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GAME MEAT IN SUBSAHARAN AFRICA: A MISUNDERSTOOD RESOURCE

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I - WILDLIFE AS GAME: FRAMEWORK AND BACKGROUND

1 - Different perceptions of African wildlife

* The Northern attitude:

The African's perception of wildlife is not the same as the Western/Northern attitude towards African animals. For westerners, wildlife is regarded through the deformed prism of foreign, urbanized societies. Wildlife is generally considered according to two main criteria:

- the aesthetic criteria: wildlife is beautiful: the mythical "African Eden" of the romantics,
- the ethical criteria: killing is wrong: to condemn those who kill animals, regardless of the reasons,

... thus wildlife is downgraded to its only -although sometimes real- value as a tourist attraction.

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* The Southern attitude:

- Pragmatism:

Aesthetic and ethical conservation values only become relevant when people do not depend on renewable natural resources for their daily survival.

- Spiritualism:

In many Southern cultures, man is not the center of the world but rather one of the elements of the universe -we could nearly say ecosystem-. Wildlife is simply one of the elements of this universe, an element which must be taken into account with its good (e.g. meat) and its bad (e.g. danger or crop damage) aspects. What is more difficult to understand for many non-Africans is that this universe is made of visible as well as invisible forces. The well-being of people and the good order of the universe rely on the balance of these forces both visible and invisible. In Africa wildlife carries a heavy weight of mystic forces. This cultural value is often overlooked by Western wildlife managers.

2 - The values of wildlife

* Wildlife for food:

- The major neglect of wildlife as the indigenous source of meat in development schemes since colonial times up to now and still on-going, despite:

- . the crucial importance of wildlife meat in the diet of many societies;
- . the preference of many peoples for native game meat.

- The predominance of Northern thinking in development for the South has put this meat source aside as an informal -often illegal- activity. Wildlife use is usually not considered as an animal production, and if so, not as a serious one. However, just like there is domestic animal production, there is wild animal production, which can and should be improved & developed.

-e.g.:

Case-study in Cote d'Ivoire (10 years interval):

in 1987: Wild meat production = 1.8 x Livestock meat production (Chardonnet et al., 1996)

in 1997: Wild meat production = 2.0 x Livestock meat production (The World Bank, 1998)

* Economic importance:

- Only the "official" wildlife activities are recognized and taken into account in the national

economies, i.e. wildlife-based tourism (photographic safaris and sport hunting) and eventually game ranching. However, as a very common paradox (in most of the Western & Central African countries), the “informal” aspects of the wildlife activities are economically more important: i.e. the wild meat trade (from insects to large mammals with all the intermediates).

- Not addressing this “informal” sector has led to the mismanagement of the wildlife resource, misunderstanding of the wildlife users, destructive competition and poor economic valorization of the resource. The “informal” share of the wildlife sector is often very high, e.g. in Cote d’Ivoire: informal is 142 times higher than “formal”.

- Including the informal sector, the wildlife GDP is:

- . usually between 1% (e.g. Burkina Faso) to 4% (e.g. Zimbabwe) of the global GDP;
- . often between 1/4 (e.g. Burkina Faso) to 1/3 (e.g. CAR) of the livestock GDP, or more: e.g. in Zimbabwe: wildlife sector value larger than livestock production value.

- As a source of foreign currency, the wildlife sector often comes in a predominant position: from 2nd place in e.g. Tanzania to 6th place in e.g. Burkina Faso.

* Ecological role:

- Wildlife as (i) a “landscape-maker” and (ii) an indicator of environment transformation and land use changes.

- Wildlife use is an efficient motivation to conserve large tracts of natural habitats and biodiversity vs. switch to other more destructive land uses.

- The ecological impact of wildlife production systems on the environment vs. domestic animals systems.

* Socio-cultural value:

Local hunting as:

- a vector of cultural identity through maintenance of tradition (initiation rites, hunting ritual societies, etc.);

- a social bond (e.g. customary sharing of meat, community hunting, prestige and mystical authority, etc.);

- and hunting success as a sign of environment health and good balance of the universe.

3 - Wildlife use systems

* Local hunting:

- Poorly known because nearly always treated as an illegal activity, to be condemned, but which in fact merits more in-depth knowledge to identify possible management methods: in many places exists a set of customary regulations (temporal, spatial, quantitative, qualitative, social, mystical, etc.) which may be re-activated to renew local control and responsibility.

- The informal sector (local hunting) is often more productive than the official one: e.g. in Cote d'Ivoire, the income per hectare from local hunting outside Protected Areas is more than 6 times higher than the income from tourism within Protected Areas.

* Commercial hunting:

- Few conclusive experiments yet.

- But there is a large place left for development (technical and socio-economic), e.g. the Nyama Project in Zimbabwe (impala meat and skins production at District level).

* Sport hunting:

- Development role:

A main land use option to generate revenue -mainly hard currency- from wildlife in most regions where (i) mass tourist infrastructures do not exist, or where (ii) poor landscape features, remoteness and lack of access are severe constraints to the development of wildlife viewing.

- Conservation role:

- . surface of hunting areas usually larger than surface of National Parks,
- . an environment-friendly activity with a clear positive ecological impact.

- Prospects:

- . large progress margin in terms of rural development and revenue/employment for local communities,
- . misunderstanding of sport hunting by the public at large: need of proper communication.

* Wildlife tourism:

- So far, small share of the entire tourism industry in the world and in Africa, although very

important only for a few countries of Eastern and Southern Africa.

- Most of the National Parks are economically not viable. They rely for sole income –apart from subsidies- on wildlife tourism and nearly exclusively on foreign tourists.

- Large margin for development and progress also:

. good intrinsic value of the tourism products but strong dependence of tourism upon external constraints (security, communications, airfares, etc.); once the constraints removed, the products will be attractive;

. the demand changes:

- (i) e.g. the wildlife tourism income decreases in Kenya while it increases in Tanzania which is closer to other African countries;
- (ii) good prospect for innovation with ecotourism run by locals (and eventually for locals): e.g. Il Ngwezi Samburu Lodge in Kenya.

* Wildlife ranching:

- Development role:

“Multi-species & multiple use systems” competitive compared to single-species livestock in terms of sustainable development.

- Conservation role:

Currently the surface area under game ranching in South Africa equals and soon will eclipse that under formal conservation (National Parks and Game Reserves), while many game ranchers now also stock rare and endangered wild animals, and even large predators.

* Wildlife farming:

Still far behind conventional animal husbandry because (i) very new, (ii) resistance of classic lobbies, and (iii) very poorly supported...

...although it shows interesting & underexplored prospects, especially with:

. large rodents: may be considered as the domestic breeds of the XXI century because they are the only short-cycle species (like pig & poultry) which do not compete with humans in terms of food (grass-eaters),

. large wild herbivores in multispecies systems: about as productive as cattle (or maybe little less) but more respective of the environment; very poorly explored.

* Trade in wildlife products:

Organization policy more effective than prohibition policy:

- A better organization of the trade would certainly help valorize the resource and make it more sustainable...
- ...but the prohibition of the wildlife trade greatly reduces -even deletes- the economic value of wildlife: live animals, traditional medicine, food (relish for meals, biltong, smoked/dried meat, fresh meat, skin and leather, crafts, etc.

4 - Status of the wildlife resource/sustainability

* The African biodiversity under change:

- Global trend = paradox:
 - . less wildlife but more conflicts with wildlife;
 - . global erosion of biodiversity with (i) particular emphasis on large species, and (ii) some exceptions (elephant, leopard, etc.).
- Multiple-correlation analysis: a method to select priority countries and regions, a tool for decision-makers.

* Driving forces of the trend:

- Causes favoring the degradation (*favorable causes*):
 - . the formal "preservation" concept: wildlife belongs to the State > tragedy of the commons;
 - . demography and agricultural encroachment;
 - . economy: living standards decrease > increased pressure on natural resources;
 - . politic: wars > weapons spreading, security, etc.;
 - . etc.
- *Determining causes:*
 - . habitat deterioration;

. overexploitation of the wildlife resource.

* To reverse the trend:

. action easier on determining causes than on favorable causes...

. ...but, without action on favorable causes, no durable positive effect.

II – CONSUMPTION OF GAME MEAT IN AFRICA

A - TENTATIVE ASSESSMENT OF GAME MEAT CONSUMPTION IN SUB-SAHARAN AFRICA

1 – The study

A comprehensive study of game meat consumption in Sub-Saharan Africa has been carried out in 1997. The scale of analysis was the country and 50 countries were covered, including islands. Game was considered as being any wild terrestrial animal species from any Class (Mammals, Birds, Reptiles, Amphibians, Insects), i.e. excluding domestic animals and aquatic species (fish, etc.). The source of game may be hunting, gathering or wild animal husbandry (ranching or farming).

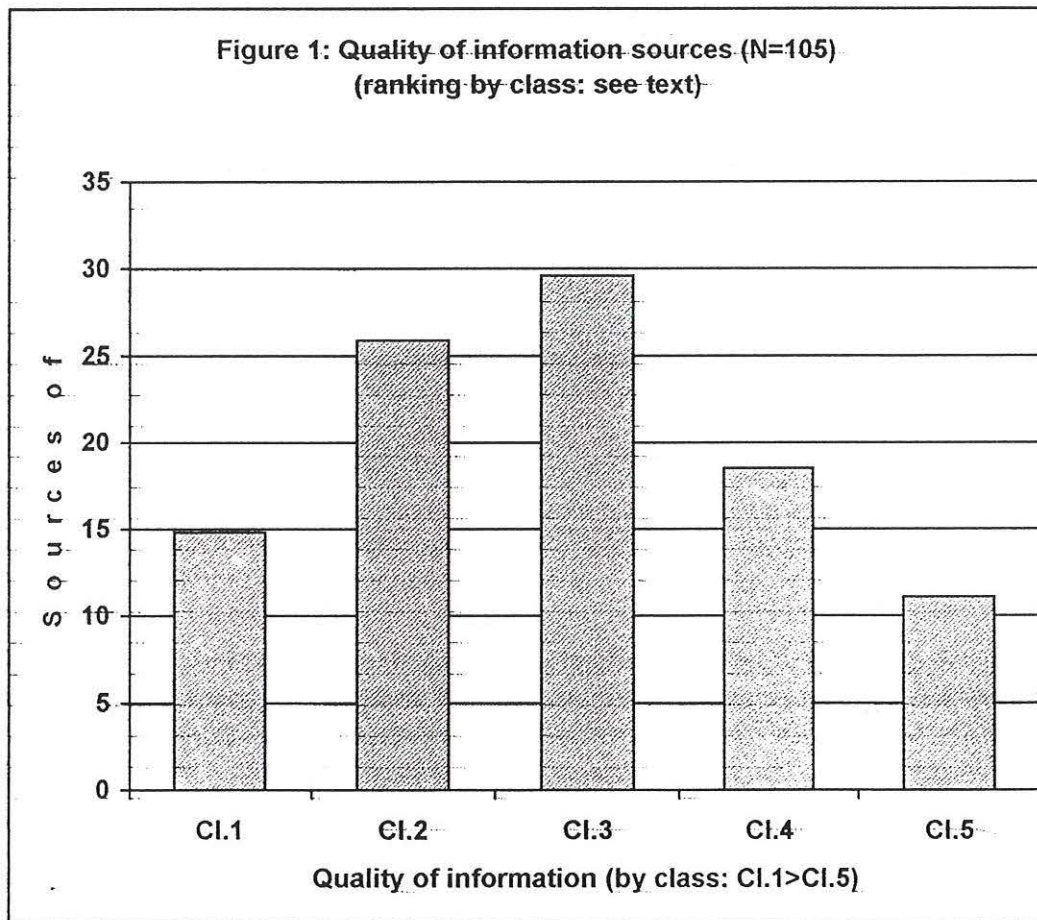
The data used on game meat were issued from 105 different sources, either published references (see references) or personal communication. The information collected was of two main types:

- the level of game meat consumption was given by nutritional surveys or anthropological studies or market inquiries;
- the yield of wildlife populations harvest was known or assessed through monitoring studies of wildlife species; it then allowed to evaluate the meat available for consumption.
- Data analysis is rather complex for two sets of reasons (not detailed here):
 - data are often difficult to compare, e.g.: studies of different years (some old ones, e.g. 1955), deficiencies in describing sampling methods, spatial and temporal heterogeneity of wildlife and human densities (extrapolation difficult), etc.;
 - the quality of data is very diverse and sometimes uncertain, e.g.: no systematic weighing of the food items, heterogeneous types of meat (fresh, dried, smoked, live weight, carcass weight, etc.), reluctance of inquired people for reason of illegal activities, etc.

In order to mark the quality level of the source of information per country, five classes of information sources have been ranked from the best (Class 1) to the worst (Class 5):

- Class 1: a comprehensive and reliable study has been recently carried out at the national level on the production and/or consumption of game meat.
- Class 2: several studies have been conducted more or less recently at regional levels on production and/or consumption of game meat; in this case, careful examination excludes non reliable data and does not extrapolate the very high consumption level of hunter-gatherers to the entire country.
- Class 3: when no reliable data is available, the FAO country tables of game meat consumption are used.
- Class 4: for some countries there is no data at all; however, the particular situation of the country allows some extrapolation from neighboring countries or regions with similar natural resources and ethnic groups.
- Class 5: countries where no data is available and no extrapolation is possible.

The importance of the 5 classes of information quality is shown in figure 1:



Exports and imports of game meat are generally inconsistent, with very limited exceptions in a few countries of Southern Africa. Thus for most countries, production is considered equal to consumption. In countries where information exists on large wildlife populations levels (e.g. Tanzania, Zimbabwe), game meat production is assessed with the difference between potential and real population dynamics.

To enable comparisons, all the data have been set on a reference year 1994 (human population in 1994).

2 – Global importance of game meat consumption in Sub-Saharan Africa

Table 1 shows the importance of game meat in Sub-Saharan Africa:

- The total game meat production reached more than 1.2 Million Metric Tons for 1994;
- The average production per capita was estimated at 2.1 kg/person/year for 1994.

3 – Variations of game meat consumption in Sub-Saharan Africa

- Ecological variations (see tables 2, 3 & 4):

The production was:

- in Savanna areas: 1.2 kg/person/year
- in Savanna-Forest areas: 3.3 kg/person/year
- in Forest areas: 5.3 kg/person/year
- in Islands areas: 0.2 kg/person/year

The consumption of game meat is 5 times and 1.6 times higher in forests than in savannas and savanna-forests respectively. First, the biomass and diversity of herbivores is known to be higher in tropical forests. Second, forest dwellers rely more on wildlife than people living in savannas where livestock production is much easier.

- Socio-economic variations:

Agriculturalist societies eat about a third of the game meat eaten by hunter-gatherer societies (Chardonnet et al., 1995). Although the hunter-gatherers are declining in Africa, they still rely much on wildlife as a staple source of protein, while wildlife is only a complement in the diet of agriculturalists.

- Settlement variations:

Game meat consumption is 4 times higher in rural areas than in urban zones (Chardonnet et al.,

CURRENT IMPORTANCE OF GAME MEAT IN SUB-SAHARAN AFRICA

RESULTS :

	POPULATION 1994 (Millions of persons)	GAME MEAT PRODUCTION 1994 (Metrics Tons)	AVERAGE / PERSON 1994 (kg / person / year)
SAVANNA	344,41	419518	1,2
SAVANNA-FOREST	162,95	533763	3,3
FOREST	54,09	287238	5,3
TOTAL	561,45	1240519	2,2

(BOURGAREL M., VITTRANT N., CHARDONNET P., 1997)

table 1

CURRENT IMPORTANCE OF GAME MEAT

COUNTRIES	FOREST						
	POPULATION (millions of persons) FAO, 1996	GAME MEAT PRODUCTION (Metrics Tons / year) 1994			CONSUMPTION (kg / person / year) 1994		ALL MEAT (FAO, 1997)
		DATA	SOURCE	DATA	GAME MEAT		
					SOURCE		
CONGO	2,517	10000	3	3,8	3	20,2	
EQUATORIAL GUINEA	0,39	6591	3	16,9	3		
GABON	1,283	19000	3	14,5	3	39,8	
LIBERIA	2,941	36762	3	12,5	3	7,1	
SIERRA LEONE	4,402	24752	3	5,6	3	4,8	
ZAIRE	42,552	190133	3	4,5	3	6,4	
TOTAL	54,085	287238		5,3			
AVERAGE		47873					

SOURCE | 1 : FAO
 | 2 : Author
 | 3 : Compilation of differents authors

(BOURGAREL M., VITTRANT N., CHARDONNET P., 1997)

Table 2

CURRENT IMPORTANCE OF GAME MEAT

SAVANNA						
COUNTRIES	POPULATION (millions of persons) FAO, 1996	GAME MEAT PRODUCTION (Metrics Tons / year) 1994		CONSUMPTION (kg / person / year) 1994		
		DATA	SOURCE	GAME MEAT		ALL MEAT (FAO, 1997)
				DATA	SOURCE	
ANGOLA	10,674	6000	1	0,6	1	11
BENIN	5,247	6000	1	1,1	1	16,1
BOTSWANA	1,444	5000	1	3,5	1	33,6
BURKINA FASO	10,046	33231	2	3,4	2	10,4
BURUNDI	6,209	6209	3	1	3	4,1
CHAD	6,183	3200	1	0,5	1	16,9
DJIBOUTI	0,566	792	3	1,4	3	16,1
ERYTREA	3,438	4813	3	1,4	3	
ETHIOPIA PDR	53,435	74000	1	1,4	1	11,3 (1992)
GAMBIE	1,08	1000	1	0,9	1	9,3
KENYA	27,343	10000	1	0,4	1	13,3
LESOTHO	1,996	3500	1	1,8	1	16,1
MALAWI	10,843	17350	3	1,6	3	3,8
MALI	10,462	17000	1	1,5	1	17,7
MAURITANIA	2,217	221	2	0,1	2	24,3
MOZAMBIQUE	15,527	24840	3	1,5	3	5,3
NAMBIA	1,5	3900	1	2,6	1	30,5
NIGER	8,846	15000	1	1,7	1	12,7
REPUBLIC OF SOUTH AFRICA	40,554	10000	1	0,3	1	34
RWANDA	7,75	7000	1	1	1	3,8
SENEGAL	6,102	28593	3	3,3	3	18,5
SOMALIA	9,077	12710	3	1,4	3	19,4
SUDAN	27,36	7800	1	0,3	1	19,9
SWAZILAND	0,832	250	3	0,3	3	32,2
TANZANIA	28,846	52309	2	1,9	2	10,1
TOGO	4,01	13300	3	3,3	3	9,5
UGANDA	20,622	14000	3	0,7	3	
ZAMBIA	9,195	30500	1	3,3	1	12,1
ZIMBABWE	11,002	13000	3	1,2	3	8,3
TOTAL	344,407	419518		1,2		
AVERAGE		14 466,1				

SOURCE | 1 : FAO
2 : Author

CURRENT IMPORTANCE OF GAME MEAT

SAVANNA - FOREST						
COUNTRIES	POPULATION (millions of persons) FAO, 1996	GAME MEAT PRODUCTION (Metrics Tons / year) 1994		CONSUMPTION (kg / person / year) 1994		
		DATA	SOURCE	GAME MEAT		ALL MEAT (FAO, 1997)
				DATA	SOURCE	
CAMEROON	12,871	41830	3	3,3	3	14,8
CENTRAL AFRICAN REPUBLIC	3,235	24784	3	11,5	3	21,7
GHANA	16,944	57000	1	3,3	1	11,1
GUINEA BISSAU	1,05	3780	3	3,6	3	15,3
GUINEA CONAKRY	6,501	24500	2	3,9	2	6,4
IVORY COAST	13,781	83585	3	7,8	3	10,4
NIGERIA	108,467	298284	3	2,7	3	8,5
TOTAL	162,849	533763		3,3		
AVERAGE		76 251,9				

SOURCE | 1 : FAO
 | 2 : Author
 | 3 : Compilation of differents authors

(BOURGAREL M., VITTRANT N., CHARDONNET P., 1997)

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1995).

- Seasonal variations:

The fluctuations of game meat harvest is dependant on (i) the ecology of prey and (ii) the feasibility of hunting, e.g.:

- in West and Central Africa, grasscutter is hunted in the dry season when burning of remaining patches of grass is possible;
- for pygmies, caterpillars collection replaces hunting during the rainy season.

- Long-term variations:

The question remains : is game meat production/consumption sustainable? There is often an *a priori* pretending that it is not. However, the observation of data does not always demonstrate this assumption so far:

Despite the human demographic growth, the level of game meat consumption seems to remain globally stable, which is quite surprising while the general status of wildlife is worsening. One explanation may be the shift from large sized species to small sized species. In particular, increasing agriculture encroachment and deforestation tend to encourage the development of so-called pest animals like large rodents.

4 – Contribution of game meat to the diet in Sub-Saharan Africa

Table 5 gives the contribution of game meat to the diet : game meat is assessed as about 16 % of the global consumption of meat: 12,5 kg of domestic meat consumption/person/year against 2.2kg for game meat in 1994.

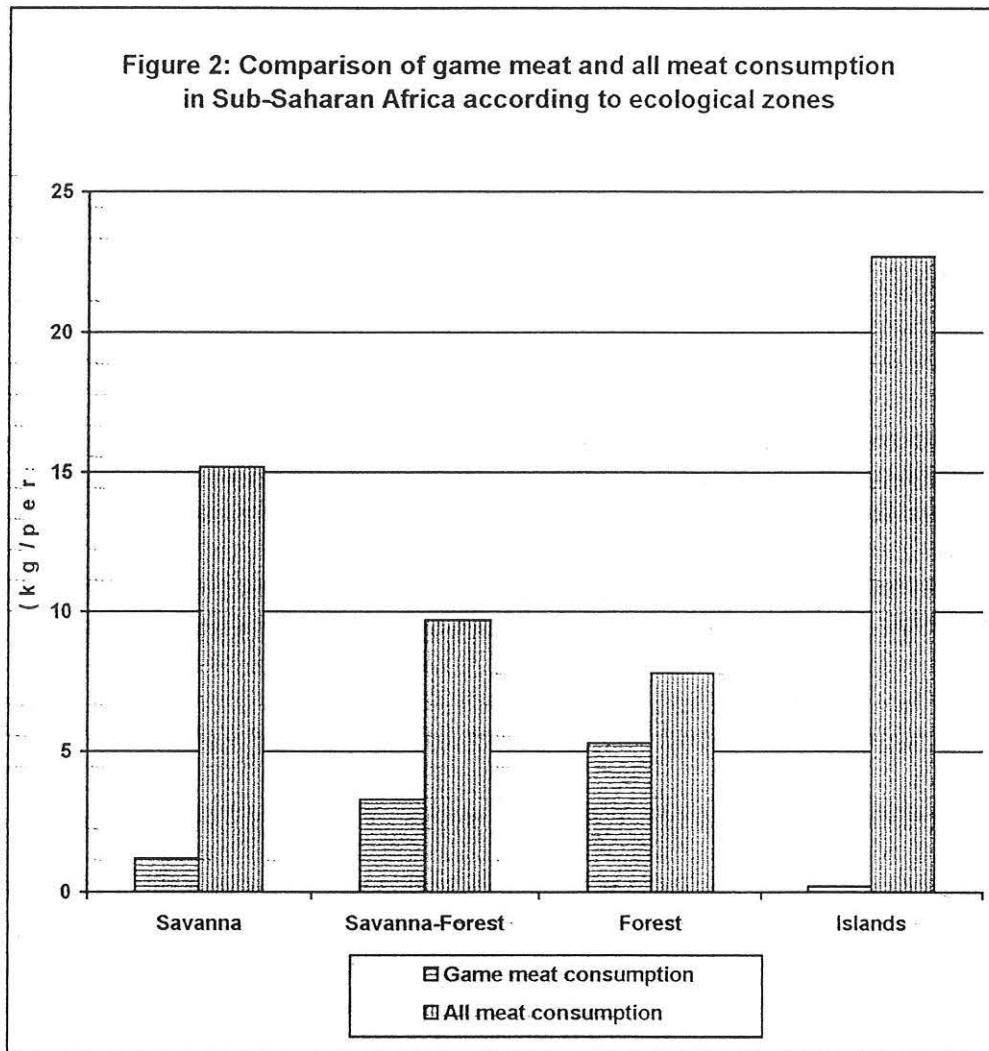
Figure 2 compares the consumption of game meat and the consumption of all meat in the different ecosystems of Sub-Saharan Africa.

Comparison with temperate countries generally shows a greater proportion of game meat in the diet of Sub-Saharan African people.

**CURRENT IMPORTANCE OF GAME MEAT
IN SUB-SAHARAN AFRICA**

	POPULATION 1994 (Millions of persons)	GAME MEAT PRODUCTION 1994 (Metrics Tons)	AVERAGE / PERSON 1994 (kg/person/year)	ALL MEAT PRODUCTION 1994 (Metrics Tons)	AVERAGE / PERSON 1994 (kg/person/year)
SAVANNA	314,16	408421	1,2	4 857 133,0	15,4
SAVANNA-FOREST	162,85	533763	3,3	1 571 732,0	9,7
FOREST	54,09	287225	5,3	418 527,0	7,8
ISLANDS	16,05	3846	0,2	378 029,0	22,7
SUB-SAHARAN AFRICA	577,15	1230255	2,1	7 225 422,0	12,5

table 5



B - A CASE STUDY : THE NYAMA PROJECT IN ZIMBABWE: PRODUCTION OF IMPALA MEAT AND SKINS BY AND FOR LOCAL COMMUNITIES

(See computer slide show)

III – CONCLUSION: CONSIDER GAME MEAT MORE POSITIVELY

1. Global approach

In terms of geography and activities:

- Geography: wildlife conservation & management cannot rely on Protected Areas and immediate surrounding areas, but on the entire territory > consider the Protected Area as only one part of a larger landscape with all resulting implications in terms of economy, heritage, etc.
- Activities: action on both favoring and determining factors responsible for wildlife degradation (see above) > work not only on wildlife itself but also on rural development, institutions, legislation, etc.

2. Operational approach

- Pragmatic activities are more persuasive than philosophy:
 - . prefer easily understandable values like money or meat for local people rather than solely environmental education preaching aesthetic and ethical values;
 - . active management of wildlife (things done) is more visible/understandable than contemplative management (prevent things from being done): people want to see things and believe in things seen.
- Take advantage of local practices:
 - . reverse the usual attitude: rather than usual outlawing and law-enforcement, organize the bushmeat sector as any other formal sector (technical support for sanitary control and marketing, control, taxes, responsabilization of the stakeholders, etc.) > legal activities are easier to control than illegal ones;

the wildlife food resource can no longer be ignored: to be included in development planning.

- Adaptive management: projects which have been identified in detail before implementation are difficult to accomplish. See the white card of the Guruve District biodiversity project in Zimbabwe.

3. Participatory approach

- History:

Conservation against people Conservation for people Conservation with people Conservation by people

- Consensus: gather all the various land users and actors, and work towards a consensus on the use of land and natural resources, eventually with external mediation like a public agency, or preferably a non-affiliated facilitator.

- Decentralize the ownership/proprietorship of wildlife (including the benefits) to provide the local users with the necessary stimulus to endorse the authority and responsibility for the management and development of the resources: e.g. CAMPFIRE project in Zimbabwe.

- Privatize the management of protected areas which are too expensive for non-rich State to run as non-profit enterprises, e.g. the new Forest Act/January 96 (Code Forestier 96) in Burkina Faso.

- Individual incentives (e.g. tangible benefits like money at household level) are more persuasive than community incentives (e.g. roads at District level).

- Respect and help the African perception of wildlife to express itself: up to the local stakeholders to re-activate or not (some of) the traditional/customary rules/habits of wildlife management.

4. Innovative approach

To revise our conventional approaches and devise innovative schemes closer to local realities.

REFERENCES

1. Agrasot, P., and J. P. Ledant. 1988. La faune sauvage. Regular Information System on Environment and Development. 7:3-35.
2. Ajayi, S. S. 1971. Wildlife as a source of protein in Nigeria : some priorities for development. The Nigerian FIELD. 36:115-127.
3. Ajayi, S. S. 1983. A quantitative assessment of wildlife and their nutritive value as a source of food in Nigeria, in AKINYELE L. & ATINMO T. eds, Nutrition and food policy in Nigeria, National Institute for Policy and Strategic Studies, Ibadan, Nigeria. .
4. Amoussa, O. H. 1992. La protection de la faune en Afrique francophone : les limites d'une approche juridique. Afrique contemporaine. 161 (spécial):246-254.
5. Amubode, F. O. 1994. Changes in harvest rate and age-sex composition of wildlife harvest in Omo forest reserve, Nigeria. Departement of Wildlife and Fisheries Management, University of Ibadan, Nigeria.
6. Anadu, P. A., P. O. Elamah, and J. F. Oates. 1988. The Bushmeat Trade in Southwestern Nigeria : A Case Study. Human Ecology. 16:199-208.
7. Anon. 1970. Utilisation et conservation de la biosphère, Conférence Intergouvernementale d'Experts sur les Bases Scientifiques et l'Utilisation Rationnelle et de la conservation des Ressources de la biosphère; 1968/09/04-13; Paris (FRA). Paris (FRA) : UNESCO, 1970. - 305 p.
8. Anon. 1981. La législation sur la faune et les aires protégées en Afrique. Rome (ITA) : FAO, 1981. - 153 p.
9. Anon. 1981. The importance of values of wild plants and animals in Africa. IUCN/WWF/UNEP/IGF.
10. Anon. 1985. L'utilisation rationnelle de la faune sauvage. Montpellier (FRA) : ENGREF, 1985. - 250 p.
11. Anon. 1986. Livestock development study in Liberia. Report - [Etude sur le développement de l'élevage au libéria. Rapport]. Paris (FRA) : BDPA, 1986. - 100 p.

12. Anon. 1988. Politique forestière et plan d'action. Annexe 4 : Les forêts dans l'économie nationale. (GIN) : Ministère de l'Agriculture et des Ressources Animales, 1988. 39 p.
13. Anon. 1988. International symposium and conference. Wildlife management in Sub-Saharan Africa. Sustainable economic benefits and contribution towards rural development - Gestion de la faune en Afrique sub-saharienne. Perspectives économiques et contribution au développement rural, Gestion de la Faune Sauvage en Afrique Sub-Saharienne. Symposium International- ; 1987/10/06-13; Harare (ZWE). Paris (FRA) : IGF, 1988. - 727 p.
14. Anon. 1988. Dossier : la faune sauvage. (BEL) : RISED, 1988. - 15 p.
15. Anon. 1989. The international symposium on the development of animal resources in the Soudan - [Symposium international sur le développement des ressources animales au Soudan], International Symposium on the Development of Animal Resources in the Sudan; 1988/01/03-07; Khartoum (SDN). Khartoum (SDN) : University of Khartoum, 1989/01. - 510 p.
16. Anon. 1991. Microlivestock : little-known small animals with a promising economic future - [Micro-animaux : petits animaux peu connus d'un avenir économique prometteur]. Washington (USA) : National academy press, 1991. - 449 p.
17. Anstey, S. 1991. Wildlife utilization in Liberia. WWF.
18. Anstey, S. 1991. Wildlife utilisation in Liberia. WWF/FDA Wildlife survey report.
19. Asibey, E. O. A. 1971. Who will eat bushmeat? Game department.
20. Asibey, E. O. A. 1974. Wildlife as a source of protein in Africa South of the Sahara. *Biological Conservation*. 6(1):32-39.
21. Asibey, E. O. A. 1987. The grasscutter : Brochure of the livestock , Show 87. :24-27.
22. Asibey, E. O. A., and G. Child. 1990. Wildlife management for rural development in Sub-Saharan Africa. *Unasylva*. 41:3-11.
23. Baillon, K. I. 1996. Etude ethno-scientifique de la filière gibier du chasseur au consommateur. Etude de cas : La ville de Yaoundé.
24. Banque mondiale. 1994. World population projections, vol. 1. The Johns Hopkins University Press, Washington, D.C.

25. Banque mondiale. 1996. African Development indicators 1996. The World Bank, Washington, D.C.
26. Banque Mondiale. 1998. Etude du secteur viande de brousse en Côte d'Ivoire. Banque Mondiale, Abidjan.
27. Bascoulergue, P. & Bergot, J. 1959. L'alimentation rurale au Moyen Congo. Service de lutte contre les grandes épidémies.
28. Bond, I. 1993. The economic of wildlife and land use in Zimbabwe : an examination of current knowledge and issues. WWF.
29. Bothma, J. du P. 1989. Game ranch management : a practical guide on all aspects of purchasing, planning development, management and utilisation of a modern game ranch in southern Africa - [Gestion d'un ranch pour animaux sauvages. Guide pratique des différents aspects : achat, aménagement, développement, gestion et utilisation d'un ranch moderne de ce type en Afrique du Sud]. Pretoria (ZAF) : J.L. Van Schaik, 1989. - 672 p.
30. Bousquet, B. 1983. Rapport de mission en Afrique orientale et en Afrique australe. Montpellier (FRA) : GERDAT-CTFT, 1983. - 51 p.
- 30bis. Bousquet, B. 1983. Rapport de mission en Afrique équatoriale et en Afrique australe. ENGREF/FOGEFAP.
31. Bui Quang Minh. 1977. Enquêtes budget et consommation des ménages. rapport général de mission. CAF/72/011, PNUD.
32. Burtney, F. 1987. The Dja forest reserve. Human pressures on the equatorial forest environment. Contribution to the drawing up of a research program - Réserve forestière du Dja. Pression anthropique en milieu forestier équatorial- . Contribution à l'élaboration d'un programme de recherche. Montpellier (FRA) : CNEARC, 1987. - 120 p.
33. Butynski, T. M. 1973. Life history and economic value of the springhare (*Pedetes capensis forster*) in Botswana. Botswana Notes and Records. 3:209-213.
34. Butynski, T. M., and W. Von Richter. 1975. Wildlife management in Botswana. Wildl. Soc. Bull. 3:19-24.
35. Campodonico, P., and C. Masson. 1988. Ostrich : rearing and productions] - Les ratites : élevage et productions. Maisons-Alfort (FRA) : CIRAD-IEMVT, 1988. - 159 p.

36. César, J., d. F. B. Peyre, P. C. Lefèvre, S. Buron, P. Chardonnet, and D. Planchenault. 1986. [Theoretical preliminary study of an animal husbandry complex of wild fauna [Côte d'Ivoire]] - Etude préliminaire théorique d'un complexe d'élevage de la faune sauvage [Côte d'Ivoire]. Maisons-Alfort (FRA) : CIRAD-IEMVT, 1986/11. - 49 p.
37. Chardonnet, P. 1988. Remarks and thoughts on deer breeding in Mauritius] - Observations et réflexions sur l'élevage de cerfs à l'île Maurice. Maisons-Alfort (FRA) : CIRAD-IEMVT, 1988. - 42 p.
38. Chardonnet, P., and B. Limoges. 1990. Guinea Bissau. Antelopes : global survey and regional action plans Part. 3 : west and Central Africa - [Guinée Bissau. Antilopes : état et plans d'action régionale. Partie 3 : Afrique Central et de l'Ouest]. Gland (CHE) : UICN, 1990. - 3 p.
39. Chardonnet, P. 1991. Proposition de stratégie de la coopération française en matière de faune sauvage africaine - Document de travail (+ 2e version). Maisons-Alfort (FRA) : CIRAD-IEMVT, 1991/01. - 66 p.
40. Chardonnet, P. 1992. Mission d'expertise sur l'élevage de cerfs à La Réunion. Maisons-Alfort (FRA) : CIRAD-IEMVT, 1992. - 20 p.
41. Chardonnet, P., B. des Clers, and H. Fritz. 1992. The contribution of hunting to conservation inside and outside protected areas : the Africa case-study. IGF/CIC/IEMVT-CIRAD.
42. Chardonnet, P. 1993. Quelques problèmes posés par l'élevage d'espèces sauvages tropicales, Réunion du Groupe Système d'Elevage sur la Diversification en Elevage; 1993/04/27; Paris (FRA). Maisons-Alfort (FRA) : CIRAD-EMVT, 1993. - 16 p.
43. Chardonnet, P., H. Fritz, N. Zorzi and E. Féron. 1995. Current importance of traditional hunting and major contrasts in wild meat consumption in Sub-Saharan Africa. Proceedings of the 1995 International Wildlife Management Congress : 304-307..
44. Chardonnet, P. 1996. Faune sauvage africaine : la ressource oubliée, vol. 1& 2. Office des publications officielles des Communautés européennes - 413 p, Luxembourg.
45. Charter. 1970. The economic value of wildlife in Nigeria. Proceedings of FAN, Annual conference Ibada. .
46. Child, G. S. 1970. Wildlife utilization and management in Botswana. Biol. Conserv. 3:18.

47. Child, G. S. 1970. Game ranching. *Proc. S. Afr. Anim. Prod.* 9:47-51.
48. Child, G. S., P. Smith, and W. Von Richter. 1970. Tsetse control hunting as a measure of large mammal population trends in the Okavango delta. *Mammalia*. 34:34-75.
49. Child, B. 1988. The role of wildlife utilization in the sustainable economic development of semi-arid rangelands in Zimbabwe - [*Le rôle de l'utilisation de la faune sauvage sur le développement économique durable des pâturages semi-arides au Zimbabwe*]. Oxford (GBR) : Worcester College, 1988. - 573 p.
50. Child, G. S. s.d. Management of wildlife in the future of Africa. Rome (ITA) : FAO, s.d. - p. 37-39. - Tiré à part.
51. Christy, P. 1979. Le Nord Kenya : la faune et l'homme. Toulouse (FRA) : ENVT, 1979. - n. 72, 114 p.
52. Clottey, S.-J. A. 1969. Wildlife as a source of protein in Ghana. Document FO : AFC/WL-69/9, 3rd Session Working Party On Wild. Mgmt Afr. For. Commission, 2 pp.
53. Conroy, A. M., and I. G. Gaigher. 1982. Venaison, aquaculture and Ostrich meat production : Action 2003. *S. Afric. J. Anim. Sci.* 12:219-233.
54. Crawford, M. A. 1968. Comparative nutrition of wild animals. *Symp. Zool. Soc. Lond.* 21.
55. Cremoux, P. 1963. The importance of game meat consumption in the diet of sedentary and nomadic peoples of the Senegal River Valley, p. 127-129, UICN Publications, New series, 1.
56. Darroze, S. J. 1983. [*Management and use of wildlife in South Africa*] - *Methodes de gestion et d'utilisation de la faune sauvage en Afrique du sud*. Maisons-Alfort (FRA) : GERDAT-IEMVT, 1983. - 115 p.
57. De Garine, I., and G. Koppert. 1988. Coping with seasonal Fluctuations in Food Supply among Savanna Populations : The Massa and Mussey of Chad and Cameroun, in GARINE, I. de & HARRISSON, G.G.A. (eds) *Coping with Uncertainty in Food supply*, Oxford University Press, pp 210-260.
58. De Gonneville, G., and P. Lhoste. 1991. Etude prospective du sous-secteur élevage au Burkina Faso. IEMVT-CIRAD/SFC-SEDES-CECOS.

59. De vos, A. 1977. Game as food. *Unasyuva*. 29:2-13.
60. Den Hartog, A. P., and A. Vos. 1973. Utilisation des rongeurs dans l'alimentation en Afrique tropicale. *Bulletin nutrition, FAO*. 11 (2):1-14.
61. Dethier, M. 1995. Etude chasse (Projet ECOFAC-Composante Cameroun). Groupement AGRECO-CTFT.
62. Dethier, M. 1996. Projet d'aménagement forestier pilote de la Sangha Mbaéré. GCFD/CIRAD-Forêt.
63. Dounias, E. 1993. Dynamique et gestion différentielles du système de production à dominante agricole des Mvae du Sud-Cameroun forestier + Annexes. Montpellier (FRA) : Université Montpellier II, 1993. - 2 vol., 646 p.
64. East, R. e. 1988. Antelopes : Global survey and regional action plans. Part 1 - East and Northeast Africa - [Antilopes : Enquête globale et plans d'action régionaux - 1ère partie : Afrique de l'Est et du Nord-est]. Gland (CHE) : UICN, 1988. - 96 p.
65. FAO. 1979. Projections of meat production, demand and trade to 1985. Document CCP : ME 79/4.
66. FAO. 1994. Annuaire de commerce 1994. FAO, Rome.
67. FAO. 1997. FAOSTAT Database Results. Internet. URL : <http://apps.fao.org/lim500/nph-wrap.pl?Production.Livestock.Primary&Domain=SUA>.
68. Feer, F., P. Chardonnet, and L. Msellati. 1996. Monographie Côte d'Ivoire, p. 46-79. In P. Chardonnet (ed.), *Faune sauvage africaine : la ressource oubliée*, vol. 2. CEE, Bruxelles.
69. Féron, E. 1989. L'utilisation rationnelle de la faune sauvage en Afrique : un facteur de développement rural et de conservation des ressources naturelles. Lyon (FRA) : ENVL, 1989. - 116 p.
70. Féron, E. 1994. Du lobbying international à l'intérêt local : variations à partir d'un congrès ordinaire, *Politique Africaine* (FRA). 1994. - n. 53, n.p. - Repris dans *Revue Presse CIRAD*, 1994/04.
71. Foggin, C. M. 1991. Veterinary aspects of intensive crocodile and ostrich farming in Zimbabwe - [Aspects vétérinaires de l'élevage intensif du crocodile et l'autruche au

- Zimbabwe], Wildlife Research for Sustainable Development; 1990/04/22-26; Nairobi (KEN). Nairobi (KEN) : KARI, 1991. - p. 11-115.
72. Fraser, D. F. 1960. Wild life in an African territory. Londres (GBR) : Oxford University, 1960. - 160 p.
73. Gaillet, J. R., J. C. Lobry, and H. Fritz. 1992. Etude de l'impact économique de la valorisation de la faune sauvage continentale. Burkina Faso, Mauritanie, Gabon, République d'Afrique du Sud. Paris (FRA) : BDPA-SCETAGRI, 1992/11. - n.p. : ill
74. Ganmavo, A. 1993. Elevage de l'aulacode et sa contribution au développement du monde rural. Cas du Bénin. PP27-34. In R. SCHRAGE and L. T. YEMANDAN (ed.), L'Aulacodiculture. Acquis et perspectives. Proceedings of the first International Conference on grasscutter production. Projet Bénino-Allemand d'Aulacodiculture,, Cotonou - République du Bénin -GTZ 225 p.
75. Gaston, A. e., M. e. Kernick, and H. H. N. e. Le. 1993. Proceedings of the fourth international rangeland congress - Actes du Quatrième congrès international des terres de parcours. Volume 1 et 2 : Communications. Volume 3 : Conférences et rapports, Congrès International des Terres de Parcours; 1991/04/22-26; Montpellier (FRA). Montpellier (FRA) : CIRAD-SCIST, 1993. - 1279 p.
76. Gauthier, J. 1991. Le cobe de Buffon en Côte d'Ivoire : possibilités d'utilisation au Nord-Est du pays. Maisons-Alfort (FRA) : CIRAD-IEMVT, 1991. - 55 p.
77. Gomez, P. A., R. Y. Halut, and A. Collin. 1961. Production de protéines animales au Congo, Bulletin agricole du Congo, p. 689-815.
78. Grivetti, L. E. 1979. Kalahari agro-pastoral hunter-gatherers : the Tswana example. Ecology of Food and Nutrition. 7:235-256.
79. Harthoorn, A. M. 1958. Comparison of Food Intake and Growth-rate of the African Buffalo with Indegenous Cattle. Vet. Rec. 70(46):939-940.
80. Heath, B. 1995. AWF : Wildlife utilisation study. Marketing compement report.
81. Heymans, J. C., and J. S. Maurice. 1973. Introduction à l'exploitation de la faune comme ressource alimentaire en République du Zaïre. Forum Universitaire. 2:6-12.
82. Hladik, C. M., S. Bahuchet, and I. de Garine. 1990. Food and nutrition in the african rain forest. UNESCO/MAB, Paris.

83. Hudson, R. J., K. R. Drew, and L. M. e. Baskin. 1989. Wildlife production systems : economic utilisation of wild ungulates - [Systèmes de production des animaux sauvages : utilisation économique des ongulés sauvages]. Cambridge (GBR) : Cambridge University Press, 1989. - 469 p.
84. Infield, M. 1988. Hunting, trapping and fishing in villages and on the periphery of the Korup national park, World Wide Fund for Nature.
85. Jahnke, H. E. 1974. The economics of controlling tsetse flies and cattle trypanosomiasis in Africa. Examined for the case of Uganda - [L'économie du contrôle des mouches tsé-tsé et de la trypanosomose du bétail en Afrique. Examen du cas de l'Uganda], Forschungberichte der Afrika. Studienstelle (DEU). Munchen (DEU) : IFO, 1974. - n. 48, 359 p.
86. Jori, F. 1996. Etude sur la faisabilité de l'élevage commercial d'espèces sauvages au Gabon. WWF.
87. Josserand, P. 1991. Etude sur la demande en protéines animales dans les pays côtiers : le cas du Ghana. OCDE/CILSS.
88. Joubert, D. M. 1978. Game ranching : too many questions still unanswered. African Wildlife. 32 (1):32-34.
89. Juste, J., J. E. Fa, J. Perz del val, and J. Castroviejo. 1995. Market dynamics of bushmeat species in Equatorial Guinea. Journal of Applied Ecology. 32:454-467.
90. Kidane, A. 1982. Wildlife management problems in Ethiopia - [Problèmes de conservation de la faune sauvage en Ethiopie], Walia (ETH). 1982/05. - n. 8, p. 3-9.
91. Koppert, G., and C. M. Haldik. 1990. Measuring food consumption, in HALDIK C.M., BAHUCHET S. & GARINE I. de eds.
92. Lamarque, F. 1996. Rearing of small game : the example of the grasscutter (*Thryonomys winderianus*) in west Africa. Office National de la Chasse.
93. Lemaitre, E., N. Morel, and B. Prince. 1995. Alternatives à l'élevage traditionnel en régions tropicales. Institut national agronomique Paris-Grignon.
94. Lignereux, Y. G. 1976. Doctorat Vétérinaire. Ecole Nationale Vétérinaire de Toulouse, Toulouse.

95. Limoges, B. 1989. Résultats de l'inventaire faunique au niveau national et propositions de modifications à la loi sur la chasse. (GNB) : Direction Générale des Services Forestiers et de Chasse, 1989. - 145 p.
96. Malekani, M. 1993. Breeding of *Cricetomys* (rodent) : study of factors improving the *Cricetomys* reproduction in captivity - [Elevage du cricétome (rongeur) : étude des facteurs améliorant la reproduction des cricétomes en captivité], Seminar Invertebrates (Minilivestock) Farming; 1992/11; La Union (PHL). Antwerp (BEL) : Institute of Tropical Medicine, 1993. - p. 18-19 : 4 réf.
97. Martin, R. B. 1984. Wildlife utilisations. Conservation and wildlife management in Africa, the Proceedings of a Workshop organised by the U.S. Peace Corps at Kasungu National Park, Malawi, p. 219-231, Caluzi.
98. Martin, R. B. 1986. Communal areas management programme for indigenous resources (CAMPFIRE). Department of National Parks and Wildlife management, Harare.
99. Mensah, G. A. 1991. Elevage des espèces de gibier : cas de l'aulacodiculture (élevage de l'aulacode : *Thryonomys swinderianus*), Revue Forestière Française (FRA). 1991. - vol. 5, p. 301-309. - Numéro spécial.
100. Ministère de l'Economie et des Finances. 1984. Enquête budget consommation 1979. Résultats généraux sur la consommation alimentaire des ménages africains de Côte d'Ivoire.
101. Ngnegueu, P. R., and R. C. Fotso. 1996. Chasse villageoise et conséquences pour la conservation de la biodiversité dans la réserve de biosphère du Dja. ECOFAC/Cameroun.
102. Ngoy, J. J. 1996. Elevage expérimental du Céphalophe bleu (*Cephalophus monticola*), Document de projet. Centre de recherches vétérinaires et zootechniques.
103. Nicol, B. M. 1953. Protein in the diet of the Isoko tribe of the Niger delta. Proceeding of the nutrition Society. 12:66-69.
104. Olatunbosun, D., E. O. Idusogie, and S. O. Olayide. 1972. Role of fish and animal products in nigerian agricultural development and nutrition. Ecology of Food. 1:235-243.
105. Pangeti, G. N. 1991. Options for wildlife management in tropical zones - [Orientations pour la gestion de la faune en zone tropicale], Revue Forestière Française (FRA). 1991. - vol. 5, p. 275-290. - Numéro spécial.

106. Payne, W. J. A. 1990. An introduction to animal husbandry in the tropics. - 4. ed. - [Introduction à l'élevage dans les pays tropicaux], Tropical Agriculture Series (GBR). Harlow (GBR) : Longman, 1990. - 881 p.
107. Perissé, J. 1959. L'alimentation des populations rurales du Togo. ORSTOM.
108. Pierret, P. V. 1975. La place de la faune sauvage dans le relèvement du niveau de vie rurale au Zaïre. Institut zaïrois pour la conservation de la nature.
109. Pontié, G. e., and M. e. Gaud. 1992. [Environment in Africa] - L'environnement en Afrique, Afrique Contemporaine (FRA). 1992. - n. 161, 294 p. - Numéro spécial.
110. Revol, B. 1988. [Wild fauna, its production and the feasibilities of the development of disadvantaged areas] - La faune sauvage, ses productions et les possibilités de développement des régions défavorisées. Maisons-Alfort (FRA) : CIRAD-IEMVT, 1988. - 56 p. : 39 réf.
111. Revol, B. 1994. Zimbabwe. Production de viande de faune dans le secteur commercial. Maisons-Alfort (FRA) : CIRAD-EMVT, 1994/04. - 66 p. : ill., réf., cart., tabl.
112. Robillard, M. J. 1989. Utilisation et perception de la faune et du milieu naturel en Guinée Bissau. (GNB) : Ministère du Développement Rural et de l'Agriculture, 1989. 106 p.
113. Roure, G. 1962. Animaux sauvages de Côte d'Ivoire et du versant atlantique de l'Afrique intertropicale. Abidjan (CIV) : Ministère de l'Agriculture et de la Coopération, 1962. - 178p. : ill., tabl.
114. Roure, G. 1966. Protection de la Nature. Conservation et Exploitation des Ressources naturelle- s. Sommaire de trois leçons consacrées à la conservation des richesses naturelles du Togo. Lomé (TGO) : Ministère de l'Economie Rurale, 1966. - 23 p.
115. Shada, K., L. Buhirane, N. N. Mubanzi, and W. Von Richter. 1988. Enquête sur la vente de la viande de chasse dans la ville de Bukavu, p. 4-19, Nature et Faune, vol. 4.
116. Steel, E. A. 1994. Etude sur le volume et la valeur du commerce de la viande de brousse au Gabon. WWF.
117. Steel & Hourtal in Chardonnet . 1996. Evaluation indépendante du projet d'élevage de petit gibier au Gabon. CIRAD/EMVT.

118. Stewart, D. R. M. 1963. Development of wildlife as an economic asset. *Bull. epizoot. Dis. Afr.* 11:167-171.
119. Swank, W. G., R. L. Casebeer, P. B. Thresher, and M. Woodford. 1974. Cropping, proceeing and marketing of wildlife in Kajiado District. Project working document 6. Game department & U.N.D.P./FAO.
120. Temporal, J. L. 1990. *La chasse oubliée*. Paris (FRA) : Gerfaut Club, 1990. - 129 p. : ill. - inter.: V.
121. Tutu, K. A., Y. Ntiamoa-Baidu, and S. Asuming-Brempong. 1996. The economics of living with wildlife in Ghana. *The economics of Wildlife : Case studies from Ghana, Kenya, Namibia and Zimbabwe*. AFTES Working Paper. 19 (Environmental Policy and Planning. The World Bank.):11-38.
122. Vincke, P. P., M. Singleton, and P. S. D. Diouf. 1985. Chasse alimentaire chez les Sereers du Siné (Sénégal). *tropicultura*. 3,4:140-144.
123. Von Richter, W. 1979. The utilization and management of wild animals. A form of land use in marginal areas of africa, p. 93-103, *Animal research and development*, vol. 1.
124. Ziegler, S. 1996. An initial study of hunting in the upper Niger National Park. *Nature et Faune*. 12(4):13-29.
125. Zorzi, N., and P. Chardonnet. 1996. Importance de la faune sauvage : Contribution alimentaire., p. 29-48. In P. Chardonnet (ed.), *Faune sauvage africaine : la resourçe oubliée*, vol. 1. CCE, Bruxelles.
126. Zwijnenberg, R. 1988. [*Development of wild fauna farms in Zimbabwe*] - *Le développement des fermes de faune sauvage au Zimbabwe*. Maisons-Alfort (FRA) : CIRAD-IEMVT, 1988. - 103 p. : 76 réf.

End