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Joint ECA/FAO Agriculture Division

HANDBOOK ON MEASURES FOR INCREASING FOOD AVAILABILITY BY PROMOTING THE USE OF EDIBLE WILDLIFE RESOURCES

Addis Ababa,
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INTRODUCTION

1. Study background and objectives

Africa has a very abundant and highly diversified variety of wildlife particularly those animals belonging to the order of Artiodactyls. There are reported to be more than 130 million hectares of game reserves in sub-Saharan Africa (Asibey and Child, 1991)[1]. But then, wildlife is only one element in the range of resources that the forests have to offer mankind.

The use of wildlife for food and nutritional purposes goes back to time immemorial and might be said to go back to the origin of mankind. For thousands of years, mankind has been eating game meat and prehistoric man depended on it for his protein requirements. Eating habits evolved on the basis of what people could find to eat even though we have taboos, restriction and preferences which have been handed down the ages.

Nevertheless, while the use of wildlife as an important source of protein is beginning to be well documented, its contribution to the food and nutrition of many peoples of Africa South of the Sahara seems to have been misunderstood. Official statistics only rarely document the availability of such food, if at all.

Obviously, in current farming systems, wildlife would not compete with the husbandry of cattle, sheep or other domesticated animals but that is neither the purpose nor the goal of using wildlife for nutritional purposes.

As part of the efforts being made by African Governments to increase the food security of their respective countries, however, every existing potential should be exploited. Considering the fact that countries are not able to produce enough meat from livestock and fish to meet the animal protein needs of their people, it has become necessary and advisable to find and exploit other sources of animal protein, including game meat which has a high nutritional value.

Opportunities exist on the continent which has rich and varied resources and considerable farming potential. Much of the food production potential has not been tapped or, if it has, insufficiently so. To avoid depending on the outside world for food and more especially to break out of its near-permanent state of famine, Africa must exploit fully its food and agriculture potential.

It is in this context that the United Nations Economic Commission for Africa (UNECA), has taken the initiative to include in its work programme on increasing food availability, a programme activity in this area. One of the objectives is to make an accurate assessment of wildlife as a source of food and income for African people. This handbook considers present and potential sources as well as the limits of edible wildlife products to solving the food and nutritional problems of Africa. The possibilities of developing, managing and exploiting such resources, particularly their potential as farm or ranch animals will also be considered in order

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[1] See Nature et Faune, 1991

to ensure and guarantee a regular and sufficient supply of game meat to people at affordable prices.

2. Sources of information

The importance of wildlife in the food and socio-economic sectors of sub-Saharan Africa have been well documented by a number of authors including Asibey, Child, Eyseson, Ledger and Smith, Ntiamoa-Baidu, Blaxter, Martin and many others. There are many publications on the subject from which this handbook has largely been drawn but the work has been complemented and enriched by findings of missions conducted to some countries of the region, especially in the central and eastern African sub-regions

CHAPTER I

FOOD AND NUTRITION IN AFRICA: GENERAL INFORMATION ON THE CURRENT SITUATION

General context

1. In most African countries, traditional agriculture is still the main source of food and income. It should be noted however, that food and agriculture production in Africa continues to be precarious as a result of a combination of factors including an adverse climate, inefficient production systems and unsuited food and agriculture policies.

2. A fast growing population, declining agricultural productivity, deteriorating terms of commodity trade and the persisting impoverishment of farmers have all contributed to the steady decline of per capita food production, worsening further the problem of famine or malnutrition in Africa. Moreover, wars and civil strife, the displacement of people, political unrest and other such phenomena continue to occur in many countries, totally disrupting and disorganizing agricultural activity and creating food shortages and emergency situations.

3. The general economic environment is not more promising. According to experts, the economic outlook of Africa is rather bleak. It would even seem that the people of sub-Saharan Africa are nearly as poor as they were thirty years ago (World Bank).

4. Africa is increasingly marginalized in world trade and the continent has lost nearly half of its share of the world market.

5. Available economic indicators reflect the lowest standards of living for the majority of Africans, infrastructural facilities in disrepair and deepening poverty not only in the rural areas but also in the urban centres.

6. The food dimension of the population growth problem is, therefore, very important and Africa now depends on the outside world to feed its people. If this is not remedied in time, the situation will come to a pass which it would be impossible for Africa to control.

The concept of food security: some indicators for Africa

7. Food security implies that everyone should have physical and economic access to adequate food for living a healthy and active life. Accordingly, food security means that all households should have the possibility to secure the foodstuffs they need either by producing it themselves or by purchase. In other cases, they might procure such food by hunting and collecting.

8. According to World Bank estimates, the number of Africans who have no food security is 103.7 million which accounts for 25 per cent of the population. In twelve countries, more than 30 per cent of the population is at risk.

Table 1. Number of persons who have no food security in some African countries

Country	Number of persons (millions)	% of population
Chad	2.4	54.0
Somalia	2.3	50.0
Mozambique	5.9	49.0
Zambia	2.7	48.0
Ethiopia	14.7	46.0
Uganda	6.1	46.0
Zaire	12.0	42.0
Kenya	6.2	37.0
Ghana	4.1	36.0
Tanzania	6.6	35.0
Mali	2.5	35.0
Burkina Faso	2.0	32.0

Source: World Bank. The challenge of hunger to global action. 1988.

9. In households, food security means guaranteeing a sufficient supply of food all year round for every member of the family, in particular vulnerable groups such as children, pregnant women, nursing mothers and the elderly. It is in this context that foods collected from plant and animal sources become particularly important for rural households. This enables them to face seasonal shortages and constitutes a significant addition to their food intake at a time when their food supply is lowest in the lean season. The role of women in this area is essential for they ensure that food is available for consumption and prepare it for the family.

10. At the national level, food security may be achieved through national production complemented, if need be, by imports and food aid. This is what applies to most African countries.

11. Although food production, including fishery and livestock products has increased in recent years, it has grown at a rate far lower than that of population and massive imports of foodstuffs are still needed to satisfy the ever-growing needs of the people. Then again, although the food situation is relatively satisfactory at the regional level, an emergency situation prevails in certain parts of the continent, especially in the horn of Africa. Some countries also happen to be facing more or less serious food deficits.

Table 2: Self-sufficiency rate for the major staple foods

	1982-1984	1986-1988
Cereals	68	85
. Wheat	30	28
. Rice	68	65
. Maize	80	92
. Millet/sorghum	96	100
Tubers	100	100

Source: FAO, African Agriculture by the year 2000.

12. In 1990, food imports (excluding fish) to Africa were evaluated at US$ 12,720,300,000 of which cereals alone accounted for about 40 per cent. It is the North African subregion, more particularly Egypt, which absorbs the greater part of cereal imports and food aid to Africa.

13. Cereal imports (both commercial and food aid) reached 31,274,000 tonnes in 1990. Of that, 20,990,000 tonnes went to North Africa which accounted for 67 per cent of the total for the continent.

14. The food dependency ratio (import/consumption) of Africa is on the decline, nevertheless, because of the general policy that most African countries are pursuing to reduce food imports. The figure of 13.1 per cent during the period 1969-1971 came down to 10 per cent in 1986-1988.

Food energy availability per capita

15. Both FAO and WHO have recommended references concerning the energy needs of individuals. However, these standards could only be relative because of the interplay of a number of factors. Moreover, global figures can only be indicative since they may conceal disparities among various socio-economic groups, households and members of the same households.

16. Table 3 shows the differences between developed countries and developing countries in terms of per capita food availability. These differences are fairly considerable, particularly when it comes to the share of plant and animal products. The differences are also significant within regions. In sub-Saharan Africa, for example, per capita food availability has stagnated for some 15 years, moving from 2,097 k/calories in 1968-1971 to 2,051 k/calories in 1983-1985 while the whole of North Africa recorded a rise of about 32 per cent over the same period. The fifth World Food Survey conducted in 1985 revealed that the average inhabitant of the least developed

countries could afford to eat in 1979-1981, only one third of the food available to the average inhabitant of the developed countries.

17. Among third world regions, Africa has recorded the slowest growth rate in per capita food energy availability. This decline has been felt mainly in those countries where food availability was already insufficient. Most of them were also low-income countries.

18. The minimum daily requirement of a person at rest has been estimated by FAO at 2,000 calories but the national data available show in many countries that the food calory intake among the poorest is lower than the minimum 2,000 calories per day. The regional average of 2,085 calories per person is far from being satisfactory.

Table 3: Daily calory and protein intake in Africa

	1979-1981			1987-1989		
	World	Developed countries	Africa	World	Developed countries	Africa
Number of calories/ person/day						
. Total	2596	3326	2336	2703	3415	2360
. Plant products	2190	2332	2152	2275	2380	2183
. Animal products	405	995	185	428	1035	177
Grammes of protein intake/person/day						
. Total	67.5	98.9	58.2	70.4	103.0	58.3
. Plant products	44.4	42.5	45.3	45.7	42.9	45.8
. Animal products	23.1	56.4	12.9	24.7	60.1	12.5
Grammes of lipid intake/person/day						
. Total	61.6	121.8	48.3	67.8	130.8	48.5
. Plant products	31.0	45.8	36.2	35.5	51.9	36.8
. Animal products	30.6	76.0	12.1	32.4	78.8	11.7

Source: FAO Production Yearbook 1990.

The scope of malnutrition and food consumption in Africa

19. Not only is malnutrition frequent in Africa, it is also very serious. Directly or indirectly, it accounts for a large share of infant morbidity and mortality. Because of conceptual difficulties and for lack of statistical information in particular, it has not been possible to secure an accurate

evaluation of the scope of famine and malnutrition in Africa. Whatever the source of data and however contradictory and divergent may be the statistics, the facts are unsettling and the reality cannot be discounted. Millions of people do not have enough to eat and both famine and malnutrition continue to rage throughout the world, wreaking more havoc than any other disaster.

20. According to the most recent estimates of FAO, about five hundred million people are suffering from malnutrition. The case of Africa would seem to be peculiar for being the region where the percentage of undernourished is highest and where their number has most increased.

21. The serious food shortages affecting all African countries in recent years have brought about near-widespread malnutrition and even famine. It is the poorest of people who cannot afford to buy adequate food that are most affected.

22. According to estimates, the percentage of the poor in Africa compared to the world's total should rise from the current 30 per cent to 40 per cent by the year 2000. A high concentration of poverty has also been observed in Africa, exceeding the level recorded in Asia by UNDP in 1992.

23. The virtually chronic food and energy deficit affecting many of Africa's rural households cause various nutritional ailments of which the most frequently encountered are:

(a) Protein - energy deficiency which is the most prevalent;
(b) Nutritional anemia; and
(c) Endemic goitre and stunted growth (cretinism).

24. Undernourishment and malnutrition in Africa are related not only to inadequate food production but also to the poor quality of the food consumed in terms of nutrient content. If the causes of mortality among children aged 0 to 5 years are considered, it can be seen that in most cases, such mortality has food deficiency as the major or associated cause.

(a) Protein - energy malnutrition

25. Generally speaking, malnutrition in African countries is caused by a protein deficiency of which Kwashiorkor is the main symptom. Notwithstanding the disparities among regions and socio-economic groups, it can be said that all the social strata of the urban and rural populations are today exposed to the risk of malnutrition. Nevertheless, calory and protein deficiency more severely affects women and children particularly those in the low-income social strata or in large households. The food they eat is poor in protein and not properly balanced.

26. In most African countries, malnutrition has accordingly become one of the major problems of public health and has turned out to be a significant cause of morbidity in certain countries.

27. The incidence and prevalence of malnutrition sometimes reaches alarming levels in many of the countries and is caused by the interplay of a number of factors such as:

(a) Poverty;
(b) The correlation between insufficient food and sickness;
(c) Unbalanced food;
(d) Lack of health, educational and information services; and
(e) The inability of the body to absorb nutrients mainly because of morbidity.

28. The causes are many, complex and multidimensional. What is more, not everything is known about them, but among the known causes of malnutrition, the subsistence economy is cited because of all it entails in terms of protein, lipid and vitamin intake, not to mention seasonal fluctuations.

29. It should also be acknowledged that malnutrition is not caused by the insufficient availability of food alone. Family organization, beliefs and tradition considerably influence food consumption and certain food restrictions have harmful effects on the nutritional status of the persons affected.

30. A number of countries particularly, those in the central and eastern African subregions, depend to a large extent on roots and tubers, predominantly cassava, for food. The consequences of eating cassava, which is very poor in protein, as a staple food can be disastrous in nutritional terms when unaccompanied by some other foods having an appreciable protein content. The many cases of malnutrition observed in this situation can partly be blamed on such unbalanced food.

31. An additional supply of cereals or animal products is therefore indispensable, particularly in countries where starchy foods account for more than 70 per cent of the calory intake. In such cases, the collection by some communities, of animals can play a very important role to the extent that such products as caterpillars, termites and larvas have a balancing nutritional value.

32. According to FAO estimates, 12.9 million children under the age of five died from malnutrition in 1990. One third of that number died in the first month of life and another third before reaching the age of one. In developing countries, children under the age of five are twenty times more likely to die from causes relating to malnutrition than children from developed countries. This was the observation of FAO in 1992.

(b) Other nutritional diseases

33. Chronic or acute malnutrition also shows up in such other forms as avitaminosis, mineral salt or mineral deficiencies. Food deficiencies have to do with several essential principles of nutrition whose importance varies by region and, sometimes, by the social and economic category of the population.

34. The nutritional problems generally encountered in many countries are principally the ailments caused by vitamin A and iodine deficiencies as well as nutritional anaemia, especially iron deficiency among pregnant women. Micro-nutrient deficiencies can, over time, create a vicious cycle will take more than one generation to correct.

35. According to FAO, about 13 million children below school-going age are exposed to xerophtalmy, a disease that causes irreversible damage to the eyes for lack of vitamin A. At least 500,000 of these children become partly or completely blind each year. Serious deficiencies in vitamin A, often combining with measles, happened to be the major cause of blindness among children enrolled at the School for the Blind in Tanzania.

36. In contrast, in those regions where people eat lots of vegetables with deep green leaves that are very rich in vitamin A, together with palm oil, their vitamin balance seems to be maintained and the problem of avitaminosis is curtailed.

37. Anaemia is another fairly widespread nutritional problem in African countries. It mainly affects women and children and is at times aggravated by the high prevalence of malaria, parasitic diseases and low consumption of meat and fish. Worldwide, the number of people suffering from iron deficiency is about 1,500 million which accounts for 28 per cent of the world population. Women of child-bearing age are particularly at risk. About one fifth of the 500,000 maternal mortality cases in pregnancy and child-birth can be attributed to severe anaemia.

38. In Zaire, for example, iron deficiency anaemia has been responsible for the death of six per cent of mothers throughout of the country. In Malawi about 25 per cent of the pregnant women are suffering from anaemia.

39. Iodine deficiency, of which endemic goitre is one of the most current manifestations, also affects many people in the world. This nutritional ailment which can reduce both mental and physical capacity affects about four per cent of the world's population. Some 20 million people are suffering, to varying degrees, from brain damage caused by iodine deficiencies. Of that number, six million have stunted growth or cretinism.

(c) Socio-cultural factors influencing food habits

40. Food habits relative to a type of food or group of foods depends partly on individual preferences but also largely on a host of factors which take into account not only the availability and price of food products, the associated quality, convenience and prestige but also ecological factors and more especially deep-seated habits and beliefs.

41. In many African countries, children do not have access to such foods as eggs, meat and fish. It is therefore, important to consider the customs, beliefs and food habits of a people or community in the planning of any food strategy particularly when it comes to introducing new foods or non-conventional foods into the diet of target populations.

42. There are also regional differences with regard to the consumption of domesticated animals and wild animals in Africa. Because of its low fat content, some communities prefer game meat to goat meat, mutton or beef.

43. Food habits, particularly those related to cultural factors, are very difficult to change but can always change over time, depending on circumstances. This applies to food habits in the towns and urban centres where traditional foods are increasingly being replaced by imported foods that afford more convenience and prestige. Bread made from wheat, a non-traditional food in Africa has now become a highly appreciated food in high demand even in the countryside.

44. For most households, eating local produce such as vegetables, roots and tubers or secondary cereals is synonymous with lacking the means or belonging to a lower social class. Apart from traditional staples, some foods which were traditionally eaten are now less traditionally consumed and are on their way out. This applies to pulses, certain fruits and vegetables that were gathered, game meat and certain insects.

45. It can be noted, however, that in the countryside people continue to eat local produce. People eat what is affordable and available. Most rural communities generally produce for themselves the bulk of their food needs which are generally complemented by the collection of products of plant and animal origin.

46. Certain taboos and food restrictions, even though they are tending to be rare, can still influence the food habits of certain societies. The word taboo, of Polynesian origin, means what is forbidden from current use. Food restrictions or prohibitions reflect the social, moral and religious values of specific societies and basically concern the products of domestic or wild animals. Such restrictions may be permanent or temporary as in the case of pregnant or nursing women, infants before they are weaned and adolescents before the age of puberty. They may also be structural or circumstantial. Food prohibition may also be collective, concerning an entire population, an ethnic group, a clan or even a family.

47. There is virtually no human society without food taboos or restrictions. Every society, wherever it may be, does have restrictions and this applies to the most advanced or so-called civilized societies as well. Be that as it may, food taboos mainly affect women and children. The nutritional impact of such restrictions on these vulnerable groups is all the more serious as it most often has to do with protein-rich foods at a time when the nutritional needs of the groups concerned are highest (childhood, pregnancy and nursing periods). Along with other factors, these food habits are the source of the growth problems of many children and the near-permanent nutritional stress observed among women in the rural areas especially.

CHAPTER II

WILDLIFE IN SUB-SAHARAN AFRICA: CURRENT AND POTENTIAL CONTRIBUTION TO THE FOOD AND NUTRITION OF RURAL PEOPLE

48. The edible wildlife products considered in this handbook include both the vertebrates such as the large mammals, rodents, reptiles and birds as well as the invertebrates such as termites, caterpillars, grasshoppers and snails.

General context

49. Hunting and gathering are, first and foremost, subsistence activities. Although such dependence has diminished with the development of animal husbandry and sedentary cultures, hunting and gathering still remain important for certain communities for whom forest products, including wild animals, form the basis of their food supply. This is particularly true of the pygmies. Even today, some people still depend largely on the food resources provided by wildlife for their animal protein supply in those areas that are not conducive to livestock development. In contrast, there are those for whom game meat is a relatively expensive luxury and prestige food item.

50. The quantity and quality as well as the variety of foods that rural people derive from wildlife differs widely on the basis of living conditions and available food resources. Be that as it may, small rodents, reptiles, snails, insects and bigger animals still feature more prominently in the diets of certain people than one would think.

51. In principle, hunting is regulated in all countries. Nevertheless, poaching is widely practised in spite of the risk of prosecution. In many cases, however, it is far more of a response to acute nutritional needs given the protein nutrient deficiency situation in some of the countries.

Contribution of wildlife to the food and nutrition of African people

52. The concept of bushmeat described in this chapter covers all wild animal meat regardless of the type of animal.

53. In many countries of Africa south of the Sahara, wild animals provide an exceptionally high proportion of food proteins. This protein supply is particularly important in the food balance of people living in the densely forested areas where domestic livestock raising is limited. Generally, however, the importance of this game meat contribution to the diet of the people is not properly understood and bushmeat cannot effectively be evaluated because it depends on how much of it is consumed.

54. Nevertheless, many publications on the importance of wildlife to the food and socio-economic sectors of Africa south of the Sahara are available and some have been used to secure some idea of the situation in selected countries.

55. In Zaire, wild animals and other wildlife products such as worms and insects have pride of place in the food of the people, particularly in those areas which have no livestock. In the rural areas, game meat provides as much as 75 per cent of the animal protein (E/ECA/CM.15/13, 1989). The production of game meat ranges from 60,000 to 70,000 tonnes per year. In the 1980s, however, a certain decline in game meat production and some stagnation in worm and insect collection has been observed as shown in table 4 below.

Table 4: Tonnage of game meat, insects and worms produced in Zaire (1976)

Year	Game meat	Insects and worms
1976	69,000	34,500
1977	68,000	35,200
1978	65,600	-
1981	63,500	37,600
1982	62,000	38,300
1983	60,913	38,992
1984	59,845	39,696

Source: Economic and social development plan of Zaire.

56. A survey on game meat consumption in Bukavu conducted by K. Shada, L. Buhirane, N. Mubanzi and Dr. W. Von Richer in 1988 shows that 73.1 per cent of the respondents ate game meat. People from the forest areas were leading consumers. The types of game meat sold on the markets surveyed are listed in table 5 below.

Table 5: Quantity and price of game meat sold in Bukavu during December 1987

Type	Quantity (in kgs)	Average price/kg in Zaire
Monkey	15,065	719
Porcupine	12,060	787
Antelope (mubale)	11,465	755
Duiker ((mbuluku)	5,443	609
Buffalo	1,840	958
Elephant	120	680

Source: K. Shada, L. Buhirane, N. Ndi-Mubanzi, Dr. W. Von Richter. 1988

57. The survey also made it possible to classify the type of game sold in accordance with their importance. Monkey meat (makako) comes first among the types of game sold at Bukavu in smoke-dried form. Next come porcupine, duiker, antelope, buffalo, hippopotamus, elephant, wild pig, grasscutter, tortoise, wild pigeons and snakes in that order.

58. In the Congo, game meat is one of the foods in the diet of all the provinces and accounts for 50 per cent of fresh meat consumption[2]. Bushmeat consumption is very high in the basin provinces of Sangha and Likouala where people consume on average 9.1 kilos/person/year. In other rural areas, the consumption level is 4.1 kilos while in the towns, game meat consumption is only 0.1 kg/person/year.

59. In Nigeria, entire communities living close to the forest derive 84 per cent of their animal protein from game meat (M. Hoskins). Nation-wide, some 46 to 62 per cent of the meat consumed comes from the bush and 95 per cent of the people interviewed eat bushmeat regularly (Marti, 1983). The average yearly consumption of bushmeat was estimated by Charter at 617,000 tonnes.

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[2]/ Findings of an ECA mission to the Congo in 1989.

Table 6: Some wildlife products consumed in Zaire by province[3]

	Lower Zaire	Bandundu	Kasai	Equateur	Kivu	Shaba
Game						
. Antelope	X	X	X	X	X	X
. Warthog	X	X	X	X	X	X
. Monkey	X	X	X	X	-	X
. Buffalo	X	X	X	X	X	X
. Elephant	-	X	X	X	X	X
. Leopard	-	-	-	X	-	-
Insects						
. Caterpillar	-	X	X	X	-	-
. Beetle	X	X	X	X	-	-
. Termite	X	X	X	X	-	X
. Worms	X	X	X	X	-	X
Reptiles						
. Crocodile	X	X	X	X	-	X
. Lizard	-	X	-	X	-	X
. Snake	-	X	-	X	-	-
. Tortoise	X	X	-	X	-	X
. Boa and python	X	X	X	X	X	X
. Snail	-	-	-	X	-	-
Birds						
. Partridge	X	X	X	X	-	X
. Sparrow-hawk	-	-	X	X		-
. Crow	-	-	-	X	-	-

Source: ECA mission to Zaire 1989. Environmental and Nature Conservation Department, Kinshasa, Zaire.

60. Bushmeat is eaten by all classes of society in Ghana and about 75 per cent of the people eat it regularly. Wild meat accounts for 80 per cent of the fresh meat consumed in the country (Riney 1967; Riney and Hill 1967a, 1967b) and in 1985, some 52,470 kgs of bushmeat were sold on the Accra markets alone (Yaa Ntiamoa-Baidu, 1987).

3/ Source: Information obtained from the Environmental and Nature Conservation Department, Kinshasa. ECA mission to Zaire in 1989.

61. In Cote d'Ivoire, the various sources available estimate that bushmeat provided 70 per cent of protein consumption in the forest areas in the southern part of the country before hunting was prohibited in 1974 (Asibey, 1986). In the northern part of the country, bushmeat consumption is estimated at 27 gms/person/day. A study conducted at Bongouanou revealed that the people ate on average 87 gms of bushmeat per person daily in their settlements and 32 gms/person/day in the villages (J. Falconer, 1990). A recent study has shown that bushmeat consumption in the rural areas remains substantial at an average of 11.3 kg/year/person compared to the 4.3 kgs/year/person of the urban consumers. The same study notes that bushmeat production exceeds the total production of livestock (FAO, 1990).

62. In Senegal, the minimum annual consumption is 373,631 tonnes of wild mammals and birds by a total population of 2,966,190 in 1963 (Sale, 1981) which works out at about 34.5 gms/day/person. In 1987, Vincke, Singleton and Diouf found that the Serrer people in Sine province consumed an average of 12.9 gms of bushmeat per day. It would seem that children consume the largest quantities of wildlife products.

63. In Liberia, wild animals are used mainly as sources of subsistence food but the expansion of the local wild meat market is seriously threatening their survival.

64. In Cameroon, wildlife has certainly had a significant impact on the food balance of the people but its contribution to their diet is not well known. Estimates have it that some five kilos are consumed annually per person[4]. Game meat is therefore an important source of protein and a traditional food in high demand. It has been estimated that 30 per cent of the meat consumed is bush meat. (Balinga, 1979).

65. In Mali, it is estimated that more than 50 per cent of meat consumption in the countryside and 15 per cent of meat consumption in the town comes from hunting and poaching (ECA 1991). Doe meat is a favourite in Bamako, particularly in the restaurants.

66. In such humid tropical countries as Equatorial Guinea, bushmeat is also estimated to account for about 80 per cent of the total animal protein intake (ECA 1991).

67. In the SADC countries, wildlife is particularly varied. Of the 84 species of large herbivores in Africa, more than half can be found in the subregion. Traditionally, these animals provide the rural population with meat, skins and other primary products. Even Botswana which is an essentially pastoral country obtains 80 per cent of its animal protein from game meat Butynski and Von Richter, 1979. Generally, livestock development, particularly of cattle, is more important as a source of animal subproducts like milk and eggs, tractive power, compost and as economic investments and savings rather than as a source of meat.

4/ Report of the Interagency Forestry Mission conducted in 1986/1987. See Afrique Agriculture No. 175 Aug.-Sept. 1990

68. There are some exceptions to this rule, however, in terms of bushmeat consumption in Rwanda and Burundi where the consumption of animal products is fairly low. For example, neither game (except for hares) nor insects feature in the food habits of the people.

69. The case of Madagascar may be considered different because except for crocodiles and wild pigs, the country has no big game as in other countries of the region. Many attempts to introduce foreign species have nearly all failed. Otherwise, the tandraka (Tenrec ecaudatus) is the game most accessible to peasants of Madagascar. In the regions where they abound, tandraka provide a significant supply of protein to a good number of families which love to eat their flesh. The roussette or fanihy (Pteropusrufus) is not much appreciated in spite of the high culinary value of its flesh.

Game fowl as an additional source of protein in the rural areas

70. In the context of this study, game fowl refers to those birds traditionally hunted for food. Generally, birds are not sold on the market but mainly consumed by hunters and their families. Occasionally however, some species may be found on the market but this happens generally in small quantities. They are sold uncooked or smoked. As for small- or medium-sized birds hunted by children, they are eaten roasted on wood fire or skewered and seasoned with salt and pepper (Yaa Ntiamoa-Baidu, 1988).

71. In certain circumstances, business and pleasure may be combined by killing crop-eating birds for food. Simple methods of trapping crop pests should be developed in order to enable local people to take from harmful birds the animal protein they need.

72. Hunted birds cover a wide range of species that vary in size and can be found in diverse places. The bird species considered as game fowl in West Africa belong to two families: The Phasianidae (partridges, quails, pheasants and guinea-fowl) and the Anatidae (ducks and geese). This is according to Fairbain, 1952 and Macworth-Praed and Grant in 1970. In the savanna areas of West Africa, the species commonly hunted include wild ducks, geese, guinea-fowl, partridges, pheasants, quails and pigeons. Along the coast, the birds usually hunted are herons and several species of water birds, especially the largest species such as curlews.

73. A list of the bird species traditionally hunted for food in West Africa is given in table 6.

74. Birds are by far the leading game hunted in the whole island of Madagascar. The most common species found and which are in fairly high demand for the succulence of their flesh are the following:

(a) Forest fowl: The voronadabo or green pigeons (Vinago australis) and the domoina or Aldabra turtle-doves (stroptopelia picturata). The voronadabo are the best from a culinary point of view but unfortunately, they are steadily disappearing;

(b) Mountain fowl: The crowned guinea-fowl or akanga (Numida mitrata), pheasants or tsipoy (Margaro perdrix) and the Cape quails or kibobo (Coturnix coturnix africana). The crowned guinea fowl is the largest specimen of the Phasianidae. It may weight up to 3 kilos. Where guinea fowl abound, they are often hunted by beaters but these birds are also threatened by extinction. As for pheasants and quails, despite their small size (a live quails weighs from 100 to 150 gms while a live pheasant weighs from 200 to 300 gms) they have a high culinary value;

(c) Swamp fowl: The true woodcocks or kitanotano (Capella macrodactylla) are the most common. All the muddy swamps which are not overflooded, abandoned rice paddies and valleys are home for them up to 2,000 metres above sea level;

(d) Aquatic fowl: They are mostly made up of wild ducks. Of the ten species of Anatidae in Madagascar, only few frequent areas that are easily accessible. Whistling ducks or tsiriry (Dendrocygna viduata) which can be domesticated eat mostly at night and preferably in the rice paddies. It is because of their characteristic whistling that hunters find it easy to locate them. The black-billed duck or sadakely (Anas punctata) hardly weighs 500 gms but like most other wild ducks, its meat is tender and in high demand. The humped ducks (Sarkidiornis melanatos) are in general fairly big, weighing 1.5 to 4 kgs with a wing span of 60 to 70 cm. They can be identified by the blackish wattle of the male during the mating period.

Edible insects and other gathered animal products

75. At the mere mention of preparing an insect dish, many people shiver with horror and repulsion. Some people would even feel insulted if you presented them with a dish of insects, however well cooked. The consumption of insects, however, is nothing new. Insects are even easily assimilated by the organism and have good nutritional value which some people have exploited. According to one French author, insect eating might well become fashionable soon in the West (Bruno Comby, 1991).

76. Whatever be the case, today, the consumption of insects has become practically common in certain African countries. Combined with pulses or meat or with cassava or millet flour, they constitute a food resource whose nutritional value is highly appreciated.

77. There are more than 500 species of edible insects but the most commonly eaten are caterpillars, termites, grasshoppers, locusts and worms. These appear cyclically and seasonally in general and their consumption is linked to characteristics of a regional nature. The other gathered products of animal origin that are commonly eaten include snails, frogs and tortoises.

78. Just like game, these small animals form part of the food habits of many rural populations (as in Central Africa) and are also eaten in the urban areas when available but their importance is limited locally.

79. In Zaire, where insects are highly appreciated and in high demand, they are consumed in several ways:

(a) Raw at the very place of collection;

(b) Raw but mixed with a little water, seasoned and spiced and served for snacks to accompany mid-day drinks at bars in western Kasai; and

(c) Cooked, grilled and basted, with palm oil and served with the local food paste called bidia.

80. Grasshoppers and termites are generally eaten roasted or boiled and salted after having clipped their wings and feet. Grasshoppers can also be dried. In the Central African Republic, termites are mixed with bean flour paste in a highly appreciated traditional dish which accompanies the staple millet ball. In Uganda, a stew called ekipooli is made out of crushed termites which have been boiled and dried.

81. Other insects which are eaten raw and therefore do not need to be cooked, can be eaten by children roasted or grilled in embers and ash to remove the hairs.

82. A survey on insect consumption in western Kasai, Zaire, was conducted by Katya-Katsya in 1989. It showed the considerable potential of insects to redress the malnourishment of certain rural populations, particularly as a substantial animal protein complement of high nutritional value.

83. The peasants who gather these insects eat part of the harvest and sell the remainder in the rural collection centres to hawkers who have come to sell their manufactured products in the countryside. Some varieties of insects are perennial and can therefore be found fresh on the market all year round. Others which are seasonal owe their perennity on the market to preservation processes such as smoking, drying and salting.

84. The findings of this survey show that the most consumed varieties are termites caterpillars and worms. The average insect consumption in the area surveyed was estimated at 28.32 kg/person/year broken down as follows into kg/person/year:

Termites	9.51
Caterpillars	8.51
Grasshoppers	3.48
Worms	6.48
Total	28.32

85. Snails are another gathered product widely consumed in certain regions and districts in Africa. The flesh is specially appreciated by many connoisseurs in Africa and elsewhere. For

example, snails are consumed as a delicacy in France which imports from China and Taiwan (EMSLIE, 1982).

86. In West Africa, the Achatina achatina known in Cote d'Ivoire as Gros-Rouge (Big Red) is the major specie eaten. This snail which can weigh 350 gms on average is well known by the local people who relish it and happens to be the specie favoured by all snail eaters.

87. For purposes of information, the annual consumption of snails was estimated at 300 tonnes in Benin and at 7,900 tonnes in Cote d'Ivoire (D. Zongo, M. Coulibaly, O. H. Diambra and E. Adjiri). In Cameroon, gathered snails are widely consumed in the cocoa and tobacco growing areas.

Nutritional benefits for wild meat and insect consumers

88. It is important to know the nutritional composition of the major foods eaten by people in order to recommend which types of food they need for growth and fitness. Indeed, some food products are not consumed by people simply out of ignorance of their quality and nutritive value. Very often, people do not even know such products are edible.

89. The essential nutrients that people get from their food can be classified into four main categories:

(a) Proteins which provide the amino acid elements for tissue growth and repair. Proteins come from animal or plant sources. Animal proteins generally have a higher percentage chance of transformation into living matter than plant proteins. A balanced diet implies that both animal and plant proteins should be consumed;

(b) Glucides or carbohydrates including fatty bodies and oils are the major source of body heat and energy. The greater part of glucides is provided by plant foods. However, over-dependence on glucides can lead to an unbalanced diet. This is often observed in those areas where the staple food (cassava, sweet potato or yam) is rich in glucides and where the people do not raise livestock, hunt or fish;

(c) Mineral salts are indispensable for the formation, maintenance or repair of various types of body tissue and help to regulate the functioning of the organism; and

(d) Vitamins are indispensable to the proper functioning of the human body. Vitamin A is very important for eye-sight.

90. People eat game meat because of its taste. Others eat it as a matter of habit. Such preference for bushmeat is a nutritional advantage to the extent that game meat has a nutritional value higher than that of livestock meat.

91. In nutritional terms, the information available indicates that fresh wild meat is comparable to livestock meat when it comes to the lean meat ratio per kilogramme of live animal, mineral and protein content (Asibey and Eyeson, 1975; Ledger and Smith, 1964).

92. According to the laboratory research findings of J. C. Heymans, a kilogramme of smoked antelope (duiker) has a protein content of 85.16 per cent. Studies conducted by Reul Hoogesteijn in 1979 have also shown than wild meat has more lipids.

93. As for grasscutter meat, it is considered very good and the nutritive value (minerals and proteins) is as high if not higher than prime beef, mutton or pork on the market. Also, as Asibey found in 1987, it has the advantage of containing less fat than the meat of domesticated animals.

94. The importance of insects as a high-grade source of protein does not seem to have been well understood by people and this partly explains why the level of insect consumption in Africa remains low. The available data, which is fairly reliable, confirm this importance and speak for themselves.

95. In terms of the protein gain by the consumer, the average annual insect consumption estimated at 23.60 kgs by the aforementioned insect consumption survey of western Kasai corresponds to 920 gms of raw protein which is equivalent to 589 gms of reference protein. This works out at an average of 19.6 gms of animal reference protein/day/person which is slightly higher than the estimated daily requirement of 16 gms. This figure does not include the quantities consumed in various circumstances.

96. It has been noted that the large African snails can rightly be considered as food having a high nutritional value since they have less fat (0.62 per cent) than chicken (5.70 per cent). Besides, their phosphorus content is relatively high (117 mgs) as is their calcium content (132 mgs). What is more, the large African snails constitute a significant source of protein and iron in the diet of people living in the forest areas.

97. The table below gives some indication of the nutritional value of the insects.

Table 7: Average composition of some insects (100 gm.)

Insect	Proteins	Glucides (g)	Lipids (g)	Calcium (mg)	Iron (mg)
Smoked caterpillar	62.3	4.5	6.5	514	7.0
Smoked termites	36.6	44.5	19.9	98	21.0
Dried Grasshopper	29.0	0.7	-	13	6.6
Worms	18.7	1.4	-	24	1.7

Source: Katya-Katsya, 1989.

98. With regard to the calorific value of wild meat and insects, the available information indicates that 100 gms of bushmeat provides 150 calories while 100 gms of insects provides 308 calories.

Wild meat supply and demand

99. Practically all classes of society consume game meat which is often preferred to that of domestic animals. Studies conducted in some African countries show that the majority of non-vegetarians are prepared to eat game meat if they can afford it. This is true regardless of social class, level of income and education, religious belief or sex (Blaxter, 1975; Martin, 1983; Niamoa-Baidu, 1986) and in none of the countries surveyed has wild meat production been sufficient to meet demand. For instance, in Bangui (Central African Republic), the city dwellers, who all come from the rural areas, prefer bush meat.

100. All species of wild mammal, especially duikers and rodents, are consumed as are roussettes and primates, reptiles and birds and such invertebrates as snails and insects. Crocodile meat is also preferred to many other domestic meats in countries of Central and West Africa.

101. Bushmeat has long been sold on the urban markets of West and Central Africa. Restaurants in African capitals are also regularly supplied with all kinds of game meat.

102. There is a major and highly profitable market for bushmeat in the major towns among the social classes of people who have high purchasing power. These are mainly the local bourgeoisie of traders and high-ranking civil servants whose above-average incomes thus contribute to the encouragement of poaching in their countries.

103. The demand for bushmeat far exceeds supply and many people cannot buy enough. Such demand continues to increase in certain societies. Bushmeat consumption is, at times, only limited by its availability and relatively high cost. The supply of bushmeat to the urban centres

and towns is limited by the poor road infrastructure and the lack of an organized marketing system.

104. Among the rodents, the great aulacode (tryonomys swinderranus) more widely known as grasscutter in certain West African countries, seems to be preferred by consumers.

105. With regard to reptiles, it would appear that large snakes like boas and pythons are most appreciated in Central Africa. In contrast, monkeys, whose meat is highly prized in certain communities of Central Africa for example, happen to be considered sacred animals elsewhere and are therefore forbidden to the people.

106. Indeed, in many of the countries, bushmeat is far more expensive and both the demand for and the prices of this category of meat increase much faster than those of domesticated animal meat.

107. For other consumers, however, the high price of this category of meat does not seem to be an obstacle. The fact is that out of habit, a large number of consumers prefer game meat to domestic meat.

108. In the bushmeat consumption survey conducted at Bukavu, Zaire by K. Shada, L. Buhirane, N. N. Mubanzi and Dr. W. Von Richter in 1988, it emerged that the unit price of game meat in Bukavu was 2.5 times higher than that of butcher's meat. The average price of game meat was 751 Zaires per kilo while 1 kilo of fresh beef cost 300 Zaires during the same period.

Table 8: Average prices of meat in Kumasi and Accra (in cedis)

Year	Beef		Mutton		Pork		Bushmeat	
	Kumasi	Accra	Kumasi	Accra	Kumasi	Accra	Kumasi	Accra
1983	165.00	135.75	150.91	150.33	-	-	125.73	373.68
1984	234.17	239.00	234.17	252.07	-	-	223.71	453.08
1985	283.94	276.53	305.00	453.15	77.22	-	349.45	510.61
1986	270.41	271.87	260.04	255.96	113.53	340.45	349.45	684.64

Source: Central Bureau of Statistics, Accra, Ghana.

109. In contrast, bushmeats costs far less in Tanzania than livestock meat. Indeed, one kilo of fresh game meat costs only 80 shillings while beef is sold at 350 shillings per kilogramme. While one kilo of dried game meat costs 400 shillings, it takes five kilos of fresh meat to obtain 1 kilo of dried meat (ECA 1992). This situation could be explained by a high consumption of

fish with the national average being 12 kilos/person/year but reaching as many as 50 kilos in certain areas.

110. In terms of packaging, it will seem that fresh meat is preferred for consumption since it has more nutrients. In the villages, game is often sold whole or quartered and then sold to licensed wholesalers. However, the hunter can make more money by selling his kill directly on the urban market as is done in Bangui, Central Republic some 12 kilometres from the capital.

111. Bush meat is also sold smoked in small quantities. This applies to monkey, porcupine, antelope, duiker, buffalo and elephant meat. Smoke-dried meat is, however, less appreciated because it is difficult to cook and chew. It has the advantage however, of keeping longer.

112. In the towns, traders use hawkers to sell their meat. This is a lucrative business not only for the hunter but also for the wholesaler and the market women who retail. For example, in Bangui, those who buy and sell spend the whole morning selling meat bought the previous day on the central markets of the town. The sellers can make as much as 20 to 50 per cent profit on the purchase price of one piece. As for the resellers who cut-up the quarters of smoke-dried meat into small pieces, they can make as much as 50 to 100 per cent profit.

113. Some people even make this their main livelihood. On the bushmeat market of Kumasi, in Ghana, some traders have been passing on the trade for four generations and the selling of game meat is their principal means of subsistence (Yaa Ntiamoa-Baidu). This trade, however, has remained in the informal sector.

Factors influencing game meat consumption and the rational use of wildlife

114. The consumption of wildlife products depends on a number of factors: food habits, climate, geographical region, tradition, availability, taboos, taste and preferences and social or economic class (especially in the urban areas).

115. Any attempt to promote or introduce foods that are non-conventional at the local level should necessarily be based on an understanding of existing consumption patterns and the underlying motivations of consumer food habits.

116. The constraints to increased consumption of bushmeat have to do, among other things, with:

(a) Availability of the product at a time and place convenient to the buyer;

(b) The particular image of the products, if considered cheap or without economic value because of the fact that they have been gathered;

(c) Repugnance towards some types of food such as insects, snails and worms whose presentation is not always acceptable to the consumer;

(d) High price of bushmeat which most people often cannot afford;

(e) Ignorance of the nutritional value of the products considered;

(f) The existence of food taboos and restrictions. In many countries, animal products, especially wild animal products, are forbidden or simply do not form part of the food habits of the people;

(g) The availability of other sources of protein in the region; and

(h) The low priority accorded to wildlife relative to other more pressing problems.

CHAPTER III

WILDLIFE DEVELOPMENT AS A POLICY FOR THE RATIONAL AND SUSTAINED USE OF WILDLIFE FOR FOOD AND NUTRITIONAL PURPOSES

117. Overexploitation of wildlife for commercial purposes (not only as bushmeat but also as trophies, hides and skins) constitutes a serious threat to its survival. A large number of indigenous species (particularly the most hunted) are threatened with extinction as a result of wanton poaching.

118. Then again, conventional animal protein sources, such as livestock meat, fish, milk and eggs are generally some of the most expensive food products in many African countries. What is more, they are rarely available in the non-producing rural areas. In the towns, they are beyond the means of many consumers.

119. Increased production of bushmeat through the rational exploitation of wildlife has become a necessity which addresses some concerns, namely:

(a) Securing and guaranteeing for the rural and urban masses a source of high-grade proteins;

(b) Providing a source of income for the rural people;

(c) Preserving the environment by averting the extinction of many indigenous species by trigger-happy poachers; and

(d) Improving the taste and quality of meat through controlled breeding.

120. Two solutions are currently being experimented with, namely: ranching or extensive husbandry of game and the domestication of wild species. The main objectives of such programmes are to increase the contribution of wildlife to the food of the rural people and to protect the environment. Wildlife raising has also been conceived as an addition to the conventional husbandry of domestic animals and helps to fill in the animal protein gap of rural African people.

121. Among the most widely consumed and therefore hunted species are such rodents as the aulacodes (Tryonomys swinderranus) more commonly known as grasscutter and the cricetomes (Cricetomys gambianus and C. emini) commonly known as Gambian bush rats. The consumer preference for grasscutter meat is explained by the superior taste of its meat and quality. Demand remains substantial and its price is often higher than that of other meat (see table).

122. Snails are also in substantial demand on the market. In addition to their unquestionable nutritional value, they are highly prized by rural and city dwellers. The sheer rate of snail-gathering and the practice of bush fires are factors which threaten the survival of this animal.

The raising in captivity of small game in West Africa: a venture which is proving profitable in many respects

123. According to the information available, grasscutter raising in captivity has been carried out especially in Benin and Ghana. The experiments have proven successful, thereby confirming the viability of the venture particularly with regard to the development of small subsistence schemes in the villages. Currently, many people have become interested in raising small game animals in captivity and research is being undertaken in order to improve the conditions of their husbandry.

124. Studies conducted by FAO in this area have revealed that the factor limiting the development of this sector was the lack of technicians trained in this type of livestock development (FAO, 1991). In this regard, FAO organized in April/May 1991 a trainer-training seminar on the raising of small game for technicians coming from four French-speaking countries of West Africa, namely Benin, Cote d'Ivoire, Guinea and Togo. The seminar was organized in cooperation with the University of Benin.

125. The initiative for the seminar was taken in response to the steady demand from some Africans for assistance in the development of small game raising projects at the national level. The ultimate aim of the seminar is to promote and develop such schemes in the villages. The seminar also provided an opportunity for impressing upon participants the importance of wildlife resources which formed an integral part of African economies. The participation of non-governmental organizations (NGOs) was considered indispensable since they were the best partners for implementing in the field this global rural development policy.

126. The domestication of grasscutters was undertaken during 1966 in Ghana by E.O.A. Asibey (Yaa Ntiamoa-Baidu, 1987). The experiments were initiated on the basis of a great demand for the meat of this animal. The grasscutters were kept in cages, in land enclosures or in parks. They were fed mainly with grass, sugarcane and cassava. Since then, many people have learnt the techniques and started raising this animal in captivity. Converts to the raising of grasscutters can be found among city and urban dwellers whatever their level of income.

127. Through one Benin-German grasscutter raising scheme in particular, Benin has built up substantial experience in this area. The raising of grasscutters in Benin very quickly caught on and spread and received grants and subsidies from financial institutions. Benin's experience has enabled it to serve as a pilot centre for the initiation of grasscutter raising experiments in other African countries.

128. In the context of technical cooperation between Benin and Germany, a grasscutter raising station was set up in 1984. The objectives of the station are to develop techniques that would guarantee the success of grasscutter raising for meat and to propagate a domestic stock. Recent research has provided further insight into the reproduction, growth and behaviour of grasscutters raised in close captivity (Mensah and Baptist, 1986; Adjanohoun, 1988; Schrage, 1990).

129. The cricetome (Cricetomys gambianus and C. emini) or Gambian bush rat was also, like grasscutter, researched in certain countries of West Africa. The research focused on several aspects of breeding the animal within the context of the research programme of Benin University focusing on the possibilities of raising wildlife. Observations were recorded regarding its social, sexual and other behaviour relating domestication and cannibalism (Godjia, 1985).

130. A similar experiment on cricetomes was conducted in Nigeria by S.S. Ajai, but information on the current status of the project is not available.

Breeding of large African snails

131. The large snail is a highly appreciated food for many African people. There has been some reluctance, however, to consume certain species such as the Achatina fulica also known as the garden snail in which there happens to be a flourishing international trade.

132. Given the substantial demand, the seasonal nature of supply and in particular the possibility that the most hunted species might become extinct, the people concerned have become aware of the need and importance of raising this animal. Snail breeding has become an activity which is gaining greater importance in Central and West Africa, particular, in Cote d'Ivoire, and has been developed in several African countries.

Ranching or extensive rearing of game: a rational way of exploiting wildlife

133. To date, animal science and technology has focused on cattle, sheep and goats which transform grass into edible and generally useful products. For many ethnic groups such as the Fulanis, the Masai and the Antandroy in southern Madagascar, the head of cattle possessed represents supreme wealth and places the individual in the social ranking.

134. Along with traditional animal husbandry, the establishment of game ranches is becoming important for the following reasons:

(a) Protection of certain indigenous species from extinction;

(b) Increasing the stock of such species;

(c) Producing meat and skins in such a way as to match supply with demand on a regular basis through the rational and sustained exploitation of game animals; and

(d) Making the raising of game animals viable by achieving production costs lower than those for cattle raising.

135. Ranching has been rightly considered a strategy for wildlife development with a view to its rational use. Programmes have been conducted initially in some countries in Southern and

Eastern Africa and, more recently in West Africa. The idea is to leave the animals to range freely within the ranch so that their movements are in fact confined to the area fenced.

136. According to the available information, no monitoring, handling or other intervention measures are necessary for keeping herds of game animals and this minimizes costs. Furthermore, the problem of wildlife management seems to be considerably simplified to the extent that wild animals need far less health and water supply services than domesticated animals, not to mention genetic improvement.

137. Whatever be the case, it is certain that the main objective of the schemes for ranching and creating wildlife game reserves is based on the concern to make rational use of wild animals in order to feed people deprived of animal protein. The experiments conducted in such Eastern and Southern African countries as Kenya, Zimbabwe, Botswana, South Africa and Namibia together with those conducted in the semi-arid savanna areas of Mali, Burkina Faso and Ghana in West Africa prove the point.

138. Wildlife is a very emotional issue in many countries. In Kenya, for example, wild animals play an important role in the life and prestige of the country, to say nothing about the enormous tourism industry. In other countries, such as those in West Africa, wild animals are both an important traditional source of food and income and, more especially, culturally valued. Relations between people and wildlife are deeply anchored in tradition, culture and religion.

139. Given these considerations, it is understandable that the most difficult aspect to manage in all this with a view to the management and rational exploitation of the wildlife might be people themselves.

CONCLUSIONS AND RECOMMENDATIONS

140. There is currently a wealth of documentation on the importance of wildlife as a source of food in Africa. Many authors have written on the subject which has become fairly well documented. National data are, however, rare and where they exist, generally based on an extrapolation of localized survey results. Estimates can vary considerably from one case to another.

141. In spite of these deficiencies however, the available data sufficiently highlight the unquestionable contribution of wildlife products to the food of many rural and urban consumers in Africa. The research and surveys conducted in the area show that many people still depend on bushmeat for their protein requirement and that others would have wished to eat wild meat if it were available and affordable.

142. As noted earlier, wildlife would probably never become the main source of animal protein and in no case replace livestock but the fact still remains that wildlife is a secure and lasting source of food rich in proteins and a valuable complement to the food of certain people. What is more, it can and should play a significant role in off-setting the animal protein deficits in those areas where the conventional livestock resources are limited. Edible wildlife products both from hunted and collected animals enable rural people to have a more varied diet without incurring too much additional cost and to break the monotony of what they eat. Eggs, hides and skins, together with other subproducts also constitute items for trade and help to improve the living conditions of the rural people.

143. Game meat also plays a significant role in regional trade. The wild meat trade is so remunerative and the demand for bushmeat on such an increase that poaching has, in cases, assumed alarming proportions.

144. Insects, rats, snails and other animals provide, in a different form, many possibilities of supplementing the protein intake. They could contribute largely to attenuating the incidence of endemic malnutrition, particularly among women and children.

145. However, research workers, extension officers, economists and food policy-makers have shown very marginal, if any, interest in wildlife. There are no official food availability statistics on the food products consumed by the people of Africa except in countries like Zaire and Ghana.

146. The time has come to take a new look at the role that wildlife (both the large vertebrates and the insects) can play in the economy of many rural communities in Africa. For this to happen, scientific and technical information must be secured in order to demonstrate and to publicise the genuine value of wildlife as a source of food and income for local people.

147. The importance of these products for certain people such as the pygmies should be underscored to the extent that their lives largely depend on the use of such resources.

148. The consumption of wildlife products is influenced by a number of factors, more especially food habits, the availability of other foodstuffs at more affordable cost and/or greater convenience, traditions or simply food preferences but more especially by the sufficiency of supply and affordability of bushmeat.

149. All these factors should be considered in any programme aimed at exploiting or managing wildlife for nutritional purposes.

Recommendations for promoting the use of edible wildlife resources in the context of food security

150. The promotion of edible wildlife resources falls within the general context of the policy for diversifying food production on one hand and for the development and optimum use of existing resources on the other hand. The final objective should be to improve the health and nutrition of rural and urban people.

In terms of production

(a) An attempt should be made to increase and secure the regularity of supply to consumer centres. An increase of bushmeat availability, including insect food availability, means that the production, collection and distribution systems must necessarily be improved and more rationally organized;

(b) Efforts should be made to increase the density and productivity (in harmony with their habitat) of the most hunted and consumed species of rodents, snails and other animals in order to redress the exploitative use of wildlife. Experiments have already been conducted in these directions, particularly by creating new sources by way of wildlife ranching and domestication. It should be noted, however, that the husbandry or domestication of wild animals is generally expensive in terms of labour and capital and could be beyond the means of many rural people;

(c) The marketing of wildlife products should be organized by economic operators in cooperation with wildlife conservation officials and produce collection, transport and storage facilities established;

(d) Potential entrepreneurs should be given credit facilities that would enable them to build the appropriate infrastructure for the marketing of bushmeat.

In terms of consumption

151. The high demand for bushmeat observed in the urban centres of many Central and West African countries bears witness to the existence of a potential market for this category of meat. Where surveys have been conducted, it would seem that most of the people interviewed would

gladly consume game meat if it were available, affordable and within the limits of their purchasing power.

152. There is, however, another category of consumers for whom wildlife products remain outside their food habits or constitute taboos. There are also those who simply do not consume such food out of ignorance of its nutritive value or for reasons having to do with their inability to accept the way such food is presented. Such reserve can be observed especially with regards to insects, caterpillars and worms. In the case of this last category of consumer, the main problem to be solved is that of making the product acceptable.

153. There are several ways of going about this:

(a) Nutritional education of the target population through the mass media, more particularly the women who carry the cooking habits of a family. The role of women should be rightly underscored since they are the principal determinants of the types of food that the family should eat and how such food should be prepared. Such education should provide more information on foods, their nutritive value, methods of preparation as well as simple recipes that can be applied to the ingredients locally available;

(b) The need to abolish social and mental attitudes which hinder the consumption of products such as insects should be impressed upon the people;

(c) In terms of food technology, research should be focused on the possibilities of manufacturing concentrates or powdered forms of products as is done with fish or meat. There is no doubt that consumers would find such forms far more presentable and acceptable.

In terms of preservation

154. For meat coming from free ranging animals, the problem of preservation is acute. Indeed, since temperature does not allow meat to be kept for long periods, it should be marketed as soon as possible in order to prevent it from going bad.

155. Simple preservation methods such as salting, drying or smoking already used by rural folk should be improved with a view to increasing the time for which meat can be kept and also increasing its taste and quality.

156. Other forms of treatment should also be explored in order to allow for the transport of bushmeat to urban consumption centres under healthy conditions.

In terms of data: methods of collecting data on wildlife production, consumption and marketing should be developed

157. The data now available gives only a general idea of the frequency with which bushmeat is consumed by people and its nutritional contribution. Generally, however, information that

would make for direct evaluation of the importance and value that people attach to these products is lacking along with information that would show the household consumption of these products.

Programmes and projects that enable local people to increase their income and improve their food security should be developed

158. Community-specific wildlife management programmes and projects should be designed to harness the potential of wildlife as additional sources of food and income. They should be tested under local conditions and take into account the food habits of the people, their customs, particularly with regard to wildlife products and the nature of the food and nutritional problems of the community.

159. Research should precede the implementation of programmes and provide more information on the way the people use and manage wildlife for food.

160. Finally, it would be imperative for the people concerned to participate in programme implementation at all levels if the exercise is to succeed.

BIBLIOGRAPHY

1. E. O.A. Asibey. The Grasscutter in Ghana. Nature et Faune. Vol 3, no. 2, April-June 1987, FAO.

2. E.O.A. Asibey and G.S. Child. Wildlife Management for Rural Development in Africa. Nature et Faune. Vol. 7, No. 1, January-March 1991. FAO.

3. J.T.C Codjia and J. C. Heymans. Experimental breeding of Giant rats (Cricetomys gambianus and C. emini) Nature et Faune. Vol. 6, No. 1, January-March 19990. FAO.

4. H. Delisle. Urban Food Habits of the Majority of Tomorrow's Population. FAO, Food, Nutrition and Agriculture Vol. 1, 1991.

5. FAO. Community Forestry Note. The major significance of minor forest products, the local use and value of forests in the West African humid forest zone. Rome 1990.

6. FAO. Raising of Small Game. Trainer Training Seminar held from 22 April to 4 May 1991 in Cotonou, Benin.

7. Chris Geering and Steven de Bie. Vers une exploitation soutenue des ressources naturelles. Nature et Faune. Vol 2, nos 1 & 2, April 1986. FAO.

8 David Hopcraft. L'élevage du gibier: un système pratique d'utilisation naturelle des terres. Nature et Faune. Vol 2, nos 1 & 2, April 1986. FAO.

9. M. Hoskins. The contribution of forestry to food security: UNASYLVA. 1990/91. FAO.

10. Albert Kalivesse. Supplying the local Bangui markets with bushmeat. Nature et Faune, Vol 7, No. 3, July-September 1991.

11. Katy-Katsya. Contribution des insectes comestibles a l'amélioration de la ration alimentaire au Kasai occidental. Zaire-Afrique. No. 239, Novembre 1989.

12. United Nations Economic Commission for Africa. Report on Non-Conventional Food Resources in Africa. E/ECA/CM.15/13. February 1989.

13. United Nations Economic Commission for Africa. Report on the use of Non-Conventional Foods in CEPGL member countries. JEFAD/APISS/90/19. February 1990.

14. United Nations Economic Commission for Africa. Back-to-office Report on Mission to Tanzania, Malawi and Madagascar on Edible Resources of Flora and Fauna, March-April 1992.

15. Yaa Ntiamoa-Baidu. West African Wildlife; A Resource in Jeopardy. UNASYLVA. Vol. 39, 1987/2. FAO.

16. Yaa Ntiamoa-Baidu. Game Birds in West Africa. Nature et Faune. Vol. 4, no. 3, July-September 1988. FAO.

17. K. Shada, L. Buhirane, N. N. Mubanzi, Dr. W. Von Richter. Survey on the sale of wild meat in Bukavu. Nature et Faune. Vol. 4, no. 3, July-September 1988. FAO.

18. Yves Thonnerieux. Afrique: vers une redéfinition du rôle de la faune sauvage. Nature et Faune. Vol. 3, no. 2, April-June 1987. FAO.

19. D. Zopngo, M. Coulibaly, O. H. Diambra and E. Adjiri. Document on the Breeding of the Giant African Snail Achatina Achatina. Nature et Faune. Vol. 6, no. 2, April-June 1990. FAO.