

# The African Bushmeat Trade – A Recipe For Extinction.



©WSPA/K. Ammann

## Ape Alliance

1998



Ape Alliance c/o Flora International, Great Eastern House, Tenison Road, Cambridge, CB1 2DT  
Tel: +44(0)1223 571 000 Fax: +44(0)1223 461 481 email: [info@fauna-flora.org](mailto:info@fauna-flora.org)

## Executive Summary

An alarming new threat to the great apes of Africa has come to light during the past decade: the commercial bushmeat trade.

Bushmeat - the meat of wild animals - has long been a part of the staple diet of forest dwelling peoples. Increasingly, as the population of Africa in particular becomes urbanised the demand for this traditional item is met by commercial hunters and traders. The trade in bushmeat - much of it illegal - has become a business in which opportunists can make large profits.

Although ape meat represents only a small proportion of the enormous bushmeat trade, it is the greatest threat facing chimpanzees, gorillas and bonobos. The Trade also threatens the survival of many other protected species throughout Africa, from giant pangolins to forest elephants.

Mammals most at risk from the bushmeat trade

Chimpanzee	<i>Pan troglodytes</i>	Red-eared monkey	<i>C. erythrotis</i>
Bonobo(pygmy chimpanzee)	<i>Pan paniscus</i>	White-throated monkey	<i>C. erythrogaster</i>
Gorilla	<i>Gorilla gorilla</i>	Giant pangolin	<i>Smutsia (ex Manis) gigantea</i>
Red colobus spp.	<i>Procolobus badius, preussi, pennantii.</i>	Forest elephant	<i>Loxodonta africana</i>
Black colobus	<i>Colobus satanas</i>	Water chevrotain	<i>Hyemoschus aquaticus</i>
Geoffrey's pied colobus	<i>C. vellerosus</i>	Zebra duiker	<i>Cephalophus zebra</i>
Drill	<i>Mandrillus leucophaeus</i>	Ogilby's duiker	<i>C. ogilbyi</i>
Mandrill	<i>M. sphinx</i>	Black duiker	<i>C. niger</i>
Preuss' monkey	<i>Cercopithecus preussi</i>	Jentink's duiker	<i>C. jentinki</i>
Sun tailed guenon	<i>C. solatus</i>	Yellow-backed duiker	<i>C. sylvicultor</i>
Owl faced monkey	<i>C. hamlyni</i>	White-bellied duiker	<i>C. leucogaster</i>
Sceater's monkey	<i>C. sclateri</i>	Leopard	<i>Panthera pardus</i>
Diana monkey	<i>C. Diana</i>	Golden Cat	<i>Profelis aurata</i>

The major limitations on this market in the past were the difficulty in gaining access to forests and the subsequent transportation of meat to urban markets. These factors have been overridden as the forested regions of West and Central Africa are opened to exploitation and settlement. With general improvements in infrastructure this has meant that the increasing demand from insatiable and growing urban markets can be met.

The rapidly growing timber industry has been a major factor in fuelling and facilitating this trade. This industry has been dominated by European owned companies, but the number of Asian timber firms is now increasing, thereby accelerating pressures on the environment in the following ways:

- ?? forestry employees hunt to provide for their own needs;
- ?? commercial hunters operate in the forest to supply the needs of forestry workers and to trade outside the forested region;
- ?? forestry infrastructure including roads, vehicles and camps, are used by hunters to gain access to new areas and to export bushmeat from the forest to urban centres.

The consequences of an unregulated bushmeat trade include:

- ?? vulnerable and endangered species facing total extinction, for example giant pangolin, and all three African great apes.
- ?? common species becoming rare, and in some cases locally extinct, for example crowned monkeys and dwarf crocodiles.
- ?? the perpetuation of an illegal trade in orphaned apes, with its attendant welfare problems
- ?? the destruction of subsistence-based indigenous communities living in the forest.
- ?? an increased risk of the transmission of dangerous diseases to humans, for example the ebola virus.

Individually, a number of conservation organisations have raised the alarm over these issues, but effective action to combat the problem has been slow. The Ape Alliance is an international coalition of 34 organisations and consultants, working for the conservation and welfare of apes. Recognising the serious impact of bushmeat trade on great apes as well as other species, the Ape Alliance commissioned a review of recent studies of the trade in countries with great apes. The review collates, for the first time, information from 80 disparate reports and technical papers. Concentrating on studies from nine countries in Africa, the trend is clear - **illegal hunting for bushmeat is a serious threat to many populations of animals including the african apes.**

**Fact Box**

One study in northern Congo (Brazzaville) showed 5-7% of chimpanzee and gorilla populations were killed each year.

In Equatorial Guinea, one monkey - the crowned geonon - is being hunted at 28 times the sustainable level.

A 12 month study in Brazzaville counted 15,000 animal carcasses at bushmeat markets, including 293 chimpanzees.

Some estimates suggest that several thousand apes are killed every year across West and Central Africa.

The bushmeat trade is a global problem, affecting primates, and other protected species in Asia and South/ Central America as well as Africa.

A conservationist in Yaounde, Cameroon, estimated that 1 metric tonne of smoked bushmeat was unloaded at the railway station everyday, to supply the bushmeat markets.

**From this review the Ape Alliance has assessed the scale of the problem and has drawn up a series of proposals to address it. If Africa's great apes are to survive the following steps must be taken.**

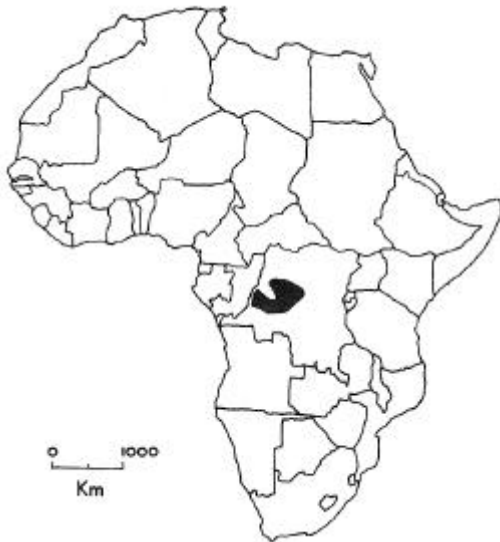
- 1) Retailers and consumers should only buy timber and timber products from sources independently certified as environmentally responsible (including strict controls on hunting) for example Forest Stewardship Council (FSC) products. The FSC is the only independent global body that guarantees that its certified timber comes from forests managed in such a way that wildlife and indigenous peoples are not adversely affected.
- 2) The European Union should use its influence to encourage all European owned companies engaged in timber extraction in West and Central Africa to adopt this code of conduct. (The resolution passed at the ACP-EU joint assembly in March 1996 calls for the EU to require that EU companies involved in logging follow a code of conduct which ensures their activities do not assist or facilitate hunting, killing or trade in protected species.)
- 3) Timber companies operating in these countries should implement a code of conduct to ensure that ecological processes are maintained. In particular the hunting of protected species such as apes must be stopped. The code must include;
  - ?? the provision of legitimate sources of nutrition for the work force
  - ?? strict adherence to national and local wildlife protection laws
  - ?? ensuring that logging vehicles and private roads are not used to facilitate illegal hunting and trade
  - ?? the provision of resources for law enforcement pertaining to wildlife
  - ?? a requirement to respect protected areas
  - ?? In addition timber companies should seek certification by an independent body such as the FSC
- 4) All concerned conservation and development organisations are encouraged to work together to:
  - ?? document incidences and evaluate trends in commercial bushmeat hunting
  - ?? campaign for greater controls of hunting and forestry activities
  - ?? provide resources for practical conservation and education projects in this region
  - ?? develop alternative sources of revenue for those currently dependent on the bushmeat trade for their livelihood
  - ?? develop alternative sources of protein to reduce dependency on bushmeat
- 5) All the above agencies are encouraged to work with Governments in the range states of bonobos and gorillas to:
  - ?? enforce existing laws designed to protect wildlife and habitat
  - ?? reassess and where necessary strengthen wildlife protection legislation to take account of increased development in forested regions
  - ?? increase resources for the implementation of wildlife protection laws
  - ?? ensure contracts for timber concessions are conditional upon adherence to (delete: include) a code of conduct which (delete: designed to) maintains ecological processes and protects (delete: the protection of) biodiversity

The Ape Alliance has proposed a code of conduct and has solicited the opinions of 61 timber companies. The response to this enquiry suggests that the timber industry has failed to recognise its role in facilitating the trade in bushmeat or to implement measures to control it.

For copies of the full report please contact The Ape Alliance, c/o Fauna and Flora International, Great Eastern House, Tenison Road, Cambridge CB1 2DT, Tel: +44 1223 571000, Fax: +44 1223 461481, Email: info@fauna-flora.org

# Distribution Maps of Africa's Great Apes

(after Oates / IUCN (1996) African Primates. Status Survey and Conservation Action Plan. Revised Edition.)



## **Bonobo** *Pan paniscus*.

Estimated population: 10,000-25,000. Status 'Endangered'.  
Range States: Democratic Republic of Congo (DRC, formerly Zaire)



## **Chimpanzee, three sub-species:**

### **Western chimpanzee** *Pan troglodytes verus*,

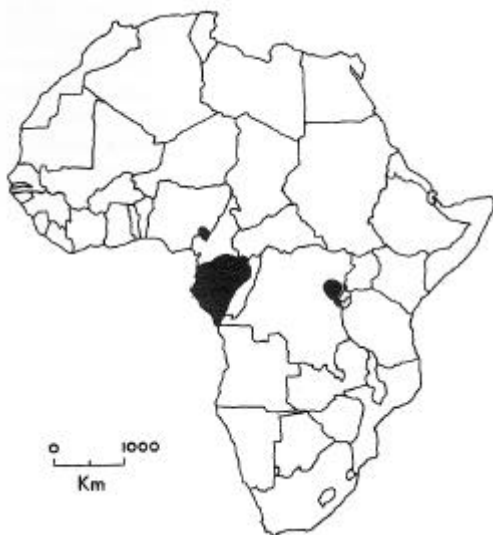
Estimated population: 12,000. Status 'Endangered'.  
Range States: Guinea, Sierra Leone, Liberia, Cote d'Ivoire, Mali, Ghana, Senegal, Gambia (extinct), Guinea Bissau (extinct?), Burkina Faso (extinct), Togo (extinct), Benin (extinct)

### **Central chimpanzee** *Pan troglodytes troglodytes*,

Estimated population: 80,000. Status 'Endangered'.  
Range States: Gabon, Congo (Brazzaville), Cameroon, Central African Republic, Equatorial Guinea, Nigeria, Angola (Cabinda enclave only)

### **Eastern chimpanzee** *Pan troglodytes schweinfurthi*,

Estimated population: 13,000. Status 'Endangered'.  
Range States: Democratic Republic of Congo (DRC, formerly Zaire), Uganda, Tanzania, Burundi, Rwanda, Sudan



## **Gorilla, three sub-species:**

### **Western lowland gorilla** *Gorilla gorilla gorilla*,

Estimated population: 110,000. Status 'Endangered'.  
Range States: Gabon, Equatorial Guinea, Congo (Brazzaville), Cameroon, Central African Republic, Nigeria, Angola (Cabinda enclave, extinct?)

### **Eastern lowland gorilla** *Gorilla gorilla graueri*,

Estimated population: 10,000 (8,700-25,500 - Hall, et al 1998). Status 'Endangered'.  
Range States: Democratic Republic of Congo (DRC, formerly Zaire)

### **Mountain gorilla** *Gorilla gorilla beringei*,

Estimated population: 600. Status 'Endangered'.  
Range States: Democratic Republic of Congo (DRC, formerly Zaire), Rwanda, Uganda.

# Contents

	<b>Page</b>
<b>Executive Summary</b>	<b>1</b>
<b>Distribution Maps of Africa's Great Apes</b>	<b>3</b>
<b>Contents</b>	<b>4</b>
<b>Preface</b>	<b>5</b>
 <i>A Review of the Commercial Bushmeat Trade with Emphasis on Central/West Africa and the Great Apes</i>	
<b>1. Authors notes and acknowledgements</b>	<b>9</b>
<b>2. Summary of information covered in this review</b>	<b>10</b>
<b>3. Introduction to the bushmeat issue</b>	<b>11</b>
3.1 Hunting of apes for meat	12
3.2 Key areas in the commercial bushmeat trade	13
<b>4. Species at risk from the bushmeat trade</b>	<b>15</b>
<b>5. Bushmeat trade impact on apes</b>	<b>19</b>
<b>6. Health risk of eating apes</b>	<b>22</b>
<b>7. Mechanics of the commercial trade</b>	
7.1. Importance of hunting to communities and individuals	23
7.2 Hunters	
7.2.1 Methods and relative impacts	23
7.2.2 Seasonality	25
7.2.3 Exclusivity of hunting areas	25
7.2.4 People involved in hunting	25
7.2.5 Attitudes and perceptions in hunting communities	25
7.2.6 Local use of specific species	26
7.3 Local consumers and preferences	26
7.4 Ethnic groupings in trade	26
7.5 Taboos	27
7.6 Routes and economics	
7.6.1 Origin of bushmeat	28
7.6.2 Transport	28
7.6.3 Hunter sales	28
7.6.4 Value of meat throughout the route	28
7.7 Traders	
7.7.1 Categories of market traders	28
7.7.2 Attitudes	29
7.8 Markets	
7.8.1 Trade	29
7.8.2 Public	29
7.8.3 Price, presentation and preference at market	29
<b>8. Urban consumer preference and attitudes</b>	<b>29</b>
<b>9. Economic importance of the bushmeat trade</b>	<b>30</b>
<b>10. International infringements regarding bushmeat</b>	<b>31</b>
<b>11. National law</b>	<b>31</b>
<b>12. Logging</b>	
12.1 Logging and bushmeat	34
12.2 The mechanics and impact of selective logging	35
12.2.1 Case study of an operation in the Congo	36
12.2.2 Logging activity in the region	36
12.2.3 Sustainability of selective logging per se	37
12.2.4 Species and methods at the point of extraction	37
12.2.5 Attempts to limit hunting	37
12.3 New Asian companies	38
<b>13. Review of some of the possible avenues to reduce local supply</b>	<b>39</b>
<b>14. Review of possible avenues to limit 'resource exploitation linked supply'</b>	<b>41</b>
<b>15. Model for a Code of Conduct to minimize the impact of hunting in logging concessions</b>	<b>43</b>
<b>16. References</b>	<b>44</b>
<b>17. Relevant references not obtained</b>	<b>47</b>
Kuching Statement	48

# Preface

## **The Ape Alliance**

During 1997, organisations which fund ape conservation and welfare work began meeting periodically in London to discuss areas of common interest and concern. The Ape Alliance, as this coalition became known, quickly grew into an international forum for debate and collaborative action on behalf of apes, both in captivity and in their natural habitat. Ape Alliance meetings are open to representatives of any organisation with an interest in ape issues. Individual specialists such as fieldworkers, consultants, and officials from ape range states are also welcome to participate, by arrangement with the Secretariat.

The aims and objectives of the Ape Alliance are:

- ?? To provide a forum for discussion on issues relating to apes
- ?? To develop position papers on key issues
- ?? To lobby collectively for enactment and/or enforcement of legislation to improve the welfare and/or conservation of apes
- ?? To campaign for greater public awareness of ape issues and increased respect for apes
- ?? To facilitate information exchange between member groups and, where appropriate, co-ordinate activities to maximise their beneficial effects.

## **The Bushmeat Initiative**

From the outset of the Ape Alliance it was clear that many organisations considered commercial hunting for bushmeat - the meat of wild animals - to be a major threat to lowland gorillas, chimpanzees and bonobos. Was it however, a more pressing threat than habitat loss, and if so, how best could it be reduced?

To answer these questions the Ape Alliance commissioned a review into the state of knowledge of the bushmeat trade. This work, and the resulting publication, was funded by contributions from the following Ape Alliance members (whose logos appear on the cover):

African Ele-Fund,	Born Free Foundation,
Bristol Zoo Gardens,	Care for the Wild, (Europe),
Dian Fossey Gorilla Fund	Fauna & Flora International,
Friends of Conservation,	
Humane Society of the United States / Humane Society International,	
International Primate Protection League,	Jane Goodall Institute,
Orangutan Foundation,	Paignton Zoo Environmental Park,
People Against Chimpanzee Experiments (PACE),	Primate Society of Great Britain,
Royal Society for the Prevention of Cruelty to Animals,	Tusk Force,
Tusk Trust,	World Society for the Protection of Animals,
WWF (World Wide Fund for Nature / World Wildlife Fund).	

The review was carried out by Evan Bowen-Jones, a Cambridge-based zoologist, with support from Fauna & Flora International and the Ape Alliance Bushmeat Working Group, and with input from many organisations and individuals in Europe, North America and Africa. After numerous revisions to add new data and ideas, the Executive Summary and Recommendations, which form the first part of this document, were presented at a press conference in London on 26<sup>th</sup> February 1998, with Karl Ammann and Dr Jane Goodall. As a result, numerous organisations and individuals around the world wrote in support of the Ape Alliance, including eminent people from all walks of life, from politics and the arts, as well as science. The 150 scientists, philosophers and conservationists attending the third Great Apes of the World Conference in Kuching, Sarawak, strongly supported the initiative, and incorporated its goals in the Kuching Statement, which is reproduced on page 48 of this report.

At the time of going to press, a total of 41 organisations have indicated their support for the Ape Alliance's bushmeat initiative. In addition to the funding organisations listed above, these are:

Amis des Animaux du Congo,	Animal Defenders,
Berggorilla & Regenwald Direkthilfe c.V.,	Biosynergy Institute Bushmeat Project,
Bonobo Protection Foundation/Language Research Center,	
Budongo Forest Project,	Cameroon Wildlife Aid Fund,
David Shepherd Conservation Foundation,	Defenders of Wildlife,
Earthkind,	East African Wild Life Society,
Environmental Investigation Agency,	Friends of the Earth,
Great Ape Project,	Humane Society of Canada,
International Fund for Animal Welfare,	Jersey Wildlife Preservation Trust,
Limbe Wildlife Centre	Monkey World and Ape Rescue
Centre,Mount N'Galiema Bonobo Sanctuary,	National Council of SPCAs of South Africa,
Pandrillus,	Wildlife Conservation Society.

As well as the many general expressions of support, the following quotes are noteworthy:

- ?? Dr Phyllis Lee, President of the Primate Society of Great Britain, wrote, "As PSGB members we need to support the Ape Alliance in their attempt to get action on the bushmeat threat to primates... primates in particular are targeted by the bushmeat trade; individual members can actively lobby to ensure the trade is halted."
- ?? David Pearson, after discussion with leading members of the Great Ape Project, wrote, "The Great Ape Project believes that all apes should have the rights to life, liberty and protection from torture. Following this ethical position, we are totally opposed to the hunting of great apes, and believe it must be stopped by means consistent with respect for the interests of all animals."
- ?? Dr Tony Rose, director of the Biosynergy Institute, cites figures that raise concerns for all African primates: "Even in areas with no logging intrusion, growing demand for chimpanzee and gorilla meat can be substantial. Kano and Asato (1994) compared ape density and hunting pressure around 29 Aka and Bantu villages along the Motaba River area of northeastern Congo (Brazzaville). They concluded that, given the ape populations measured and kills recorded, the survival of gorillas and chimpanzees is at serious risk in this territory. Further east, the bonobo faces a similar fate "unless a strong system can be established which combines effective protection with the provision of attractive substitutes for ape meat to the local people." He adds, ominously, "Even village hunting of apes is unsustainable when guns are used, and so we must be concerned about the organised commercial bushmeat trade - supported by timber industry infrastructure - that is feeding and fostering consumer preferences in towns and cities. If the taste for bushmeat continues to spread across equatorial Africa at its current pace, all non-human primates in Africa may soon be threatened by extinction."
- ?? Dr John Robinson, Vice President and Director of International Conservation, at the Wildlife Conservation Society in New York, wrote, "I increasingly feel that hunting of wildlife in forests is probably more of an immediate threat than the more traditional villain of habitat destruction... we agree absolutely on the core issues: The bushmeat trade is a major conservation challenge and it is increasing in volume; the timber industry is, indirectly or directly, largely responsible for the trade (at least in Africa)... I think what you are doing is appropriate and necessary. And I am pleased that a large percentage of the information collected in in Even Bowen-Jones' report came from WCS researchers and WCS supported studies. Good luck as you move forward."

The results of this review and the reaction to its launch are indisputable. There is a broad-based consensus of expert opinion, backed by a rising groundswell of public opinion, that the bushmeat trade is out of control. Urgent action **must** follow, and the publication and distribution of this document is only the first step. The fact that you are reading it indicates that you have an important role to play in the next step - and if Africa's apes are to survive, we must take our collective steps sooner rather than later.

Ian Redmond  
Chairman, Ape Alliance



“It is my firm belief that unless we work together to change attitudes at all levels - from world leaders to the consumers of illegal bushmeat - there will be no viable populations of great apes in the wild within 50 years.”

**Dr Jane Goodall**

**A Review of the Commercial Bushmeat Trade with Emphasis on  
Central/West Africa and the Great Apes**

**Evan Bowen-Jones  
Report for the Ape Alliance**

c/o Fauna & Flora International,  
Great Eastern House, Tenison Road, Cambridge. CB1 2DT, UK.  
Tel: +44 (0)1223 571000 Fax: +44 (0)1223 461481  
e-mail: [info@fauna-flora.org](mailto:info@fauna-flora.org)

## 1. Author's notes and acknowledgements

This review is a working paper summarizing literature on the bushmeat trade in Central and West Africa.

The Ape Alliance undertook this review because there was a need for a summary of knowledge on the bushmeat trade, particularly with reference to apes. Therefore the review places geographical emphasis on Central Africa.

The document is intended as a source of reference on this issue for members of ApAl and other interested parties, both in the range states of the apes and the donor community in the developed world.

There were difficulties in obtaining all relevant references, and section 17 lists some of the more important ones that could not be obtained. In addition, this topic has been generating an increasing amount of concern among the conservation community since 1990 and is now yielding some detailed socio-economic and ecological information, which is being published at regular intervals. Therefore, there are a number of very relevant papers in press. However, references were sought from a variety of people and groups and it is the author's opinion that the literature consulted as a result has yielded a broadly accurate picture of the bushmeat trade, which should promote further discussion and research.

Thanks are due to the following people for provision of references, comments, help and criticism:

- ?? John Fa, Jersey Wildlife Preservation Trust;
- ?? Mike Fay, Mich Eaton, Amy Vedder and Andy Plumtree, Wildlife Conservation Society, U.S.A.;
- ?? Mike Appleton, Martin Hollands, Jacqui Morris, Stephanie Pendry and Mark Rose, FFI, U.K.;
- ?? Paul Toyne and Richard Barnwell, WWF-UK;
- ?? Steve Gartland and Wale Adeleke, WWF-Cameroon;
- ?? Stuart Wilson at Forest Monitor; Anna Jenkins, Oxford Forestry Institute;
- ?? Emmanuel de Merode, University College London;
- ?? Simon Counsell, Rainforest Foundation, U.K.;
- ?? Matthew Wemban-Smith and Hannah Scrasse, Forest Stewardship Council;
- ?? Jonathan Kingdon and Ian Redmond, ApAl;
- ?? Jonathan Pearce, World Society for the Protection of Animals, U.K.;
- ?? Karl Ammann;
- ?? Heather Eves;
- ?? Jo Myers Thompson;
- ?? Jean-Luc Roux, WWF-Belgium;
- ?? Olivier Langrand and Tom Hammond, WWF-Gabon;
- ?? Hannah Buchannan Smith, Primate Society of Great Britain;
- ?? Liz Rogers, University of Edinburgh, U.K.;
- ?? Sam Kanyamibwa, World Conservation Monitoring Centre, U.K.;
- ?? Sue Fisher, Tusk Force, U.K.;
- ?? Anthony Rose, Biosynergy Institute, U.S.A.

## 2. Summary of information covered in this review

The references cited in this review are a selection of those available for Central and West Africa. Primate studies were included only where they focussed on the bushmeat trade. A total of 52 of the papers, reports and articles that were considered to be directly relevant and country specific were used to calculate the percentages given below. This helps to identify areas where more work is needed on this regional issue.

### **Cameroon**

Much information has been collated on the bushmeat trade in Cameroon (21% of the literature), from work that has been carried out in various areas, including protected areas such as Korup, Dja and Lobeke (the latter proposed, but not yet gazetted). Market studies have also been carried out and logging activities of selected companies have been analysed on the basis of sustainability.

### **Central African Republic (CAR)**

There is little information available on the situation in CAR (4% of the literature), although more has been made available recently with studies in the tri-national park region bordering Cameroon and Congo (Eves, 1996; Noss, 1997). The literature that is available illustrates that the situation in CAR is similar to that of surrounding countries and therefore warrants the same degree of concern.

### **Congo**

Throughout the report 'Congo' refers to Congo Brazzaville. Within Congo (17% of the literature), much information has been collected during studies in the northern part of the country, because of its international importance in terms of its immensely rich fauna and the increasing impact of human activities. Some of the best assessments of logging activities have been carried out here.

### **Democratic Republic of Congo (ex-Zaire)**

This country is referred to as DRC in the report. It is one of the least well studied of the countries involved (13% of the literature) and there appears to be little information on the bushmeat trade. (The author was not able to refer to Colyn's work (see section 17). It appears that because of the lack of infrastructure in the south, the trade is currently confined to the east of the country. Here the demand for forest meat is so high that traders obtain it from neighbouring countries, such as CAR (Eves, 1996; Usongo and Curran, 1996).

### **Equatorial Guinea**

There is little information on the situation in Equatorial Guinea (10% of the literature), but the market studies that exist are comprehensive and provide what is probably an accurate picture of what is going on in the whole country. The author was unable to obtain information on the current logging activities there.

### **Gabon**

This is the third most intensively studied country of those featured in this review (19% of the literature). Long-term studies have yielded ecological data on chimpanzees and gorillas, as well as, more recently, information on the effects of logging on these species.

### **Ivory Coast**

There has been some work done in the Côte d'Ivoire (2% of the literature). There is little forest left and that which remains is under intense pressure from the traders of neighbouring countries unable to meet their own demands as a result of impoverished forest resources. These include Liberia and Senegal.

### **Liberia**

Although there has been little recent work done because of the civil war and only one reference is used in this résumé, this document suggests that once a measure of stability returns there will be enormous pressures on the remaining forests. Therefore, the recent recovery of some species could be short-lived.

### **Nigeria**

Not much has been published on the trade in Nigeria. Although there are very few apes left within its borders, there are populations of both chimpanzees and gorillas. The former are relatively more common in some Muslim areas, including Gashaka Gumti National Park, where ape meat is seldom eaten (R. Barnwell, *pers.comm.*). The remaining gorillas represent the western-most animals in the species's range and are severely under threat. Gadsby (1990) and Gadsby and Jenkins (1992) document these threats as well as markets in meat of other species from Nigeria and from neighbouring states.

### 3. Introduction to the bushmeat issue

The Central and West African countries covered by this document include most of the range of African ape species. The majority of available data on bushmeat is from this region and there is general consensus that this is where the bushmeat issue is reaching critical importance. Non-domestic animals have always been an important resource but traditional, subsistence use of fauna has been changing as commercial factors have affected the socio-economics of communities that are dependent on the forest for protein. This is the case whether they are composed of recent immigrants or indigenous people. Many of these pressures come from urbanization and associated market economies that are creating demand for a variety of products in ever-increasing quantities. Meat is no exception and with improved infrastructure it can be transported further for sale.

The conversion from subsistence to commercial hunting has been occurring for some time. Hart (1978) observed this change among the Mbuti Pygmies of the Ituri forest in Democratic Republic of Congo (DRC- formerly Zaire). In the 1950s the Mbuti started to make contact with meat traders, who went to their forest camps with them and promoted intensification of traditional hunting methods such as communal net drives. At this stage there was no significant exploitation on either side, meat was exchanged for iron tools, tobacco or agriculturally produced food. However, there was a detectable decrease in duiker/forest antelope (*Cephalophus* spp.) densities as a direct consequence of the change in hunting focus and methods.

This new trade was an understandable step for the hunter-gatherer Mbuti, who had been trading with the Bantu peoples (shifting agriculturalists) in the region for centuries. Hart (1986) cited evidence, based on the dietary potential of the Ituri forest, that hunter-gatherers may only have been able to live there since Bantu farmers spread south from the Cameroons. This occurred at approximately 4000 BP and prior to this, although meat was available all year round in the forest, there was not sufficient starch-rich vegetable matter available for the Mbuti's survival. Therefore, trading meat for agricultural crops might have been a necessary survival tool in this environment. In other areas, this dependence on, and therefore familiarity with, trading was not necessary due to different conditions, e.g. forest with higher densities of yams (Hart and Hart 1986). However, in many places in Central Africa indigenous forest dwellers have been trading meat for other commodities for a long time. Wilkie and Finn (1990) noted that 59% of all Mbuti kills are made in the secondary growth caused by the activities of agriculturists. This adds credence to the idea of a symbiosis between the Pygmy hunter-gatherers and subsistence farmers (Noss, 1997).

This trading ethos, accompanied in some cases by varying degrees of coercion, has led to an often hierarchical structure in the newly prospering commercial trade in meat from the forest, where Bantu *patrons* make use of Pygmy hunters. In other cases, the hunting is carried out by immigrants attracted by work or the prospect of making money by poaching and hunting. However, the common denominator is that, increasingly, animals are hunted not for local consumption but for the urban population centres, where demand keeps prices high and inspires others in the forest to hunt. Aveling (GCN, 1993) reported that bushmeat was a severe problem in Congo, through the supply to urban centres, and that the crash in coffee and cocoa on the world market had forced rural people into the commercial bushmeat trade.

In many areas of Central and West Africa the appetite for bushmeat is so insatiable that hunting levels are thought to be unsustainable for even the faster breeding and relatively common species, such as the smaller duikers. Where hunting levels are of these proportions and where indiscriminate methods, such as snaring as well as opportunistic shooting are used, then other species are also killed. These include the great apes of the region: two subspecies of gorilla (*Gorilla gorilla*); all three subspecies of chimpanzee (*Pan troglodytes*); and the pygmy chimpanzee or bonobo (*Pan paniscus*). There is no evidence that mountain gorillas have been targeted for bushmeat hunting, although they face injury or death in snares set for buffalo and antelope.

According to King (1994), in Cameroon chimpanzee carcasses may fetch as much as \$US20 to \$US25 each and there is, therefore, ample incentive to hunt them, along with other large forest animals. The degree to which these larger species are taken depends upon human factors, such as taboos and food preferences, as well as availability of suitable equipment, and original density and shyness of the animals involved. Aveling (GCN, 1994) reported that hunting pressure in the Ndoumi Lossi region, near Odzala National Park in Congo, was low as a result of both the low human density and the cultural taboos against hunting apes.

Although forest-dwelling Africans have always eaten meat from forest animals, the current magnitude of the demand for bushmeat is such that action needs to be taken in order to save examples of Central African ecosystems with complete assemblages of megafauna. The international importance of some of these Central African forests in terms of biodiversity is beyond doubt.

The majority of Africa's intact tropical forest is now confined to Congo, Cameroon and Democratic

Republic of Congo (formerly Zaire), with Congo having the second largest area (213,000 km<sup>2</sup>), of which only 0.5% is protected. The overall total for gazetted areas across the region is 7% (Pearce and Ammann 1995).

The exploitable forest in northern Congo alone covers 8,984,749 ha and holds some of highest concentrations and diversity of large mammals in the world (Blake, 1993; Fay, 1993). Democratic Republic of Congo has the third-highest number of animal species in the world (Caldecott *et al.*, 1994). Redmond (1989) pointed out that with only 2 million or so people in Congo and a land area larger than Britain, the two-thirds forest cover should mean that wildlife conservation is possible. Cameroon contains 48% of Africa's known mammal species (Besong 1995). Steel (1994) estimated that 85% of Gabon's land was rain forest, of which 39% had been or was being exploited. On the positive side, nearly all of the logging operations in this country are selective rather than the clear-cutting-based ventures usual in other parts of the world. However, as more Asian companies move into the region, this situation might change and become a cause for concern.

Chaterlain *et al.* (1996) indicated a decrease in area of 22% of the remaining forest fragments in south-western Ivory Coast between 1984 and 1994. This included encroachment into the largest tract of wet forest in West Africa, the Tai National Park, a biosphere reserve. This is also of great importance as a centre of endemism because it was a Pleistocene forest refuge area. The fact that such important, protected, remnants of habitat are still under threat is a cause for great concern. With the threats increasing because of hunting pressure, the preservation of both habitat and fauna in some of the remaining large areas of forest that can support viable populations of large mammals must be considered in doubt.

The problem, therefore, is not merely one of preserving habitat but also of limiting access for hunters. Access can be through rivers or roads. The latter are often built by logging companies to extract timber from remote concessions. Pearce (1996) examined the factors affecting the bushmeat trade in Gabon, which is the richest country in sub-Saharan Africa per capita because of oil, manganese, uranium and timber. Pearce surmised that the growth of the trade was largely due to the logging companies. In 1988 an estimated 1400 km<sup>2</sup> of new forest was being logged per year. In 1990 1.7 million m<sup>3</sup> of logs were taken, of which 90% were exported. Although European companies took a national average of two trees per hectare, new Malaysian companies in the south plan to take 10 trees per hectare. (However, European companies have logged many areas up to seven times in succession taking increasingly smaller trees).

Whatever the damage done by logging, it is the

infrastructure that is required by such operations that facilitates the commercial trade in bushmeat. Wilkie *et al.* (1992), studying mechanized logging in Congo, reported that an average area of only 6.8% of canopy was lost per logging unit, which should therefore have a minimal projected effect on primate populations. However, the occurrence of primates in the concession was low for tropical moist forests, including chimpanzees and western lowland gorillas, the latter of which were known to be hunted. This was because "*hundreds of kilometres of trails and road... allow an easy and systematic exploitation of apes.*" This view has been backed up by many other authors, including Juste *et al.* (1995), who stated that "*the danger lies in the uncontrolled rising demand for animal protein from the urban centres, in the greater availability of shotguns and in easier accessibility to forests through the enlargement of roads.*"

### 3.1 HUNTING OF APES FOR MEAT

The hunting of apes for human consumption is widely reported from all the countries where biological or sociological research has been carried out. Steel (1994) reported that the cheapest meat in Libreville, Gabon, was gorilla at 167 CFA/kg. Chimpanzee was sold in the same area at 245 CFA/kg. There are some areas where the hunting of these animals is a cause for immediate concern. This is particularly the case for protected areas, where there is often widespread poaching in the few areas that are meant to be sanctuaries.

There are reports of gorilla hunting in Nigeria (Oates, GCN 1991, Cross River), which are of particular concern because of the limited range of the species in this country, which is the westerly limit of its distribution. There may be cause for optimism in this case because of the moderation of these activities as determined in hunter interviews by Gadsby and Jenkins (1992). However, with the ever-changing situation in this area of Africa there can be no cause for complacency, as illustrated by McFarlan's (GCN, 1994) comments. He recorded that hunting activity in the Cross River area was still prevalent despite a locally agreed hunting ban, although local people expressed their support for gorilla conservation. Goldsmith (GCN, 1995) documented heavy hunting pressure by poachers despite patrols on western lowland gorillas in CAR (Dzang-Ndoki National Park).

Yamagiwa's (GCN, 1991) survey results for eastern lowland gorillas in Kahuzi-Biega National Park, DRC, showed a slight increase in the population of gorillas in the park in comparison with survey results from 1978 to 1979. However, Hall *et al.* (GCN 1994) reported on another survey in an extension to the same park, where they found extremely high densities of gorillas, 1 per km<sup>2</sup> but also recorded intense hunting pressure as shown by remains found in snares in hunting camps. This had already wiped out elephant and buffalo from some tracts so that hunters were turning increasingly to gorillas. The following year Basabose *et al.* (GCN,

1995) documented poaching in Kahuzi-Biega National Park, which had resulted in the unintentional capture of victims of eastern lowland gorillas when snaring for other bushmeat species.

Aveling (GCN, 1995) in Monte Alen National Park, Equatorial Guinea, reported that improved protection increased human - gorilla conflict because the animals visited the secondary forest on the edges of the park more often and therefore crop-raiding increased.

Jo Myers Thompson (*pers comm.*) indicated that bonobo range in DRC is restricted to the south-east and south-west by the effects of uncontrolled shifting cultivation and plantation agriculturalists within the natural barriers of the Congo/Lualaba River and the Kasai/Sankuru river system. She also commented that within the borders of DRC bonobos are actively traded, but that it is the trade in live animals that currently presents the greatest threat to this species. However, it may be that this is a by product of consumption of their meat, as with other ape species in Central Africa. Kano (1984) and Kingdon (1997) reported that bonobos are widely eaten throughout their range.

Initial concerns over ape trade in Africa focused on the trade in orphans in the early 1980s and early 1990s. Sabater (1981) reported that 63 gorillas were killed during the capture of 34 infants for zoos between 1966 and 1969. He reported that pitfalls, nooses, dogs, etc. were used to obtain young animals. Werikhe (GCN, 1991) reported that around the Rwanda/Uganda border, monkeys were sold, with their tails removed and the white neck patch dyed black, as gorilla babies.

However, in recent times it has become abundantly clear that the real problem facing apes and other less photogenic, emotive species is the bushmeat trade. Orphans currently appearing on the market are merely a symptom of a more deep-rooted problem. There may be other uses for ape parts when the animal has been killed, although hunting to meet these specific demands has not been reported to the author's knowledge. The use of fetishes (Redmond, 1989) is likely, in the majority of species, to be a by product of the meat trade. King (1994), working in south-western Cameroon, discovered that chimpanzee bones were valued in the area for healing sprains and breaks. This was achieved by boiling the appropriate bones and applying the liquid to the area in question. There was also an isolated report of one hunter selling the skull of chimpanzee to a client in Nigeria for 'magic' for CFA 10,000 and Prescott *et al.* (1994) had heard similar reports.

It may be that chimpanzee populations are particularly at risk of local extermination from hunting after logging because even selective logging seems to drastically reduce their densities, leaving them vulnerable to further post-logging pressure. White and Tutin (*in press*) analysed the

effect of different degrees of selective logging in Gabon and suggested that the decrease in chimpanzee densities was due to disruption and then conflict in the fission/fusion communities. Gorillas, on the other hand, with their polygamous society and territorial overlaps are less affected. They found that the recorded density of 1.1 chimpanzees per km<sup>2</sup> pre-logging in Gabonese rain forest fell to between 0.2 and 0.5 per km<sup>2</sup> after disturbance. More recently White was cited regarding his work on the disruption to chimpanzee society in a *New York Times* article (Stevens, 1997), where he postulated that logging causes chimpanzee wars. Thus, there may be multifold pressures on wildlife, including chimpanzees, due to their often unknown social systems and ecology. This highlights the need to control the bushmeat trade in order to allow populations to recover after the initial ecosystem trauma caused by even the less severe logging techniques.

### 3.2 KEY AREAS IN THE COMMERCIAL BUSHMEAT TRADE

Within the geographical region of Central and West Africa, it is safe to say that all major urban centres are foci for the growing trade in wild animal meat. The supply links between rural areas to larger towns and cities follow predictable patterns and it is the infrastructure in a given region that determines the availability of meat. The demand is a constant, and when transport, of any form, becomes available it is inevitably used by the bushmeat trade.

Because the area affected by the trade is enormous, it is necessary to define some priority areas for its control. These correspond in many cases to areas where fieldwork has been carried out and to protected areas, where enforcement of existing laws in the control of hunting will be crucial.

Cameroon is a well studied case and has a relatively good road system. This means that the protected areas and areas under concession are threatened by hunting to meet demand from the population centres. The situation observed by Infield (1988) around Korup National Park appears to be typical of that observed around many of the parks in Central Africa. He suggested that the biggest centres of the trade around Korup were Mundemba and Moleka. Observations suggested that these were used as a base for hunters and sellers, and that this corresponded to the lack of fauna noted by researchers in the adjoining areas. The Erat, original inhabitants of this forest, did not use these areas, despite the fact that they were traditional hunting grounds, because it was not worth their while. Powell *et al.* (1994) reported how initial surveys showed that most large mammals are at low densities within the park as a result of hunting pressure, agreeing with Infield (1988), and Payne (1992).

Another key site in Cameroon, which is not currently protected, is the Mount Kupe region in

Bakossiland. According to King (1994), the demand created by the commercial markets in the region might be unsustainable at current levels. Gadsby and Jenkins (1992) noted a similar situation around Mount Cameroon in 1992. At this time the area still held a small population of chimpanzee and elephant, both of which were considered to be at imminent risk of extinction as a result of hunting pressure for meat. In addition, the site is considered to be very important for *Cercopithecus preussi*, amongst the IUCN's six highest priority primates; and *C. erythrotis*. Drills (*Mandrillus leucocephalus*; probably the most endangered African primate) are also present along with red-capped mangabey (*Cercocebus galeritus*). Species that have become extinct locally include leopard (*Panthera pardus*) and golden cat (*Profelis aurata*). There are large markets at Yaounde and Douala, which are supplied by all the major land links to these cities.

The Lobeke region of south-eastern Cameroon is becoming the focus of commercial hunting to supply the urban centres of the rest of the country, as well as CAR and Congo, the other states that contain the tri-national protected area. According to WCS (1996) the urban trade is increasing because of the depletion of wildlife elsewhere through hunting activity. In this region the stakeholders of the perceived common resource have been swollen by immigrants looking for work in the timber and safari companies, as well as by poachers from urban areas. The off-take by commercial hunters was found to be 10 times more per immigrant hunter than for local subsistence hunters, for whom it was only 2.9 animals/hunter/month.

In Congo, studies by Blake (1993), Bennett Hennessy (1995), Ammann and Pearce (1995), Usongo and Curran (1996), suggested that there is a large volume of trade in the northern Congo centred on the areas of Ouessou and Djembe, and destined for Pointe Noire and Brazzaville. Malonga (1996) gave details of routes by river and road to the markets in Brazzaville. Eves (1996) described routes across the border to Bangui in CAR and

those taken by traders into DRC and Senegal. Northern Congo is becoming a centre for the bushmeat trade, particularly elephant meat, and for the ivory trade. She also concluded that "*Relying on game meat as the primary protein source in larger population centres such as Ouessou and Kabo is expected to be ecologically and economically unsustainable in the long term.*" I. Redmond (*pers. comm.*) points out that the 1997 civil war is likely to have made the situation worse because people have fled the urban centres and will be increasingly reliant on nondomestic protein. On top of this law enforcement will have diminished.

Butynski and Koster (1994) confirmed the importance of Bioko in Equatorial Guinea in terms of its fauna. At least two endangered species of primate are found in each of its four natural habitats, and had increased in numbers, mainly as a result of governmental gun control. However, J. Fa (*pers. comm.*) remarks that the situation has worsened considerably for the island's primates.

In Gabon, Steel (1994) indicated that the major 'official' markets are located in the regional capitals of the nine states. In Libreville this trade amounts to at least US\$1.35 million per annum. However, most of the trade in Gabon is direct to vendors, restaurants or consumers and therefore hard to quantify as also reported by Pearce (1996). Steel also listed sources of meat reaching Libreville, Franceville and Port Gentil. Of particular concern are a timber company's plans for timber extraction in Lopé Reserve (Ingham, 1996).

For the Democratic Republic of Congo, Jo Myers Thompson (*pers. comm.*) reports that the main centres of commercial consumption are Goma, Bukavu, Kisangani and Kinshasa, plus cities east of the Congo/Lualaba river system. However, there is also substantial risk that the exploitation that exists in the eastern side of the country will spread, as plans for improving the dilapidated rail and road systems are carried out and access is increased.

## 4. Species at risk from the bushmeat trade

Many species are threatened by the bushmeat trade, to the extent that Steve Gartlan (*pers. comm.*), amongst others, considers it inappropriate to examine ape hunting in isolation. He believes that there is probably more ecosystem dysfunction being caused by the enormous off-take of other species, such as duikers, than the relatively low numbers of apes being killed as a constituent of this hunting. However, Pearce and Ammann (1995) postulated that the bushmeat trade is the most significant threat to the future of Africa's gorillas and chimpanzees.

The data are far from complete for apes, (Section 5) but these animals are probably, in numerical terms, a small part of an immense, very important issue for African conservation and socio-economic development. Although there are strong arguments that the great apes warrant special concern, it must be realised that for many Africans they are just another source of meat. Ethical arguments and even traditional taboos are commonly secondary or irrelevant when, often through opportunity rather than selection, an ape is shot by a hunter, or injured/killed in a wire snare (Redmond, 1995, 96).

Oates and Davies (1986) stated that "*large bodied primates dependent on mature forest face possible extinction.*" They specifically mentioned red colobus and Diana monkey, and these and other primates are at similar or greater risk than the great apes.

The bushmeat issue is one that spans virtually the whole of Africa, Asia and the Neotropics, threatening a multitude of species of wildlife. Some of these have higher tolerance of hunting pressure than others because of their habits, and their reproductive potential. Others may be subjected to less hunting pressure because of the taste of their meat or their ease of preparation. They are also put under varying pressures depending on the techniques used locally to catch them (see section on hunting methods). However, with a rapidly increasing human population and a tendency towards urbanization, with the resultant commercialisation of markets including those centred on food production, fewer areas of the continent are left as pure wildlife reserves. Indeed, it is widely recognized that while protected areas should remain a cornerstone of conservation (R. Barnwell, *pers. comm.*) the creation of old-style national parks is in most cases now inappropriate. This is because of the knock-on effects for local people, such as loss of potential agricultural land and natural resources, and problems of providing financial incentives for conservation for the local communities around parks. One of the main ways that people in Africa use wildlife is for food and this is therefore going to have to be one of the key issues integrated into conservation policies in order to promote the preservation of species to Africans.

In order to do this, sustainable harvesting of some species is going to have to be allowed, in conjunction with animal husbandry schemes and other ideas. However, the wide range of nongovernmental organizations and individual proponents of this strategy also stress that realistic and effective protection of especially vulnerable 'meat' species is a necessity.

Apes will be dealt with separately as the main focus of this report. However, the species listed below should benefit from protective measures taken to stop hunting of chimpanzees, bonobos and gorillas, although national and international laws already exist to protect most of them. The problem, therefore, is one of enforcement and this could, in part, be addressed by logging companies in whose concessions much of the heavier hunting takes place (Section 12.1).

Even the animals that could be hunted sustainably are often being exploited at probably unsustainable levels and controls need to be introduced in order to make sure that they are not added to the vulnerable category.

The species listed below are generally thought to be at risk from the bushmeat trade, or are currently rare or vulnerable as a result of restricted distribution. This means that they could easily succumb to the additional pressure of hunting, exacerbating their decline. The species listed have been selected by Jonathan Kingdon and the author (based upon information from *The Kingdon Guide To African Mammals*) and from other literature sourced in this review:

Red colobus spp.

*Procolobus badius, preussi, pennantii.*

Black colobus	<i>Colobus satanas</i>
Geoffrey's pied colobus	<i>C. vellerosus</i>
Drill	<i>Mandrillus leucophaeus</i>
Mandrill	<i>M. sphinx</i>
Preuss' monkey	<i>Cercopithecus preussi</i>
Sun tailed guenon	<i>C. solatus</i>
Owl faced monkey	<i>C. hamlyni</i>
Sclater's monkey	<i>C. sclateri</i>
Diana monkey	<i>C. diana</i>
Red-eared monkey	<i>C. erythrotis</i>
White-throated monkey	<i>C. erythrogaster</i>
Giant pangolin	<i>Smutsia (Manis) gigantea</i>
Forest elephant	<i>Loxodonta africana</i>
Water chevrotain	<i>Hyemoschus aquaticus</i>
Zebra duiker	<i>Cephalophus zebra</i>
Ogilby's duiker	<i>C. ogilbyi</i>
Black duiker	<i>C. niger</i>
Jentink's duiker	<i>C. jentinki</i>
Yellow-backed duiker	<i>C. sylvicultor</i>
White-bellied duiker	<i>C. leucogaster</i>
Leopard	<i>Panthera pardus</i>
Golden Cat	<i>Profelis aurata</i>

In addition, golden cat (*Profelis aurata*) and

leopard (*Panthera pardus*) have become locally extinct as a result of snaring and hunting. These two are considered to be indicator species because they are among the first animals to become locally extinct due to hunting pressure. Wilkie and Finn (1990) confirmed that leopard, okapi and yellow-backed duiker out of 19 identified species, were significantly affected by slash – and - burn roadside agriculture in the Ituri forest, DRC. The densities of other small duikers were not significantly reduced in secondary forest caused by the latter practice. The authors thought that sustained hunting pressure in this habitat and initial low population density had caused local extirpation of duikers.

Bennett Hennessey (1995) hypothesized that if the limited area accessible to hunters in the Ouessou area of Congo were enlarged, species such as leopard, golden cat, large spotted genet, African civet, marsh mongoose, black-footed mongoose, sitatunga, yellow-backed duiker, giant pangolin and long-tailed pangolin would all be threatened. Elephants in the area already were in this situation due to targeted 24hr snaring.

There have been a number of market studies detailing the species and biomass of fauna that are available in markets throughout Central Africa. These show that an enormous volume of meat is being taken from some of the most important forest habitats in the world. However, the vast majority of this is not ape meat. Table 1 shows the amount of meat available at these markets and indicates the scale and seriousness of an ecological problem that will only escalate if the commercial trade goes unchecked.

In Gabon, Pearce (1996) found the most commonly sold bushmeat species were porcupine, blue duiker, greater white-nosed guenon, white-collared guenon and moustached guenon. He assessed the level of off-take as probably being unsustainable. This would concur with the views of White (1992) working in Gabon, who suggested the possibility of local extinction due to hunting pressure for large mammals including large duikers and some monkey species. At the same time *Cephalophus monticola*, *Cercopithecus nictitans*, *C. cephus* and *C. pogonias*, showed little change between heavily and lightly hunted areas.

Steel (1994) commented that all 130 mammal species recorded from Gabon, apart from the very smallest, are used as food by humans. Some species sold are fully protected, including Bosman's potto, Demidoff's galago, gorilla, chimpanzee, water chevrotain and giant pangolin. Others are partially protected - mandrill, sitatunga, red river hog, forest buffalo, golden cat, African rock python, Nile monitor lizard and dwarf crocodile. The most important species in terms of market share of carcasses were brush-tailed porcupine at 27% of the total; blue duiker at 20%; Peter's and Bay duiker together at 17%; moustached guenon at 6% and mandrill at 3%, with

a total of 5031 carcasses counted.

Duikers represented three-quarters of the bushmeat harvest in Liberia (Anstey, 1991), which seems to be typical of the commercial trade in West and Central Africa, where the “*commonest animals, pests and animals around human habitation are the ones that appear most for sale*”. The artiodactyls in general, i.e. bush pigs, water chevrotain, buffalo and duikers represent the majority of animals traded in the region (Table 1), whether hunted by local subsistence hunters or commercial hunters (WCS, 1996). WCS found that both groups also regularly harvest brush-tailed porcupine and Emin's rat.

Duikers are often assumed to be relatively resilient to hunting pressure, but this does not mean that the current levels of killing involved are sustainable. For example, Fa *et al.* (1995) evaluated the impact of hunting in Equatorial Guinea and found that seven species in the two towns surveyed were being hunted unsustainably. Some of these were duikers, the species involved being *Cephalophus ogilbyi* (1.96 times above sustainable rate in Bioko as compared with 11.5-13.2 times the sustainable rate for Korup, as estimated by Payne [1992]) and *C. dorsalis*. The other species involved were five primates: *Cercopithecus erythrotis*, *C. nictitans* and *C. pogonias* (the latter being killed at 28 times the sustainable level); *C. preussi* and *Mandrillus leucophaeus* (these last two species being among the most endangered primates in Africa). On Bioko Island, Fa *et al.* (1995) noted that endemic subspecies were taken, including *Mandrillus leucophaeus poensis* and Preuss's guenon (*Cercopithecus preussi insularis*), russet-eared guenon (*C. erythrotis erythrotis*) and red colobus (*Procolobus badius pennanti*). Sales in Equatorial Guinea relied heavily on three species: *Cephalophus monticola* and a rodent *Cricetomys emini* on Bioko Island; and the former animals plus a different rodent *Atherurus africanus* on the mainland, Rio Muni.

In Korup National Park, Cameroon, Infield (1988) found that approximately 60% of hunters' income was generated from duikers and red colobus (*Procolobus badius preussi*), and drill accounted for a further 7%. Drills are elusive and encounters with hunters are rare but when such encounters occur more than one is killed - 6-15 taken in this case. Infield also reported that Nigerian elephant hunters operated in the area, using local Cameroonian guides. Most of the elephant meat was sold in Nigeria. Additionally, Ogilby's duiker, yellow-backed duiker, water chevrotain and bush pig, were hunted and consumed; and *C. erythrotis* was among the other primates taken. Muchaal and Ngandjui (1995) found that *C. dorsalis* was taken at nine times the sustainable rate in the Dja Reserve, Cameroon. The most commonly taken animals were three species of duiker followed by *Atherurus africanus*. They also noted that the low level of observations of pairs of *C. monticola* may

indicate that one of the pair had been shot, or that both had been killed and subadults left on their own. There is, therefore, the possibility of social disruption, higher subadult mortality and decreased reproductive success after the hunting.

Malonga (1996) reported *Cephalophus leucogaster* as being among the animals at the Brazzaville market. Elephants totalled 7% of the meat (in terms of carcasses) at the same market, nearly equalling apes. Giant pangolin were also available in Congolese markets, according to Wilkie *et al.* (1992), who also recorded sitatunga, water chevrotain, golden cat and leopard sold as meat hunted from concessions. Blake (1993) found that over 18 trading days 45.7% of all bushmeat carcasses at local markets in the Likouala swamp area of northern Congo were primates. Jo Myers Thompson (*pers comm.*) states that within the basin area of DRC (Democratic Republic of Congo) the majority of bushmeat trade is concentrated on dried antelope and small mammal (rodent) meat.

Eves (1996) carried out an extensive survey of villages in three forestry management units in northern CAR and detailed high levels of elephant hunting in the area. These included examples of villages such as Birao, where the predominant income was from hunting and from where hunters killed an estimated 33 elephants between October 1995 and January 1996 alone. This hunting yields both meat and tusks. In another village - Beh-Seke - an estimated four or five leopards are taken per

month and meat and skins sold to Zairean (DRC) traders.

There appears to be little, if any, specialist hunting for given species of animal, apart from the elephant (Eves, 1996). Other authors, including Fay (1989), Blake (1994) and Bennett Hennessy (1995), in northern Congo and southern Cameroon gave details of '*la grande chasse*'. This is often carried out by Pygmies with guns given to them by outside patrons. However, from the evidence available this does not appear to be because elephant meat is particularly in demand but because elephants yield more meat per kill than other animals and have the additional bonus of possessing ivory. Bennett Hennessy (1995) concluded that, although meat in such large quantities was probably more profitable than ivory, the key factor governing killing elephants for meat was access to transportation. In Odzala National Park, Congo, the presence of Ecogardes had stopped commercial elephant hunting prior to the war in 1997, which was the main activity of some villages in the past (Vanwijnsberghe, 1996). Considering the level of elephant hunting suggested by these data and the nature of this animal's role in the ecosystem, e.g. in seed dispersal and the creation of *bais* (clearings), this is a very serious issue. There needs to be further, specific research in the near future on the impact of hunting on forest elephant populations. *Bais* are used by a variety of other animals including apes and many rain forest trees maybe solely reliant upon elephants for dispersal.

**Table 1 Records of carcasses available for sale in West and Central Africa from data collected during this decade.** (This only includes those data that were collected in the field as part of holistic surveys, carried out over a period greater than one month, and published in report or paper format).

<b>Author and Date</b>	<b>Locality</b>	<b>Duration of study</b>	<b>Total No. carcasses recorded</b>	<b>Protected species for sale, and major components of total.</b>
Anstey (1991)	Liberia, markets in Monrovia	1 year	1,150 records	10 protected species included, antelopes totalled 67%
Bennett Hennessy (1995)	Ouessou markets, Congo	4 months	6,540 approx.	13 species protected under Congolese law, 66% of total per week were bovids.
Boussougou (1994)	Gongue logging camp, Gabon	2 months	1,037	41% primates including 121 mandrills, plus water chevrotain, golden cat, giant pangolin.
Dethier (1995a)	village hunting in Dja Biosphere Reserve, Cameroon	12 months	1,087	84% of total was artiodactyls, several protected species including elephant and leopard were taken.
Fa <i>et al.</i> (1995).	Equatorial Guinea market study, Rio Muni component	12 months	6,440 (the total on Bioko island, where apes are not present was over 10,000.)	42 % of the total was artiodactyls, 22% primates and 32% rodents.
Malonga (1996)	Brazzaville markets, Congo	12 months	15,141	Bovids totalled 64%, Primates represented 8% of total meat available by weight, with 1469 carcasses recorded,
Steel (1994)	Gabon market study, Libreville component	12 months	5,031	40% were artiodactyls, 20% primates, 18 protected species were involved.
Vanwijnsberghe (1996)	village hunting, Odzala National Park, Congo	6 months	1,497 (total for 2 villages)	50% artiodactyls, 12% primates, water chevrotain and golden cat were amongst those killed.

## 5. Bushmeat trade impact on apes

There are numerous references in the literature to ape meat being available for sale, but apart from scattered figures in the market surveys that have been undertaken, there have been no estimates of the overall loss of apes and the resultant impact on their populations. One of the few exceptions at a local regional level was carried out by Kano and Asato (1994) who estimated that, in the Motaba region of north-east Congo, 0.020 chimpanzee and 0.010 gorillas per km<sup>2</sup> were hunted per year. This was in an area where overall densities were estimated at 0.3 chimpanzees and 0.2 gorillas per km<sup>2</sup>, fairly low for the species concerned, and thus the authors considered that both species were threatened, even though this was only local hunting pressure.

These figures would mean that the annual off-take from the ape population was 5-7% in this region. This was calculated to be a nonsustainable hunting pressure, assuming an average survival of two young in a female chimpanzee's lifetime, and two to three young for a female gorilla in her lifetime.

Part of the problem with impact assessment for larger areas is that there is a wide range of population estimates for the African great apes. Table 2 shows the most recent figures available regarding numbers of chimpanzees, bonobos and gorillas per country for the main areas under consideration in this review.

The indications are that gorilla numbers are higher than previously thought in many areas of their

range. There is also growing evidence that they can survive in secondary forest (White and Tutin, *in press*) and, as a result, there has even been some debate over their conservation status (Harcourt, 1995). Densities also vary throughout ape ranges and data on gorillas suggest that maximum densities reached are something in the order of 2.6 km<sup>2</sup> in north-east Congo (Fay 1989). Chimpanzees reach their highest known densities in Tai National Park, Côte d'Ivoire (Kano and Asato, 1994).

The highest estimates of numbers of apes killed are educated guesses, which have been made while looking for evidence of ape carcasses and have been extrapolated from limited data from hunter interviews. An example of this was the study conducted by Pearce and Ammann (1995), who estimated that 800 gorillas are killed annually in a 10,000 km<sup>2</sup> area of Cameroon and that several thousand are killed per year across the species's range. This may be true but to make such evaluations more stringent methods would be needed to estimate population sizes. The problems in estimating population sizes are compounded by differences in the numbers of apes killed in areas that are relatively close to each other. However, given the obvious threat from the trade, the precautionary principle should be adhered to for these and other animals.

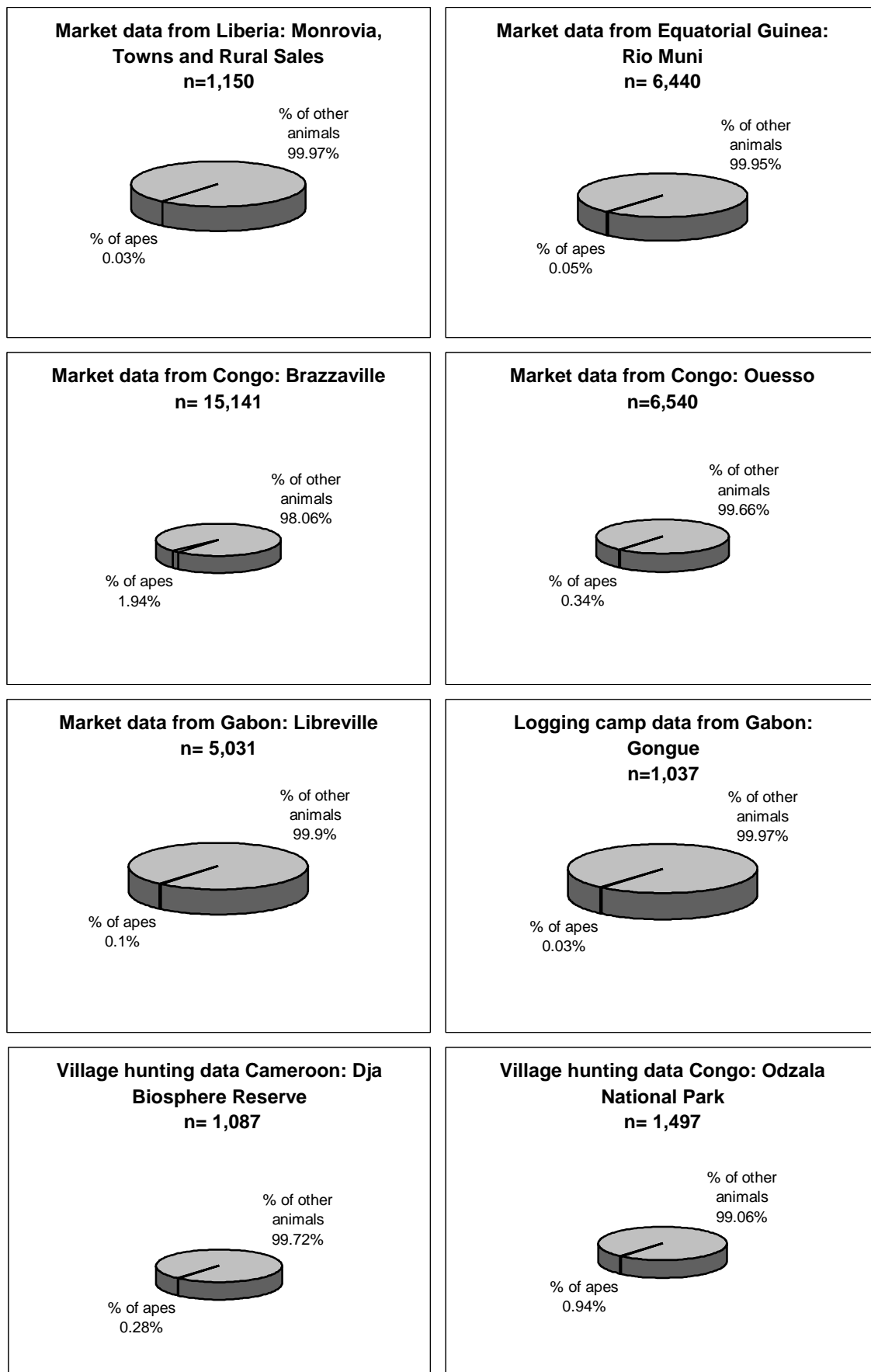
Regional differences can be due to local taboos, availability of ammunition and guns, hunting seasons and ease of hunting in various seasonal conditions. In addition, the initial densities of apes

**Table 2 Estimated number of apes in West and Central African countries mentioned in this review.**

<b>Country</b>	<b>Chimpanzees</b>	<b>Bonobos</b>	<b>Gorillas</b>
Cameroon	<10,000		12,500
CAR	800-1000		9,000
Congo	3-5,000		44,000
Democratic Republic of Congo	4-5,000	10-20,000	10,500+
Equatorial Guinea	500-2,000		3,000
Gabon	51-77,000		43,000
Ivory Coast	<750		
Nigeria	>5000*		100
Liberia	2-4,000		
<b>TOTAL over whole range (conservative estimate)</b>	<b>91,900-128,350</b>	<b>10,000-25,000</b>	<b>115,000</b>

(Sources: Kemf and Wilson, 1997; Redmond 1997 *pers. comm.* and \*R. Barnwell 1997 *pers. comm.*.)

**Figure 1-8: Percentage carcasses found amongst market, village and logging concession surveys in five West and Central African countries that were found to be those of ape species (These data are from the same source as Table 2 for the reasons of effective comparison)**



vary as a result of available habitat, history of access and past hunting. For example Blake (1993) reported that the people who live around the Likouala swamps in Northern Congo are keen hunters of gorillas. One man told of killing 18 in a year; but gorilla meat was not seen during the study because access into the inner swamp during the dry season was problematic. Further instances in the literature highlighting some other problems in estimating ape numbers are outlined in the following paragraphs.

Pearce and Ammann's (1996) study was based in the Kika, Moloundou and Mabele areas of Cameroon. Redmond (1989) cited estimates of a comparable number of 400-600 gorillas being killed per year in northern Congo. The gorilla trade fell into three main categories: meat illegally sold in markets, parts as fetishes and infants for sale to expatriates. He judged that the total amount of bushmeat of all species consumed, even if relatively conservative arguments were employed, was staggering. However, these data were also amassed from secondary sources such as instances of orphan apes and hunter interviews. Pearce (1996) reported that traders in Libreville market, Gabon, indicated that they could supply ape and elephant meat. However, the fact that such meat is available does not indicate the level at which these animals are being killed and the majority of other data suggest that there is little specialist hunting for gorilla.

Also in northern Congo, Bennett Hennessy (1995) estimated that only 15% of 20,000 km<sup>2</sup> around Ouesso, a major bushmeat centre, was affected by hunting at present, but he emphasized that this may increase with extensions to the road system. His estimates from data collected on the meat trucks, which may represent an underestimate, indicated that 0.4 chimpanzees and 1.6 eastern lowland gorillas per week were available for sale in Ouesso (this reflects the lack of availability of suitable Chevrotonne cartridges). His estimate was derived from a total of three chimpanzees (one sold as smoked meat) and 19 gorillas (14 sold as smoked meat), which he saw in 4 months of monitoring.

Further notes to the effect that apes are being killed at an unspecified but significant rate have been made by other workers in the field, including Fay (1991) in south-west Congo. Ape hands were seen for sale in Brazzaville and this was leading to a dramatic decrease in the density of wild apes in a number of areas (M. Fay and M. Agnagna, *pers. comm.*). Redmond (1989) observed ape meat at markets, as well as ape parts being sold as fetishes and souvenirs during work in Congo. Wilkie *et al.* (1992) noted that there were no signs of chimpanzees in the concession of the Société Forestière Alegro-Congolaise and that, although gorillas were present in high numbers, there was active hunting and staff had observed five carcasses in 2 years.

Although the data available suggest that ape meat is a small proportion of the bush meat consumed in Central and West Africa, they do not necessarily reflect the true extent of the problem.

Most of the quantitative data available have been recorded as numbers of carcasses. However, if the weight of animals is taken into account, the percentage of ape biomass involved would be higher than the percentage of recorded bodies (Figures 1-8). Malonga's (1996) study was one of the largest of those where data on weight of bushmeat were collected. His figures from the markets in Brazzaville, Congo, indicated that the gorilla and chimpanzee carcasses recorded (approximately 1.94% of the total number of animal carcasses), weighed 2,036.7kg. Thus ape carcasses by weight represented 2.23% of the total weight of meat sold. This gives a more accurate estimate of biological significance of the proportion of bushmeat accounted for by apes.

There are other reasons why the numbers of apes killed for meat might be under - represented in these studies.

- ?? Steel (1994) recorded only two gorillas and three chimpanzees out of a total of over 5000 records, but admits that these, together with elephant and buffalo, may have been under - represented because the vendors questioned knew it was illegal to hunt these species.
- ?? In some areas the inconvenience of carrying large carcasses (such as gorillas) out of the forest and the fact that the meat is held in such favour means that they are eaten on the spot, or in the village (J. Fa, *pers. comm.*).
- ?? Apes are among some of the more vulnerable species when an area that was previously un hunted and inaccessible becomes opened up for exploitation. This is due to their unwary behaviour when first confronting humans, making them easy targets for hunters with shotguns. Thus, at first, there may be a higher local killing rate, before the apes become more wary, than is shown in more broadly based market studies.
- ?? In order to preserve large volumes of meat until it can be sold, parts are often smoked, which makes the identification of species and the number of individual animals taken difficult to determine. Wilson and Wilson (1991), who saw only two heads of gorillas and three of chimpanzees, but numerous arms of both species in 2 weeks of monitoring in south-west Congo, provide an illustration of this. Malonga (1996) also commented on the difficulty of giving accurate estimates of the number of animals in Brazzaville markets because meat is sold in smoked pieces.

However, by collecting data on weights he managed to overcome some of this bias.

?? Heather Eves (*pers. comm.*), working in DRC, notes that gorillas, in particular, are often injured in trap lines and this may lead to a lingering death. This would not appear in market survey figures. Jo Myers Thompson (*pers. comm.*) indicates that the situation in Democratic Republic of Congo is similar with regards to bonobos and other workers report this in chimpanzee populations across Africa, e.g. V. Reynolds *pers. comm.* from Uganda. Thus, figures indicating direct hunting effects may not reflect important secondary effects.

Studies on bonobos might provide some historical evidence of the impact of subsistence hunting on an ape species. Kano (1984) attributed the discontinuous distribution (which is now being looked at in more detail by Jo Myers Thompson) and overall low density of the species to human hunting pressure. He found that where there was high human population pressure, bonobo densities were lower, and that many people in areas that had no bonobos still included them in their 'food repertoire'. This suggested that the population in 1984 was merely a remnant.

In quantitative terms apes are a minor constituent of the commercial bushmeat trade and there does not appear to be a specific hunting or consumer niche for them. However, information based on investigations by Karl Ammann (Pearce and Ammann, 1995) suggest that in parts of eastern Cameroon gorillas are considered a key target species by hunters, due to the sheer weight of saleable meat.

Whether or not their role in the ecosystem of African tropical rain forest communities means that their loss from some areas is ecologically more important than the higher off-take of duikers and other animals remains to be determined. I. Redmond (*pers. comm.*) argues that primates are "*an active part of the forest ecosystem responsible for dispersing seeds, pruning leaves and opening up the canopy. Thus, when primates disappear from a forest, other species which depend on them for some part of their life cycle will also disappear. If tree species which depend on apes for seed dispersal die out because apes become locally extinct, the insects which feed on that tree species also disappear and the insectivorous birds, reptiles and mammals which feed on the insects will be affected. Thus there is a loss of biodiversity far beyond the loss of apes.*"

The argument that the loss of apes will probably cause ecosystem dysfunction is probably true; however, with the paucity of data on the effect of removing ungulates or primates from the forest, it is impossible to prove this. Therefore, the emphasis must be on solutions to the commercial bushmeat trade, which will ensure the survival of complete faunal groups including apes and other vulnerable species.

## 6. Health risk of eating ape meat

'Little is known about the parasitic diseases carried by the apes....the level of hygiene which occurs during killing and butchery is obviously the main route of infection to consider, but the process of curing/cooking the meat then requires consideration.... more information will be required before specific recommendations can be made.' Dr S. D. Carter (*pers. comm.*) Dept. of Veterinary Pathology, University of Liverpool.

As a result of the physiological similarities between African apes and humans, there would appear to be definite risks inherent in eating apes, particularly in the form of the transmission of zoonoses. This has been confirmed by an outbreak of Ebola fever in north-east Gabon that killed 13 people. The source was traced to a dead chimpanzee that they had found and eaten. A health warning was circulated by the authority that told people not to eat primate meat, particularly ape meat (Tutin *et al.* GCN 1996).

## 7. Mechanics of the bushmeat trade

### 7.1 IMPORTANCE OF HUNTING TO COMMUNITIES AND INDIVIDUALS

The importance of bush meat to local communities cannot be ignored. Lahm (1996) described how villagers in Gabon have become more dependent on bushmeat because of permanent settlement along roads, replacement of traditional weapons, abandonment of traditional beliefs and participation in a cash economy. She used only transect censuses but found marked declines in large animals as a result of hunting pressure in the least occupied, unlogged area of Gabon. Infield (1988) stated that the main reason for hunting in the Korup area in Cameroon was for cash income rather than protein, the average hunter earning up to CFA 350,000 per annum. This represented 33% of the village income. This meat is on top of the estimated 100 kg of meat that is hunted for consumption per villager per year. In Congo a detailed study of communities in three forestry units around the Nouable Ndouki National Park (Eves, 1996), found that 47.9% of Pygmy households and 50.7% of Bantu households earned income from meat sales.

Even where the predominant source of income in a forested area is from agriculture, hunting has become economically important. Muchaal and Ngandjui (1995) found that cocoa was cited as the primary income for households in Dja, Cameroon, and that hunting was second, supplementing income from the crop. In this area in November 1994, 731 animals were killed and average income was calculated at CFA 308,433 per hunting household. Although these households retain only 25-30% of the meat for consumption, it is the main protein source in the dry season; and fishing is a purely subsistence activity. In the northern region of Korup National Park, on the border with Nigeria, 80% of meat obtained is destined for the commercial markets. This same area is the last place in the region with gorillas present and 25% of local income comes from bushmeat (Prescott *et al.*, 1994). There is almost inevitably going to be some conflict of interests without some form of management scheme.

Anstey (1991) made the point that bushmeat is of crucial importance to rural communities in Liberia, where it represented one of the only available protein sources, was a method of controlling crop pests and helped to raise taxes and pay for schooling. In Odzala National Park, Congo, the importance of the trade was confirmed by Vanwijnsberghe (1996), who found that hunting was the only source of revenue for villages within the borders of the park.

A frequently used argument is that some hunting is

traditional and that allowances must be made for this. However, it is becoming increasingly difficult to distinguish traditional from commercial hunting, because indigenous groups supplement their incomes with the sale of meat. This change from subsistence to commercial hunting was studied by Hart and Hart (1986) in Democratic Republic of Congo (as described in Section 3) and was also reported by Wilkie *et al.* (1992) in Congo. They reported that hunting had become 'big business' for the BaKouele and BaNgombe, for whom it constitutes the major source of revenue and is an extension of what they have always practised to meet protein requirements in a diet dominated by manioc and plantain.

### 7.2 HUNTERS

#### 7.2.1 Methods and relative impacts

There is an understandable preference for hunting larger animals with shotguns because of the knockdown capabilities of these firearms. This is the case with gorillas, where until it was banned (following a campaign by WSPA) the ammunition of choice was the MACC Chevrotine (Pearce and Ammann 1995) manufactured in Pointe Noire. The same goes for '*la grande chasse*' where large - bore ammunition is preferred for hunting elephants. However, in general shotguns are now widespread. Wilkie *et al.* (1992) saw 40 guns in one concession camp in Congo alone. Ammunition is also becoming more readily available. Wilkie *et al.* (1992) reported ammunition as being for sale within the concession and an estimated 6 million non - export cartridges were being produced per annum at Pointe Noire. Although the costs associated with hunting are high, Infield (1988) pointed out that some traders in Cameroon were providing guns on a hire-purchase basis. Jo Myers Thompson (*pers comm.*) reports that, in much the same way as other apes are hunted, hunting of bonobos in DRC is dependent on possession of guns and ammunition, and ammunition is restricted by poor access to regional markets. In Cameroon few data were collected on shooting by Gadsby and Jenkins (1992) because most guns are unlicensed. Although gun ownership is low in Cameroon, government personnel provide guns to hunters for a share of the meat. They also noted that 80% of shooting was carried out by day and only 20% used headlamps at night. Night shooting is indiscriminate because hunters cannot identify species by eye shine, and hence shoot first and look later (Brown, 1996). Vanwijnsberghe (1996) investigated the time employed using different hunting techniques in two villages bordering Odzala National Park, Congo. The results are presented in Table 3.

**Table 3 Percentage of hunting time employed using various techniques in 2 villages in Odzala National Park, Congo, with percentage of game caught per method (from Vanwijnsberghe 1996).**

Percentage of hunting time Village	Trapping	Day shooting	Night shooting	Net hunting	Using dogs	Total
Diba	79.1	17.9	2.7	0.3	0	100
Percentage of game catch	53.5	26.9	19.4	0.2	0	100
Olémé	60.4	26.8	8.1	4.1	0.6	100
Percentage of game catch	52.8	20.4	19.0	5.3	2.5	100

This demonstrates that trapping in both villages was the most effective method employed, although this was sometimes accompanied by daytime shooting because the trapper took a gun with him. Each method of hunting is efficient for different types of animals. Vanwijnsberghe (1996) found that 91% of primates killed by Diba were shot during the day; whereas 76% of carnivores, 65% of artiodactyls and 61% of rodents were trapped. Within the artiodactyls some species, such as the blue duiker *Cephalophus monticola*, were more vulnerable to daytime shooting, whereas others were caught almost exclusively in traps e.g. *C. callipygus*.

During their work Gadsby and Jenkins (1992) found that the ratio of hunters using guns only, to those trapping and shooting, to those trapping only was, 1:3:2. Thus trappers were five times more numerous than those who used only shotguns. This is explained by the high costs of shooting. Traps are cheap and in this case were made of a 1-2 m wire loop and a sapling under tension, in two possible configurations. Trappers spent 3 to 6 days in the forest checking their snares and smoking the meat of captured animals before going to market to meet the traders. Reportedly each man set 25-70 traps at a time. The propensity for snaring is common, with Infield (1988) finding that more hunters in the Korup region of Cameroon were involved in this than active hunting. Traps vary depending on the animal being targeted. Infield (1988) identified three main kinds of trap.

1. Neck traps - set for small animals such as cane rats (*Thryonomys swinderianus*) around farms;
2. Waist traps - perpendicular to the ground and set on animal tracks, or walkways across streams, etc.;
3. Foot traps - on the ground over shallow pits, set almost only in the forest and of a size capable of catching buffalo (*Syncerus caffer*). These traps, together with smaller versions set for bushbuck or duiker, are also dangerous for apes, particularly young ones (I. Redmond *pers. comm.*).

Thus, within the same country the time of hunting is not a constant and the specific method of setting

snares may vary. Regional differences must be taken into account when examining hunting and its impacts. Muchaal and Ngandjui (1995) amassed similar data to that of Infield from Dja Biosphere Reserve in Cameroon. They found that snare hunting was the most common method used, with 56% of 39 households using these while 29% made use of firearms or dogs, or employed Baka Pygmies.

Two major factors make uncontrolled use of snares a potentially greater problem for the conservation of terrestrial fauna than guns (R. Carroll, *pers. comm.*). The first is their indiscriminate nature and the second is that they are cheap and easy to make from a readily available source. Today this is most commonly wire, but in the past vines were the main snare material. Usongo and Curran (1996) found that hunters using snares may deploy 50-300 per year each and that 10% of the animals captured rotted before they were recovered. However, Muchaal and Ngandjui (1995), in Dja, found an even higher level of wastage in the dry season. Snares were visited less frequently in the dry season because of the lower capture rates caused by water scarcity limiting animal movements. Dethier (1995a) in Dja also, observed that in the dry season animals may be found 3 days after they were trapped, compared with 1 day in the wet season. Having divided the areas used around the village into zones, Muchaal and Ngandjui (1995) found that the percentage of rotten carcasses increased with distance from the hunters' base until it reached 97% in the furthest zone. Although, in this study, the off-take of the more commonly caught species was assessed and determined to be within the limits of sustainability, this indiscriminate technique has the potential to threaten the resource base of many regions if it is not rationalized. In this example it was only more productive duikers (i.e. blue and Peter's duikers) whose populations were maintained at sustainable levels.

Hunting pressure and resultant densities of duikers were investigated during Eves's (1996) study in the northern Congo. The only villages where the situation appeared to be sustainable were those where hunting was controlled and there were other

economic alternatives in the area. She also found that the estimated rate of return was higher around subsistence - hunting villages than in commercial - hunting areas, such as those associated with logging communities.

### 7.2.2 Seasonality

Traditionally, there was widespread adherence to hunting seasons and on paper many countries in the region have closed seasons. However, these laws are often not enforced because insufficient resources are available to the appropriate authorities responsible and because of the logistical problems. For example, in Congo, where hunting is banned from November to May and use of snares is illegal (Wilkie *et al.*, 1992), many regions are difficult to reach or monitor, so the law is hard to enforce.

The level of hunting, whether shooting or snaring, is not necessarily constant throughout the year, even in the absence of effective legal control. Infield (1988) reported that snaring in the Korup area of Cameroon is primarily a wet season activity because it is possible to identify where to set snares in the thicker undergrowth that confines animals to defined paths. This pattern of trapping was also found by Muchaal and Ngandjui (1995), but they and other authors have observed hunting with shotguns occurring all year round, day and night. The effectiveness of active shooting varies and is reported to be higher in the rainy season (as a result of wet leaf litter muffling both the sound of the hunter's approach [Gadsby, 1990] and reducing his odour, according to Vanwijnsberghe [1996], who noted the same seasonal discrepancy in Equatorial Guinea). In contrast to Infield (1988), Gadsby and Jenkins (1992) found that trapping around Mt Cameroon increased in the dry season to "*compensate for the lower number of animals*". However, they pointed out that elsewhere in Cameroon it stayed at a constant rate and that this difference could be due to a lower availability of guns at local level. This highlights the regional differences between hunting in areas of the same country, compounded by differing motivations, that makes quantitative extrapolation of local results such a problem.

Vanwijnsberghe (1996) found that annual activity patterns of two villages in Odzala National Park, Congo, were dictated by agriculture. Within this seasonal framework, hunting was carried out as a secondary activity. The peak of hunting was September/October. However, compared with village hunting in Dja, Cameroon (Dethier 1995a), hunting was carried out throughout the year. This is because the permanent waterways enable some conversion to fish as a protein source in the dry season.

### 7.2.3 Exclusivity of hunting areas

In the past, tribal organization would have ensured some degree of exclusivity to a community's hunting area (Blake, 1994). In the case of two

villages bordering Odzala National Park in Congo, Vanwijnsberghe (1996) estimated that one, the smaller with 51 inhabitants, had an exclusive hunting territory of approximately 55 km<sup>2</sup> and the larger village, of 142 inhabitants, had 81 km<sup>2</sup>. However, with immigration due to employment activities and along new roads, and the replacement of traditional value systems with permanent settlement and adoption of a market economy, this kind of system is changing. In the Mt Cameroon area, Gadsby and Jenkins (1992) observed that most villages had overlapping hunting territories and traditional exclusive zoning did not work. No taboos existed to any concrete extent. In contrast, Stromayer and Ekobo (1991) in Congo saw that the highway trade in bushmeat was dominated by villagers, who were hunting in what they considered to be locally owned land. They maintained semipermanent snare and trap lines up to 10 km into the forest within these areas.

### 7.2.4 People involved in hunting

In the Korup area of Cameroon, where hunting is practised by local people from surrounding villages (Infield, 1988), men from an early age into their fifties were involved in hunting. The age/sex make-up of this group is typical of Central and West Africa, where hunting is regarded as a male activity, as observed by others including Vanwijnsberghe (1996) in Congo. He quotes men as saying that they will hunt until they are old, when it will become too energy - demanding for them and their children will then hunt for them. He found that the majority of hunters in the two villages he surveyed were 21 to 30 years old.

The predominance of local inhabitants is not always the case. Censusing hunters in the Lobeke region of Cameroon, Usongo and Curran (1996) found that 85% were Cameroonians from other parts of the country and that 75% of them were exlogging employees, who moved to the region to see what financial opportunities were available.

### 7.2.5 Attitudes and perceptions in hunter communities

According to interviews from the Mount Cameroon area, most people regard hunting as a degrading way to make a living and, given the opportunity, would do something else (Gadsby and Jenkins, 1992). From the same interviews the authors ascertained that all methods of hunting were indiscriminate because a hunter shoots anything that moves, and sells what he can not eat. One hundred per cent of those interviewed stated that hunting was more difficult than 5 years ago because "*killing too much*". Professional immigrant hunters from eastern Cameroon and increased hunting by local people were responsible for this. To ensure future supply of meat, 33% of women questioned in the Korup area had tried to discourage the hunting of pregnant or young animals but had had little success (Brown, 1996).

In Estuaire Province, Gabon, wildlife populations

near villages have decreased to the extent that it has now become necessary to travel for a day or so from the village in order to obtain a useful amount of meat, and young men no longer considered it a viable occupation (Steel, 1994). However, in other areas where animals are still plentiful, it may be difficult to persuade people to introduce measures to prevent a future decrease in animal densities. Vanwijnsberghe (1996) found that understanding of the status afforded protected animals was that “*it is you whites who know the reason for protection*” and hunters thought the forest inexhaustible.

Kano and Asato (1994) reported that most residents in their study area in north-east Congo knew that apes were protected by law, but considered that their eating ape meat should be allowed because they had eaten it for longer than the laws had existed.

It has been suggested that if offered alternative employment, the ‘macho’ element of hunting would dissuade hunters from taking up other offers (Gadsby, 1990). However, women in the Korup area did not believe that there would be any loss of male status if hunting was limited. This was because their status was based purely on bread-winning capability, rather than ‘strength’ (Brown, 1996). In northern Congo, Eves (1996) found that utilitarian attitudes towards wildlife predominated among the communities interviewed and respondents admired gorilla and elephant hunters. However, 76.6% of those questioned showed concern as to whether or not current levels of wildlife would persist in the future.

This view is not universal by any means. Noss (1997) stated that local residents in CAR Dzanga-Ndoki National Park area, were not concerned at overexploitation of wildlife, because they assume that they will be able to switch to other resources in the future. Infield (1988) also found that hunters around Korup did not expect their children to have to hunt and therefore were not concerned by the prospect of local extinctions. In addition, Noss (1997) pointed out that, because short-term financial benefits from illegal poaching outweigh financial gain from resource management schemes, residents were unwilling to bear conservation costs.

#### **7.2.6 Local use of specific species**

In Korup, Cameroon, Infield (1988) recorded that the majority of carcasses retained for consumption were either small, e.g. two-spotted palm civet, or highly flavoured, e.g. pangolin. Muchaal and Ngandjui (1995) in the Dja region of Cameroon found that duikers, pigs and porcupines were the species most often sold, while Emin’s rat (*Cricetomys emini*) was always consumed. It is of concern that in some areas species that are not consumed or sold are still shot, e.g. genets (*Genneta servalina*) in the Odzala National Park (Dethier, 1995b). This may be because of local perception of these animals as pests, but illustrates the indiscriminate effects of active hunting in a

protected area and the need to take non – market - based data into account when considering conservation management recommendations.

In Congo, Vanwijnsberghe (1996) found that the most important animals in terms of sales, as opposed to local consumption at village level, were the artiodactyls. Within this group the most frequently sold were those most often caught: *Cephalophus monticola*, *C. callipygus* and *C. dorsalis*. These three species represented 79% and 85% of bushmeat profit for the two villages studied, respectively. Although a similar situation was seen in Cameroonian village economies by Dethier (1995a), artiodactyls were more highly represented in sales, accounting for 95% of profit. This was because rodents and primates had a lesser role in village sales than in Congo.

#### **7.3 LOCAL CONSUMERS AND THEIR PREFERENCES**

A total of 44% of women respondents in the Korup National Park support zone cooked bushmeat throughout the year and 70% of them obtained this meat from their husbands. Out of this group 28% of women obtained direct income through the sales of meat or products, and 17% of these were engaged in preserving it. The women favoured domestic meat (Brown, 1996; Infield, 1988), such as pig and chicken, over bushmeat in terms of both preparation and taste. Of the wild meat available they displayed a preference for water chevrotain and drill, both protected species in the area (Brown, 1996). The preferences of the people in urban communities, from where most of the demand for meat comes, may be completely different, although there is no evidence yet that this will affect those species shot or trapped at the local supply level (see Section 7.8.3).

Eves (1996) found that where there is increased income per household, meat purchases increase and the conditions for this are often coupled with opportunities for long-term employment. Therefore game meat consumption will be high in areas where hunting laws are not enforced and industries are developed. Elsewhere in Congo, Vanwijnsberghe (1996) found that meat was present in 72% of village meals and that the meat of rodents, including porcupine, was most favoured, while duiker meat was relatively unappreciated.

#### **7.4 ETHNIC GROUPINGS IN TRADE**

Hart and Hart (1986) noted that the trading relationship between Bantu and Pygmy in the Ituri forest was probably one of historical necessity and that there was little exploitation involved, but it may be that in other modern cases the balance has changed. Bantu *patrons* in Congo often supply guns for Pygmy hunters to bring back meat (Blake, 1994; Rose, 1996). In Congo, official SNBS (logging firm) hunts, organized by the company, were carried out by Pygmies and the meat was sold immediately on return to Kabo by the Bantu *patrons*. However, the only return for the Pygmies

was to keep and eat the viscera (Blake, 1994).

The situation in Congo at present is somewhat better for the Pygmies (Eves, 1996), although they receive less for their kills from CAR *patrons*. Bantus claim to get CFA 130,000 per elephant whereas Pygmies only receive CFA 15,000.

The ethnic differences in the role of hunting within communities, and hence the trade, in the region was highlighted by Eves (1996). She found that Bantu housewives in Congo buy the majority of their meat, obtain some from their husbands and receive a small amount as gifts. Pygmy housewives get the majority from their husbands, followed by gifts and then a small amount is bought for cash. Overall, the Bantu consumed more meat than Pygmies and it is this group that dominates the region's towns and cities. The overall amount of money received by each ethnic group in a mixed village is also unequal in Congo, as highlighted by Vanwijnsberghe (1996), who found that the amount of money from sales of meat to consumers reaching Pygmies in this Bantu - dominated community is less than 9.8%.

## 7.5 TABOOS

Muchaal and Ngandjui (1995) found that the Badjue people from the northern sector of the Dja Biosphere reserve in Cameroon believe that it is taboo to eat yellow-backed duiker (*C. sylvicultor*), which they believe will adversely affect the present and future offspring of the consumer. In the past, bush pig along with other 'big' animals, i.e. chimpanzee, buffalo and giant pangolin, were donated to the village and could not be eaten by the hunter. Now only the head of the pig goes to the village as a result of the value of the rest of the carcass (Infield, 1988). He also reported that people in the Korup area did not shoot buffalo, chimpanzee or leopard because of fear of these animals; others claimed that it was taboo to eat chimpanzee or snakes, but these opinions were far from unanimous. With the relaxation of traditional taboos in many areas, it is seldom possible to generalize about animals that are off - limits to hunting. Leopards and genets are two of the few animals under more or less strict dietary taboo in the Odzala region of Congo, according to Vanwijnsberghe (1996), because of their association with symptoms of illness.

Oates and Davies (1986) noted that "*the coastal rain forest zone of West Africa corresponds very closely to the area over which monkeys and other wildlife are hunted for their meat. North of the forest, in predominantly Muslim areas monkey - eating is much less common and cattle are a more important source of meat.*" This is borne out by the fact that areas such as Gashaka Gumti National Park in Muslim Nigeria support good chimpanzee populations (Harcourt and Ellerton, 1995) as a result of lack of hunting pressure, among other factors, while ape populations in south-eastern Nigeria are among the most threatened in Africa.

Similarly, Guinea-Bissau still contains small population of chimpanzees, despite reports that they were extinct (Gipppoilti and Dell'Omo 1995), as a result of the widespread belief among the Dari that they are too similar to men to be hunted and eaten. Anstey (1991) mentioned that chimpanzees are the subject of the most common taboos on hunting and consumption in Liberia. Bennett Hennessy (1995) noted that some hunters said chimpanzees looked too much like people to hunt.

Jo Myers Thompson (*pers comm.*) indicates that, although there are traditional taboos regarding the consumption of bonobos throughout their range in Democratic Republic of Congo, these are not adhered to consistently throughout the communities involved. Additionally, although young women in DRC have traditionally been subject to stricter taboos on the consumption of meat, they have been attempting to introduce trends towards leniency on these and therefore are increasing the potential consumer base. Where traditional taboos are still in place, village women in the Odzala region of Congo are not only barred from eating black-fronted duiker, but also avoid eating gorilla for fear that their husbands will adopt the same violent behaviour as the male gorilla (Vanwijnsberghe, 1996). Women in this society do not eat chimpanzee either.

In sharp contrast to this, Redmond (1989) reported that certain tribes of people in Congo are said to prefer gorilla meat above all else, e.g. in the Likouala region. Redmond also cites Sabater and Groves (1972) as saying that the Fang of Equatorial Guinea eat many higher primates, as do other indigenous groups. Harcourt and Stewart (1980) described the attitude of some villagers in rural areas of Gabon to apes as "*vermin that can be eaten*" because of their propensity for crop raiding. Sikubwabo (GCN 1993) reported that tribes south of the Maiko Gorilla National Park ate gorillas, but that in the areas directly around the borders there was a taboo about ape meat and also a fear of great apes. Thus, even though there is a high rate of intrusion into the park, there is little impact on gorillas. However, the number of gorilla casualties increases in areas in the south, where gorillas have damaged crops, and in some areas gorillas have been locally exterminated.

## 7.6 ROUTES AND ECONOMICS

### 7.6.1 Origin of bushmeat

Stromayer and Ekobo (1991) working in south-east Cameroon (Moloundou subdivision) summarized the main categories of place from where bushmeat originates. Here resident Baka and nonresident immigrants were united by dependence on bushmeat as their principal protein source. This demand was being augmented by the presence of five logging towns. The active hunting communities could be divided into three categories: (i) villagers on the highway, (ii) people living on logging roads leading to main the highway; (iii)

people in defunct logging towns on the south-east border supplying to Ouessou in Congo (see Section 10).

The hunting camps on the road from North Congo into Cameroon were closed when there was a lack of logging traffic in 1995 to transport the meat out because of a dispute with the haulage company (Pearce and Ammann 1995). The latter authors also encountered the bodies of two silverback gorillas on consecutive days at camps in Cameroon, where they were told that 90% of meat was transported to Douala, Yaounde by logging truck.

These reports highlight the fact that the majority of the commercial bushmeat trade is dependent on roads reaching the forest for hunting and often on trucks to transport the meat to the market centres, regardless of its origin.

### 7.6.2 Transport

Meat can be taken to market by plane (Malonga, 1996); boat (Blake, 1993; Bennett Hennessy, 1995); train (Steel, 1994); or truck (Pearce and Ammann 1995), but hunters have to carry the meat to meet the transport. Sometimes traders meet the hunters halfway. Bennett Hennessy (1995) saw buyers travelling by road and boat to meet hunters, before selling the meat in Ouessou at double the price. At Ouessou meat came from: (i) the Lioussou road; (ii) pirogues from the Ngoko River; and (iii) from pirogues on the Sucambo River.

According to Steel (1994) main sources of meat for Libreville in Gabon, are:

- ?? the primary source, the Kango road leading from Libreville into the interior
- ?? from the Remboue River
- ?? Foulenzem, a town south of Libreville
- ?? The trans - Gabon train between Franceville and Libreville
- ?? the Medouneu Road
- ?? the Coco Beach route north to Equatorial Guinea.

The meat coming in by road is picked up from roadside hunting camps and villages, and sold by middlemen. Meat from the train came from several stops, including the Forêt des Abeiles, an area considered sacred by its indigenous inhabitants, where it must have come via logging camps and roads. Thus, a picture of major cities picking up bushmeat from anywhere where the infrastructure enables the transport of the carcasses emerges as the general pattern all over Congo basin countries. In Odzala National Park the only factor limiting the development of commercial hunting among the local communities is the fact that lorries, cars and motorbikes are infrequent (Vanwijnsberghe, 1996).

This evidence of the link between roads and bushmeat availability in the towns is backed up by Jo Myers Thompson (*pers comm.*). With the deterioration of infrastructure in the south of DRC since the 1960s there is an access problem, and waterways are the predominant mode of

transporting meat and other commodities. This has reduced the threat of access by limiting logging activities, unlike in other West and Central African countries. Thus, it is in areas with navigable waterways where reports of a limited commercial trade in bonobos is reported, e.g. the western portion of the Lomako Forest Reserve reached by the Yekokora/Lulonga/Congo and Lomako/Lulonga /Congo River bordering the reserve to the north and south.

At the same time the road and water access for movement of cut timber on the western border of the DRC is controlled by the German company SIFORZAL. Researchers report the trade in bonobo meat and resultant infants to timber company workers as an economic base for commerce, particularly in the absence of any accessible passage to markets for selling cash crops. As M. Fay stated (*pers comm.* in Wilkie *et al.*, 1992) “systematic exploitation of the forest for timber results in systematic exploitation of the forest’s fauna, leading to a dramatic reduction in animal densities”.

### 7.6.3 Hunter sales

Hunters either take meat to the nearest market themselves, sell it via traders in the village, or meet traders at hunting camps. When the trader has built up a load, it is taken to market (Infield, 1988). Stromayer and Ekobo (1991) saw hunting camps in south-east Cameroon where dried meat is amassed and then carried out by the trader, or by porters hired to collect it. In this case the trader was a market woman selling locally. These meat traders may make three or four trips per month to a hunting camp and buy meat worth CFA 15,000 on each visit. During the same study, the authors noted that these hunters based on the logging roads sold directly to the logging company. In this case the company was SIBAF, the largest logging company in the region, based at Kika. This camp consumed 80 to 100 animals per day and was supplied by numerous small-scale hunters. The main meat was that of duikers and porcupines, which were often sold fresh or live. Bennett Hennessy (1995) suggested that live duikers and smaller monkeys being bought into Ouessou alive were for sale to Muslim buyers.

### 7.6.4 Value of meat throughout route

Bennett Hennessy (1995) documented the path of a Cameroon duiker’s retail value as follows: hunter to buyer CFA 3000; buyer to pirogue CFA 4000; pirogue to traveller to Brazzaville CFA 6,000; and then sold in Brazzaville for CFA 15,000. He commented that gorillas are hunted not because they reach a higher price but because they represent more meat per kill. In Pokola hunters bring meat straight to town and therefore the price is cheaper for the public at CFA 250-500 per batch dependent on quality and bartering. This is possible because 41% of meat at Ouessou is smoked.

## 7.7 TRADERS

### 7.7.1 Categories of market traders

There are two main categories of sellers within markets. Unlike the hunting side of the business, women dominate this area of the commercial bushmeat trade. 'Pepe' soup sellers use much of the bushmeat from Korup and its surrounding area. They are supplied by hunters who come into town at night to avoid the law enforcement officers (Infield, 1988). Pepe soup sellers are an important component of most markets and may control the whole market (Gadsby and Jenkins, 1992). The soup is a nonspecific meat broth and is common fare from Yaounde and Douala in Cameroon down to the smaller regional towns such as Buea (author's *pers obs.*).

The stalls that are available for meat in town markets are also rented by market women, who buy the majority of meat coming into the area, then cut it up and sell it to the public (Bennett Hennessy, 1995). Steel (1994) observed that only women sold meat in Libreville's markets and the majority were Fang from Gabon. At Oloumi there were more Cameroonian women, but they refused to be interviewed. Steel (1994) and Gadsby and Jenkins (1992) in Gabon agree that much of the trade is underground and it is therefore difficult to assess the full extent of the business. Much of the meat in Gabon is sold directly to restaurants and therefore never passes through official markets. The majority of sales in Mundemba, Cameroon, are not through markets but through private sales (Infield, 1988) and the market is predominantly occupied by pepe soup sellers. These sellers paid an increasingly high price for the meat as they competed for it having arrived as early as 3 am to buy it. He also noted that some hunters sell directly to restaurants.

### 7.7.2 Attitudes of traders

When questioned about the idea of bushmeat trade regulation, market women in Gabon viewed the lack of equality with regards to officials and expatriates obeying existing laws, as a major impediment (Steel, 1994). There are few published accounts of detailed questionnaire - based, socio-economic work on this important group of stakeholders in the bushmeat trade.

Given the critical role of these traders in the effective implementation of any future control mechanisms, their participation will be crucial. Therefore, there is a need to find out more about their views.

## 7.8 MARKETS

### 7.8.1 Trade

Malonga (1996) divided Brazzaville markets into 'gros' and 'detail' the first being for commercial traders, selling in bulk. The Maya-Maya airport can be considered under this first category because it receives flights with meat from at least three different localities in northern Congo. Port Yoro, on the River Congo, receives meat from the north and from DRC. Here commercial retailers meet the hunters' pirogues in their own well-equipped ones

to evade the *Eaux et Forêts* authorities. There are four other 'gros' markets in Congo, of which the most important for commercial transport from all over the country is the Marche Commission. At northern Congolese markets like Botala, meat is bought by traders and taken by bus three times daily to larger markets such as Impfondo (Blake, 1993).

### 7.8.2 Public

The 'detail' markets described by Malonga (1996) are defined by meat being bought by consumers and are dominated by market women. He found five of these markets in Brazzaville, where some stalls were allocated for bushmeat. The markets in Libreville are of this sort and, according to Pearce (1996), are better stocked than those in other countries. Most meat seen was fresh and sold as whole animals.

### 7.8.3 Price, presentation and preference at market

In a larger, quantitative study Steel (1994) found that the pricing of meat in Gabon was dependent on a variety of factors, but was structured i.e. the larger animals are sold in pieces and the smaller in their entirety. Others, such as crocodiles and pangolins, were displayed alive. Price varied with type of animal with the most expensive per kg being red river hog and the cheapest gorilla. The average cost for bushmeat is 1.6 times that of the most popular cut of beef, ragout. Steel (1994) suggested that the opposite is often true in rural areas. Bennett Hennessy, (1995) looking at the meat in Ouesso market, found that it was sold by 11 women who rent covered market booths for CFA 20,000 per month. They then sell the thumb-sized chunks of meat for CFA 500 per batch, with the head placed at the rear of the display to indicate the species, even though the price does not vary for different animals. The differences in methods of selling meat to the public reflects the regional differences in the trade and presumably in human preferences.

In south-west Cameroon there was some variation in price between primate species: chimpanzee was sold at 300 CFA/kg; drill at 200 CFA/kg; and monkey at 300 CFA/kg (King, 1993). This is cheaper than domestic meat was at the time. In Korup Infield (1988) found that the value of meat varied according to size of carcass, favoured taste, whether or not it was smoked or fresh, shot or trapped, which season, where sold and the bargain struck. Those stalls selling bundles of meat had cubes of 500g for CFA 500 and 1kg for CFA 1,000. This was cheaper than beef and chicken and the same as fish.

## 8. Urban consumer preference and attitudes

Anstey (1991) carried out interviews in randomly selected households covering all social strata in

Monrovia, Liberia to gauge public perceptions. He found that the then government's programme to "save wild animals and forests in Liberia" was regarded as a good idea by 60% of the 438 respondents. Of the 13% who said it was bad, the reason was that they disagreed with a complete ban on hunting that included crop pests. Out of 373 detailed responses to a further question 66% of interviewees said that they ate bushmeat because it "made them feel strong and had plenty of protein" and 31% because "they felt it was cleaner than imported meat and uncontaminated". A further 87% of 432 respondents in 1990 admitted that they could do without bushmeat.

In questions relating to preference for eating the 'deer' category (including duiker, water deer, etc.) and 'monkeys', primates ranked highly.

## **9. Economic importance of the bushmeat trade**

Meat from the Korup National Park was worth £271,000 per year according to Infield (1988). This illustrates the economic importance of the trade at a regional level, therefore one would expect that at national level there would be a significant contribution to the economy. Steel (1994) found that in Gabon the trade overall was worth US\$3 million in markets and US\$21 million through rural consumption. This was known to be an under estimate of the total worth, leaving out local economic return and the more underground side

including direct sales to restaurants.

The national economic importance of bushmeat to Gabon is not exceptional. A study carried out in Liberia (Anstey 1991) found that although there was, at the time a total ban on all wildlife utilisation since 1988, the commercial trade was worth more than timber revenues at US\$24 million per annum. With the inclusion of subsistence bushmeat the total estimate was thought to be US\$42 million per annum. He also calculated that the replacement of this resource with a domestic meat alternative would involve the expenditure of US\$100 million per annum. This might be seen as an extreme due to the fact that Liberia is probably one of the highest users of bushmeat per capita in Africa and its demand extends to hunting in neighbouring countries such as Ivory Coast (Oates and Davies 1986). However, J. Fa (*pers. comm.*) indicates that the situation in Nigeria and Ghana is comparable, whilst Ivory Coast makes an estimated US\$117million per year from the trade.

It should be noted that these countries, where estimates of the overall importance of the trade have been carried out are often heavily urban biased in their populations. Gabon had 60% of the 1.1 million inhabitants living in urban areas in 1994 (Steel 1994), compared to Liberia having 41% of its 2.4 million inhabitants in urban areas in 1987 (Anstey 1991). It is the demand from these centres that fuels the massive scale of trade recorded.

## 10. International Infringements with Regards to Bushmeat

An overview of international laws with regards to apes was presented by WWF (1996). All apes are listed on Appendix 1 of CITES and are also listed as Class A of the African Convention (1969) - see Lee *et al.* 1988 - which prevents hunting and capture of the species except on the authorisation of the highest competent authority. All of the countries with apes within their borders are CITES signatories.

This legislation does not however, mean that there is no cross border trade in these species, and many authors have obtained evidence of infractions. For example, 13% of meat at a Congolese market was found to originate from Cameroon, Bennett Hennessy (1995) and given the general lack of distinction between species this is likely to have included restricted trade species including apes and elephants plus many of those listed on Table 1. He also gives an account of one hunter going into Cameroon after elephant purely for ivory and taking 5 animals. He witnessed evidence of 3.8 elephant kills per week.

Blake (1994) describes Djembe on the Cameroon side of the Cameroon/Congo border as an important place for the bushmeat trade between the 2 countries, due to the logging road and the SNBS timber concession in Kabo (Congo). He also mentions gorilla meat bought from Cameroon by a Pygmy hunter hired by the police chief in Kabo - Congo who later sold it, along with elephant meat and also tusks hunted from Cameroon and being taken for sale in Ouessou - Congo. Eves (1996) notes that active trade routes now exist between villages on the Ibenga River (Congo) and both Bangui and Nola in Central African Republic. Both of these countries are CITES signatories. She also details the same system of gun provision for both elephant and smaller mammal hunting from Zairian (DRC) and Senagalese traders based at Impfondo in the same area of Congo. The Pygmies carry out the hunting and transport of ivory and meat by night to avoid confiscation.

There are also vaguer reports of chimpanzee skulls from Cameroon being sold in Nigeria for magic (Prescott *et al.* 1994 and King 1994). There was also the possibility of CIB trucks carrying meat into Cameroon from a North Congo concession (Pearce and Ammann 1995). Hall (1993) observed bushmeat being transported out of the Kabo region in Congo, through Lobeke in Cameroon, to Douala overland on vehicles owned by the transporter BLAT. Usongo and Curran (1996) talk of meat from the Lobeke region going across the river Sangha to CAR and overland in Cameroon to the major centres, or to Ouessou in Congo. Stromayer and Ekobo (1991) mentioned that defunct logging towns (previously established by the company CNN) on the SE Cameroon border area were supplying Ouessou by river from distances of 8 and

15 km. These areas had become collection points for bushmeat, leopard skins, and ivory, from the authors' study site in Lobeke. This trade had left the southern third of the study area depauperate in large mammal species.

Fay (1993) documented movement of elephant meat from Congo - specifically, in January 1993 elephant meat was sent from Bomassa for consumption in CAR and Cameroon. The ivory ban, had led to the departure of the Moslem ivory dealers and elephants were only being killed for meat. This level of killing was below 1989 levels as there were less people involved. (Although, with the 1997 down-listing of certain elephant populations to CITES Appendix 2, it remains to be seen if the reduction in poaching can be maintained). The hunting of elephants is a specialist occupation and there are many reports that detail '*le grande chasse*'. Fay (1993) also suggested that illegal hunting by people from CAR was a potential problem for one of the borders of the Nouable-Ndoki National Park, which was later confirmed by Blake (1994). This risk he maintains is from both subsistence and commercial hunting. Infield (1988) details the reason that villagers in Ekundukundu and Erat sold the majority of their meat in Nigeria in the past was because of the fluctuations in the Nira. This made the trade more profitable than sales within Cameroon - where markets were also further away. However, at the time of the study the economies of the 2 countries did not make this worth while and therefore sales were concentrated within Cameroon.

Malonga (1996) reported that Port Yoro in Brazzaville on the River Congo, receives meat from the north and from Democratic Republic of Congo.

Steel (1994) mentions that there is a large bushmeat route known as the Coco Beach route into Libreville (Gabon) from Equatorial Guinea. Oates and Davies (1986) mention that Liberian hunting occurs in Sierra Leone and Ivory Coast in the Tai National Park due to the decline of Liberian monkey populations.

To sum up, there is widespread infraction of CITES agreements and an active international trade in ape meat, and that of other protected species. This is a component of the commercial bushmeat trade that has already established itself as a major regional trade in Central and West Africa.

There has been some alleged trade of ape meat further afield than Africa. Kemp and Wilson (1997) reported that baggage handlers in Spain were concerned about the Ebola risk from meat that was reputed to be in bags from Africa. However, like stories of ape meat being eaten in restaurants in Brussels and Paris, the author was unable to find

any well-substantiated evidence. On the latter point there may have been some isolated incidents in the past, as there are European restaurants in areas with strong African communities in them, that serve 'bushmeat' (J. Kingdon *pers. comm.*). Indeed, unspecified bushmeat is available on a restaurant menu and for takeaway in London (I. Redmond *pers. comm.*). It is doubtful that any of these places specifically sell ape meat, or that of other endangered species. However, this situation warrants close future monitoring.

## 11. National Law

The specifics of national law are important to the degree of protection that can be expected for rarer animals and also in order to see which animals are protected in the first place. WWF Gabon has produced a detailed critique of Gabonese law with regards to the management of wildlife and including legislation affecting the bushmeat trade. However, as can be seen from Anstey's (1991) study in Liberia, prior to the recent conflict, the problem is not the legislation but the willingness and effectiveness of enforcement. All of the evidence so far suggests that blanket - bans on wildlife use are ineffective. They should only be used as a last resort, after alternative controlled use options have been tried. Additionally, as Anstey said "*while it [the ban] provided limited benefits in depressing the bushmeat trade, as a management method it carried major costs - especially in alienating those people on whose support the long-term future of conservation depended. The ban was a product of a state resource management system that tended towards an authoritarian and narrow perspective. The ban was not based on a consultative process, nor on the established conservation goals in Liberia.*"

The problems of enforcing even more moderate laws are illustrated when one looks at examples of national laws being flouted in many of the range states included in this review. This means that the increase in protection afforded to some species probably means little on the ground.

Similarly, it is illegal to hunt at all in the closed season in Congo and the hunting of gorilla is completely illegal. Blake (1994) noted that this law is completely flouted and that the chief of police in Kobo was seen selling large quantities of gorilla meat. Also, the Pygmy that he bought this from had a hunting camp in Cameroon. Wilkie *et al.* (1992) noted that Congolese law (No. 48/83 of April 21, 1984) prohibits jack lighting and use of nontraditional material such as wire for snares. Also, shotguns must be registered, (Decree No. 85/879 of July 6, 1985) and a hunting fee is required. Additionally there is a closed season for hunting between November and May when only traditional methods are allowed, i.e. spear and bow and arrow. All of the above measures are routinely ignored.

As described, bushmeat export is illegal in Congo but Bennett Hennessy (1995) says "*in Northern Congo, regular transport from A to B will be utilised for meat trade, regulated or not.*" Eves (1996) refers to the fact that there is a route out of Congo into CAR and in her extensive village survey cites other examples of such trade. In Bimbe village the majority of meat is smoked and sold to Central African traders, 20 of whom visit the place per month and export 300-400 duikers per month. They also supply guns for elephant hunting, which again are sold to the *patrons* from CAR and send assistants to oversee the hunting in Congo.

In Equatorial Guinea it is legal to own a shotgun on Bioko under Government license and ammunition is readily available at the markets (Butynski and Koster 1994). Fa *et al.* (1995) states that unlike other countries there is no closed season in Equatorial Guinea.

Steel (1994) notes that fully protected animals under Gabonese law cannot be killed or captured except with permission from the highest authority. These include chimpanzees and gorillas. However, with the level of hunting occurring there, the effectiveness of these regulations is minimal despite renewed efforts by the Eaux et Foresti re service.

In the Democratic Republic of Congo, Jo Myers Thompson (*pers comm*) reports that during colonial rule (1885-1959) the Belgian administrators established game laws and wildlife reserves to protect fauna. Under these laws bonobos were protected throughout their extent of occurrence, as they were considered rare. Within the context of reserves all hunting was prohibited except in buffer zones where subsistence hunting was permitted. (Belgian law allowed Pygmies to hunt with traditional methods, regarding them as part of the natural order that they were trying to preserve - I. Redmond *pers. comm.*). Special licences were also granted for capture or killing of protected animals for scientific purposes.

Effective national legislation in DRC, from April 1985, which deals with hunting and protected animals, became less restrictive in order to incorporate the needs of indigenous people. Laws adopted included:

1. Document number LE/0027086, a statutory instrument that repealed the earlier order prohibiting hunting throughout the national territory. Under this law local open and closed hunting seasons may be recognized at the discretion of local authorities.
2. Document Number LE/0018653 prohibited killing of fully protected animals in hunting reserves but authorised trophy killing and export with certification. This law also stipulated that a part of the meat from a kill must be distributed to local villagers. It set a limit of one animal per species per day for each hunter.

3. Document Number LE/0018625 established the conditions for the issuance, validity and use of hunting licences and established that protected animals can be exported with authorisation if the exporter holds a certificate of possession. This law proclaimed that fauna of Zaire (now DRC) is the property of the State, belongs to

the National Heritage and must be managed in the interest of the Nation.

Jo Myers Thompson comments that this obscure protection is not enforced and allows for huge interpretation.

## 12 Logging

An estimated 130 European Community owned logging 'subsidiaries' are active in Africa. As the International Institute for Environment and Development stated in a report for the ITTO "*it is not yet possible to demonstrate conclusively that any natural tropical forest anywhere has been successfully managed for the sustainable production of timber*". The ITTO also targeted the year 2000 as a deadline for making tropical timber production sustainable (White 1992). However, given current trends towards the opening of new concessions and the sale of existing ones to Asian logging firms in countries such as Gabon, this target is unlikely to be fulfilled. The other major problem with aiming to promote sustainability of timber harvesting is the definition of sustainability and the criteria used to measure it. As White has suggested with his initial ideas on community disruption in chimpanzees (see below), there is a need for a deeper ecological understanding of the faunal community involved as well as the tree dynamics of that community in order to effect truly long-term sustainable forestry. Tutin *et al.*'s (GCN, 1996) report from Lopé states that logging in Gabon is highly selective with only a 10% loss of canopy species and basal area. However, this is probably not sustainable even in this form. At a local level, Stromayer and Ekobo (1991) estimated that the supply of bushmeat in the south-east Cameroon region was still sustainable due to hunting only taking place within 10.0 km of frequently travelled roads, or navigable rivers. Since then, the increase in logging activities has led to more roads and the situation is changing with an increase in the resident population and their methods of generating income (WCS 1996).

White has intimated that logging practices were responsible for the reduced chimpanzee densities that have been seen in Gabon (in Stephens 1997 *New York Times*). This has already possibly brought the estimated total of 50,000 chimpanzees in the country down to an estimated current total of 30,000. This might be due to the violent disruption of their social systems as territorial boundaries are crossed when troops flee, having been disturbed by logging activities. This may lead to battles in which 4 out of 5 adults may be killed. Andy Plumtree (*pers. comm.*) mentioned that this doesn't happen in Budongo, Uganda, due to the fact that where logging takes place it is on a smaller scale and thus chimpanzees just move to a different part of their group territory. However, this is not possible when there is a continuous front of mechanised logging for 3-6 miles, but evidence is circumstantial. This reduction was observed in Lopé, where there is no hunting. Additional hunting pressure in other areas where the same effect is apparent, would be disastrous. White's (1992) study, from further Lopé data, suggested that gorillas are not adversely affected to the same extent by this form of selective logging. This could be because the social structure

of gorillas is different and groups frequently have overlapping territories. They therefore do not indulge in the killing of whole outside groups as seen in chimpanzees, due to their social system being based on the dominance by silverbacks rather than on a fission/fusion basis. Although there is some evidence of beneficial effects for both gorillas and elephants after selective logging in terms of increased food patches composed of secondary regrowth, these can easily be negated by hunting as an after effect.

The situation can be summed up with a quote from Skorupa in Sayer *et al.* (1992). He said "*Loggers cannot be held solely responsible for the wildlife in their concessions, but it is imperative that they are aware of prevailing hunting patterns and that they respect government schemes such as gun control, bushmeat farming and policies that invest traditional hunters with the means to exclude competing commercial hunters.*" Similarly, Butynski and Koste (1994) working on Bioko noted that "*the absence of roads and settlements on the eastern, southern and western slopes of Pico Basile and over the southern third of the island, makes these regions less subject to hunting pressure.*"

### 12.1 LOGGING AND BUSHMEAT

Robinson (1995) detailed the effect of human society on forest fragments that are still used for hunting after habitat degradation. The effect of these factors mean that models based around island biogeography theory, are insufficient to predict future trends in extinction, as hunters preferentially take fauna over 1 kg in body mass. This in turn reduces biomass and therefore has secondary consequences on biodiversity and community structure. Although the aforementioned study was undertaken in the Neotropics, the same holds true in Africa, except that the effect of hunting would appear to be more pronounced at the moment.

In the past there has been an even more obvious link between logging and the supply of commercial bushmeat. As mentioned in previous sections, there is wide spread agreement amongst authors and field workers that to a large extent loggers not only increase access to regions for hunters, but also facilitate the transport of meat to market centres with their trucks. Further specific cases of the carrying of meat are cited below, however, some other companies went even further as in the case of SNBS in Congo, whose trucks were at one stage used for organised Sunday hunts. These were specifically to provide food for the workers. (The trucks were also regularly used by outside hunters for hitching into the forest of the Kabo concession Blake 1994). Most hunters admitted that they were dependent on SNBS trucks to go deep enough into the forest to find good hunting grounds. All activities of carrying hunters and shells, plus

allowing the Pygmies to hitch into the forest had been declared illegal by the SNBS management but they happened every day. There was no effort to enforce these rules, or Congolese laws, by the management. Meat was brought back on the same trucks and all involved admitted it would be hard to be effective hunters without them. SNBS also allowed a local gunsmith to make cartridges specifically for killing elephants in their workshops.

In south-east Cameroon the links could not be clearer, where 75% poachers are ex-loggers. The hunting camps carry on during 'closed' seasons (Bushmeat Canopée). Also in Cameroon, SIBC and SFID trucks have been seen collecting up to 200 kg of meat at one go, of various species (Pearce and Amman 1995) and SIBAF concession traffic was observed with gorilla carcasses and CIB carrying chimpanzees for sale in Yaounde. SNBS permitted an official Sunday hunt in the Kabo (Congo) area using logging trucks. Ammann has filmed hunters waiting for lifts from SEBEC trucks and seen a baby gorilla in one of the camps. He has also seen 8 new hunting camps along the CIB road to Cameroon; and has seen 3 dead silverbacks on a SIBAF truck that had been killed around the company headquarters (Pearce and Ammann 1995). Usongo and Curran (1996) highlight the link between forest enterprises and immigration; illegal activities due to lack of job security; improved access to inaccessible areas; and poaching supplies of ammunition and arms in the camps from where transport of meat to commercial centres is possible. In south-east Cameroon 85% of the meat taken by poachers is taken out on logging trucks to fuel the commercial trade. SNBS (Congo), CIB (Congo) and SIBAF (Cameroon) play important roles in this. Logging roads are presently going through the proposed Lobeke reserve in Cameroon. This is part of the tri-national park and the authors also note that the road that bisects the park to access forest enterprises in north-east Congo allowed new hunting camps to be set up in 1994 that didn't exist the year before.

Hall (1993) observed the reopening of the Kabo to Douala route that replaced the Sangha River route and enabled further commercial hunting. Meat was observed being transported out of the area on vehicles owned by BLAT throughout the mission. The CIB boat ferrying service that enabled the transport of meat across the Sangha River to the Cameroonian coast was detailed again by Bennett Hennessy (1995) as taking approximately 7 trucks

a day and as having created the infrastructure for the growing bushmeat trade in Cameroon.

## 12.2 THE MECHANICS AND IMPACT OF SELECTIVE LOGGING

Selective logging is practised in Congo basin countries as a rule. However, this is still a highly mechanised process requiring substantial infrastructure and in many cases the importation of large numbers of external workers into an area that has not before supported large consumer populations (WCS 1996).

In his report on the operations of a company called Leroy now operating in the Lopé reserve, Pearce (1996) highlighted the changes to the Forêt des Abeilles where operations were centred. This 500,000 ha area is the only place where the sun-tailed guenon (*Cercopithecus solatus*) occurs. Originally the forest had no people in it, but with the start of logging this rose to 1,200 inhabitants in 2 permanent purpose - built settlements. To facilitate extraction of timber Leroy also constructed 110km of roads, 8m wide and gravel covered, with a further 15m of vegetation cut away each side to aid drying of the road surface. Leroy has operated in Gabon for 40 years and was bought out by the German company Glunz in 1992. Ingham (1996) states that Leroy are planning 180 km of road for the Lopé reserve and that even though they are going to enforce a no-hunting rule, this is bound to have consequences in such an important protected area.

This is one example of an operation in a broad spectrum of companies that practice the same form of logging but that differ greatly in their methods, impacts, economic outlook and hence degree of exploitation. The case study below could be regarded as one of the least extreme examples of selective logging and it provides a detailed picture of how selective logging is carried out. It also illustrates of how hunting occurring at the same time as some of the best practice in the industry in Central and West Africa still has the potential to affect fauna in those concessions. At the other end of the spectrum are the new Asian firms whose reported activities involve much higher extraction densities and who put in a higher level of infrastructure (Section 12.3). Section 12.2.3 provides further specific examples of cases where practices are not up to scratch, but probably still exceed the former Asian interests' logging procedures.

### 12.2.1 Case study of an operation in Congo

In Congo Wilkie *et al.* (1992) concluded that selective logging in the absence of hunting might have had a limited effect on wildlife, but that in the presence of these increased pressures, had grave consequences. This was demonstrated by the observed reduction of primates on all transects that were carried out. Thus, the authors recommended that loans from the African Development Bank and other financing mechanisms should in future incorporate measures to ensure wildlife conservation. The paper examined the situation under the logging company Société Forestière Algero-Congolaise, a semipublic company working on a 20 year agreement between Algeria and Congo over 855,000ha of the Sangha region.

#### i) Selection of trees to harvest

The Société maintains 6-10 inventory teams of 8 men which are employed in the annually selected tract of forest to map the locality of all exploitable trees that exceed the minimum diameter at breast height. Primary transects are then established north/south and cleared of undergrowth for 3m width and secondary transects are cut that then cross these at 250m intervals east/west. In this way the plot is divided into 0.25km<sup>2</sup> blocks. This then forms the inventory of commercial trees that has to be approved by the regional ministry.

#### ii) Roads

The road system consists of primary roads (perennial and cleared either side) from the logging units to the Société compound; secondary roads maintained whilst in use (12-15 months) connecting log parks at 2km intervals, together within the timber unit; and bulldozer tracks used for extraction within the unit. Road layout is designed to avoid marshy, hilly and uneconomic areas.

#### iii) Felling and extraction

Trees are felled by teams of 3/4 men who clear the fall path and cut lianas. From Pouna the logs are transported en route to Brazzaville by barge or as log rafts. The journey time takes from 30-240 days and involves degradation in timber quality due to insects and rot.

The density of exploitable trees was low due to market dynamics and valuable species were at a density of one tree per 1-13 ha. The average area of canopy removed was 952.3 m<sup>3</sup> per tree. Thus, an average of 6.8% of total canopy loss was seen per logging unit. The Société never reached its authorised maximum volume - and the bank loan that they were applying for at the time was to buy more equipment to meet their quota.

#### iv) Specific impact

The overall loss above meant that there was a minimal projected affect on the primate populations from Wilkie *et al.* (1992). However, this was not the total effect, as other currently unexploited species of tree were also marked as local sawmill quality ('sciére'). The occurrence of primates in the concessions was low for tropical moist forests. Species present included chimpanzees, at very low densities, and western lowland gorillas which were acknowledged as being hunted. This situation was explained by the authors in the statement "*hundreds of kilometres of trails and road... allow an easy and systematic exploitation of apes.*" It should be noted that research to date shows that moderately logged forest can support viable primate populations. Only one species declined in an Ugandan forest under study with moderate logging, as opposed to 5 out of 7 species when forest was heavily logged. Thus at the logging level documented by Wilkie *et al.* (1992) without hunting pressure the fauna would probably not be threatened. Other authors reaffirm their conclusions including Oates and Davies (1986) who state that "*even when felling is highly selective, causing only moderate canopy damage, logging roads improve access for hunters.*"

### 12.2.2 Logging activity in the region

Within this spectrum of companies in Central and West Africa operating at varying degrees of exploitation, several authors have amassed data that are relevant to this section on the coverage and locality of firms operating in key areas.

Stromayer and Ekobo (1991) reported the presence of the following companies in south-eastern Cameroon, SEBC at Bela, SEFAC at Libongo, SIBAF at Kika, SOTREF at Moloundou (4 of these are French owned, with offices in Douala.) Additionally, SIFCAM, SOCAMBO, and FOREC (formerly CCN) operated in the region in the last 30 years.

In the same area, south-eastern Cameroon, in 1993 - Hall reported on the activities of companies in the

environs of the proposed Lobeke protected area. He mentioned that talks were held with SOTREF (Société Tropicale d'Exploitation Forestière) who were seen operating in a zone that they did not claim to be in but that was within a proposed 'multiple use' area of the buffer zone. Also present were SFIS (Société Forestière et Industrielle de la Sangha) who appeared not to have used their camp for eight months or so but were operating across the border in CAR under the same parent company. Additionally, SEFAC (Société d'Exploitation Forestière et Agricoles du Cameroun) who had operated within the Lobeke region for years, at this time had a new Italian owner. SIBAF (Société Industrielle des Bois Africains), was also present, having been in the Lobeke region for 15 years and just being given a 'stop gap' concession whilst another permanent one was found. This was within

an area already identified as remnant primary undisturbed forest and important for inclusion in the protected area, because it was critical for the maintenance of the area's biological integrity. The company was asking for concessions within the reserve because of the World Bank moratorium on creating further concessions.

In Central African Republic, Carroll (1986) mapped the concessions that had been granted permits by that time and that already covered the southern, forested area of CAR. At that time there were 13 companies that had been granted permits, of which at least 4 European - owned companies were still operating in the area in 1997.

European - owned timber companies and their subsidiaries have, until recently, dominated Central and parts of West Africa. These, along with those from other countries, were the subject of an intensive report with data collated over a 2 year period for Friends of the Earth (Rice and Counsell 1993). This found that in 1990 the EU imported 4.498 million m<sup>3</sup>, of African tropical timber as compared to a mere 13 thousand m<sup>3</sup>; which went to the US and a total of 522 thousand m<sup>3</sup>; that ended up in Asia. This reflects both historical ties and proximity to market. At the time African timber also dominated world timber trade for uncut logs, whereas Asia supplied the bulk of sawn timber.

In the 1980's the majority of EU timber imports were supplied by Ivory Coast and one of the fastest annual deforestation rates in the world resulted in the loss of the majority of the country's forests (9-18% of original cover remains in small fragments). From 1994 the export of logs from the country was banned and therefore Liberia took up the EU's quota. This is one of the most forested countries in West Africa, which since the war's end has been the focus of much "illegal export of logs to benefit expatriates, faction leaders and foreign entrepreneurs" (Mike Appleton, FFI *pers. comm.*) Also adding an increasing amount of timber into the equation have been the Central African countries including Cameroon and Gabon: the fact that during the same period the commercial bushmeat trade has proliferated in these countries is no coincidence. Throughout the region deforestation rates are estimated at between 800 and 1500km<sup>2</sup> per year (Rice and Counsell 1993).

### 12.2.3 Sustainability of selective logging *per se*.

An assessment of 3 logging operations in Cameroon (carried out on behalf of WWF and cited by Rice and Counsell, 1993) found that all of the concerns examined failed to meet the sort of standards required to be able to define an operation as sustainable. The 3 companies involved were Danzer, Wijma and Alpi. References to this confidential report mention that "there was an absence of contour mapping leading to poor and environmentally damaging road construction; unnecessary skid trails were constructed; saplings were destroyed with considerable understorey

damage; and wastage was considerable both on the forest floor and in the mills". Also, 2 of the companies had supply problems with the mills they had constructed and therefore topped up their own timber with that bought from Cameroonian concessions where controls were less stringent.

Rice and Counsell (1993) also note that further studies on the Wijma operation found an average of 14.2% (sometimes up to 70%) of the logged area was damaged, due to lianas and fall paths not being cleared. On top of this, roads were planned on the shortest route between 2 points, not on the basis of contour planning. When compared to the practices of Société Forestière Algero-Congolaise (Wilkie *et al.* 1992) the lack of forethought in this operation is clear.

### 12.2.4 Species and methods at point of extraction

Okoume *Aucoumea klaineana* is reported to account for 90% all wood exported from Gabon (Steel, 1994). Pearce (1996) observed that this softwood was taken on the first cut - and a later cut of hardwoods was made as well due to market changes. The cutting was done with chain saws operated by 12 men out of the total 270 employed. All timber in Gabon is sold through the state owned company SNBG which then supplies Leroy with the majority of its okoume. From 1997 Leroy will also get this from Equatorial Guinea and Congo.

Demand in consumer countries dictates the species that can be economically exploited. Hall (1993) saw one company with new Italian owners that purchased most of the timber and exploited a suite of species with *Triplochiton schleroxylon* - Ayous, being the primary by volume. The company had no management plan but regarded its concessions as semipermanent and was re-entering old areas already used by SEFAC in the past to exploit this new species, as well as extract all of the remaining mahoganies. They also went for *Entandrophragma* sp. due to the economics of selling to middlemen. This re-entry was contrary to the recommendations of a mission that surveyed the area for consideration of giving it protected status.

### 12.2.5 Attempts to limit hunting

Leroy took the following actions during their activities in the Forest of the Bees (Pearce 1996). In April 1995 all commercial hunting was prohibited, including the transport of hunters and meat and export of meat from the concession. However, the workforce was allowed to hunt for themselves, providing they kept within the wildlife laws. Freezers with supplies were present on the concession as part of a private business and staff were told that hunting protected species would result in them being sacked. Legitimate hunting was mainly undertaken with snares although Pearce suggested this could cause problems for sun-tailed guenon which is unusual in being a ground - dwelling monkey. Token checkpoints had also been

erected at the entrance to the concession to monitor vehicles, although according to the author the effectiveness of this control was not convincing. Leroy has announced that when the next concession - No 32 in Lopé - is started, no hunting will be allowed.

### 12.3 NEW ASIAN COMPANIES

In 'Forests Foregone', Rice and Counsell (1993) cited projections on the exports of timber from Asia, Africa and Latin America. These predictions suggested that emphasis would be further placed on Latin America and Africa as excessive exploitation in Asia limited supply. This increase in pressure has happened, although this may be more to do with the vast increase in demand from Asia's growing economies, including the vast markets of China. As a result, Asian companies are increasingly establishing themselves in Africa and Latin America, with their methods and ethos of timber extraction differing from the European companies they are replacing.

Richard Barnwell (*pers. comm.*) indicated that the Malaysian logging company on the Korup border is extremely efficient and much more so than the French companies in Cameroon. They put in a comprehensive road system, because as they say "*the economics of tropical forestry are such that profit is dependent on good access*". Thus, they clear a 75m wide strip road for main access, with the actual road surface 30m across and also feeder roads and bulldozer extraction roads that are similarly substantial. In total they are taking in the order of 85 species of tree at a density probably exceeding 20 per hectare. The whole process is very fast. Within 5 years the lower quality logs that have been used to cross the smaller rivers have

rotted and the roads themselves last about 2 years. The majority of workers are Malaysian including bulldozer drivers. This one company has 16 bulldozers, far more than in other operations, and only a minimal number of Cameroonian chainsaw operators are employed. Now, some of the local villagers are beginning to realise what is going on, having initially been appreciative of the new roads, because fruit and nut trees have started to be taken.

The efficiency of these operators is illustrated by the story of Michelle Bayes, a researcher from the Institute of Zoology, London, studying galagos in Gabon. Having set her traps she returned to check them a day later, to find that the forest had gone and the traps were stacked neatly in the empty space. This was the work of Chinese loggers (I. Redmond *pers. comm.*).

Wale Adeleke (*pers. comm.*) added to this information on Asian Companies (which WWF Cameroon have been investigating). He acknowledges that information is very difficult to get hold of due to the fact that these businesses are operating under the names of Cameroonians. He also maintains that it is the lack of clear forestry policy and enforcement that has attracted these companies to Cameroon.

Jean-Luc Roux of WWF Belgium (*pers. comm.*) estimates that in Gabon new companies have already acquired between 1.5 and 2 million hectares. He named some of the key players in this and surrounding countries as Rimbunan Hijau (operating under the name of Shimmer in Cameroon and Equatorial Guinea), WTK, Vickwood and Pan Pacific.

### 13. Review of some of the possible avenues to reduce 'local supply'

The author proposes the definitions below for the purposes of analysis of the commercial trade. What is presented is a brief synthesis of some of the solutions currently being worked on, or that have been proposed by various authors for the reduction of 'local supply'.

A later section addresses the possible measures to combat '*resource exploitation linked supply*'. At this stage this side of the urban supply can be defined as '*the supply of bushmeat from concessions and other areas, often involving large numbers of immigrant workers and often for purely commercial purposes*'. The current section deals with 'local supply', the working definition of which is '*supply of meat from local hunters to markets, not involving immigrant workers*'. This is still a part of the commercial trade and distinct from subsistence hunting and consumption, although in practice it may represent the spare generated in the latter process.

From their work in Dja Biosphere Reserve, Cameroon, Muchaal and Ngandjui (1995) suggest control of indiscriminate snare and rifle use. Both hunting techniques are going to require some form of limitation.

?? Control of snares could include further restriction on limited zone distances from the village where they can be set. From conversations with John Fa (JWPT), Mike Fay (WCS), Richard Carroll (WWF US), Richard Barnwell (WWF UK) and others it is obvious that the control of snares is commonly regarded as a necessity to prevent the local extinction of wildlife in and around protected areas. One of the ways to do this is to promote tighter zoning systems in buffer zones around protected areas.

?? Although the use of wire snares is deemed illegal in many of the countries in question, e.g. in Congo (Wilkie *et al.* 1992), the fact that they are so widely used makes the enforcement of a ban impractical. However, the indiscriminate nature of the technique means that alternative ideas need to be tried to reduce its impact. One of the obvious aims should be to minimise wastage, which can be seen to increase when trap lines are set away from the villages or camps that the hunters are from. This suggests that snaring should only be permitted in closer zones to villages, for example 2 km away being a maximum and this could be effected as part of a quota system, which could cover shooting as well.

?? However, the basic lack of information on the population dynamics of the main 'prey' animals makes the setting of such quotas difficult. In order to determine sustainability, population densities, reproductive potential

and rate of off-take are needed (Robinson and Redford 1994). There is an urgent need for such basic ecological research on the main meat species such as porcupines, rats and smaller duikers (and this is a direction that some newer work has been going in).

?? Quotas could be used in conjunction with the promotion of direct hunter sales to markets so that higher prices are reached for smaller amounts of meat. This would mean that revenue for taxes etc. was still payable at local level as a direct consequence of hunting. This would have the effect of promoting the idea of sustainable use at community level and, given sufficient value to these products, could start to meet some of the discrepancies between short-term gain and long-term management schemes as highlighted by Noss (1997). Additionally, this would remove the more legitimate side of some middlemen's business from their often simultaneous illegal activities, allowing easier enforcement of wildlife legislation.

?? Eves (1996) concluded that "*further study in these areas (as above) is necessary in order to determine .....market potential for alternative sources of protein*". Although this topic has not been covered in detail in this report there are a number of options available to curb the supply end of the trade in terms of reducing the need for subsistence protein so that some of the quota meat could be used to earn income. These measures could in some cases include the encouragement of suitable husbanded livestock. One of the chief proponents of this is John Fa who wants to attempt a pilot of this on Bioko Island, Equatorial Guinea (*pers. comm.*).

?? However, it has to be stressed that in order to implement quotas there also needs to be either a fundamental change in attitudes of stakeholders, or an increase in the ability and willingness to enforce regulations. Attempts at implementing quota systems must, therefore, encourage adherence to them through economics, education and existing cultural etiquette as appropriate. This implies making sure that there is sufficient local increase in wealth to discourage excessive or illegal hunting; raising public awareness of the issues involved; and encouraging social traditions that preclude selfish, individual hunting.

?? Another option is to encourage heavier snaring on agricultural land to control pests such as cane rats (*Thryonomys swinderianus*) and Emin's rat (*Cricetomys emini*) that are also eaten in large quantities in many areas. These species have also been the object of attempted intensive breeding with mixed success. Along with other larger species such as blue duikers,

they have not turned out to be the solution that had been hoped for.

- ?? Other animals that are being suggested for farming include giant forest hogs (J. Kingdon and I. Redmond *pers. comm.*). However, J. Fa (*pers. comm.*) questions the ability of wild animals with limited reproductive potential being able to meet demand. He suggests that cattle, in a controlled setup, may be a more feasible alternative.
- ?? A combination of the above strategies, together with the control of more wholesale supply to the urban centres from *resource exploitation linked supply* may be able to reduce the level of hunting in many areas. This in turn would prevent the otherwise very serious potential for local or even species extinction in the larger - bodied and more vulnerable species in the region.
- ?? Gadsby and Jenkins (1992) report that hunters in the Mount Cameroon area thought that the only way to control hunting - which they agreed was necessary - was by government intervention as it would not work at village level. They also thought that seasons, or reserves to stock hunting areas were options worthy of consideration. This illustrates the need for a whole suite of compatible and coherent measures to effectively control the commercial trade. Governments are going to have to be centrally involved in legislative and nonlegislative aspects of future management initiatives and their enforcement.
- ?? Anstey (1991) makes the point that in order to effect sensible conservation policies, the decline in the status of some species due to their loss at some local levels is inevitable. However, the key is a pragmatic approach identifying areas and species as priorities. Given limited resources, both economic and in terms of manpower, full protection will have to be concentrated on priorities identified by key stakeholders and particularly governmental organizations in the counties in question. This is the only way to effect long-term conservation.

In order to define the mechanisms with which to implement these measures there must be strong input from NGOs and nationals concerned to promote strategies specific to the country involved. This is the case for '*local level supply*' controls and '*resource exploitation linked supply*' (Section 14). Due to the regional and local level variations in all aspects of the bushmeat trade, this is a principle that should be adhered to in all efforts to alleviate the problem of overexploitation.

At both levels of supply there are likely to be key components that will have to be adhered to in order to ensure that extinction does not become one facet

of the bushmeat trade that will still exist after management strategies are in place. These are likely to include the total protection of designated endangered species and the total ban on hunting in given core areas. These may be as part of a buffer system in a national park, or at local level could be hunting reserves to maintain future supplies of meat.

A further general point made by several authors including Noss (1997) is that there must be an incentive to conserve resources at a local level and one of the problems at the moment is that local people do not have the ability to exclude outsiders from exploiting their resource base. He cites the fact that in CAR all of the land is government owned and therefore locals have no say in the awarding of concessions, or access to land for safari hunting. Therefore, a way to foster interest in promotion of long-term resource use might be to include land and resource tenure as part of community conservation efforts, as has been attempted in East and Southern Africa. This does not, however, guarantee that subsequent community decisions would promote conservation and warrants close monitoring and careful planning to prevent subsequent immigration due to local prosperity caused by successful schemes.

De Merode *pers. comm.* suggests from his initial work on Garamba National Park in DRC that the system there has worked, but for different reasons to the ones normally proposed for community conservation. With community hunting reserves on its borders and its devolved power structure, large mammal populations have been relatively well conserved. He suggests that this is not because of 'community conservation' (he agrees broadly with Noss' views on this) but because community use of wildlife in the area is low and having little effect on most larger mammals. In addition, the completely protected zone at the heart of the park maintains good elephant and buffalo populations that are lower near villages. Therefore, the emphasis should be on the maintenance of low usage situations where there is coexistence of wildlife and human populations. (Although it remains to be seen how the 1997 conflict has changed the situation).

With the suite of options that are mentioned above for alternative protein supply and rationalised off - take of wild animals, plus a reduction of urban demand and supply from other sources, there is no reason why a system that meets the true definition of sustainability cannot evolve. In order to do this, the active participation at every stage of the planning process and at all stages of implementation from the countries involved is fundamental.

## 14. Review of possible avenues to limit 'resource exploitation linked supply'

The UK House of Lords stated in 1990, having reviewed EU policy on tropical forests, that a more discriminatory approach (to tropical hardwood imports) could encourage trade in 'high - value products from sustainable sources and discourage other imports' (Rice and Counsell 1993). Trade organizations such as the ITTO, however, have not so far been able to regulate (or have been unwilling to interfere with) the import of timber, or the practices of European-owned logging firms.

However, increasingly both consumer preference and national governments in Africa, as well as competition with Asian rivals, will mean that European companies may have to try and make their practices sustainable and therefore more acceptable to their markets. This includes limiting their role in the commercial bushmeat trade and therefore reducing resource exploitation linked supply.

?? A few companies are already making attempts to do something about this, as part of the certification process for organizations such as the FSC. However, more needs to be done and the opportunity exists for nongovernmental organizations, governments, the logging industry and local people involved in hunting to try and work out some solutions to the current unacceptable state of affairs. If this does not begin to happen in the next couple of years, much of the incredible wealth of life in the tropical moist forests of Africa will be lost. When this starts to happen there will be little alternative but to use drastic legislation from within the EU and Africa to both restrict logging exports and imports severely.

?? One way to try and effect change in the logging industry would be to get the logging companies to participate in the formulation of national codes of conduct for logging practice, under the existing structure of national laws. A general idea of the sort of code that could be worked towards, is included in Section 15. This 'code of conduct' could then be introduced under the aegis of organizations such as FSC national councils. Additionally, working groups such as that existing in Cameroon involving a variety of stakeholders could develop 'recommended actions/methods' e.g. for certification bodies to check on hunting in concessions and concerned logging managers to make sure that rules were being upheld.

?? There is also a strong argument for the French government, amongst others, to promote certification, or other measures, and encourage their adoption by francophone national governments within Africa. This may help to safeguard their own firms from the Asian

competitors who are already capable of pushing European firms out.

?? There are obstructions to such long-term strategies, in the form of short-term economics. One of these is the fact that most concessions are permitted on a short-term basis and this is less than the minimum time that forest should be left before recutting. An example of this was in the WWF report mentioned in Section 12.2.3. The concession licenses involved were for only five years and therefore not conducive to long-term management strategies; the opinion of the consultants was that for Danzer and Alpicam, "*sustainability is not immediately achievable*". However, many of the companies that have been looked at viewed their tenure of concessions as a longer-term proposition, although with the emergence of the Asian companies such perceptions may be changing.

With the correct approach from concerned parties, willing to work with companies, there is the potential to develop practical and enforceable strategies. These could counter commercial wildlife exploitation on concessions as part of a two - pronged attack on the commercial trade, the other as described at local level. These measures could together limit the supply of meat to urban markets, which in itself could be augmented with other protein sources. (See possible avenues to reduce 'local supply').

A combination of *local supply limitation*; limiting other *exploitation linked supply*; plus legislation to limit other external sources of supply and support for alternative initiatives will be necessary to sustainably meet the protein requirements of local and urban areas, both of which can significantly affect wildlife populations.

This will have to form part of the overall development plans of the countries involved, which will also have to provide alternative employment in rural areas.

With care and discussion between all parties concerned in a participatory framework at all stages, a balance can be struck to meet dietary, conservation and economic needs of the populace. This will facilitate the long-term survival of protected and endangered species including the great apes. However, the treatment of these animals in a separate category from those others at risk must be avoided. Conservation should be based on economic and ecological arguments rather than ethics, which vary according to cultural and religious influences (Redmond 1995, 1996). It is within this framework that solutions to the bushmeat problem that now threatens many species of animal including apes, if not whole ecosystems,

can be found. The methods to do this will need to be developed by a variety of stakeholders within the region. They will probably have to be based on a conservation ethos based on sustainable use. This

in turn will have to be coupled with enforced protection for vulnerable species such as the great apes as well as designated protected areas.

## 15. Model for a ‘Code of Conduct’ to minimise the impact of hunting in logging concessions

These are the steps that the Ape Alliance would like to see logging firms implement:

1. Ensure that your employees, their families, and other parties present on your concessions\* obey the wildlife laws of the country within which you are operating.
2. Make sure that none of the species protected by national law, are hunted in your concessions.
3. Ensure that there is no bushmeat exported from your concessions.
4. Ensure that hunters are not transported into/within the specified concessions on logging trucks or other vehicles.
5. Do not allow hunters to reside in logging camps on your concessions.
6. Make sure that workers in camps in the above - specified concessions are provided with sufficient protein to ensure that hunting for food is not necessary.
7. Do not allow workers in these camps to possess unlicensed firearms.
8. Regulate the type of ammunition available to people on the above - specified concessions in compliance with national law.
9. Do not allow the use of snares in your concessions.
10. On leaving a concession ensure that further vehicle access is impeded.
11. Make sure that chemicals are disposed of in responsible fashion, avoiding contamination of local water sources.
12. Ensure that awareness of the national wildlife laws is raised amongst the communities in your concessions.

[\*concessions includes those that you have holdings in.]

In addition to this set of measures there should be a separate sheet detailing national wildlife law; a list of protected animals; and ‘recommended actions/methods’ relating to the enumerated points such as:

re 6. The Ape Alliance realises that this may take some time to implement, but expects you to work towards full provision of protein for workers on your concessions. This can be done by providing meat through outlets on site at or near to cost price.

re 9. The use of snares is indiscriminate and affects species of animals that are protected by national and international law. It is, therefore, necessary to prevent their use. This can be done by limiting the availability of wire on the concessions, but also would be controlled by a ban on exportation of meat, and by increased provision of protein.

Additionally, snares could be checked for by certifiers and other enforcement bodies on the ground.

re 10. This could be done by destroying bridges and ploughing up side cuttings and roads. The former is cheap as bridges are constructed of local timber and therefore on re-entering a concession can be rebuilt from the same materials cut on-site. The ploughing of side roads not only inhibits vehicle access deeper into the forest, but also promotes secondary growth which can be beneficial to some species including gorillas and elephants.

Richard Barnwell (*pers. comm.*) makes the following points about the code of conduct.

- a) Government Wildlife and Forest Conservation personnel should be assisted to visit and patrol concession areas.
- b) Timber companies should be responsible for passing information on illegal activities to the relevant authorities.
- c) Well - managed protected areas must remain a cornerstone of rain forest conservation initiatives, which logging companies must be made to respect. This is also the area where capacity building and other forms of support by local and international NGOs can be most effective.

## 16. References

Items marked with a “\*” were sent to the author after the report was written and are therefore not cited. Other noncited material has been included, but might still be considered relevant to the issue by others investigating similar topics and are therefore included in the list.

**African Primates:** The newsletter of the Africa section of the IUCN/SSC primate specialist group. Eds. Butynski T. & Forthman D. L. *Selected references as quoted.*

**Ammann K.** The great ape debate and the bushmeat trade.

Annuaire des Enerprises Industrielles, Commercial et de Services du Cameroun. 1995/6. *CCIM.*

**Anstey, S.** (1991). Wildlife utilisation in Liberia. WWF/FDA survey report. WWF International, Gland. Switzerland.

**Canopée.** Bulletin sur l'environnement en Afrique Centrale. *ECOFAC.* Multipress, Libreville, Gabon.

**Caldecott, J. O. et al.** (1994) Priorities for conserving global species richness and endemism. WCMC. *World Conservation Press.*

**Carapento G. M. and Germini F. P.** (1992). Diversity of mammals and traditional hunting in Central African forests. *Agriculture, Ecosystems and Environments* **40**: 335-354.

**Carroll R.W.** (1986). The status distribution and density of the lowland gorilla, forest elephant, and associated dense forest fauna south-western Central African Republic: Research towards the establishment of a reserve for their protection. *PhD thesis*, Yale University School of Forestry and Environmental studies. USA.

**Bennett Hennessey A.** (1995) A Study of the meat trade in Ouessou, Republic of Congo. *WCS/GTZ.* New York. USA.

**Besong J.** (1995). Cameroon Forest Assessment. *WWF Report.* Godalming. UK.

**Blake S.** (1993). A reconnaissance of the Likoula swamps of Northern Congo and its implications for conservation. Masters Dissertation. University of Edinburgh.

**Blake S.** (1994). A reconnaissance survey in the Kabo logging concession south of the Nouable-Ndoko National Park North Congo. *WCS.* New York. USA.

**Boussougou R.** (1994). Estimation de la pression de autour d'un camp forestier au Gabon. *carried out for L'Ecole des Eaux et Forêts.*

**Brown M.** (1996). The roles of wild animals in rural households of the Korup National Park support zone, women's perspectives. *Component*

*report WWF.* Godalming. U.K.

**Butynski T. M. and Koster H.** (1994). Distribution and conservation status of primates in Bioko Island, Equatorial Guinea. *Biodiversity and Conservation* **3**: 893-909.

**Chaterlain et al.** (1996). A recent history of forest fragmentation in south-western Ivory Coast. *Biodiversity and Conservation*, **5**: 37-53.

**Connor S.** (1994). Great apes face extinction as food trade grows. *The Independent.* London. U.K. (29<sup>th</sup> October).

**\*Delvingt W.** (1997). “La Chasse Villageoise”. Synthèse régional des études réalisées durant la première phase du Programme ECOFAC au Cameroun, au Congo et en République Centrafricaine. *ECOFAC/AGRECO.* Brussels. Belgium.

**Dethier M.** (1995a). Etude du chasse. In the Dja Reserve, Cameroon. *ECOFAC/AGRECO.* Brussels. Belgium.

**Dethier** (1995b). Etude chasse villageois au Parc d'Odzala. *ECOFAC/AGRECO.*

**Eves H.E.** (1996) Socio-economic study 1996 Nouable-Ndoki National Park Congo. *Draft documents submitted to WCS.* New York. USA.

**\*Fa J. E. in press.** Hunted animals in Bioko island, West Africa: sustainability and future. (to appear in Sustainability of hunting in tropical forests. Eds. Robinson J.G. and Bennett E.).

**Fa J. E., Juste J., Perez del Val J., and Castroviejo J.** (1995). Impact of market hunting on mammal species in Equatorial Guinea. *Conservation Biology*, **9**, (5): 1107-1115.

**Fa J. E. & Purvis A.** (1997). Body size, diet and population density in Afrotropical forest mammals: a comparison with Neotropical species. *Journal of Animal Ecology* **66**: 98-112.

**Fay J.M.** (1989). Partial completion of a census of the western lowland gorilla (*Gorilla g. gorilla* Savage and Wyman) in southwestern Central African Republic. *Mammalia* **53**, 2: 203-215.

**Fay J.M.** (1993). A survey of the proposed Nouable Ndoki National Park conservation area, Northern Congo. *WCS.* New York. USA.

**Freese C.** (1996). The commercial and consumptive use of wild species: managing it for

the benefit of biodiversity. *WWF-US and WWF International*. Washington. USA.

**Gadsby E.L.** (1990). The status and distribution of the drill (*Mandrillus leucophaeus*) in Nigeria. A report focusing on hunters and hunting and their threat remaining populations of drills and other forest primates in south-east Nigeria.

**Gadsby E.L. and Jenkins P.D.** (1992). Report on hunting in the proposed Etinde Forest Reserve. *Limbe Botanic Garden & Rainforest Genetic Conservation report*. Cameroon.

**Gippoliti S. and Dellomo G.** (1995). Status and conservation of the chimpanzee (*Pan troglodytes versus*) in Guinea-Bissau. *African Primates*. **1** (1): 3-5.

**Gorilla Conservation News:** selected articles, *quoted where appropriate*.

**Hall J.** (1993) Report on the strategic planning mission for the creation of a protected area in the Lobeke region of south-eastern Cameroon: Assessment of timber exploitation, safari hunting and preliminary vegetation analysis. *WCS*. New York. USA.

**Harcourt A.H. and Stewart K.J.** (1980). Gorilla - eaters of Gabon. *Oryx* **15**, 3. 248-251.

**Harcourt A.H.** (1995). Is the gorilla a threatened species? How should we judge? *Biological Conservation* **7**: 134-142.

**Harcourt C. S. and Ellerton N. G.** (1995). A brief look at the primates of Gashaka Gumti National Park, Nigeria. *WWF UK and NCF*. Godalming. UK.

**Hart J.A.** (1978). From subsistence to market: a case study of the Mbuti Net Hunters. *Human Ecology* **6**: 323-353.

**Hart T.B. and Hart J.A.** (1986). The ecological basis of hunter - gatherer subsistence in African rainforests: the Mbuti of eastern Zaire. *Human Ecology* **14**:29-55.

**Heymans J.C.** (1994). Utilisation rationnelle de la faune sauvage - élevage de petit gibier. République de Guinée-Équatoriale. Ministère de l'Agriculture, Pêche et Alimentation. Groupement AGRECO-CTFT.

**Infield M.** (1988). Hunting, trapping and fishing in villages within and on the periphery of the Korup National Park. *WWF report*. Washington. USA.

**Ingham J.** (1996). Chainsaw massacre. *The Express*, 9<sup>th</sup> December.

**Johnson K.** (1996). Hunting in the Budongo Forest, Uganda. *SWARA*.

**Juste J., Fa J.E., Perez del Val J. and Castroviejo J.** (1995) Market dynamics of bushmeat species in Equatorial Guinea. *Journal of Applied Ecology*. **32**: 454-467.

**Kano T.** (1984). Distribution of pygmy chimpanzees (*Pan paniscus*) in the central Zaire basin. *Folia Primatologica* **43**: 36-52.

**Kano T. and Asato R.** (1994). Hunting pressure on chimpanzees and gorillas in the Motaba river area, north-eastern Congo. *African Study Monographs*: **15** (3): 143-162.

**Kemf E. and Wilson A.** (1997) Great Apes of the Wild. *WWF Status Report*. Gland. Switzerland.

**King S.** (1994) Utilisation of Wildlife in Bakossiland, West Cameroon, with particular reference to primates. *Traffic Bulletin* **14**, 2. Cambridge. UK.

**Kingdon J.** (1997). The Kingdon Guide to African Mammals. *Academic Press*, 465pp.

**Lahm S.** (1996) Gabon's village hunting: assessing its impact. *African Primates* **2** (1).

**Lee P.C., Thornback J., and Bennett E.L.** (1988). Threatened primates of Africa. The IUCN Red Data Book. *IUCN Gland*, Switzerland and Cambridge, U.K.

**Malonga R.** (1996). Circuit commercial de la viande de chasse a Brazzaville. *WCS,GEF*. New York. USA.

**McRae M.** (1997). Road kill in Cameroon. *Natural History*. **2**: 36-98.

**de Merode E.** (1997). Interim report on the APFT project on the analysis of data collected in the communities surrounding Garambe National Park, Democratic Republic of Congo, for a study of bushmeat utilisation amongst the Azande. London. U.K.

**Muchaal P. K. and Ngandjui G.** (1995). Secteur ouest de la reserve de faune du Dja (Cameroun): evaluation de l'impact de la chasse villageoise sur les populations animales et propositions d'aménagement en vue d'une exploitation rationnelle. *ECOFAC/MEF*, Yaounde, Cameroon.

**Neale G.** (1995). Gorillas eaten to the edge of extinction. *Sunday Telegraph*. London. U.K. 3<sup>rd</sup> December.

**Noss A. J.** (1997). Challenges to nature conservation with community development in Central African forests. *Oryx* **31** (3): 180-187.

**Oates J. F. and Davies A. G.** (1986). Primate conservation in West Africa. In: Stevenson M. F. *et*

- al (eds) Current issues in primate conservation. *Primate Eye* **29**, Supplement: 20-24.
- Pearce J.** (1996). A bridge too far. *Animals International*. U.K.
- Pearce J.** (1996). Wildlife and timber exploitation in Gabon: A case study of the Leroy concession, Forest des Abeilles. *WSPA*. London. U.K.
- Pearce J. and Ammann K.** (1995). Slaughter of the apes: how the tropical timber industry is devouring Africa's great apes. *World Society for the Protection of Animals*, London. UK.
- Powell J. A. et al.** (1994). Korup National Park: report on research and conservation activities of the Cameroon biodiversity project. (*Biodiversity Support Programme and US Agency for International Development Cameroon Mission.*) Washington. USA.
- Prescott J. et al.** (1994). Statut de chimpanzees et gorilles au Cameroun. *Le Courier de la nature*. **148**: 34-41.
- Redmond I.** (1989). Trade in Gorillas and other primates in the Peoples Republic of Congo. Report to International Primate Protection League, U.K. & U.S.A.
- Redmond I.** (1995). The ethics of eating ape. *BBC Wildlife Magazine*. Bristol. U.K. Oct: 72-74.
- Redmond I.** (1996). Elephant Family Values. In *The Exploitation of Mammal Populations*, edited by V. Taylor and N. Dunstone, pp 358-375, Chapman and Hall.
- Rice T. and Counsell S.** (1993). Forests foregone: the European Community's trade in tropical timbers and the destruction of the rainforests. *FOE report*. London. U.K.
- Robinson J. G.** (1995). Hunting wildlife in forest patches: an ephemeral resource. *WCS*. New York. USA.
- Robinson J.G. and Redford K. H.** (1994). Measuring the sustainability of hunting in tropical forests. *Oryx* **28** (4): 249-256.
- Rose A.L.** (1996a). The Africa forest bushmeat crisis. Web pages of the Bushmeat Project of the Biosynergy Institute.
- Rose A.L.** (1996b). Death in the Forest. Web pages of the Bushmeat Project at the Biosynergy Institute.
- Sabater J.** (1981). Exploitation of gorillas (*Gorilla g gorilla*) Savage and Wymann 1847, in Rio Muni, Republic of Equatorial Guinea, W. Africa. *Biological Conservation*, **19**: 131-140.
- Sabater J. and Groves C.** (1972). The importance of higher primates in the diet of the *fang* of Rio Muni. *Man*, **7** (2): 239-243.
- Sayer J. A., Harcourt C. S., and Collins N. M.** (1992) The Conservation Atlas of Tropical Forests: Africa. *IUCN Macmillan*.
- Steel E. A.** (1994). Study of the value and volume of bushmeat commerce in Gabon. *WWF Programme pour le Gabon*. Libreville. Gabon.
- Stevens W.K.** (1997) Logging sets off an apparent chimpanzee war. *New York Times*. USA.
- Stromayer K. A. K. and Ekobo A.** (1991). Biological surveys of southeastern Cameroon. *EU, WCS*. New York. USA.
- Tutin C. E. G. and Fernandez** (1984). Nation-wide Census of Gorilla (*Gorilla g. gorilla*) and Chimpanzee (*Pan t. troglodytes*) Populations in Gabon. *American Journal of Primatology* **6**: 313-336.
- Usongo L. and Curran B.** (1996). Le commerce de la viande de chasse au sud-est du Cameroun dans la region trinationale. *African Primates* **2** (1).
- Vanwijnsberghe S.** (1996). Etude sur la chasse villageoise aux environs au Parc d' Odzala. *ECOFAC/AGRECO*. Brussels. Belgium.
- White L. J. T.** (1992). Vegetation history and logging disturbance: effects on rain forest mammals in the Lopé Reserve, Gabon (with special emphasis on elephants and apes.) *PhD thesis*, University of Edinburgh.
- White L. J. T.** (1994). The effect of commercial mechanised selective logging on a transect in lowland rainforest in the Lopé Reserve, Gabon. *Journal of Tropical Ecology* **10**: 313-322.
- White J.T. and Tutin C. E. G.** (*in press*). Why chimpanzees and gorillas respond differently to logging: a cautionary tale from Gabon. in *African Rain Forest Ecology and Conservation*. Yale University Press.
- Wilkie D. S.** (1996). Logging in Congo: Implications for indigenous foragers and farmers. in *Tropical Deforestation The Human Dimension*. Sponsel L.E., Headland T. N., and Bailey R. C. (Eds.) New York, Columbia University Press.
- Wilkie D. S. and Finn J. T.** (1990). Slash - burn cultivation and mammal abundance in the Ituri Forest, Zaire. *Biotropica* **22** (1): 90-99.
- Wilkie D.S., Sidle J. G., and Boundzanga G. C.** (1992). Mechanised logging, market hunting, and a bank loan in Congo. *Conservation Biology*: **6** (4): 570-580.
- Wilson, C.C. & Wilson W.D.** (1975). The

influences of selective logging on primates and some other animals in East Kalimantan. *Folia Primatologica* 23:245-75.

**Wilson C. C. and Wilson W.D.** (1991). La chasse traditionnelle et commerciale dans le sud-ouest du Congo. *Tauraco Research Report* 4: 279-289.

**World Bank, GEF** (1993). Congo Wildlands protection document. Washington. USA.

**Wildlife Conservation Society** (1996). The Lobéké Forest: Southeast Cameroon. Summary of Activities Period 1988-1995. *July 1996*, New York. USA.

**WSPA** General report of the conference on the impacts of forest exploitation on the wildlife. (Bertoua, eastern Cameroon 17-18 April 1996). London. U.K.

**WWF** July, 1996. Species Fact sheets. Gland. Switzerland.

## 17. Relevant references not obtained

**Chardonnet P., Fritz H., Zorzi N. and Feron E.** (1995). Current importance of traditional hunting and major contrasts in wild meat consumption in sub-Saharan Africa. pp 304-307. in J.A. Bissonette and P.R. Kraussman (eds.) *Integrating People and Wildlife for a Sustainable Future*. Proceedings of the first international wildlife management conference. *The Wildlife Society*, Bethesda, Maryland.

**Colyn, M.M.A., et al** (1987). Données sur l'exploitation 'du petite et moyen gibier' des forêts ombrophiles du Zaïre'. *International Symposium*

*and Conference on Wildlife Management in Sub-Saharan Africa*. 110-145. UNESCO, Paris.

**Hall J. and Wathaut W. M.** (1992). Rapport sur la mission de prospection sur la distribution de gorille de plaine de l'est. *Unpub report*. WCI/IUCN.

**Hart J. A. and Kiyengo S.** (1989). Rapport d'une mission de prospection au Parc National de la Maïko, Zaïre. *Institut Zairois pour la Conservation de la Nature*, Kinshasa, Zaïre.

**Lahm S.A.** (1991). Richness, abundance and distribution of game species in relation to human predation in northeastern Gabon. *Unpublished report*. WCI. 46pp.

**Lahm, S.A.** (1993). Ecology and economics of human/wildlife interaction in northeastern Gabon. PhD thesis. *New York University*, New York.

**Moamosse D.** (1990). Statut de la population des gorilles dans la partie nord-ouest de la réserve du Dja. Rapport de stage, école et faune, Garoua.

**Payne J.C.** (1992) A field study of techniques for estimating densities of duikers in Korup National Park, Cameroon. M.S. thesis, University of Florida, Gainesville. U.S.

**Skorupa J.P.** (1986) Responses of rain forest primates to selective logging in Kibale forest, Uganda: a summary report. (in K. Benirschke, editor. *Primates: the road to self sustaining populations*. Springer-Verlag, New York. USA.)

**Skorupa J.P.** (1988). The effects of selective timber harvesting on rainforest primates in Kibale Forest, Uganda. *Unpub. PhD thesis*, Uni. California, Davis, USA.