or enjoy more prestige than others, either within a defined status or function or not. In egalitarian societies, high status, special function or attributes and prestige seem highly linked. For example, previous research among hunter-gatherer groups emphasize a relation between status and age, showing that older individuals benefit from a higher social status and from more deference probably because they have had more time to accrue their knowledge, skills and social support (Silverman & Maxwell, 1978; Reyes-Garcia et al. 2008).

As meat in tropical areas is vital for subsistence but its acquisition remains unpredictable and irregular and its storage non-practicable, forest people often rely both on economic (e.g., diversification and a optimization of subsistence strategies) and social strategies (e.g., meat-sharing) to pool resources and smooth meat consumption (Bachuchet, 1990; Grenand, 1996; Balée, 1989; Dove, 1996). For example, meat sharing is a common social strategy used in many hunter-gatherer societies (Bachuchet, 1990; Enloe, 2004; Kaplan & Gurven, 2005). Some researchers have argued that this strategy compensates the daily meat intake variance and reduces the risk of "hungry days" (Trivers, 1971; Hawkes et al., 2001) and associated conflicts. As Marcel Mauss early wrote in his *Essay on the Gift* (1950 [1923]) many forms of sharing in "traditional" societies are not just spontaneous expressions of generosity but rather aim at producing social relations. In this sense, meat-sharing typically allows the consolidation of social bounds within the community (Levi-Stauss, 1944; Bahuchet, 1990; Patton, 2005), despite the costs for the hunter and the inequalities created between good and bad hunters (Winterhalder, 1986). In that sense, hunting large prey for public consumption has been interpreted as a voluntary strategy for signalling knowledge and skills to potential partners or allies[55] (Plourde, 2008; Bird et al. 2002; Smith et al. 2003), allowing altruist and good hunters to increase their social capital by showing their cooperative intentions through sharing (Bliege Bird & Smith, 2005; Gintis et al., 2001). Elsewhere, as for example among the Aka and the Mbendjele Pygmies, meat is forced to be shared among the co-residents, and notably to those who ask for (Bahuchet, 1990; Lewis, 2008). An interesting aspect of form of social interaction, widely described in the hunter-gatherers studies and called demand-sharing, is "recipient-controlled" (Lewis, 2015 (Blurton-Jones, 1987; Woodburn, 1998; Ichikawa, 2005).

Hunting in hunter-gatherer societies is often interpreted by evolutionary scholars - influenced by neo-darwinian approaches and sociobiology - as a strategy for signalling or showing off, allowing

[55] See Bliege Bird & Smith (2005) for a review of the Cost Signaling Theory mobilized in the human behavior studies.

to acquire in return signs of deference, respect, or prestige (Heinrich & Gil-White, 2001; Gurven & von Rueden, 2006), to increase reproductive success (Kaplan & Hill, 1985; Smith, 2004), or mating (Hawkes & Bliege Bird, 2002), biological fitness, coalitional support or access to contested resources (Gurven & von Rueden 2006).

Social anthropologists, on their side, emphasize more the cultural factors and social logics behind status. If status specific might be assigned to someone, however any tentative to get inequitable personal benefits from enjoying status are rapidly curtailed by the rest of the group. Indeed, the temptation of conversion of this personal benefit into forms of dominance - that would allow better access to resources or increase influence - is often made impossible by the rest of the group through levelling system allowing to maintain resources pooling (Woodburn, 1982). Wiessner (1996) compiled from the literature the different levelling process: 1) removing the hunter out of the focus of attention for instance by attributing the success of the hunts to spirit forces and not to hunters skills or merits; 2) dispossessing the harvest from the hunter and giving the responsibility of sharing to other individuals; or 3) not considering that society has a debt toward the hunter and/or reversing the duty by considering the hunter hold a debt to his co-residents (Wiessner, 1996).

Despite the importance of hunting as a potential marker of prestige, we lack studies examining the relation between hunting, meat-sharing, and benefits (such as prestige) in the context of the current socioeconomic changes affecting contemporary hunter-gatherers groups. Moreover, most previous studies addressing the relation between hunting and prestige have focused on south-american foragers-horticulturalists and have taken an evolutive approach centred on individual strategies to achieve prestige (Gurven & von Rueden, 2006; Hill & Knight, 2009). To fill the gap, in this Chapter I examine the relations between hunting knowledge, status or social role, and prestige among the Baka.

The Baka are an ideal case study for this research for two reasons. First, the cultural aspects of hunting are in rapid change. Traditionally, hunting holds a central place in Baka social organization, culture, and livelihood by articulating geographical mobility, cooperation, sharing, and relations between the natural and the spiritual worlds (Joiris, 1993). Baka hunting practices are characterized by the omnipresence of propitiatory remedies and ritual practices performed before a hunt, notably regarding the elephant hunting expeditions called **màka** (Joiris, 1993). In the last decades Baka hunting practices have suffered many critical changes due to the intensification of both bushmeat and ivory smuggling (Ichikawa, 2016; see Chapter 1 and 3). With the diffusion of firearms, the easier penetration in remote forest through logging roads, as well as the monetization of exchanges, the intensification of bushmeat trade has brought new stakes for the hunters, resulting in the emergence of new hunters' profiles, interested in commercial hunting (Duda et al. 2017, see Chapter 5).

The second reason why the Baka represent an ideal case to study is that their social organization also seems to be changing. The Baka traditionally had an acephalous and egalitarian political organization. However, three important figures and functions are remarkable in traditional Baka social organization: 1) the 'master-hunter' tuma, specialist of elephant hunting, who enjoys a particular relation with the spirit world and therefore a special position among the hunters (Joiris, 1998), 2) the diviner-healer nganga, and 3) the lineage elders (men and women) called kobo, among which some are considered important through their specific roles in rituals as "mother" and "father of the forest spirit" (Bahuchet & Guillaume, 1979; Tsuru, 1998; Lewis, 2002). It is worth noticing that

these three important social functions are achieved, acquired through lifetime, and never fully inherited[56].

Such social structure, however, is now changing. In the past decades some Baka village chiefs have been recognized as intermediaries between the community and the external institutions, although they remain without any legal status. Concerning the tuma, two apparently contradictory trends have been observed. On one hand, Bahuchet and Guillaume (1982) mentioned that the development of ivory trade impacted the status of the Aka tuma by reinforcing the bases of their power. On the other hand, Joiris (1992) mentioned that the influence of tuma was already declining in the 1980's due to sedentarisation and decline of wildlife. Köhler (2005a) underscores that the tuma enjoyed a great prestige at the beginning of the twentieth century during the peak of ivory trade created by colonial demand. Ivory entering in bridewealth exchanges allowed tuma to marry non-Baka women, an unseen practice today. Given the current increase of ivory trade in our research area, the question is then how these two trends, and more widely how all the changes observed in the area, affect tuma's social status and the social perception of hunters' position.

This chapter attempts to answer questions at two levels. At a first, more general level, I examine whether hunting knowledge and skills might (still) be a distinctive attribute that allows people to hold a position of prestige and deference within their community. Specifically, I compare attributes of prestige as defined in the past and defined nowadays. At a second, more specific level, I address the issue of prestige regarding the "great hunters", hunters specialized in large game hunting, holding important cynegetic knowledge, and specific relations with forest spirits, notably in the context of elephant hunting. Here I wonder whether being considered a tuma (i.e., being named as such by the rest of the group and being able to lead large game hunting) necessarily means enjoying prestige and esteem from the group. In parallel, I wonder if people might have prestige and esteem without necessarily occupying one the three traditional functions previously described.

The chapter is organised as follows. First, based on literature and my own ethnographic observations, I give a general overview of the distinctive and traditional forms of socio-cultural function among the Baka. After detailing the methods used, the main results are presented and discussed in two parts. First, I compare attributes assigned to people held in high regards in the past with the attributes assigned to people held in high regards now. In the second part of the chapter, I use qualitative data collected during in-depth interviews to explore the current role of the tuma in the Baka social organization.

[56] However, the son or daughter of a nganga might be perceived as having more propensity or a gift in healing, divining and relating with spirits, but it is ultimately to he or she to take the responsibility to become a nganga.

2. Case study: The making of social status among the Baka

To position the analysis presented here in the wider Baka ethnographic context, I first present an overview of the different aspects that previous research among the Baka has linked to social status.

2.1. Tuma, kobo, nganga: The three pillars of deference and responsibility

In the absence of political leaders, traditional Baka social organization is characterized by the presence of important functions, which might lead to circumstantial "authority". As mentioned by Leonard (1997), for the Baka anyone can have "authority" in a field he or she masters (dance, hunting, ritual, medicine), but no one claims to be the leader of the entire group. Those who try to accumulate power or manipulate the group might be easily rejected. Overall, three distinctive socially recognized functions seem to be observed: the 'great hunters' (tuma), the diviner-healer (nganga), and the elders or lineage's head (kobo) (Joiris, 1992; Bahuchet, 1992; Tsuru, 1998). One person can cumulate functions. These three important figures have been also described among the Aka[57] (Bahuchet, 1985; Hewlett, 1991) and the Mbendjele (Lewis, 2002). As in these other populations, the Baka have no ascribed gender hierarchy. The tuma are always men, but the nganga -although often men- can also be women. Women also show a critical and apparent political power, exerted collectively through show-off speaking. Some women appear to have more power than others, notably the midwives (Hewlett, 1997; Gallois & Duda, 2016), the tuma's wives, and elder women. Traditional midwives, female healers, and male dancers acting on specific ritual repertoires might hold particular status within the village due to their specialization.

The tuma is considered a great hunter, or 'master-hunter', and a specialist on elephant hunting (Hayashi, 2008). His status is intrinsically related to the salient role of elephants in the Baka cosmology (Joiris, 1998), and a tuma is first refered as such -simply- after his first elephant killing. Among all the natural entities, the elephant is the one who carries the most powerful symbolic status for the Baka, representing ancestral figures of the forest (Köhler, 2005). The elephant is highly valued at three levels: spiritual, social, and psychological. First, elephant's symbolic status gives to its hunt a spiritual value as the elephant hunt requires the tuma, the nganga, and the women (through the singing ritual **yéli**) to engage their specific connections with forest spirits. Secondly, elephant hunting might guarantee extensive food sharing. Finally, compared to other animals, elephant meat is held in high regards for its disproportionate amount of fat and flesh, making of the abundance and the availability

of elephant meat a synonym of wellbeing and happiness. Consequently, among the Baka the tuma is considered the meat provider by excellence.

Because slaughtering an elephant implies courage and knowledge, being a tuma is the most specialized - and also the most prestigious - function among the Baka, as also described for the Aka (Thomas et al., 2013). Requiring long learning and initiation, the level of mastering associated to elephant hunting confers to the tuma a form of authority in the hunting group. Indeed, during elephant tracking expeditions, the tuma is in charge of a group of hunters and porters. The tuma organizes and leads the big hunts but also the rituals preceding these expeditions in accordance with the nganga. Traditionally, the tuma is distinguished from other people as he is supposed to have particular relations with forest's spirits, ancestors and animals which confer him success and luck, which he then maintains by leading specific rituals and preparing remedies (Joiris, 1998). Killing an elephant is also not trivial as elephant - contrarily to other animals- are believed to maintain particular relations with humans in mythical, spiritual, and cosmological dimensions (Köhler, 2005). Moreover, as I will develop later, the tuma is appreciated due to his supposedly higher contribution to meat sharing within the village. For these reasons, the opportunities for elephant hunters to gain prestige from their coresidents are obvious, as also pointed out by Lewis (2002) for the Mbendjele. Yet, levelling mechanisms prevent the tuma from gaining too much benefit from his activity. The Baka rules of sharing impose the tuma to share the elephant meat with a symbolic disengagement, as the tuma is not supposed to eat the elephant he killed. Today, the illegality of elephant hunting has obviously affected the sharing of meat acquired by the tuma, and meat sharing cannot be as extensive or as visible as it was in the past. After the killing of one or several elephants, ivory tusks are taken out and most of the elephant carcass putrefies in the slaughtering place. Only small pieces of elephant flesh and fat are discreetly brought to the camps nearby or to the village.

The nganga is both a diviner-healer and an initiated person who can maintain relations with spiritual entities. Both men and women can be nganga and several *nganga* might coexist in a village. As a diviner, the nganga also contributes to large game hunt by visualising elements of the forthcoming expedition (length, directions to follow, number of the animals to encounter). His or her visions allow him to decide the direction of the hunt and to estimate the importance of the kill. The nganga are also holders of a dense knowledge about medicinal plants, spells, curing, and treatments. The efficiency of nganga divination skills are often well acknowledged far from the limit of the village, and people from other regions (e.g., politicians, football players) might come to consult them. However, their role is restrained to their specific skills and do not imply an influence on the village's decision or authority in any other domain.

Some of the **elders (kobo),** known for their wisdom, are important figures in Baka communities and enjoy a great respect. They are typically the lineage's head and corresponded to the camp's head during forest seasonal life. They often enjoy meat which hunters share with them as gifting and are now presented as the "guardians of the village". For these reasons, they regularly attend - often in silence - administrative and NGO meetings with a status of representatives. Their opinions are often heard. However, age does not necessarily give them more responsibility in decisions, as even if very old people are still all respected they lose influence and authority. Elders' role in group level decisions is also related to their own personality, charisma, and wisdom. Such "guardians of the village" often maintain specific relation with forest spirits and consequently are also

considered as “guardians of the spirits” and hold a role of leaders during ritual performances, notably the **jengi.** Status and functions might be cumulated, for instance some male elders who have been elephant hunters in the past, or currently occupy the status of village chief, or nganga, usually enjoy high respect from the community but also from their neighbours.

2.2. Emergence of Baka *chefferies*

Traditionally the communities of south-eastern Cameroon (both Baka and Bantu speakers) were acephalous. The emergence of chiefdoms in non-Baka villages dates back to the 1920s, when the French administration created an administrative level called *chefferie*, appointing chiefs in order to levy the tax, and granting these chiefs the management of a territory on which individuals must settle (Robillard, 2010). Thus, the idea of social and political hierarchies between individuals was instituted by the colonial power, implying the territorialisation of the different ethnic groups. At that time, the Baka lineages maintaining inter-individual relations with their neighbours were quickly placed under the administrative authority of the newly elected non-Baka chiefs.

From the 1970s, with the creation of settlements that cluster several Baka lineages and under the pressure of their neighbours, Baka communities started to designated "chiefs" who represented them in the outside world. In fact, the Baka often designate as “chief” the elder of the dominant lineage. Copying their neighbours’ political organization, the Baka even designate different “notables” or representatives. It is worth noting that the term primarily used to design the Baka chief is **kukuma (nz)**, a Bantu term. However, despite this denomination, the “chief” does not have an authoritative power over the whole Baka village (at least in the visited villages) and his role is restrained to be a spokesman and attend meetings. Moreover, I observed that these statuses are only mobilized in relation to external agents and not during the discussion of internal matters. In the same line, Baka chiefs have no legal power and the villages remain administratively under the authority of the Nzime *chefferies*, so Baka are indeed excluded from formal administrative and political power, and consequently from land properties (Bigombe Logo, 2007), while the non-Baka people act as intermediaries at the political level (Robillard, 2010). While Baka *chefferies* are legally recognized in Gabon (Soengas, 2010), only one is acknowledged in Cameroon (the historically-specific case of Le Bosquet, Messok district[58]). Surprisingly, the existence and the place of the Baka chiefs have been poorly mentioned in the literature (except Tsuru, 1998).

[58] See footnotes page 55 for a description of the specificities of this *ex-nihilo* built village.

3. Methodological approach

I examine the current relevance of the different social roles associated to status (tuma, nganga, kobo and chief) and describe the different attributes granting prestige both in the past and nowadays. I use different variables as indicator as prestige, such as socio-demographic and economic data, peer-rating, hunting knowledge, and hunting offtakes, thus alternating data collected from systematic/one-shot surveys and semi-structured interviews. Quantitative data were collected among 143 individuals (61 males, 82 females; mean age 34.7, min=17, max: 69) from whom 70 persons answered a hunting knowledge test. Later, I conducted semi-structured interviews with 25 individuals of this sample. Semi-structured interviews were constructed and data analysed in the context of a participatory observation and helped by notes issued from a long-term presence in the studied village. I explain here the methodology used for collecting: i) socio-demographic and economic data, ii) hunting returns, knowledge and skills data, and iii) prestige data.

3.1. Socio-demographic and economic data

Data used for this chapter were collected in one single village: MB[59]. A census conducted in 2012 gathered names, age, maximum level of schooling, skills in speaking French, the national language (between 0 and 3), number of language known, and household composition of all the people in the studied village. To evaluate the individual economic characteristics, between July 2012 and July 2013, I collected income data. Specifically, once a quarter, I asked about all the sources of income perceived by each individual during the 15 days before the interview. These sources are divided in income from sales of wild meat, agricultural or forest products and income from wage labour. As some income came from barter or wages were paid in kind, I converted the product into monetary equivalent of the goods received by multiplying it by its local prices. To assess wealth, I asked people to report ownership of a selection of 10 items locally perceived as valuable. The list included products plant-made as well as market products. I then converted the 10 items into their monetary equivalent.

3.2. Prestige data

In March and April 2015, in the same village, I conducted semi-structured interviews on prestige and social status with 25 individuals that took part of the previously cited survey. Interviews were structured in two parts: a listing exercise and a semi-structured interview. To conduct the interviews, I selected individuals from each hamlet of the village, belonging to each lineage. Although an effort

[59] The choice of one single village sample was dictated by the presence of pre-existing data there (census, knowledge), by my nearly constant presence in this village during the study period, and by a better knowledge of social relations patterns in this settlement.

was put on interviewing women, more men were willing to participate. All the people interviewed had a thorough knowledge of other people in the community. Their ages ranged from 16 and 72 and included 17 men and 8 women. To estimate the prestige of a person, I first asked to list "*all the people in the village who receive respect and deference from the community*"[60] and then, for each person, to describe why they are considered important and are respected. I secondly asked to list people *"who were respected and esteemed in the past"*[61]. Similarly, I asked about the reason why the community had deference to them.

To have a deeper understanding of the characteristics associated to status among the Baka, I asked informants about their perceptions of i) respect within the community and how recent socio-economic changes have affected this notion, ii) the notion of authority, chieftainship, leadership, and the capacity of decision-making for the group; iii) the relation between elders and youths, and iv) the social role of the tuma and whether they had observed changes in it. The questions in the interviews followed the same sequence in order to maintain consistence. I recorded all interviews (Baka discourses and their translation in French) using a digital audio recorder and later transcribed the audio files. Results capture the recurrent themes and relevant insights that emerged from these interviews.

3.3. Hunting effort, knowledge and skills

Hunting returns and effort: To estimate the hunting returns (or CPUE, catch per unit effort), I used data described in Chapter 5, i.e., the amount of game (in kilos) killed per hour invested in hunting (including trap preparation), and collected on weekly recalls of two days. The hunting effort corresponds to the share of times a person was observed hunting from all the times I have scan data for that person.

Individual variations in knowledge and skills have been examined through two methods: knowledge and skills tests and peer ratings (see Reyes-Garcia et al., 2016a for a complete description).

Hunting knowledge and skills tests: The evaluation of individual levels of hunting knowledge have been done from etic perspective, testing informants on the base of questionnaire on identification, ecology and behaviour of 10 selected game species. Game species used have been taken from free listings exercise and then categorized according to their saliency (Smith and Borgatti, 1998) to constitute terciles. Species were then chosen from each group to produce a list of 10 species for the knowledge. For each species, each informant was asked 1) to provide its vernacular name based of a visual stimulus (a picture), and 2) to answer two questions about this animal (one about ecological and one about behavioural traits). I generated the scores by contrasting informant's responses with scientific information. To assess hunting skills, I asked informants to report their hunting frequency, the weapons most commonly used, and their ability to lure animals (mostly

[60] Original question: **naka bo ba to pe jù a gba ké ? à wa nié ?**
[61] Original question: **à tié ké mO te é.wanjo, naka bo ba to ngi pe jù a gba ké ?**

antelopes) by reproducing their calls. I also asked to self-report how many Red river hog they have hunted during their life (either precise numbers, or *"around 20", "around 50"* as good hunters do not remember). Combining responses to these questions, I created a hunting skill score.

Peer rating**:** the second method to assess hunters' knowledge was more emic oriented and based on a peer rating exercise (Reyes-García et al., 2016a). It consists in asking to the informant to evaluate each subject on a list on the basis of questions such as: *"Is [name] a good hunter?"* Adults from the village have been randomly grouped in different lists of 20 persons. Each list was assigned to an evaluator. Six evaluators (three men and three women from different ages) were first chosen within households belonging to different kinship. They were asked to rate subjects' hunting abilities based on their knowledge, and rated them as excellent (4 points), good (3 points), average (2 points), not so specialized (1 point), or not applicable (as they do not hunt) (0 points). At the end, each individual received a score that correspond to the average of the points the six evaluators assigned to him..

3.4. Data analysis

Concerning prestige data, I first analysed the lists of people acknowledged as respected in the past and now, and the list of attributes that conferred them status. I first calculated the occurrence of the attributes elicited (i.e., the reasons why people were named) to obtain a list of the most cited attributes (Table 6.1 and 6.2), with frequency and percentage of report both in the past and nowadays.

To compare the lists of past and present attributes that confer respect, the attributes evoked were categorized as 1) leadership, 2) age, 3) traditional or modern skills or status, 4) holding a representative role, or 5) displaying an appreciated behaviour. I compared people included in the list of respected people and those not included according to their variations 1) in their social and economic characteristics and 2) in their features related to hunting (skills score, knowledge score, hunting returns and effort). I compared both groups (cited as prestigious and not cited) to test whether there are differences between them. To do so, I used a Wilcoxon Ranking test for the set of variables described above.

I analysed the list of people nominated as a free-listing. According to the Smith's Saliency Index (which is derived from the frequency and the order of nomination of the item in the informants' lists) (Puri & Volg, 2005), I generated a ranking list and report the reasons why these people were nominated.

4. Results and discussion

4.1. Evaluating the sources of social status

4.1.1. Past and present status attribution

During semi-structured interviews, informants listed a total of 17 sources of status, functions, qualities, or appreciated behaviours which I categorized into six groups (Table 6.1). The specific roles recognized in Baka culture, such as being a tuma or a nganga, but also a ritual dancer, represent 54.5% of the attributes elicited (Table 6.2). I noted that several persons listed as having social status in the past were listed for more than one reasons, for example, because they were tuma and also chief, or dancer and also tuma.

Sources of status common in the past (tuma, nganga, dancer) seem to be less important now, as they only represent 6% of the elicited attributes. The difference might indicate a relative devaluation of these roles in conferring status in the present time. Nowadays, attributes of respected people correspond mostly to attributes related to the "representative roles", such as being a notable or representative (of youth or of women) (33%). Having good communication skills is also appreciated, highly valorised, and considered as an attribute conferring status (19%). Indeed, oratory skills often go hand-in-hand with leadership, prestige, and influence within the community as it has been already mentioned by previous researches, for instance among the !Kung (Lee, 1979) and the Semai of Malaysia (Dentan, 1979).

Table 6.1. Attributes conferring status

Attributes	Category
kukuma (chief)	Chief
Tuma (master-hunter), nganga (diviner-healer), dancer	Traditional figure
Kobo (elder)	Age
Notable or representative (of women, young people, or the village)	Representative role
Good capacity in communicating, or solving conflicts	Diplomacy, communication
Intelligence, having good ideas for village development, being active in collective work, having stopped drinking alcohol, being respected by the Nzime	Appreciated behaviour

Table 6.2. Attributes conferring status to people listed as respected by the Baka

Category		Attributes associate to people listed as holding status			
		In the past		Nowadays	
		Freq.	Percent	Freq.	Percent
1	Chief	9	16,36	15	15
2	Traditional figure	30	54,55	6	6
3	Age	1	1,82	11	11
4	Representative role	8	14,55	33	33
5	Diplomacy and communication	2	3,64	19	19
6	Appreciated behaviour	5	9,09	16	16
Total		55	100	100	100

4.1.2. Who is esteemed now?

The list of people nominated as prestigious and currently living in the village includes 17 men and 2 women. Thus, women are relatively absent of this listing. The age of people listed as prestigious ranges from 20 to 69 years old with a mean of 43.5 years. Difference between people in the census with prestige and people without prestige is significant: people with prestige tend to be older than people not cited as holding prestige (Wilconxon test: p=0.010). The relation between prestige and age might be explained because, although the prestige of some old people might be affected by the decline of their hunting skills with age, most elders have been able to maintain it because they are well known for their experience and knowledge and benefit from accumulated relational capital (von Rueden et al, 2008).

Prestige is not related to the level of schooling, nor to the frequency of trips to the market town, both variables used here a proxy of market integration (Table 6.3). However, prestige is related to the ability to speak languages other than Baka (e.g., French fluency and number of languages known), probably because higher importance is given to people whose linguistic skills enable them to interact with outsiders, such as political bodies or Bantu-speaking neighbours, to attend NGO meetings (always held in French), or to negotiate with merchants, as it has already been shown for the Mekranoti (Werner, 1981) and the Tsimane' (von Rueden et al., 2008; Reyes-García et al., 2008).

Overall, people in the two groups do not differ in their economic characteristics. None of the variables I tested (wealth, and income from sale and wages) were different between persons enjoying respect and deference and the other members of the community. These results can be put into perspective with studies that tested such relation in other small-scale societies. Some scholars have highlighted that market-related skills are an increasingly important predictor of prestige (Reyes-García et al., 2008), although status and wealth are not related. For example, using a similar proxy (the possession of 10 of personal ornaments and tools), Werner (1981) demonstrated that among the Mekranoti of Brazil, the chiefs do not differ from their peers in terms of material capital, arguably

because of the low material capital generally accumulated in that society and because of the fact that not many items are needed for production. In such societies, the social capital -generated by status- might be more efficient than wealth accumulation, as suggested by Chaudhary et al. (2015) who studied the Aka. It is an open question whether, as the consumption of market goods becomes more general, material wealth might become a source of status for the Baka, as other authors have reported in other societies (Hill & Hurtado, 1996; von Rueden et al., 2008 ; Godoy et al., 2007).

Table 6.3. Socio-demographic and economic attributes of adults cited and not cited as respected

	Cited as respected (n=18)	Not cited as respected (n=186)	Wilcoxon ranking Test
SOCIO-DEMOGRAPHIC			
Age (in years)	43.5 (n=18)	32.8 (n=186)	0.0010***
Schooling (in levels)	1.2 (n=18)	1.2 (n=163)	0.7188
Visits to market town (per month)	1.9 (n=18)	1.7 (n=163)	0.1106
Skills in national language (0-3)	1.3 (n=18)	0.7 (n=165)	0.0010***
Number of languages known	3.05 (n=18)	2.26 (n=186)	0.0002***
ECONOMY			
Household wealth (in $ppp)	59 (n=9)	56.6 (n=48)	0.8696
Sale (in $ppp)	1.7 (n=16)	1.8 (n=128)	0.2803
Wage (in $ppp)	6.3 (n=16)	4.5 (n=129)	0.8784

*p<0.1; **p<0.05; *** p<0.01

The ranking of people nominated as respected nowadays was analysed using the Saliency Index for saliency. According to the saliency index, the current village chief **kukuma** is the person with higher saliency, followed by men holding secondary village authorities roles (“chief deputy”, “notables”). Two tuma were listed but were not explicitly elicited because of their status of tuma, but rather for their ability in dialogue with external agents, communicate regarding about villages issues, or solving problems (their actual status of tuma being identified from parallel interviews and observations). There seems to be, therefore, a relative overlap between different forms of status.

4.1.3. Are hunting knowledge and skills currently good predictors of status?

I examined whether there is a relation between the individual hunting data and being nominated as a respected person (Table 6.4). I found that, overall, respected people hold higher levels of knowledge, hunting skills, and returns, although results are not always statistically significant. People listed as respected show a higher hunting knowledge, as measured by their capacity to identify game species (p=0.000), similarly their ethological and ecological knowledge are also higher than the knowledge of people not listed as prestigious, although the differences are small.

Interestingly, people who were more often listed as respected tend to spend more time hunting than people who are not. Thus, for the variable hunting effort (i.e., hours spend hunting) the difference between both groups is highly significant (p=0.0005), although the success in hunting in terms of catch per unit effort (kg of game killed by hour spent in hunting) does not differ between both groups (p=0.2687). The fact that elder men (notably the chief) were elicited as respected might obviously drive this result, as elders might see their hunting offtakes largely decline with age while still being considered as respected.

Table 6.4. Hunting knowledge, skills, and returns between people cited/not cited as respected

	cited as respected	not cited	Wilcoxon Ranking Test
Hunting knowledge: identification	9.3 (n=12)	6.9 (n=58)	0.000***
Hunting knowledge: ecology	7.4 (n=12)	6.5 (n=58)	0.0775*
Hunting skills: self-reported	6 (n=14)	4.5 (n=68)	0.0412**
Hunting skills: evaluated by peers	2.70 (n=16)	2.53 (n=26)	0.2176
Hunting returns (kg/hr)	0.8 (n=16)	0.7 (n=64)	0.2687
Hunting effort (times in hunting/times observed)	0.23 (n=16)	0.10 (n=140)	0.0005***

4.1.4. Summary and limitation

In brief, people listed as prestigious tend to be male, between 38 and 50 years old. People listed as prestigious and people not listed do not differ in their school attendance or in the number of visits to the market town. However, people listed as prestigious seem better able to relate with non-Baka, as they have higher French fluency and know more tongues than adults not listed. In addition, people with more prestige tend to have more hunting knowledge than other individuals, although they are not necessarily more efficient, probably because people listed as prestigious include a high proportion of elders, with low hunting rates.

While the results presented provide interesting insights regarding status variations, they have some limitations. First, although the studied village is home of several tuma, their sporadic presence during the scan observations (due to long elephant hunting expeditions and long stay in forest camps by fear of ecoguards) did not allow to integrate them in the analysis, and compare their status with non-tuma hunters. Their absence also does not allow capturing elephant meat in the hunting off-takes, which might have severely affected our calculations of hunting returns. Secondly, as mentioned in the introduction, the authority and power of the three important figures (tuma, nganga, kobo) are mainly masculine and individualized. This tends to invisibilize the role of woman within the community, although women hold a critical role in terms of collective authority (as described by Hewlett, 1997 for the Aka) and decision-making. This is evident, for example in relation to village's mobility (Joiris, 1992), notably in hands of the tuma's wife and other women (usually elders) known as 'mothers of spirits'.

Furthermore, status being built through social relations and collective perceptions that go beyond the village, the analysis presented here, constructed with data from only one village, might also be partial. A qualitative lens can help overcome some of these limitations and complete the previous analysis, which poorly captured the individual perceptions and the social aspects of the relations. The second section of this chapter attempts to achieve this by providing an analysis of the social perception of the tuma.

4.2. Being a *tuma*: Outcomes, social duty and changing prestige

In this section, I use information collected through 25 semi-structured interviews to explore how the figure of the hunter, and specifically the tuma, is perceived in terms of respect and the changing function and prestige of this figure.

Tuma use to be well-considered and respected, either for their important role of meat providers or for other qualities and attributes related to their function (e.g., power of invisibility, relations with spirits). Nowadays Baka have contrasted opinions of the tuma. Some informants mentioned that the tuma have to be respected during hunting expeditions, others respect them for their knowledge, and still others appreciate them for their ability to obtain large amounts of income through the sale of ivory. Results from interviews show that these views are mostly shared by young peoplebut not by the older fringe of the community who have contrasted opinions related to non-respect of egalitarian norms.

The corpus of data collected highlighted three main issues to address when discussing the status of tuma: i) their differentiated appreciation while in the village and in the forest, ii) the relations with non-Baka and notably their cooptation by ivory dealers, and iii) their responsibility in sharing.

4.2.1. Village and forest, two different spaces of respect

> « *The tuma are listened during their hunts but not here* [in the village] *because they don't share meat anymore* [J.S., male, 31 years old, MB village].

Researchers have already discussed the importance of the physical and symbolic border between the forest and the village for the Baka, notably concerning the spirits activities in these two spaces (Joiris, 1998). In the interviews, differences in space perceptions appeared in relation to the social context of tuma activities and relations. Contrarily to most Baka activities, the social organization of elephant hunting expeditions is hierarchical: during hunting expeditions the tuma leads the hunt, walks ahead, and decides on the "programme" (term used in French by Baka informants). The tuma is said to be highly respected during hunting expeditions, which are clearly related to a specific space, the "inner forest" (**a to bele**), far from the village settlement, where elephants can be found. All along the hunt, people who follow him hold him in respect. Assuming his role of circumstantial leader, the tuma needs to be listened to ensure the success of the expedition. This hierarchical situation is due to his invisibility power (**mònjòyì**) as well as his particular relation with the spiritual world and with the diviner-healer, from whom he is the only one to receive indications such as the amount of animals he will encounter, the place where he will find animals, and the number of days the hunt will last.

> *"He* [a tuma from the village] *is respected by the people who follow him during the hunts, but in the village, we just know that he is able to "meet" the animals"* [M.M, male, chief, 63 years old, MB village].

The notion of "meeting"/"encountering" revealed in most of the discussions about large mammals hunting is translated by the Baka term **màka** (**na màka**: to encounter), which also designates the elephant hunting expedition in itself. For the Baka, big hunting is less a pursuit than a "meeting", which might have been fostered by propitiatory remedies. It is precisely for this power to meet big game that the tuma enjoys deference. This aspect critically points out the Baka cosmological conception of hunting and how they perceive the success of a hunt, which depends not only on the hunter's practical knowledge and skills (e.g., tracking, evaluating footprints, smells, and broken stems), but also on other factors (e.g., the willingness of the forest to "open" itself to the hunters, the success in rituals made to tie good relations with spirits, or the efficacy of the corporal remedies for luck). At this level, the tuma is first and foremost a hunter who has the ability to create good conditions for hunting and enjoys prestige and deference precisely for that faculty. Such power is however only relevant inside the forest space, in the well-determined time of the hunting expeditions.

Back in the village the perception of the tuma by the rest of community slightly differs from the deference received in the forest. In the village, the respect attributed to a tuma is principally based on the way he will distribute the resource acquired in forest. Thus, those two forms of respect seem independent and refer to two forms of responsibility assumed by the tuma and related on two spacio-temporal contexts: the responsibility of leading a group toward a successful hunt and the responsibility of providing the community with meat through sharing. Currently, these two contexts are threatened, notably because the function of the tuma seems to have shifted as they became only elephant hunters, working as employees in a context that do not benefit the society.

4.2.2. Cooptation of great hunters and appeal among young men

> *"The tuma receive respect here in the village because they do good job: they kill elephants"* [E.E., male, 20 years old, MB village].

Because elephant hunting now exclusively targets ivory, the activity has become more responsive to external demand than to internal solicitation from the Baka community. Thus, the present position held by the tuma in the Baka society can not be detailed without describing their relationship with their first economic partners, the *commanditaires* or ivory dealers. As described in Part 4.3 of Chapter 3, riffles owners, mainly non-local people, enter into partnership with wealthy Nzime men to motivate and organize elephant hunts driven by the tuma. These economic partners have a great influence on

the hunters and frequently instrumentalize the tuma (and others future/expected tuma) by promising them important gifts such as motorbike, steel roofing or large amount of money as a motivation.

Both appeal for material benefits and prestige seems inherently related, as the tuma and other great hunters interviewed seem visibly to seek prestige and show-off in the eyes of Nzime middlemen or foreigner ivory dealers rather than in the eyes of their Baka co-residents. This citation of a *tuma*'s father is a good example to illustrate this point:

> *"I want my son* [a tuma of 27 years old] *to stop to deal with ivory* (…). *We do not see what he earns with it, while others already have a motorcycle. (He) is not considered as a great hunter, he lives with the Nzime. He wants to live with the Nzime. If the family does not consider him, it is his fault. He considers the wine more than his family and the fact to give us something. (…) In the past, the former tuma were not standing so proudly in front of villagers"* [J.-L.A., male, 46 years old, MB village].

It worth noticing that, as shown in Table 6.3, prestigious individuals are more often fluent in other languages, including French. They seem to be more and more attracted by the will to ensure good reputation and status from external economic partners, and the fictive counterparts they might earn from them.

There are differences in how young and old people perceive the tuma. The youth generation sees the tuma as persons highly respected who -supposedly- have privileged access to material wealth due to the disproportionally high income received in exchange of elephant expeditions. Becoming a tuma is therefore the aspiration of many male adolescents who hope to gain economic and social rewards, notably esteem in the eyes of foreigners and non-Baka.

> *"In other villages there are also tuma, but not as many as they are here. Here, everyone wants to do his part. If you see your brother has success in something, naturally you want to do the same."* [P.K., male, 18 years old, MB village]

In fact, the income promised by the dealer is rarely at the level of the one expected by the hunter. Moreover, as shown above, the tuma have not accumulated more material capital than the rest (see Table 6.3). Indeed, when a hunter earns a large amount of money, I observed that he might be tempted to buy modern items for himself. However, demand-sharing and thief (due to jealousy) are the main hurdles for wealth accumulation. Modern items, highly visible (radio, sun glasses, etc.), rapidly create an imbalance, which generate jealousy. These items are therefore rapidly stolen and disappear from the village, operating thus a levelling process to restore the social balance. During fieldwork in 2015, a Baka hunter 25 years old, who just bought a motorcycle after an ivory deal, fascinated the youth. Aware of the ostentatious aspect of this enrichment, he rapidly decided to move to another village fearing jealousy and robberies.

4.2.3. Tuma's sharing responsibilities

As developed in the introduction, meat-sharing is considered a salient way of showing-off in hunter-gatherer societies (Hawkes et al., 2001; Patton, 2005). Meat sharing logically generates a favourable treatment from group members towards the hunter sharing meat, who might gain or will to gain status, prestige, social capital, fitness, or even mating benefits (Heinrich & Gil-White, 2001; Gurven & von Rueden, 2006; Kaplan & Hill, 1985). However, this last short as the group - if based on an egalitarian ethic - might rapidly curtail such personal benefits (Wiessner, 1996). Among the Baka, food sharing is said to be declining in village settlements (Kitanishi, 2006), including tuma sharing of elephant meat.

Sharing elephant meat was previously considered as the debt the hunter pays to the rest of the community by initiating a generalized sharing. However, the hunters are now forced not to bring meat to the village (or just a little) to avoid anti-poaching control or jealousy among the Baka. Such jealousy might lead to treason and would harm the lucrative business of the middleman and the *commanditaire*. However, if treason and conflict might emerge in a context of an unequal sharing, the total absence of meat sharing (or hunting revenue sharing) obviously also generates jealousy and blame:

> *"We respect the tuma anyway, but the responsibility is on their side, they work hidden. They should give some money, because everyone lives the same way. What generates denunciations is the fact that they do not share. The hunters must give to both chiefs, Nzime and Baka, to avoid problems".*
> [P.K., male, 18 years old, MB village]

Sharing behaviour and abandoned meat

In the past, most of the elephant body (weighting between 3 and 4 tons for a male) was smoked in the butchering place and brought to the village, or to the forest camps nearby, to be shared among the families (Bahuchet, 1989; see also Turnbull, 1961 for the Mbuti). Today, except the portions of meat consumed by the participants on the slaughtering place, most of the carcass remains untouched after the tusks have been taken out. As the leader of the hunting expedition, the tuma is the first to be blamed for not bringing meat and sharing it. This situation tends to create a tension between the potential "provider" and the demanders, a tension that aggravates during episodes of "hunger meat" (**pene**), when the small hunts are less productive. Likely tensions aggravate progressively in the global context of wildlife decline. On one side, "casual" hunters face difficulties to hunt medium-sized game (antelopes, monkeys, porcupines, wild boars) whose populations are decreasing in the village surroundings. On their side, the tuma tend to have more incentives to kill elephants, as the demand increases, but do not redistribute the offtake (the meat) or the obtained benefits (money). Informants perceived this non-cooperative behaviour as a lack of responsibility and respect. Here, the notion of respect appears clearly dependent on reciprocity: people will be respected provided that they respect the rest of the community, and notably their family and the elders by fulfilling the social obligations associated to their roles.

> *"Before we respected tuma as they brought large amounts of food. Today, if they are not respected anymore it is their fault; they do not respect the others"* [J.N., male, 38 years old, MB village].

Letting meat that is highly sought and desired in the village rot in the forest constitutes a deep paradox regarding the cultural value of that food. In fact, this paradox establishes for the Baka a rupture in the balance linking humans and the forest. This balance is, in the Baka cosmovision, highly dependent on the fair sharing of resources between humans, which is at the basis of a situation of social equilibrium. It means that elephant hunters nowadays do not accomplish one of the main functions of what, for the Baka, should be a tuma. It operates a shift of meaning in the definition of the tuma in the Baka society.

Elders tend to perceive the tuma as individualistic, disrespectful and sometimes insulting. First, the very punctual income the tuma earns is often associated with alcohol drinking, which is highly devalued among elders, who point out youngster's incapacity to manage money. Second, the fact that, according to the informants, the tuma are younger (less mature) than in the past could explain why they have a tendency to ignore social rules. Reasons for disrespect are mainly failure in honouring valued social practices such us sharing meat or being present in the village to fulfil village responsibilities.

On this last point, tuma are often criticized for their long absences from the village (occupied in hunting for ivory or remaining living in forest camp all year round). They are also blamed for denying their responsibilities regarding community's issues. This tendency is interesting as it has polarized two lifestyle preferences and notions of morality. Traditionally, forest life was the most valued because it would signal knowledge and skills, the forest being a place of resources abundance and freedom. On the contrary, village life was mainly reduced to a place for monetary exchanges, wage labour, procurement of starchy food, extra-familial sociality, and conflicts. The values assigned to both spaces seem to be progressively changing, with an increasing valorisation of the village lifestyle, as also remarked by Lewis (2001) among the Mbendjele. Such valorisation appears to go hand in hand with the adoption of "village people" values, morality and conception of social duty on their own society. The vision of "good life" in the village goes along with the adoption of cash crop cultivation and monetization (Köhler, 2005). The fact the great hunters are criticize for their absence of the village life stresses this polarity.

Another scale of analysis must be considered in the light of the sedentarisation trend. As already mentioned by Paulin (2010), the increase in the average size of the Baka villages (from 30 to 40 individuals to 100-400 individuals) renders impossible the maintenance of traditional egalitarian rules of sharing, and even tends to generate jealousy and suspicion about wild meat, as shown by Leclerc (2006) (see also Chapter 8). The regrouping of different lineages for elephant hunts was once an opportunity to work collectively and acquire an abundant resource. With the process of sedentarisation along roads and the social and spatial changes it implied, the Baka no longer take part in collective hunts. Collective hunting has been replaced by hunting often performed by only two men, co-opted by outside actors. As explained in Chapter 2, the composition of elephant hunting expeditions has been greatly reduced in the past years, the tuma and the middlemen preferring to leave

in reduced groups to avoid the risk of betrayal. Furthermore, as ivory has become the only purpose of these hunts, the abandon of meat signifies also the lesser necessity to leave with meat-porters.

My case study thus emphasizes that even though pachyderms are still slaughtered in the area, the Baka community does not access them easily due to the political and social issues described above. The village-based individuals thus point out to a single individual, the tuma, as the only responsible for the lack of sharing throughout the community and the subsequent jealousy and tensions. In a way, the tuma undergoes - as a scapegoat - the consequences of the Baka spatial and social dynamism and the difficulty of maintaining - in an economic, demographic, and political changing context - a social practice dependent on defined status, generating expectation from the whole community.

However, the perspective might be different from the tuma point of view. Indeed, it has been shown that sharing among egalitarian hunter-gatherers is mainly based on co-presence (Widlok, 2017). So, even if the tuma are willing to share meat, as elephant hunting occurs in increasingly remote area, they might share in priority with co-participants and closest kinship-related forest camps, and share less easily with people who do not live in the forest anymore. Tuma point of view would need to require more attention to have a complete perspective on this question. Moreover, this point shed light once again on the necessity to take into account the dissociation between village life and forest life in terms of social organisation and livelihood.

FROM MEAT TO ALCOHOL SHARING

Despite the impossibility of sharing a desired resource within larger groups, hunters continue to hunt elephants because of the lure of extra-community prestige and monetary gain. This monetization of the elephant hunting is a critical factor to take into account for the study of the changing function of the tuma. The amounts of cash income the tuma receive from the ivory trade also seem to be literally breaking the balance between people and their needs. However, the constant effort of social levelling is crystallized in a mistrust of all forms of power and success. Therefore, the accumulation of wealth generates jealousy and rumours and sometimes suspicion of hidden bonds with sorcery. But face to such impossibility to accumulate monetary or material wealth, the tuma might prefer to spend their income (or a part of it) in consumable goods, such as food, tobacco, and alcohol, or domestic tools (e.g., cooking pots, machetes, flip-flops, petrol for oil lamps). Thus, if meat cannot be shared ostentatiously in fear of ecoguards raids, or jealousy, the benefit of the elephant hunting might more likely be shared among in-laws and co-residents through market goods.

The increasing easiness of accessing alcohol (notably the new whiskey sachet[62]) has important consequences. If not paid totally in cash, a part of a wage might be directly paid in alcohol. Such instrumentalisation of hunters with alcohol is frequent and occurs also in agricultural work. By doing so, non-Baka often take a direct financial and social benefit of the recent addiction of the Baka to

[62] « Whiskey » *sachets* are the cheapest alcohol, very strong, containing 50ml of low-quality industrially manufactured alcohol with artificial additives. They are sold 100 cfa, arrived in the East Cameroon very recently (2010-2011), and already have a very harmful impact on health, notably fertility (Rozzi et al., in press).

strong liquors, and issue of chronic alcoholism. As emphasized by Townsend (2015), alcohol is often sold on credit, setting up relations of indebtness between Baka and non-Baka (Nzime middlemen or merchants), reinforcing Baka marginalization. For example, several informants reported that the announcement of a successful hunt is no more identified by the call for sharing meat, but by the drunkenness of the hunter at the dawn, after a night spent on his way back from the forest, drinking a part of his wage.

> *"The problem now is the alcohol [menyo]. The respected tuma, it was only in the past... We gave respect to tuma because they were sharing meat. Today, only the wine allows us to see they have hunted"* [A.A., female, 70 years old, MB village].

The use of cash income to acquire alcohol and tobacco is a practice that has already been highlighted by Coad et al. (2010) among the Pouvi of Gabon, who showed that more than 50% of the income from meat selling is used to buy alcohol and tobacco, notably among hunters with higher income. As observed, alcohol and cigarettes have the advantage of being easily sharable in small quantities and of allowing the one who share them to be appreciated by a maximum amount of people. Moreover, alcohol sharing and co-drinking echoes the recent development of disco bars playing modern music in Baka villages or nearby (Oishi & Hayashi, 2014), and is facilitated by the rapid monetization of the local economy (Köhler, 2005; Kitanishi, 2006 ; Oishi, 2012). Village bars (never managed by Baka) put music on demand, creating new forms of social space of recreation, highly appreciated by youth, and where alcohol (and consumerism in general) is valued[63] (Gallois, 2015; Oishi & Hayashi 2014; Townsend, 2015). Men having gained a high income, such as tuma, might be seen at such place sharing with everyone present the alcohol procured with his recent income, before leaving again to the forest for several days or weeks.

This situation shows a relative transfer of the object and context of sharing (from meat to alcohol and small gifts), but highlights a continuity in the pressure that the group exerts on the one who acquired a disproportionate amount of resources to share with village residents, notably by elders and women. It should be noted that although alcohol sharing might be seen as an alternative way to consolidate the hunter's social capital, it creates discord between the elders, who depreciate it, and the youth, who accept and valorise it. In sum, any other form of sharing does not, for most of the people, compensate the absence of meat sharing which is the resource that retains most of the attention.

5. Conclusion

This chapter aimed at describing changes in the way prestige is nowadays attributed among the Baka, and especially with regards to the 'master-hunter', the tuma. Results from the first part show that attributes of prestige and respect have changed over one or two generations. Additionally, I highlighted the link between being considered prestigious and hunting. I also found that people receiving deference show no wealth distinction, although they have higher incomes that might – supposedly- be redistributed.

The second part, based on local perceptions, brings additional insights to describe changes in sources of prestige. I showed that hunter's prestige is based on social obligations and on his social role linking the group to a resource he is the only one able to acquire because of spiritual and ritual reasons. In the specific context of elephant hunting, to provide elephant meat, an important food in terms of quantity and of symbol appeared as tuma's specific duty towards the community. Nowadays, the tuma hold an ambivalent position. They are still highly valued (notably by young hunters) for their knowledge, their skills, their ability to "encounter" the coveted animals, and the primal role of their "job" –to kill elephants– but also because of their involvement in a market logic and in social links to non-Baka who value them as experts in providing a high-value resource. However, while they might have the opportunity to show-off in front of co-residents, the benefits of their investment is rapidly dispersed in the consumption of goods that might be extensively shared (i.e., alcohol). In sum, we observe both a change in status and a change in function.

On the other side, in the eyes of some, the tuma are devaluated because of their lack of investment in the social duties of the activity they master. Beyond non-distributing meat among the village inhabitants, the tuma are blamed for a more general lack of responsibility towards the community. Baka informants mentioned the absence of village benefits from such high plus-value practices. The paradox of the change in tuma status is that they now let the meat to decay in the forest, a situation that potentially generates social tensions, notably from the ones who experienced the lack of meat in the village-based life. Tuma status and function are inherently related to the forest space, forest knowledge, and forest spiritual world. Therefore, his activities, his lifestyle and his "absences" might be highly criticized as a disinterest in the community's issues, especially by people who prefer roadside village lifestyle, showing the progressive adoption of a morality typical from their Nzime neighbours. Finally, at several levels, the tuma appears clearly as intermediary actor between the forest and the society, his knowledge of the forest and the elephant - forest animal par excellence - allowed social cohesion through extensive sharing of meat, something that they do not do anymore. Tuma's current perception highlights the increasing polarization between two spaces differently valued: the village and the forest.

The changing function of the tuma, becoming just an elephant hunter for wealthy partners, might also be credited to the progressive changing relations between the Baka and their neighbours. These relations are more and more economically-based, and affected by the increasing importance of ivory trade. The tuma - prestigious local figures and knowledge holders - are deeply instrumentalised

(notably with alcohol) to provide a global illegal market, which does not benefit the community, neither economically nor socially. As in the past (Robillard, 2012), Baka neighbours show a necessity to make alliances with great hunters to be efficiently supplied in meat. However, by becoming indispensable middlemen in the very organized ivory commodity chain, the Nzime also strengthen the material and ideological bases of their social and symbolic domination over the Baka.

The increasing value of ivory on the black market has deepened the contentious issues between conservation and subsistence economy. The central and complex role the tuma occupies in the ivory trade network is often overlooked. However, as a mediator between forest life and village life, the tuma should be better considered in the wildlife conservation strategies and upstream reflections.

Chapter 7

Baka perceptions of fauna changes

1. Introduction

In the last decades, a plethora of studies have described the defaunation in the Congo Basin and the causes of the bushmeat crisis (e.g. Fa et al., 2002; Milner-Gulland & Bennett, 2003; Abernethy et al., 2013 ; Ripple et al., 2016). Most of these studies have mobilized biological parameters and ecological models to describe and quantify both the big picture and the local variations regarding the bushmeat crisis (Robinson & Redford, 1991; Fa, 2007; van Vliet & Nasi, 2008; Yasuoka, 2006; Fa et al., 2016). However, data from these studies (i.e., market surveys, animal dung) are often difficult to interpret and results are often biased by a lack of accuracy or consistency in prey densities estimates (Noss, 1998; Fargeot, 2013), or do not consider the spatial heterogeneity (prey and hunters distributions) inherent in hunting systems (van Vliet et al., 2009).

In Central Africa, although the rapid faunal changes directly concern local people's wellbeing, threatening their food security or even leading to social conflicts (Nasi et al., 2008; Brashares et al., 2014), their views and knowledge of these changes are rarely assessed. However, such knowledge might provide critical information (Huntington, 2011), either to be a basis of action or to understand hurdles to resource management strategies or to conservation measures misrepresentation and rejection.

The institutional recognition of the potential of local knowledge for biodiversity conservation and resource management provided by the CBD (1992) led to a generalized interest in this knowledge systems. Local people's dependency toward the environment has allowed local communities to develop a deep knowledge on ecosystems functioning and species behaviour (Berkes, 2009). Based on long-term interactions with their resources basis, local knowledge form a basis by which local

communities perceive changes affecting the natural resources (Orlove et al., 2010; Leclerc et al., 2013). For this reason, LEK holders are increasingly considered as precious allies in the observation and the evaluation of environmental changes (Crate 2011). In the last decade, a handful of studies have been directed to local understandings of global environmental changes (GEC), or "indigenous way of knowing" (Berkes et al., 2000; see Pyhälä et al., 2016 for a review), with a particular interest on climate change (e.g. Berkes & Jolly, 2001; Fernández-Llamazares et al., 2015; Petherham et al., 2010; Reyes-García et al., 2016c). These researches highlight the potential contributions of people's knowledge and observations to better illustrate the local variations of these changes, to anticipate their own reactions in terms of adaptive strategies, and/or to properly adapt resource management strategies. Concerning faunal changes, local communities have been mobilized by several studies to analyse the abundance or the presence of species (e.g. Zimmerer 1991; Vaughan et al. 2003; Moller et al. 2004) or the population abundance and trends (Ferguson et al. 1998; Mallory et al. 2003; Van Holt et al., 2010; Sahoo et al. 2013; Fernández-Llamazares et al., 2016; Van Holt et al., 2016).

Recent scientific evidence attests the critical faunal changes driven by various human activities in the area (Yasuoka et al., 2014; Bobo et al., 2015). Because of their close relation with animals for several intertwined purposes (hunting, diet, cosmovision), the Baka are probably able to perceive these changes. Indeed, discussions about lack of meat, prey scarcity, or unsuccessful hunts are constant and infuse in daily discussions in the village. However, the notions of scarcity or depletion invoked by western conservationists are based on a western and scientific understanding of the environment that relies on ecological conservation concepts such as fauna density, abundance, source-sink dynamics, or habitat quality. Non-western populations, such as the Baka, may not perceive the environment and its changes in such terms, as their different ontology imply other types of interactions with non-humans (Descola, 2005). Local cosmologies and ontologies might consequently also deeply influence the perceived causality of such changes (Pyhälä et al., 2016). Several anthropologists have studied the specific way in which hunter-gatherers perceive the environment (Ingold, 1996; Bird-David, 1990; Descola, 2005), although the attitudes of the Central African hunter-gatherers towards fauna in the specific context of conservation have been examined only by Köhler (2005), Rickenbach (2015), and Lewis (2008). Lewis emphasizes that the western view of forest is focused on a value of scarcity, which is opposed to the Mbendjele Pygmies view of the forest as a place of abundance.

The divergence between western's and local's conceptions and local views might constitute an obstacle in the establishment of locally adapted conservation strategies. If the co-management of natural resources is now institutionally valorised, the local understanding of environmental changes critically need to be examined (Berkes, 2009). This chapter aims to present Baka's perspectives regarding local faunal changes. The two aims of this chapter are: 1) to give first evidences of individual Baka perceptions of faunal changes by looking at the species perceived as more or less abundant now than in the past and 2) to describe how these changes are experienced and explained by the Baka from their own point of view.

1.1. Scientific evidence of faunal changes

Today, in all Central Africa, the percentage of species unsustainably harvested range from 40 to 60 % (Fa et al. 2002; Nasi et al. 2008). The situation of the forest elephant is certainly the most alarming (Maisels, et al., 2013) as between 2002 and 2011 its population declined by 6% and the taxon lost 30% of its geographical range (Bennett, 2011). Beyond a global threat on fauna diversity, researchers highlight that the bushmeat crisis generates critical changes in faunal assemblages (Abernethy, 2013). Indeed, mammals species deplete differently according to the habitat and, notably, to the presence of human activity. Patterns found emphasize different prey depletion profiles (Bobo et al., 2014; Fa et al., 2015), different resistance to anthropogenic pressures (Oates, 1996), or the replacement of large-bodied mammals by others species (Fa et al., 2015). For instance, large-bodied species (primates, large antelopes, elephants) are more heavily targeted by commercial hunting and therefore more depleted more than other taxa (Noss, 2000; Laurance et al., 2006; Wilkie et al., 2011; Yasuoka et al., 2014). Moreover, as they have slower reproductive rates (Fa et al, 2002; Nasi et al. 2011), they are also more vulnerable, and present the highest risk of extinction (Dirzo et al., 2014). In addition, the removal of large-bodied species might led to critical cascading effects (Ripple et al., 2016) as many of them are keystone species (Redford & Feinsinger, 2003), providing important ecosystem services (Redford, 1992; Stoner et al., 2007). Smaller species remain more abundant, benefiting of better resilience, however they also seem to suffer from overhunting (Bennett & Robinson 2000).

Beyond estimates of prey densities and diversity, scholars have highlighted how prey animals might respond to anthropogenic activities, and notably to over-hunting (Frid & Dill, 2002; Fa & Brown, 2009; Ciuti et al., 2012). Anti-predator behaviours (such as vigilance) might increase in order to reduce mortality (Brown, 1999; Croes et al., 2007). Primates and duikers may notably respond to hunting pressure by becoming more cryptic, secretive, increasing their nocturnal activity and reducing the calls (Croes et al., 2006; Kumpel et al., 2008), and duikers might stop "freezing" at night when enlightened by front-lamp (Croes et al., 2007). Studies also describe how elephants' behaviour, and their displacements in forest, are affected by the « social trauma » of hunting (Bradshaw et al. 2005; Siebert 2006).

1.2. Baka view of environment and fauna

Animals, and specially prey species, are embedded at different levels of the Baka everyday life, notably meat sharing, illnesses etiology, and cosmovision. I have shown in Chapter 5 and 6 how meat sharing is valued and how it strengthens or restores social cohesion (see also Ichikawa et al., 2016; Joiris, 1998). As shown in the Chapter 5, wild animals are at the core of Baka perceptions of health, being mobilized in a causality scheme to explain most of their diseases and abnormalities. Following the same rule (called **kìlà**), circumstantial food avoidances, specific to each species, are practiced. These avoidances depend on the person´s life stage, and are largely oriented to avoid specific diseases in different contexts of "vulnerability".

A related aspect of this relation with animals is the mythological and ontological basis of this relation. Traditional tales, **lìkànɔ́,** allow the transmission of knowledge about the forest, about the specificity of animal behaviours, and about the spiritual and sacred world (Boursier, 1994). However, storytelling also describes how humanity, animality, and personhood are perceived. For example, in the case of the Baka, the **lìkànɔ́** systematically involve animals, as many of them recount how **komba**, the Creator-God, created the animal kingdom from human beings. **komba** created humans beings and then transformed some of them into animals based on specific bad or inappropriate behaviours. Beyond the primary transformation that relates humans and non-humans, the Baka also believe in post-mortem transformation (rebirth in a different shape), as well as in the possibility of transformation during life - called **mòkìlà**: a hunter might either becoming invisible or transforming himself into an animal during a hunt to approach his prey (Köhler, 2005).

For the Baka, the forest is a source of abundance and has been created by **komba** to provide and satisfy all their needs, notably the daily need of bushmeat, considered as vital in diet. Wild animals are thus being created just to be consumed, a view that largely differs from the primary meaning of the wildlife conservation that attributes inherent value to animal species (Joiris, 1997) or value scarcity while Baka, as the Mbendjele of Congo, tend to give value to the notion of abundance (Lewis, 2008).

Their environmental perceptions have thus been developed in a bounty of natural resources, exploited sparingly in a mobile lifestyle. Until recently, this very mobile lifestyle might have help them to develop an accurate perception of trends in density and abundance of a large number of forest species. As local knowledge is intimately related to cultural practices and beliefs (Woodley, 2005), Baka knowledge of animals might be more important for species to which they pay more attention, as for example species playing an important part in cultural representations or species used regularly (for example as food). However, recent social changes might have affected the way the Baka perceive their surrounding environment. Thus, the adoption of a semi-sedentary lifestyle in the last decades has changed their mobility pattern (Leclerc, 2010), which now implies more return trips to the forest from a village base. We might suppose that such changes entail adjustments in the way Baka perceive local fauna, which might now be more focused on animals surrounding the village.

2. Methods

The methodology used was oriented to answer to the two aims of this chapter. To address the first objective, i.e., to evaluate the perceptions of faunal changes through time, I used quantitative data; while to describe how these changes are explained by the Baka according to their overall perception of the environment I used qualitative data from ethnographic interview and discussions.

2.1. Baka perceptions of faunal changes

Sampling

To examine the local knowledge of fauna abundance, I used a systematic survey in which I asked individuals about their perceptions of environmental changes in game species comparing their memories of past abundances with perceptions of present abundance. The survey was held in the village of MB. I interviewed 36 individuals (23 men, 13 women), selected in different hamlets of the village, corresponding to various families and lineages. I choose to include women in the sample, as although they less often seek contact with fauna through tracking their presence in forest leads them to encounter animal traces, call, shoots as much as men do. Informants' age ranged between 18 and 70 years old (mean age: 39.3 years old).

Data collection

Drawing on Fernández-Llamazares and colleagues (2015), I used the informant's childhood as an individual baseline to assess perceptions of faunal population trends. Using the free enumeration technique (known as free-listing) (Puri & Volg, 2005), I asked informants to report a maximum of five game species that were more abundant in their childhood than in present times and five species that are more abundant now compared to the past. In the questions, "past" was explicitly explained to informants as "at the time you were starting to acquire a hunting experience alone", referring to the period an individual starts to have an independent mobility through forest and so a first enlarged perception of the faunal resources (in terms of game hunted by adults), so estimated between 16 and 18 years. These questions were often interpreted in terms of "visibility" (including both, the visibility of the animal itself, but also the visibility of paths or sounds). The survey was coupled with a question about proxy of encounters and remoteness for elephant, one of the most culturally valued species. The Baka were asked to estimate, in walking days from the village, the distance required to encounter elephants' foot print in the forest. Again the question was asked in relation to nowadays and their young years.

Data analysis

In order to report the faunal changes perceived by the Baka, I look at the species they consider as more visible in the past than during their childhood, as well as the ones they perceived as less visible nowadays. To do so, data derived from free listings were analysed separately on two lists ("increasing" and "declining" species) using Flame v.1.2. (Pennec et al., 2012). The lists (table 7.1 to 7.4) report only species mentioned at least twice by informants. I looked at the salience of the different items mentioned (known as the Smith's Saliency Index), which corresponds to the gross mean percentile rank of each species mentioned across all lists (relation between measures of frequency and order) (Smith & Borgatti, 1998). I provide the percentage of agreement in the responses for each species, i.e., the number of times the species was reported divided to the total number of informants who answered the question.

I first analysed the pooled data and then looked at the differences according to the age of the respondent, differentiating between informants in three age groups: 18-30 years, 31-50 years, and 51-70 years old.

Baka overall perception of fauna population trends (emic view) was compared to IUCN species trends (IUCN, 2016) and vulnerability status (etic view). It should be noticed, however, that the IUCN trends are produced at the regional scale, and therefore do not take into account the local variability. To provide more accurate local trends, I complement the UICN with regional studies (Laurance et al., 2006; Bobo et al., 2015). The data used by Bobo et al. (2015) were notably collected at the same period than mine in a relatively close area (north part of the Boumba-Bek and Nki National Parks).

2.2. Examining Baka perceptions of abundance

To strengthen the anthropological insight of the global analysis, each survey was followed by open questions asking the informants to develop the reason why, according to them, the reported changes had occurred, and their perceptions of environmental changes in general. Each interview lasted between 10 and 15 minutes. Information from these interviews has been analysed qualitatively by noting recurrences in information provided by different informants and nuances in the elements of the discourses.

3. Results & discussion

3.1. Perceptions of the faunal changes

Globally, people interviewed mentioned a change in the current and the past faunal composition on their territory (Tables 7.1 & 7.2).

Table 7.1 shows that the species mentioned as "less visible" nowadays are mostly large-bodied mammals: forest elephant, red river hog, gorilla, large duikers, giant pangolin, African buffalo, and chimpanzee. A large majority (66%) agreed that elephants are much less encountered nowadays than in the past. This species is the one often mentioned first. All the species mentioned by the Baka as enduring a negative trend are also reported as enduring decrease (Laurance et al., 2006; Bobo et al., 2015). For example, Bobo et al. (2015) showed that large duikers, such as Peter's duiker, and elephants have fewer presence in areas where higher human activities are recorded, and that Red river hogs' distribution clearly correspond to less populated areas.

Most of the species in Table 7.1 are mammals rarely or never hunted nowadays (see hunting offtakes in Chapter 4). Interestingly, the species reported in this category are all mammals of remarkable cultural importance, carrying strong symbolic values, and most of them are among the most preferred meat (see Chapter 5). Each species have been differently discussed by the Baka during this survey, stimulating different reactions or stories. For example, reports of elephants often generate discussion about the rarity of elephant meat in the village or the time required nowadays to find their paths, while reports of less presence of apes stimulate systematic reactions related to the proximity they maintained with humans in the past (*"before we heard them from here, they were just here, behind the houses, they were close to us").*

Table 7.1. Animal species reported (at least twice) as less visible nowadays than in the past, in comparison with scientific trends and conservation status

Scientific name	Vernacular name	IUCN status	Population trend (IUCN, 2014)	Reaction to human settlement and activities69	Total number of reports as "less visible nowadays"	% of agreement as less visible nowadays	Smith index
Loxodonta africana cyclotis	ya	VU	Decreasing[70]	Decreasing	24	66.67	0.500
Potamochoerus porcus	pame	LC	Decreasing	Decreasing	20	55.56	0.429
Gorilla gorillla	ebobo	CR	Decreasing	Decreasing	15	41.67	0.199
Cephalophus callipygus	ngendi	LC	Decreasing	Decreasing	10	27.78	0.193
Smutsia gigantea	kelepa	VU	Decreasing	ND	10	27.78	0.144
Syncerus caffer	mboko	LC	Decreasing	Decreasing	9	25	0.116
Pan troglodytes	seko	EN	Decreasing	ND	8	22.22	0.106
Cephalophus dorsalis	ngbomu	NT	Decreasing	Decreasing	7	19.44	0.150
Tragelaphus eurycerus	mbongo	NT	Decreasing	ND	7	19.44	0.116
Panthera pardus	sua	NT	Decreasing	ND	6	16.67%	0,053
Philantomba monticola	dengbe	LC	Decreasing	Increasing	6	16.67%	0,111
Atherurus africanus	mboke	LC	ND	Increasing	6	16.67%	0.050
Hylochoerus meinertzhageni	bea	LC	Decreasing	ND	5	13.89%	0.069
Orycteropus affer	kpinya	LC	ND	ND	5	13.89%	0.037
Cephalophus sylvicultor	bemba	NT	Decreasing	Decreasing	2	5.56%	0.014

Table 7.2. Principal animal species reported (at least twice) as more visible nowadays than in the past, compared to scientific trends and conservation status

Scientific name	Vernacular name	IUCN status	Population trend (IUCN, 2014)	Reaction to human settlement and activities	Total number of reports as "more visible nowadays"	% of agreement as more visible nowadays	Smith index
Philantomba monticola	Dengbe	LC	Decreasing	Increasing	18	69.23	0.600
Atherurus africanus	Mboke	LC	NC	Increasing	13	50	0.262
Arboreal monkeys[71]	Kema	-	Decreasing	Decreasing	12	46.15	0.249
Cephalophus callipygus	Ngendi	LC	Decreasing	ND	10	38.46	0.258
Cricetomys emini	Gbe	LC	Stable	Increasing	9	34.62	0.220
Cephalophus dorsalis	Ngbomu	NT	Decreasing	ND	8	30.77	0.253
Manis tricuspis	kokolo	VU	Decreasing	ND	7	26,92%	0,063
Pan troglodytes	seko	EN	Decreasing	Decreasing	5	19,23%	0,080
Potamochoerus porcus	pame	LC	Decreasing	Decreasing	3	11,54%	0,035
Gorilla gorilla	ebobo	CR	Decreasing	Decreasing	3	11,54%	0,049

Table 7.2 presents the species perceived as increasing, i.e., the species reported as more visible nowadays than in the past. The Baka interviewed reported an increase of abundance of several small-sized mammals, such as the Blue duiker, and the Brush-tailed porcupine, but also, surprisingly, monkeys.

Observations provided by the Baka about Blue duiker and porcupine match with trends recorded by ecological studies, which consider that those two generalist species are more resilient and resistant than others, such as larger specialist mammals that might have endure local depletion (van Vliet & Nasi, 2008). Indeed, Blue duiker and Brush-tailed porcupine seem to be still abundant in areas close to villages, even if they have been long subject to a high hunting pressure (Lahm, 1996, Muchaal & Ngandjui, 1999, Hart, 2000; van Vliet & Nasi, 2008), arguably because they are able to persist even in extremely small fragments. In south-eastern Cameroon, it has been recently shown that Brush-tailed porcupine and Blue duiker are more present in areas with higher presence of human activities (Yasuoka et al., 2014; Bobo et al., 2015). The same finding applies to the Emin's pouched rat, which thrives in disturbed areas.

The species perceived as more visible now than in the past correspond to the most hunted species (cf. Chapter 5). Therefore, these results raise one critical question: it could be that the Baka hunt more these species because they are more abundant than in the past. However, do the Baka report an increase in the numbers of these species because they are more abundant, or just because they are more visible to their eyes, given the depletion of large mammals around human settlements? Unfortunately, our data does not allow going further on this point. A bigger sample and differentiation between expert hunters and non-hunters (as in Van Holt et al., 2016) would have been useful to strengthen this argument.

The trends perceived by the Baka do not go systematically in the same sense than the ecological literature. The fact that monkeys (**kémà**)[64] are considered more abundant nowadays than in the past (Table 7.2) contradicts the trend found in the scientific literature. Ecological studies on monkey population show that as hunting pressure increases, the number of primates in an area decreases (Oates, 1996) and that monkey species resist much less to hunting pressure than blue duikers and porcupines for instance (Nasi & van Vliet, 2008). A recent study even suggests that primates are the first group to be depleted in case of high bushmeat hunting pressure (Fa et al., 2015). Only one person, out of the 36 people interviewed, mentioned encountering now fewer monkeys than in the past, while almost half of the interviewees report an increase of monkeys presence.

[64] Monkeys are most of the time elicited by the Baka as a whole, with the categorial term **kémà**.

FAUNA PERCEPTIONS, BY AGE GROUPS

I analysed faunal changes perceptions according to age groups. People from 18 to 30 years of age mentioned 16 species as less visible nowadays, whereas people between 31 and 50 mentioned 17 species, and people between 51 and 70 mentioned 13 species. For the list of species reported as more visible today, people in the age range 18-30 mentioned 12 species, people in the age range 31-50 mentioned 15 species and people above 51 mentioned 5 species. People in the medium range (31-50) reported more species in both cases. However, the list of species reported differs according to age groups. Two cases particularly retain our attention here: the perceptions of elephant abundance (in table 7.3) and monkey abundance (in Table 7.4).

Baka elders reported an increase of monkey abundance through time. Although all age groups share this perception, this view is mainly reported, in terms of saliency by the older people. A potential explanation might be that their perception of prey abundance is less accurate due to lesser direct observation and prey encounters, as they tend to spend less time in forest than people from other age groups. At the same time, the young hunters might conceive that the abundance of monkeys may have remained the same between nowadays and their recent baseline of observations (around 16-18 years old, when they started to hunt actively). Indeed, as shotgun hunting became more and more common in the last decades, it generated a higher hunting pressure especially on arboreal monkeys, which are only accessible with shotgun. We might expect that the elders' perception might differ from young hunters by the increasing harvest of monkeys with shotguns, which were more rarely hunted in their younger ages and more frequent now in the diet.

The case of the elephant is interesting because each age group perceive elephant abundance differently. People under 30, age group that includes several elephant hunters, mention the elephant as the most decreasing species, while elders cited this species only in third position (Table 7.3). Elders accord much more importance to the dwindling of River hogs and Peter's duiker, this latter being much less reported by younger generations.

I used the case of the elephant to capture variations in the perception of wildlife changes. Specially I asked *"how many days do people need today to encounter elephant prints in the forest, from here?*". Responses vary from 1 day to 10 days. In average, men report that 4.8 walking days in forest are now needed (n=26), while women reported globally a higher estimation: 6.1 days (n=9). Asking about the numbers of days needed to encounter elephant footprints in the past, women still tend to report higher estimations (1.9 walking days, n=8) than men (1.3 days, n=29). Elephants were, unsurprinsingly, perceived as much closer to the village in the two last decades.

An analysis taking into the age allows to show the perception of the increasing remoteness of elephant populations. We observed that older people (51-70 years old) reported that only less than one walking day was needed in the past to find elephant's paths in their early years (so between 1965 and 1985), while the young Baka mentioned than almost two full walking days were required in their own past years (after 2005).

Table 7.3. Dwindling faunal species (i.e., considered as less abundant nowadays than in the past), by age groups

Age 18-30 (n=17)		Age 31-50 (n=21)		Age 51-70 (n=7)	
Species	Saliency	Species	Saliency	Species	Saliency
Forest elephant	**0.638**	Red river hog	0.528	Red river hog	0.448
Red river hog	0.297	**Forest elephant**	**0.484**	Peter's duiker	0.400
Lowland gorilla	0.206	Giant pangolin	0.216	**Forest elephant**	**0.281**
Blue duiker	0.185	Lowland gorilla	0.195	Bai duiker	0.229
Bai duiker	0.169	African buffalo	0.141	Sitatunga	0.229
Peter's duiker	0.154	Giant forest hog	0.141	Lowland gorilla	0.193
African buffalo	0.149	Porcupine	0.141	Chimpanzee	0.157
Sitatunga	0.128	Peter's duiker	0.134	Porcupine	0.064
Giant pangolin	0.117	Blue duiker	0.125		
Chimpanzee	0.108	Leopard	0.116		
Leopard	0.077	Bai duiker	0.100		
Aardvark	0.056	Chimpanzee	0.083		
		Aardvark	0.075		
		Sitatunga	0.056		

Table 7.4. Animal species reported (at least twice) as increasing, considered as more abundant nowadays than in the past in terms of saliency of reports, according to age of the informants.

Age class : 18-30 (n= 17)		31-50 (n= 21)		51-70 (n= 7)	
Species	Saliency	Species	Saliency	Species	Saliency
Blue duiker	0.664	Blue duiker	0.525	Blue duiker	0.667
Emin' pouched rat	0.320	Peter's duiker	0.433	Monkeys	0.583
Porcupine	0.285	Porcupine	0.306		
Bai duiker	0.274	Bai duiker	0.296		
Monkeys	0.139	Monkeys	0.267		
Peter's duiker	0.091	Emin' pouched rat	0.183		
Sitatunga	0.091	Chimpanzee	0.175		
Tree pangolin	0.086	Tree pangolin	0.088		
Lowland gorilla	0.073				
Red river hog	0.059				

In sum, the Baka from all ages perceived the local depletion of large-bodied mammals (elephant, apes, large duikers) and their replacement by small-bodied mammals consistently with ecological studies. Indeed, the dwindling of large-bodied mammals might have created for smaller ones a favourable space for increasing in abundance, even in a scenario of high hunting pressure (Fa et al., 2015). Thus, both the composition of species hunted by the Baka (Chapter 5) and Baka perceptions of changes in faunal composition dovetail with results from biological studies measuring hunting impacts on fauna.

However, such perceptions should be put into perspective with an emic view that takes into account Baka relation to forest space and cultural representations of the animal world. Anthropological insights are thus critical to point out the potential biases brought by the etic notions of decline and abundance conveyed by the above surveys and with which the Baka are not familiar. This is the aim of the following section.

3.2. Local explanations of faunal changes

I have shown that the Baka observed changes in fauna composition and that the fauna trends they described present intracultural variations (sex and age) as well as commonalities and divergence with scientific assessments. During interviews, Baka provided different sets of explanations for those changes. According to Baka emic views, the faunal changes observed are driven by two distinct factors: 1) an external driver: over-hunting by non-Baka with firearms, which is coupled with the increasing number of humans into remote forest areas, and in general new forest activities affecting animal density, its behaviour, and its mobility, and 2) an internal driver: the lack of luck in hunting explained by changes in the relation with the supernatural world.

Informants diverge in their narratives regarding the potential consequences of the present situation: while some interviewees do not conceive the possibility of a decline in abundance and a potential extinction of certain species, others mention a probable end of the prey animals. I develop these different narratives in this section.

Shotgun, over-hunting by non-Baka, and changes in animal behaviour

> *"There is still some game in the forest, but less. Overall, it is money that makes game scarce, because now we consider game as a trade item"* [G.H., male, 53 years old, MB village].

Among people who acknowledge defaunation, the two main causes invoked are: 1) the generalized use of shotgun and 2) the fact that now hunting occurs night and day. The Baka argue they have a weaker

hunting pressure compared to non-Baka hunters, as it has been shown recently by Fa et al. (2016) who compared hunting pressure between Pygmies and their neighbors, using among others, our hunting data from MB village. When taking about drivers of defaunation, the Baka never blame themselves, but rather accuse the Nzime or foreigner hunters who are more likely to practice full-time hunting with better gears (shotgun, front-lamp, more snares). For example, the Baka express anger when motorbikes driven by people from neighbouring regions pass through the village carrying a large amount of game freshly killed in "their" forest. In a period when access to meat is highly regulated and controlled, the Baka manifest a feeling a frustration regarding the disproportionate amounts of prey game being illegally extracted by non-Baka (see also next chapter). They argue that although it is their forest, they do not have the same means of transportation (motorbikes that ease access to area richer in game) and hunting gears (given their conditioned access to shotgun via the Nzime owners) to extract meat as much as the non-Baka.

> *"Before the Baka were hunting much more than now, nowadays it is the contrary, the Nzime kill much more than before, now they 'enter' in forest, it is new"* [J.B., male, 38 years old, EL village].
>
> *"In the past days, it was the Baka who commanded the forest. Today it is the Nzime man who 'eats' everything: timber, game, gathering products"* [M.M, male, 62 years old, MB village].

In an area where game is scarce, the Baka notice that some hunters use shotguns to kill large birds or porcupines, a practice they consider inappropriate regarding the cost of cartridges. Other Baka manifest a deep anger against hunters who kill baby elephants to obtain even the smallest tusks. Hunting at night, with front-lamps, is perceived as harmful too, mostly among the elders, who mentioned that this was "a restless hunt".

Aside from the direct effect of hunting on biomass extirpation, the Baka draw their attention to the escape effect propitiated by human activities in general and hunting in particular. As observed by Fernández-Llamazares and colleagues (2016) among the Tsimane', many Baka explain changes in animals behaviour due new human activities in forest that disturb animals and push them to sink deeper into the forest, moving away from a disturbed territory.

In conceptualizing the local environment, the Baka seem to divide it between two spaces: the village forested surroundings, frequently travelled, and the remote forest, where they walk less steadily. While the Baka agree that most of the large mammals have disappeared from the villages surrounding, they also believe that these animals are still foraging in remote forest areas, "inside the forest" according to their terms (**a to bele**). A Baka hunter notes that *"the problem is not that some species might disappear but rather that it will be difficult to hunt them"*. In other words, for the Baka the issue seems more related to distance than to a perception of a real decline in abundance. The animals are perceived according to their own mobility patterns, some being able to cover larger forest areas (such as the aardvark or the elephant), and so to flee further, than others (such as the Blue duiker).

"The way people hunt will cause the elephant to move away, but the elephant can not disappear." [G.H., male, 53 years old, MB village].

"The elephants are fleeing the loggers and their tracks in forests, the noise of the guns and the chainsaw. In the past the spear did not make any noise" [V.N., female, 35 years old, MB village].

Thus, many Baka conceive the faunal changes in terms of behavioural changes as a result of human disturbances. Several interviewees acknowledge behavioural adjustments made notably by duikers in responses to hunting pressure. For example, they mentioned that a group of large duikers might flee by fear (called **mbuèmbuè**) to another area if one of them has been caught in a place where the rest of the herd "*will never come back to that place*". Indeed, this view is close to observations made by ecologists working on the behavioural plasticity resulting from the interactions between experience (learning) of the animals and their innate behavioural responses (Allendorf & Hard, 2009; Mery & Burns, 2010). In Central Africa, the behavioural responses to hunting pressure have notably been among the arboreal monkeys (Laurance et al., 2008; Remis & Jost Robinson, 2012). Animal adaptation, manifested in an increasing vigilance, also seems well known by informants. Male hunters stress that the mammals are there but do not *"show-off",* i.e., they are wiser and calmer, more cautious or "prudent" in their movements, or that diurnal mammals now move at night, that monkeys and duikers have stopped shooting or answering to hunter's mimicry calls.

"Animals today are wiser than before. They are there, but calmer, not to show that they are there. Of course those who have the shotguns hunt a lot, but they cannot finish the game" [J.-L. A., male hunter, 45 years old, MB village]

Disturbances that affect animal behaviour also relate to sound and smell. The noise appears for the Baka as the main driver affecting animal behaviour, notably noise emitted by logging trucks, bulldozers and chainsaw, but also shotgun blast. Also animals, and notably elephants, are said to be very sensitive to human smell or fire smoke (as it signifies human presence). The increasing presence of small hunting camps, notably snaring camps (**sàkɔ)** and the enlargement of cacao Nzime camps are considered as a multiplication of areas emitting smoke and odour, which make the animals flee away. Baka hunters are in fact deeply aware of animals' (and particularly elephant) capacity to detect human smell and presence. In that sense, it is worth noticing that the elephant hunters, the tuma, are said to be able to approach the prey without being seen thanks a specific power obtained with invisibility (Kölher, 2000), consisting of applying vegetal unguents of the hunter's skin, which likely mask human odour.

The fine Baka understanding of the hunted prey behaviour seems to push some Baka to believe that animals are just "hiding" but will never disappear. A believe that fundamentally differs from

arguments of the western conservationists warning about the scarcity, depletion and extinction of the same animals.

On another side, I observe that some Baka hold a very different discourse, showing a relative awareness of the implications of defaunation for their subsistence. These other Baka, quite similar to conservationnist discourse, seem to relate the increasing remoteness of the prey species with the idea that hunted species might reach extinction:

> *"Yes, the game might finish one day, because now if you got the gun you must walk long to find the game. People hunt too much. The children that will be born will not know the species, not see them".* [D.A., male, nganga, 60 years old, MB village].

> *"They protected the animals for the children to see them, and for not their parents end them all"* [R.N., male, 43 years old, DK village].

> *"What the brigades [ecoguards] do is good. My grand-children need to see the leopard and the elephants. Now I hunt less than before. People who have moderate hunting are mainly the elders, they hunt less because they have a family and are too old to go to jail".* [J.M., male, EL village].

Interestingly, these people tend to speak about faunal changes in similar ways, i.e. highlight the risk that children in a few years won't "*see*" the animals, and emphasize a non-utilitarian value to fauna rather than a function in diet or symbolic aspects in which animals are often related in Baka cosmovision. We could think that this alternative view is based on a higher knowledge and higher presence in forest of these informants. However, it would be more relevant to examine to which extend such perceptions is rather based on the reproduction of discourse heard during workshop attendance, or the influence of external ambient discourse held by e.g. the Nzime and ecoguards about the wildlife depletion and the justification of hunting regulations (as suggested in other context by Marin & Berkes, 2012; Fernández-Llamazares et al., 2016).

Some others knowing the conservationist discourse of awareness about future, notably future diet, but stay sceptical about the defaunation:

> *"These people [WWF and ecoguards] say that it is better to keep the animals in order to allow children like my child Noni [3 years old] to eat them. But me I don't believe that game can end one day".* [D.A., male, nganga, 60 years old ,MB village].

The idea that the game will never finish is also used by people who contest the idea of defaunation arguing that there are still as many animals as before. While acknowledging the lack of meat, informants often point out the repeated lack of success and lack of chance in hunting activities to explain it. In a certain way, each unsuccessful hunt is perceived as an isolated event whose failure resulted in a circumstantial causality, directly related to the event. In other words, they do not perceive them as a trend. This type of explanation is deeply rooted in the way hunting is perceived among the Baka as a symbolic practice embedded in cosmological relation with environment and social norms and morality.

From the etic, western, point of view, a successful hunting would be the result of two factors: the hunter's skill and experience and the hazardous nature of the encounter with a prey animal (or the possibility the prey passes where a snare trap has been set up). However, for the Baka themselves, even if skills are valorised, the hunting success is less dependent on ability than on luck in encountering a prey.

Perception of wildlife abundance by the Baka is intrinsically related to their repeated hunting activities, which leads to a "cumulated" knowledge about the resource. Thus, as the encounter with game is directly related to the possibility to bring game back to the village, the "absence" of animals is subsequently explained in terms of unsuccessful hunting expeditions (or empty snare traps). Hunting, and encountering prey, is then not a matter of hazard but rather of luck. Therefore, many hunters do not justify absence of prey encounters or returning to the village without game by an absence of prey on their hunting territory, but by repeated misfortune. As already widely highlighted by Joiris (1998), the role of fortune and misfortune in hunting success is an omnipresent notion in Baka thought. It is the main perceived causality factor determining their access to natural resources. Luck and misfortune have also their own causal scheme, as hunt has to be led in "good conditions", which relate to good relations with spirits, propitiatory remedies, proper social and conjugal behaviour, cohesion and social harmony in the village. The generalization of causality to explain that the scarcity of game might be a key factor to consider.

This luck or good fortune (called **libanjò**) might be call in and provoked, notably by the use of different remedies and consultation of the nganga. Hunting success and luck also depend on good relations with forest spirits, as well as the respect of the social rules, **kìlà**, consisting in meat sharing and precise norms of avoidances. Thus, the hunter's failure in encountering a prey will be mostly explained by not following the appropriate social behaviours, such as spilling an animal's blood during hunter's wife menstruations, having sexual intercourses during that period, infidelity or breaking a temporary taboo.

4. Conclusion

This chapter provides first insights on two different but related aspects of the Baka perception of the environment in a context of faunal changes: 1) knowledge of changes and species abundance and 2) cultural explanations and perceived causality of these changes.

I have shown that the Baka perceive local changes that concern both the culturally important species and the most hunted species and explained them in terms of adaptations at different levels. This view goes in the same direction than recent ecological studies which highlight the modification of wildlife assemblages in Central African forests due to human activities. The Baka assessment of faunal composition is however fragmented, presenting differences notably related to informant's ages, or concerning certain species. These preliminary results raise the question of the cognitive aspects of the perceptions of environmental changes, calling -for example- for the concept of reference baselines, which has not been analysed here. Based on these first findings, in the future a bigger sample could allow to investigate such perceptions, and their intergenerational variations with the concept of Shifting Baseline Syndrome (Fernández-Llamazares et al., 2015 ; Kai et al. 2014; Papeworth, 2008).

One caveat of this chapter is not to have isolated the knowledge of wildlife changes of the "experts", i.e. the best hunters, in order to test whether their perceptions are different than the perceptions of non-experts, or biased, due to both their knowledge and their larger time spent tracking prey species. However the sample used here was too small to drive generalizations. Analysing experts' knowledge of prey abundance Van Holt et al. (2016) recently showed that hunting experts are affected by cognitive biases, and for this might be the most difficult individuals to convince about management plans because they globally perceive higher prey abundance than the rest of the community.

In a second part, I have stressed that the Baka might conceive and explain the situation of resource scarcity based on the cultural and cosmological vision of the relation between humans, animals and the forest. The perceived causality is mainly attributed to over-hunting practices by their neighbours or non-local poachers; however the Baka importantly present other factors of causality, notably lack of luck, which is more embedded in their cultural representations of hunting and relations between hunters and preys. Unfortunately, the sample of this study was not large enough to test individual variations and relations between individual profiles and values attribution (such as Rickenbach et al., 2016) recently did among the Aka).

The information presented here lead me to infer that the Baka, rather than perceiving the forest as scarce or threaten, mostly perceive it as an inexhaustible environment, where resources are of course subject to changes and adaptations, but not to depletion or extinction. To some extent, the Baka consider forest as a « parent » in the sense of Bird-David's metaphor (Bird-David, 1990). Like proposed by Hewlett for the Aka (2014), Kölher for the Baka (2005), and Lewis for the Mbendjele (2008), we might

postulate that Baka worldview is similarly based on such economic behaviour where forest is a perceived as “giving” parent, a provider. In such relation, typical of animist cosmology (Bird-David, 1999), people trust the forest to share with them all what it can give. In such ontological framework, this parent cannot stop giving to humans. However, it is up to humans to be respectful with the balance linking spirits, animals and humans, by respecting the rules of **kìlà**, i.e. sharing and avoidances. If Baka do not respect the rules of sharing and food avoidances, **komba** will not restrain the animals but rather the humans will “pay” by developing illnesses whose animals are the symbolic transmitters. In the sense of the « giving environment » conceptualized by Bird-David, the forest played a nurturing role (Ingold, 2000) where exists an analogy between the sharing process from the environment to humans and the sharing between humans. If the forest is generous by providing abundance, the human must do the same, thus the whole process being embedded in an ideological ethic of generosity by respecting sharing rules within the society, as I have argued in Chapters 6 and 7.

The discourse of luck as a way to justify wildlife scarcity through repeated unsuccessful hunting is interesting as it reveals a difficulty to generalize isolated events at a wider scale, and therefore perceive a global depletion. Consequently, the situation of game scarcity is rarely directly perceived as a real threat for their livelihood, while in the same time the decreasing share of meat in their diet is indeed a reality they clearly observed. However, bad luck and its driving forces result in temporary socio-cosmological disorders, which might always be fixed with responses of the same order. This example is a good illustration of the difficulty for western conservationists to prone legitimacy of hunting regulations face to local cosmologies and institutions, social values and norms. Indeed, if involvement and understanding of local people in conservation depend on external incentives, social norms, cognitive factors and beliefs play also a large role (Millner-Gulland & Rowcliffe, 2007). According to Cooney et al. (2016), the costs and the benefits of supporting conservation interact and have necessarily deal with these social values and local perceptions.

Chapter 8
Baka reactions to wildlife conservation

A shorter version of this chapter has been submitted, accepted and will be published as follows: Duda R., Gallois S. Déclin de la faune et conservation au Sud-est Cameroun : Savoirs et perceptions des Baka. In *Le devenir des peuples autochtones pygmées à l'orée du 21ème siècle.* Coll. Questions Autochtones. GITPA (Groupe International de Travail pour les Peuples Autochtones).

1. Introduction

The previous chapter has shown the challenges of conciliating different views of the environment and bringing Baka's cosmovision and western conservation interests together. Beyond the theoretical mismatch between western conceptualization and local perceptions of biodiversity conservation, the actual implementation of western conservationist ideas in Central Africa has been shown to have direct impacts on local livelihoods.

The study area is subject to several environmental regulations, from logging to climate change issues (with REDD+ projects) (Ichikawa, 2014; Ichikawa et al. 2016), from which hunting regulations are the ones that more directly affect the Baka. Baka hunting practices and relations to wildlife are first and foremost fundamentally embedded in cultural and identity-related aspects of the society and, as discussed before, they affect social cohesion, cosmovision and wellbeing. However, nowadays these practices are entangled into a multi-scale and complex system of regulations that, in conjunction with political and economic issues, restrict their rights to access resources needed for their livelihood (Ichikawa, 2006; Matsuura, 2017).

This situation has indeed become a human rights issue (Pyhälä et al., 2016; Matsuura, 2017; see Lewis, 2016 for the same situation in Congo), notably since indigenous rights NGOs recently disclosed moral and physical abuses against the Baka in the context of coercive measures taken for wildlife conservation (Hardin et al., 2008; Survival International, 2017). Baka perceptions of this complex situation and their responses to wildlife policies have, paradoxically, not received much attention from scholars. To fill this gap, this chapter examines how the Baka perceive conservation agents and the way conservation regulations (and specially hunting regulations) are enforced on their territory.

1. 1. Contested conservation and the role of NGOs

I have already resumed how, after the failures of the top-down conservation model (Hulme & Murphree, 2001), conservation projects have, since the 1990´s, progressively promoted and integrated local participation under a new paradigm of community-based conservation (see Chapter 1). In the Congo Basin, the implication of local people in environmental conservation projects is consequently, at least in theory, more and more expected and scrutinized. However, local people remain evicted from "fortress conservation" areas, and poorly involved in practice and rarely enjoy the benefits of conservation (West et al., 2006; Ichikawa, 2014), while wildlife depletion, large scale poaching and trafficking networks continue to be overlooked or supported by state corruption (Lewis, 2016).

As detailed in Chapter 1, the new resources management institutions developed at local scale (such as the Community Forests) because they overlooked the social cleavages, power relations, and cultural frameworks, have been mainly described as ineffective but also resulting in many negative impacts for local populations (i.e., the increase of illegal hunting, state corruption, and traffickers not being adequately tackled) (Oyono et al., 2006a; Robillard, 2010; Bigombe Logo et al., 2010; Bennett, 2014). Moreover, it has generated rapid negative reactions and rejection of conservation initiatives (Brockington, 2004).

Given the limited financial and technical resources available for conservation and development in remote areas such as south-eastern Cameroon, the State has often delegated the implementation of conservation measures to Big International NGOs (known as "BINGO"), and notably to WWF. The relative stranglehold of BINGOs on local environmental issues has -to some extent- recreated a new form of top-down conservation management, in which local communities are poorly involved. Such organizations rather engage in what Lemos & Agrawal (2006) call a "hybrid environmental governance", where - rather than constructing direct links with communities - NGOs establish, for example, partnerships with companies to fight anti-poaching in logging concession areas (Hardin et al., 2008). In parallel, the increasing presence of firearms and illegal hunting has resulted in the use of force as a reaction to tackle the problem. This has reduced the wildlife conservation strategy to anti-poaching raids, and to a punitive "guns and guards" approach, consisting in a militarization of conservation (Duffy, 2014; Duffy et al., 2015).

In that context, human rights organizations have increasingly started to scrutinize the respect to human rights and wellbeing derived from the implementation of anti-poaching measures (Matsuura, 2017). Indeed, the issue of human rights in relation to indigenous peoples restriction of access to land and resources has long been recognized (Martinez-Cobo, 1981; Brockington et al., 2006), but emerged in the 2000s as a central element in debates about the political ecology of conservation (Sunderlin et al., 2005; Brockington et al., 2006; Chan et al., 2007; Hardin et al., 2008). These debates emphasized the challenge of combining poverty reduction and western conservation priorities, notably pointing out to legislation

that makes land occupation and resources use illegal, neglecting local practices, needs and rights, and the social impacts of wildlife conservation measures. From this research, we know that some of the wellknown social impacts of conservation are local impoverishment and involuntary displacements (Brockington & Igoe, 2006; Cernea & Schmidt-Soltau, 2006, Schmidt-Soltau, 2009; Schimidt-Soltau & Brockington 2007). Moreover, as the conservation model is often applied beyond the boundaries of protected areas (e.g., in Cameroon hunting regulation is enforced across the entire forested part of the country) the impact of such policies in considerably large.

1. 2. BAKA RIGHTS AND ECOGUARDS' ABUSES

Human rights issues in conservation occur all throughout Central Africa. In a recent study in the Congo Basin conducted by Rainforest Foundation UK, conflicts between local people and parks managers or ecoguards were reported in 21 of 24 parks for which this information was available (Pyhälä et al., 2016). In Cameroon specially, violence experienced by local people due to hunting regulations enforcement have recently attracted international attention. In February 2016, a complaint was submitted by the UK-based indigenous rights NGO, Survival International (SI), to the OECD regarding the activities of WWF in the area[65]. The report points out human rights violations within the implementation of conservation measures around south-eastern Cameroonian protected areas, notably violence and abuses practiced by Cameroonian civil servants, mostly ecoguards in charge of hunting law enforcement (Survival International, 2016). Survival International broadcasted videos featuring Baka testimonies of violence conducted upon them during anti-poaching controls[66], in which WWF agents were directly accused. This event has brought to public light the issue of Baka rights regarding hunting, and questioned the potential and indirect WWF's implication in the violation of human rights[67]. If it has been revealed to the public recently, the situation is not new. In the last decade, in south-eastern Cameroon, the illegal wildlife trade has been increasingly handled as a national security problem, given the recent arrival of automatic rifles that has precipitated and fueled externally-driven illegal elephant hunting for the global ivory trade[68]. According to WWF, the Cameroonian government has seized 100 Kalashnikovs in the south-eastern area between 2007 and 2014 (WWF, 2014). Intensification of elephant hunting has led to a reinforcement of anti-poaching operations in the area surrounding Boumb-Bek, Nki and Lobeke National Parks through increasing financial means and partnerships between Fauna and Forest Ministry (hereafter MINFOF) and WWF. The situation has also led to an intervention in the studied area by BIR (*Bataillon d'Intervention Rapide*), a military elite corps created to eradicate the large-scale banditry and secure the national borders. Militarization of the anti-poaching measures has gone hand-in-hand with the increase of conflicts and the

[65] http://assets.survivalinternational.org/documents/1527/survival-internation-v-wwf-oecd-specific-instance.pdf
[66] Survival International affirms to put itself as a spokesperson of the Baka in absence of official Baka representatives to conduct the claim (Survival International, 2016)
[67] http://www.survivalinternational.org/news/11107.
[68] In recent years automatic rifles have been smuggled into Cameroon mostly from neighbouring countries (Central African Republic and Congo Brazzaville) after the end of their period of political instability.

widespread rejection by local people of an externally defined system of resources use, imposed on them by the government and international institutions.

In Cameroon, these tensions are explained by the increasing use of force in anti-poaching operations led by ecoguards. Although grabbing big poachers engaged in commercial hunting is often the main objective of such operations, they might also target the Baka. Baka might be subjected to abusive controls by ecoguards for two main reasons: carrying weapons (snares or shotgun) or game species and establishing forest camps within national parks boundaries. Abuses recorded in the studied areas range from excessive threats (e.g., threats of imprisonment and torture), to material confiscation, or moral and physical violence (i.e., beating, torture).

Most of the stories heard on the field occurred in forest camps, in presence of a reduced number of people. Ecoguards either contest the legitimacy of the camp in the area, attempt to obtain information about the localization of a hunter or an on-going hunt, or rummage huts in order to find snares or guns. Aggressive behaviours are also reported during barrier controls along the road. The nature of the raids raises questions as they might arguably be conducted when the Baka were engaging in subsistence activities, but also when they are commissioned to kill elephants by external ivory dealers. Indeed, most of the acts of violence reported occur in the context of crackdown on elephant poaching in which the Baka are often involved, serving as guides or hunters.

Similar cases of abuse have been recently reported in Cameroon (Oishi et al., 2015), in Congo against the Mbendjele (Lewis, 2016), against the Mbuti of DRC (Inter Press Service, 2016 cited by Mastuura, 2017), and finally all cross the Congo Basin (Pyhälä et al., 2016). Although ecoguards or BIR personnel are said to be the perpetrators of violence, the WWF is accused of being linked to the abuses because of their financial and technical support to anti-poaching raids and because the absence of their legal support in the face of frequently reported abuses[69]. Consequently, the legal complaint states that WWF violates both OECD human rights guidelines and goes against their very own ethical policy, through which WWF committed to respect customary rights of indigenous people and their claims[70]. Indeed, the conflicting views of SI and WWF reflect a classical divide between a top-down, exclusionary conservation paradigm and human rights defenders, generally referring to the "people vs. parks" debate, opposing people-free areas against people-centred conservation (Wilhusen, 2003). This situation demonstrates once again the tension between local livelihoods and imposed conservation strategies, notably "fortress conservation", but also underscores the need to better understand both Baka perceptions of wildlife conservation and the consequences western conservation has on their livelihood.

[69] To this accusation WWF responses that militarization of the area in necessary due to the presence of armed conflicts in neighboring countries, which leads to well-armed poaching (Survival International, 2016).

[70] WWF is a founding member of the Conservation Initiative on Human Rights. Its own statement of principles regarding indigenous peoples and conservation was written in 1997 and reaffirmed in 2008. Its states that they will not promote or support any interventions (such as protected areas or restrictions in resource use) which have not received the Free Prior and Informed Consent of affected indigenous communities and would not adversely impact – directly or indirectly – on the environment of indigenous people's territory, and affect their rights. The statement can be consulted here : http://www.worldwildlife.org/publications/wwf-statement-of-principles-on-indigenous-peoples-and-conservation

To fill this gap, this chapter analyses the tension between externally defined wildlife conservation strategies and local cosmovision, livelihoods, and rights by addressing how the Baka perceive hunting regulations and the way it is imposed on their territory and in relation with others agents (ecoguards, WWF, poachers, and neighbours). I examine Baka perceptions and experiences regarding the idea of wildlife conservation as it is made concrete in the study area, i.e., through the enforcement of the Forest Law by local agents. I analyse Baka relations with other local agents involved in hunting or bushmeat trade (i.e., ecoguards, NGOs, poachers, ivory dealers), and then I describe the physical, psychological, and cultural damages experienced by the Baka due to the crackdown of poaching.

2. METHODS

Information for this chapter was collected through semi-structured interviews between August 2012 and August 2013. Complementary interviews and observations were gathered in March-April 2014 and April-May 2015. I presented the study guarantying the anonymity of all the individuals participating in it. The interviews were mainly held in MB village and secondarily in EL village. In both villages, respondents were selected based on their willingness to take part in the interview. I nevertheless attempted to obtain a representative sample of community members in terms of role, lineage, sex and age. A total of 25 individuals responded to the interviews (18 active male hunters, 2 women, 4 elders (men and women), and 2 male adolescents). Participants' age ranged from 16 to 65 years old. I interviewed at least one individual from each lineage. Informal focus group discussions were also held in four other villages of the Lomié, Messok, and Ngatto districts, with groups composed by five to seven men, between 30 and 50 years old.

Interviews were held in Baka tongue, with the help of two translators: a Nzime and a Baka. The level of mastery of Baka language acquired by the end of my fieldwork allowed me to maintain a more direct interaction with informants. All the interviews with their immediate translations were audio-recorded and then transcribed into French.

An open-ended interview guideline was used, adapting the order of questions to the flow of the conversations. Discussions addressed participants' views on the purpose of wildlife protection, positive and negative aspects of conservation initiatives, personal stories in relation to conservation actors, or conflicts, perceptions of conservation agents (NGO and ecoguards), and consequences of imposed conservation strategies on their way of life. Interviews lasted 30-45 minutes. The emerging themes were captured by coding relevant categories that appeared in discursive responses. The discussion narratives were then analysed by extracting dominant themes which ended up forming three analytical categories: 1) perception of the purpose of externally imposed wildlife conservation, 2) representations of local agents

involved in wildlife conservation, and 3) impacts of wildlife conservation strategies on local livelihoods. Within these categories, I report the recurrences and interpret the discourses, backed with observation notes and background information acquired throughout my time in the field.

To obtain contextual and complementary information, I also interviewed other actors, including Nzime villagers, ivory traffickers (in the studied village, Lomié and Yaoundé), bushmeat traders, local authorities (local Chief Forester; Nki NP conservator), local institutions, and NGOs representatives (WWF regional head, and representatives from *Centre pour l'Environnement et le Développement*, CED-Yaoundé).

No meetings on wildlife issues were held by external organizations during my stay. However, I attended four other thematic meetings held in the studied villages, each of them organised by one of the following institutions: *Plan* (on Baka schooling and school attendance), *Pallisco* logging company (about logging issues, compensations and recruitment), the local CPF (*Comité Paysan Forêt*), and *Formod (Forêts Modèles*) (about co-management in community forests). Attendance to these meetings allowed me to discuss the participation of the Baka within projects that advocate collaborative actions between Nzime and Baka as well as Baka participation in the discussion arena on social or natural resources issues.

3. Baka responses to wildlife conservation structures: From injustice to distrust

During informal discussions and interviews, as soon as I start talking about hunting, the Baka would almost systematically bring up stories of conflicts and voice their negative perceptions of WWF and ecoguards, or even cases of abuse. Overall, this reaction reflects how Baka question external actors at three different levels, which constitute the three sections of this chapter: 1) Baka's own understanding of wildlife conservation; 2) the characteristics of the relation between the Baka and different conservation agents, and 3) the effects of hunting regulations on Baka livelihood.

3.1. Wildlife conservation and poaching

Wildlife value and the meaning of conservation

Overall, the Baka do not understand the aim of the western vision of wildlife conservation. This can be due to the fact that, as I experienced during fieldwork, the main contact the Baka have with wildlife conservation agents is through anti-poaching controls, environmental education in the area being almost non-existent.

As highlighted before, the Baka perception of the forest approaches the idea of abundance more than that of scarcity. Forests are appreciated for being "ours" and highly valued for the freedom to consume meat and for the presence of marketable natural resources, remedies, and food. Thus, imposed restrictions on hunting are simply incomprehensible for most Baka. Regulating hunting is considered unfair as it limits their access to monetary income and restrains the possibility of eating meat. Given the high symbolic and psychosocial value of bushmeat as well as the fear of the "meat hunger" (see Chapter 4), this affects Baka wellbeing. The Baka often declare that conservation policies protect animals to prevent people not to eat too much meat, admitting that they are not able to provide further reasons for such prohibitions (*"They just want to stop us from eating meat")*. Indeed, the main concern that kept appearing during the interviews was two-fold: the interlocking of the economic and subsistence value of bushmeat. Hunting restrictions have led Baka to worry about their diet, and partially about their children's present and future diets. Thus, the concern regarding children's needs of meat was regularly reported, the Baka arguing for the importance of wild meat for children in terms of both nutrition and symbolic power during a period of growth. . In other words, Baka see the purpose of conservation measures as a practice directed *against* them, not *for* them, or even for wildlife.

> *"They sometimes abuse when you have just hunted a Duiker. If someone takes from you that piece of meat, what will the children eat?"* [C.D., male, 40 years old, MB village].

The new regime of values assigned to animal species (the different categories of species protection in the Cameroonian Forest Law, applied by ecoguards) is perceived as imposed by the government or institutions from outside their territory, without their consent. This underlines the absence of local consultation and negotiations prior to the establishment of conservation measures (such as protected areas) in this area, as reported by Pyhälä, et al. (2012) elsewhere in the Congo Basin.

The Baka know well that anti-poaching actions are driven by a western-led organization, reinforcing the idea that conservation is an idea imposed from the outside and coming from the "Whites" in a framework where their voice is not listened and taken into account at any points. To the question "do you know why animals are protected?" some Baka answered *"But it is you, the white people, who know that, no?"* Also, the elephant is sometimes called the "*son of Paul Biya*" (President of Cameroon) or "*the son of the Whites,*" highlighting Baka perception of a paternalistic regime where protected species are protected as much as children ("*the government considers the animals as its own family*"). This view that animals are more valuable than people is accentuated by the penal aspect associated to hunting

regulations, while authorities are reproached not to care of local communities' subsistence needs. Two Baka hunters remarked that:

> *"If you kill it (the elephant) it is considered a crime, and you can be put in prison for that. So the elephant is considered a man!"* [A.N., female, 37 years old, MB village]

> *"WWF raises concerns if you kill the crowned eagle, although this animal is a monkey killer itself! Animals are considered as humans and this is not good"* [A.A., male, 45 years old, LB village]

Being judged for killing an animal appears incomprehensible to the Baka. These two citations reflect the social ethic of the Baka concerning their relation to animals. For the Baka, the superior entity **komba** created animals to be killed and eaten by humans, so eating wild animals is considered part of the cosmological exchange: the forest shares animals with humans, and humans share food together and sometimes with spirits, a cosmological economy of sharing which resembles what has been presented by Bird-David (1990) among the Nayaka of South-India. Penalizing for killing animals, equating animals to humans, appears to be conflicting with the Baka animist ontological regime. It represents thus a deep change in the symbolic status of animals, which disrupts the cosmological order of the world.

In the second citation, the informant don't understand the difference between a Baka who kill a monkey and a crowned eagle that do the same, as they both do that for living. When talking about their subsistence strategies, the Baka commonly say that, as animals, they are just "doing their job" (i.e., "hunting for living"), thus stating that they just have a natural behaviour within an ecosystem where every being has its own form of predation. In that case, the informant does not understand why the crowned eagle is protected although it kills monkeys and the Baka are accused for the same action.

In other words, the mismatch between the purpose of western view of wildlife conservation and the Baka cosmovision might be highly related to the co-existence of two philosophical postures which do not attribute the same values to non-human beings. This critical gap in value orientations (see Rickenbach et al., 2016) might just be the result of a lack of communication and efforts directed to an understanding of the local socio-cosmological basements.

> *"If we do not have money, we cannot live. If they (the wildlife conservation actors) could monitor and arrest the great hunters (poachers), it would be good, but they do not do that"* [V.B., male, 38 years old, MB village].

> *"What the brigades do is bad, they should leave us. There are the Nzime who hunt too much, more than ten game at a time"* [R.N., male, 42 years old, MB village].

In spite of misunderstanding the deep meaning of conservation, when asking whether conservation activities in the area are "good" or "bad", I was often given opinions marked by a feeling of injustice and highlighting a clear differentiation between large scale poaching practiced by some Nzime, foreigners, or ivory traffickers on the one hand, and subsistence hunting on the other. Baka consider wildlife conservation strategies as beneficial if they punish poachers, notably non-local ones, who are considered wealthy and with a subsistence and income not directly depending on the forest. These people are considered by the Baka to be foreigners who come to their forest to "take their game". Indeed, the increasing presence of non-local poachers alarmed the authorities in the 2000s and led to the creation of a denunciation system of illegal activities, the Village Vigilance Committees (*Comité de Vigilance Villageoises*). These committees were deliberately designed to report situations involving non-local people in extractive activities (illegal ebony cuts, elephant hunting, large poaching). Composed by Nzime (in a large majority) and Baka, the Vigilance Committees' role is to monitor and report illegal extractive activities. Solly (2010) notices that Vigilance Committees are the only form of "active" local participation in natural resource management. However, these institutions are said to be weakly active, or having disappeared due to corrupted members.

The Baka themselves say they are not the only community to be subjected to abusive controls, violence and psychological pressures. For example, one informant reported:

> *"The ecoguards* (…) *are as hard with us as with the Nzime: recently, they whipped an Nzime with an incandescent machete because of the meat*" [C.D., male, 40 years old, MB village].

However, the Baka consider that big poachers extirpate game from "their" forest and that the crackdown on them or meat is insufficient. However, the crackdown on elephant hunting (for ivory) is less frequently criticized by the Baka. It is possible that this relates to the fact that this practice is so strongly tied to traditional practices or current economic incentives. Elephant hunting, although organized by non-Baka people, often involves at least one Baka hunter whose status is valorised among the Baka community. Generally, it also involves other Baka who serve as others hunters, guides or porters, and it allows a few community members to benefit from a relatively symbolic share of elephant meat, alcohol or material gifts. Only the elders seem to perceive positively crackdown of elephant poaching, indeed they are more likely to pronounce in favour of a control of elephant hunting. Such a position might be related to a

negative judgment toward young elephant hunters who are considered by the elders as killing too much without respecting customary sharing rules, as detailed in the Chapter 6.

Here, the local definition of poaching needs to be clarified. Among Nzime villagers, two types of shotgun owners can generally be identified. A first category includes those who use firearm to obtain meat for their own subsistence, selling the surplus to meat trader-intermediaries passing through the village. These hunters can organize hunting expeditions on their own, lend their firearm to other Nzime men or to certain Baka men, or even leave with them for the hunt. Although, the Forest Law names "poacher" (*braconnier*) all illegal hunters, the local definition of poaching differs slightly and rather reports to a second type of non-Baka hunters. These "true poachers", under local definitions, organize their hunting activity on capitalization, practicing hunting as their main source of income, spending several days or up to one week in the forest in order to get the maximum amount of bushmeat and often targeting the more valuable game species. They are specialized either in snaring or shotgun hunting and may set up from 100 to 300 snares in forest.

Relationships between Baka and Nzime hunters are not binary as they involve pseudo-kinship bonds (Joiris, 2003). Indeed, besides habitual situations of denunciation, some forms of protection also occur. Nzime hunters (or big poachers) often protect "their" Baka. A Baka hunter might, at the same time, highly criticize the practices of the Nzime people as a whole, regarding elephant hunting or poaching, but refuse to denunciate the man with whom he is working, relating through a symbolic pseudo-kinship and economic dependence. Thus, the Nzime shotgun owner exerts on the Baka a symbolic and practical power by guarantying them income in exchange of a mutual trust that the Nzime are finally the first to benefit from.

3. 2. Baka perceptions of conservation agents

This section highlights how this dynamic of control seems to be the basis of the negative perception of conservation agents, the reinforcement of the existing power asymmetries, and a Baka feeling of marginalization and injustice experienced in the face of corruption and laxity. The multiplicity of types of actors involved in conservation also generates a profound confusion amongst local people.

The Baka consider as similar the different actors involved in anti-poaching in the area. The fact that Ecofac anti-poaching guards, locally dependent on WWF, wear green uniforms, just like the ecoguards from MINFOF, clearly adds to the confusion. In addition, the frequent presence of a WWF local agent during anti-poaching raids, adds to the confusion as such operations are performed with a WWF vehicle and driven by a WWF agent. Thus, even if the control is made under the authority of MINFOF, it is locally perceived as led by WWF. The impact that WWF car has on the local representations is worth to be noticed. The white four-wheel-drive used by NGOs in the area is very distinguishable by the WWF Panda logo. When such a vehicle stops in the village, it always generates a

moment of tension: the Baka hide their wire cables or the meat boiling in the pot. When a Baka, walking on the dirt road sees the car arriving upstream of the road he or she runs into the bush, fearing to be arrested.

> *"When I hunted with a gun I often fear, have anxiety in my heart, I can not walk by the roadside. As soon as I hear the roaring of cars, I hide in a bush"* [P.K, male, 18 years old, MB village]

The way these different agents are named by the Baka shows a relative confusion regarding the perception of their roles. Thus, different names are mixed in the narratives, making it difficult to clearly identify the actors involved.

I asked to report the differences between all those "*whose job is related to animal protection*". MINFOF ecoguards, Ecofac agents, and WWF were often named indifferently and interchangeably. All agents involved in the law enforcement of hunting might be called *wa wé so* (litt. those who seize the meat). WWF agents are often named under the nickname *dobi-dobi* (derived from "WW") but this term does not refer strictly to WWF, the name being more of an informal term attributed to anyone involved in anti-poaching. Ecoguards are thus sometimes called under this name too, although sometimes they are also named "brigade rouge", while the WWF personnel is called "the ecofac" and vice-versa. The military personnel of the BIR are contrarily highly distinguished by the Baka, wearing black uniforms, heavily armed, and visiting the area only sporadically, only for important one-off operations to track ivory dealers.

This relative lack of differentiation is obviously due to the same form of interference these actors employ. In addition, the different conservation agents impose a feeling of fear, which is signalled by the uniform (whatever it may be), because it symbolizes for the Baka a form of State control.

Despite these confusions, the Baka did mention some differences between these agents. The BIR are well known for searching big elephant poachers and ivory dealers. They are highly feared, but their presence remained weak during the study period. Overall, the WWF -who concentrate mainly on ivory seizures- is perceived as more severe than Minfof agents, who mostly concentrate on the control of "small" hunts, seizure of snaring cables and protected species. WWF, as well as the BIR personnel, are also the most frequently mentioned when talking about seized spears or snares, people beaten, or forest huts burnt and razed on the ground (because of the illegality to live within the protected area boundaries). The practice of seizure is, however, normally restrained to ecoguards according to the 1994 Forest Law. We know also that WWF personnel often escort ecoguards. One Baka hunter interestingly mentioned that the WWF people *"do not know the law (...) because they control hunting practices out of the limits of their reserve"*.

In the same line, the ecoguards and WWF agents are badly perceived by the Baka because their behaviour is not in accordance with what they are supposed to implement, but rather they seem to re-

interpret the law to their convenience (i.e., seizing bushmeat), but then acting against it benefiting from corruption at all levels (i.e., circulate with illegal meat and selling it for their own benefits). This citation of a Baka hunter is quite illustrative:

> *"Since I've been hunting, I've never had any problems with WWF/Brigades, but once they found me on the way back to the village with 6 bundles of wild honey. The personnel of Eaux et Forêts wanted to seize the honey. After a while, the commander finally wanted to pay for it, then the other also. But I refused to sell to the one who wanted to buy the honey to treat someone sick by justifying "but you prevent us from exploiting the forest and now you want to buy our products to treat you!"* [J.-L. N., male 40 years old, MB village]

The fact that authorities might be repressive with some people and permissive with others generates a deep misunderstanding from the Baka and a rejection toward all forms of authority, and notably when laxity and indulgence are observed. Every government employees (ecoguards, military and political elites) might be protected at some point and circulate quite freely with illegal meat and tusks. For instance, during my presence in the field, two Baka hunters spent several days in jail for having performed an elephant hunting ordered by a Presidential Guard military. Such inequality of power relationships reinforce the marginalization of the Baka who are the least likely to get benefits from corruption due to their social, political and economic situation. As Pascal Dongmo, Nki NP conservator said: "*poaching of elephants is severe in Nki. Unfortunately, everyone is involved in it, even administrative and traditional authorities, the military, politicians and the clergy*" (Dongmo, in WWF, 2014).

Conversely, corruption and negotiation might benefit some Baka: the best hunter of the studied village admitted to occasionally be employed to provide meat for WWF regional meetings, a practice that clearly gives a paradoxical message.

> *"The brigades and WWF do not pose any problem to me because I am "their" hunter. When organizing workshops, WWF use to order me hunts because duikers and monkeys are served during the meals of these workshops*" [J.N., male, 38 years old, MB village].

Interviewed in the WWF base, the WWF regional head admits in the interview that ecoguards tend to feel more at ease in penalizing a solitary Baka hunter or trapper than a group of four or five non-Baka trappers at night, which moreover often belong to the same ethnic group as the ecoguard. In addition, he admits a severe deficiency in the law that enables the ecoguards to act according to their subjectivity:

> *"The 1994 Forest Law does not define a limiting amount of game for the definition of poaching. This is the responsibility of the personal assessment of the ecoguard. It is up to him to define whether the game is for resale or for the purchase of oil and soap"* [G.E., WWF, Ngoyla]

The fate of the meat that the ecoguards put so much effort to confiscate saddens the Baka, notably because it is most likely eaten or resold in Messok or Lomié markets, and for a very high price. One Baka man mentioned:

> *"When I was in the cell [in Lomié prison] I did not eat for two days. The WWF sells meat at auction, or they give it to their wives* (…). *For the ivory? A part goes into the State coffers; another part is sold for their benefit."* [C.D., male, 40 years old, MB village].

Sympathizing with ivory traffickers or poachers coming from other areas, I discovered that they often affirm to belong to powerful and rich families or government-related networks[71], which might help them, get out of tricky situations, or might have direct arrangement with mayors and prefects in the case of ivory export. In such situations of high-level corruption, the economic and political marginalization of the Baka, who are already locally and nationally regarded as inferior, adds to the fact of being considered as an easy target for ecoguards. The Baka are indeed locally known to be unwilling and/or unable to defend themselves when confronted by the more powerful administration.

However, my long period in the field allowed me also to observe a certain clemency from some ecoguards toward the Baka, as also many informants remarked. Although the ecoguards are essentially non-Baka - adding to ethnic discrimination and the possibility of conflicts - the severity of the controls also seems to be a matter of personality of the agents, some being locally known for greater clemency than others. However, these relationships of trust or mistrust are often temporary. I was able to verify between 2012 and 2015 that the ecoguard position appears to undergo a significant turnover with agents being regularly evicted as a result of having been accused of corruption or abuse of power.

This injustice perceived by the Baka (and their neighbours) is reinforced by the fact of becoming soft-targets of anti-poaching, enduring abuses and violent controls.

4. Impacts hunting regulations on Baka wellbeing

Through Baka narratives, and based on my own observations in the field, this section examines the social climate created by the enforcement of current hunting regulations. I describe how the crackdown policy and militarization of wildlife conservation directly and indirectly affect Baka wellbeing and some aspects of their daily life. The relationship between the Baka and wildlife conservation actors is widely marked

[71] High-ranking officers circulating in official cars with tinted glass, owning military weapons, are also known to look for tuma and command them elephant hunting expeditions.

by a social stress and a feeling of fear created by the restrictions on their livelihood activities through coercive measures. Interestingly, these reactions seem to significantly affect people's daily behaviour, wellbeing, and livelihood activities, including hunting, mobility, and cultural and ritual practices.

4.1. Abuses and human rights violations

While I personally did not witness any violence during my time in the field[72], the Baka did report to me many cases of abuse of power and violence endured by village members in the previous months or years prior to my arrival or between my different phases of fieldwork. The cases which retain the attention of the Baka are: abusive confiscation of game, cables, and spears, either in the village or in the forest camps, abusive entrance into houses or huts, adults and children forced to denunciation, moral pressure, threat of imprisonment, and physical abuses to push to denunciation. Survival International's complaint contains similar descriptions of what I have collected in the field.

> *"I never hunted with the shotgun; it's too much trouble with the brigades. If they find you with the snares then they grab your cables and the meat. If they find you with the spear: they take the meat from you. If they find you with the gun, they take both the meat and you!"* [V.E., male, 51 years old, MB village].

Huts and houses situated in forest camps burnt by ecoguards are also frequently mentioned, although it was not possible for me to identify whether these camps were settled outside of or within a national park. In that case, burning a habitat might be considered by the ecoguards as a strict implementation of the law, as overnight stays are forbidden within the limits of the National Park. Beyond the strict legal aspect, the ethical and moral legitimacy of that mode of action is highly debatable. In all the cases reported, the Baka did not seem to be able to clearly identify the formal demarcations of the protected area in question, which do not consider their relations to land use and occupation.

> *"The brigades burn the houses, and kick people out. If they do not find you at the forest camp they break everything, burn everything. They must not find bones inside of the house"* [D.A., male, nganga, 60 years old, MB village].

Also, although Baka have very little knowledge of their own rights, they are nonetheless aware of the power abuses exerted by ecoguards regarding the law:

[72] However, we shall admit that the presence of a foreign researcher might have severely dissuaded cases of abuse, or at least the reporting of them.

"Messok's brigades passed after you (the researcher) left, they searched all the houses to look for the cables, they come inside without asking permission. Normally if the owner is not there, they do not have the right to enter in the houses…" [A.S., male, 45 years old, MB village]

I report one of the few cases of power abuse that occurred during my presence in the studied village (as a direct excerpt from my field notebook):

The 19th of April 2013, MB village.

A WWF car occupied by 5 or 6 persons (one WWF representative and several ecoguards from MINFOF) passed through MB village without stopping, taking the road to Maléa/Ngatto. They stopped nearby a forest camp settled 1 km from the village and asked to the lineage chief of the camp to tell them "where the people who have entered the forest recently are" (for elephant hunting). The old man remained mute and quiet. They threatened to handcuff him and to send him to jail "where he will be hanged by the feet until he talks". They decided to search in the houses. They found a roll of steel cable used for snaring. They said "you were the man we were looking for!" and to punish the old man they brought him to the car and drove in the direction of the isolated Ngatto village and the Nki national park. His son-in-law forced them to also take him as he did not want to see the elder be taken alone. Thirty minutes later they opened the doors of the car, forced them to get out and to go back home walking. The old man acted as a drunk, which made the ecoguards/WWF nervous. Few hours later, the WWF car got out of the forest area through the same logging road. They finally arrested one (or several?) Nzime guys with more than nine baskets full of bushmeat.

4. 2. DENUNCIATION AND SOCIAL STRESS

Wild meat is so highly valued, both economically and symbolically, that it has created suspicious and jealousy relations both amongst the Baka and between Baka and Nzime. It also created an intense fear of anti-poaching control when returning from the forest and thus a form of social stress[73]. Social tension is however not new in an area where coveted resources, such as wild meat, might naturally generate jealousy and competition (Leclerc, 2006).

[73] Social stress is here defined as "the feelings of discomfort or anxiety that individuals may experience in social situations, and the associated tendency to avoid potentially stressful social situations" (Wadman et al., 2011).

Leclerc (2006) examined how Baka groups clustering along roads, congregating different lineages, have changed spatial dynamics but also altered their social relations by generating jealousy. Indeed, within bigger settlements traditional sharing rules cannot be accomplished and meat cannot meet everyone needs. With a judicial regime constraining traditional practices and an increasing scarcity of the most coveted resources (meat and ivory), jealousy can do no more than grow, notably as it is fuelled by denunciation encouraged by the anti-poaching practices.

Opportunist barrier controls, performed at day or at night, are the main or most visible tool used to enforce hunting regulations in the south-eastern Cameroon. However, denunciation is also a common practice used by the local administration to track and tackle illegal hunting activities. Failing to be able to effectively control large and remote areas in absence of proper technical means to circulate across the territory, the anti-poaching fight is highly based on seeking information. Encouraging denunciation, or even forcing to denounce under threat, occurred several times during my absences from the villages and constituted the basis of the abuses committed by ecoguards. The case of the Village Vigilance Committees described above is relevant as even if the Baka do not feel threatened by this institution that mostly targeted big poachers, this form of control is clearly representative of what Robillard (2010) has already emphasized in south-eastern Cameroon: an intensification of social conflicts between communities by the authorities establishing new forms of governance in parallel with local customary institutions. Be it a good or bad initiative, such initiative institutionalizes the information disclosure, and might increase the feeling of surveillance and suspicion. Denouncing someone might be now perceived a simple way to settle accounts with him, and not only among the Baka but also between different agents: Baka denunciating Nzime poachers, logging companies disclosing Baka hunting in the concessions, etc.

For these reasons, most of the hunting expeditions and related practices tend to be kept hidden. Except close family, other people rarely know the activities of other village's members. The uncatchable nature of the Baka activities might of course be partly due to the day-to-day organization of the hunter-gatherers way of living. However, I experienced the situation face witnessing the very elusive schedule of the hunters. Asking the permission to accompany three men in mushroom picking expedition, I finally realized after a three hour walk that they had no mushrooms in mind. The aim of the expedition was only to recover elephant molars[74] abandoned in the forest. A Baka man reported a similar situation:

> *"Now you have to be careful. Nowadays people are no longer aware of anything, they don't talk, they say they will visit the traps or pick up the* **pekè** *[Irvingia sp.], and on the way back you learn in fact that they went hunting"* [D.A., male, 40 years old, MB village].

[74] Containing ivory, an elephant molar is also sought on the market and might be bought for 5.000 cfa.

4. 3. Culture of hiding, hiding culture

By altering the rhythm and Baka relation to space, conservation strategies might affect social relations and lead to the disappearance of local knowledge and ritual practices embedded in hunting practices and inherent to Baka cultural identity.

This is particularly relevant in the case of the big hunts called **màka**, targeting large mammals, and notably elephants. Because elephant hunting was technically specific and also constituted a social event where the community cohesion was marked and showed, this practice was both recognizable and very demonstrative (songs and rituals, specific spears, visible propitiatory remedies on hunters' body, grouped departure, extensive sharing, etc.). While hunting tends to be a discrete practice, the social and ritual aspects surrounding hunting also tend to be hidden.

If the *technical effectiveness* (*sensu* Leclerc, 2012) of men in hunting is compromised by the anti-poaching controls, the *symbolic effectiveness* of women allowing the success of expeditions is, in fact, also threatened. The most representative ritual practice of this man-woman complementarity for hunting success is that of the **yéli**. The disappearance of this ritual is always attributed by the Baka to anti-poaching measures. The **yéli** is a ritual repertoire practiced by women (notably the hunter's wife) throughout the night when hunters leave the village (or the camp) for an elephant hunting expedition. The ritual is done to fortify (in the sense of a ritual protection) spears or rifles and to bring luck in their encounter with game. Men and women in six Baka villages told me that this ritual was no longer practiced. Characteristic and easily recognizable by non-Baka locals, this repertoire would allow anyone from neighbouring villages to understand what enterprise is on going. Fearing denunciation or eco-guards night patrols, the Baka reported to have ceased this ritual with the intensification of anti-poaching operations.

> *"Nowadays people are doing this in secret. In the past, women made the remedies, and sang the songs for the great hunt. If one heard the women singing in camp, or if the men came back for their hunt singing, people knew that the hunters had shot down [elephants]. The nganga always looks in the Civet or Genet's skin. He says 'you're going to stay two days in the forest, you must go there for hunting', but we are not singing anymore. The hunters still consult the nganga, we still make scarifications [for hunting success], but now we go into the forest discreetly" [B.L., male, 37 years old, MB village].*

In the Baka social organization of hunting, the nganga holds a critical role. By showing places where to hunt elephant, how to find them rapidly, and giving hunters' remedies against fears, the nganga is central in the elephant hunting process, without being threatened by the law at any point. I observed that the propitiatory inscriptions he or she practices on the body of the tuma are still visible but are now more discreet. The consultation with the nganga occurs at night, and the tuma must enter in forest right after to avoid any tracing that could lead to denunciation. According to the nganga interviewed, their

practices have not significantly changed as these are traditionally hidden, occurring inside the houses away from prying eyes.

4. 4. Searching for secure place: changes in sharing and mobility

Fear of anti-poaching controls and denunciation therefore create a form of social stress that interestingly appears to be more present in the village than in forest camps, as already reported by Hagino (2014). The village is perceived by the Baka as a space of sociality, but also of jealousy and suspicion, while the social relations within the reduced groups in forest camps tend to be more characterized by trust and freedom of action. This dichotomy is highly relevant for the Baka and was regularly mentioned during discussions about living place preferences (village or forest). This perception tends to affect meat consumption patterns and Baka mobility.

The Baka admit to consume, whenever possible, the game hunted directly in forest camps, in small groups. This way of consuming meat has an impact on the traditional system of meat sharing, as it does not include people who have stayed in the village. This often generates a tension within the families, notably reproaches from elders or family-in-law. Meat consumption appears to be considered as a practice at risk, passing from a typical extended sharing practice to a hidden practice.

The very mobility of the Baka, already affected by the grouping along roads in the 1960-1970s, is now being altered by anti-poaching controls. The Baka increasingly avoid walking along the roads where hazardous barrier controls are carried out. Thus, while some Baka say that to avoid these controls it is now more safe to stay in the forest, others maintain that it is better to live as long as possible in the village, hunting small mammals and reducing their hunting practices. Indeed, perceptions here diverged, and might give a glimpse of a variation in subsistence strategies influenced by social stress. However, some peoples' views diverged in considering which place is either safe or a source of problems.

> *"I prefer to stay in the village to avoid problems. In the village, as long as you do not look for problems, you have no problems. In the forest, problems end easily as long as you do not go out"* [C.D., male, 40 years old, MB village].

The fear of anti-poaching control thus affects the mobility of the Baka and their distribution. There are exceptions however. Interestingly, few households lived exclusively in forest camps. The stress and discomfort embedded in meat consumption push them to spend most of the year in the forest rather than in the village, justifying this choice solely by the fear of confrontations with authorities and the possibility to "eat their game freely".

To summarize, the Baka are facing an issue of subsistence, mobility and land rights. On the one side, living in the village is posing them an issue of subsistence (dwindling fauna around), increased dependency to Nzime and national economy, alcohol, social stress, change in traditional practices, mobility, and ritual. On the other side, living almost permanently in forest settlements - where according to them the resources and medicines are - but where they are closer to protected areas and logging concessions put them regularly in a situation of increased illegality where their activities are increasingly criminalized and they shall adapt their daily mobility.

5. Conclusion

In this chapter, I found that Baka do not capture the western conception of conservation enforced in their territory, and even generate negative reactions and rejection. Beyond a problem of mismatch between two ways of perceiving the environment and managing resources, it is mainly the way hunting regulations is re-enforced in the studied area that raises critical issues. Implemented without their consent, by various actors with confusing roles, hunting regulations are views a restrictive regime and coercive measures, limiting access to the most prestigious good: wild meat, but also to monetary income and traditional territories, and finally affecting wellbeing. The punitive system employed (through the criminalization of all hunting methods) appears indeed counter-productive as it conveys a negative image, a rejection, the reinforcement of a pre-existing marginalization, a feeling of harassment and restriction of freedom of moving and acting. In the last decade, a whole slew of studies have already shown the limits, the non-convincing results or the weakness of the Forest Law as well as the resources management programmes implemented in Cameroon (Vermeulen et al., 2006; Oyono et al., 2006a; Julve et al., 2007; Garcia & Lescuyer, 2008; Ezzine de Blas et al., 2009; Joiris et al., 2014). NGOs and scientists, as well as local views - such as demonstrated in this chapter - pointed out the difficulties to enforce a regulation process using military and denunciation methods, against a corruption background and where customary institutions and complex inter-ethnic relations pre-exist (Oyono, 2006a; Robillard, 2010). I have notably showed how hunting regulations have impacted some aspects of the Baka culture by generating a constant fear of denunciation, social discomfort and distress, and created an institutionalization of suspicion.

By emphasizing both the Baka misunderstanding of wildlife conservation goals and the overlooking of Baka rights, livelihoods, and relations with their environment, this chapter points that it is going to be difficult for wildlife conservation programs based on western ideologies to have a real beneficial impact on both the Baka and the environment they keep using and managing daily. Given the weak power of the State in areas such as the East Cameroon, we might only expect that future changes emerge from better relation between local communities and the big international NGOs already established.

Both social changes and regulatory policies seem to converge to transform the traditional social structure into new forms of complexity (social conflicts with neighbours, reduction of hunting territory) in which the marginalization of the Baka is accentuated. Within conservation strategies, this marginalization is related to structural issues. Indeed, their mobility and absence of leaders prevent them to make themselves heard. They critically lack space to share their opinions and perceptions beyond the village scale, and lack representativeness at regional and national levels. For instance, Baka associations exist in the different districts but critically lack of capacity and means. Relations between wildlife conservation NGOs and Baka associations are not good because these latter are often background supported by indigenous rights organisations (Robillard, 2010), rekindling the unfortunate polarisation of the discourses and actions between development and biodiversity.

In the case of wildlife conservation NGOs, such as WWF, as they have a considerable amount of local power and influence on environmental issues, they might only bring changes by being more attentive to local people's perceptions and worldviews but also by respecting their engagements in terms of human rights. However, such NGOs are in an uncomfortable position: while attempting to take into consideration critics and past failure, they also have to deal with their own commitment with the State and financial backers, with a pre-existing corruption, and manage a territory neglected and abandoned by the central state power.

Biodiversity conservation inevitably depends on local peoples' agency, feeling of ownership and involvement, and locally managed institutions as well as their wellbeing (Milner-Gulland et al., 2014; Conney et al., 2016). In spite of efforts in the last decades, some western wildlife conservation measures still consider local practices, and therefore local peopl firstly as primarily a threat for biodiversity, and although this idea has proved its limitations for long, such a posture is still adopted in the field, neglecting critical importance of local levers for action. In south-eastern Cameroon, the Baka, already enduring stigmatization and weak political power are often the first ones to be overlooked.

In parallel, although western-based indigenous rights organizations are pointing out critical problems in terms of human rights, they often broadcast a reductionist discourse, which separates the indigenous from the "others". Although marginalization of the Baka is effective and alarming, the overlook of the complex socio-political and poly-ethnical system deeply rooted locally will not allow to construct socially sustainable solutions. Moreover, the idea that indigenous people as eternal guardians of the biodiversity - because of their prescribed "indigeneity" and their cosmological relation with the environment - is a simplistic argument which reflects more a western idealism that a local and more complex reality.

This chapter finally emphasizes the necessity of collaboration between wildlife conservation and indigenous rights proponents that still confront their views rather than working together in a burning context where both interests, humans and non-humans, shall be tackled at the same levels.

Conclusions

Along the chapters of this dissertation, I have described and analysed the complexity of the social and cultural dimensions of hunting among the Baka and the interlocking of these dimensions with wildlife. I have showed how the market economy, conservation policies, and the changing relations with local actors might enter in conflict with the ways the Baka relate to the environment in general and with the animal world in particular. In this context, and in accordance to its initial objectives, this thesis gives elements to understand how the Baka adapt and respond to current changes. The analysis presented covers the social, practical, and cognitive aspects of Baka relations with animals, but also among themselves through animal-related situations (e.g., meat consumption, hunters' status). A large focus of the thesis has been on hunting, which constitutes a keystone practice of the Baka, embedded in their knowledge system, rituals, and cosmovision.

This thesis brings new and up-dated data on the fast changing situation faced by the Baka of southeastern Cameroon, a population that endures huge pressures through the new economic and environmental stakes in the area, some of them threatening their rights and their livelihood. Despite the importance of Baka cultural attachment to hunting and their increasing implication in bushmeat trade, most previous research among the Baka has centred on ritual, political, and identity issues, or on the interethnic relations in which they are involved (Rupp, 2001; Joiris, 2003; Robillard, 2012), but not on hunting. Moreover, although numerous human ecologists and ethnoecologists have provided interesting insights on the relations between the Baka and their environment (Hayashi, 2008; Oishi, 2014; Yasuoka et al., 2014; Gallois et al., 2016, 2017) or general insights on natural resources issues (Ichikawa, 2014; Ichikawa et al., 2016), the links between hunting pressure, hunter's behaviour, and socio-cultural issues surrounding wild meat and hunting have not received much scholarly attention. The present thesis has attempted to fill this gap, and this last chapter details its conclusions, which are structured around four aspects: theoretical contributions, methodological contributions, limitations, and policy implications.

THEORETICAL CONTRIBUTIONS

This thesis sets one more piece into the large puzzle of studies held in the last decades on the relation between local people and wildlife decline in Central Africa. However, it presents multiple particularities that singularize it from previous research on the topic.

First, this thesis reverses the scope of most previous "bushmeat studies" by tackling the issue from a different approach. Bushmeat studies have mostly used macrostatistics and modelling to analyse the impacts of hunting (notably commercial hunting) on wildlife, overlooking social and cultural components that surround subsistence hunting and hunting decisions. In this dissertation, rather than evaluating the human impact on the environment, I choose to examine how a society largely dependent on subsistence hunting responds to wildlife decline, pressures to trade bushmeat and other animal products, and western conservation policies implement in their territory. In doing so, I add a needed focus on the social issues that surround hunting and thus bring new elements to understand the complex interaction between economic, social, cultural, and ecological aspects of the wildlife crisis in a specific case study. By doing so, this thesis fills an important gap in the literature on bushmeat studies (Hardin et al., 2008; van Vliet & Nasi, 2008; Nasi et al., 2011; Lescuyer, 2013). I found that commercial hunting and subsistence hunting are not so easily distinguishable, specially for hunter-gatherer populations such as the Baka who have a long history in meat exchange and procurement to regional market, and whose decision between selling and keeping meat for household consumption is a matter of complex decisions merging external incentives, with internal social, economic, and cultural components.

Another important contribution of this dissertation relates to the importance of looking at "hunting" as a whole, including notions of social motivations, social debt, cosmovision, and knowledge variations. In the current context of rapid environmental and economic change, hunter's behaviour can not be reduced to offtake and wildlife pressure. The present work has shown how hunting is embedded in different socio-cultural elements, which are themselves critically affected by other changes: 1) the food factor conveying consumption patterns and consequently hunting decisions through taboos and preferences, 2) the cosmological factor and the cultural representation of the environment and the hunted animal, 3) the social factor which define the justification and legitimacy of hunting and resource sharing, and 4) the inter-ethnic factor that bring Baka hunting into complex power relations, particularly with shotgun and riffle owners, and ivory traders. All these factors show that the hunter is never an isolated individual seeking only to maximize outcomes and fitness, but that he or she responds to a group's logic. Probably for that reason modelling hunting practices is reductive, as this technique does not allow to access the socio-cultural complexity that surrounds hunting.

While socio-cultural factors and collective norms are essential, this thesis also shows that it is necessary to understand the variations at the individual level within the hunting practice. It is this perspective that sheds light on how society reacts in a differentiated and fragmented way to new constraints, for example in terms of hunting pressure, technical choices, or economic decisions. While intracultural variations have always existed, the increasing incentive provided by the new socio-economic

context tends to exacerbate them. Some individuals are thus tempted to adopt a lifestyle oriented to market values and the norms from their neighbours, while others are more oriented towards traditional values such as game sharing and subsistence. My thesis highlights that forest camps-based lifestyle is not necessarily synonymous with distance from the market economy (e.g., ivory transactions are done in forest camps with Baka hunters rarely present in the village). Rather, the adoption of market values is an individual process that mainly mobilizes the Baka as specialist producers (the best example is the tuma, but it is also true for all hunters and NTFP collectors). At this level, the understanding of individual variations and the importance of the knowledge specialists in the current market economy remains essential to grasp future social changes.

Several aspects of this thesis have drawn attention to how bushmeat trade - and market economy in general - might reinforce the existing power asymmetries and the instrumentalization of the Baka by non-Baka people on the base of the traditional relation of "patron-client" (Solly, 2010), in which the Baka admit to receive no benefits.

Finally, this dissertation has the originality of having considered both the market system (local for bushmeat and international for ivory) and conservation policies as part of the same causal system. The analysis suggests that both drivers exert opposing pressures on how the Baka practice and socially legitimize hunting. The Baka with their knowledge and values system are thus caught in a wicked paradox. On the one hand, the multiple drivers of bushmeat crisis keep pushing the Baka to engage in bushmeat hunting (although affecting the redistribution of meat). On the other hand, western environmental values, promote a vision of wildlife conservation based on coercive measures, that according to Baka's perception affect their territorial rights and vital needs. This thesis emphasizes that, between these choices, the Baka tend to choose the first one, wildlife conservation being imposed without commitment and disclosing views and values which alien to them. Thus, the deep interlocking between hunting and a vision of forests based on abundance tend to favor an involvement, already ancient, in a meat economy rather than the respect of recent and western imposed norms, especially when they are applied in an authoritarian and sometimes abusive way.

Methodological contributions

Conducted mostly in one village, this research is highly anchored in the anthropological ground through a culture-specific case study. However, an important particularity of this work was also to alternatively employ diverse aspects of the ethnoecological approach to the various specific objectives. A constant effort was made all along the thesis to combine qualitative information collected through an extensive fieldwork period and the large and comparative view provided by quantitative measurements. In that way, alternating emic and etic perspectives, individual data and perceptions regarding collective practices was a methodological challenge this thesis voluntary attempt to take up. These two types of data collection methods, brought in almost all the issues, allowed me to contrast results and thus assess the robustness of

findings. Rigorous observation and long-time presence on the field allowed me to produce detailed qualitative data to support quantitative results or to relativize them when they did not reflect the complexity attested by the qualitative information. I argue that to answer the main objective of the thesis, such combination of approaches and postures was necessary.

Ethnoecological researches, combining quantitative and qualitative approaches, are critically needed in the complex situation involving local actors bearing western conservationist ideas and local people whose socio-economical conditions highly relate on livelihood. Ethnoecologists can play the role of mediators to help design new forms of local governance which not only bring local peoples as participants, but also considering local discourses and perceptions about changes, and how people handle environmental issues, and adapt their responses to them.

LIMITATIONS AND CAVEATS

This thesis had several limitations. The first limitation relates to its "case study" character and its consequent inability to generalize the results to the whole Baka population given the potential variations that might happen between study areas. Indeed, the Baka are a large group settled in different countries, with different histories, an different economic and social contexts. This dissertation only discussed issues related to the Baka of Lomié and Messok district, i.e., a population living in an area of relatively easy access, occupied by the Nzime people and characterized by strong presence of outside merchants, and with village surroundings "empty" of large game. In the absence of comparative research, my results can not be extrapolated. Despite this caveat, and based on recent studies mentioned along this thesis, I however argue that other Baka groups, as well as other Pygmies of the Congo Basin, are facing similar challenges, such as weak political status, restriction in land access and use, and marginalization, and might therefore be similarly affected by issues changing their relation to hunting and wildlife. Thus, contributions resulting from this work might indeed provide some more general insights at the same time that they could hopefully inspire new research and comparative studies.

The second limitation of this work relates to its inability to adequately capture the difference between village and forest life. The data collected for this thesis mainly came from the 'village side' of the Baka life. Systematic data collection required full time presence in the village settlement where data were collected. Regular travels to remote forest camps were not possible, without compromising the previously adopted methodology of data collection. However, during my short visits to forest camps I could see that forest life present a more traditional social organization in reduced groups, which might show critical variations in terms of social and economic relations, dependence to other groups, and subsistence practices given a better access to more abundant resources. However, regular work on forest camps would have dramatically reduced my sample size, given the distance from one campo to another, which would then raise issues of the representativeness.

A third limitation of this work is that, despite aiming at a comprehensive approach, it overlooks some important components of hunting. For example, the ritual dimension of hunting, central in the way the Baka perceive and justify hunting, was not included. Hunting rituals were initially put asides because they have been the subject of other in-depth studies (Joiris, 1998). However, over the course of the work it became evident that hunter's decisions, perception of forest space, gender relations, and sharing rules are deeply entangled with ritual perspective and cosmovision. A deeper look at those aspects, mostly by updating Joiris's work, would have benefited the whole argument. Without this aspect, any attempt of ethnoecology of hunting finally remains incomplete.

A final limitation of this work refers to two important issues related to data reliability. First, the sensitive aspect of my research, involving illegal practices (e.g., type of weapon used, hunting of protected species) has made difficult the access to reliable and complete information, notably concerning ivory trade and elephant hunting. Second, although the posture I took as permanent inhabitant of a Baka village allowed me to gain trust of village people and some traders, it also prevented me to have close relation and so to collect data from ecoguards themselves and authorities. Therefore, I am aware that data related to some of the most conflictive aspects of hunting in the area might not be completely accurate.

POLICY IMPLICATIONS

Several policy implications can be derived from the results of my work, as it notably raises critical issues on the relation between subsistence hunting, the use of new hunting techniques, and the legal framework for wildlife protection.

The first policy implication of this thesis relates to the profound lack of adequacy of the national conservation policy and the local practices and economic realities. Targeting hunting techniques, as the current legislation does, rather than amount of game killed is indeed misleading for several reasons. As mentioned above, a strict distinction between subsistence and commercial hunting is nearly impossible given the entanglement between monetary needs, sharing, and social relations between Baka and gun owners. Second, by focusing on hunting techniques the law overlooks the current reality of hunting in forest area and, consequently, criminalizes practically all the hunting practices currently mobilized by the Baka for their subsistence. In itself, this constitutes an important ethical and livelihood issue, for which the current legislation is at odds with the international trend to recognize local and indigenous land rights. The restriction of legal hunting to what the law considers as 'traditional' proves ignorance of the local practices and does not cover Baka subsistence in a social and ecological context of a so-called "empty forest" and sedentarism.

While the use of the firearms is wide spreading in an alarming way, I have shown that only a small fringe of the Baka uses them. On the contrary, traps are the most common hunting method and therefore play a vital role in Baka subsistence. Moreover, the way snaring is currently used by the Baka

appears as particularly adapted to a semi-sedentary lifestyle, its adoption being correlated with a lifestyle revolving around agricultural products and seasonality. In the studied areas, where wildlife has been subjected to strong anthropogenic pressure, trapping around the villages seems to affect mainly small resilient mammals, even if the impact of trapping can be quite different in other less populated areas (Yasuoka, 2014). Today, a Baka might set up an average of 10 to 30 snares, whose yield would be often split between consumption and sales, thus generating a large part of the household income. In contrast, some non-Baka trappers with much higher means investing in large-scale trapping can install up to 300 forest traps and travel to set them up in remote areas that are often richer in fauna. The ecological and economic consequences of both strategies are incomparable, as recently showed by Fa et al. (2016) in a large-scale comparison between Pygmies and non-Pygmies hunting. To tackle this issue, controls should be directed to amount and species hunted rather than to hunting techniques, in order to better target non-local professional poachers rather than threatening local subsistence. Such a shift might help start reconciling local people with wildlife conservation, and potentially help change Baka perception that conservation is a restriction of human freedom and wellbeing in the benefit of animals.

Observations and in-depth interviews conducted during this work outline cases of abuses made by sworn agents in charge of wildlife conservation and how the Baka react to them. These findings echo with what Pygmy groups in others regions currently endure (Lewis, 2016; Oishi, 2016b; Rickenbach, 2015), emphasizing that the ancient forms of marginalization of the Pygmies continue to be maintained and, to some extent, nurtured by an imposed wildlife conservation ideology based on eviction and criminalisation of subsistence activities. Face to the difficulties or the reluctance of the authorities to tackle large-scale poaching, we observe a profound negative perception regarding hunting regulations and a reinforcement of Baka feeling of marginalization and injustice. The deep difference between the two perceptions of the environment surely constitutes the major hurdle for the acceptance of conservation policies by local people. To deal with that, the examination of such tension should the basement of all future work attempting to conciliate local wellbeing and wildlife conservation. This thesis has attempted to bring new elements in a situation that will continue to be a scientific and political issue to tackle in the next years. In that line, my work suggests the need to design inclusive conservation policies that consider the specifities of local cosmovision and perceptions of natural resources.

* *

*

References

Abernethy, K., Coad, L., Taylor, G., Lee, M. & 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.

Adams, W. M. & Hulme, D. 2001. If community conservation is the answer in Africa, what is the question? *Oryx* 35: 193-200.

Adams, W. M. & Hutton, J. 2007. People, parks and poverty: Political ecology and biodiversity conservation. *Conservation and Society* 5: 147-183.

Aisher, A. 2016. Scarcity, Alterity and Value: Decline of the Pangolin, the World's Most Trafficked Mammal. *Conservation and Society* 14 (4): 317-329.

Alcorn, J. 1993. Indigenous peoples and conservation. *Conservation Biology* 7: 424-426.

Althabe, G. 1965. Changements Sociaux Chez le Pygmées Baka de l'est Cameroun. *Cahiers d'Etudes Africaines* 5: 561–592.

Alvard, M. 1993. Testing the Ecologically Noble Savage Hypothesis: Conservation and Sub-sistence Hunting by the Piro of Amazonian Peru. Ph.D. Dissertation, University of New Mexico, Albuquerque.

Alvard, M.S. 1995 Intraspecific prey choice by Amazonian hunters. *Current Anthropology* 36 : 789-818.

Alvard, M.S. 1998. Indigenous hunting in the Neotropics: conservation or optimal foraging? In Caro, T. (ed) *Behavioural ecology and conservation biology*. Oxford University Press: 474-500.

Anderson, C., & Kilduff, G.J. 2009. Why do dominant personalities attain influence in face-to-face groups? The competence-signaling effects of trait dominance. *Journal of Personality and Social Psychology* 96 : 491–503.

Angelsen, A., Jagger, P., Babigumira, R., Belcher, B., Hogarth, N.J., Bauch S. & Wunder, S. 2014. *Environmental Income and Rural Livelihoods: A Global-Comparative Analysis*. World Development 64: 12–28.

Arom, S. 1978. *Anthologie de la Musique des Pygmées Aka*, Ocora-Radio France 558: 526–528 [Reed.1987, C559012/13].

Artaud, H., 2014. De l'« efficacité » symbolique des interdits à leur fonctionnalité écologique. *Revue d'Ethnoécologie*, 6. URL : http://ethnoecologie.revues.org/2055 (Accessed on January 18, 2017).

Bahuchet, S. & Guillaume, H. 1982. Aka-farmer relations in the northwest Congo basin. In Leacock, E. & Lee, R. (eds.), *Politics and history in band societies*, Cambridge: University Press/M.S.H: 189-211.

Bahuchet, S. 1972. Étude Ecologique d'un Campement de Pygmées Babinga (République Centrafricaine). *Journal d'Agriculture Tropicale et de Botanique Appliquée* 19(12): 509–559.

Bahuchet, S. 1985. *Les Pygmees Aka et la foret Centrafricaine: ethnologie écologique*. Paris: SELAF. 638 p.

Bahuchet, S. 1988. Food supply uncertainty among the Aka Pygmies (Lobaye, C.A.R.). In de Garine & Harrison (eds). *Coping with Uncertainty in food supply*, Oxford University Press (Oxford), pp.118-149

Bahuchet, S. 1989. *Les Pygmees Aka et Baka. Contribution de l'ethnolinguistique à l'histoire des populations forestieres d'Afrique Centrale*. Paris: Université René Descartes (Paris V). 766 p.

Bahuchet, S. 1990. Food sharing among the Pygmies of central Africa. *African Study Monographs* 11(1): 27-53.

Bahuchet, S. 1991. Les Pygmées d'aujourd'hui en Afrique centrale. *Journal des Africanistes* 61(1): 5-35.

Bahuchet, S. 1992. *Dans la forêt d'Afrique Centrale. Les pygmées Aka et Baka*. Peeters-Selaf, Paris-Louvain. 359 p.

Bahuchet, S. 1993a. L'invention des Pygmées. *Cahier d'études africaines* 33(129): 153-181.

Bahuchet, S. 1993b. History of the inhabitants of the central African rain forest: perspectives from comparative linguistics. In In Hladik, C. M., Hladik, A. Linares, O.F., Pagezy, H., Semple, A., & Hadley, M. (eds.), *Tropical Forests, People and Food. Biocultural Interactions and Applications to Development*. Paris: Unesco-Parthenon, Man and Biosphere serie: 37-54.

Bahuchet, S. 2012. Du Jatba-Revue d'ethnobiologie à la Revue d'ethnoécologie. *Revue d'ethnoécologie* 1 (Accessed on the 23th june 2017. URL : http://ethnoecologie.revues.org/689

Bahuchet, S. 2012. Du Jatba-Revue d'ethnobiologie à la Revue d'ethnoécologie. *Revue d'Ethnoécologie* 1: 1-12.

Bahuchet, S. 2014. Cultural diversity of African Pygmies. In Hewlett, B.S. (ed.) *Hunter-gatherer of the Congo Basin Cultures, Histories and Biology on African Pygmies*. New Brunswick/London:Transaction Publishers: 1-29

Bahuchet, S., Mckey, D. & de Garine, I. 1991. Wild Yams Revisited : Is Independence from Agriculture Possible for Rain Forest Hunter-Gatherers ? *Human Ecology* 19(2): 213-243.

Bailey, R.C. 1991. The Behavioral Ecology of Efe Pygmy Men in the Ituri Forest, Zaire. University of Michigan *Anthropological Papers* No. 86. Ann Arbor: University of Michigan.

Bailey, R.C., and N. R. Peacock. 1988. "Efe Pygmies of Northeast Zaire: Subsistence Strategies in the Ituri Forest." In de Garine, I. and Harrison, G.A. (eds.) *Coping with Uncertainty in Food Supply*. Oxford: Clarendon Press : 88-117.

Bailey, R.C., and T. N. Headland. 1991. "!e Tropical Rainforest: Is It a Productive Environment for Human Foragers?" Human Ecology 19(2): 261-285.

Bailey, R.C., G. Head, M. Jenike, B. Owen, R. Reichman, and E. Zechenter. 1989. "Hunting and Gathering in Tropical Forests: Is It Possible? American Anthropologist 91:59-82.

Bakarr, M., da Fonceca, G.A.B., Mittermeir, R., Rylands, A.B. & Painemilla, K.W. 2001. *Hunting and bushmeat utilization in the African rain forest: perspectives toward a blueprint for conservation action*. Washington DC: Conservation International.

Barkow, J. H. 1975. Prestige and culture: a biosocial interpretation. *Current Anthropology* 16: 553-572.

Barnard, H. R. 2005. *Research methods in anthropology: qualitative and quantitative approaches*. Walnut Creek, California: Altamira Press, 824 p.

Bayard, J. F., Geschiere, P., and Nyamnjoh, F., 2001, Autochtonie, démocratie et citoyenneté en Afrique. *Critique internationale* 10: 177-194.

Bennett E.L., Blencowe E., Brandon K., Brown D., Burn R.W., Cowlishaw G., Davies G., Dublin H., Fa J.E., Milner-Gulland E.J., Robinson J.G., Rowcliffe J.M., Underwood F.M., Wilkie D.S. 2007. Hunting for consensus: reconciling bushmeat harvest, conservation, and development policy in West and Central Africa. *Conservation Biology* 21: 884–887.

Bennett, E. L., Nyaoi A. J., & Sompud J. 1997. Hornbills Buceros spp. and culture in northern Borneo: can they continue to co-exist? *Biological Conservation* 82: 41 – 46

Bennett, E.L. & Robinson, J.G. 2000. Hunting of wildlife in tropical forests - implications for biodiversity and forest peoples. *Environment Department Papers* 76. The World Bank, Washington DC.

Bennett, E.L. 2014. Legal ivory trade in a corrupt world and its impact on African elephant populations. *Conservation Biology* 29(1): 54–60.

Berkes, F. 2004. Rethinking community-based conservation. *Conservation Biology* 18, 3: 621–630.

Berkes, F., Colding, J. & Folke, C. 2000. Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications* 10 (5):1251-1262.

Berlin B., Breedlove D.E. Et Raven P.H., 1974. *The principles of Tzeltal plant classification*. New York, London, Academic Press.

Bertaut, M. 1943. Contribution à l'étude des Négrilles de la région du Haut-Nyong. *Bulletin de la Société d'études camerounaises* 4: 73-95.

Biesbrouck, K. 1999. Agriculture and equatorial African hunter-gatherers and the process of sedentarization: the case of the Bagyeli in Cameroon. In Biesbrouck, K., Elders S. & Rossel, G. (eds.) *Challenging Elusiveness: Central African Hunter-Gatherers in a Multidisciplinary Perspective*. Leiden: CNWS, Universiteit Leiden: 189-206.

Bigombe Logo P. & Roulet P.-A. 2010. L'évolution des zones d'intérêt cynégétique à gestion communautaire au Cameroun. In Joiris, D.V. & Bigombe Logo P. (eds.) *La gestion participative des forêts d'Afrique centrale. Un modèle à l'épreuve de la réalité*. Versailles, QUAE (Synthèses): 143-151.

Bigombe Logo P., Yamo A. & Ngonde B. 2010. Les forêts communautaires au village. In Joiris D.V. & Bigombe Logo P. (eds.). *La gestion participative des forêts d'Afrique centrale. Un modèle à l'épreuve de la réalité*. Versailles, QUAE (Synthèses): 105-119.

Bigombe Logo, P., 2006. *Les Élites et la Gestion décentralisation des forêts au Cameroun. Essai d'analyse politiste de la gestion néopatrimoniale de la rente forestière en contexte de décentralisation*. Yaoundé : Cerad-Gepac. 18 p.

Bigombe Logo, P., 2007. Trajectoires de construction progressive de la citoyennete des « Pygmées » au Cameroun. GITPA report [online] http://gitpa.org/Autochtone%20GITPA%20300/gitpa300-16-60camerounTEXTREFbigombelogo.pdf

Bigombe Logo, P., Abessolo, J. A., & Koulbout, D. 2005. *La Gestion participative et le développement intégré des aires protégées de Lobéké, Boumba-bek et Nki au sud-est du Cameroun*. Genève-Gland-Yaoundé : IUCN-IUED, 34 p.

Binot, A. 2010. *La conservation de la nature en Afrique centrale. Entre théorie et pratique. Des espaces à géométrie variable*. Ph.D. thesis. Université Paris 1 Panthéon-Sorbonne. 442 p.

Bird-David, H.N. 1990. The giving environment: Another perspective on the economic system of gatherer–hunters. *Current Anthropology* 31(2):189-196.

Bird-David, N. 1992. Beyond "The Hunting and Gathering Mode of Subsistence": Culture-Sensitive Observations on the Nayaka and Other Modern Hunter-Gatherers. *Man 27*(1), 19-44.

Blake, S. 2005. Long-term system for monitoring the illegal killing of elephants (MIKE). Central African forests: final report on population surveys 2003–2004. Washington DC: Wildlife Conservation Society http://www.cites.org/common/prog/mike/survey/central_africa_survey03-04.pdf

Bliege Bird, R., & Smith, E.A. 2005. Signaling theory, strategic interaction, and symbolic capital. *Current Anthropology* 46: 221–248.

Blurton-Jones, N. 1987. Tolerated theft, suggestions about the ecology and evolution of sharing, hoarding, and scrounging. *Social Science Information* 26, 31–54.

Bobo, K. S., Kamgaing, T. O. W., Kamdoum, E. C., Dzefack, Z. C. B. 2015. Bushmeat Hunting in Southeastern Cameroon: Magnitude and impact on Duikers (Cephalophus spp.). *African Study Monographs* Suppl. 51: 119-141.

Bobo, K. S., Kamgaing, T.O.W., Ntumwel, B.C., Kagalang, D., Kengne, P.N.J., Ndengue, S.M.L., Badjeck, M.M.N. & Aghomo, F.F.M. 2014. Species richness, spatial distributions and densities of large and medium-sized mammals in the northern periphery of Boumba-Bek National Park, southeastern Cameroon. *African Study Monographs* Suppl. 49: 91-114.

Boehm, C. 1993. Egalitarian society and reverse dominance hierarchy. *Current Anthropology* 34 : 227–254.

Boëtch, J.-M. 2012. L'agriculture itinérante sur brûlis: quelques pratiques particulières des Pygmées du Gabon et les raisons qu'ils en donnent. *Journal des Africanistes* 82(1-2).

Boursier, D. 1994. *Depuis ce jour là, Contes des pygmées Baka du sud est du Cameroun*. Paris: L'Harmattan, 218 p.

Bowen-Jones E. & Pendry, S. 1999. The threat to primates and other mammals from the bushmeat trade in Africa, and how this threat could be diminished. *Oryx* 33(03): 233–246.

Bowen-Jones, E. 1998. *The African Bushmeat Trade; A Recipe For Extinction*. Ape Alliance, London.

Brashares, J. S., Abrahms B., Fiorella K. J., Golden C. D., Hojnowski C. E., Marsh R.A., McCauley D. J., Nuñez T. A., Seto K., and Withey L. 2014. Wildlife decline and social conflict. *Science* 345: 376-378.

Brashares, J. S., Golden, C.D., Weinbaum, K.Z., Barrett, C.B. & Okello, G.V. 2011. Economic and geographic drivers of wildlife consumption in rural Africa. *Proceedings of the National Academy of Sciences of the United States of America* 108(34): 13931-13936.

Brisson, R. 1981-1984. *Contes des Pygmées Baka du Sud-Cameroun, I-IV*. Paris : SELAF. («3 tomes) 188+200+228+236 p.

Brisson, R. 1984. *Lexique Français-Baka*. Douala: BP 5351, 396 p.

Brisson, R. 1999. *Mythologie des Pygmées Baka*. Paris-Louvain: Peeters, 210 p.

Brisson, R. 2010. *Petit Dictionnaire baka-français, Sud-Cameroun*. Paris: L'Harmattan, 640 p.

Brisson, R., & Boursier, D. 1979. *Petit dictionnaire baka-français*. Douala: Collège Liberman, 506 p.

Brockington, D. & Igoe, J. 2006. Eviction for conservation: A global overview. *Conservation and Society* 4(3): 424.

Brockington, D. 2002. *Fortress conservation: the preservation of the Mkomazi game reserve, Tanzania*. Bloomington, Indiana: Indiana University Press. 192 p.

Brockington, D. 2004. Community conservation, inequality and injustice: myths of power in protected area management. *Conservation and Society* 2(2):411-432.

Brockington, D., Igoe, J. & Schmidt-Soltau, K. 2006. Conservation, human rights, and poverty reduction. *Conservation Biology* 20(1): 250–252.

Brodie, J. F., Giordano, A. J., Zipkin, E.F., H. Bernard, J. Mohd-Azlan & L. Ambu, L. 2015. Correlation and persistence of hunting and logging impacts on tropical rainforest mammals. *Conservation Biology* 29(1): 110–121.

Brosius, J.P. 2006. Common ground between anthropology and conservation biology. *Conservation Biology* 20(3): 683-685.

Brown, C.H. 1977. Folk Botanical Life-Forms: Their Universality and Growth. *American* Anthropologist 79:317-342.

Brown, D. 2003. *Bushmeat & Poverty Alleviation: Implications for Development Policy*. Wildlife Policy Brief Number 2. Overseas Development Institute. London.

Brown, J.S. 1999. Vigilance, patch use and habitat selection: Foraging under predation risk. *Evolutionary Ecology Research* 1: 49–71.

Brym & John Lie. 2003. *Sociology: Your Compass for a New World*. Belmont, CA: Wadsworth, 602 p.

Bulmer, B. 1968. The strategies o f hunting in New Guinea. *Oceania* 38(4): 302-318.

Bundo, D. 2001. Social relationship embodied in singing and dancing performances among the Baka. *African Study Monographs* Suppl. 26: 85-101.

Burn, R.W., Underwood F.M., & Blanc J. 2011. Global trends and factors associated with the illegal killing of elephants: A hierarchical Bayesian analysis of carcass encounter data. *PLoS One* 6: 24165.

Cavalli-Sforza, L. L. 1986. *African Pygmies*. New York: Academic Press, 462 p.

Cawthom, D.M. & Hoffman, L.C. 2015. The bushmeat and food security nexus: A global account of the contributions, conundrums and ethical collisions. *Food Research International* 76 : 906-925

CBD, Convention on Biological Diversity, 1992. Convention on Biological Diversity. CBD, United Nations, New York.

Cernea, M.M. & Schmidt-Soltau, K. 2006. Poverty risks and national parks: Policy issues in conservation and resettlement. *World Development* 34(10): 1808–1830.

Cerutti, P.-O., Lescuyer, G., Assembe Mvondo, S. & Tacconi, L. 2010. *Les défis de la redistribution des bénéfices monétaires tirés de la forêt pour les administrations locales : une décennie de redevance forestière assise sur la superficie du titre d'exploitation au Cameroun*. Bogor, Indonesia, CIFOR (Occasional Paper 53), 15 p.

Cerutti, P.O. & Tacconi, L. 2008. Forests, illegality and livelihoods: the case of Cameroon. *Society and Natural Resources* 21(9): 845-53.

Cerutti, P.O., R. Nasi, R. & Tacconi. L. 2008. Sustainable forest management in Cameroon needs more than approved forest management plans. *Ecology and Society* 13(2): 36. [online] URL: http://www.ecologyands ociety.org/vol13/iss2/art36/

Chan, K.M.A., Pringle, R.M., Ranganathan, J., Boggs, C.L., Chan, Y.L., Ehrlich, P.R., Haff, P.K., Heller, N.E., Al-Khafaji, & K., Macmynowski, D.P. 2007. When agendas collide: human welfare and biological conservation. *Conservation Biology* 21:59–68.

Chatty, D. & Colchester, M. 2002. Introduction. In Chatty, D. & Colchester, M. (eds.) *Conservation and Mobile Indigenous Peoples*. New York: Berghahn Books. 420 p.

Cheng, J., Tracy, J.L., Henrich, J. 2010. Pride, personality, and the evolutionary foundations of human social status. *Evolution and Human Behavior* 31: 334–347.

Ciuti, S., Northrup, J.M., Muhly, T.B., Simi, S., Musiani, M., Pitt, J.A., Boyce, M.S. 2012. Effects of humans on behaviour of wildlife exceed those of natural predators in a landscape of fear. *PLoS One*: 7(11):e50611.

Coad, L. 2007. Bushmeat hunting in Gabon: socio-economics and hunter behaviour. Ph.D. thesis University of Cambridge. 291 p. Available at http://www.iccs.org.uk/thesis/CoadPhDThesisJan2008.pdf

Colchester, M. 1994. *Slave and Enclave: The Political Ecology of Equatorial Africa*. World Rainforest Movement, Penang, Malaysia. 75 p.

Colchester, M. 1997. Salvaging nature: indigenous peoples and protected areas. In Ghimire, K. B. & Pimbert, M.P. (eds.) *Social Change and Conservation. Environmental Politics and Impacts of National Parks and Protected Areas*. London: Earthscan: 97-130.

Colchester, M. 2004. Conservation policy and indigenous peoples. *Environmental Science & Policy* 7: 145-153.

Colding J. Folke C. & Elmqvist T. 2003. Social Institutions in ecosystem management and biodiversity conservation. *Tropical Ecology* 44(1): 25-41.

Colding, J. & Folke, C. 1997. The relations among threatened species, their protection, and taboos. *Conservation* Ecology 1(1): 6.

Colding, J. & Folke, C. 2001. Social taboos: « invisible » systems of local resource management and biological conservation. *Ecological Applications* 11 (2): 584-600.

Cooney, R., Roe, D., Dublin, H., Phelps, J., Wilkie, D., Keane, A, Biggs, D. 2016. From Poachers to Protectors: Engaging Local Communities in Solutions to Illegal Wildlife Trade. *Conservation Letters* 10(3) : 367–374.

Corry, S. 2015. When Conservationists Militarise, Who's the Real Poacher? *Truthout* (Accessed on 3 july, 2016) http://www.truth-out.org/opinion/item/32255-when-conservationists-militarize-who-s-thereal-poacher

Cottes, A. 1911. *La Mission Cottes au Sud-Cameroun (1905-1908)*. Paris: Leroux E. 254 p.

Cowlishaw, G., Lawes, J.M., Lightbody, M., Martin, A., Pettifor, R., 1 Rowcliffe, J.M. 2004. A simple rule for the costs of vigilance: empirical evidence from a social forager. *Proceedings of the Royal Society of London* Biological Sciences 271(1534): 27-33

Cowlishaw, G., Mendelson, S., & Rowcliffe, J.M. 2005. Evidence for postdepletion sustainability in a mature bushmeat market. *Journal of Applied Ecology* 42: 460–468.

Craigie, I. D., Baillie, J. E. M., Balmford, A., Carbone, C., Collen, B., Green, R. E. & Hutton, J. M. 2010. Large mammal population declines in Africa's protected areas. *Biological Conservation* 143(9): 2221-2228.

Crampel, P. 1890. Les Bayagas, Petits Hommes de la Grande Forêt Equatoriale. *Compte-Rendu des Séances de la Société de Géographie* 16-17: 548-554.

Croes, B.M., Laurance W.F., Lahm S.A., Tchignoumba L., Alonso A., Lee M.E., Campbell P., & Buij R. 2006. The influence of hunting on antipredator behavior in Central African monkeys and duikers. *Biotropica* 39: 257–263

Damania, R., Milner-Gulland, E.J. & Crookes, D.J. 2005. A bioeconomic analysis of bushmeat hunting. *Proceedings of the Royal Society* 272: 259–266.

De Merode, E., Homewood, K. & Cowlishaw, G. 2004. The Value of Bushmeat and Other Wild Foods to Rural Households Living in Extreme Poverty in Democratic Republic of Congo. *Biological Conservation* 118(5): 573-581.

De Planhol, X. 2004. *Le paysage animal, l'homme et la grande faune, une zoogéographie historique*, Paris: Fayard, 1127 p.

Demesse, L. 1978. Changements Techno-Economiques et Sociaux Chez les Pygmées Babinga (Nord-Congo et Sud-Centrafrique). Paris: SELAF, 262 p.

Demesse, L. 1980. *Techniques et Economie des Pygmées Babinga*. Paris: Institut d'Ethnologie, 302 p.

Descola, P. 2005. *Par-delà nature et culture*. Paris: Gallimard, 640 p.

Dhellemes, I. 1985. *Le Père des Pygmées*. Paris: Flammarion, 231 p.

Diamond J. 1992. *The Third Chimpanzee*. New York: Harper Collins, 432 p.

Dickman, A., Johnson, P. J., van Kesteren, F. and Macdonald, D. W. 2015. The moral basis for conservation: how is it affected by culture? *Frontiers in Ecology and the Environment* 13: 325–331

Dirzo, R., Young, H.S., Galetti, M., Ceballos, G., Isaac, N.J.B., Collen, B. 2014. Defaunation in the Anthropocene. *Science* 345(6195): 401-406.

Dodd, R. 1980. Rituals and the maintenance of internal cooperation among the Baka hunter and gatherers. Paper presented at *2nd International Conference on Hunting and Gathering Societies (Québec)*: 1-30.

Douglas, M. 2005 [1966]. *De la souillure : Essais sur les notions de pollution et de tabou*. Paris: Éd. de la Découverte. [First published as *Purity and Danger: An Analysis of Concepts of Pollution and Taboo*. Routledge & Kegan Paul, London].

Dounias, E. 1987. Ethno écologie et alimentation des Pygmées BaGyeli, Sud-Cameroun. Le Havre : Institut Supérieur Technique d'Outre-Mer, rapport de stage.

Dounias, E. 1993. Perception and use of wild yams by the Baka hunter-gatherers in South-Cameroon. In Hladik, C. M., Hladik, A. Linares, O.F., Pagezy, H., Semple, A., & Hadley, M. (eds.), *Tropical Forests, People and Food. Biocultural Interactions and Applications to Development*. Paris: Unesco-Parthenon, Man and Biosphere serie: 621–632.

Dounias, E. 1995. Comment les pygmées du sud du Cameroun forestier modèlent la forêt à l'usage de leur vie nomade. *Flamboyant*, *36*, 28–30.

Dounias, E. 1996. Sauvage ou cultivé ? La paraculture des ignames sauvages par les pygmées Baka du Cameroun. In Hladik, C. M., Hladik, A., Linares, . O. F., Koppert, G. J. A. & Froment, A. (eds.)

L'alimentation en forêt tropicale: interactions bioculturelles et perspectives de développement. Bases culturelles des choix alimentaires et stratégies de développement. Paris: Unesco-Parthenon, Man and Biosphere serie: 939–960.

Dounias, E. 2001. The Management of Wild Yam Tubers by the Baka Pygmies in Southern Cameroon. *African Study Monographs* 26: 135–156.

Dounias, E. 2011. La pêche chez les peuples forestiers d'Afrique Centrale. In Paugy D., Lévêque C., Mouas I. (eds.) *Poissons d'Afrique et peuples de l'eau*. Marseille, IRD-éditions: 209-231.

Dounias, E. 2015. Commensal symbiosis between the honeyguide bird and Congo Basin honey hunters. Oral Communication in session "Animal auxilliaries". *11th Conference on Hunting and Gathering Societies*, Vienna (Austria), 7-11 September 2015.

Dounias, E. 2016. From Subsistence to Commercial Hunting: Technical Shift in Cynegetic Practices Among Southern Cameroon Forest Dwellers During the 20th Century. *Ecology and Society* 21(1): 23.

Dounias, E., & Froment, A. 2006. When forest-based hunter-gatherers become sedentary: Consequences for diet and health. *Unasylva*, *57*(224), 26–33.

Dounias, E., & Leclerc, C. 2006. Spatial shifts and migration time scales among the Baka Pygmies of Cameroon and the Punan of Borneo. In de Jong, W., Tuck-Po L., & Kenichi, A. (eds.) *The social ecology of tropical forest: migration, populations and frontiers*. Kyoto: Kyoto University Press & Trans Pacific Press: 147-173.

Du Chaillu, P. 1863. *Voyages et aventures en Afrique Equatoriale. Moeurs et coutumes des habitants, chasses au gorille, au crocodile, au léopard, à l'éléphant, à l'hippopotame*. Paris: Michel Lévy. 546 p.

Duda R., Gallois S. & Reyes-García V. 2017. Hunting techniques, wildlife offtake and market integration. A perspective from individual variations among the Baka (Cameroon). *African Study Monographs*. 38(2): 97-118

Duda R., Gallois S. & Reyes-García V. 2017. Hunting techniques, wildlife offtake and market integration. A perspective from individual variations among the Baka (Cameroon). *African Study Monographs* 38(2): 97-118

Duffy, R. 2014. Waging a war to save biodiversity: The rise of militarized conservation. *International Affairs* 90(4): 819-834.

Duffy, R., St John, F., Büscher, B. & Brockington D. 2015. The Militarization of Anti-Poaching: Undermining long term goals, *Environmental Conservation* 42: 345-348.

Dwyer, P. 1985. A hunt in New Guinea: Some difficulties for optimal foraging theory. *Man* 20: 243-253.

Eba'a Atyi, R., Devers, D., de Wasseige, C., Maisels, F., 2009. State of the forests of Central Africa: regional synthesis. In: Wasseige, C., De Marken, P., Eba'a Atyi, R., Nasi, R., Mayaux, Ph. (eds.) *The Forests of the Congo Basin - State of the Forest*. Publications office of the European Union, Luxembourg [online] http://observatoire-comifac.net/edf2008.php?l=en :17-44

Effiom, E. O., G. Nuñez-Iturri, H. G. Smith, U. Ottosson & O. Olsson. 2013. Bushmeat hunting changes regeneration of African rainforests. *Proceedings of the Royal Society B: Biological Sciences* 280(1759).

Egbe, S.E. 2001. *The Law, Communities And Wildlife Management in Cameroon*. Rural Development Forestry Network. Network Paper 25: 1-12.

Ellen, R. 1988. Persistence and change in the relationship between anthropology and human geography.

Progress in Human Geography 12(2): 229-262 .

Ellen, R. 1991. Conceptualizing the unique in human ecology and evolution. *Reviews in Anthropology* 19: 145-158.

Epelboin A. & Formenty P. 2011. Anthropologie sociale et culturelle et lutte contre les épidémies de fièvre Ebola et Marburg. In Leport C. & Guégan J.-F. (eds.) *Les maladies infectieuses émergentes : état de la situation et perspectives*. Haut Conseil de la santé publique La Documentation française, Collection Avis et rapports: 111-113.

Epelboin A., Bahuchet S. & Durand J. L. 2012, Le bon goût de la viande de primate : des interdits des Pygmées aka aux injonctions écologiques. In Cros, M., Bondaz, J. & Michaud, M. (eds.) *L'animal cannibalisé. Festins d'Afrique*, Paris, Éditions des archives contemporaines: 45-69.

Ezzine de Blas D., Ruiz Pérez M., Sayer J.A., Lescuyer G., Nasi R. & Karsenty A. 2009. External Influences on and Conditions for Community Logging Management in Cameroon. *World development* 37(2) : 445-456.

Fa, J.E., Brown, D. 2009. Impacts of hunting on mammals in African tropical moist forests: a review and synthesis. *Mammal Review* 39: 231-264.

Fa, J.E., Olivero, J., Farfán, M. A., Lewis, J., Yasuoka, H., Noss, A., Hattori, S., Carpaneto, G., Germi, F., Márquez, A. L., Duarte, J., Duda, R., Gallois, S., Riddell, M., Nasi, R. 2016. Differences between indigenous and non-indigenous hunting in Congo basin forests. *Plos One* 10(9): e0161703.

Fa, J.E., Seymour, S. Dupain, J., Amin, R., Albrechtsen, L. & Macdonald, D. 2006. Getting to grips with the magnitude of exploitation: Bushmeat in the Cross-Sanaga rivers region, Nigeria and Cameroon. *Biological Conservation* 129: 497-510.

FAO. 2002. *Evaluation des ressources forestières mondiales 2000*. Rapport principal. Etude FAO Forêts 140. Rome.

Fernández-Llamazares, Á, Díaz-Reviriego, I. & Reyes-García, V. 2016. Defaunation through the eyes of the Tsimane'. In Pyhälä A. & Reyes-García, V. (eds.) *Hunter-Gatherers in a Changing World*. New York. US: Springer: 77-90.

Fernández-Llamazares, Á., Díaz-Reviriego, I., Luz, A.C., Cabeza, M., Pyhälä, A., & Reyes-García, V. (2015). Rapid ecosystem change challenges the adaptive capacity of Local Environmental Knowledge. *Global Environmental Change* 31 : 272-284.

Fitzgerald, D. 2011. *Why Kùnda sings: Narrative discourse and the multifunctionality of Baka song in Baka story*. University of Florida.

Foale, S., Cohen P., Januchowski-Hartley S., Wenger A. & Macinture M. 2011. Tenure and Taboos: origins and implications for fisheries in the Pacific. *Fish and fisheries* 12(4) : 357-369.

Frid, A., Dill, L. 2002. Human-caused Disturbance Stimuli as a Form of Predation Risk. *Conservation Ecology* 6: 94–109.

Friedberg, C., 1974. Les processus classificatoires appliqués aux objets naturels et leur mise en pratique. *Journal d'Agriculture Tropicale et de Botanique Appliquée* 21 (10-11-12):313-329.

Froment, A. 2014. Human Biology and Health of African Rainforest Inhabitants. In Hewlett B.S. (ed.) *Hunter-gatherer of the Congo Basin Cultures, Histories and Biology on African Pygmies*. New Bruswick: Transaction Publishers: 117-164.

Fürniss, S. 2005. Femmes, maîtresses, mères: Chants et danses des jeunes filles baka. *Cahiers de Musiques Traditionnelles 18*, 217–237.

Fürniss, S. 2008. The adoption of the circumcision ritual bèkà by the Baka-Pygmies in Southeast Cameroon. *African Music* 8(2): 94-113.

Gallois, S, 2015. *Dynamics of Local ecological knowledge among the Baka children from southeastern Cameroon*. Universitat Autònoma de Barcelona, Barcelona. 377 p.

Gallois, S., & Duda, R. 2016. Beyond Productivity: Socio-cultural role of fishing among the Baka of southeastern Cameroon, *Revue d'Ethnoécologie*. [online], 10. https://ethnoecologie.revues.org/2818 (Accessed on December 14, 2016)

Gallois, S., Duda, R., & Reyes-García, V. 2016. "Like Father, Like Son"? Baka children's ethnoecological learning in a context of cultural change. In Pyhälä A. & Reyes-García, V. (eds.) *Hunter-Gatherers in a Changing World*. New York. US: Springer: 195-212.

Gallois, S., Duda, R., and Reyes-García, V. 2017. Local ecological knowledge among Baka children: a case of 'children's culture´ ?. *Journal of Ethnobiology*. Accepted August 19, 2016, *in press*.

Gallois, S., Duda, R., Hewlett, B., and Reyes-García, V. 2015. Children's daily activities and Local Ecological Knowledge acquisition. A case study among the Baka from southeastern Cameroon. *Journal of Ethnobiology and Ethnoecology* : 86.

Garcia, C. & Lescuyer G. 2008. Monitoring Indicators and Community-Based Forest Management in the Tropics: Pretexts or Red Herrings? *Biodiversity and Conservation* 17(6): 1303-1317.

Garine, I. de 1993. Food resources and preferences in the Cameroon-ian forest. In Hladik, C. M., Hladik, A. Linares, O.F., Pagezy, H., Semple, A., & Hadley, M. (eds.), *Tropical forests, people and food. Biocultural interactions and applications to development*. Paris: Unesco-Parthenon, Man and Biosphere serie: 561-574.

Garine, I. de, and H. Pagezy. 1990. Seasonal hunger or "craving for meat." In Hladik, C.M., Bahuchet, S., & Garine, I. de (eds.) *Food and nutrition in the African rain forest*. Paris: United Na-tions Educational, Scientific, and Cultural Organization-Man and the Biosphere Programs: 43-44.

Garine, I. de. 1972. The socio-cultural aspects of nutrition. *Ecology of food and nutrition* 1 : 143-163

Gautier-Hion, A., Colyn, M. & Gautier, J.-P. 1999. *Histoire naturelle des primates d'Afrique Centrale*. Libreville, Gabon: ECOFAC. 162 p.

Gill, D. J. C., Fa, J.E, Rowcliffe, J.M. & Kümpel, N.F. 2012. Drivers of Change in Hunter Offtake and Hunting Strategies in Sendje, Equatorial Guinea. *Conservation Biology* 26: 1052-1060.

Gintis, H., Smith, E. A., & Bowles, S. 2001. Costly signaling and cooperation. *Journal of Theoretical Biology* 213: 103-119.

Godoy, R., Reyes-García, V., Huanca, T., Leonard, W.R., McDade, T.W., Tanner, S., Vadez, V., Seyfried Jr., C. 2007. Signaling by consumption in a native Amazonian society. *Evolution and Human Behavior* 28(2): 124-134.

Groo, M. 2014. Elephants in the media: a conversation with Melissa Groo. *A voice for elephants*. March 23rd, 2017. http://voices.nationalgeographic.com/2014/01/17/elephants-in-the-media-a-conversation-with-melissa-groo/

Gurven, M. & von Rueden, C. 2006. Hunting, social status and biological fitness. *Social Biology* 53, 81-99.

Gurven, M., & Hill, K. 2009. Why Do Men Hunt? *Current Anthropology* 50(1) : 51-74.

Gurven, M., Kaplan, H. & Gutierrez, H. 2006. How long does it take to become a proficient hunter? Implications for the evolution of extended development and long life span. *Journal of Human Evolution* 51: 454-470.

Hagino, I., Sato, H., & Yamauchi, T. 2014. The demographic characteristics and nutritional status for a hunter-gatherer society with social transitions in southeastern Cameroon. *African Study Monographs* Suppl. 47: 45-57

Harako, R. 1976. The Mbuti as Hunters: A Study of Ecological Anthropology of the Mbuti Pygmies. *Kyoto University African Studies* 10: 37-99.

Hardin R., Robillard M., & Bahuchet S. 2008. Political Boundaries, Divided Peoples and Transborder Conservation of Central African Forests : Two Congo Basin Cases. In de Jong, W. (ed.) *Transborder Environmental and Natural Resource Management*. Discussion Paper 4. CIAS (Center for Integrated Area studies), Kyoto University, December 5-7 2007: 95-116.

Hardin, G. 1968. The tragedy of the commons. *Science* 162: 1243-1248.

Hardin, R. 2005. A Travers La Foret, vers une nouvelle anthropologie environnementale (Introduction). *Anthropologie et Societes*. Special issue "Forêts Tropicales" (Hardin, R. (ed.)) 29 (1).

Hardy, C. L., & Van Vugt, M. 2006. Nice guys finish first: The competitive altruism hypothesis. *Personality and Social Psychology Bulletin*, 32 : 1402-1413.

Harmon, D. 1996 Losing species, losing languages: connections between biological and linguistic diversity. *Southwest Journal of Linguistics* 15: 89-108.

Harris, M. 1979. *Cultural materialism : The struggle for a Science of Culture*. New York : Random House.

Harrison, R. D. 2011. Emptying the Forest: Hunting and the Extirpation of Wildlife from Tropical Nature Reserves. *BioScience* 61 (11): 919-924.

Hart, T. B., & Hart J.A. 1984 . The Ecological Basis of Hunter-gatherer Subsistence in African Rain Forests: The Mbuti of Eastern Zaire. *Human Ecology* 14(1): 29-55.

Hattori, S. 2006. Utilization of Maranthaceae plants by the Baka hunter-gatherer in southeastern Cameroon. *African Study Monographs*. Suppl. 33, 29-48.

Hattori, S. 2014. Current issues facing the forest people in southeastern Cameroon: The dynamics of Baka life and their ethnic relationship with farmers. *African Study Monographs* Suppl., 47: 97-119

Hawkes, K. & Bliege Bird, R. 2002. Showing off, handicap signaling, and the evolution of men's work. *Evolutionnary Anthropology* 11(2): 58-67.

Hawkes, K., O'Connell, J. F., & Blurton Jones, N. G. 2001. Hadza meat sharing. Evolution and *Human Behavior* 22(2): 113–142.

Hayashi, K. 2000. Hunting and gathering activities of the Baka in southeastern Cameroon: The actual condition and contemporary significance. *Human and Science* 14, 27-38.

Hayashi, K. 2008. Hunting Activities in Forest Camps among the Baka Hunter-gatherers of Southeastern Cameroon. *African Study Monographs* 29: 73-92.

Hecht, S.B., Kandel, S., Gomes, I., Cuellar, N. & Rosa., H. 2006. Globalization, forest resurgence and environmental politics in El Salvador. *World Development* 34: 308-323.

Heinrich, J., & Gil-White, F.J. 2001. The evolution of prestige: freely conferred deference as a mechanism for enhancing the benefits of cultural transmission. *Evolution and Human Behavior* 22: 165-196.

Hewlett, B.S. & Fancher, J.M. 2011. Central African Hunter-Gatherer Research Traditions. In Cummings, V., Jordan, P. & Zvelebil, M. (eds.) *Oxford Handbook of the Archaeology and Anthropology of Hunter-Gatherers*. Oxford: Oxford University Press: 936-957.

Hewlett, B.S. 1988. Sexual Selection and Paternal Investment among Aka Pygmies. In Betzig, L., Borgerhoff Mulder, M. & Turke, P. *Human Reproductive Behavior: A Darwinian Perspective*, edited by. Cambridge: Cambridge University Press: 263–276.

Hewlett, B.S. 1989. Multiple Caretaking among African Pygmies. *American Anthropologist* 91: 186–91.

Hewlett, B.S. 1991. *Intimate Fathers: The Nature and Context of Aka Pygmy Paternal Care*. University of Michigan Press. 216 p.

Hewlett, B.S. 1996. Cultural diversity among African Pygmies. In Kent, S. (ed.) *Cultural Diversity among Twentieth-Century Foragers in an African Perspective*, Cambridge: Cambridge University Press: 215-244

Hewlett, B.S. 2014. Introduction. In Hewlett B.S. (ed.) *Hunter-gatherer of the Congo Basin Cultures, Histories and Biology on African Pygmies*. New Bruswick: Transaction Publishers

Hill, K. & Hurtado, A.M. 1996. *Ache Life History: the ecology and demography of a foraging people*. Aldine de Gruyter, New York. 561 p.

Hladik A., Dounias E. 1993. Wild yams of the African forests as potential food resources. In Hladik, C. M., Hladik, A. Linares, O.F., Pagezy, H., Semple, A., & Hadley, M. (eds.), *Tropical forests, people and food. Biocultural interactions and applications to development*. Paris: Unesco-Parthenon, Man and Biosphere serie: 163-176.

Hoare, A. 2006. *Divided forests: towards fairer zoning of forest lands*. Rainforest Foundation, London, UK.

Hulme, D. & Murphee, M. 2001. *African wildlife and livelihoods: The promise and performance of community conservation*. James Currey, Oxford.

Hutton, J., Adams, W. & Murombedzi, J. 2005. Back to the barriers? Changing narratives in biodiversity conservation. *Forum for Development Studies* 32: 341-370.

Ichikawa, M. 1978. The Residential Groups of the Mbuti Pygmies. *Senri Ethnological Studies* 1 (Africa 1): 131-188.

Ichikawa, M. 1981. Ecological and Sociological Importance of Honey to the Mbuti Net Hunters, Eastern Zaire. *African Study Monographs* 1: 55-68.

Ichikawa, M. 1983. An Examination of the Hunting-dependant Life of the Mbuti Pygmies, Eastern Zaïre. African Studies Monographs 4: 55-76.

Ichikawa, M. 1987. Food restrictions of the Mbuti Pygmies, eastern Zaire. *African Study Monographs*, suppl. 6: 97-121.

Ichikawa, M. 1996. Déterminismes écologiques et culturels des choix alimentaires des chasseurs-cueilleurs Mbuti du Zaïre. In Hladik, C. M., Hladik, A., Linares, . O. F., Koppert, G. J. A. & Froment, A. (eds.) *L'alimentation en forêt tropicale: interactions bioculturelles et perspectives de développement. Bases culturelles des choix alimentaires et stratégies de développement*. Paris: Unesco-Parthenon, Man and Biosphere serie: 759-770

Ichikawa, M. 2005. Food sharing and ownership among central African hunter-gatherers: an evolutionary perspective. In *Property and Equality*, Vol. 1, edited by Thomas Widlok and Wolde Tadesse, Berghahn Books, 151-164.

Ichikawa, M. 2005. Food sharing and ownership among central African hunter-gatherers: an evolutionary perspective. In Widlok, T. & Tadesse, W. (eds.) *Property and Equality*, Vol. 1. Berghahn Books: 151–164.

Ichikawa, M. 2006 Problems in the Conservation of Rainforests in Cameroon. *African Study Monographs* Suppl. 33: 3-20.

Ichikawa, M. 2014. Forest conservation and indigenous peoples in the Congo basin: New trends toward reconciliation between global issues and local interests. In Hewlett, B. (ed.) *Hunter-Gatherers of the Congo Basin: Culture, History and Biology of African Pygmies*. Transaction Publishers, New Jersey: 321–342

Ichikawa, M., Hattori, S. & Yasuoka, H. 2011. Environmental Knowledge among Central African Hunter-gatherers: Types of Knowledge and Intra-cultural Variations. In Whallon, R., Lovis, W.A. & Hitchcock, R.K. *Information and Its Role in Hunter- Gatherer Bands*. Costen Institute of Archaeology, Los Angeles:117-132.

Ichikawa, M., Hattori, S., & Yasuoka, H. 2016. Bushmeat Crisis, Forestry Reforms and Contemporary Hunting Among Central African Forest Hunters. In Reyes-García, V. & Pyhälä, A. (eds.), *Hunter-gatherers in a Changing World*. Springer, New-York : 59–75.

Ingold, T. 1987. The appropriation o f nature: Essays on human ecology and social relations. Manchester: Manchester University Press.

Ingold, T. 1996. Hunting and Gathering as Ways of Perceiving the Environment. In Ellen, R. & Fukui, K. (eds.) *Redefining Nature: Ecology, Culture an Domestication*. Oxford, Berghman: 117-154.

Ingold, T. 2000. *The Perception of the Environment: Essays in Livelihood, Dwelling, and Skill*. New York: Routledge.

Institut National de la Statistique. 2010. Population et Affaires sociales. In *Annuaire Statistique du Cameroun*. Institut National de la Statistique, Cameroun : 39–52

Inter Press Service 2016. *Militarised Conservation Threatens DRC's Indigenous People*. Online. http://www.ipsnews.net/2016/09/militarised-conservation-threatens-drcsindigenous-people-part-1 (Accessed on March 9, 2017).

Isaac, N. J. B. & Cowlishaw, G. 2004. How species respond to multiple extinction threats. *Proceedings of the Royal Society* 271(1544): 1135–1141.

IUCN, 2016. The IUCN Red List of Threatened Species. Version 2016-3. http//www.iucnredlist.org (Accessed from March to December 2016).

Jerozolimski, A. & Peres, C.A. 2003. Bringing home the biggest bacon: A cross-site analysis of the structure of hunter-kill profiles in Neotropical forests. *Biological Conservation* 111: 415–425.

Johannes, R.E. 1981. *Words of the lagoon, Fishing and marine lore in the Palau district of Micronesia*. Berkeley, University of California Press.

Johannes, R.E. 1993. Integrating traditional ecological knowledge and management with environmental impact assessment. In Inglis, J.T. (ed.) *Traditional ecological knowledge: Concepts and cases*. Ottawa, International Program on Traditional Ecological Knowledge and International Development Research Centre : 33-40.

Joiris D. V. 1993. Baka Pygmy hunting rituals in Southern Cameroon: How to walk side by side with the elephant. *Civilisation*, XLI(2): 51-81.

Joiris D.V. & Bigombe Logo P. (Ed.). 2010. *La gestion participative des forêts d'Afrique centrale. Un modèle à l'épreuve de la réalité*. Versailles, QUAE.

Joiris D.V. 1992. Entre le village et la forêt : place des femmes bakola et baka dans des sociétés en voie de sédentarisation. In Bisilliat, J. (dir.), Pinton, F. & Lecarme M. (eds.) *Relations de genre et développement : femmes et sociétés*. Paris: ORSTOM (Colloques et Séminaires): 125-148.

Joiris, D. 1996. Ce que bien manger veut dire chez les Pygmées Kola (Gyeli) et Baka du Sud-Cameroun. In Froment A., de Garine I., Binam Bikoi C. & Loung J. F. (eds.). *Bien manger et bien vivre. Anthropologie alimentaire et développement en Afrique intertropicale: du biologique au social*. L'Harmattan / ORSTOM, Paris, 520 p.

Joiris, D.V. 1996. A comparative approach to hunting rituals among the Baka Pygmies. In Kent, S. (ed) *Cultural Diversity among 20th Century Foragers*. Cambridge: Cambridge University Press: 245-275.

Joiris, D.V. 1998. *La chasse, la chance, le chant. Aspects du système rituel des Baka du Cameroun*. Ph.D. thesis, Faculté des Sciences Sociales, Politiques et Economiques, Université Libre de Bruxelles, Brussels.

Joiris, D.V. 2003. The framework of Central African hunter-gatherers and neighbouring societies. *African Study Monographs*. Suppl. 28: 57-79.

Joiris, D.V., Bigombe-Logo, P. & Abega, S.C. 2014. La gestion participative des forêts en Afrique centrale. *Revue d'ethnoécologie* [online] http://ethnoecologie.revues.org/1960

Joppa, L.N., Loarie, S.R. and Nelson, A. 2010. Measuring population growth around tropical protected areas: current issues and solutions. *Tropical Conservation Science* 3(2): 117-121.

Julve C., Vandenhaute M., Vermeulen C., Castadot B., Ekodeck H. & Delvingt W. 2007. Séduisante théorie, douloureuse pratique : la foresterie communautaire camerounaise en butte à sa propre législation. *Parcs et Réserves* 62(2): 18-24.

Kaplan H, & Gurven M. 2005. The natural history of human food sharing and cooperation: a review and a new multi-individual approach to the negotiation of norms. In Gintis H, Fehr, E., Bowles, S. Boyd, R. (eds.) *Moral Sentiments and Material Interests: On the Foundations of Cooperation in Economic Life*. Cambridge, MIT Press: 75–113.

Karsenty, A. 2008. Des « communautés locales » problématiques. In Méral Ph., Castellanet Ch. & Lapeyre R. (dir.) *La gestion concertée des ressources naturelles*. L'épreuve du temps, Gret, Karthala: 277-288

Karsenty, A., & Marie, J., 1997. *Les Tentatives de mise en ordre de l'espace forestier en Afrique centrale*. GRET-CNRS-Orstom-Banque mondiale, Paris. 8 p.

Kelly, R.M. 1995. The foraging spectrum: Diversity in hunter-gatherer lifeways. Washington, D.C.: Smithsonian Institution Press.

Kenrick, J. & Lewis, J. 2004. Indigenous Peoples' Rights and the Politics of the Term 'Indigenous'. *Anthropology Today* 20(2): 4-9.

Kilian-Hatz, C. 1989. *Contes et Proverbes des Pygmées Baka*. Avec une Introduction au Peuple et à la Langue Baka par Brisson R. et Boursier D. Paris: ACCT, 262 p.

Kingdon, J. 2001. *The Kingdon field guide to African mammals*. Academic Press, San Diego.

Kitanishi, K. 2003. Cultivation by the Baka hunter-gatherers in the tropical rain forest of central Africa. *African Study Monographs. Suppl. 28*, 143-157.

Kitanishi, K. 2006. The impact of cash and commoditization on the Baka hunter-gatherer society in southeastern Cameroon. *African Study Monographs* Suppl. 33:121-142.

Koch, C. 1913. Die Stämme des Bezirks Molundu in sprachlicher, geschichlicher und völkerundlicher Beziehung. Leipzig. *Baessler Archiv* 3: 257-312.

Köhler, A. & J. Lewis. 2002. Putting hunter-gatherer and farmer relations in perspective: A commentary from Central Africa. In Kent, S. (ed.) *Ethnicity, Hunter-gatherers, and the "Other": Association and Assimilation in Africa*. Smithsonian Institution Press, Washington and London: 276–305

Köhler, A. 1998. *Forest, hearth and home: Baka village life in Northwestern Congo*. University of Manchester PhD thesis.

Köhler, A. 2000. Half-man, half-elephant: Shapeshifting among the Baka of Congo. In Knight, J. (ed.) *Natural Enemies People-wildlife Conflicts in Anthropological Perspective*. Routledge, London: 50–77.

Köhler, A. 2005. Money makes the world go round? Commodity sharing, gifting and exchange in the Baka (Pygmy) economy. In Widlok, T. & Tadesse W. (eds.) *Property and equality* Volume 2: *Encapsulation, commercialisation, discrimination*. New York, Oxford: Berghahn Books: 32–55.

Köhler, A. 2005. Money makes the world go round? Commodity sharing, gifting and exchange in the Baka (Pygmy) economy. In Widlok, T. & Tadesse, W. (eds.) *Property and equality* Volume 2: *Encapsulation, commercialisation, discrimination*. New York, Oxford: Berghahn Books: 32-55.

Konopo, J. 2016. Botswana's 'shoot-to-kill policy' against suspected poachers. *Mail and Guardian*, March 18th, 2016. http://mg.co.za/article/2016-03-16-botswanas-shoot-tokill-policy-against-suspected-poachers

Kopnina, H.N. 2016. Wild Animals and Justice: The Case of the Dead Elephant in the Room. *Journal of International Wildlife Law & Policy* 3 (19): 219-235.

Koppert, G.J.A., Dounias, E., Froment, A. et Pasquet, P. (1996). Consommation alimentaire dans trois populations forestières de la région côtière du Cameroun: Yassa, Mvae et Bakola. In Hladik C.M., Hladik A., Pagezy H., Linares O.F., Koppert G.J.A., Froment, A. (eds.). *L'alimentation en forêt tropicale: interactions bioculturelles et perspectives de développement. Bases culturelles des choix alimentaires et stratégies de développement*. Paris: Unesco-Parthenon, Man and Biosphere serie 477-496.

Koster, J. M., Hodgen, J. J., Venegas, M. D. & Copeland, T. J. 2010. Is Meat Flavor a Factor in Hunters' Prey Choice Decisions? *Human Nature* 21: 219–242.

Koutou, D.K. 2010. *Another look at the law*. ITTO Tropical Forest Update 19/2: 13.

Kümpel, N.F., Milner-Gulland, E.J., Cowlishaw, G. & Rowcliffe, J. M. 2010. Incentives for hunting: The role of bushmeat in the household economy in rural equatorial guinea. *Human Ecology*, 38: 251–264.

Kumpel, N.F., Milner-Gulland, E.J., Rowcliffe, J.M., Cowlishaw, G. 2008. Impact of gun-hunting on diurnal primates in continental Equatorial Guinea. *International Journal of Primatology* 29: 1065-1082.

Kümpel, N.F., Rowcliffe, J.M., Cowlishaw, G. & Milner-Gulland, E.J. 2009. Trapper profiles and strategies: Insights into sustainability from hunter behaviour. *Animal Conservation*, 12: 531–539.

Kuper, A. 2003. The return of the native. *Current Anthropology* 44 (3): 389-402.

Laurance, W.F., Croes, B.M., Tchignoumba, L., Lahm, S.A., Alonso, A., Lee, M.E., Campbell, P. & Ondzeano, C. 2006. Impacts of roads and hunting on Central African rainforest mammals. Conservation Biology 20 : 1251-1261.

LeBreton, M., Prosser, A.T., Tamoufe, U., Sateren, W., Mpoudi, Ngole, E., Diffo, J.L.D., Burke, D.S.,

Wolfe, N.D. 2006. Patterns of bushmeat hunting and perceptions of disease risk among central African communities. *Animal Conservation* 9(4): 357-363

Leclerc, C. 2001. *En Bordure de Route: Espace Social, Dynamisme et Relation a l'environnement Chez les Pygmées Baka du Sud-Est Cameroun*. Nanterre: Paris X, 372 p.

Leclerc, C. 2012. *L'adoption de l'agriculture chez les Pygmées baka du Cameroun, dynamique sociale et continuité structurale*. Quae/MSH, Paris.

Leclerc, C., 2006. Le retour de chasse : avènement de la jalousie chez les Baka et dynamique sociale (Cameroun). *Colloque La chasse : pratiques sociales et symbolique,* maison René Ginouvès, archéologie et ethnologie, 9 au 11 juin 2005: 121-132.

Lee, R., & Daly, R. 1999. Introduction: Foragers and others. In Lee, R. B. & Daly, R. (eds.) *The Cambridge Encyclopedia of Hunters and Gatherers*. Cambridge: Cambridge University Press.

Lee, R.B. & I. deVore (eds.). 1968. *Man the hunter*. Chicago: Aldine.

Lee, R.B. 1979. *The !Kung San: men women and work in a foraging society*. Cambridge: Cambridge Univ. Press.

Lemos, M. C., & Agrawal, A., 2006. Environmental governance. *Annual Review of Environment and Resources*, 31 : 297-325.

Lescuyer, G. 2013. Évaluation économique de la chasse villageoise. In Eba'a Atyi, R. Lescuyer, G. & Poufoun Ngouhouo (eds.) *Etude de l'importance économique du secteur forêt-faune au Cameroun* : 153-176.

Lescuyer, G., Assembe Mvondo, S., Essoungou, J. N., Toison, V., Trébuchon, J.-F., and Fauvet, N. 2012. Logging concessions and local livelihoods in Cameroon: from indifference to alliance? *Ecology and Society* 17(1): 7.

Letouzey, R. (1976). *Contribution de la botanique au probleme d'une éventuelle langue pygmée*.

Lévi-Strauss C. 1962. *La pensée sauvage*. Paris, Presses Pocket (Agora).

Levi-Strauss, C. 1944. The social and psychological aspects of chieftanship in a primitive tribe: the Nambikwara. *Transactions of the New York Academy of Sciences* 2(7): 16–32.

Lévi-Strauss, C. 1962. *La pensée sauvage*. Paris: Presses Pocket, collection Agora. 347 p.

Levi-Strauss, C. 1987. *Le Regard éloigné*, Plon, Paris, 1983. *The view from afar*, trans. J. Neugroschel and P. Hoss. Harmondsworth : Penguin.

Lewis, J. & J. Nelson 2006. Logging in the Congo Basin. What hope for indigenous peoples' resources, and their environments? *Indigenous Affairs* 4: 8-15.

Lewis, J. 2001. Forest people or village people: Whose voice will be heard? In Barnard, A., & Kenrick, J. (eds.), *Africa's Indigenous Peoples: 'First Peoples' or 'Marginalized Minorities'?* Edinburgh : Centre for African Studies : 61-78.

Lewis, J. 2002. *Forest hunter-gatherers and their world: a study of the Mbendjele Yaka pygmies of Congo-Brazzaville and their secular and religious activities and representations*. Ph.D. thesis. Univeristy of London. 311 p.

Lewis, J. 2007. Enabling forest people to map their resources & monitor illegal logging in Cameroon. *Before Farming: The Archaeology and Anthropology of Hunter-Gatherers*, 2: 1-7.

Lewis, J. 2008. Maintaining abundance, not chasing scarcity. The real challenge for conservation in the twenty-first century. *Radical Anthropology* 2: 11-19.

Lewis, J. 2012. Technological leap-frogging in the Congo Basin. What has happened and where is it going? *African Study Monographs*, Suppl. 43:15-44.

Lewis, J. 2013. A cross-cultural perspective on the significance of music and dance on culture and society, with insight from BaYaka Pygmies. In Arbib, M. (ed.) *Language, music and the brain: A mysterious relationship*. MIT Press: Cambridge, MA: 45–65.

Lewis, J. 2014. Egalitarian Social Organization: The Case of the Mbendjele BaYaka. In Hewlett B.S. (ed.) *Hunter-gatherer of the Congo Basin Cultures, Histories and Biology on African Pygmies*. New Bruswick: Transaction Publishers: 219-243.

Lewis, J. 2015. Where goods are free but knowledge costs: Hunter-gatherer ritual economics in Western Central Africa. *Hunter-Gatherer Research* 1 (1) : 1-27.

Lewis, J. 2016. 'Our life has turned upside down! And nobody cares'. *Hunter-gatherer research* 2(3), pp. 375-384

Lewis, J., & Nelson, J. 2006. Logging in the Congo Basin. What hope for indigenous peoples' resources, and their environments? *Indigenous Affairs*. IWGIA, Copenhagen : 8–15.

Linder, J. M. & Oates, J.F. 2011. Differential impact of bushmeat hunting on monkey species and implications for primate conservation in Korup National Park, Cameroon. *Biological Conservation* 144: 738-745.

Lunstrum, E. 2014. Green militarization: anti-poaching efforts and the spatial contours of Kruger National Park. *Annals of the Association of American Geographers* 104 (4): 816-832.

Luz A.C., Guèze M., Paneque-Gálvez J., Pino J., Macía M.J., Orta-Martínez M. & Reyes-García V. 2015. How Does Cultural Change Affect Indigenous Peoples' Hunting Activity? An Empirical Study Among the Tsimane' in the Bolivian Amazon. *Conservation & Society* 13(4): 382–394

Luz, A. C. 2012. *The role of acculturation in indigenous peoples. The case of the Tsimane' in the Bolivian Amazon*. Ph.D. thesis, Universitat Autònoma de Barcelona, Barcelona. 172 p.

Maisels, F., Strindberg, S., Blake, S., Wittemyer, G., Hart, J. et al. 2013. Devastating Decline of Forest Elephants in Central Africa. *PLoS ONE* 8(3): 59469. doi:10.1371/journal.pone.0059469

Makoye, K. 2014. Anti-poaching operation spreads terror in Tanzania. *Inter Press Service*. Jan 6th, 2014. http://www.ipsnews.net/2014/01/anti-poaching-operation-spreadterror-tanzania/

Martínez-Cobo, J.R. 1981. *Study of the problem of discrimination against indigenous populations. Report for the Commission on Human Rights*, United Nations economic and social Council E/CN.4/Sub.2/476.

Matsuura, N. 2017. Humanitarian Assistance from the Viewpoint of Hunter-Gatherer Studies: Cases of Central African Forest Foragers. *African Study Monographs* Suppl. 53: 117-129

Mauss, M. 1950. [1923]. Essai sur le Don - Forme et Raison de l'Échange dans les Sociétés Archaïques, Sociologie et Anthropologie, 144-273. Paris: Presses Universitaires de France. [First published in : *Année sociologique* 1923-1924, 1].

Mbolo, M., 2006. *Les perspectives de la certification des produits forestiers non ligneux en Afrique Centrale*. Yaoundé: FAO. 30 p.

McDade, T.W., Reyes-García, V., Blackinton, P., Tanner, S., Huanca, T. & Leonard, W. R. 2007. Ethnobotanical knowledge is associated with indices of child health in the Bolivian Amazon. *Proceedings of the National Academy of Sciences of the United States of America* 104 (15): 6134-6139.

Meyer-Rochow, V.B. 2009. Food taboos: their origins and purposes. *Journal of Ethnobiology and Ethnomedicine* 5: 18.

Milliken, T., Burn, R.W., Underwood, F.M. & Sangalakula, L. 2012. The Elephant Trade Information System (ETIS) and the Illicit Trade in Ivory: A report to the 16th meeting of the Conference of the Parties to CITES. COP16 Doc. 53.2 (Rev. 2). CITES, Geneva, Switzerland. 30 p.

Milliken, T., Emslie, R.H., Talukdar, B. 2009. African and Asian rhinoceroses: A report from the IUCN Species Survival Commission (IUCN/SSC) African and Asian Rhino Specialist Groups and TRAFFIC to the CITES Secretariat pursuant to Resolution Conf. 9.14 (Rev. CoP14) and Decision 14.89. Doha: IUCN: 1-18.

Milner-Gulland, E. J. and Bennett, E. L. 2003. Wild Meat: The Bigger Picture. Trends in Ecology & Evolution 18 (7): 351-357.

Milner-Gulland, E.J., & Beddington, J.R. 1993. The exploitation of elephants for the ivory trade-an historical perspective. *Proceedings of the Royal Society of London* - Series B: Biological Sciences 252: 29–37.

Milner-Gulland, E.J., Mcgregor, J.A., Agarwala, M., Atkinson, G., Bevan, P., Clements, T., Daw, T., Homewood, K., Kumpel, N., Lewis, J., Mourato, S., Palmer Fry, B., Redshaw, M., Rowcliffe, J.M., Suon, S., Wallace, G., Washington, H. And Wilkie, D. 2014. Accounting For The Impact Of Conservation On Human Well-Being. *Conservation Biology* 28: 1160-1166

Motte-florac, E., Bahuchet, S., Thomas, J. M. C., & Epelboin, A. (1996). Place de l'alimentation dans la thérapeutique des Pygmées Aka de Centrafrique. In Hladik, C. M., Hladik, A., Linares, . O. F., Koppert, G. J. A. & Froment, A. (eds.) *L'alimentation en forêt tropicale: interactions bioculturelles et perspectives de développement. Bases culturelles des choix alimentaires et stratégies de développement*. Paris: Unesco-Parthenon, Man and Biosphere serie: 835-856.

Motte, E. 1980. Les Plantes Chez les Pygmées Aka et les Mozombo de la Lobaye (Centrafrique). Contribution a une ethnobotanique comparative chez des chasseurs-cueilleurs et des pêcheurs-agriculteurs vivant dans un même milieu végétal. Paris: SELAF, 546 p.

Muchaal, P. K. & Ngandjui, G. 1999. Impact of village hunting on wildlife populations in the western Dja reserve, Cameroon. *Conservation Biology* 13: 385-396.

Nadasdy, P. 2005. Transcending the Debate over the Ecologically Noble Indian: IndigenousPeoples and Environmentalism. *Ethnohistory* 52(2): 291-331.

Naepels M. 1998. Une étrange étrangeté. Remarques sur la situation ethnographique. *L'Homme* 38 (148): 185-199.

Nasi, R., Brown, D., Wilkie, D., Bennett, E., Tutin, C., Van Tol, G. & Christophersen, T. 2008. *Conservation and Use of Wildlife-Based Resources: The Bushmeat Crisis*. Secretariat of the Convention on Biological Diversity, Montreal. and Center for International Forestry Research (CIFOR), Bogor. Technical Series (33), 50 p.

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

Nazarea, V.D. 1999. Preface. In Nazarea, V.D. (ed.) *Ethnoecology: situated knowledge/located lives*. Tucson: University of Arizona Press, 299 p.

Neumann, R. 2004. Moral and discursive geographies in the war for biodiversity in Africa. *Political Geography* 23 (7): 813-837.

Neumann, R.P. 2002. The postwar conservation boom in British colonial Africa. *Environmental History*

7: 22-47.

Nguiffo, S. & Talla, M. 2010 La législation relative à la faune sauvage au Cameroun: entre usages locaux et perception légale. *Unasylva* 236 (61): 14-18.

Njounan-Tegomo, O., Defo, L. & Usongo, L. 2012. Mapping of resource use area by the Baka Pygmies inside and around Boumba-Bek National Park in southeast Cameroon, with special reference to Baka's customary rights. *African Study Monographs* Suppl. 43: 45-59.

Noss, A. 2000. Cable snares and nets in the Central African Republic. In Robinson J.G. & Bennett, E.L. (eds.) *Hunting for Sustainability in Tropical Forest*. New York : Colombia University Press : 282-304.

Noss, A. J. 1998. The impacts of cable snare hunting on wildlife populations in the forests of the Central African Republic. *Conservation Biology*, 12: 390-398.

Oates, J.F. 1996. Habitat alteration, hunting and the conservation of folivorous primates in African forests. *Australian Journal of Ecology* 21: 1-9.

Oishi T. 2014. Sharing hunger and sharing food: staple food procurement in long-term fishing expedition of Bakwele horticulturalists in southeastern Cameroon. *African Study Monographs*, Suppl. 47: 59-72.

Oishi, T. & Hayashi, K. 2014. From ritual dance to disco: Change in habitual use of tobacco and alcohol among the Baka hunter-gatherers of Southeastern Cameroon. *Africa Study Monographs* 47: 143-163.

Oishi, T. 2012. Cash Crop Cultivation and Interethnic Relations of the Baka Hunter-gatherers in Southeastern Cameroon. *African Study Monographs* Suppl. 43: 115-136.

Oishi, T. 2013. Human-Gorilla and Gorilla-Human: Dynamics of Human-animal boundaries and interethnic relationships in the central African rainforest. *Revue de primatologie* 5: document 63.

Oishi, T. 2016a. Aspects of interactions between Baka hunter-gatherers and migrant merchants in southeastern Cameroon. *Senri Ethnological Studies*, 94 (Ikeya, K & Hitchcock, R.K. (eds.), « Hunter-Gatherers and their Neighbours in Asia, Africa and South America »): 157-175.

Oishi, T., 2016b. Why elephant poaching does not falter? Local populations of Cameroon and strategy for the suppression of poaching (in japanese) ゾウの密猟はなぜなくならないか―カメルーンにおける密猟取り締まり作戦と地域住民―. Center for Integrated Area Studies, Kyoto University. Discussion Paper Series: 15-21

Oishi, T., Kamgaing, O.W.T., Yamaguchi, R. & Hayashi, K. 2015. Anti-poaching operations by military forces and their impacts on local people in South-Eastern Cameroon. Symposium '*Beyond Enforcement: Communities, Governance, Incentives and Sustainable Use in Combating Wildlife Crime'* organized by IUCN CEESP/SSC Sustainable Use and Livelihoods Specialist Group. (27 Feb 2015 at Glenburn Lodge, Muldersdrift, South Africa).

Olivier de Sardan, J.-P. 2008. *La rigueur du qualitatif. Les contraintes empiriques de l'interprétation socio-anthropologique*. Louvain-la-Neuve, Academia-Bruylant, 365 p.

Oyono, P.R., 2004. One step forward, two steps back? Paradoxes of natural resources management decentralisation in Cameroon. *Journal of Modern African Studies* 42(1): 91-111.

Oyono, P.R., Diaw M.-C. & Sangkwa F. 2006b. Les réformes forestières et les nouvelles frontières de la gestion locale au Cameroun. In Nasi R., Nguinguiri J.-C. & Ezzine de Blas D. (eds.). *Exploitation et gestion durable des forêts en Afrique centrale. La quête de la durabilité*. Paris, L'Harmattan: 317-367.

Oyono, P.R., Ribot J.C. & Larson A. M. 2006a. *Green and black gold in rural Cameroon: natural resources for local governance, justice and sustainability*.Washington DC: WRI, 92 p.

Pagezy H. 1982. Seasonal hunger as experienced by the oto and the twa of a Ntomba village in the equatorial forest (lake Tumba, Zaïre). *Ecology food and Nutrition* 12: 139-153.

Pagezy, H. 1975. Les Interrelations Homme-Faune de la Forêt du Zaïre. In *L'homme et l'animal*. 1er Colloque d'ethnozoologie. Paris: Institut International d'Ethnosciences, 63-88.

Patin, E. Laval G, Barreiro LB, Salas A, Semino O, Santachiara-Benerecetti S, Kidd KK, Kidd JR, Van der Veen L, Hombert JM, Gessain A, Froment A, Bahuchet S, Heyer E, Quintana-Murci L. 2009. Inferring the Demographic History of African Farmers and Pygmy Hunter-gatherers Using a Multilocus Resequencing Data Set. *Plos-Genetics* 5(4):2–13.

Patton, J.Q. 2005. Meat sharing for coalitional support. *Evolution and Human Behavior* 26(2): 137–157.

Paulin, P. 2010. *Les Baka du Gabon dans une dynamique de transformations culturelles, Perspectives linguistiques et anthropologiques*. Ph.D. thesis. Université Lumière Lyon 2. 626 p.

Pedersen, J., Waehle, E., Ingold, T., Riches, D., & Woodburn, J. 1991. The complexities of residential organization among the Efe (Mbuti) and the Bamgombi (Baka): a critical view of the notion of flux in hunter-gatherer societies. In Ingold, T., Riches, D. & Woodburn, J. (eds.), *Hunters and gatherers: volume 1: history, evolution and social change*. Oxford/Washington: Berg: 75-90.

Pelican, M., 2009. Complexities of indigeneity and autochtony: an african exemple. *American Ethnologist*, 36(1): 52-65.

Pennec, F., Wencelius, J., Garine, E., Raimond, C., & Bohbot, H. (2012). *FLAME*. Paris: CNRS.

Peres, C.A. 2000. Effects of subsistence hunting on vertebrate community structure in Amazonian forests. *Conservation Biology* 14: 240-253.

Peterson, N. 1993. Demand Sharing: Reciprocity and the Pressure for Generosity among Foragers. *American Anthropologist* 95(4): 860–874.

Plourde, A.M. 2008. The origins of prestige goods as honest signals of skill and knowledge. *Human Nature* 19: 374-388.

Pooley, S., Fa, J.E. & Nasi., R. 2015. No conservation silver lining to Ebola. *Conservation Biology* 29(3) : 965-967.

Price, T.D., Brown, J. A. 1985. *Pre-historic Hunter-Gatherers: The Emergence of Cultural Complexity*. New York: Academic. 450 p.

Puri, R.K. 1997. *Hunting knowledge of the Penan Benalui of east Kalimantan, Indonesia*. Ph.D. thesis. University of Hawaii at Manoa.

Puri, R.K., & Vogl, C.R. 2005. *A Methods Manual for Ethnobiological Research and Cultural Domain Analysis With analysis using ANTHROPAC*. Available here: https://ay14-15.moodle.wisc.edu/prod/pluginfile.php/59446/mod_resource/content/0/Puri_and_Vogl_Methods_Manual_2005.doc

Pyhälä, A. 2012. *What Future for the Baka? Indigenous Peoples' Rights and Livelihood Opportunities in South-east Cameroon*. IWGIA Report 13. Copenhagen: IWGIA & PLAN. 70 p.

Pyhälä, A., Osuna Orozco, A. & Counsell, S. 2016. *Protected areas in the Congo Basin :Failing both people and biodiversity ?* Rainforest Foundation UK, Report. 144 p.

Quave, C. & Pieroni, A. 2015. A reservoir of ethnobotanical knowledge informs resilient food security and health strategies in the Balkans. *Nature Plants* 1(14021):1-6.

Randolph, S. & Stiles, D. 2011. *Elephant Meat Trade in Central Africa: Cameroon Case Study*. IUCN, Gland, Switzerland. 70 p.

Rappaport R.A. 1968. *Pigs for the Ancestors: Ritual in the Ecology of a New Guinea People*. New Haven: Yale University Press. 311 p.

Redford, K. H., & Feinsinger, P. 2001. The half-empty forest: Sustainable use and the ecology of interactions. In Reynolds, J.D., Mace, G.M., Redford, K. H., & Robinson, J.G. (eds.) *Conservation of exploited species*. Cambridge, UK: Cambridge University Press : 370-399).

Redford, K.H. 1991 The ecologically noble savage. *Orion* 9, 24-29.

Redford, K.H. 1992 The empty forest. *Bioscience* 42, 412-422.

Remis, M. & Hardin, R. 2009. Transvalued Species in an African Forest. *Conservation Biology*. 23(6): 1588-1596

Remis, M., Jost Robinson, C.A. 2012. Reductions in Primate Abundance and Diversity in a Multiuse Protected Area: Synergistic Impacts of Hunting and Logging in a Congo Basin Forest. *American Journal of Primatology* 74: 602-612

Republic of Cameroon. 1994. *Loi No 94/01 du 20 janvier 1994 portant régime des forêts, de la faune et de la pêche*. Republic of Cameroon, Yaoundé, Cameroon.

Republic of Cameroon. 1995. *Décret No 95-53-PM du 23 août 1995 fixant les modalités d'application du régime des forêts*. Republic of Cameroon, Yaoundé, Cameroon.

Reyes-García, V., & Gallois, S. 2014. How does social status relate to traditional ecological knowledge? In Paulino de Albuquerque, U. & Nóbrega Alves, R.R. (eds.) *Introduction to ethnobiology*. Springer:

Reyes-García, V., & Pyhälä, A. 2016. Introduction. In Pyhälä, A. & Reyes-García, V. (eds.), *Hunter-gatherers in a changing world*. Springer.

Reyes-García, V., Díaz-Reviriego, I., Duda, R., Fernández-Llamazares, Á., Gallois, S., Guèze, M., Napitupulu, T. & Pyhäla, A. 2016a. Peer evaluation can be a reliable method to measure local ecological knowledge, *Field Methods* 28(4): 1–18.

Reyes-García, V., Díaz-Reviriego, I., Duda, R., Fernández-Llamazares, Á., Gallois, S., Guèze, M., Napitupulu, T., Orta, M. & Pyhäla, A. 2016b. The adaptive nature of culture. A cross-cultural analysis of the returns of Local Environmental Knowledge in three indigenous societies. *Current Anthropology* 57(6): 761-784.

Reyes-García, V., Fernández-Llamazares, Á., Díaz-Reviriego, I., Duda, R., Gallois, S., Huditz, S. 2017 (in press). The dynamic nature of indigenous agricultural knowledge. An analysis of change among the Baka (Congo Basin) and the Tsimane' (Amazon). In Sillitoe P. (ed.). *Indigenous Knowledge : Enhancing its Contribution to Natural Resources Management*. Wallingford, UK: Cabi Publishing.

Reyes-García, V., Fernández-Llamazares, Á., Guéze, M., Garcés, A., Mallo, M., Vila-Gomez, M., Vilaseca, M. 2016c. Local indicators of climate change: The potential contribution of local knowledge to climate research. *WIREs: Climatic Change* 7:109-124.

Reyes-García, V., Godoy, R.A., Vadez, V., Ruíz-Mallén, I., Huanca, T., Leonard, W.R., McDade, T.W, Tanner, S. & TAPS Bolivian Study Team. 2009. The Pay-Offs to Sociability. *Human Nature*, 20: 431-446.

Reyes-García, V., Molina, J.L., Broesch, J., Calvet, L., Huanca, T., Saus, J., Tanner, S., Leonard, W.R., McDade, T.W., Team, T.B.S. 2008. Do the aged and knowledgeable men enjoy more prestige? A

test of predictions from the prestige-bias model of cultural transmission. *Evolution and Human Behavior* 29: 275-281.

Rickenbach, O. 2015. *Central African forest dwellers and the role of wildlife in their livelihoods*. Ph.D. thesis. ETH Zurich. 155 p.

Rickenbach, O., Reyes-García, V., Moser, G. García, C. 2016. What Explains Wildlife Value Orientations? A Study among Central African Forest Dwellers. *Human Ecology* 45: 293

Riddell, M. 2013. Assessing the impacts of conservation and commercial forestry on livelihoods in northern Republic of Congo. *Conservation & Society* 11: 199–217.

Ripple W.J., Abernethy, K., Betts, M.G., Chapron, G., Dirzo, R., Galetti, M., Levi, T., Lindsey, P.A., Macdonald, D.W., Machovina, B., Newome, T.M., Peres, C.A., Wallach, A.D., Wolf, C., Young, H. 2016. Bushmeat hunting and extinction risk to the world's mammals. *Royal Society Open Science* 3: 160498.

Robillard, M. & S. Bahuchet. 2012. Les Pygmées et les autres : terminologie, catégorisation et politique. *Journal des Africanistes* 81(2) : 15-51.

Robillard, M. 2010. *Pygmées Baka et Voisins dans la Tourmente des Politiques Environnementales en Afrique Centrale*. Ph.D. thesis. Muséum National d'Histoire Naturelle. 506 p.

Robineau, C. 1966. *L'Évolution Économique et Sociale en Afrique Centrale. L'Exemple de Souanké (République du Congo Brazzaville)*. Paris: ORSTOM. 283 p.

Robinson, J.G. & Bennett, E.L. 2004. Having your wildlife and eating it too: an analysis of hunting sustainability across tropical ecosystems. *Animal Conservation* 7: 397-408.

Robinson, J.G., Redford, K.H., & Bennett, E.L. 1999. Wildlife harvest in logged tropical forests. *Science* 284: 595-596.

Rodary, E., & Castellanet, C. 2003. Les trois temps de la conservation. In Rodary, E., Castellanet, C., and Rossi, G. (eds.) *Conservation de la nature et développement : l'intégration impossible ?* Paris: Karthala, Collection « Economie et développement » : 5-44.

Ross, E.B. 1978. Food Taboos, Diet and Hunting Strategy: The Adaptation to Animals in Amazon Cultural Ecology. *Current Anthropology* 19(1).

Roth, R. 1992. *Histoire de l'archerie, arc et arbalète*. Montpellier: Max Chaleil, 262 p.

Rupp, S., 2001. *I, You, We, They: forests of identity in southeastern Cameroun*. Ph.D. thesis, Yale University. 573 p.

Rupp, S.K. 2003. Interethnic relations in Southeastern Cameroon: challenging the "hunter-gatherer" - "farmer" dichotomy. *African Studies Monographs,* Suppl.28: 37-56

Rupp, S.K. 2011. *Forests of Belonging: Identities, Ethnicities, and Stereotypes in the Congo River Basin*. Seattle: University of Washington Press, 306 p.

Salick, J. & Byg, A. 2007. *Indigenous Peoples and Climate Change*. Tyndall Centre for Climate Change Research, Oxford, United Kingdom.

Sanderson, S. E., & Redford, K.H. 2003. Contested relationships between biodiversity conservation and poverty alleviation. *Oryx* 37: 389–390

Sato, H. 1992. Notes on the distribution and settlement pattern of hunter-gatherers in Northwestern Congo. African Study Monographs 13(4): 203-216.

Sato, H. 2001. The potential of edible wild yams and yam-like plants as a staple food resource in the African tropical rain forest. *African Study Monographs* 26: 123–134

Sato, H., 1998. Folk etiology among the Baka, a group of hunter-gatherers in the African rainforest. African Study Monographs, suppl. 25 (33): 33-46.

Savorgnan de Brazza, P. 1888. *Conférences et lettres de P. Savorgnan de Brazza dans l'ouest africain (1875-1887)*. Paris: M. Dreyfus.

Schebesta, P. 1938. *Die Bambuti Pygmäen vom Ituri*. Mémoire de l'Institut Royal Colonial Belge, vol.1, Falk, Bruxelles. 253 p.

Schebesta, P. 1941. *Les Pygmées*. Paris: Gallimard, collection « L'Espèce Humaine ». 199 p.

Schebesta, P. 1952. *Les Pygmées du Congo Belge*. Bruxelles. MRAC

Schlutz, M. 1991. *The Batua and the Baoto of the Central Basin of Zaïre: A Study of Changing Subsistence Patterns and Hunter-Gatherer Farmer Interaction under the impact of Colonialism*. Ph.D. Thesis. Cambridge University.

Schmidt-Soltau, K. & Brockington, D. 2007. Protected areas and resettlement: What scope for voluntary relocation? *World Development* 35(12): 2182–2202.

Schmidt-Soltau, K. 2009. Is the displacement of people from parks only 'purported', or is it real?. *Conservation and Society* 7(1): 46.

Silverman, P., Maxwell, R.J. 1978. How do I respect thee? Let me count the ways: deference towards elderly men and women. *Cross-Cultural Research* 2: 91-108.

Smith, E.A. & Wishnie, M. 2000. Conservation and Subsistence in Small-Scale Societies. *Annual Review of Anthropology* 29(1) : 493–524.

Smith, E.A. 2004. Why do good hunters have higher reproductive success? *Human Nature* 15: 343– 364.

Smith, J. J., & Borgatti, S. P. 1998. Salience counts—and so does accuracy: Correcting and updating a measure for free-listing item salience. *Journal of Linguistic Anthropology* 7, 202-209.

Smith, R.J, Muir, R.D.J., Walpole, M.J., Balmford, A. & Leader-Williams, N. 2003. Governance and the loss of biodiversity. *Nature* 426: 67–70.

Smith, R.J., Biggs, D., St John, F.A., 't Sas-Rolfes, M., and Barrington, R. 2015. Elephant conservation and corruption beyond the ivory trade. *Conservation Biology* 29 (3): 953-6.

SNV Collectif, 1988. *Projet de micro-réalisation dans le cadre de l'intégration socio-économique des Baka et Bakola*. SNV. Yaoundé: MINAS. 15 p.

Soengas, B. 2010. *La subsistance des Pygmées Bakoya à l'épreuve de l'agriculture : dynamique des savoirs ethnobotaniques et des pratiques*. Ph.D. thesis. Paris: Muséum National d'Histoire Naturelle.

Soengas, B. 2012. Des Pygmées cultivateurs, les Bakoya: changements techniques et sociaux dans la foret gabonaise. *Journal des Africanistes* 82(1–2): 167-192.

Solly H. 2010. Donner, recevoir ou prendre dans la réserve du Dja au Cameroun. In Joiris, D.V. & Bigombe Logo, P. (eds.). *La gestion participative des forêts d'Afrique centrale. Un modèle à l'épreuve de la réalité*. Versailles, QUAE (Synthèses): 177-193.

Sonoda, K. 2014. The "easy-going" attitude of knowledgeable participants in hunting and gathering activities. *RNMH A02 Research Report* 4: 149-159.

Stearman, A. M. 1989. Yuqui foragers in the Bolivian Amazon: subsistence strategies, prestige, and leadership in an acculturating society. *Journal of Anthropological Research* 45: 219-244.

Steward, J. 1955. *Theory of Culture Change: The Methodology of Multilinear Evolution*. Champaign, IL: University of Illinois Press.

Stiles, D. 2012. Elephant meat and ivory trade in Central Africa. *Pachyderm* 50: 26–36.

Stoner, K.E., Vulinec, K., Wright, S.J., & Peres, C.A. 2007. Hunting and plant community dynamics in tropical forests: a synthesis and future directions. *Biotropica* 39(3): 385-392.

Struhsaker, T.T. 1999. Primate communities in Africa: the consequences of long-term evolution or the artifact of recent hunting. In Fleagle, J.G., Janson, C.H., Reed, K.E. (eds.) *Primate communities*. New York: Cambridge University Press: 289–294

Sunderlin, W.D., Angelsen, A., Belcher, B., Burgess, P., Nasi, R., Santoso, L., & Wunder, S. 2005. Livelihoods, forests, and conservation in developing countries: an overview. *World Development* 33 (9) :1383-1402

Survival International, 2016. *Specific instance to OECD. Survival International Charitable Trust Complainant vs The World Wide Fund For Nature Respondent*. Available online at http://assets.survivalinternational.org/documents/1527/survival-internation-v-wwf-oecd-specific-instance.pdf

Survival International. 2015. *Baka "Pygmies" abused in the name of conservation*. URL: https://www.youtube.com/watch?v=OKksHO1XA60 (Accessed on November 3rd 2016)

Tabuna, H., 2007. *Commerce sous régional et international des produits forestiers non ligneux alimentaires et des produits agricoles traditionnels en Afrique Centrale*, FAO, Yaoundé, 150p.

Takeda, J. & Sato, H. 1996. Stratégies de subsistance et apports en protéines du régime alimentaire des cultivateurs Ngandu et Boyela de la Cuvette Centrale du Zaïre. In (eds A. Hladik, H. Pagezy, O.F. Linares, J.A. Koppert & A. Froment (eds.) *L'alimentation en forêt tropicale: intéractions bioculturelles et perspectives de développement* Vol. 2. Paris : UNESCO.

Takeuchi, K. 2013. Food Restriction and Social Identity of Aka Forager Adolescents in the Republic of the Congo. In Hewlett, B.L. (ed.) *Adolescent Identity*. New York: Routledge.

Takeuchi, K. 2014. Inter-ethnic relations between Pygmies and farmers. In Hewlett, B. (ed.) *Hunter-Gatherers of the Congo Basin: Culture, History and Biology of African Pygmies*. Transaction Publishers, New Jersey: 299-320.

Talla, M. 2010. *Le régime de la faune sauvage au Cameroun, entre conservation, marchandisation et difficultés d'application*. Yaoundé: Editions Clé. 135 p.

Tanno T. 1981. Plant Utilization of the Mbuti Pygmies. *African Study Monographs* 1:1-53.

Tanno, T. 1976. The Mbuti Net-Hunters in the Ituri Forest, Eastern Zaire: their Hunting Activities and Band Composition. *Kyoto University African Studies* 10: 101-135.

Taylor, G., Scharlemann, J.P.W., Rowcliffe, J.M. Kümpel, N.F., Harfoot, M.B.J. Fa, J.E. & Coad, L.M. 2015. Synthesising bushmeat research effort in West and Central Africa : A new regional database. *Biological conservation* 181: 199-205.

Terashima, H. 1983. Mota and Other Hunting Activities of the Mbuti Archers. *African Study Monographs* 3: 71-85.

Terashima, H. 1985. Variation and Composition Principles of the Residence Group (Band) of the Mbuti Pygmies. *African Study Monographs*, supplement 4: 103-120.

Terashima, H. 1987. Why Efe Girls Marry Farmers?: Socio-ecological Backgrounds of Inter-ethnic Marriage in the Ituri Forest of Central Africa. *African Studies Monographs*, Suppl. 6: 65-83.

Ternay, A. de. 1948. Les Pygmées Baka de l'Est du Cameroun. *Les Missions Catholiques* 80: 53-111.

Thomas, J.M.C., Bahuchet, S., Epelboin, A. (depuis 1993) & Fürniss, S. (depuis 2003) (éds.) (Arom, Bahuchet, S., Cloarec-Heiss, Epelboin, A., Fürniss, S. Guillaume, H., Motte, E., Sénéchal & Thomas, J.M.C.). 1981-2014. *Encyclopédie des Pygmées Aka : techniques, langage et société des chasseurs-cueilleurs de la forêt centrafricaine* (Sud-Centrafrique et Nord-Congo). Paris : Editions Peeters-SELAF, 11 volumes. 3130 p.

Toledo, V.M. 1992. What is ethnoecology ? Origins, scope and implications of a rising discipline. *Etnoecológica* 1: 5-21

Toledo, V.M. 2001. Biodiversity and indigenous peoples. In: Levin, S.A. (ed.) *Encyclopedia of Biodiversity*, Volume 3. Academic Press, San Diego, California, United States: 451-463.

Topa, G., Karsenty, A., Megevand, C., Debroux, L. 2009. *The rainforests of Cameroon: experience and evidence from a decade of reform*. Directions in development environment and sustainable development. Washington, DC: World Bank. 226 p. http://documents.worldbank.org/curated/en/134871468010898097/The-rainforests-of-Cameroon-experience-and-evidence-from-a-decade-of-reform

Townsend, C. (2015). Baka ritual flow diverted. *Hunter Gatherer Research* 1(2), 197-224.

Townsend, C. 2015. Baka ritual flow diverted. *Hunter-gatherer research* 1(2): 197–224.

Trilles, R. P. 1932. *Les Pygmées de l'Afrique Equatoriale*. Paris: Bloud et Gay. 530 p.

Tsuru, D. 1998. Diversity of Ritual Spirit performances among the Baka Pygmies in Southeastern Cameroon. *African Study Monographs*, Suppl. 25: 47-84.

Tsuru, D. 2001. Generation and transaction processes in the spirit ritual of the the Baka Pygmies in Southeast Cameroon. *African Study Monographs* Suppl 27: 103-123

Turnbull C. 1961, *The forest people: A study of the Pygmies of the Congo*, The Natural History Press, New York.

Turnbull, C. 1965. *Wayward Servants: The Two Worlds of the African Pygmies*. New York: The Natural History Press, 392.

Turner, N. J., Ignace, M.B. & Ignace, R. 2000. Traditional Ecological Knowledge and Wisdom of aboriginal peoples in British Columbia. *Ecological Applications* 10 (5): 1275-1287.

Vallois, H. V. 1935. La signification anthropologique des Pygmees. *Revue Lorraine d'Anthropologie, Nancy*. 7ème année. 145 p.

Vallois, H. V. 1948. Chez les Pygmées du Cameroun. *La Nature* 76: 17-20.

Vallois, H. V., & Marquer, P. 1954. *Les Pygmées Baka du Cameroun : Anthropologie et Ethnographie avec une annexe démographique*. Paris: Muséum National d'Histoire Naturelle, Paris. 195 p.

van Vilet, N., Nasi, R. 2008. Mammal distribution in a Central African logging concession area. *Biodiversity Conservation* 17: 1241–1249

van Vliet N., Moreno J., Gómez J., Zhou W., Fa J.E., Golden C., Alves R.R.N., & Nasi R. 2017. Bushmeat and human health: Assessing the Evidence in tropical and sub-tropical forests *Ethnobiology and Conservation* 6: 3

van Vliet, N. & Mbazza, P. 2011. Recognizing the Multiple Reasons for Bushmeat Consumption in Urban Areas: A Necessary Step Toward the Sustainable Use of Wildlife for Food in Central Africa. *Human Dimensions of Wildlife* 16: 45-54

van Vliet, N. & R. Nasi. 2008. Hunting for livelihood in Northeast Gabon: Patterns, evolution, sustainability. *Ecology and Society*, 13(2): 33. http://www.ecologyandsociety.org/vol13/iss2/art33/. (Accessed on June 25, 2015).

van Vliet, N. 2011. *Livelihood Alternatives for the Unsustainable Use of Bushmeat*. Report prepared for the CBD Bushmeat Liason Group. CBD Technical series 60. Secretariat of the Convention on Biological Diversity, Montreal.

van Vliet, N., Milner-Gulland, E.J., Bousquet, F. Saqalli, M. & Nasi, R. 2010. Effect of small-scale heterogeneity of prey and hunter distributions on the sustainability of bushmeat hunting. *Conservation Biology* 24: 1327-1337.

Verdu, P. 2012. Perspectives de la génétique humaine sur l'origine et la diversité des populations pygmées d'Afrique centrale. *Journal des Africanistes* Tome 82 (1-2): 53-72

Verdu, P. 2014. Population Genetics of Central African Pygmies and Non-Pygmies. In Hewlett, B.S. (ed.) *Hunter-gatherer of the Congo Basin Cultures, Histories and Biology on African Pygmies*. New Brunswick/London:Transaction Publishers: 31-58

Verdu, P., F. Austerlitz, A. Estoup, R. Vitalis, M. Georges, S.Théry, A. Froment, S. Le Bomin, A. Gessain, J-M Hombert et al. 2009. Origins and Genetic Diversity of Pygmy Hunter-gatherers from Western Central Africa. *Current Biology* 19: 312-318.

Verhille, E. 1949. Les Pygmées Ba-Ngombé de la Ngoko-Sanga. *Annales Spiritaines* 59: 11-15.

Vermeulen C., Vandenhaute M., Dethier M., Ekodeck H., Nguenang G.-M. & Delvingt W. 2006. De Kompia à Djolempoum: sur les sentiers tortueux de l'aménagement et de l'exploitation des forêts communautaires au Cameroun. *VertigO* 7(1) URL : http://vertigo.revues.org/2149 (Accessed on 14th February 2014)

Vigne, L. & Martin, E. 2017. *Decline in the legal ivory trade in China in anticipation of a ban*. Kenya, Nairobi: Save the Elephants. 83 p. http://www.savetheelephants.org/about-ste/press-media/?detail=dramatic-changes-in-china-s-ivory-trade (Accessed on April 2nd, 2017).

Von Rueden, C., Gurven, M. & Kaplan, H. 2011. Why do men seek status? Fitness payoffs to dominance and prestige. *Proceedings of the Royal Society* 278: 2223-2232.

Von Rueden, C., Gurven, M., and Kaplan, H. S. 2008. The multiple dimensions of male social status in an Amazonian society. *Evolution and Human Behavior* 29 (6): 402-415.

Vuola, M. & Pyhälä, A. 2016. Local community perceptions of conservation policy: Rights, recognition and reactions. *Madagascar Conservation & Development* 11, 2: 77-86.

Wadman, R., Durkin, K., Conti-Ramsden, G. 2011. Social stress in young people with specific language impairment. *Journal of Adolescence* 34 : 421-431

Wasseige C. de, Devers D., de Marcken P., Eba'a Atyi R., Nasi R., Mayaux P., 2009. *Les forêts du Bassin du Congo - État des forêts 2008*. Luxembourg, Office des publications de l'Union européenne, 426 p.

West, P., Igoe, J. and Brockington, D. 2006. Parks and peoples: The social impacts of protected areas. *Annual Review of Anthropology* 35: 251–277.

Western, D. & Wright, R.M. 1994. *Natural connections. Perspectives in community-based conservation*, Island Press. 581 p.

Whitaker A. 2005. Environmental anthropology: taboos and the food chain. *Current Anthropology* 46: 499-500.

White, N. 2014. The 'White Gold of Jihad': violence, legitimisation and contestation in anti-poaching strategies. *Journal of Political Ecology* 21: 452-474 .

Wicander, S. & Coad, L. 2014. *Learning Our Lessons: A Review of Alternative Livelihood Projects in Central Africa*. Gland, Switzerland: ECI, University of Oxford and IUCN.

Widlok, T. 2017. *Anthropology and the economy of sharing*. New York: Routledge. 218 p.

Wiessner, P. 1996. Leveling the hunter: constraints on the status quest in foraging societies. In Wiessner P. & Schiefenhövel, W. (eds.) *Food and the status quest*. Oxford: Berghahn Books: 171-192.

Wilkie, D.S. & Carpenter, J.F. 1999. Bushmeat hunting in the Congo Basin: An assessment of impacts and options for mitigation. *Biodiversity and Conservation* 8: 927–955.

Wilkie, D.S., Bennett, E.L., Peres, C.A. & Cunningham, A.A. 2011. The empty forest revisited. *Annals of the New York Academy of Sciences* 1223: 120-128.

Wilshusen, P.R. 2003. Territory, nature and culture: negotiating the boundaries of biodiversity conservation in Colombia's Pacific coastal region. In Brechin, S.R., Wilshusen, P.R., Fortwangeler, C.L. & West, P.C. (eds.) *Contested nature: promoting international biodiversity with social justice in the twenty-first century*. Albany : State University of New York Press: 73-88.

Winterhalder, B. 1986. Diet choice, risk, and food sharing in a stochastic environment. *Journal of Anthropological Archaeology* 5: 369-392.

Wittemyer, G. et al., 2014. Illegal killing for ivory drives global decline in African elephants. *Proceedings of the National Academy of Sciences* 111(36), pp.13117-13121.

Wolfe, N., Switzer, W., Folks, T., Burke, D., & Heneine, W. 2004. Simian retroviral infections in human beings. *The Lancet*, 364(9429): 139-140.

Woodburn, J. 1982. Egalitarian societies. *Man* 17: 431-451.

Woodburn, J. 1998. Egalitarian Societies. In Gowdy, J. (ed.) *Limited wants, unlimited means: A reader on hunter-gatherer economics and the environment*. Washington DC: Island Press: 87-110.

Woodburn, J. 2005. Egalitarian Societies Revisited. In Widlok, T. & Tadesse, W.G. (eds.) *Property and Equality*. Volume 1*: Ritualisation, Sharing, Egalitarianism*. Oxford and New York: Berghahn: 18-31.

Yasuoka, H. 2006. Long-term foraging expeditions (Molongo) among the baka hunter-gatherers in the Northwestern Congo Basin, with special reference to the "wild yam question". *Human Ecology* 34: 275-296.

Yasuoka, H. 2014. Snare hunting among Baka hunter-gatherers: implications for sustainable wildlife management. *African Study Monographs* Suppl. 49: 115-136.

Yasuoka, H., Hirai, M., Kamgaing, T.O.W., Dzefack, Z.C.B., Kamdoum, E.C.B. & Bobo, K.S. 2015. Changes in the composition of hunting catches in southeastern Cameroon: a promising approach for collaborative wildlife management between ecologists and local hunters. *Ecology and Society* 20(4): 25.

ANNEX 1 : PUBLICATIONS

In parallel to this thesis, I participate as co-author to several articles published (or in press) in peer-reviewed journal or as book chapter.

PEER-REVIEWED ARTICLES

Duda R., Gallois S. & Reyes-García V. 2017. Hunting techniques, wildlife offtake and market integration. A perspective from individual variations among the Baka (Cameroon). *African Study Monographs*. 38(2): 97-118

Abstract
Hunting is a main threat for wildlife conservation in Central Africa, but remains an essential component of local people's livelihoods. Research suggests that hunters engage in hunting in different ways, especially according to various technical means, which might potentially have differentiated impacts on wildlife. Using quantitative data collected over a 12 months period, we analyse different hunter's profiles among the Baka of Southeastern Camer-oon, and compare socioeconomic and hunting offtake data across profiles. We monitored 719 hunting events, recording 579 catches (belonging to 32 species). Most Baka hunters engage in snare trapping, a relatively low-efficiency hunting technique, while a reduced number of Baka hunters use firearms. Firearm users obtain the highest offtake and sell most of it. This study therefore suggests the emergence of specialized hunters in shotgun hunting with a higher integration in market economy. Disentangling the effects of hunting techniques and their relations to socioeconomic status might help design wildlife management strategies that take into consideration the diversity and the complexity of practices among local populations.

Gallois S., **Duda R.** 2016. Beyond productivity : The socio-cultural role of fishing among the Baka of south-eastern Cameroon. *Revue d'ethnoécologie*, 10.

Abstract
For long, the importance of fishing for forest societies has been hiding behind the term "hunter-gatherers". Whereas the importance of hunting is commonly recognized among such societies, some research has also highlighted that fishing is a primordial resource for subsistence, as well as a key element in the cosmology of several forest societies. However, very few studies — and less so among Central African forest societies — have focused on fishing practices and their social, cultural and symbolic complexity. To contribute to fill this gap, we analyse fishing activities among two Baka communities from southeastern Cameroon, particularly focusing on fishing productivity as well as the ethnoecological specificities and the socio-cultural role of fishing. Data were

collected through interviews and systematic observations of fishing activities carried out with children and adults and weekly interviews on productivity carried out during twelve months (n = 272 individuals). Results of this study highlight that fishing, and most specifically dam fishing, a collective women fishing technique, bears a specific place in Baka society. In contrast with hunting, whose value is mostly associated to the cultural valorization of the wild meat, the cultural importance of fishing is largely based on the activity in itself, through its socio-cultural dimension. Dam fishing creates a specific space where, in the absence of men, women create social cohesion through exchanges and sharing. Furthermore, dam fishing represents a privileged space for learning, because it allows not only the transmission of ethnoichthyological knowledge, but also the transmission of other aspects of cultural knowledge that shape the early gender differentiation between boys and girls. This paper aims to highlight the socio-cultural value of fishing activities in the livelihood of contemporary forest hunter-gatherers.

Gallois, S., **Duda, R.**, Reyes-García, V. 2017. Local ecological knowledge among Baka children: a case of 'children's culture´ ?. *Journal of Ethnobiology*. Accepted 19.08.2016, *in press*

Abstract
Childhood is an extensive life period specific to the human species and a key stage for development. Considering the importance of childhood for cultural transmission, we test the existence of a 'children's culture', or child-specific knowledge and practices not necessarily shared with adults, among the Baka in Southeast Cameroon. Using structured questionnaires, we collected data among 69 children and 175 adults to assess the ability to name, identify, and conceptualize animals and wild edibles. We found that some of the ecological knowledge related to little mammals and birds reported by Baka children was not reported by adults. We also found similarities between children's and adult's knowledge, both regarding the content of knowledge and how knowledge is distributed. Thus, middle childhood children hold similar knowledge than adults, especially related to wild edibles. Moreover, as children age, they start shedding child-specific knowledge and holding more adult's knowledge. Additionally and echoing the gendered knowledge distribution present in adulthood, since middle childhood there are differences in the knowledge hold by boys and girls. We discuss our results highlighting the existence of specific ecological knowledge held by Baka children, the overlap between children's and adults' knowledge, and the changes in children's ecological knowledge as they move into adulthood.

Gallois S., **Duda R.,** Hewlett, B.S. & Reyes-García V. 2015. Children's daily activities and knowledge acquisition : A case study among the Baka from south-eastern Cameroon. *Journal of Ethnobiology and Ethnomedicine*, 11(1).

Abstract
The acquisition of local knowledge occurs through complex interactions between individual and contextual characteristics: as context changes, so it changes the acquisition of knowledge. Contemporary small-scale societies

facing rapid social-ecological change provide a unique opportunity to study the relation between social-ecological changes and the process of acquisition of local knowledge. In this work, we study children's involvement in subsistence related activities (i.e., hunting and gathering) in a context of social-ecological change and discuss how such involvement might condition the acquisition of local knowledge during childhood.We interviewed 98 children from a hunter-gatherer society, the Baka, living in two different villages in southeastern Cameroon and assessed their involvement in daily activities. Using interviews, we collected self-reported data on the main activities performed during the previous 24 h. We describe the frequency of occurrence of daily activities during middle childhood and adolescence and explore the variation in occurrence according to the sex, the age group, and the village of residency of the child. We also explore variation according to the season in which the activity is conducted and to the predicted potential of the activity for the acquisition of local knowledge. Baka children and adolescents engage in subsistence-related activities (i.e., hunting and gathering) and playing more frequently than in other activities (i.e., traditional tales or schooling). Gender differences in children's subsistence activities emerge at an early age. Engagement in activities also varies with age, with adolescents spending more time in agricultural activities, modern leisure (i.e., going to bars), and socializing than younger children. When conducting similar activities, adolescents use more complex techniques than younger children. Subsistence activities, which present a high potential for transmission of local knowledge, continue to be predominant in Baka childhood. However, Baka children also engage in other, non-traditional activities, such as modern forms of leisure, or schooling, with a low potential for the transmission of local knowledge. Baka children's involvement in non-traditional activities might have unforeseen impacts on the acquisition of local knowledge.

Reyes-García V., Díaz-Reviriego I., **Duda R.,** Fernández-Llamazares Á., Gallois S., Guèze M., Napitupulu T., Orta M., Pyhäla A. 2016b. The adaptive nature of culture. A cross-cultural analysis of the returns of Local Environmental Knowledge in three indigenous societies. *Current Anthropology*, 57(6).

Abstract
Researchers have argued that the behavioral adaptations that explain the success of our species are partially cultural, i.e., cumulative and socially transmitted. Thus, understanding the adaptive nature of culture is crucial to understand human evolution. We use a cross-cultural framework and empirical data purposely collected to test whether culturally transmitted and individually appropriated knowledge provides individual returns in terms of hunting yields and health and, by extension, to nutritional status, a proxy for individual adaptive success. Data were collected in three subsistence-oriented societies: the Tsimane' (Amazon), the Baka (Congo Basin), and the Punan (Borneo). Results suggest that variations in individual levels of local environmental knowledge relate to individual hunting returns and to self-reported health, but not to nutritional status. We argue that this paradox can be explained through the prevalence of sharing: individuals achieving higher returns to their knowledge transfer them to the rest of the population, which explains the lack of association between knowledge and nutritional status. The finding is in

consonance with previous research highlighting the importance of cultural traits favoring group success, but pushes it forward by elucidating the mechanisms through which individual and group level adaptive forces interact.

Reyes-García V., Pyhäla A, Díaz-Reviriego I., **Duda R.,** Fernández-Llamazares Á., Gallois S., Guèze M., Napitupulu T. 2016. Schooling, Local Knowledge and Working Memory : A Study among Three Contemporary Hunter-Gatherer Societies. *PlosOne*, 11(1).

Fa, J. E., Olivero, J., Farfán, M. A., Lewis, J., Yasuoka, H., Noss, A., Hattori, S., Carpaneto, G., Germi, F., Márquez, A. L., Duarte, J., **Duda, R.**, Gallois, S., Riddell, M., Nasi, R. 2016. Differences between indigenous and non-indigenous hunting in Congo basin forests. *PlosOne,* 10(9).

Reyes-García V., Díaz-Reviriego I., **Duda R.,** Fernández-Llamazares Á., Gallois S., Guèze M., Napitupulu T., Pyhäla A. 2016a. Peer evaluation can be a reliable method to measure local ecological knowledge, *Field Methods*, 28(4) : 1–18.

Book chapters

Gallois S., **Duda R.** & Reyes-García V. 2016 – "Like Father, Like Son" ? Baka children's ethnoecological learning in a context of cultural change. In Reyes-García V. & Pyhälä A. (eds.) *Hunter-Gatherers in a Changing World*. New York, Springer : 195-212.

Abstract
Hunter-gatherer societies face social-ecological changes that have led them to alter their living strategies. Given the importance of local ecological knowledge for subsistence and for the preservation of biocultural diversity, this chapter analyses how social-ecological changes affect the acquisition of local ecological knowledge among the Baka, a hunter-gatherer group in southeastern Cameroon. As the acquisition of local ecological knowledge is embedded in daily activities, we evaluate how parental livelihood strategies relate to children's daily activities. We analyse Baka children's involvement in their activities using a sample of 98 children between 5 and 16 years of age. We then use three parental indicators of cultural change: (1) involvement in traditional vs. modern productive activities, (2) income, and (3) level of schooling to test differences in children's activities related to parental indicators of cultural change. Our results indicate that children's involvement in daily activities is not directly associated to parental indicators of cultural change. We conclude that cultural changes affecting Baka society might be so pervasive as to affect all children equally, beyond direct parental influence.

Duda R., Gallois S. (accepted). Déclin de la faune et conservation au Sud-est Cameroun : Savoirs et perceptions des Baka. In *Le devenir des peuples autochtones pygmées à l'orée du 21ème siècle*. Coll. Questions Autochtones. GITPA (Groupe International de Travail pour les Peuples Autochtones).

Reyes-García, V. Fernández-Llamazares, A., Díaz-Reviriego, I., **Duda, R.,** Gallois, Huditz, S. 2017 (in press). The dynamic nature of indigenous agricultural knowledge. An analysis of change among the Baka (Congo Basin) and the Tsimane' (Amazon). In : Sillitoe P. (eds). *Indigenous Knowledge : Enhancing its Contribution to Natural Resources Management*. Cabi Publishing. Wallingford, UK

POLICY BRIEFS

Reyes-García, V., I. Díaz-Reviriego, **R. Duda**, A. Fernández-Llamazares, S. Gallois, M. Guèze, L. Napitupulu, P. Pérez, A. Pyhälä, and V. Reyes-García. 2015. Lessons from the field: what can the knowledge society learn from the study of local environmental knowledge? LEK-Project Policy brief 1. Available at: http://icta.uab.cat/etnoecologia/lek.

Guèze, M., I. Díaz-Reviriego, **R. Duda,** A. Fernández-Llamazares, S. Galloois, L. Napitupulu, P. Pérez, A. Pyhälä, and V. Reyes-García. 2015. A biocultural approach to conservation: what can conservationists learn from forest use by contemporary indigenous peoples? LEK-Project Policy brief 2. Available at: http://icta.uab.cat/etnoecologia/lek.

Reyes-García, V., A. Pyhälä, M. Guéze, A. Angelsen, I. Díaz-Reviriego, Á. Fernández- Llamazares, S. Gallois, L. Napitupulu. 2015. Local perceptions of wellbeing. Insights from the Global South. LEK-Project Policy brief 3. Available at: http://icta.uab.cat/etnoecologia/lek.

Annex 2 : List of animal species

Animal species have been determined on the field in presence of the game hunted or using stimuli: pictures and videos for most of the animals, and songs for the birds (in addition to correlate information). Bird names collection using sound stimuli has been found as the most efficient tool to obtain relevant information about birds. Using headphones and make the informants listened (in two different interview sessions) 50 species found in the region. Baka names have been mentionned only if they were reported by at least 5 persons. When frequently used by informants, the Nzime names of the species have been reported between brackets. When the determination is not certain and would require further investigation I mention TC (to confirm) in the line.

Mammals & reptiles

Order	Family	Scientific name	English name	Baka name	
Afrosoricida	Tenrecidae	*Potamogalus velox*	Giant otter shrew	linje	
Artiodactyla	Suidae	*Hylochoreus meinertzhageni*	Giant forest hog	Bèà	
Artiodactyla	Bovidae	*Cephalophus sylvicultor*	Yellow-back duiker	bèmbà	
Artiodactyla	Bovidae	*Philantomba monticola*	Blue duiker	dèngbE	
Artiodactyla	Tragulidae	*Hyemoschus aquaticus*	Water chevrotain	geke	
Artiodactyla	Bovidae	*Syncerus caffer nanus*	African buffalo	mboko	
Artiodactyla	Bovidae	*Cephalophus leucogaster*	White-bellied duiker	mbombolimbo? mongala?	
Artiodactyla	Bovidae	*Tragelaphus euryceros*	Bongo	mbongo	
Artiodactyla	Bovidae	*Tragelaphus spekii*	Sitatunga	mbùlì	TC
Artiodactyla	Bovidae	*Cephalophus nigrifrons*	Black fronted duiker	mònjombe	
Artiodactyla	Bovidae	*Cephalophus dorsalis*	Bai duiker	ngbomù	TC
Artiodactyla	Bovidae	*Neotragus batesi*	Bates antelope	ngele or gbele ? [eku]	TC
Artiodactyla	Bovidae	*Cephalophus callipygus*	Peters' duiker	ngendi	TC
Artiodactyla	Suidae	*Potamocherus porcus*	Red river hog	pàme	
Carnivora	Viverridae	*Poiana richardsoni*	African linsang	?	
Carnivora	Herpestidae	*Bdeogale nigripes*	Black-footed mangoose	busE [mié ?]	
Carnivora	Viverridae	*Genetta servalina*	Servaline genet	jàmà	

Carnivora	Viverridae	*Civettictis civetta*	African civet	liabo	
Carnivora	Mustelidae	*Hydrictis maculicolis*	Spotted-necked otter	londo	
Carnivora	Nandiniidae	*Nandinia binotata*	African palm civet	mboka	
Carnivora	Mustelidae	*Mellivora capensis*	Ratel	ndime/libolo [ebo]	TC
Carnivora	Felidae	*Felis aurata*	Golden cat	nduku [ebie]	
Carnivora	Herpestidae	*Atilax paludinosus*	Marsh mangoose	nganda [nyamesuu]	TC
Carnivora	Felidae	*Panthera pardus*	Leopard	sùà	TC
Crocodilia	Crocodilidae	*Osteolaemus tetraspis*	Dwarf crocodile	mokwakele	
Crocodilia	Crocodilidae	*Crocodilus niloticus*	Nile crocodile	ngando	TC
Hyracoidea	Procaviidae	*Dendrohyrax dorsalis*	Tree hyraxe	yoka	
Pholidota	Manidae	*Phataginus tetradactyla*	Long-tailed pangolin	kanjono	
Pholidota	Manidae	*Smutsia gigantea*	Giant pangolin	kelepa	
Pholidota	Manidae	*Phataginus tricuspis*	Tree pangolin	kokòlo	
Primates	Cercopithecidae	*Cercopithecus neglectus*	Cercopithèque de Brazza	?	
Primates	Pongidae	*Gorilla gorilla gorilla*	Lowland gorilla	?eBoBo	
Primates	Cercopithecidae	*Colobus satanus*	Black colobus	bonjì	
Primates	Cercopithecidae	*Cercopithecus cephus cephus*	Moustac	gbElEkEsE	TC
Primates	Cercopithecidae	*Colobus guereza*	Guereza	kàlu	
Primates	Lorisidae	*Perodicticus potto*	Bosmans potto	katu	
Primates	Cercopithecidae	*Miopithecus ogouensis*	Gabon talapoin	kema na ngo [puo] ?	TC
Primates	Cercopithecidae	*Cercopithecus nicticans*	White-nose guenon	koi	
Primates	Cercopithecidae	*Cercopithecus pogonias*	Mone pogonias	màmbe	
Primates	Cercopithecidae	*Lophocebus albigena*	Grey-cheeked mangabey	ngada	TC
Primates	Galagidae	*Galago alleni*	Allen's squirrel galago	polo	TC
Primates	Galagidae	*Eoticus elegantulus*	elegant needle-clawed galago	punge	TC
Primates	Cercopithecidae	*Mandrillus leucophaeus*	Drill	see	TC
Primates	Pongidae	*Pan troglodytes*	Common chimpanzee	seko	TC
Primates	Cercopithecidae	*Cercocebus agilis*	Agile mangabey	tamba	TC
Proboscidea	Elephantidae	*Loxondonta africana*	Forest elephant	ya	
Rodentia	Sciuridae	*Protoxerus stangeri*	African giant squirrel	boko	
Rodentia	Cricetidae	*Cricetomys emini*	Emin's pouched rat	gbè	
Rodentia	Sciuridae	*Anomalurus beecrofti*	Beecroft's flying squirrel	likuya	
Rodentia	Hystricidae	*Atherurus africanus*	Brush-tailed porcupine	mbòke	

Rodentia	Thryonomyidae	*Thryonomys swinderianus*	Cane rat	pancomo	TC
Rodentia	Sciuridae	*Myosciurus pumilio*	African pygmy squirrel	sende	TC
Rodentia	Sciuridae	undet.	squirrel	tangongo, njekpa, pise ?	
Sauria	Chamaeleonidae	*chamaeleo oweni*	Owen's chamaleon	ekoo	
Squamata	Viperidae	*Bitis nasicornis*	Rhinoceros viper	diàkò	
Squamata	Gekkonidae	*Hemydactylus fascitus*	Banded forest gecko	kolé	
Squamata	Scincidae	*Scincinae*	undet.	likebe	
Squamata	Viperidae	*Atheris squamigera*	Green bush viper	lipolopoto	
Squamata	Scincidae	*Feylinia currori*	Feylinia	lutu	
Squamata	Colubridae	*Thrasops batesi ?*	Bates tree's snake ?	mbalanga ?	TC
Squamata	Colubridae	*Hapsidophrys smaragdina*	Emerald snake	mbalanga ?	TC
Squamata	Varanidae	*Varanus ornatus*	Ornated monitor	mbambe	TC
Squamata	Viperidae	*Bitis gabonica*	Gaboon viper	mbùmà	
Squamata	Pythonidae	*Python sebae*	African rock python	meke	
Squamata	Colubridae	*Thrasops flavigularis*	Yellow-throated bold-eyed snake	mopi	
Squamata	Elapidae	*Dendroaspis jamesoni (?)*	Jameson's mamba	mosokopande	TC
Squamata	Elapidae	*Naja melanoleuca*	Forest cobra	ngeke	TC
Squamata	Scincidae	*Lepidothyris fernandi*	Fire skink	yambamba	
Squamata	Natricidae	*Natriciteres fuliginoides*	Collared Marsh-Snake	yongo	
Testudines	Testudinidae	*Kynixis erosa*	Forest hinge-back tortoise	kùnda	
Testudines	Pelomedusidae	*Pelusios gabonensis*	African forest turtle	lende	
Tubulidentata	Orycteropodidae	*Orycteropus afer*	Aardvark	kpìnyà	TC

Birds

Order	Family	Scientific name	English name	Baka name	
Accipitriformes	Accipitridae	*Black kite*	Black kite	akpanga ? [eben]	TC
Accipitriformes	Accipitridae	*Accipiter* sp.	Long-tailed sparrow hawk	akpanga ? [eben]	TC
Accipitriformes	Accipitridae	*Kaupifalco monogrammicus*	Lizzard buzzard	akpanga ? [eben]	TC
Accipitriformes	Accipitridae	*Stephanoaetus coronatus*	Crowned eagle	ngolio	
Anseriformes	Anatidae	(category)	ducks	soso	
Bucerotiformes	Bucerotidae	*Lophoceros fasciatus or Horizocerus albocristatus*	African pied hornbill or White-crested hornbill	mokuyékuyé	TC
Bucerotiformes	Bucerotidae	*Bycanistes fistulator*	Piping hornbill	sanya ?	TC
Bucerotiformes	Bucerotidae	*Bycanistes subcylindricus*	Black-and-white casqued hornbill	sanya ?	TC
Bucerotiformes	Bucerotidae	*Bycanistes albotibialis*	White-tighted hornbill	kata	
Bucerotiformes	Bucerotidae	*Ceratogymna atrata*	Black-casqued hornbill	mango	
Bucerotiformes	Bucerotidae	*Horizocerus hartlaubi or Horizocerus albocristatus*	Black-dwarf hornbill or or White-crested hornbill	mbedi	
Bucerotiformes	Bucerotidae	*Lophoceros camurus*	Red-Billed dwarf hornbill	ndokoloko	TC
Caprimulgiformes	Caprimulgidae	*Caprimulgus binotatus*	Brown nightjar	bolondo	TC
Caprimulgiformes	Caprimulgidae	*Caprimulgus batesi*	Bate's nightjar	elonga or ndokoloko ?	TC
Ciconiiformes	undet.	undet.	Ibis or stork	jimbuo	TC
Coliiformes	Coliidae	*Colius striatus ?*	Speckled mousebird ?	momba	TC
Columbiformes	Columbidae	*Treron calvus*	African green pigeon	epeba	
Columbiformes	Columbidae	*Turtur brehmeri*	tourterelette demoiselle ?	pungulu	TC
Coraciiformes	Alcedinidae	*Halcyon senegalensis*	Senegal woodland kingfisher	jossi	
Cuculiformes	Cuculidae	*Cuculus solitarius*	Red-chested cuckoo	kangongo	
Cuculiformes	Cuculidae	*Centropus anselli*	Gabon coucal	mopipi	
Galliformes	Numididae	*Agelastes niger*	Black guineafowl	mosalala	TC
Galliformes	Phasianidae	*Peliperdix lathami*	Latham's francolin	pungbulu	TC
Galliformes	Phasianidae	*Pternistis squamatus*	Scaly francolin	kembe or kuengue	TC
Musophagiformes	Musophagidae	*Corythaeola cristata*	Great blue turaco	kulungu	

Musophagiformes	Musophagidae	*Tauraco persa*	Green turaco	koloka	
Passeriformes	Ploceidae	*Ploceus cucullatus*	Village weaver	teke	
Passeriformes	Nicatoridae	*Nicator chloris*	Western nicator	sangongo	
Passeriformes	Monarchidae	*Terpsiphone viridis*	African paradise flycatcher	tisoinsoin	TC
Passeriformes	Turdidae	*Turdus pelios*	African thrush	sakolo [tjoélé]	TC
Passeriformes	Pycnonotidae	*Eurillas virens*	Little greenbul	eto'o	
Passeriformes	Pycnonotidae	*Thescelocichla leucopleura*	Swamp palm bulbul	nu peke	
Passeriformes	Passeridae	*Passer griseus*	Grey-headed sparrow	banguma [atolo]	
Passeriformes	Sturnidae	*Lamprotornis splendidus*	Splendid glossy starling	ngoa	
Passeriformes	Nectariniidae	(category)	Sunbirds family	sésé	
Passeriformes	Corvidae	*Corvus albus*	Pied crow	corbeau (french name used)	
Passeriformes	Estrildidae	*Estrilda atricapilla*	Blach-headed waxbill	bogala [ada]	
Piciformes	Indicatoridae	*Indicator minor*	Lesser honeyguide	mbeleko	TC
Piciformes	Indicatoridae	*Melichneutes robustus*	Lyre-tailed honeyguide	e.selesele	TC
Piciformes	Indicatoridae	*Indicator sp. ?*	Indicator (undet.)	e.penapena	TC
Piciformes	Indicatoridae	*Indicator sp. ?*	Indicator (undet.)	kpanda	TC
Piciformes	Picidae	undet.	Woodpecker	e.kpopodo	TC
Piciformes	Lybidae or Megalaimidae ?	undet.	Barbet or tinkerbird ?	bomboko	TC
Psittacidae	Psittacus	*Psittacus erithacus*	African grey parrot	kukulu	
Strigiformes	Strigidae	*Strix woodfordii*	African wood-owl	esukuli	