DISSERTATION

UTILIZATION OF WILDLIFE RESOURCES IN NIGERIA

Submitted by

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WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY MOSES OLANREWAJU ADEOLA ENTITLED UTILIZATION OF WILDLIFE RESOURCES IN NIGERIA BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

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ABSTRACT OF DISSERTATION

WILDLIFE UTILIZATION IN NIGERIA

Primary purposes of this study were to determine: which wildlife species are being used by the people, in what quantity, and during what season; the effect of religion, culture, and tribal festivals on game species utilized; the game species utilized or consumed in different ecological zones; which game species and parts of wild animals are used for healing and preventive medicine in each ecological zone; and to assess the economic and recreational values of the utilized wildlife.

The three ecological zones surveyed for consumptive uses of wildlife resources in Nigeria were: savanna (Bauchi, Plateau, Niger, and Kwara states), deciduous (Anambra and Bendel states), and rain forest (Oyo and Cross River states). For nonconsumptive uses, three national parks (Kainji Lake National Park, Yankari Game Reserve, and Jos Wildlife Park) and four zoological gardens (Ibadan, Jos, Enugun, and Ogba) were surveyed. Data were collected from farmers, hunters, and visitors in each of the conservation areas through a person-to-person questionnaire interview.

This study confirmed that small game were the most abundant wild animals in the three zones surveyed and most of them were located in the savanna region. This study indicates that a major proportion of animal protein consumed by farmers and hunters in the regions came from wild animals. Farmers and hunters in the savanna preferred using small game (rodents) and big game (duikers) more than in the other zones.

Wildlife species were used more during installation ceremonies (of a new chief, Emir, Oba, and Obis) than in other cultural festivals. In the rain forest more species were used for installation ceremonies than in any region surveyed. During Muslim festivals in Nigeria, farmers rarely used wildlife species, but some were used to supplement income. Christians used many different wild animals for religious festivals, but more were used during the Easter period in the deciduous region than the rain forest and savanna regions.

Expenditures per visitor in the three national parks showed more per capita expenditures from foreigners than Nigerians. The number of nights stayed in the national parks and game reserves is the major factor in determining how much money the visitor spent.

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Chapter I

INTRODUCTION

Wildlife is a sensitive renewable natural resource to be used within reason for the benefit of the people. The Government of the Republic of Nigeria recognizes the merits of wildlife and its contribution to the national economy. The government is committed to ensuring that the resources are adequately managed for the long-term benefit of its people.

Few people in Nigeria are fully aware of wildlife resources and the extent of their use. Many conservation areas (national parks and game reserves) are being under-utilized because of the lack of public enlightenment (Adeola 1983). Wildlife has been utilized for the welfare of mankind in many parts of the world and has gained prominence as a revenue source in numerous African countries (Ajayi 1973, 1975b; Asibey 1972; Crawford 1968, 1974; Hortog et al. 1973). If managed properly as a renewable natural resource, wildlife can provide a sustained source of protein for human consumption and also attract international tourists who bring foreign exchange.

The economic importance of wildlife to Nigeria can be illustrated by the Yankari Game Reserve, which receives about 10,000 visitors every year, accruing about N20,000

(U.S. $30,000) from entrance fees, and Kainji Lake National Park, which receives about 5,000 visitors annually, with about N10,000 (US $15,000) accruing from fees (Afolayan 1980). Hotel managers in both wildlife areas realize more than N20,000 (U.S. $30,000) from lodging, conferences, and serving food to visitors.

Von Richter (1970, 1976), Von Richter et al. (1974, 1976), and Retief (1971) reported that products and services from wildlife in Botswana were valued at nearly U.S. $10 million annually and included tourism, trophy dealing, and hunting. Wildlife-based tourist trade brought about U.S. $60 million (of foreign exchange) into Kenya annually (Ajayi 1972b). Wildlife is Tanzania's major tourist attraction, and the national parks have continued to attract visitors from all over the world, particularly North America and Europe. Tourism is the largest foreign exchange earner after agricultural products. Moreover, tourist traffic to Tanzania was growing at the rate of 10-15 percent annually and more provisions are being made to accommodate visitors by creating additional national parks and by building hotels and airports (Ajayi 1972b). This rate of growth ceased in 1974 when the border to Kenya was closed.

Most farmers in rural areas in Nigeria depend solely on wild animals for their daily animal protein supply. In some cases, farmers combine their subsistence farming with trapping, hunting, and encircling animals with fire, especially during the dry season. In developed countries like the United States, hunting is primarily for recreation, but in Nigeria and most of the African countries, it is often for survival.

African farmers depend on bushmeat (all wildlife including birds, rodents, and larger animals) for both food and cash income. Nigerian farmers are known to hunt no longer for their immediate domestic use alone, but largely to obtain meat to sell in the urban and other population centers where bushmeat is more expensive. Ajayi (1978) estimated that 20 percent of the animal protein consumed by rural communities in the southern states of Nigeria is derived from bushmeat. Several writers (including Akum 1978; Mossman 1975; Topps 1975; Deane et al. 1971; Johnston 1971) have also stressed the important role played by wild animals in the diet of people living in rural communities, especially in the coastal regions where cattle do not thrive because of tsetse flies and other disease vectors. Riney (1967), Asibey et al. (1975), and Asibey (1976a) confirmed that bushmeat constituted over 80 percent of the fresh meat consumed in Ghana.

The traditional use of wildlife and the increasing awareness of the significance and utilization of wildlife areas for tourism and for sources of food show that the contribution of wildlife resources to the entire economy of

Nigeria is worth further development. In many tribal areas of Nigeria wildlife resources are, however, already depleted and virtually destroyed. This has occurred because wildlife is a major component of the Nigerian diet. It is feared that the present state of unorganized and uncontrolled exploitation will diminish the remaining game stock rapidly to a level at which it is not usable (Adeola 1983). This natural protein source, on which many Nigerians have been dependent, may not be fully replaced by domestic livestock (Adeola 1983).

It is therefore a reasonable assumption that, in most ecological zones, tribes and cultures of Nigeria, 80 percent or more of the population today would eat game meat if it were available and within their means, irrespective of their being urban or rural residents (Adeola 1983). This study is designed to investigate the following stated goals and objectives which could emphasize the importance of the wildlife industry in Nigeria.

GOAL

To determine the importance of wildlife resources to the people of Nigeria.

Objectives

1. To determine which species are used by the people, in what quantity, and during what season;

2. To determine the effect of religion, culture, and tribal festivals on the game species utilized;
3. To determine the game species utilized or consumed from different ecological and administrative zones, states, and counties;
4. To determine which game species and parts of wild animals are utilized for healing and preventive medicine in each ecological zone; and
5. To assess the economic and recreationial values of the utilized wildlife.

HYPOTHESES

1. Rodents are utilized more in the deciduous and rain forests than in the savanna forest.

Explanation

Most wild animals in the deciduous and rain forests are rodents. These areas are intensively used for commercial agricultural crops (cocoa, rubber, and palm products) and serve as good habitat for rodents. Savanna habitat supports both large ungulates and rodents, but the demand for ungulates is higher.

2. The proportion of game meat in the diet decreases from the southern to the northern ecological zone.

Explanation

Livestock thrives in the northern part of Nigeria where there are fewer tsetse flies. Livestock (goat, cow, sheep, and camel) is the major meat source, substituting for wild meat.

3. People's use of wild meat increases as one moves away from major cities.

Explanation

Rural dwellers utilize more wild meat than city dwellers primarily because rural dwellers get animal protein from wild meat, if available, because of their occupation, predominantly subsistence farming. City people cannot afford the prohibitive cost of wild meat, hence they prefer the cheaper meat sources--livestock.

4. Christians use more monkeys and warthogs for food than Muslims.

Explanation

Christians are not forbidden from eating a various wild meats. The Muslims are selective and are forbidden to consume monkeys and warthogs by religion and taboos. Because more Muslims live in the north, such meat is used less in the northern part than in the southern part of Nigeria.

5. Utilization of wildlife is related to the ecological zone in which people live.

Explanation

People living in mangrove forest areas eat fish, crocodile, python, and monitor lizard, while people in savanna areas prefer larger ungulates, duikers, antelopes, and buffalo. They eat what is available.

6. More wild meat is utilized during the dry season than the rainy season.

Explanation

During this period most farmers have less work on their farms, hence they switch to an alternative profession--hunting. Also, most game animals are more susceptible to trapping, circling with hot fires, and shooting in the dry season because there is less cover and the remnant vegetation is dry and ready for ignition.

7. The number of wild animals utilized for food increases as population increases, which also increases poaching.

Explanation

Nigeria's population increases at the rate of 2.5 percent annually (World Bank, 1982). This results in increased demand for animal protein, especially wild meat, and also leads to poaching.

8. The grasscutter (*Thryonomys swinderianus* Temminck, 1827) is widely accepted and utilized for food by more tribes than the African giant rat (*Cricetomys gambianus* Waterhouse, 1840).

Explanation

The grasscutter is a rodent that most people prefer to eat rather than the African giant rat. There are fewer taboos or cultural beliefs prohibiting its consumption. For the African giant rat there are some spiritual taboos associated with it by different tribes.

9. More wild animals are utilized as pets in the savanna and sahel than in the mangrove and rain forests.

Explanation

People in the savanna area keep more wild animals as pets because there are more small mammal species in this ecological zone than in the mangrove where the dominant species are reptiles.

10. More game animals are utilized for food during cultural festivals than during religious festivals.

Explanation

During cultural festivals people rarely forbid consumption of any game meat. Religious festivals forbid consumption of many game meats, especially by Muslims who will never eat pork and various wild meats.

11. Wild animal products (skin and trophies) are utilized more for leather products (bags, belts, and shoes) in the north than in the south.

Explanation

Leather products (bags, belts, and shoes) made from wild animal products are displayed for sale more frequently in markets, hotels, and shopping centers in the northern part than in the southern part of Nigeria. This could be because there are more wildlife species which could be used for this purpose in the north than in the south.

Ecological and Administrative Setting

Nigeria's vegetation is determined by climate, particularly the mean annual rainfall and the severity of the dry season. In the southern, wetter part of the country, rain forest is the climax vegetation, whereas in the drier northern states the climax vegetation is a savanna woodland with grass.

There are five ecological zones in Nigeria. These are the mangrove forest, rain forest, deciduous forest, savanna, and the sahel. For this survey, the sample area (Nigeria) was purposefully divided into three major ecological strata. These strata consist of the rain forest, deciduous forest, and the savanna.

States within the rain forest ecological stratum from which data were collected are: Oyo and Cross River states. In the deciduous forest, data were collected from Bendel and Anambra states. Savanna ecological stratum is the largest area from where data were collected and the states within this area are: Niger, Kwara, Plateau, and Bauchi states. Each stratum represented at least two states and one to two local government councils (counties) from where data were collected. This totals eight states and nine local government councils (counties) in the three strata.

Table 1 shows the states, local government councils (counties), and the strata. Also Appendix A and Figs. 7-12 illustrate by maps the nine different local government councils where the national survey on utilization of wild-life resources was conducted.

Nigeria is a complex country in Africa when it comes to running a stabilized democratic government. The civilian government and the military regime have been the two transitional governments in Nigeria since independence was achieved October 1, 1960. These types of government have a direct influence on the setup of administrative zones in the country. For example, the administrative setting is based on different cultures, tribes, costumes, traditions, and languages.

There are four distinct administrative zones in Nigeria. These include the North West Zone (NWZ), which is comprised of four states, and the Federal Capital Territory (Sokoto, Niger, Kaduna, Kano, and Abuja). The headquarters of the North West Zone is at Kaduna, while Abuja serves as the Federal Capital Territory of the entire country. The North East Zone (NEZ) is primarily composed of the Bauchi, Borno, Plateau, and Gongola states. The headquarters is based in Jos. South West Zone (SWZ) has four states in it and these are Ogun, Ondo, Kwara, Lagos, and Oyo states. The headquarters is at Ibadan. South East Zone (SEZ) is one of the largest zones with five states (Cross River, Anambra, Imo, Bendel, and Rivers states), and the headquarters is in Enugun.

On the basis of the administrative setup in the country, the author purposefully selected at least two states from each administrative zone. A total of eight states (Table 1) were selected from the entire country. Another factor considered in making the purposeful selection was the tribal groups that speak the same language. Bauchi, Plateau, Niger, and Kwara states have the five major tribes (Hausas, Fulanis, Kanuris, Tivs, and Nupes) in the northern part of Nigeria. Oyo, Bendel, Anambra, and Cross Rivers states have the five major tribes (Yorubas, Edos, Ibo, Ibibio, and Efiks) in the southern part of the country.

Table 1. Some Aspects of Ecological and Administrative Setting in Nigeria Used for the Survey Conducted in Nigeria from July to November 1986.

State	Ecological Zone	Administrative Zone	County
Oyo	Rain Forest	SW	Oluyole
Cross Rivers	Rain Forest	SE	Akampa
Bendel	Deciduous	SE	Oredo Ovia
Anambra	Deciduous	SE	Udi
Niger	Savanna	NW	Zuguma
Kwara	Savanna	SW	Borgu
Plateau	Savanna	NE	Nasarawa
Bauchi	Savanna	NE	Alkeleri
		TOTAL	9

Chapter II

LITERATURE REVIEW

Wildlife as a Source of Animal Protein

Protection of wild nature is a special form of land use and should be categorized in a way that acknowledges its uniqueness. Expansion of human population and man's exploitation of resources around him for economic and other purposes, or the exploitation of wildlife itself as a resource tends to displace wildlife, or even put certain species into extinction.

Nigeria has a population of 100 million that is increasing by 2.5 percent per year. People are settling in places which used to be suitable habitat for wildlife. Industrialization, agriculture, and construction of dams and roads are the major factors depleting wildlife habitat in Nigeria. As population increases, poaching also poses a threat to wildlife conservation in Nigeria (Adeola, 1983).

Available data show that where wild meat is readily available and within people's reach and means, it is heavily utilized as food in cities, villages, and mining and industrial areas of Nigeria.

Olawoye and Ajayi (1975) surveyed meat consumption at Ibadan, Nigeria, and found that bushmeat (all wildlife including birds, rodents, and larger animals) constitutes about 25 percent of the protein intake of one-third of the people. Charter (1970) indicated that for locally produced animal food, 19 percent came from wild animals (mostly mammals), 60 percent from fish, and 21 percent from domestic animals in southern Nigeria.

Holsworth (1970) estimated that the production of wild fowl and fish amounted to about N 70 million ($105 million). This means that the bushmeat and other naturally produced animal protein such as fish were worth about N 100 million ($150 million) or 4 percent of the Gross National Product of Nigeria (GNP) in 1965 (Ajayi 1973). Charter (1970) estimated the value of bushmeat consumed annually in southern Nigeria at N 20 million (U.S. $30 million). According to the 1963 census, 26,770 people in Nigeria gave their occupation as hunters. Afolayan (1980) estimated the total annual value of bushmeat in Nigeria as N 30 million (U.S. $45 million) and the total value of naturally-produced protein food at N 100 million (U.S. $150 million).

Ajayi (1972a, 1974, 1978) estimated that 20 percent of the animal protein consumed by residents in rural communities in the southern states of Nigeria is derived from wild meat. Child (1970) and Asibey (1974a, 1976c, 1977, 1978a,b) stressed the important role played by wild meat in the diet of residents of rural communities in Africa, especially in the coastal regions where cattle do not thrive because of tsetse flies and other disease vectors. Riney (1967) and Asibey (1970a,b, 1971, 1974b, and 1975) confirmed that bushmeat constituted over 80 percent of fresh meat consumed in Ghana and that about 50 percent of the population of Africa south of the Sahara depended on wildlife including fish, insects, caterpillars, maggots, snails, and various rodents--as a source of protein in their diet.

Martin (1983) estimated the value of bushmeat trade in Nigeria as N150 million - N200 million ($135 million - $180 million). Roth (1966) confirmed that the meat derived from game animals in Zimbabwe provided enough animal protein for at least 80,000 adult humans. Acceptance of wildlife resources for human food resource cannot be overemphasized (Talbot et al., 1962, 1965; Mossman, 1963, 1964; Bigalke, 1964, 1965; Talbot, 1964; Skinner 1967, 1973).

Tuttle (1983) found that in Guam, bat dinners were sold for $25 a plate, and in West Africa (Nigeria, Ghana, etc.) bats are so valuable that two poachers working together can make $1000 in a single day. Funmilayo (1978) confirmed that Nigerians eat meat mainly from wild animals, and the straw-colored fruit bat (<u>Eidolon helvum</u>) is one of the popular meats. Adeola (1984, 1986) found that bats are shot in large numbers and sold fresh near the roosts and in the markets or are cooked in restaurants, hotels, and beer parlors.

Folorunso and Okpetu (1975) reported on how the fruit bat meat could be prepared deliciously in an average Nigerian home with detailed fruit bat recipes. Halstead (1977) confirmed that one of the most effective methods of cropping roosting bat populations for meat is by shooting them with shotguns.

Bushmeat and Land Use

The pattern of land use in a country is a reflection of its cultural evolution. Consequently, the pattern of land use of any country has to be viewed as a dynamic process. Unfortunately, the current pattern of land use and development planning in Nigeria does not reflect the recognition of wildlife conservation outside a government-owned reservation. Unreserved lands are being rapidly opened up for timber exploitation and other forms of land use and development. At the same time, even lands specially reserved for wild animals are threatened by demand to change their present use. The large herds of Fulani cattle grazing in the northern part of Nigeria make it difficult to find suitable areas for wildlife conservation in the north except those lands owned by federal or state government (Adeola, 1983).

Pressures on reserved lands are expected to increase. The rate of annual population growth is generally high, and the man-land ratio may be expected to grow as fast with

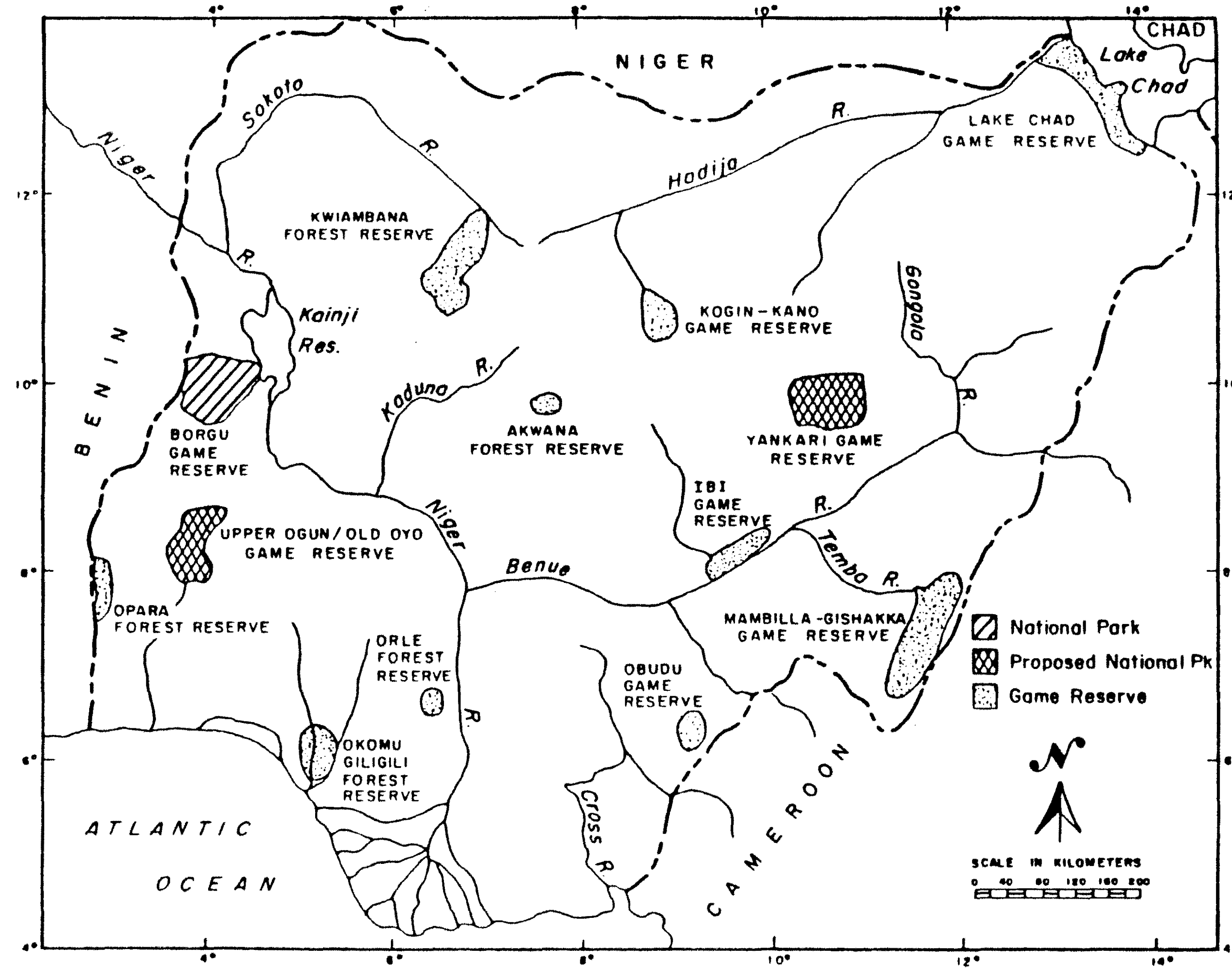

Figure 1. Map of Nigeria showing the national park (Borgu Game Reserve), proposed national park, and game reserves (Adeola 1983).

improved medical services and increasing life expectancy. At the same time, the pattern of land ownership is changing. Communal ownership of land and wild animals with related taboos and customary laws are breaking down and being replaced by statutory laws and law enforcement systems. Land is being individualized following the pattern of Western European and American models. In the end, the existence of wildlife conservation in private land use will be decided by the landowners (Adeola 1983 and Asibey 1976).

Nigeria has 9.8 percent of its land area under some form or degree of conservation. Forest reserves constitute the larger part of the officially conserved area (Appendix B), while game reserves and the national park form about 3 percent (Figure 1) (Afolayan 1980 and Adeola 1983).

It is important to note that the area of land officially under conservation has been rather extensively encroached upon for other land uses. Appendix B summarizes the land use in Nigeria. As the population has exploded and technological know-how has improved, expansion and urbanization programs have increased tremendously. More lands are being demanded for exploitation in all sectors (Appendix B). Indigenous flora and fauna are disappearing at an alarming rate from shifting cultivation and over exploitation. Wild animals, which have always been a good source of protein for the people of Nigeria, are disappearing rapidly. More species are becoming endangered. The trend of human population, land use, desertification, and quality and quantity of tropical rain forests as they affect wildlife conservation are important concerns of Nigeria.

Myers (1981, 1982) confirmed that land-use decisions will be highly influenced by economic criteria. Government's indecision on the position of wild animals in the public pattern of land use will, by and large, be related to economics (Mutinda 1976; Pelinck 1976 and Sayer 1976). FAO (1975) emphasized that in some countries, the proportion of land in national parks and equivalent reserves compares favorably with the area of arable land.

Abel (1976) found that incompatible forms of land use were and still are spreading into what were hitherto strongholds of wild animals. Myers (1972) emphasized that the luxury of land devoted exclusively to wildlife cannot be easily justified in the face of overpopulation. Lusigi (1982) stated that land-use plans for the remaining land in Africa should assume a degree of compatibility between competing uses such as wildlife, animal husbandry, and agriculture. Mutinda (1976) and Asibey (1969a, 1969b, 1977) stressed the economic feasibility of game meat production, processing, and marketing; that it has a strong hold on the effect of land-use patterns on the future supply of wild meat; and that these aspects must be seriously considered in land-use planning.

Wildlife By-Products

Some important uses of wildlife by-products in Nigeria are in cultural festivals (masquerades, death ceremonies, installation of traditional rulers) and in performing ritual rites (traditional medicine, invoking and appeasing traditional gods and witches), especially in rural areas. For example, feathers of parrots, *Poicephalus* spp., are special tools in making masks for masquerades in some communities in the southern part of Nigeria (Irun-Akoko, Ogbagi-Akoko, Ado-Ekiti, Egbe-Ekiti--all in Ondo State in Nigeria). The skins of bush-buck (*Tragelaphus scriptus*), patas monkey (*Erthrocebus patas*) are sacred requirements for a hunter's burial ceremony.

The by-products of wild animals--such as tusks, horns, hooves, skins, feathers, and beaks--are used for various purposes in Nigeria. For example, the tusks and skins of elephant (*Loxodonta africana*) are used for the installation of traditional rulers, the tusks of hippo (*Hippopotamus amphibius*) are used for aphrodisiacs and ornamentals, while the skins of leopard (*Panthera pardus*) and lion (*Panthera leo*) are used for installation of traditional rulers, worn by kings (oba, emir and obi), and are used for making shoes, bags, and winter coats (in the United States).

Skins of hyena (Crocuta crocuta), serval cat (Felis serval), and various antelopes and reptiles are used for making shoes, bags, purses, and may even be worn as clothes. Traditional rulers, local herbalists, and hunters like to decorate their homes with animal skins, ivory, feathers, hooves, and horns.

One important use of wildlife by-products in Nigeria is in traditional medicine (Ajayi 1978). Wild animals and their by-products are widely used for preparations in curative and preventive medicine. More importantly, they are also used for invoking and appeasing traditional gods and witches. Tables 51-58 show the medicinal and witch-craft uses of wildlife by-products in Nigeria (Bauchi, Plateau, Oyo, Bendel, Cross-River, Niger, Kwara, and Anambra States).

Ajayi (1978) reported that leopard skins from tropical forests and savanna regions of Africa were exported to Britain regularly for many years, for decorations in military parades. Ajayi (1978) and Afolayan (1980) confirmed that skins of reptiles, crocodile, python, monitor lizard, and various antelopes are used for shoes, ladies' handbags, purses, and belts.

Ajayi (1970) reported that skins and hides exported in 1966 from Nigeria had a declared value of $1.25 million. He emphasized that the total customs revenue of $40,000 (more or less) was derived primarily from the export of live animals ($10,000) and undressed reptile skins ($25,000). The annual export value of all hides and skins totaled approximately $7.8 million and wild animal skins represented nearly one-quarter of this export trade. Export revenue from wildlife by-products amounted to 0.2 percent of the total export duties earned by Nigeria (Ajayi 1970).

The total revenue including declared value and customs from wild animals and animal by-products was $3.8 million in 1966 (Ajayi 1973). This means that revenue obtained from wildlife in Nigeria in 1966, including bushmeat, was $48.9 million.

Von Richter (1970) reported that wildlife is valued at nearly $10 million annually and is utilized through tourism, trophy dealing, and hunting in Botswana. Nimir (1983) reported the total annual wildlife utilized in southern Darfur, Sudan, as between 35,984 and 18,492 kg of dried wild meat, 124 to 62 leopard skins, 866 to 430 wild cat skins, 388 to 194 ungulate skins, 35,732 python skins, and 2,548 to 1,024 elephant tusks.

Nimir (1983) emphasized that reptile skins are the second most important wild animal product, after elephant tusks, exported from the Sudan. Wilson (1978) stated that some of the reptile skins exported from Darfur (in Sudan) were illegally imported into Darfur in the first place, from southern Sudan, the Republic of Central Africa, and Chad. Nimir (1983) stated that Egypt imported the largest numbers of lizard and python skins from the Sudan, followed by France and the United Kingdom in importation of lizard skins and Greece in the importation of python skins. Switzerland has imported the largest number of crocodile skins, followed by France and Egypt. Saudi Arabia and the United Arab Emirates are the main importers of live animals from the Sudan (Nimir 1983).

Foya (1984) reported that feasible by-products from cropped animals in a pilot hunting scheme were skins, horns, teeth, and ivory. Sales of these products have been a major foreign exchange earner to the Tanzania Game Division. Kahama (1983) stated that wildlife by-products alone produced about U.S. $3 million to the economy of Tanzania.

In South America, the export of wild animals and their hides and skins from Ignitos in Peru to the United States was about U.S. $1 million annually (FAO 1969). Between June and August 1968, 7,169 jaguar skins worth $852,237 were imported from the tropical forests of South America to the United States; of these, 4,422 skins (worth $403,648) came from Brazil alone (FAO 1969). FAO (1967, 1969) reported that considerable amounts of valuable wildlife products were exported to the United States from the tropical forest regions of Asia and Pacific.

For Singapore, exports of crocodile, snake, and lizard skins, live birds, and fish for aquaria were worth $9 million in 1966 (Ajayi 1976). Ajayi (1978) also reported that between July 1965 and July 1966, one million crocodile skins worth $415,340 were imported to the United States from New Guinea.

Game Viewing and Tourism

The development of tourism in Nigeria is justified both by the number and diversity of indigenous wildlife and the general open aspect of the vegetation which facilitates game viewing and photography. Most tourists visiting the Kaniji Lake National Park and Yankari Game Reserves in 1980 and 1981 were favorably impressed by what they observed and several returned later (Adeola 1983).

Revenue from game viewing in national parks and game reserves is increasing. The increase would have been much larger if there had been sufficient conservation education and satisfactory public relations and publicity in Nigeria and abroad.

Afolayan (1980) reported that the University of Ibadan Zoological Garden receives about 240,000 visitors a year and accrues about $90,000 from the sale of entry tickets. The two major national parks in Nigeria (Yankari and Kaniji Lake National Parks) receive about 10,000 and 5,000 visitors, respectively (Afolayan, 1980). The amount accrued from sales of entry tickets, lodging, and food sold to visitors was about $30,000 from Yankari Game Reserve, while that of the Kaniji Lake National Park was $15,000

(Afolayan 1980). Nigeria had 16,878 visitors in 1966 (Nigerian Tourist Association 1968), but only 1 percent made an effort to view wildlife conservation areas (Ajayi 1970).

In Kenya, 225,000 tourists, who came primarily to view African wildlife, produced an export industry worth $12.1 million in 1966 (Denney 1968). Ajayi (1972b) found that tourism contributed about $60 million to Kenya's economy, while Mitchell (1968) found the rate of growth of number of tourists to Kenya to be 39.5 percent in 1962-1963, 45 percent in 1964-1965, and 52 percent in 1965-1966. In the early 1970s, Kenya was earning $60 million a year in hard currency from tourism. This really boosted Kenya's economy, particularly in earning foreign exchange (Republic of Kenya 1976). Gross revenue from existing and potential uses of Amboseli National Park in southern Kenya was calculated as $1.2 million (Western 1982).

Mitchell (1968) reported that tourism brought about $60 million to Kenya's economy annually. The rule of thumb is that in East Africa for every one dollar spent by an overseas visitor, 40 cents goes to imported items, leaving a net addition of foreign exchange of 60 cents. This means that Kenya derives a foreign exchange of about $22 million annually from tourism (Ajayi 1978). Hall (1972) stated that Kenya is pulling ahead in tourism faster than is being planned for the current development plan. Ajayi (1978) confirmed that tourism creates jobs for about 20,000 people in hotels and airlines in East Africa. He also stated that the growth level of revenue from tourism in Kenya is about 30 percent annually. In 1966, about $4,511,400 was derived from sport-hunters visiting East Africa (Clarke et al. 1968). In the same year, revenue from photographic safaris (i.e., visitors who came for the purpose of producing films) was $3 million (Ajayi 1978).

In Uganda, the number of visitors entering the Murchison Falls Park rose from 7,500 in 1954, to 58,739 in 1970. Between 1960 and 1964, tourist revenues grew at a rate of 24.4 percent in Uganda, faster than either Kenya or Tanzania. On the basis of this trend, predictions were tentatively made that revenues from tourism could reach $28 million by 1975, and $85 million by 1980 (Laws et al. 1975). Von Richter (1976) confirmed that wildlife is valued at nearly $1 million annually and is utilized through tourism, trophy dealing, and hunting in Botswana.

Tanzania's major tourist attraction is wildlife and the number of tourists to the country's national park is growing approximately 10-15 percent annually (Ajayi 1973). Tourism was the second largest foreign exchange earner for Tanzania (second to revenue from agriculture) in 1972 (Ajayi 1973). In 1968, an estimated 40,000 foreign visitors to Tanzania Park spent about $6 million (Ajayi 1973). The amount realized directly by Manyara National Park in

Tanzania from gate fees and accommodations was $225,000 in 1970 (Ajayi 1973).

Game Cropping

One way to justify wildlife conservation in most African countries is to crop the over-populated big game in game reserves and national parks to feed the hungry masses. Game cropping and sport hunting could be a profitable way of using some of the existing game reserves which are not accessible to tourists either because of rugged terrain (Obudu, Mambilla-Gashaka game reserves) or where the river systems have made it impossible to build roads. Other game reserves (Ifon and Meko game reserves) could be set aside for controlled hunting for meat supply to the people in rural areas (Ajayi 1975a,c; Curry-Lindahl 1969a,b and St. John 1971).

The buffer zones of national parks could be set aside for integrated multiple uses. An example of this approach is applied to Kenya by Lusigi (1981). Some managed cropping of wildlife on a sustained yield basis would occur in this area (Mossman 1963; Talbot 1963 and Linear 1970). This particular system will not suit every situation, but the general concept of buffering the strictly protected areas with partly controlled areas is important.

Cropping of elephants is an annual event in Nigeria (Wildlife Division - Borno State). This is done to reduce the number of elephants and their menace to humans and crops. Child and Henshaw (1971, 1972) discussed the new attitudes regarding wildlife utilization in Nigeria such as cropping of animals, removal of trophies and skins, and processing the meat. According to the two FAO wildlife experts, the most telling argument for the protection of wildlife in Nigeria is their utilization for meat. A sustained yield of game would be more profitable than a sustained yield of sheep or cattle in some areas (Darling, 1960, 1961 and Zyl, 1962).

Child (1982) found that hunting in safari areas in Zimbabwe yielded about $550,000 in profit paid to the local District Council. Other reports on the potential of wild-life resources as a paramount contribution to alleviate shortages of animal protein in the rural population have been confirmed by many authors (Cremoux, 1963; Petrides, 1965; Chevallarie 1970, 1972; Pollock 1969 and Huxley 1962).

Foya (1984) reported that in Tanzania peasant populations cropped and ate a wide variety of mammals, birds and reptiles from which they obtained most of their protein. Authors reporting similar results include Ledger (1964), FAO (1966), Talbot (1966), Field (1974), De Vos (1978), and Cumming (1981).

Cropping of game in Africa has been advocated (Lamprey 1964; Talbot 1966; Dodds 1967; Brown 1974; Mankoto 1978 and Lusigi 1981). Swank et al. (1974)

confirmed that the operation in Kenya could yield a private cropper a profit in the range of 20 to 40 percent per annum of the total revenue. Hanks et al. (1981) also found that from 1975 to 1979, Kruger National Park obtained 32 percent of its total net income from cropping. Reinwald (1968), Hvidberg-Hansen (1971), and Western (1979) stated that game cropping can be most profitable when undertaken by a specialized private company. Foya (1984) found that approximations of costs and returns from cropping schemes in South Africa, Zambia, Zimbabwe, Tanzania, and Kenya have shown that cropping of wild animals is profitable. He reported that in 1983, revenue generated by the presence of wildlife in Tanzania amounted to U.S. $3 million, including returns from the cropping scheme.

Cheffings (1975) found that in the 1970s the Tanzania Game Division was removing an average of 10,000 elephants per year to protect crops. Ferrar (1983), Ledger (1963), and Ledger et al. (1967) indicated that wildlife cropping could be used as a management tool to prevent range and habitat degradation, risk of mass die-offs, and the consequent loss of animal products which cannot be tolerated where the majority of people are short of animal protein. The theory on cropping wildlife was well reviewed by Dasmann (1964, 1965), Caughley (1976), Mentis et al. (1976), Schmidt et al. (1978), and Riney (1982).

Young (1975) emphasized that the cropping technique should make provisions for humanity, minimal disturbance, economy, efficiency, low wounding losses, little damage to carcasses, and adequate bleeding. In the United States, white-tailed deer, bighorn sheep, bison, and elk have been taken by trapping (Schmidt et al. 1978). Portable and permanent corrals are used extensively in Africa (Pienaar 1973; Riney 1982). Swank et al. (1974) confirmed that drive trapping was used in a cropping project in Kaijiado (Kenya) but found that the method was partially successful when large traps were used and animals were driven by helicopter. Parker and Graham (1975) stated that when a 500 m net was used to trap a herd of gazelles, the few which passed through became entangled and were bruised so extensively that their carcasses had to be condemned.

Riney (1982) found that driving the animals toward shooters improves the harvest rate, but the likelihood of accidents in the hunting crew increases. Densham et al. (1979) indicated that the success rate has improved elsewhere (the United States and South Africa) by using hides for the shooters. Steel (1968) found that in Luangwe Valley, Zambia, conventional shooting was used to crop 20 elephants, 20 buffalo, and 40 hippos in 1964.

Another method of cropping used successfully in Nigeria, Zambia, the United States, and South Africa (Kruger National Park) is darting animals with drugs. Steel

(1968), Harthoorn (1976), and Riney (1982), emphasized that drugs have been used successfully in cropping elephants, hippos and buffalos.

Chapter III

STUDY AREA

Historical Background

Nigeria is the most populous black African country in the world. It has a population of about 100 million with an annual increase of 2.5 percent (WRC 1982 and Adeola, 1983). This population belongs to many ethnic groups, each of which has its own customs, cultures, traditions, costumes, and languages. The larger groups are the Hausas, Fulanis, and Kanuris in the north; the Tivs and Nupes in the middle belt; and the Yorubas, Ibos, Ibibios, and Edos in the south. Based on these major tribal groups, Nigeria got split into its present 19 states, including the Federal Capital Territory (Abuja).

Nigeria has an area of 356,699 square miles (923,773 Km^2). Located approximately between 4° and 14° N, and 3° and 14°E, its territory extends about 650 miles (1,050 Km) from north to south, and 700 miles (1,134 Km) east to west. It is bordered on the south by the Gulf of Guinea, on the west by the Republic of Benin, on the north by the Republic of the Niger, and on the east by the Republics of Chad and Cameroon. Part of the eastern boundary runs along the crest of the Adamawa Plateau (Adeola 1983; Udo 1970 and

Buchanan 1966). Figure 2 shows the 19 states, including the Federal Capital Territory (Abuja), and the state capitals.

Modern Nigeria dates from 1914, when the two British protectorates of Northern and Southern Nigeria were joined. The country became independent on October 1, 1960, and three years later adopted a republican constitution, but elected to remain a member of the Commonwealth of Nations. Relics of British rule are still to be seen in Nigerian life. The official language, English, is likely to remain because there are more than 200 different languages spoken by the many tribal groups living in the country (Adeola 1983). Trade and cultural contacts with the more distant English-speaking countries of Ghana and Sierra Leone remain stronger than those with the adjacent French-speaking Dahomey, Niger, and Cameroon. Nigeria's major foreign exchange commodity is oil, and per capita income was was $1,010 (Adeola 1983 and WRC 1982).

Islam is the predominant religion in the far north, but the south is predominantly Christian, although Moslems outnumber Christians in some parts of Yorubaland (Ijebus and Ibadans). Christianity has also made great inroads in the middle belt (Jos, Makurdi, and southern Zaria), but in some regions of Nigerians are pagans, worshipping several gods and practicing in polygamy.

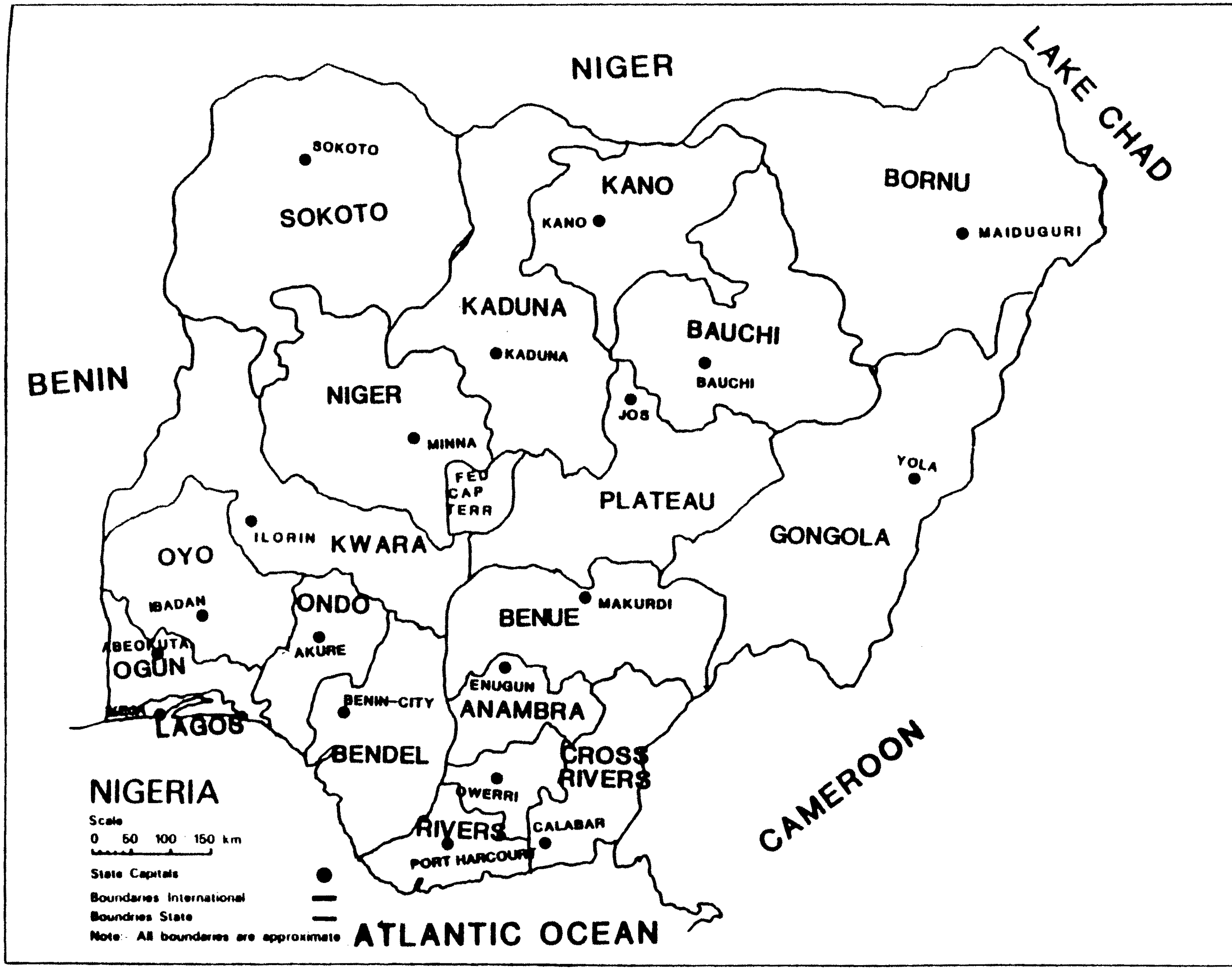

Figure 2. Map of Nigeria showing the nineteen states including the Federal Capital Territory and the state capitals.

Geology and Soil

Nigeria is on the lower part of the great African continental plateau, which slopes slowly downward from south and east to north and west. Nigeria itself consists of several eroded surfaces, occurring as plateaus, at elevations of approximately 2,000 feet (610 m), 3,000 feet (915 m), and 4,000 feet (1,220 m) above sea level. The coastal areas, including the Niger Delta, are covered with young soft rocks, commonly found in the Lake Chad Basin, and the western parts of the Sokoto region. Gently undulating plains, which become waterlogged during the rainy season, are found in these areas. In most parts of the western states, and in the central part of the northern states, the underlying rocks are old and hard, and the characteristic landforms consist of high plains with broad shallow valleys dotted with numerous hills or inselbergs (steep-sided residual masses of rock, left after erosion (Adeola 1983).

The Udi Hills, with their sharp faces turned eastward, are perhaps the country's most prominent relief feature. Other prominent relief forms include the Jos Plateau and the Biu Plateau, both of which are dotted with numerous extinct volcanic cones. The craters of these volcanic hills are well preserved; several of them contain crater lakes (Udo 1970).

The four main soil groups correspond closely with the main climatic and vegetation zones, which comprise the coastal swamp and alluvial soils, the rain forest soils, the lateritic soils (red soils), and the sandy soils of the north.

Along the coast, the soils are either sandy or swampy and, like the soils of the forest belt, are heavily leached. In the rain forest belt, soils derived from old hard rocks, complex in structure, which pre-date the sedimentary rocks found elsewhere, support cocoa trees, while those derived from sandstones do not. Under cultivation, forest soils soon lose their fertility, which is concentrated in a thin top layer. Lateritic soils, which form along gentle slopes in areas with a markedly dry season, are widespread. Rich in iron compounds, and sometimes so hard as to appear to be rocks, they are difficult to cultivate (Adeola 1983).

Soil erosion is most obvious in those densely populated areas of northern and eastern Nigeria in which overcultivation and overgrazing have exposed the soil to erosion by wind and running water. The areas most affected include the farmlands of Iboland in the east, where the threat posed by advancing gullies has resulted in the abandonment of some villages; the Jos Plateau in the center; and the Kano-Katsina region and parts of Sokoto region, in the north. In the extreme north, wind erosion is particularly noticeable toward the end of the dry season, when the winds preceding the onset of the rains move away much soil (Buchanan 1966).

Climate and Drainage

Nigeria has a tropical climate with wet and dry seasons. It is hot and wet throughout the year in the southeast but markedly dry in the southwest and further inland. Duration of the seasons depends on the relation of the area to the sea or to the Sahara. Three climatic patterns are distinguished: (1) a tropical wet climate in the southeast with uniformly high temperatures and heavy rainfall distributed throughout the year; (2) a tropical wet and dry, or savanna, climate in the north and west; and (3) the dry, or steppe, climate in the far north (Adeola 1983). Figure 3 shows the climate classification of Nigeria.

Two air masses, the equatorial maritime and the tropical continental, dominate the climate. The former is associated with the rain-bearing southwest monsoon, which blows from the ocean; the latter is associated with the harmattan, a dry and dusty wind from the Sahara. In general, the length of the rainy and dry seasons decreases from south to north. In the south, the rainy season lasts from March to November. In the far north, however, it lasts only from mid-May to September. This pattern is

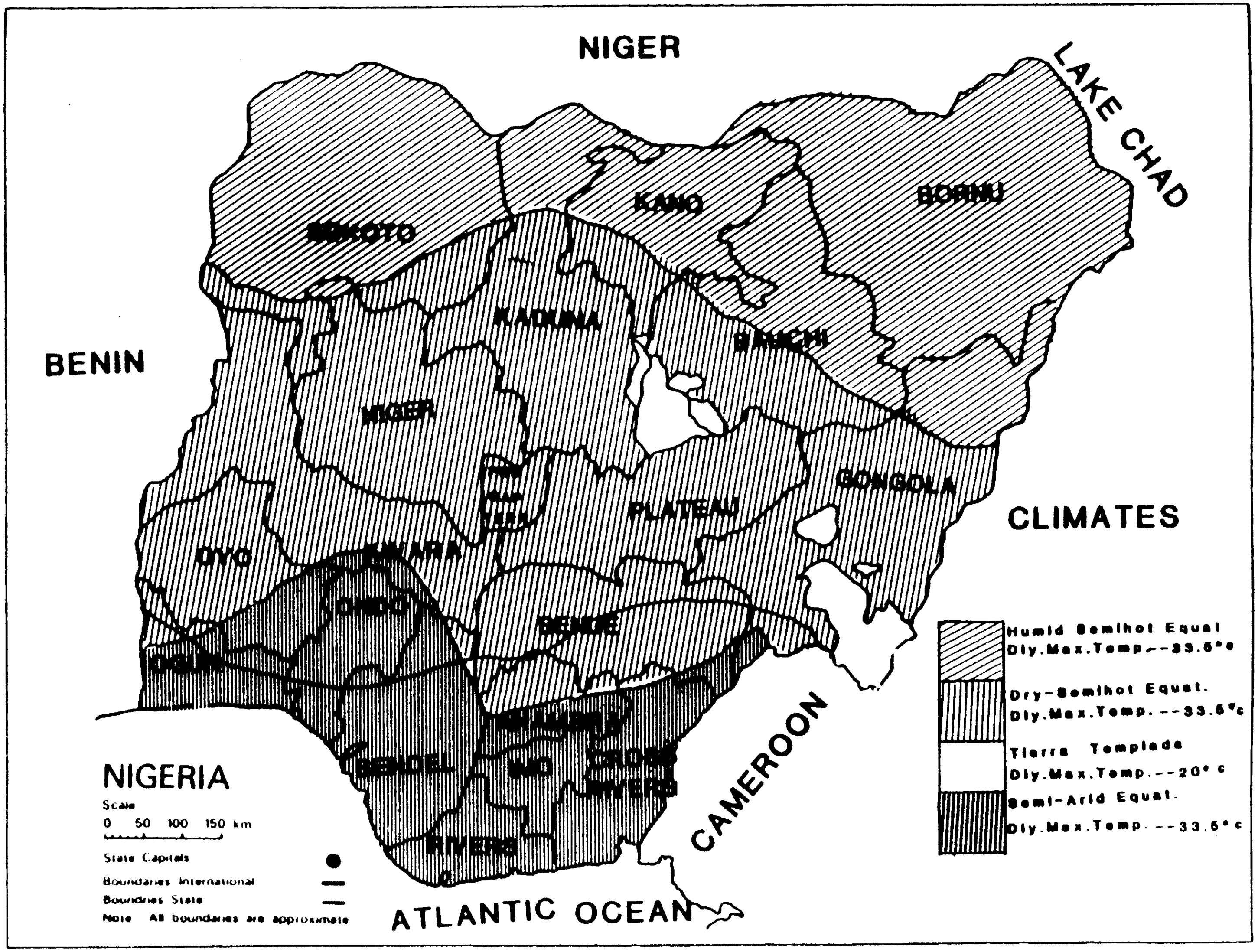

Figure 3. The climatic classification in Nigeria.

interrupted in the south, where rainfall reaches a peak twice a year and where there is a break in the rains in August. There are thus four seasons in the south: the long rainy season (March to early August), the short dry season (August), the short rainy season (September to early November), and the long dry season (mid-November to February) (Adeola 1983).

Rainfall is heavier and more reliable in the south, particularly in the southeast, which has more than 120 inches (3,050 mm) a year, compared with 70 inches (1,779 mm) in the southwest. The annual rainfall decreases as one moves farther from the coast; in the far north it is not more than 20 inches (508 m). The rainy season is preceded by intense heat, after which the drought is broken by heavy thunderstorms accompanied by lightning, during which as much as 1.5 inches (38 mm) of rain may fall in less than one hour (Walter 1967).

Temperature and humidity remain relatively constant throughout the year in the south. In the north, however, considerable seasonal changes occur, and the daily temperature range is wide during the dry season. On the coast, the mean monthly maximum temperatures are steady throughout the year, remaining, for example, constant at 95°F (35°C) at Lagos and at about 85°F (29°C) at Port Harcourt; the mean monthly minimum temperatures remain at approximately 70°F (21°C) for Lagos, and at 73°F (23°C) for Port Harcourt.

In the northeastern city of Maiduguri, on the other hand, the mean monthly maximum temperature may exceed 100°F (38°C) during the hot months of April and May, while in the same season frosts can also occur at night (Adeola 1983).

There are three major drainage areas--the Niger-Benue Basin; the Lake Chad Basin; and the coastal, or Gulf of Guinea, basin. The Niger River, after which the country is named, and the Benue, its largest tributary, are the principal rivers. Both have their sources outside the country. The Niger has numerous rapids and waterfalls, but the Benue (whose valley, in its Nigerian course, is cut through young sedimentary rocks) is not interrupted by waterfalls and is navigable throughout its length whenever the water level is high enough. All the rivers draining the area north of the Niger-Benue trough rise on the Jos Plateau. These include the Sokoto, the Kaduna, and the Gongola as well as the rivers draining into Lake Chad. The coastal areas are drained by short rivers, which flow from north to south into the Gulf of Guinea (Adeola 1983).

Navigation is restricted to river stretches unhampered by rapids or falls. During the months of the dry season, the low water level renders navigation impossible, even along the Benue, which is free of rapids. During this season smaller streams may dry up completely. Only half of Lake Chad lies within Nigerian territory.

Vegetation

Vegetation in Nigeria is governed by the south to north decrease in rainfall, and the main vegetation belts run, therefore, in broad east to west belts, parallel to the Equator. Mangrove and freshwater swamps occur along the coast and in the Niger Delta. A few miles inland, swamps give way to dense tropical rain forests, in which the most important economic species of trees include such hardwoods as mahogany (*Khaya ivorensis*), iroko (*Chlorophora excelsa*) (a tree with mottled wood), and obeche (*Triplochiton scleroxylon*), which has whitish wood. The valuable oil palm tree grows wild in the forest and is usually preserved when the forest is cleared for cultivation. In the more densely populated parts of Iboland and Ibibioland--areas in the southeast--the original forest vegetation has been completely replaced by open palm bush. In the western and midwestern states, large forested areas have replaced by cocoa and rubber farms (Keay 1959 and Clayton 1957).

Tree-studded savanna (tropical grassland) occupies more than half the area north of the forest belt. The savanna landscape becomes more open in the far north and is characterized by scattered stunted trees and short grass. Semi-desert conditions appear in the Lake Chad region, where common trees include various species of acacia (of which one is the source of gum arabic) and the doum species of palm. Gallery forests (narrow forest zones occurring along rivers) are also characteristic of the open type of savanna landscape encountered in the north (Keay 1959).

The most important vegetation associated with the national survey on utilization of wildlife resources that will be discussed in this paper are: rain forest, deciduous forest, and savanna. Figure 4 illustrates the different components of vegetation in Nigeria.

Rain Forest

The rain forest is less extensive than it used to be. It is now restricted to a few forest reserves in Ondo, Bendel, and Cross River states. The forest consists of evergreen phreatophytic (water-tolerant) plants of great species diversity, and is characteristically stratified. Three different tree layers can be identified. The upper tree layer consists of very tall trees of 40-50 m in height, while the middle tree layer is about 16-40 m high. The lower tree layer forms a more or less continuous canopy at a height of 10-16 m. Tree crowns are narrow and closely packed. Below the tree layers are the shrub and the herb layers; the latter in fact contain more young trees and seedlings than mature shrubs (Barbour et al. 1983).

Some of the matured trees include: *Albizia* spp., *Alstonia boonei*, *Amphimas pterocarpoides*, *Aubrevillea* spp., *Berlinia* spp., *Cola* spp., *Dacryodes edulis*, *Entandrophragma*

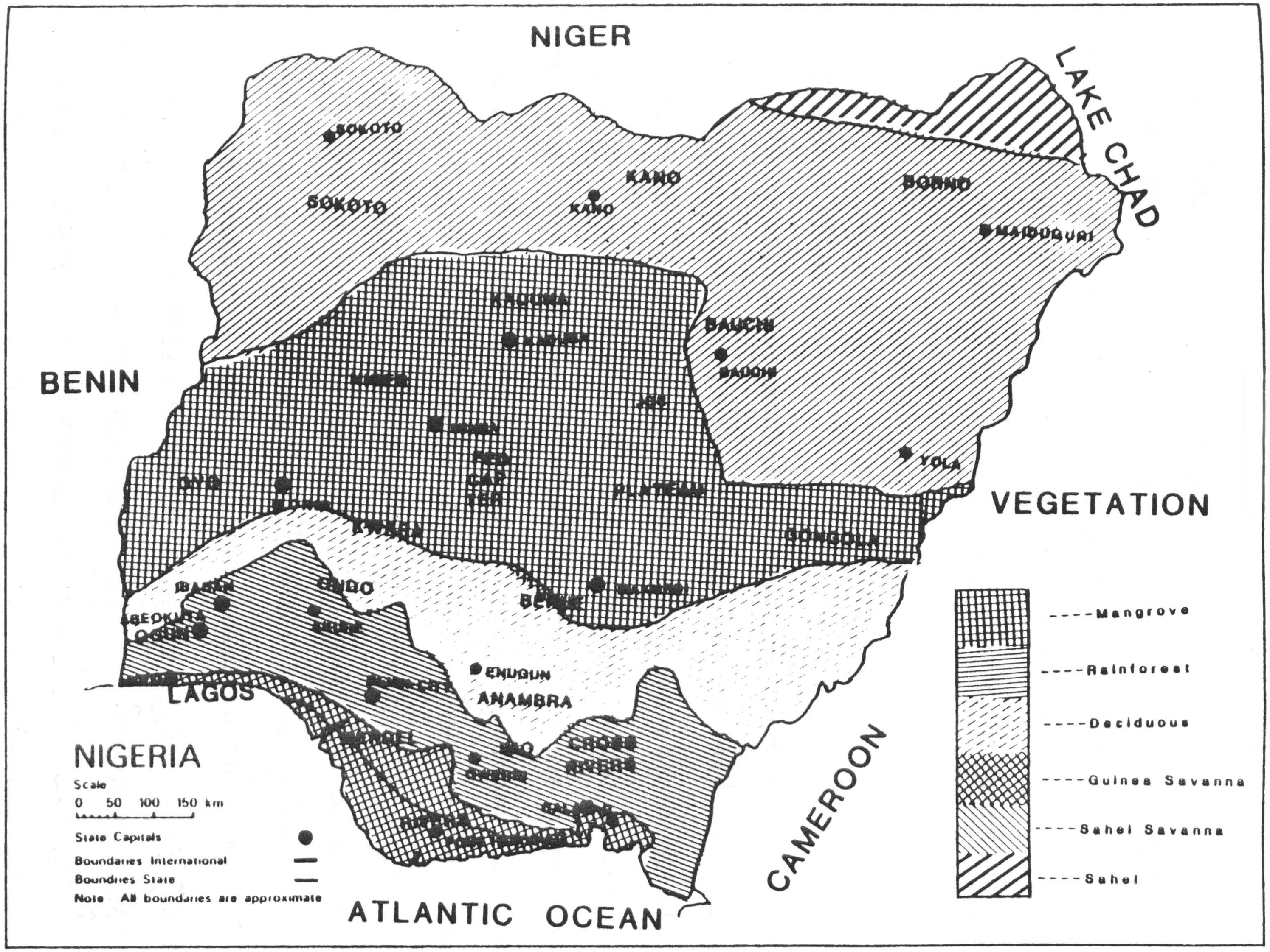

Figure 4. Vegetation of Nigeria

angolense, Erythrophleum ivorensis, Fagara macrophylla, Khaya ivorensis, Irvingia gabonensis, Lovoa trichilioides, Uapaca spp., Vitex spp., Lophira alata, Piptadeniastrum africanum, and Scottellia coriacea (FDF 1984).

Shrubs, herbs, and climbers found in the rain forest include: Eupatorium odoratum, Alchornea spp., and Entada spp.

Deciduous Forest

This is the vegetation pattern characteristic of the derived savanna. High rural population densities, shifting cultivation, and annual bush-burning have all combined to degrade the original high forest vegetation to derived savanna. Most of the fire-tender forest trees have been progressively replaced by fire-tolerant species. In some areas only isolated stands of a few forest-emergent trees remain as evidence of the original forest. Character of the vegetation varies rapidly over short distances. Low forests, dense woodlands and thickets alternate with open tree and grass savanna. Dominant trees in this region include: Chlorophora excelsa, Elaesis guineensis, Ceiba pentandra, Harungana madagascariensis, Hevea brasiliensis, Irvingia gabonensis, Mimusops warneckei, Musanga cecropioides, Terminalia superba, and Trema guineensis (FDF 1984).

Savanna Woodland Grasses

The savanna woodland grasses are located in the northern part with a few patches in the southern part of Nigeria (Adeola 1983 and Keay 1961). It covers about 180,710 square miles (468,000 Km^2) of the country's total land area (Adeola 1983). It's the most important and productive vegetation associated with wildlife in Nigeria (Geerling 1973).

Savanna woodland is well developed with trees up to 50 feet (15 m) tall with spreading crowns and a continuous tall grass layer occurring on high level sites or gentle slope with well developed and deep soils. Afzelia africana is the dominant tree; other common species include Burkea africana, Afrormosia laxiflora, Anogeissus leiocarpus, Boswellia dalzielli, Pterocarpus erinaceus, Detarium microcarpum, Isoberlina spp., Prosopis africana, Terminalia avicennioides, and Uapaca togoensis.

Grass cover is dense and tall, up to 8 feet (2.5 m) high at the end of the rainy season and dominated by the annual Hyparrhenia involucrata. Other dominant grasses include: Andropogon gayanus, Aristida kerstingii, Beckeropsis uniseta, Panicum spp., Schizachyrium exile, Pennisetum spp., Schoenefeldia spp., and Imperata cylindrica.

Important shrubs in this region are Acacia spp., Lannea spp., Combretum spp., Crossopteryx febrifuga, Lophira lanceolata, Strychnos spinosa, and Ziziphus abyssinica. Some important vegetation types associated with rain forest, deciduous forest, and savanna are provided by Hutchinson and Dalziel (1954-72), Hopkins (1975), and Adeola (1983).

Fauna

The distribution of wildlife in Nigeria relates to the pattern of vegetational cover. Many species of antelope and carnivores are found in the grassland of the northern states, while species requiring forested habitat are confined to the rain forest in the southern states. There is no monitoring or census of wildlife outside the game reserves and national parks in Nigeria. One of the places where there is adequate census data and intensive wildlife management practice is the Kainji Lake National Park. Information about fauna will be based on this national park because there are no data from other game reserves in Nigeria.

Child (1973) reported 60 species of wild game animals at the Kainiji Lake National Park. These included members of the following orders: Carnivora (16), Rodentia (13), Artiodactyla (12), Chiroptera (6), Primates (5), Insectivora (2), Lagomorpha (1), Pholidota (1), Proboscidea (1), Sirenia (1), Tubulidentata (1), Hydracoidea (1), Reptilia (21), and Mollusca (1). There are also nine species of Amphibia and over 350 species of birds. The composition of the mammalian fauna of Nigeria is typical of a well watered Guinea savanna. It includes species associated with wooded savanna such as hartebeest (Alcelaphus buselaphus), elephant (Loxodonta africana), buffalo (Syncerus cafer), hippopotamus (Hippopotamus amphibius), warthog (Phacochoerus aethiopicus), bush buck (Tragelaphus scriptus), red-flanked duiker (Cephalophus rufilatus), Grimm's duiker (Sylvicapra grimmia, water buck (Kobus defessa), kob (Kobus kobus), roan antelope (Hippotragus equinus), oribi (Ourebia ourebia), lion (Panthera leo), and leopard (Panthera pardus). Many of these species are associated with adequate perennial water supplies within savanna and forest outliers. Appendix D gives the checklists of mammals, birds, reptiles, and molluscs useds in the farmers and hunters survey.

Chapter IV

METHODS AND MATERIALS

Primary objectives of this study were to determine: the wildlife species the Nigerian people use, in what quantity, and during what season; the effect of religion, culture, and tribal festivals on game species utilized; the game species utilized or consumed in different ecological zones; which game species and parts of wild animals are used for healing and preventive medicine in each ecological zone; and the economic and recreational values of the utilized wildlife.

To accomplish the objectives, a nationwide survey was conducted in three ecological strata and four administrative zones in Nigeria. During the survey, the interview questionnaire method was used to collect data on the consumptive and nonconsumptive uses of wildlife resources in the rural areas of Nigeria. The major parks and zoological gardens were also surveyed to assess economic and recreational values of wildlife resources in Nigeria.

Design of Questionnaire

The questionnaire consisted of three parts: 1) non-consumptive uses of wildlife; 2) farmers' identification, availability, and consumptive uses of wildlife; and 3) hunters' identification, availability, and consumptive uses of wildlife. See Appendix C for a sample questionnaire.

I. On the farmers' and hunters' surveys, the interview questionnaire method was used to collect data on the following:

1. Which game species are utilized, when, and in what quantity?
2. The effect of religion, culture, and tribal beliefs on the game species utilized.
3. The preferred game species utilized or consumed in various ecological and administrative zones, states, and counties.
4. Which wildlife species are utilized for ritual, invoking and appeasing traditional gods and witches.
5. Which game species and parts of wild animals are utilized for healings and preventive medicine in each ecological zone?

II. A questionnaire on national parks, zoological gardens, and game reserves was used to collect the following data:

1. Nonconsumptive use of wildlife to assess economic and recreational values in terms of revenue accruing from visitors from entrance and guide fees.

2. The percentage or number of visitors visiting these recreational areas per day per month.
3. Determine an average cost for each visitor in terms of money spent on transportation, lodging, and food per day per month.

Sampling Procedure

The sample area (Nigeria) was divided into three major ecological strata (rain forest, deciduous and savanna). States, counties, administrative and ecological zones were purposely selected. From each of the selected local government councils (counties), 5-6 villages, 12-15 households, and 3-6 hunters were selected using tables of random numbers or drawing villages or household numbers out of a random list.

Four (4) interviewers were attached to one supervisor: three enumerators for the farmers and one interviewer for the hunters in each village. Four questionnaires each were used by three interviewers for the farmers, while three questionnaires each were used by an interviewer for the hunters per village per day. This makes a total of 15 questionnaires per village per day. In five villages for one week (Monday through Friday) 75 farmers and hunters were interviewed. Therefore, a total of 600 farmers and hunters were interviewed in the eight states. Sample size is shown in Table 2. The distance to town from each of the villages where the survey was conducted was based on a minimum of 32 kilometers.

Four zoological gardens (Jos, Enugun, Ibadan, and Ogba Zoos) and three major parks (Kainji Lake National Park, Yankari Game Reserve, and Jos Wildlife Park) (Fig. 6) were chosen selectively, based on ecological zone, to assess economic and recreational values of wildlife resources in Nigeria. More importantly, one to two zoological gardens were drawn from each administrative structure zone (NW, NE, SE, SW) so each zone is represented.

Groups of visitors or each visitor into the parks and zoological gardens were selected using tables of random numbers or drawing visitors' numbers out of a random list. With this method, 10 questionnaires were filled out each day for a week at gate entrances of the zoological gardens and of the three major parks. Seventy questionnaires were filled out for each of the conservation areas, making a grand total of 490 questionnaires (Table 3).

Survey Implementation

Conducting a survey in developing countries like Nigeria can be frustrating if proper public relations and relevant official procedures are not strictly followed. The first step of the study was to inform the extension services of the federal and state Ministry of Agriculture and the Department of Forestry of the survey, where and

Table 2. Sample Size for the farmers' and hunters' survey conducted in Nigeria, July to November 1986.

State	Ecological Zone	Administrative zone	Sample Size Households	Hunters	Total
Plateau	Savanna	NE	60	15	75
Bauchi	Savanna	NE	60	15	75
Niger	Savanna	NW	60	15	75
Kwara	Savanna	SW	60	15	75
Oyo	Rain Forest	SW	60	15	75
Cross Rivers	Rain Forest	SE	60	15	75
Anambra	Deciduous	SE	60	15	75
Bendel	Deciduous	SE	60	15	75
				TOTAL	600

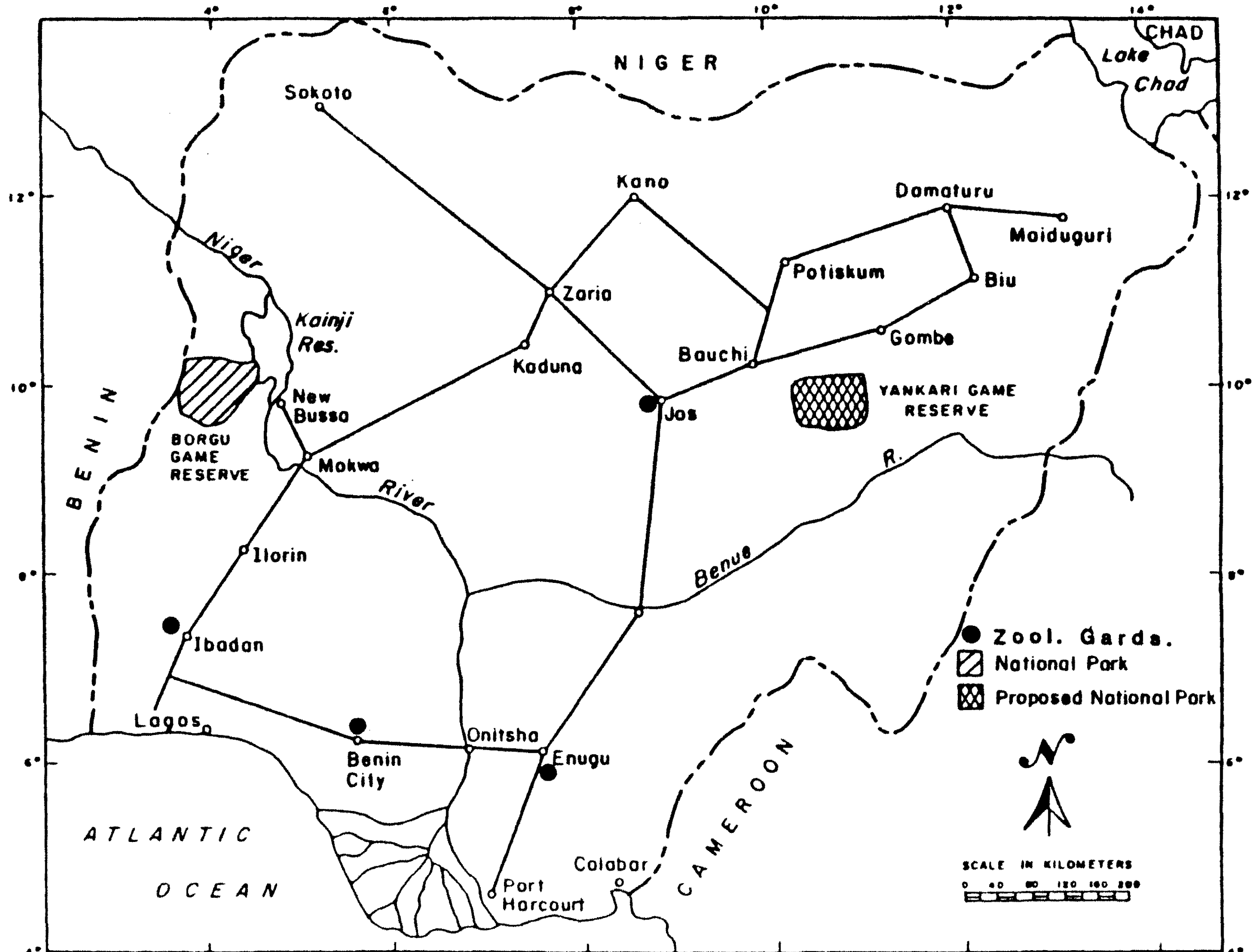

Figure 5. National parks, proposed national park, and important zoological gardens in Nigeria.

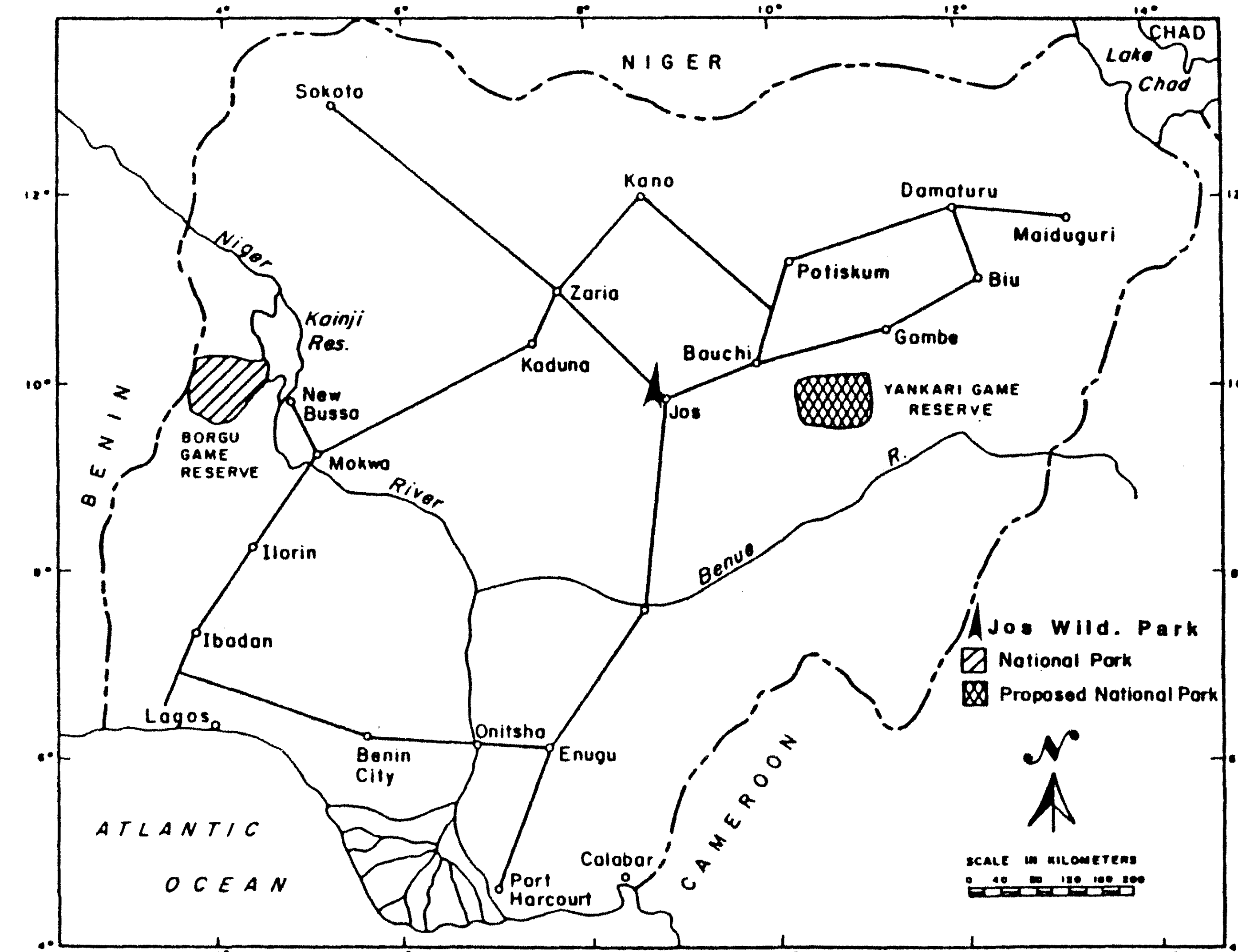

Figure 6. Map of Nigeria showing main access routes to Kainji Lake National Park (Borgu Game Reserve), Yankari, and the Jos Wildlife Park.

Table 3. Sample Size of a Survey Conducted in the Parks and Zoological Gardens in Nigeria from July to November 1986.

State	Ecological Zone	Administrative Zone	Parks and Zoological Gardens	Questionnaires per day	Sample Size: Questionnaires per week (7 da)	Sample Size: Total
Bauchi	Savanna	NE	Yankari	10	70	70
Plateau	Savanna	NE	Jos Zoo	10	70	70
			Jos Wildlife Park	10	70	70
Kwara	Savanna Savanna	SW NW	Kainji Lake National Park	10	70	70
Anambra	Deciduous	SE	Enugum Zoo	10	70	70
Bendel	Deciduous	SE	Ogba Zoo	10	70	70
Oyo	Rain Forest	SW	Ibadan Zoo	10	70	70
					TOTAL	490

when the survey would be conducted, and the duration of the survey.

The local government council (counties) areas where the survey was conducted were told over the news media (radio, TV, and local newspapers) and basic communication systems (official letters were written and meetings were held with the top officials of all counties and states where the survey was taking place, including the local chiefs, obas, emirs, and obis) that government officials from the Federal Ministry of Agriculture would be interviewing farmers and hunters in their villages about the utilization of wildlife. It was emphasized that the information collected would never be used against any person.

The survey of farmers and hunters began with a training session in each of the local government councils (counties) to instruct the interviewers and supervisors in the procedures necessary to successfully administer the questionnaire. After the necessary training, a pre-test of the questionnaire and procedures was conducted to detect any inadequacies in wording and/or structure of the questionnaire. This was also useful to determine whether the interviewer understood the questionnaire and the response of farmers and hunters to each of the questions in the questionnaire. Results of the pre-test indicated the questionnaires could be used with little change, the farmers and hunters were willing to cooperate, and the interviewers making the contacts were adequately prepared and trained.

The primary tool in collecting information was a person-to-person interview. The interview method was selected because it would yield the most reliable data for the type of information being collected (Murphy and Sprey 1983; Kearl et al. 1975 and Gordon 1969). Interviews per farmer and hunter lasted about 45 minutes to one hour and were on a person-to-person basis, with opportunity for the interviewee to express his views. At the end of the day all questionnaires were thoroughly reviewed.

In the parks and zoological gardens, each gateman was trained to fill out questionnaires. From the randomly selected visitors number, the gatemen gave each group of visitors or visitor a questionnaire on their way into the park or zoo. In this way, 10 questionnaires were filled out per day for a week (Monday through Sunday) in each of the conservation areas. The number of visitors per annum was calculated by counting the stubs of official receipts at each gate per day per month from the previous year (1985).

Full-time interviewing was conducted from July to November 1986. Total time spent arranging and conducting interviews was estimated at 650 hours.

Data Analysis

After interviews were completed, data were entered on the NCR, PCB, IBM-compatible computer with software for processing. Data analysis involved comparing park and zoological garden characteristics, i.e., revenue accruing from visitors' entrance and guide fees; the percentage or numbers of visitors visiting the parks and zoological gardens; and the average cost of each visitor in terms of money spent on transportation, lodging, and food.

Summary descriptive statistics were computed for all variables in the farmers and hunters data analysis. These included frequencies, percent relative frequencies, means, standard deviations, medians and modes. These statistics serve as the basis for more detailed analysis and testing procedures.

Statistical testing procedures used included chi-square tests of significance. The chi-squared test is more meaningful, especially when categorical data are compared with an independent variable. The chi-squared procedure tests whether a relationship exists between two variables by comparing expected frequencies with actual frequencies of response, judges how the data are distributed, and measures index of dispersion. The 0.05 level of significance was used for the chi-squared tests.

Chapter V

ANALYTICAL RESULTS AND DISCUSSION OF THE ECONOMIC AND RECREATIONAL VALUES

Conservation areas including national parks, game reserves, zoological gardens, and sanctuaries have proved to be one of the world's greatest attractions for tourists. Tourist revenue begins with fares paid for international and local air and land transportation. Land transportation is accomplished using personal vehicles, boarding taxis and buses, or hiring vehicles. This is followed by paying hotel bills and entry fees, which vary from one national park to another. In addition, tourists pay for services such as game guides and interpreters, and purchase locally made goods like crafts, clothing, materials depicting different cultures, and souvenirs.

This section highlights nonconsumptive uses of wildlife resources in Nigeria. Areas of emphasis include the revenue accrued from visitors for entrance and guide fees; percentage of visitors visiting the parks and zoos; and the average cost for each visitor in terms of money spent on transportation, lodging, and food.

Park Attendance by Age and Sex

Table 4 shows that out of the total of 3,175 people sampled as they visited the parks (Yankari, Kainji Lake National Park, and Jos Wildlife Park) and zoological gardens (Ibadan, Jos, Ogba, and Enugun), 2,468 (79 percent) were adults, and 707 (22.3 percent) were children. Out of 1,086 adults visiting the parks, 659 (54.6 percent) were males, while 427 (34.6 percent) were females. The latter figures indicate that the percentage of adult females visiting the parks is lower than the percentage of adult males.

The survey confirmed that an average of 575 (28.6 percent) children visited the zoological gardens and an average of 132 (10.8 percent) visited the parks. This shows that during the survey periods, children visited the zoological gardens more than the parks. There was little difference between the average of 754 (39.2 percent) adult males, 628 (32.1 percent) adult females, and 575 (28.6 percent) children that visited the zoological gardens. This evidence shows that most families visit the zoo with family members.

Many factors could be responsible for the low percentage of females visiting parks in Nigeria. One major factor is religion. Most Muslims prefer to keep their wives secluded (Purdah) from social activities except on special occasions that are acceptable to Muslim's rites.

Table 4. Attendance at national parks and zoological gardens in Nigeria by age and sex during a national survey conducted from July to November 1986.

Park or Garden	Adult Males (No.)	(%)	Adult Females (No.)	(%)	Children (No.)	(%)
			Game Reserve/Park			
Yankari	206	46.3	189	42.5	50	11.2
Kainji Lake	244	57.4	135	31.8	46	10.8
Jos Park	209	60.1	103	29.6	36	10.3
SUBTOTAL	659	54.6	427	34.6	132	10.8
			Zoological Gardens			
Ibadan	280	35.9	247	31.6	254	32.5
Enugu	149	41.2	120	33.1	93	25.7
Ogba	160	38.0	147	34.9	114	27.1
Jos	165	42.0	114	29.0	114	29.0
SUBTOTAL	754	39.2	628	32.1	575	28.6

In rural Hausaland (Hausa--a tribe in the northern part of Nigeria) husbands and wives are never seen together in public and avoid addressing each other by name (Hill 1972).

Location of the parks could also affect the percentage of female visitors. For example, the Yankari Game Reserve, Jos Wildlife Park, and Kainji Lake National Park are located in the northern part of the country. This area is dominated by Muslim culture, which secludes women from social activities. An inadequate transportation system, lack of good roads, and suitable stopovers also could affect the number of females visiting the parks.

Other factors include occupation of females in Nigeria. Occupation of women varies from one tribe to another in Nigeria. In most cases, women are always assisting on the farms with domestic tasks (trading, threshing, winnowing, and local restaurant management). All these occupations are physically exhausting and leave little time for women to visit national parks.

Culture, tradition characterized by rigid ritualistic and social instructions, is bound to affect female visitors to national parks and zoological gardens (Butler 1973). Lack of favorable orientation to change from traditional norms to a modern system; a relatively low level of literacy; and lack of conservation education, good public relations, and publicity are also contributing factors toward the low percentage of females visiting the parks.

The survey confirmed that children visited the zoological garden more than the parks. Some major reasons are that zoos in Nigeria are located in or near urban areas, amenable to day trips and are open to the public every day, including the weekends (8 a.m. to 6 p.m.). More importantly, most national parks in the country are open from September to May, while schools (elementary and higher institutions) in Nigeria follow the same schedule. There is a direct conflict between the open season of national parks and the resumption of the schedule of schools in the country, making it impossible for children to visit the parks.

Other factors include lack of conservation education, good public relations and publicity, especially at the primary schools, and through higher institutions. Infrastructures *in situ* are lacking in most national parks and game preserves. These include transportation, good roads, and suitable stopovers for visitors (children) going to the national parks.

Expenditures for the Number of Overnight Stays in the Parks

Table 5 summarizes revenue accruing from visitors for entrance and guide fees and the average cost for each visitor in terms of money spent on transportation, lodging, and food. Visitors spend a substantial part of their money on food and lodging.

Table 5. Expenditures by visitors to National Parks stratified by number of overnight stays during the week of survey in Nigeria from July to November 1986.

No. of Over-nights Stayed	Park or Zoo	Transp.	Admiss.	Food and Lodging	Total Expenditures (₦)**	Total Expenditures ($)	Per Person Expenditures (₦)**	Per Person Expenditures ($)
3+	*Yankari	15.0%	2.6%	82.3%	754.9	679.4	143.9	129.5
	*KLNP	24.7%	1.8%	73.3%	611.4	550.2	133.4	120.1
	*JWP	7.7%	0.3%	91.9%	958.7	862.8	161.3	145.1
	*Enugu	18.6%	0.2%	81.0%	429.2	386.2	143.0	128.7
	AVERAGE	16.5%	1.2%	82.1%	688.5	619.7	145.4	130.9
2	Yankari	27.8%	3.8%	68.3%	457.7	411.9	106.8	96.1
	KLNP	29.4%	2.8%	67.7%	474.6	427.1	120.5	108.4
	JWP	29.7%	0.5%	69.7%	561.6	505.4	92.1	82.8
	AVERAGE	29.0%	2.3%	68.6%	498.0	448.2	106.5	95.8
1	Yankari	41.2%	6.1%	52.5%	210.2	189.2	80.6	72.5
	KLNP	43.5%	4.3%	52.0%	293.4	264.1	70.9	63.8
	JWP	41.8%	0.8%	57.2%	256.0	230.4	53.4	48.0
	AVERAGE	42.2%	3.8%	53.9%	253.2	227.9	68.3	61.4

*Yankari = Game Reserve
KLNP = Kainji Lake National Park
JWP = Jos Wildlife Park
Enugun = Zoo

**$1 = ₦ 0.90

Table 5 shows that as the number of overnight stays in the park increases, total expenditure and per person expenditure also increase, while the percentage for transportion and admission fees decreases. For example, in the groups of visitors that stayed three nights or more, the average total money spent was N688.58 ($619.72) with an average per-person expenditure of N145.44 ($130.90). The bulk of this money was expended on food and lodging (82.18 percent) compared to that spent on admission fees and transportation, 1.28 percent and 16.54 percent, respectively.

Visitors that never stayed overnight in the park spent most of their money on transportation and admission fees. Table 6 also shows that out of an average total expenditure of N50.67 ($45.60), 54.63 percent of it was spent on transportation and 45.36 percent on admission fees, while an average per-person expenditure was N11.02 ($9.91). The number of nights stayed in the game reserve or national park was the major determinant of how much money was spent.

The average total expenditure of the visitor to the zoological garden was N9.39 ($8.45). This was all expended on admission fees (67.17 percent) and transportation (32.82 percent). No money was spent on food and lodging, and the average per-person expenditure was N2.05 ($1.85).

Table 6. Expenditures by visitors that never stayed overnight in the parks during the week of the survey conducted in Nigeria from July to November 1986.

No. of Over-nights Stayed	Park or Zoo	Transp.	Admiss.	Total Expenditures *(₦)	Total Expenditures (8)	Per Person Expenditures *(₦)	Per Person Expenditures ($)
None	Yankari	55.1%	44.8%	62.9	56.6	10.8	9.7
	JWP	54.1%	45.8%	38.4	34.6	11.1	10.0
SUBTOTAL (Parks)		54.6%	45.3%	50.6	45.6	11.0	9.9
	*Ebadan	26.6%	73.3%	16.7	15.0	1.7	1.5
	*Enugun	40.6%	59.3%	11.6	10.4	4.2	3.7
	*Ogba	35.0%	64.9%	4.6	4.1	0.8	0.7
	*Jos	28.9%	71.0%	4.6	4.1	1.4	1.2
SUBTOTAL (Zoos)		32.8	67.1	9.3	8.4	2.0	1.8

*Zoos

Total Expenditure Calculations

The contribution of recreational resources to the national economy in Nigeria is one of the ways to justify development of more conservation areas in the country. The economic value of game reserves and zoos is important and controversial, especially where conservation resources have alternative uses such as timber, agriculture, mineral, energy and water development. National parks and zoos can compete equally with other natural resources if they can pay for themselves in terms of contributing toward the national economy.

Tables 7-10 highlight the total expenditure for admissions, expenditure per visitor, expenditure in the week of the survey, and the national totals. Table 11 summarizes an estimate of total revenue generated from unsurveyed zoos.

Admissions

The survey reveals that foreigners prefer to visit national parks more than zoological gardens. Table 7 shows that foreign visitors visited the three national parks. The zoos were visited by Nigerians and not by foreigners. Out of the total of 445 people visiting the Yankari game reserve, 278 (62.5 percent) were Nigerians, while 167 (37.5 percent) were foreigners. In Kainji Lake National Park, 275 visitors (64.7 percent) were foreigners,

Table 7. Total Admissions to the Parks and Zoological Gardens During a Survey Conducted in Nigeria from July to November 1986.

	Parks			Zoological Gardens			
Admissions	Yankari	KLNP	Jos WP	Ibadan	Enugun	Ogba	Jos
Foreigners	167	275	55	-	-	-	-
Nigerians	278	150	297	781	362	421	392
TOTALS	445	425	352	781	362	421	392
Nigerians as %	62.5	35.3	84.4	100	100	100	100
Admission Fees per Visit	$2.9*	$1.9	$0.42	$0.7	$0.3	$0.4	$0.3
Admission Fees as % of Total Visitors	4.6	2.0	1.04	48.2	5.6	57.4	28.4

*$1 = ₦0.90

and 150 (35.3 percent) were Nigerians. Jos Wildlife Park had 55 (15.6 percent) foreign visitors and 297 (84.4 percent) Nigerians (Table 7). During the week of the survey, more foreign visitors were recorded in the Kainji Lake National Park, while the fewest were recorded at Jos Wildlife Park. From all the parks and zoos surveyed, more Nigerians visited the zoological garden at Ibadan, while the Jos Wildlife Park was the least visited.

Expenditures Per Visitor

Expenditures per visitor in the three national parks show more per capita expenditure from foreigners than Nigerians (Table 8). For example, per capita expenditure for a foreign visitor in Yankari Game Reserve was $75.36, while per capita expenditure for a Nigerian visitor was $55.65. This means that a foreign visitor spends 35 percent more than a Nigerian visitor in this park. For the Kainji Lake National Park, per capita expenditure for a foreign visitor compared with a local visitor was $98.23 to $79.07. The difference in this amount shows that a foreign visitor spent 24 percent more than a local visitor. Table 8 also shows that the Jos Wildlife Park has $59.10 as per capita expenditure for a foreign visitor compared to $36.90 for a local visitor. This indicates that an average foreign visitor spends 60 percent more than a local visitor in this park.

Table 8. Expenditure per Visitor ($) During the Week of the Survey in Nigeria from July to November 1986.

	Parks			Zoological Gardens			
Per Capita	Yankari	KLNP	JWP	Ibadan	Enugun	Ogba	Jos
Foreigners	$75.3*	$98.2	$59.1	-	-	-	-
Nigerians	$55.6	$79	$36.9	$1.5	$5.5	$0.7	$1.3

*$1 = ₦0.90

<u>Expenditure in the Week of the Survey</u>

From the three parks surveyed, the Kainji Lake National Park made the highest revenue with $38,875, Yankari Game Reserve $28,059, and Jos Wildlife Park, $14,210. Also during the week of the survey, four zoos were surveyed. Enugun Zoo received $2,016, Ibadan Zoo $1,219, Jos Zoo $510, and Ogba Zoo $330 (Table 9).

In the weighted average (foreigners and Nigerians) expenditures per visit, Table 10 shows that out of the three parks, Yankari made $91.47, Kainji Lake National Park $63.05, and Jos Wildlife Park $40.37. Enugun Zoo had the highest weighted average of $5.57, Ibadan Zoo $1.56, Jos Zoo $1.30, and Ogba Zoo $0.78.

Total annual revenue accrued from visitors (admission fees, food and lodging, and transportation) based on this survey in the three national parks was $2,741,000. Out of this amount, $1,261,000 (46 percent) was spent in Yankari Game Reserve, $914,700 (33 percent) was from Kainji Lake National Park, and $565,000 (21 percent) was made from the Jos Wildlife Park (Table 10).

The total annual revenue generated from visitors (admission fees) in the eight major zoological gardens in Nigeria was $1,050,000. Out of this, $468,200 (45 percent) accrued at Ibadan Zoo, $445,500 (42 percent) at Enugun Zoo (Table 10), $26,397 (3 percent) at Kano Zoo, $16,081 (2 percent) at Port-Harcourt Zoo, $12,537 (1 percent) at

Table 9. Expenditures in the Week of the Survey Conducted in Nigeria from July to November 1986.

	Parks			Zoological Gardens			
Totals	Yankari	KLNP	JWP	Ibadan	Enugun	Ogba	Jos
Total (fgn)	$12,600*	$27,000	$ 3,300	$ 0	$ 0	$ 0	$ 0
Total (Nig)	$15,500	$11,900	$10,900	$1,200	$2,000	$330	$510
GRAND TOTAL	$28,100	$38,900	$14,200	$1,200	$2,000	$330	$510

*$1 = ₦0.90

Table 10. Estimated annual revenue generated from visitors to parks and zoos surveyed in Nigeria from July to November 1986.

	Parks			Zoological Gardens			
Revenue	Yankari	KLNP	JWP	Ibadan	Enugun	Ogba	Jos
Weighted Average (fgn + Nig) expenditures per visit	$63.05*	$91.47	$40.37	$ 1.56	$5.57	$0.78	$1.30
Total Visits/Yr.	20,000	10,000	14,000	300,000	80,000	24,000	42,000
Total ($/Yr.)	$1,261,100	$914,700	$565,200	$468,200	$445,500	$18,800	$54,700
NATIONAL TOTAL	$3,730,000						

*$1 = ₦0.90

Maiduguri Zoo, $6,665 (0.6 percent) at Calabar Zoo, (Table 11), $54,700 (5 percent) at Jos Zoo, and $18,800 (2 percent) at Ogba Zoo (Table 10).

Four zoos (Maiduguri, Kano, Calabar, and Port Harcourt Zoos) that were not surveyed were taken into consideration in calculating the national total. Annual revenue generated from each of the unsurveyed zoos was estimated. For example, visitors to Ibadan Zoo in 1983 totaled 240,000 (Afolayan 1980), and the population of the city is 10,600,000 (Federal Statistics 1986). Number of visitors divided by the population (240,000/10,600,000) gives 2.3 percent. This percentage (2.3 percent) was used to multiply the population of each city where each of the unsurveyed zoos is located to estimate the total visitors per annum (Table 11). Weighted average expenditures per visitor of the four zoos (Ibadan, Enugun, Ogba, and Jos Zoos) surveyed were used to estimate the weighted average of zoos not surveyed ($2.3) (Table 11).

The total revenue that national parks ($2,700,000) and zoological gardens ($1,050,000) contributed toward the national economy of Nigeria based on this survey was $3,750,000.

The above shows the substantial contribution of parks and zoos to the national economy of Nigeria. This revenue cannot be used to generalize as the total revenue that

Table 11. Estimate of Total Revenue Generated from Unsurveyed Zoos during the Period of the Survey in Nigeria from July to November 1986.

Zoological Gardens	Pop. of City where Zoo is Located	Percentage of Visitors Used for Estimate*	Total Visitors per Year	Weighted Average for Zoo per Visit**	Total ($/Yr)
Kano	499,000	23%	11,477	$2.3***	26,397
Calabar	126,000	23%	2,898	$2.3	6,665
Maiduguri	237,000	23%	5,451	$2.3	12,537
Port-Harcourt	304,000	23%	6,992	$2.3	16,081
				TOTAL	61,680

*Derived from number of visits per year divided by urban population in cities where zoos were surveyed.

**Weighted average of surveyed zoos.

***$1 = ₦0.90

could be generated from parks and zoos in Nigeria for the following reasons. The survey was conducted from July to November 1986, which falls between the rainy and dry seasons in some parts of the country. The survey in the parks and zoos was only conducted for a week (Monday through Sunday) and was at the beginning of the open season for most parks in Nigeria. Both of these factors suggest that the values derived here are underestimates of the actual totals.

Chapter VI

ANALYTICAL RESULTS AND DISCUSSION OF THE FARMERS' SURVEY

In this section results of the farmers' survey regarding consumptive uses of wildlife resources in rural areas of Nigeria are discussed. Results indicate species used during the rainy season; how many are used; and species utilized during Christian, Muslim, and cultural festivals. Other data in this section show which game species are consumed from different ecological zones and which wildlife species and parts are used for healing and preventive medicine in each ecological zone in Nigeria.

Farmers' Characteristics

Results of selected farmers' characteristics are shown in Table 12. From Table 12, "t" tests were calculated on distance, numbers of dependents, and chi-square for years of schooling in the savanna, deciduous, and rain forest ecological zones to test for level of significance on these characteristics.

The computed "t" test value of 30.14 in Table 13 is statistically significant at the 0.05 level of confidence;

Table 12. Selected farmers' characteristics used in survey of wildlife utilization in Nigeria from July to November 1986.

State	Ecological zone	Average distance away from city (km)	Average Dependents	Average Years of Schooling
Bauchi	Savanna	141.8	11.3	0.1
Plateau	Savanna	41.2	10.5	0.3
Kwara	Savanna	68.6	12.0	0.4
Niger	Savanna	76.8	12.3	0.0
Bendel	Deciduous	40.4	15.8	3.3
Anambra	Deciduous	40.0	10.3	1.7
Oyo	Rain forest	39.2	10.7	1.7
Cross River	Rain forest	58.8	10.4	3.3

Table 13. "T" test of independence among three ecological zones to the distance, dependents, and years of schooling in the farmers' survey, Nigeria, 1986.

Distance

	Savanna	Deciduous	"T" test	Accept or reject
Aver.	82.1	40.20	*30.14	
s^2p	338.52	61.2	df = 358	Reject

	Savanna	Rain forest	"T" test	Accept or reject
Aver.	82.1	49	*19.24	
s^2p	338.52	184.56	df = 358	Reject

	Deciduous	Rain forest	"T" test	Accept or reject
Aver.	40.20	49	-6.15 NS	
s^2p	61.2	184.5	df = 358	Accept

*Significant at the 0.05 or greater level of confidence.

NS: Non-significant

therefore, the null hypothesis (distance to savanna = distance in deciduous) was rejected. Table 13 shows that the computed "t" test value of 19.24 is statistically significant at the 0.05 level of confidence; therefore, the null hypothesis (savanna = rain forest) was rejected. In other words, there is a difference in the distance of savanna and rain forest ecological zones.

In the deciduous and rain forest strata, the distance is statistically significant as shown in Table 13. The computed "t" test value of -6.15 is significant at the 0.05 level of confidence; therefore, the null hypothesis (deciduous = rain forest) was rejected.

Analysis confirmed that there is a significant difference in the distance of villages from cities between the savanna, deciduous, and rain forest regions in Nigeria. The results also show a significant difference in the distance of villages from cities between the deciduous and rain forest regions.

The distance of rural areas from major cities (35 km + away from cities) is common in the savanna due to different types of occupations. Most farmers in this region combine cattle rearing with their occupation; hence there is seasonal migration. Farmers in the deciduous and rain forest regions are permanent settlers who depend solely on plantations (cocoa, rubber, kola, and coffee). These farmers rarely migrate unless there is war or an outbreak of devastating diseases.

Table 14. "T" test of independence among three ecological zones to the distance, dependents, and years of schooling in the farmers' characteristics, Nigeria, 1986.

Dependents

(a)	Savanna	Deciduous	"T" test	Accept or Reject
Aver.	11.56	13.06	-1.42 NS	Accept
s^2p	134.44	178.18		
			df = 358	

(b)	Savanna	Rain Forest	"T" test	Accept or Reject
Aver.	11.56	10.57	0.82 NS	Accept
s^2p	134.44	111.75		
			df = 358	

(c)	Deciduous	Rain Forest	"T" test	Accept or Reject
Aver.	13.06	10.57	1.58 NS	Accept
s^2p	178.18	111.75		
			df = 358	

NS = Non-significant

The computed "t" test values of -1.42, 0.82, and 1.58, respectively, in Table 14 are not statistically significant at the 0.05 level of confidence; therefore, the null hypothesis was accepted in all three cases (Table 14a, b, c). This indicates there is no difference in the numbers of dependents in the three ecological zones surveyed.

An average of 12 dependents per farmer is quite large compared to what exists in developed countries like the United States and Europe. This could be attributed to the population growth rate and large family size in Nigeria. An extended family system cuts across the country. An average Nigerian is not only responsible for his immediate family, but also takes care of other distant related members of the society.

Nigeria's population of about 100 million increases annually about 2.5 percent. Survey results show a high rate of growth in Nigeria is common to all the ecological zones.

Factors responsible for overpopulation in Nigeria include religion, culture, lack of public enlightenment, and rigid family control measures as practiced in some developing countries like China and India. Other factors include costumes, taboos, and traditions characterized by rigid ritualistic and social structures especially in the rural areas; all these greatly impact population growth in Nigeria.

The computed chi-square test in Table 15 shows that 19.18 and 27.18 are statistically significant at the 0.05 level of confidence; therefore, the null hypotheses (savanna = deciduous and savanna = rain forest) were rejected. Table 15 also shows that the computed chi-square value of 1 is not significant at the 0.05 level of confidence; therefore, the null hypothesis (deciduous = rain forest) was accepted. This result shows most farmers in the savanna areas are illiterate. There is no difference in the level of education among the farmers in the rain forest and deciduous areas.

The high illiteracy rate may be attributed to many factors, especially in northern Nigeria, which falls in the savanna ecological zone. Most farmers in this region are Muslims in contrast to the other two regions (rain forest and deciduous), which are highly dominated by Christians. Other factors are tribal taboos, culture, and lack of public enlightenment and adult education in rural areas.

Availability of Wild Animals by Ecosystem

Availability of wildlife species by ecosystem is shown in Table 16. Out of 2,157 wild animals reported available by farmers in the savanna region, 1,904 (28.3 percent) big game were reported as common, while 253 (4 percent) big game were believed to be uncommon. In the

Table 15. Chi-square test of independence in the ecological zones relative to some schooling among the farmers, Nigeria, 1986.

	Schooling			
	Savanna	Deciduous	Chi-square	Accept or reject
Some schooling	57	38	*19.18	Reject
No schooling	3	23	df = 1	

	Savanna	Rain forest	Chi-square	Accept or reject
Some schooling	57	32	*27.18	Reject
No schooling	3	28	df = 1	

	Deciduous	Rain forest	Chi-square	Accept or reject
Some schooling	28	32	1 NS	Accept
No schooling	23	28	df = 1	

* Significant at the 0.05 or greater level of confidence.

NS = Non-significant.

Table 16. Opinion on availability of wildlife species by farmers in three ecological zones during a survey conducted in Nigeria from July to November 1986.

Savanna (N = 6708)

	Big Game	%*	Small Game	%	Reptiles	%	Game Birds	%
Common	1904	28.3	1976	29.5	1704	25.3	480	7.2
Scarce	67	1	30	0.45	167	2.5	0	
No longer found	98	1.5	8	0.12	20	0.3	0	
Never	80	1.2	132	2	23	0.35	0	
Don't know	8	0.12	5	0.07	6	0.09	0	

Deciduous (N = 3940)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Common	374	12.7	775	26	787	27	200	7
Scarce	176	6	61	2	152	5	33	1
No longer found	116	4	2	0.07	10	0.33	0	-
Never	370	13	2	0.07	10	0.33	5	0.2
Don't know	44	1.5	0		1	0.03	2	0.07

Rain Forest (N = 3102)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Common	395	12.7	763	24.6	705	22.7	185	6
Scarce	101	3.3	69	2.2	167	5.4	26	0.84
No longer found	134	4.3	7	0.23	27	0.87	7	0.23
Never	399	12.9	1	0.03	55	1.8	22	0.71
Don't know	34	1.1	0		5	0.16	0	

*Percentage of common and uncommon wild animals as reported by farmers.

deciduous region, out of 1,080 big game reported by farmers, 374 (12.7 percent) big game were considered common, and 706 (24.5 percent) were said to be uncommon. Of 1,063 big game reported in the rain forest region, 395 (12.7 percent) were common, while 668 (21.6 percent) were uncommon.

This result revealed that out of the total 4,300 big game reported by farmers in the three ecological zones, 2,673 (62 percent) big game were said to be common, while 1,627 (38 percent) were thought to be uncommon.

Chi-square tests of independence were computed for the responses for the three ecological zones to determine if significant relationships existed concerning the availability of wild animals. The alpha level of 0.05 was selected to test whether there were significant relationships among the opinions of the farmers and hunters in the three ecological zones surveyed regarding animal availability. Big game, small game, reptiles, and birds that were used for this analysis and computation of chi-square and "t" tests are listed in Appendix G, and for scientific names of the species used, check Appendix D.

The computed chi-square value of 1,047.45 as shown in Appendix E is statistically significant at the 0.05 level of confidence; therefore, the null hypothesis (big game in savanna is equal to that of the deciduous) was rejected. This result indicates there is a significant difference in the availability of big game in the savanna and deciduous regions.

One factor for the abundance of big game in the savanna is habitat preference. The savanna region supports most of the big game in Nigeria. The deciduous region is much more disturbed in terms of subsistence agriculture, timber exploitation, deforestation for growing commercial crops (coffee, rubber, cocoa, citrus, and kola). Under this condition, there could be little or no habitat left to support big game in the deciduous region in Nigeria.

The calculated chi-square value of 907.98, as indicated in Appendix E, is statistically significant; therefore, the null hypothesis (big game in savanna is equal to that of the rain forest) was rejected. This result supports the idea that there is a significant difference in the availability of big game in the savanna and rain forest zones.

The rain forest in Nigeria used to hold some big game, but due to the bush fallow system of farming, overpopulation ,and overexploitation of timber, most big game have diminished. The remaining big game are in conservation areas and are strictly protected by wildlife law.

The computed chi-square value of 24.42 in Appendix E is statistically significant at the 0.05 level of confidence; therefore, the null hypothesis (deciduous = rain forest) was rejected. This indicates there is a significant difference between deciduous and rain forest ecological zones regardsing availability of big game. Therefore, more big game reside in deciduous than in rain forest regions.

Table 16 shows that out of 2,151 small game reported by farmers in the savanna region, 1,976 (29.5 (percent) were common and 175 (2.5 percent) were considered uncommon. Of 840 small game indicated by farmers in the rain forest region, 763 (24.6 percent) were common and 77 (2.5 percent) were uncommon. In the deciduous region, 840 small game were reported by farmers; 775 (26 percent) were common, while 65 (2 percent) were uncommon.

The data indicate that 3,831 small game were reported by in the three ecological strata surveyed; 3,514 (92 percent) were believed to be common and 317 (8 percent) were thought to be uncommon. This indicates that small game are common wildlife species in the three ecological zones in Nigeria.

The computed chi-square values of 117.5 and 138.66 in Appendix E are statistically significant at the 0.05 level of confidence; therefore, the null hypotheses (savanna = deciduous and savanna = rain forest) were rejected. The chi-square value of 3.7 is not significant; therefore, the null hypothesis (deciduous = rain forest) was accepted.

These data show there is a significant difference in numbers of small game available in savanna, deciduous, and rain forest regions. It also reveals that there is no significant difference in numbers of small game available in deciduous and rain forest regions.

Table 16 also shows the availability of reptiles according to farmers surveyed in the three ecological zones. Of the 1,920 reptiles reported in the savanna region, 1,704 (25.3 percent) were reported as common, and 216 (3.2 percent) were reported as uncommon. Out of 960 reptiles reported in the deciduous region, 787 (27 percent) were considered common, while 173 (5.7 percent) were considered uncommon. Of the 959 reptiles reported in the rain forest zone, 705 (22.7 percent) were reported as common, and 254 (8.2 percent) were reported as uncommon.

This survey shows that out of 3,839 reptiles reported in the three ecological zones, 3,196 (83 percent) were considered common, and 643 (17 percent) were considered uncommon. This indicates that more reptiles than big game are present in all three ecological zones.

The computed chi-squared values of 34.09, 121.28, and 46.84 in Appendix E were statistically significant at or beyond the 0.05 level of confidence; therefore, the null hypotheses (savanna = rain forest; savanna = deciduous; and deciduous = rain forest) were rejected. This indicates a significant difference in the availability of reptiles in savanna, deciduous, and rain forest regions.

Table 16 shows that all 480 game birds reported by farmers in the savanna region were believed to be common. Of the 240 game birds reported in the deciduous region, 200 (7 percent) were common, while 40 (1.3 percent) were uncommon. In the rain forest region, 240 game birds were reported; 185 (6 percent) were reported as common and 55 (1.8 percent) were reported as uncommon.

Therefore, out of 960 game birds reported by farmers in the three ecological zones, 865 (90 percent) were considered common and 95 (10 percent) were considered uncommon.

The computed chi-squared value of 84.71 and 119.10 are statistically significant at or beyond the 0.05 level of confidence; therefore, the null hypotheses (savanna = deciduous and savanna = rain forest) were rejected. From Appendix E, the chi-squared value of 2.95 is not significant and the null hypothesis (deciduous = rain forest) was accepted. This indicates that significantly more game birds are available in the savanna than in deciduous and rain forest regions.

Wild Animals Consumed During the Rainy Season in Nigeria

Table 17 shows the results of a survey asking farmers in the three ecological zones how frequently they consumed wild animals during the rainy season. Results indicate that out of 1,061 big game reported in the savanna region,

Table 17. Number of wild animals consumed by farmers during the rainy season in a survey conducted in Nigeria from July to November 1986.

Savanna (N = 3065)

	Big Game	%*	Small Game	%	Reptiles	%	Game Birds	%
**URS	82	2.8	35	1.1	88	2.9	35	1.1
***UMRS	979	31.9	987	32.2	423	13.8	436	14.2

Rain Forest (N = 1371)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
URS	46	3.4	115	8.4	177	12.9	40	2.9
UMRS	235	17.1	529	38.6	212	15.5	77	5.6

Deciduous (N = 1380)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
URS	45	3.3	132	9.6	81	5.9	57	4.1
UMRS	238	17.2	540	39.1	211	15.3	76	5.5

*Percentage of wild animals consumed during rainy and dry seasons.

**URS = used during rainy season.

***UMRS = used most often during rainy season.

979 (31.9 percent) were consumed most often during the rainy season, while 82 (2.8 percent) were consumed only in the rainy season. Of the 281 big game reported in the rain forest zone, 235 (17.1 percent) were consumed most often during the rainy season, while 46 (3.4 percent) were consumed only during the rainy season. Out of 283 big game reported in the deciduous region, 238 (17.2 percent) were consumed most often during the rainy season, while 45 (3.3 percent) were consumed only during the rainy season.

The results indicate that out of 1,625 big game consumed by farmers in the three ecological zones, 1,452 (89 percent) were consumed most often during the rainy season, while 173 (11 percent) were consumed only during the rainy season. This indicates that big game is a major source of animal protein for Nigerian farmers during the rainy season.

The computed chi-squared values of 19.23 and 17.44 are statistically significant at or beyond the 0.05 level of confidence; therefore, the null hypotheses (savanna = rain forest; savanna = deciduous) were rejected (Appendix F). The chi-squared value of 0.02, as shown in Appendix F, is not significant and the null hypothesis (deciduous = rain forest) was accepted.

This data indicate that big game consumption during the rainy season in the savanna differs from that in the deciduous and the rain forest. Big game consumption differs slightly in the deciduous and rain forest regions during the rainy season.

Table 17 shows the results of a survey of farmers regarding small game used most often during the rainy season and those used only during the rainy season. Of 1,022 small game reported in the savanna region, 987 (32.2 percent) were consumed most often during the rainy season, and 35 (1.1 percent) were consumed only during the rainy season. Of the 644 small game reported in the rain forest zone, 529 (38.6 percent) were consumed most often during rainy season and 115 (8.4 percent) were consumed only during the rainy season. In the deciduous region, farmers consumed 672 small game; 540 (9.6 percent) were consumed only during the rainy season, and 132 (20 percent) used it only during the rainy season.

A total of 2,338 small game was reported in the three ecological zones. Out of 2,338, 2,056 (88 percent) small game were used most often during the rainy season; 282 (12 percent) were used only during the rainy season.

The computed chi-squared values of 100.44 and 120 in Appendix F are statistically significant at the 0.05 level of confidence; therefore, the null hypotheses (savanna = rain forest; savanna = deciduous) were rejected. Appendix F also shows the chi-square value of 0.69 is not significant at the 0.05 level of confidence; therefore, the null hypothesis (deciduous = rain forest) was accepted. This indicates a significant difference in the use of small game most often during the rainy season by farmers in the savanna, deciduous, and rain forest regions. Use of small game by farmers in the deciduous and rain forest regions is of little significance (deciduous = rain forest) (Appendix F).

Results regarding reptile consumption during the rainy season are shown in Table 17. Out of 511 reptiles reported by farmers in the savanna region, 423 (13.8 percent) were consumed most often during the rainy season; 88 (2.9 percent) were consumed only during the rainy season. In the rain forest region, farmers consumed 389 reptiles; 212 (15.5 percent) most often during the rainy season, and 177 (12.9 percent) only during the rainy season. In the deciduous region, of 292 reptiles reported by farmers, 211 (15.3 percent) were consumed most often during the rainy season; 81 (5.9 percent) were consumed only during the rainy season.

Therefore, out of 1,192 reptiles reported in the three ecological regions, 846 (71 percent) were consumed most often during the rainy season, while 346 (29 percent) were consumed only during the rainy season. The data indicate that reptiles were not eaten as frequently as big game and small game.

The computed chi-squared values of 85.03, 12.37, and 22.36 in Appendix F are statistically significant at the 0.05 level of confidence; the null hypotheses (savanna =

rain forest; savanna = deciduous; and deciduous = rain forest) were rejected. This indicates a significant difference between the three ecological zones regarding consumption of reptiles most often during the rainy season and only during the rainy season.

Table 17 shows the consumption of game birds (francolin and guinea fowl) during the rainy season. Out of 471 game birds consumed in the savanna region, 436 (14.2 percent) were consumed most often during the rainy season, while 35 (1.1 percent) were consumed only during the rainy season. In the rain forest region, 117 game birds were consumed; 77 (5.6 percent) most often during the rainy season and 40 (2.9 percent) only during the rainy season. In the deciduous region, of the 133 game birds consumed, 76 (5.5 percent) were consumed most often during the rainy season, and 57 (4.1 percent) were consumed only during the rainy season.

These results show that out of 721 birds consumed by farmers in the three ecological zones, 589 (82 percent) were consumed most often during the rainy season and 132 (18 percent) were consumed only during the rainy season. Farmers' consumption of game birds and reptiles most often during the rainy season appears similar.

The computed chi-squared values of 60.03 and 100.81 in Appendix F are statistically significant at the 0.05 level of confidence; therefore, the null hypotheses (savanna =

rain forest; savanna = deciduous) were rejected. Appendix F also shows that the chi-square value of 1.97 is not significant at the 0.05 level of confidence; therefore, the null hypothesis (deciduous = rain forest) was accepted.

This result indicates a significant difference between the two ecological zones (savanna = rain forest and savanna = deciduous) regarding the use of game birds. There is no significant difference between the rain forest and deciduous regions regarding the use of game birds.

Table 18 shows the wild animals used by Nigerian farmers during the rainy season. The dominant big game utilized were the gray duiker, bush buck, and water buck. Principal small game used include cane rat, African giant rat, porcupine, crocodile, and squirrel. Reptiles used include crocodile and monitor lizard. Other wild species used include game birds (francolin and guinea fowl) and African giant snail.

Preferability of Wildlife Species by Ecosystem

The results of a survey showing wild animals preferred by farmers for consumption are shown in Table 19. Out of 1,444 big game reported in the savanna region, 1,013 (70 percent) were preferred for consumption, while 431 (30 percent) were not. In the rain forest region, out of 306 big game reported, 204 (67 percent) were preferred for consumption, while 102 (33 percent) were not. Out of 336

Table 18. Results of survey indicating wild animals used by Nigerian farmers in rainy season, 1986.

Species	Savanna Region Farmers (N = 240) #	%	Deciduous Region Farmers (N = 120) #	%	Rain Forest Region Farmers (N = 120) #	%
Big Game						
Bush buck	228	20	77	27	96	35
Gray duiker	228	20	119	42	114	41
Water buck	193	17	1	0.4	-	-
Roan antelope	168	15	-	-	4	1
Kob	140	13	1	0.4	-	-
Buffalo	110	10	13	5	8	3
Baboon	17	20	26	10	7	3
Elephant	17	20	1	.4	4	1
Warthog	13	1	45	16	42	15
	114		283		275	
Small Game						
Cane rat	236	24	119	19	116	18
African giant rat	235	23	119	19	114	18
Porcupine	228	22	118	18	104	16
Squirrel	217	21	111	17	96	15
Flying squirrel	44	4	57	9	62	10
Bats	42	4	69	11	71	11
Pangolin	20	2	49	8	81	13
	1022		642		644	
Reptiles						
Python	76	16	20	12	29	10
Crocodile	116	25	26	15	26	9
Monitor lizard	173	37	56	32	50	18
Tortoise	52	11	46	26	62	22
Cobra	13	3	9	5	41	14
Puff adder	21	5	11	6	36	13
Night adder	13	3	6	4	40	14
	464		174		284	
Mollusc						
African giant snail	47		118		107	
Game Birds						
Guinea fowl	236	50	67	50	53	45
Francolin	234	50	66	50	64	55
	470		133		117	

Table 19. Numbers of preferred wildlife species by ecosystem in a farmers' survey conducted in Nigeria from July to November 1986.

Savanna (N = 3621)

	Big Game	%*	Small Game	%	Reptiles	%	Game Birds	%
Preferred	1013	28	712	20	630	17	332	9.1
Unpreferred	431	12	67	1.9	436	12	-	

Rain Forest (N = 1047)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Preferred	204	19.5	331	31.6	133	12.7	49	4.7
Unpreferred	102	9.7	3	0.3	255	21.5	-	

Deciduous (N = 1399)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Preferred	323	23.1	470	34	193	13.8	115	8.1
Unpreferred	13	0.9	2	0.1	283	20	-	

*Percentage of preferred wild animals by ecosystem as reported by farmers.

big game reported in the deciduous region, 323 (96 percent) were preferred for consumption, and 13 (4 percent) were not.

Data reveal that out of 2,086 big game reported in the three ecological zones, 1,540 (86 percent) were preferred for consumption, while 545 (14 percent) were not. This indicates that most farmers in Nigeria prefer big game to other bushmeat.

From Appendix J, chi-squared was calculated on preferability of big game by ecosystem to test for the level of significance. The computed chi-squared value of 1.45 in Appendix J is statistically not significant at the 0.05 level of confidence; therefore, the null hypothesis (big game consumption is the same in savanna and rain forest) was accepted. From Appendix J also the calculated chi-square value of 98.26 is significant and therefore the null hypothesis (consumption of the big game in savanna is the same as in deciduous) was rejected. The chi-squared value of 94.55 in Appendix J is significant, and this rejects the null hypothesis that consumption of big game in the rain forest is the same as in the deciduous region.

The results of chi-squared tests on consumption of big game in the three ecological zones revealed no significant difference between savanna and rain forest regions. There is a big difference with regard to big game consumption between the savanna and deciduous, also between the rain forest and deciduous regions.

Table 19 shows that out of 779 small game reportedby farmers in the savanna region, 712 (91 percent) were preferred for consumption, while 67 (9 percent) were not. In the rain forest, out of 336 small game, 331 (98 percent) were preferred for consumption, while 3 (2 percent) were not. Out of 472 small game reported by farmers in the deciduous region, 470 (99.5 percent) were preferred for consumption, while 2 (0.05 percent) did not.

Table 19 indicates that out of 1,585 small game reported by farmers in the three ecological zones surveyed; 1,513 (95 percent) were preferred for consumption, while 72 (5 percent) were not. This reveals that an average farmer in Nigeria would prefer to eat small game.

The results of the computed chi-squared value of 23.53 for savanna and rain forest, 37.71 for savanna and deciduous are statistically significant, while the value of 0.71 for rain forest and deciduous is not significant (Appendix G). This indicates that the null hypothesis (small game in savanna is the same as in the rain forest and deciduous) was rejected. The null hypothesis (small game in the rain forest is not different from that of the deciduous region) was accepted.

It can be seen in Table 19 that out of 1,066 reptiles reported by farmers in the savanna region, 630 (59 percent) were preferred for consumption, while 436 (41 percent) were not. In the rain forest, out of 358 reptiles, 133 (37 percent) were preferred for consumption, while 225 (63 percent) were not. Out of 476 reptiles reported by farmers in the deciduous region, 193 (40 percent) were preferred for consumption, while 283 (60 percent) were not.

Of 1,900 reptiles reported by farmers in the ecological zones surveyed, 956 (50 percent) were preferred for consumption, while 944 (50 percent) were not. This indicates that reptiles are not as acceptable as big game and small game in Nigeria.

Table 19 shows that all farmers responding in the savanna, rain forest, and deciduous ecological zones preferred birds (francolin and guinea fowl) for consumption in their daily diet. There is no computed chi-squared value in the three ecological zones. This indicates there is no difference in the preferability of birds in the savanna, rain forest, and deciduous regions in Nigeria.

Results of this survey show that all 540 farmers responding preferred birds in their diet. This indicates that an average farmer in Nigeria would prefer to eat game birds (francolin and guinea fowl).

Preferability of Cane Rat and African Giant Rat

Table 20 shows that out of 582 farmers responding in the three zones, 332 (57 percent) preferred to consume cane rat, while 250 (43 percent) preferred the African giant rat. Of the total number of farmers that preferred both

Table 20. Preferability of cane rat and African giant rat by farmers in the three ecological zones surveyed in Nigeria from July to November 1986.

	Savanna		N = 251	
	Cane rat		African giant rat	
Preferred	139	55.4%	111	44.2%
Unpreferred	1	4	0	

	Rain Forest		N = 144	
	Cane rat		African giant rat	
Preferred	86	60%	57	39.3%
Unpreferred	-		1	.7

	Deciduous		N = 189	
	Cane rat		African giant rat	
Preferred	107	57%	82	43%
Unpreferred	-		-	

species, 139 (24 percent) preferred cane rats and 111 (19 percent) preferred the African giant rat in the savanna region, 86 (15 percent) said they would consume the cane rat and 57 (10 percent) said they would consume the African giant rat in rain forest, while 107 (18 percent) preferred cane rat and 82 (14 percent) the African giant rat in the deciduous region.

This analysis indicates that in all three zones surveyed cane rat was the most preferred. It reveals that the cane rat consumption rate by farmers is higher than that of the African giant rat.

Frequency of Use Per Month

Table 21 shows the frequency with which wild animals are consumed each month in each of the ecological zones. The total number of times that wild animals were consumed per month in the three regions was 20,211. Of this number, 1,431 (7 percent) were big game, 8,887 (44 percent) small game, 2,971 (15 percent) reptiles, and 6,923 (34 percent) game birds. These results indicate that small game are the dominant species consumed per month by an average farmer in Nigeria during the period of the survey.

Table 22 shows the monthly composition of wild animals taken by farmers in the three regions surveyed. Dominant big game utilized were the bush buck and gray duiker. Principal small game taken include squirrel, por-

Table 21. Frequency with which wild animals are consumed per month by farmers during a survey conducted in Nigeria from July to November 1986.

Savanna (N = 10,406)

	Big Game	%*	Small Game	%	Reptiles	%	Game Birds	%
#	670	6.4	2942	28.3	342	3.3	6452	62
Aver.	21.53		72.85		19.67		27.19	
Std.	10.59		43.18		11.23		16.08	

Rain Forest (N = 5153)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
#	375	7.3	3304	64.1	1370	26.6	104	2
Aver.	23.04		127.06		73.10		7.53	
Std.	11.11		64.92		33.11		3.48	

Deciduous (N = 4647)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
#	386	8.3	2641	56.8	1253	27	367	7.9
Aver.	15.21		52.72		30.20		8.44	
Std.	8.96		50.84		21.27		6.30	

*Percentage of wild animals used per month as reported by farmers.

Table 22. Monthly composition of wild animals taken by farmers in a survey conducted in Nigeria from July to November 1986.

Species	Savanna Region Farmers (N = 240) #	%	Average farmer	Deciduous Region Farmers (N = 120) #	%	Average farmer	Rain Forest Region Farmers (N = 120) #	%	Average farmer
Big Game									
Elephant	16	6	0.06	-	-	-	3	0.4	0.03
Buffalo	124	5	0.15	25	3	0.2	29	4	0.24
Roan antelope	245	9	1	-	-	0	60	8	0.5
Bush buck	507	19	2	160	21	1.3	212	27	2
Kob	176	7	0.7	4	0.5	0.03	68	9	0.6
Water buck	376	14	2	2	0.26	0.16	67	8	0.6
Gray duiker	966	37	4	427	56	4	341	43	3
Warthog	152	6	0.6	82	11	0.7	9	1	0.07
Baboon	78	3	0.3	69	9	0.6	7	0.6	0.06
	2640			769			796		
Small Game									
Cane rat	3245	24	27	956	18	8	568	13	5
African giant rat	2715	20	23	1060	20	9	1023	23	9
Porcupine	2080	16	17	493	9	4	468	10	4
Pangolin	208	2	2	81	2	0.7	55	1	1
Flying squirrel	379	3	3	195	4	2	170	4	1
Squirrel	4044	30	34	1283	24	11	1558	35	13
Bat	704	5	6	1215	23	10	663	15	6
	13,375			5283			4505		

Table 22 (continued)

Reptiles									
Python	128	11	0.5	23	7	0.2	24	5	0.2
Crocodile	209	18	1	39	12	0.3	29	6	0.2
Monitor lizard	429	38	2	143	45	1	144	32	1
Cobra	6	0.5	0.03	5	2	0.04	81	18	0.7
Puff adder	17	2	0.07	11	3.5	0.1	74	16	0.6
Night adder	35	3	0.15	3	1	0.03	50	11	0.4
Tortoise	311	27.5	1	91	29	0.8	52	11	0.4
	1135			315			454		
Mollusc									
African giant snail	1501			2192			1030		
Game Birds									
Guinea fowl	3324	66	14	1074	65	9	470	64	4
Francolin	1691	34	7	570	35	5	264	36	2
	5015			1644			734		

cupine, cane rat, and African giant rat. Monitor lizard, tortoise, and crocodile were the major reptiles taken. All the game birds (francolin and guinea fowl) were utilized and large numbers of African giant snails were taken.

Total Number of Wild Animals Trapped Per Month

Table 23 shows the total number of wild animals trapped by farmers during the survey. Out of 5,174 wild animals trapped in the three ecological regions, 912 (18 percent) were big game; 3,382 (65 percent) small game; 218 (4 percent) reptiles; and 662 (13 percent) game birds. From this data it appears that most of the wild animals trapped were small game. Farmers in Nigeria trap more small game than big game because small game are more abundant and most of them are pest species.

Total Number of Wild Animals Shot Per Month

Table 24 shows the number of wild animals shot per month during the survey. Out of 4,072 animals farmers reported shot in the three regions, 1,209 (30 percent) were big game; 1,862 (46 percent) were small game; 511 (13 percent) were reptiles; and 490 (12 percent) were game birds. These data indicate that small game were shot more frequently than big game, while very few reptiles and game birds were shot.

Table 23. Total number of wild animals trapped per month by farmers during a survey conducted in Nigeria from July to November 1986.

Savanna (N = 1445)

	Big Game	%*	Small Game	%	Reptiles	%	Game Birds	%
#	359	25	672	46.5	4.00	0.3	410	28.2
Aver.	63.59		93.08		4.00		47.56	
Std.	22.48		37.67		0.00		23.93	

Rain Forest (N = 2108)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
#	274	13	1670	79.2	116	5.5	48	2.3
Aver.	17.88		75.84		41.11		7.71	
Std.	19.81		53.85		9.49		9.59	

Deciduous (N = 1621)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
#	279	17.2	1040	64.2	98	6	204	12.6
Aver.	27.00		58.73		42.04		13.06	
Std.	14.78		42.21		12.39		19.38	

*Percentage of the total wild animals trapped by farmers.

Table 24. The number of wild animals shot per month by farmers during a survey conducted in Nigeria from July to November 1986.

Savanna (N = 1375)

	Big Game	%*	Small Game	%	Reptiles	%	Game Birds	%
#	705	51	275	20	40	3	355	26
Aver.	66.35		78.34		16		56.97	
Std.	31.75		20.43		1.00		24.28	

Rain Forest (N = 1313)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
#	239	18	824	63	235	18	15	1
Aver.	16.95		70.93		40.64		3	
Std.	8.95		55.97		35.87		2.53	

Deciduous (N = 1384)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
#	265	19	763	55	236	17	120	9
Aver.	29.06		81.44		78.34		16.84	
Std.	20.59		39.26		52.09		8.38	

*Percentage of wild animals shot per month as indicated by farmers.

Wildlife Species Used During Cultural Festivals

Table 25 shows wild animal use during cultural festivals in the three ecological zones of Nigeria. Farmers consumed 1,148 big game during cultural festivals in the savanna region; 394 (17 percent) consumed it during masquerades (a festival that takes place in the fall to appease one of the traditional gods, "Ogun"), 232 (10 percent) at marriage ceremonies, 170 (7 percent) at birth ceremonies, 261 (11 percent) at death ceremonies, and 91 (4 percent) at installation ceremonies. Out of 265 big game that farmers in the rain forest indicated preference for during cultural festivals, 38 (5 percent) were preferred at masquerades, 31 (4 percent) at marriage ceremonies, 25 (3 percent) at birth ceremonies, 25 (3 percent) at death ceremonies, and 146 (20 percent) during installation ceremonies. In the deciduous region, out of 236 big game, 28 (4 percent) were preferred at masquerades, 25 (3 percent) at marriage ceremonies, 16 (2 percent) at birth ceremonies, 51 (7 percent) at death ceremonies, and 116 (16 percent) at installation ceremonies.

This analysis revealed that out of 1,649 big game that were preferred for cultural festivals in the three ecological zones, 460 (28 percent) were used at masquerades, 288 (17 percent) at marriage ceremonies, 226 (14 percent) at birth ceremonies, 337 (20 percent) at death ceremonies, and 353 (21 percent) during installation

Table 25. Total number of wild animals used by farmers during cultural festivals in a survey conducted in Nigeria from July to November 1986.

Savanna (N = 2313)

	Big Game	%*	Small Game	%	Reptiles	%	Game Birds	%
Masq.	394	17	178	8	182	8	91	4
Marr. Cer.	232	10	61	3	44	2	86	4
Birth Cer.	170	7	34	1	36	1.5	36	1.5
Death Cer.	261	11	105	5	102	4	102	4
Inst. Cer.	91	4	34	1	37	2	37	2

Rain Forest (N = 746)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Masq.	38	5	41	5	29	4	7	1
Marr. Cer.	31	4	23	3	11	2	-	-
Birth Cer.	25	3	18	3	4	0.5	4	0.5
Death Cer.	25	3	51	7	9	1	7	1
Inst. Cer.	146	20	233	31	20	3	24	3

Deciduous (N = 727)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Masq.	28	4	34	5	20	3	11	1.5
Marr. Cer.	25	3	26	3.5	4	0.5	3	0.4
Birth Cer.	16	2	21	3	2	0.3	6	0.8
Death Cer.	51	7	64	9	16	2	8	1
Inst. Cer.	116	15	203	28	37	5	36	5

*Percentage of wild animals used during cultural festivals as reported by farmers.

ceremonies. This indicates that big game are utilized more by farmers during masquerades than other cultural festivals.

The computed chi-squared values of 345.40, 274.07, and 14.83 in Appendix H are statistically significant at the 0.05 level of confidence; therefore, the null hypotheses (savanna = rain forest, savanna = deciduous, and rain forest = deciduous) were rejected. These data illustrated significant differences among the three ecological zones regarding the consumption of big game during cultural festivals.

Table 25 shows farmers' responses in the three ecological zones on their preference for 1,126 small game during cultural festivals. Of this number, 253 (23 percent) were used at masquerades, 110 (10 percent) at marriage ceremonies, 73 (6 percent) at birth ceremonies, 220 (20 percent) at death ceremonies, and 470 (41 percent) at installation ceremonies. This reveals that farmers used more small game during installation ceremonies than other cultural festivals.

The calculated chi-squared values of 273.06 and 241.75 in Appendix H are significant at the 0.05 level of confidence; therefore, the null hypotheses (savanna = rain forest and savanna = deciduous) were rejected.

These results indicate a significant difference in the consumption of small game in the savanna, deciduous, and rain forest regions. A chi-square value of 4.15 at the same level is not significant; the null hypothesis (deciduous = rain forest) was accepted. Therefore, there was no significant difference regarding the use of small game in the deciduous and rain forest regions.

Table 25 shows that farmers in the three regions surveyed indicated they used 553 reptiles during cultural festivals. Of this number, 231 (42 percent) preferred reptiles at masquerades, 59 (11 percent) at marriage ceremonies, 42 (7 percent) at birth ceremonies, 127 (23 percent) at death ceremonies, and 94 (17 percent) during installation ceremonies. From these results, it appears that farmers consume more small game at masquerades than at other cultural festivals.

The calculated chi-squared values of 23.72, 73.36, and 12.40 in Appendix H are statistically significant at the 0.05 level of confidence; therefore, the null hypotheses (savanna = rain forest, savanna = deciduous, and rain forest = deciduous) were rejected. Therefore, there are significant differences in the three ecological zones regarding consumption of reptiles during cultural festivals.

In the three regions surveyed, 458 game birds were consumed during cultural festivals (Table 25). Of this number, 109 (24 percent) were used during masquerades, 89 (19 percent) at marriage ceremonies, 46 (10 percent) at birth ceremonies, 117 (26 percent) at death ceremonies, and 97 (21 percent) were used during installation ceremonies. Apparently game birds are utilized more frequently by farmers during death ceremonies.

The computed chi-squared values of 66.31 and 81.69 in Appendix K are statistically significant at the 0.05 level of confidence; therefore, the null hypotheses (savanna = rain forest and savanna = deciduous) were rejected. Analysis of the data indicated a significant difference exists in the consumption of game birds by farmers during cultural festivals in the savanna, rain forest, and deciduous regions.

A chi-squared value of 2.29 at the same level is not significant; therefore, the null hypothesis (deciduous = rain forest) was accepted. This indicates that there is no significant difference regarding the use of game birds by farmers in the rain forest and deciduous regions.

Table 26 shows the composition of wild animals used by Nigerian farmers in cultural ceremonies. Dominant big game used were the buffalo, bush buck, gray duiker, and roan antelope. Major small game used include cane rat, porcupine, and squirrel. Monitor lizard, crocodile, and python were the major reptiles used. All the game birds (francolin and guinea fowl) were utilized. Other wildlife species utilized include the African giant snails.

Table 26. Composition of wild animals used by Nigerian farmers in cultural ceremonies, 1986.

Species	Savanna Region Farmers (N = 240) #	%	Deciduous Region Farmers (N = 120) #	%	Rain Forest Region Farmers (N = 120) #	%
Big Game						
Elephant	61	5	2	0.8	1	0.4
Buffalo	179	16	22	9.2	15	6
Roan antelope	196	17	-	-	-	-
Bush buck	195	17	48	20	100	38
Kob	137	12	-	-	-	0
Water buck	158	14	-	-	2	0.8
Gray duiker	173	15	104	44	99	37
Warthog	28	2.5	34	14	41	15.5
Baboon	18	1.5	26	11	7	3
	1145		236		265	
Small Game						
Cane rat	95	23	79	23	99	26
African giant rat	62	15	76	22	94	25
Porcupine	88	21	75	22	97	25.5
Pangolin	25	6	47	14	48	12.5
Flying squirrel	52	13	27	8	10	3
Squirrel	73	18	30	9	26	7
Bat	16	4	11	3	7	2
	411		345		381	
Reptiles						
Python	66	20	4	8	2	5
Crocodile	92	27	7	14	7	17
Monitor lizard	94	28	32	64	4	10
Cobra	11	3	1	2	4	10
Puff adder	12	4	-	-	5	13
Night adder	9	3	-	-	4	10
Tortoise	52	15	6	12	14	35
	336		50		40	
Mollusc						
African giant snail	20		28		33	
Game Birds						
Guinea fowl	183	52	24	57	36	55
Francolin	169	48	18	43	28	44
	352		42		64	

Wildlife Species Used During Muslim Religious Festivals

Wild animal consumption during the three important Muslim festivals is shown in Table 27. Out of the 867 big game reported in the savanna region, 299 (18 percent) were consumed at Id-el-Kabir, 124 (7 percent) at Id-el-Fitr, and 444 (26 percent) were consumed during the period of Id-el-Maulud. From the rain forest region, out of 103 big game reportedly used during Muslim festivals, 6 (2 percent) were consumed at Id-el-Kabir, 12 (4 percent) at Id-el-Fitr, and 85 (27.3 percent) at Id-el-Maulud. In the deciduous region, farmers reported only 34 big game; 1 (1 percent) was used at Id-el-Kabir, no big game was consumed during the Id-el-Fitr, and 32 (27 percent) were consumed at Id-el-Maulud.

These results indicate that out of 1,004 big game reported in the three zones, 306 (30 percent) were consumed at Id-el-Kabir, 136 (14 percent) at Id-el-Fitr, and 561 (56 percent) at Id-el-Maulud, indicating that farmers consumed more big game at Id-el-Maulud than at Id-el-Kabir and Id-el-Fitr.

The computed chi-squared values of 41.07 and 26.74 in Appendix I are statistically significant at the 0.05 level of confidence; therefore, the hypotheses (savanna = rain forest and savanna = deciduous) were rejected.

These results show there was a significant difference between residents of savanna, deciduous, and rain forest in

Table 27. Total numbers of wild animal consumption by farmers during Muslim religious festivals in a national survey conducted in Nigeria from July to November 1986.

Savanna (N = 1683)

	Big Game	%*	Small Game	%	Reptiles	%	Game Birds	%
Id-el-Kabir	299	18	137	8	88	5	88	5
Id-el-Fitr	124	7	21	1.2	14	.8	65	4
Id-el-Maulud	444	26	127	8	101	6	178	11

Rain Forest (N = 311)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Id-el-Kabir	6	2	5	1.6	5	1.6	2	0.6
Id-el-Fitr	12	4	25	8	4	1	3	0.9
Id-el-Maulud	85	27.3	118	38	27	9	19	6

Deciduous (N = 116)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Id-el-Kabir	1	1	2	2	7	6	-	-
Id-el-Fitr	-	-	-	-	1	1	-	-
Id-el-Maulud	32	27	59	51	7	6	7	6

*Percentage of wild animals used during Muslim religious festivals as reported by farmers.

their use of big game during Muslim religious festivals. The other chi-square value of 4.83 is not statistically significant at the same level of confidence; therefore, the null hypothesis (deciduous = rain forest) was accepted. Therefore, no significant difference exists between the deciduous and rain forest regions regarding the consumption of big game during Muslim festivals.

Of 285 small game reported by farmers during Muslim festivals in the savanna region, 137 (8 percent) said they use it at Id-el-Kabir, 21 (1.2 percent) at Id-el-Fitr, and 127 (8 percent) at Id-el-Maulud. In the rain forest region, 148 small game were reported; of this number, 5 (1.6 percent) were used at Id-el-Kabir, 25 (8 percent) at Id-el-Fitr, and 118 (38 percent) at Id-el-Maulud. Out of 61 small game reported by farmers in the deciduous region, 2 (2 percent) were used at Id-el-Kabir, none were used at Id-el-Fitr, and 59 (51 percent) at Id-el-Maulud.

This shows that out of 494 small game reported, 144 (29 percent) were used at Id-el-Kabir, 46 (9 percent) at Id-el-Fitr, and 304 (62 percent) at Id-el-Maulud. From this analysis, it appears that farmers consume more small game at Id-el-Maulud than at other Muslim festivals.

The calculated chi-square values of 88.94, 55.02, and 11.78 are statistically significant at the 0.05 level of confidence; therefore, the hypotheses (savanna = rain forest, savanna = deciduous, and rain forest = decidous) were rejected. This indicates a significant difference in the three ecological regions regarding the consumption of small game during Muslim religious festivals.

Out of 203 reptiles used in the savanna region during Muslim festivals, 88 (5 percent) were used at Id-el-Kabir, 14 (0.8 percent) at Id-el-Fitr, and 101 (6 percent) at Id-el-Maulud. Out of 36 reptiles reported in the rain forest region; 5 (1.6 percent) were used at Id-el-Kabir, 4 (1 percent) at Id-el-Fitr, and 27 (9 percent) at Id-el-Maulud. In the deciduous region, 15 reptiles were reported; of this number, 7 (6 percent) were used at Id-el-Kabir, 1 (1 percent) at Id-el-Fitr, and 7 (6 percent) at Id-el-Maulud (Table 27).

This analysis shows that out of 254 reptiles reported in the three zones, 100 (29 percent) were used at Id-el-Kabir, 19 (8 percent) at Id-el-Fitr, and 135 (53 percent) at Id-el-Maulud. It is evident that reptiles are utilized more at Id-el-Maulud than at the other Muslim festivals.

The computed chi-squared values of 11.18 and 6.32 are significant at the 0.05 level of confidence; therefore, the null hypotheses (savanna = rain forest and deciduous = rain forest) were rejected. This shows a significant difference between the residents of the savanna, rain forest, and deciduous regions in the consumption of reptiles for Muslim religious festivals. The other chi-square value of 0.06 at the same level of confidence is not statistically significant; therefore, the null hypothesis (deciduous = rain forest) was accepted. Consequently, there is no significant difference between deciduous and savanna regions in the consumption of reptiles during Muslim religious festivals.

Table 27 shows that farmers in the savanna reported 328 game birds consumed during Muslim religious festivals; 88 (5 percent) were used at Id-el-Kabir, 65 (4 percent) at Id-el-Fitr, and 178 (11 percent) at Id-el-Maulud. Farmers reported 25 game birds in the rain forest region, 2 (0.6 percent) were used at Id-el-Kabir, 3 (0.9 percent) at Id-el-Fitr, and 19 (6 percent) at Id-el-Maulud. In the deciduous region, all seven game birds farmers reported were used at Id-el-Maulud.

These results indicate that out of 360 game birds reported in the three regions, 90 (25 percent) were used at Id-el-Kabir, 65 (18 percent) at Id-el-Fitr, and 204 (57 percent) at Id-el-Maulud. Therefore, it appears more farmers preferred using game birds at Id-el-Maulud than at other Muslim religious festivals.

The computed chi-square values of 5.97 and 5.80 in Appendix I are not statistically significant at the 0.05 level of confidence; therefore, the null hypotheses (savanna = rain forest and savanna = deciduous) were accepted. This indicates there is no significant difference in the consumption of game birds in the savanna, rain forest, and deciduous regions during Muslim religious festivals.

Table 28 shows the composition of wild animals used by Nigerian farmers in Muslim religious ceremonies. Important big game were roan antelope, bush buck, and gray duiker; small game include cane rat, porcupine, and squirrel. Dominant reptiles utilized were the crocodile, monitor lizard, and python. All the game birds (francolin and guinea fowl) were used and the African giant snail.

Species Used During Christian Religious Festivals

Table 29 shows data obtained on wild animals eaten during Christian religious festivals in Nigeria. Out of 376 big game reported in the savanna zone, 191 (23.6 percent) were consumed during Christmas, 75 (9 percent) during harvest (a festival that takes place in the fall when Christian farmers harvest their farm products and celebrate), and 110 (13.6 percent) during Easter. In the rain forest region 239 big game were reported, 39 (5.6 percent) were consumed at Christmas, 26 (4 percent) during harvest, and 174 (25 percent) during Easter. Of 245 big game reported in the deciduous region, 26 (3 percent) were consumed at Christmas, 36 (4.4 percent) during harvest, and 183 (23 percent) at Easter.

Table 28. Composition of wild animals used by Nigerian farmers in Muslim religious ceremonies, 1986.

	Savanna Region Farmers (N = 240)		Deciduous Region Farmers (N = 120)		Rain Forest Region Farmers (N = 120)	
	#	%	#	%	#	%
Big Game						
Elephant	50	6	-	-	-	-
Buffalo	129	15	-	-	-	-
Roan antelope	162	18	-	-	-	-
Bush buck	150	17	10	30	51	77
Kob	98	11	-	-	-	-
Water buck	129	15	-	-	1	2
Gray duiker	156	18	14	43	12	18
Warthog	3	0.3	5	15	1	2
Baboon	-	-	4	12	1	2
	887		33		66	
Small Game						
Cane rat	78	27	14	23	4	4
African giant rat	44	15	15	25	37	35
Porcupine	73	26	12	20	25	24
Pangolin	9	3	10	16	14	13
Flying squirrel	29	10	3	5	2	2
Squirrel	47	16	4	7	20	19
Bat	5	2	3	5	4	4
	285		61		106	
Reptiles						
Python	31	16	2	25	2	13
Crocodile	60	32	1	13	2	13
Monitor lizard	60	32	1	13	2	13
Cobra	2	1	1	13	2	13
Puff adder	3	2	1	13	4	27
Night adder	4	2	1	13	3	20
Tortoise	30	16	1	13	-	-
	190		8		15	
Mollusc						
African giant snail	12		7		20	
Game Birds						
Guinea fowl	171	52	4	57	14	58
Francolin	157	48	3	43	10	42
	328		7		24	

Table 29. Total number of wild animals consumed by farmers during Christian religious festivals in Nigeria during a survey conducted from July to November 1986.

Savanna (N = 808)

	Big Game	%*	Small Game	%	Reptiles	%	Game Birds	%
Christmas	191	23.6	125	15	194	13	6	1
Harvest	75	9	31	4	15	2	22	3
Easter	110	13.6	45	5.5	43	5.3	41	5

Rain Forest (N = 691)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Christmas	39	5.6	42	6	26	4	15	2
Harvest	26	4	29	4	13	2	7	1
Easter	174	25	238	34.4	49	7	33	5

Deciduous (N = 802)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Christmas	26	3	35	4	16	2	17	2
Harvest	36	4.4	29	4	14	2	17	2
Easter	183	23	294	36.6	85	11	50	6

*Percentages of the wild animals consumed during Christian religious festivals as reported by farmers.

These data show that out of 860 big game reported in the three ecological zones, 256 (30 percent) were consumed at Christmas, 137 (16 percent) were consumed at harvest, and 467 (54 percent) were preferred during Easter. Therefore, farmers in Nigeria consume more big game during Easter than at Christmas, while they consume very little during harvest.

The computed chi-square values of 113.77 and 135.76 in Appendix J are statistically significant at the 0.05 level of confidence; therefore, the null hypotheses (savanna = rain forest and savanna = deciduous) were rejected. This result indicates a significant difference between the savanna, rain forest, and deciduous regions regarding consumption of big game during Christian festivals. The chi-square value of 4.37 in Appendix J at the same level of confidence shows that the null hypothesis (deciduous = rain forest) was accepted. This indicates that there was no significant difference between deciduous and rain forest regions regarding big game consumption during Christian festivals.

Data in Table 29 indicate that 201 small game were consumed in the savanna region during Christian festivals. Out of the 201, 125 (15 percent) were consumed at Christmas, 31 (4 percent) at harvest period, and 45 (5.5 percent) during Easter. Out of 385 deciduous region small game, 35 (4 percent) were consumed at Christmas, 29 (4 percent) at harvest, and 294 (36.6 percent) during Easter. From the rain forest zone, 309 small game were reported, and of this number 42 (6 percent) were consumed at Christmas, 29 (4 percent) at harvest, and 238 (34.4 percent) at Easter.

Interpretation of these results indicates that out of 868 small game consumed during Christian religious festivals in the zones surveyed, 202 (23 percent) prefer small game at Christmas, 89 (10 percent) at harvest period, and 577 (67 percent) at Easter. This indicates that most farmers eat more small game at Easter than at Christmas or during the harvest period.

The computed chi-square values of 157.12 and 205.72 in Appendix J are statistically significant at the 0.05 level of confidence; therefore, the null hypotheses (savanna = rain forest and savanna = deciduous) were rejected. This indicates a significant difference between the savanna, rain forest, and deciduous regions for small game the farmers consume during Christian religious festivals. The chi-square value of 2.95 in Appendix J at the same level of confidence shows that the null hypothesis (deciduous = rain forest) was accepted. There is no significant difference in small game consumption during Christian religion festivals between the deciduous and rain forest regions.

Out of 162 reptiles reported by farmers in the savanna region, 104 (13 percent) were consumed at

Christmas, 15 (2 percent) at harvest, and 43 (5.3 percent) at Easter. Of 115 reptiles consumed during Christian festivals, 16 (2 percent) were consumed at Christmas, 14 (2 percent) at harvest, and 85 (11 percent) at Easter. In rain forest region, farmers reported 88 reptiles; out of this 26 (4 percent) were consumed at Christmas, 13 (2 percent) at harvest, and 49 (7 percent) at Easter.

This indicates that out of 365 reptiles reported in the three regions, 146 (40 percent) were used at Christmas, 42 (12 percent) at harvest period, while 177 (48 percent) were consumed during Easter. It seems, therefore, that more farmers consumed reptiles at Easter than at Christmas and harvest festivals.

The computed chi-square values of 27.87, 72.46, and 28.63 are statistically significant at the 0.05 level of confidence; therefore, the null hypotheses (savanna = rain forest, savanna = deciduous, and deciduous = rain forest) were rejected. This reveals a significant difference in the consumption of reptiles in the three ecological zones.

Results in Table 29 show the number of game birds that were consumed at Christian religious festivals. Out of 69 game birds reported in the savanna region, 6 (1 percent) were consumed at Christmas, 22 (3 percent) at harvest, and 41 (5 percent) at Easter. Out of 55 game birds reported in the rain forest region, 15 (2 percent) were consumed at Christmas, 7 (1 percent) at harvest, and 33 (5 percent) at Easter. In the deciduous region, 84 game birds were reported; of this number, 17 (2 percent) were consumed at Christmas, 17 (2 percent) at harvest, and 50 (6 percent) at Easter.

This indicates that out of the 208 game birds reported in all the ecological zones, 38 (18 percent) were preferred at Christmas, 46 (22 percent) at harvest, and 124 (60 percent) at Easter. This data also suggests that farmers prefer to eat game birds at Easter more than at Christmas and harvest periods.

The computed chi-square value of 11.04 in Appendix J is significant at the 0.05 level of confidence; therefore, the null hypothesis (savanna = rain forest) was rejected. The other chi-square values of 5.37 and 1.80 at the same level of confidence are not statistically significant; therefore, the null hypotheses (savanna = deciduous and deciduous = rain forest) were accepted.

These results show there is a significant difference between the savanna, rain forest, and deciduous regions in the consumption of game birds during Christian festivals. There is no significant difference in rain forest and deciduous regions regarding utilization of game birds for Christian festivals.

Table 30 shows the of wild animals used by Nigerian farmers in Christian religious ceremonies. The dominant

Table 30. Composition of wild animals used by Nigerian farmers in Christian religious ceremonies, 1986.

Species	Savana Region Farmers (N = 240) #	%	Deciduous Region Farmers (N = 120) #	%	Rain Forest Region Farmers (N = 120) #	%
<u>Big Game</u>						
Elephant	15	4	2	0.8	5	2
Buffalo	52	14	8	3	19	8
Roan antelope	58	15	-	-	2	0.9
Bush buck	67	17	60	24.5	71	30
Kob	45	12	1	0.4	-	-
Water buck	49	13	-	-	1	0.5
Gray duiker	58	15	109	45	94	40
Warthog	23	6	35	14	38	16
Baboon	17	4	30	12	5	2
	384		245		235	
<u>Small Game</u>						
Cane rat	39	20	90	26	85	28
African giant rat	26	13	75	21	77	25
Porcupine	42	21	83	24	79	26
Pangolin	14	7	39	11	34	11
Flying squirrel	30	15	19	5	5	2
Squirrel	40	20	36	10	22	7
Bat	7	4	10	3	7	2
	198		352		309	
<u>Reptiles</u>						
Python	32	22	6	9	3	8
Crocodile	40	27	10	14	8	20
Monitor lizard	35	24	35	50	10	25
Cobra	4	3	4	6	4	10
Puff adder	9	6	1	1	5	12.5
Night adder	5	3	4	6	5	12.5
Tortoise	22	15	10	14	5	12.5
	147		70		40	
<u>Mollusc</u>						
African giant snail	17		45		46	
<u>Game Birds</u>						
Guinea fowl	62	53	52	62	29	53
Francolin	56	47	32	38	26	47
	118		84		55	

big game utilized in the regions were the bush buck, gray duiker, and warthog, while the samll game include cane rat, porcupine, and squirrel. Python, crocodile, and monitor lizard were the most utilized reptiles. Important game birds used include the guinea fowl and francolin. Another wildlife species used in large numbers was the African giant snail.

Chapter VII

ANALYTICAL RESULTS AND DISCUSSION OF HUNTERS' SURVEY

This section highlights consumptive uses of wildlife species in the three regions surveyed based on availability of different animals by ecosystems, hunters' characteristics, and hunting frequency per year based on quarterly seasons in Nigeria. Other consumptive aspects discussed include the wild animals hunted during rainy and dry seasons, and species hunted during different religious and cultural festivals. Emphasis is placed on wild animals hunted for medicinal purposes, used at home, and sold in villages and at the market.

Hunters' Characteristics

The results of the hunters' characteristics survey are shown in Table 31. From Table 31, "t" tests were calculated on dependents and chi-squared for years of schooling. One of the hunters' characteristics discussed in an earlier chapter is the distance. The distance of each village from cities where the farmers and hunters' survey was conducted is the same.

Table 31. Selected hunters' characteristics used in the survey of wildlife utilization in Nigeria from July to November 1986.

State	Ecological zone	Average distance away from city (km)	Average Depen-dents	Average years of school-ing
Oyo	Rain Forest	39.2	9.2	0.0
Cross River	Rain Forest	58.8	8.3	4.8
Bendel	Deciduous	40.4	7.2	3.3
Anambra	Deciduous	40.0	8.9	1.0
Bauchi	Savanna	141.8	9.8	6.3
Plateau	Savanna	4.2	10.3	5.4
Niger	Savanna	76.8	12.0	3.6
Kwara	Savanna	58.8	8.3	4.8

The calculated "t" test value of -3.42 and 4.76 in Table 32 are statistically significant at the .05 level of confidence; therefore, the null hypothesis (rain forest = savanna and savanna = deciduous) were rejected. This indicates is a significant difference between rain forest, savanna, and deciduous regions regarding the number of dependents per average hunter. The "t" test value of 0.89 is not significant at the same level of confidence; therefore, the null hypothesis (rain forest = deciduous) was accepted. This reveals no significant difference between rain forest and deciduous regions regarding dependents.

Data showed that the average number of dependents per hunter in the three regions surveyed is nine. This is low compared with an average of 12 per farmer as discussed in an earlier chapter.

The computed chi-squared values of 4.98 and 7.04 in Table 33 are statistically significant at the 0.05 level of significance; therefore, the null hypotheses (rain forest = savanna and savanna = deciduous) were rejected. This indicates was a significant difference between savanna, rain forest, and deciduous regions regarding years of schooling of hunters. Chi-square value of 0.24 is not significant at the same level of confidence; therefore, the null hypothesis (rain forest = deciduous) was accepted. This indicates no significant difference between rain forest and deciduous regions regarding the years of schooling of hunters.

Table 32. "T" test of independence among three ecological zones to the dependents and years of schooling in the hunters' characteristics.

	Dependents			
	Rain Forest	Deciduous	"T" Test	Accept or Reject
Aver.	8.81	8.10	.89	Accept
s^2p	43.53	29.82	df = 358	

	Rain Forest	Savanna	"T" Test	Accept or Reject
Aver.	8.81	11.48	-3.42	Accept
s^2p	43.53	60.46	df = 358	

	Savanna	Deciduous	"T" Test	Accept or Reject
Aver.	11.48	8.10	4.76	Reject
s^2p	60.46	29.82	df = 358	

Table 33. Chi-square test of independence among three ecological zones relative to years of schooling among the hunters.

Schooling

	Rain Forest	Deciduous	Chi-square	Accept or Reject
Some schooling	3	2	0.24	Accept
No schooling	12	13	df = 358	

	Rain Forest	Savanna	Chi-square	Accept or Reject
Some schooling	3	10	4.98	Reject
No schooling	12	7	df = 358	

	Savanna	Deciduous	Chi-square	Accept or Reject
Some schooling	10	2	7.04	Reject
No schooling	7	13	df = 358	

<u>Availability of Wild Animals by Ecosystem Through the Hunters' Survey</u>

Availability of wild animals in the three regions surveyed is shown in Table 34. Out of 3,081 wild animals reported available by hunters in the three regions, 2,506 (81 percent) were common, 224 (7 percent) scarce, 105 (3 percent) no longer found, 226 (8 percent) never existed, and 20 (1 percent) did not know about their availability. Out of 2,506 animals reported common, 682 (27 percent) were big game, 734 (20 percent) small game, 862 (34 percent) reptiles, and 228 (9 percent) game birds.

This analysis indicates that reptiles and small game are the most numerous wild animals in the three regions, followed by big game and birds. From Table 34, out of 5,506 wild animals reported common, 1,230 (49 percent) were from the savanna, 683 (27 percent) from the deciduous, and 593 (24 percent) were from the rain forest region. This indicates that about 50 percent of the common species in the three zones were from the savanna region.

<u>Wildlife Species Hunted During Christian Religious Festivals in Nigeria</u>

Table 35 shows that in the three regions, 797 wild animals were hunted during Christian religious festivals. Of this number, 140 (18 percent) were hunted at Christmas, 107 (13 percent) at harvest, and 550 (69 percent) at

Table 34. Opinions of hunters regarding availability of wild animals by ecosystem through the hunters survey conducted in Nigeria, July to November 1986.

	Rain Forest						(N = 778)	
	Big Game	%*	Small Game	%	Reptiles	%	Game Birds	%
Common	144	19	191	25	200	26	58	7
Scarce	45	6	18	2	25	3	1	0.12
No longer found	26	3	1	0.12	1	0.12	0	-
Never	54	7	0	-	10	1.3	1	0.12
Don't know	1	0.12	0	-	2	0.26	0	-

	Deciduous						(N = 768)	
	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Common	222	29	175	23	227	30	59	8
Scarce	25	3	21	3	7	0.9	1	0.13
No longer found	17	2	0	-	1	0.13	1	0.13
Never	5	0.65	3	0.4	0	-	0	-
Don't know	1	0.13	0	-	3	0.4	0	-

	Savanna						(N = 1535)	
	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Common	316	21	368	24	435	28	111	7
Scarce	38	2.5	9	0.6	30	2	4	0.26
No longer found	48	3	10	0.7	0	-	0	-
Never	110	7	29	2	14	0.9	0	-
Don't know	8	0.5	3	0.2	1	0.06	1	0.06

*Percentage of common and uncommon wild animals.

Table 35. Total number of wild animals killed by hunters during Christian religious festivals in Nigeria in a survey conducted from July to November 1986.

Rain Forest (N = 286)

	Big Game	%*	Small Game	%	Reptiles	%	Game Birds	%
Christmas	29	10	9	3	14	5	8	3
Harvest	3	1	7	2.5	1	0.35	0	-
Easter	38	13	99	35	63	22	15	5

Deciduous (N = 239)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Christmas	1	0.4	0	-	3	1	1	0.4
Harvest	1	0.4	5	2	2	0.8	5	2
Easter	65	27	125	52	13	5	18	8

Savanna (N = 272)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Christmas	37	14	22	8	12	4	4	1
Harvest	26	10	22	8	22	8	13	5
Easter	51	19	38	14	16	6	9	3

*Percentage of total wild animals killed by hunters during Christian festivals.

Easter. This indicates that wildlife species are hunted more for Easter festival than other Christian festivals in Nigeria. Out of 550 species hunted for Easter, 154 (28 percent) were big game, 262 (48 percent) small game, 92 (16 percent) reptiles, and 42 (8 percent) game birds.

This indicates that more wildlife species are hunted during the dry season, which is also the Easter season in Nigeria. This is a period when hunters have less to do on their farms, hence they switch to alternate sources of income.

Table 36 shows the composition of wild animals taken by Nigerian hunters in Christian religious ceremonies. The dominant big game utilized in the regions were the warthog, gray duiker, and bush buck; while cane rat, African giant rat, and porcupine were the important small game. Monitor lizard and cobra were the reptiles taken. Other wild animals include guinea fowl, francolin, and African giant snail.

Wild Animals Hunted During Muslim Religious Festivals in Nigeria

Table 37 shows the number of wild animals hunted in the three regions during Muslim religious festivals. Out of 927 species hunted, 185 (20 percent) were from the savanna region, 25 (3 percent) from the rain forest, and 717 (77 percent) from the savanna. Of all the species

Table 36. Composition of wild animals taken by Nigerian hunters in Christian religious ceremonies, 1986.

Species	Savanna Region Hunters (N = 60)		Deciduous Region Hunters (N = 30)		Rain Forest Region Hunters (N = 30)	
	#	%	#	%	#	%
Big Game						
Elephant	3	3	-	-	1	1
Buffalo	9	8	2	3	5	7
Roan antelope	11	10	1	1.5	8	11
Bush buck	14	12	18	27	14	19
Kob	13	11	1	1.5	-	-
Water buck	15	13	1	1.5	10	14
Gray duiker	14	12	25	37	23	32
Warthog	19	17	10	15	11	15
Baboon	16	14	9	13	-	
	114		67		72	
Small Game						
Cane rat	14	17	29	22	20	17
African giant rat	14	17	26	20	20	17
Porcupine	14	17	21	16	28	24
Pangolin	12	15	16	12	16	14
Flying squirrel	11	14	12	9	13	11
Squirrel	10	12	17	13	12	11
Bat	6	7	9	7	6	5
	81		130		115	
Reptiles						
Python	9	19	-		6	9
Crocodile	15	31	-		8	12
Monitor lizard	8	17	1	25	13	20
Cobra	4	8	1	25	8	12
Puff adder	3	6	-		9	14
Night adder	4	8	-		9	14
Tortoise	5	10	2	50	12	19
	48		4		65	
Mollusc						
African giant snail	2		13		13	
Game Birds						
Guinea fowl	12	46	13	57	6	26
Francolin	14	54	10	43	17	74
	26		23		23	

Table 37. Total number of wildlife species killed by hunters during Muslim religious festivals in Nigeria in a survey conducted from July to November 1986.

	Rain Forest						(N = 185)	
	Big Game	%*	Small Game	%	Reptiles	%	Game Birds	%
Id-el-Kabir	0		0		0		0	
Id-el-Fitr	0		0		0		0	
Ed-el-Maulud	29	16	77	42	64	35	15	8

	Deciduous						(N = 25)	
	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Id-el-Kabir	0		0		0		0	
Id-el-Fitr	0		0		0		0	
Id-el-Maulud	5	20	17	68	1	4	2	8

	Savanna						(N = 717)	
	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Id-el-Kabir	60	8	43	6	57	8	17	2
Id-el-Fitr	89	12	49	7	23	8	16	2
Id-el-Maulud	141	20	97	14	65	9	60	8

*Percentage of total wild animals killed by hunters during Muslim festivals.

hunted in the three zones, 120 (13 percent) were hunted during Id-el-Kabir, 177 (19 percent) at Id-el-Fitr, and 573 (62 percent) during Id-el-Maulud. Table 37 shows that no wildlife species were hunted in the rain forest and deciduous regions during Id-el-Kabir and Id-el-Fitr. All the species hunted during this period were from the savanna region only.

Table 38 shows the composition of wild animals used by Nigerian hunters for Muslim religious ceremonies. The most important big game used in the regions were the gray duiker and bush buck, while porcupine and cane rat were reported as the dominant small game. Reptiles used include python, crocodile, and monitor lizard. Francolin and guinea fowl were used in addition to the African giant snail.

This indicates that wild animals were not used specifically for most Muslim religious festivals. Hunters sought wildlife speces during Muslim religious festivals to supplement income.

Wild Animals Hunted During Cultural Festivals in Nigeria

Table 39 shows that 1,225 wild animals were hunted in the regions during cultural festivals in Nigeria. Out of this number, 241 (20 percent) were hunted for masquerades, 204 (17 percent) for marriage ceremonies, 124 (10 percent) for birth ceremonies, 211 (17 percent) at death ceremonies,

Table 38. Composition of wild animals used by Nigerian hunters in Muslim religious ceremonies, 1986.

Species	Savanna Region Hunters (N = 60) #	%	Deciduous Region Hunters (N = 30) #	%	Rain Forest Region Hunters (N = 30) #	%
Big Game						
Elephant	22	8	-		-	
Buffalo	32	11	-		-	
Roan antelope	47	17	-		-	
Bush buck	47	17	2	40	14	48
Kob	42	15	-		-	
Water buck	47	17	-		-	
Gray duiker	44	16	3	60	15	52
Warthog	-	-	-		-	
Baboon	-	-	-		-	
	281		5		29	
Small Game						
Cane rat	41	22	3	12	14	19
African giant rat	34	18	3	12	13	18
Porcupine	48	26	4	16	15	21
Pangolin	15	8	3	12	8	11
Flying squirrel	14	8	3	12	10	14
Squirrel	25	14	3	12	11	15
Bat	8	4	6	24	1	1
	185		25		72	
Reptiles						
Python	41	29	6	11	-	
Crocodile	44	32	5	9	-	
Monitor lizard	32	23	10	18	-	
Cobra	2	1	9	16	-	
Puff adder	2	1	9	16	-	
Night adder	2	1	9	16	-	
Tortoise	16	12	7		-	
	139		55		-	
Mollusc						
African giant snail	5		9		-	
Game Birds						
Guinea fowl	45	52	4	27	1	100
Francolin	41	48	11	73	-	
	86		15		1	

Table 39. Total number of wild animals hunted during cultural festivals in Nigeria in a survey conducted from July to November 1986.

Rain Forest (N = 25~~5~~6)

	Big Game	%*	Small Game	%	Reptiles	%	Game Birds	%
Masq.	9	4	2	0.8	3	1	0	-
Marr. Cer.	9	4	5	2	9	4	1	0.4
Birth Cer.	1	0.4	1	0.4	2	0.8	0	-
Death Cer.	1	0.4	0	-	0	-	0	-
Install. Cer.	49	19	99	39	51	20	14	6

Deciduous (N = 195)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Masq.	21	11	2	1	0	-	0	-
Marr. Cer.	2	1	3	1.5	1	0.5	2	1
Birth Cer.	3	1.5	8	4	1	0.5	0	-
Death Cer.	5	2.5	1	0.5	0	-	2	1
Install. Cer.	43	22	79	40.5	15	8	7	4

Savanna (N = 774)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Masq.	77	10	58	7	49	6	20	3
Marr. Cer.	32	4	50	6	83	11	7	.9
Birth Cer.	49	6	29	4	19	2	11	1
Death Cer.	52	7	72	9	35	5	43	6
Install. Cer.	29	4	21	3	29	4	9	1

*Percentage of total wild animals killed by hunters during cultural festivals.

and 445 (36 percent) at installation ceremonies. This analysis indicates that more wild animals were used during installation ceremonies in the three regions than during other cultural festivals.

Out of 445 wild animals used for installation ceremonies, 121 (27 percent) were big game, 199 (45 percent) small game, 95 (21 percent) reptiles, and 30 (7 percent) game birds. This shows that most of the wildlife species used during installation ceremonies were small game.

Table 40 shows the composition of wild animals used by Nigerian hunters in cultural ceremonies. Bush buck, gray duiker, and buffalo were the dominant big game used for cultural ceremonies in the regions. Small game used include the game birds (francolin and guinea fowl) and African giant snail.

Hunting Frequency in the Three Regions Surveyed Based on Quarterly Periods

Out of 1,428 hunts in the three regions, 475 (33 percent) were in the first quarter (January - April), 475 (33 percent) in the second quarter (May - August), and 478 (34 percent) in the third quarter (September - December). Of the total 1,428 hunts, frequency of less than once a week was 300 (21 percent), 226 (16 percent) once a week, 362 (26 percent) several times a week, 151 (11 percent)

Table 40. Composition of wild animals used by Nigerian hunters in cultural ceremonies, 1986.

Species	Savanna Region Hunters (N = 60) #	%	Deciduous Region Hunters (N = 30) #	%	Rain Forest Region Hunters (N = 30) #	%
Big Game						
Elephant	31	10	-	-	-	-
Buffalo	52	16	1	2	4	6
Roan antelope	49	15	1	2	-	-
Bush buck	51	16	14	25	17	27
Kob	42	13	-		-	-
Water buck	50	15	1	2	-	-
Gray duiker	48	15	23	41	26	42
Warthog	-	-	8	14	14	23
Baboon	-	-	8	14	1	2
	323		56		62	
Small Game						
Cane rat	44	19	21	23	22	20
African giant rat	36	16	21	23	25	23
Porcupine	49	21	19	21	20	18
Pangolin	25	11	13	14	10	9
Flying squirrel	26	11	6	7	10	9
Squirrel	30	13	7	8	15	14
Bat	21	9	5	5	7	6
	231		92		109	
Reptiles						
Python	40	21	2	22	6	10
Crocodile	39	20	2	22	6	10
Monitor lizard	33	17	1	11	11	19
Cobra	21	11	1	11	8	14
Puff adder	19	10	1	11	9	16
Night adder	20	10	1	11	8	14
Tortoise	23	12	1	11	10	17
	195		9		58	
Mollusc						
African giant snail	22		8		7	
Game Birds						
Guinea fowl	50	56	6	55	4	27
Francolin	40	44	5	45	11	73
	90		11		15	

half day, every day, and 339 (24 percent) all day, every day (Table 41).

This analysis indicates there is no significant difference among the quarters regarding frequency of hunting in the three regions. Results show that more hunts occurred several times a week in all the quarters.

Animals Hunted During Rainy and Dry Seasons in Nigeria

Wildlife speces hunted during rainy and dry seasons in the three regions surveyed are shown in Table 42. Of the 1,955 species reported hunted, 595 (30 percent) were big game, 595 (30 percent) small game, 578 (30 percent) reptiles, and 187 (10 percent) game birds. Out of 1,955 species hunted, 1,130 (58 percent) were hunted in the rainy season and 825 (42 percent) in the dry season.

This analysis shows no significant differ ence among big game, small game, and reptiles hunted during both the rainy and dry seasons in Nigeria. It also indicates that more wild animals were hunted during the rainy season than during the dry season.

Appendix K shows that the computed chi-squared values of 168.97 and 159.04 on big game are significant at the 0.05 level of confidence; therefore, the null hypotheses (rain forest = deciduous and deciduous = savanna) were rejected. Chi-squared value of 2.48 is not significant at the same level of confidence; therefore, the null hypothesis (rain forest = savanna) was accepted.

Table 41. Hunting frequency per year as reported by hunters in the three regions surveyed based on quarterly seasons or periods (January - April, May - August, September - December) in Nigeria, 1986.

Rain Forest (N = 36~~6~~0)

	1st Quarter	%**	2nd Quarter	%	3rd Quarter	%
*LTOAW	3	0.8	25	7	27	8
OAW	18	5	21	6	10	3
STAW	57	16	64	18	60	17
HDED	1	0.3	4	1	4	1
ADED	41	11	6	2	19	5

Deciduous (N = 352)

	1st Quarter	%	2nd Quarter	%	3rd Quarter	%
LTOAW	11	3	86	24	31	9
OAW	31	9	9	3	29	8
STAW	32	9	5	1	32	9
HDED	40	11	7	2	13	4
ADED	4	1	8	2	14	4

Savanna (N = 716)

	1st Quarter	%	2nd Quarter	%	3rd Quarter	%
LTOAW	23	3	70	10	24	3
OAW	30	4	40	6	38	5
STAW	61	9	64	9	56	8
HDED	27	4	17	2	19	3
ADED	96	13	49	7	102	14

*LTOAW = Less than once a week
OAW = Once a week
STAW = Several times a week
HDED = 1/2 day, every day
ADED = All day, every day

**Percentage of hunting frequency as reported by hunters.

Table 42. Total number of wild animals hunted during rainy and dry seasons in Nigeria, 1986.

Rain Forest (N = 448)

	Big Game	%*	Small Game	%	Reptiles	%	Game Birds	%
Rainy season	43	10	52	12	53	12	13	3
Dry season	95	21	76	17	74	17	42	9

Deciduous (N = 688)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Rainy season	229	33	165	24	212	31	47	7
Dry season	15	2	2	0.3	5	0.7	13	2

Savanna (N = 819)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Rainy season	84	10	102	12	98	12	32	4
Dry season	129	16	198	24	136	17	40	5

*Percentage of wild animals taken by hunter during rainy and dry seasons.

This result indicates there was a significant difference among the rain forest, deciduous, and savanna regions on species hunted during the rainy and dry seasons. It also reveals no significant difference between rain forest and savanna regarding wild animals hunted in both seasons.

For small game, the computed chi-squared values of 126.10 and 183.99 in Appendix K are statistically significant at the 0.05 level of confidence; therefore, the null hypotheses (rain forest = deciduous and deciduous = savanna) were rejected. The chi-squared value of 1.71 is not significant at the same level of confidence; therefore, the null hypothesis (rain forest = savanna) was accepted.

This analysis indicates a significant difference exists in the rain forest, deciduous, and savanna regions for small game hunted during rainy and dry seasons. It reveals that in the deciduous and savanna regions, no significant difference exists in species hunted in both seasons (Appendix K).

For reptiles, the computed chi-squared values of 141.83 and 163.22 in Appendix K are significant at the 0.05 level of confidence; therefore, the null hypotheses (rain forest = deciduous and deciduous = savanna) were rejected. Chi-squared value of 0.00 is not significant at the same level of confidence; therefore, the null hypothesis (rain forest = savanna) was accepted.

This analysis shows a significant difference among the rain forest, deciduous, and savanna regions for reptiles hunted during rainy and dry seasons. There was no significant difference in the rain forest and savanna regions on reptiles hunted in both seasons.

Appendix K shows that the computed chi-squared values of 34.41, 5.90, and 15.64 were significant at the 0.05 level of confidence; therefore, the null hypotheses (rain forest = deciduous, rain forest = savanna, and deciduous = savanna) were rejected. This result indicates a significant difference in the three ecological regions in game birds hunted during rainy and dry seasons.

Table 43 shows the composition of wild animals taken by Nigerian hunters in rainy and dry seasons. Dominant big game taken by hunters in the regions were the bush buck, gray duiker, water buck, and baboon, while the major small game included porcupine, cane rat, African giant rat, and squirrel. Dominant reptiles taken include python, crocodile, and monitor lizard. Francolin and guinea fowl (game birds) were taken and African giant snail.

Wild Animals Consumed at Home, Sold in the Village, and at the Market

The total number of wild animals consumed at home and sold in the village and at the market are shown in Table 44. Out of 1,937 species utilized in the three regions,

Table 43. Composition of wild animals taken by Nigerian hunters in rainy and dry seasons, 1986.

Species	Savanna Region Hunters (N = 60) #	%	Deciduous Region Hunters (N = 30) #	%	Rain Forest Region Hunters (N = 30) #	%
Big Game						
Bush buck	59	13	13	19	14	17
Gray duiker	53	12	30	43	30	36
Water buck	57	13	1	1	-	-
Roan antelope	52	12	-	-	-	-
Kob	42	10	-	-	-	-
Buffalo	47	11	2	3	11	13
Baboon	56	13	9	13	4	5
Elephant	25	6	2	3	4	5
Warthog	51	12	12	17	20	24
	442		69		83	
Small Game						
Cane rat	49	17	28	19	28	14
African giant rat	48	16	25	17	29	15
Porcupine	58	20	26	18	29	15
Squirrel	48	16	23	16	27	14
Flying squirrel	31	11	13	9	27	14
Bats	31	11	18	12	25	13
Pangolin	27	9	14	10	30	15
	292		147		195	
Reptiles						
Python	55	18	7	11	14	9
Crocodile	48	16	8	13	18	12
Monitor lizard	46	15	14	23	28	18
Tortoise	42	14	8	13	26	17
Cobra	28	13	7	11	23	15
Puff adder	37	12	10	16	22	14
Night adder	36	12	8	13	22	14
	302		62		153	
Mollusc						
African giant snail	33		15		28	
Game Birds						
Guinea fowl	58	55	21	50	17	39
Francolin	47	45	21	50	27	61
	105		42		44	

Table 44. Total numbers of wild animals consumed at home, sold in the village, and at the market as reported by hunters in a survey conducted in Nigeria, 1986.

Rain forest (N = 470)

Eaten at	Big Game	%*	Small Game	%	Reptiles	%	Game Birds	%
Eaten at home	15	12	86	52	61	48	35	64
Sold in village	5	4	5	3	21	17	3	6
Sold at market	28	23	16	10	22	17	8	15
All combined	76	61	57	35	23	17	9	16

Deciduous (N = 697)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Eaten at home	33	13	150	88	107	49	57	95
Sold in village	7	3	5	3	0	-	0	-
Sold at market	69	28	13	8	60	28	3	5
All combined	141	56	2	1	50	23	0	-

Savanna (N = 770)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
Eaten at home	26	12	210	79	121	56	57	83
Sold in village	13	6	10	4	3	1	0	-
Sold at market	83	38	18	7	54	25	6	9
All combined	98	45	28	11	37	17	6	9

*Percentage of wild animals consumed at home, sold in the village and at market.

958 (50 percent) were eaten at home, 72 (4 percent) sold in the village, 377 (19 percent) sold at the market, and 527 (27 percent) consumed at home, sold in the village, and at the market. Out of the 1,937 species consumed, sold in the village, and at the market, 594 (31 percent) were big game, 600 (31 percent) small game, 559 (29 percent) reptiles, and 184 (9 percent) game birds.

This analysis indicates that 50 percent of the wild animals utilized in the three regions were consumed at home. The result also reveals that the dominant species in the diet of the hunters were big game and small game.

Appendix L shows that the computed chi-squared values of 10.57 and 9.78 for big game are significant at the 0.05 level of confidence; therefore, the null hypotheses (rain forest = savanna and deciduous = savanna) were rejected. The chi-squared value of 1.62 is not significant at the same level of confidence; therefore, the null hypothesis (rain forest = deciduous) was accepted. This analysis shows a significant difference in the rain forest, savanna, and deciduous and savanna regions in big game utilized. The result also shows that there is no significant difference between the rain forest and deciduous regions regarding big game consumed at home, sold in the village, and at the market.

For small game, the computed chi-squared values of 68.85, 41.78, and 14.58 are statistically significant at the 0.05 level of confidence; therefore, the null hypotheses (rain forest = deciduous, rain forest = savanna, and deciduous = savanna) were rejected. This analysis shows a significant difference in small game utilized in the three regions (Appendix L).

For reptiles, the computed chi-squared values of 40.41 and 29.32 are significant at the 0.05 level of confidence; therefore, the null hypotheses (rain forest = deciduous and rain forest = savanna) were rejected. The chi-squared value of 6.11 is not significant at the same level of confidence; therefore, the null hypothesis (deciduous = savanna) was accepted (Appendix L).

This analysis shows a significant difference in the rain forest, deciduous, and savanna regions for reptiles utilized. It also indicates no significant difference exists between deciduous and savanna regions for reptiles eaten at home and sold in the village and at the market.

The computed chi-squared values of 7.66 and 6.40 for game birds are not significant at the 0.05 level of confidence; therefore, the null hypotheses (rain forest = savanna and deciduous = savanna) were accepted. The chi-squared value of 19.35 is significant at the same level of confidence above; therefore, the null hypothesis (rain forest = deciduous) was rejected. This analysis indicates no significant difference in the rain forest, savanna, and deciduous regions in game birds utilized. It also reveals a significant difference between the rain forest and deciduous regions in game birds eaten at home and sold in the village and at the market.

Table 45 shows the composition of wild animals consumed at home and sold in the village and at the market by Nigerian hunters. Dominant big game utilized in the three regions included the bush buck and gray duiker, while major small game included the squirrel, African giant rat, porcupine, and cane rat. Reptiles used consist of crocodile, python, and monitor lizard. All the game birds (francolin and guinea fowl) were utilized and the African giant snail was reported as a favorite delicacy.

Prices of Wild Animals

Table 46 shows the total and average prices of wild animals hunted during a survey conducted in Nigeria from July to November 1986. N103,000 (U.S. $92,000) was the total calculated amount made from the sale of wild animals in the three regions surveyed. Of this amount, N94,000 ($85,000) (92 percent) was made from savanna, N2,000 ($2,000) (2 percent) from deciduous, and N5,900 ($5,300) (6 percent) from the rain forest region.

Out of N103,000 ($92,000) made from all the zones, N92,000 ($82,000) (89 percent) was made from the sale of big game, N4,100 ($3,000) (4 percent) from small game, N6,000 ($5,000) (6 percent) from reptiles, and N600 ($540)

Table 45. Composition of wild animals consumed at home, sold in village, and at market by Nigerian hunters, 1986.

Species	Savanna Region Hunters (N = 60) #	%	Deciduous Region Hunters (N = 30) #	%	Rain Forest Region Hunters (N = 30) #	%
Big Game						
Elephant	20	5	2	3	3	3
Bufallo	48	11	2	3	11	12
Roan antelope	46	11	-	-	2	2
Bush buck	58	13	14	20	28	29
Kob	41	9	-	-	-	-
Water buck	57	13	1	1	-	-
Gray duiker	55	13	30	44	30	31
Warthog	51	12	12	17	18	19
Baboon	56	13	8	12	4	4
	432		69		96	
Small Game						
Cane rat	48	17	28	20	25	15
African giant rat	48	17	25	17	26	16
Porcupine	58	20	23	16	30	18
Pangolin	28	10	14	10	20	12
Flying squirrel	33	11	18	13	22	13
Squirrel	43	15	22	15	21	13
Bat	31	11	13	9	19	12
	289		143		163	
Reptiles						
Python	43	15	7	11	14	11
Crocodile	50	17	8	13	19	15
Monitor lizard	47	16	14	23	22	18
Cobra	38	13	8	13	16	13
Puff adder	37	13	9	15	17	14
Night adder	36	12	8	13	16	13
Tortoise	43	15	8	13	21	17
	294		62		125	
Mollusc						
African giant snail	33		14		24	
Game Birds						
Guinea Fowl	58	52	21	55	19	46
Francolin	47	48	17	45	22	54
	105		38		41	

Table 46. Prices of wild animals (in dollars and naira) as reported by hunters in a survey conducted in Nigeria, 1986.

	Big Game (₦)**	Big Game ($)	%*	Small Game (₦)	Small Game ($)	%	Reptiles (₦)	Reptiles ($)	%	Game Birds (₦)	Game Birds ($)	%
Rain Forest (N = 30)												
Total	3610	3200	60	944	850	16	1290	1161	22	73	66	1
Aver.	851.00	766.0		95.4	85.8		224	202.0		9.7	8.7	
Std.	377.00	340.00		31.6	28.5		88	80.0		2.5	2.3	
Deciduous (N = 30)												
Total	1500	1400	64	740	660	30	71	64	3	158	140	7
Aver.	341	307		95	85		33	29		22	20	
Std.	37	34		17	16			1		4	3	
Savanna (N = 60)												
Total	860000	780000.0	99	2400	2100.0	0.3	5210.00	4690.00	.6	370	333	0.1
Aver.	12100.00	10900.00		217	195.0		549.00	494.00		39.7	35.7	
Std.	2200.0	2030.00		63.3	57.0		175.00	157.00		6.7	6.0	

*Percentage on prices of wild animals as reported by hunters. **₦ = Naira (Nigerian currency)

(1 percent) from game birds. This analysis shows that most revenue from the sale of wild animals comes from the savanna region. It also reveals that more revenue could be generated from big game animals than small game, reptiles, and game birds.

Frequency of Hunting Per Month During the Rainy Season

The calculated "t" test values of -5.4, and -5.87 in Table 47 are statistically significant at the 0.05 level of confidence; therefore, the null hypotheses (savanna = rain forest and savanna = deciduous) were rejected. This shows a significant difference regarding frequency of hunting per month in the savanna, deciduous, and rain forest regions. The "t" test value of -1.32 is not significant at the same level of confidence; therefore, the null hypothesis (deciduous = rain forest) was accepted. This reveals no significant difference exists between rain forest and deciduous regions in frequency of hunting per month.

Income from Sale of Wild Animals (in U.S. Dollars and Naira)

Table 48 shows the total income from the sale of wild animals in the three regions surveyed. N194,000 ($174,000) was made from the three zones; of this amount, N171,000 ($154,000) (89 percent) was from savanna, N6,000 ($5,000) (3 percent) from deciduous, and N16,000 ($14,000) (8

Table 47. "T" test of independence on three ecological zones relative to hunting frequency per month.

Hunting frequency per month

	Savanna	Rain Forest	"T" Test	Accept or Reject
Aver.	3.94	8.32	-5.4	Reject
s^2p	4.06	76.27	df = 358	

	Savanna	Deciduous	"T" Test	Accept or Reject
Aver.	3.94	7.05	-5.87	Reject
s^2p	4.06	30.89	df = 358	

	Deciduous	Rain Forest	"T" Test	Accept or Reject
Aver.	7.05	8.32	-1.32	Accept
s^2p	30.89	76.27	df = 358	

Table 48. Income from the sale of wild animals taken by hunters, Nigeria, 1986.

Rain Forest (N = 30)

	Big Game (₦)	Big Game ($)	%**	Small Game (₦)	Small Game ($)	%	Reptiles (₦)	Reptiles ($)	%	Game Birds (₦)	Game Birds ($)	%
Total income	244	220	45	154	138	28	129	116	24	12	11	2
Aver./hunter	16	14		10	9		9	8		1	0.9	

Deciduous (N = 30)

	Big Game (₦)	Big Game ($)	%	Small Game (₦)	Small Game ($)	%	Reptiles (₦)	Reptiles ($)	%	Game Birds (₦)	Game Birds ($)	%
Total income	97	87	46	83	75	40	13	12	6	15	14	7
Aver./hunter	7	6		6	5		0.8	0.7		1	0.9	

Savanna (N = 60)

	Big Game (₦)	Big Game ($)	%	Small Game (₦)	Small Game ($)	%	Reptiles (₦)	Reptiles ($)	%	Game Birds (₦)	Game Birds ($)	%
Total income	538	484	75	90	81	13	46	41	6	42	38	6
Aver./hunter	35	32		11	10		3	3		3	3	

*₦ = Naira (Nigerian currency)
**Percentage of total income from the sales of wild animals as reported by hunters.

percent) from the rain forest region. Out of N194,000 ($174,000), as income made from the three regions on wildlife, N138,000 ($125,000) (72 percent) was generated from big game, N28,000 ($26,000) (15 percent) from small game, N15,000 ($13,000) (8 percent) from reptiles, and N10,000 ($9,000) (15 percent) from game birds.

This result reveals that most of the income from the sale of wild animals came from the savanna region, with very little from other zones. More income was generated from the sale of big game rather than small game, reptiles, and game birds.

Species Hunted in the Past Two Market Periods

Table 49 shows the numbers of species hunted in the past two market periods during a survey conducted in Nigeria. Out of 726 big game killed during this period, 553 (76 percent) were killed in the savanna region, 101 (18 percent) in the rain forest, and 72 (13 percent) in the deciduous region. This result indicates that most big game killing occurs in the savanna, while few big game reside in the rain forest and deciduous regions.

The calculated "t" test values of 112.37, 5.62, and 119.72 in Appendix M are statistically significant at the 0.05 level of confidence; therefore, the null hypotheses (rain forest = deciduous, savanna = deciduous, and savanna = rain forest) were rejected.

Table 49. Numbers of species hunted in the past two market periods (a fortnight) during a survey conducted in Nigeria from July to November 1986.

Rain Forest (N = 1775)

	Big Game	%*	Small Game	%	Reptiles	%	Game Birds	%
#	101	6	892	50	703	40	79	4
Aver.	16.0		73.4		62.6		8.9	
Std.	6.6		60.0		42.1		5.7	

Deciduous (N = 610)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
#	72	12	249	41	226	37	63	10
Aver.	12.4		45.7		57.6		13.5	
Std.	5.4		23.2		46.6		5.0	

Savanna (N = 3774)

	Big Game	%	Small Game	%	Reptiles	%	Game Birds	%
#	553	15	1328	35	392	10	1501	40
Aver.	69.9		160.6		50.2		126.4	
Std.	21.5		53.6		20.5		55.5	

*Percentage of numbers of wild animals taken in the past two market periods (a fortnight).

This indicates a significant difference in the numbers of big game killed in the three ecological regions.

In the three ecological zones, 2,469 small game were killed; out of this number, 1,328 (54 percent) came from the savanna, 892 (36 percent) from the rain forest, while 249 (10 percent) were from the deciduous region. This indicates that more than half of the total small game killed came from the savanna, while a small proportion of those killed came from the rain forest and deciduous regions.

The calculated "t" test values of 3.47 and 10.2, Appendix M, are significant at the 0.05 level of confidence; therefore, the null hypotheses (rain forest = deciduous and savanna = deciduous) were rejected. This shows a significant difference in rain forest, deciduous, and savanna regarding small game killed in these regions. The "t" test value of 0.90 at the same level of confidence is not significant; therefore, the null hypothesis (rain forest = savanna) was accepted. This indicates there is no significant difference between the rain forest and savanna regions in numbers of small game killed.

In the three zones surveyed, 1,321 reptiles were killed. Out of this number, 703 (53 percent) were taken from the rain forest region, 392 (30 percent) from the savanna, and 226 (17 percent) from the deciduous region. This result confirms that more than half of the reptiles killed were from the rain forest region, one-third from the savanna, and a few from the deciduous region.

The calculated "t" test value of 6.83 in Appendix M is statistically significant at the 0.05 level of confidence; therefore, the null hypothesis (rain forest = savanna) was rejected. This shows a significant difference between the rain forest and savanna regions in the reptiles killed. The "t" test values of 0.80 and -1.65 are not significant at the same level of confidence; therefore, the null hypotheses (rain forest = deciduous and savanna = deciduous) were accepted. This indicates there was no significant difference between rain forest, deciduous, and savanna regions regarding reptiles killed.

Out of 1,643 game birds (francolin and guinea fowl) hunted in the three regions during the past two market periods, 1,501 (91 percent) were from the savanna, 63 (4 percent) were from deciduous, while 79 (5 percent) were from the rain forest region. Thus, most of the game birds killed came from the savanna region.

The calculated "t" test values of -4.71 and -21.38 in Appendix M are not statistically significant at the 0.05 level of confidence; therefore, the null hypotheses (rain forest = deciduous and rain forest = savanna) were rejected. This indicates no significant difference between these regions in game birds killed. The "t" value of 22.14 is significant at the same level of confidence; therefore, the null hypothesis (savanna = deciduous) was rejected.

This reveals a significant difference between the savanna and deciduous regions regarding game birds taken by hunters.

Table 50 shows the weekly composition of wild animals taken by hunters. The dominant big game taken in the regions were the gray duiker, bush buck, and warthog. Small game taken include cane rat, squirrel, African giant rat, and porcupine. Important reptiles taken include crocodile, monitor lizard and tortoise. Game birds utilized were the guinea fowl and francolin. Other important wildlife species include the African giant snail, which was reportedly taken in large numbers.

Wild Animals Used for Ritual Purposes in Nigeria

Table 51 shows data obtained on wild animals used for ritual activities in the three surveyed regions of Nigeria. Eighteen wild animals were used for rituals; 9 (50 percent) were big game, 4 (22 percent) small game, 2 (11 percent) reptiles, and 3 (17 percent) birds. Of the total animals used, 8 (45 percent) were from the rain forest, 3 (16 percent) from the deciduous, and 7 (39 percent) from the savanna region. Out of the three regions, more wildlife species were used for ritual sacrifices in the rain forest region. The small game used for ritual activities in the three zones was the African giant rat (Table 51).

Table 50. Weekly composition of wild animals hunted in a survey conducted in Nigeria from July to November 1986.

	Savanna Region Hunters (N = 60)			Deciduous Region Hunters (N = 30)			Rain Forest Region Hunters (N = 30)		
	#	%	Average hunter	#	%	Average hunter	#	%	Average hunter
Big Game									
Elephant	22	4	0.4	-	-	-	-	-	-
Buffalo	32	6	0.5	-	-	-	2	2	0.1
Roan antelope	54	10	1	-	-	-	-	-	-
Bush buck	73	13	1	8	10	0.3	47	46.4	2
Kob	47	8	0.8	-	-	-	-	-	-
Water buck	62	11	1	-	-	-	-	-	-
Gray duiker	96	17	1.6	46	59	2	42	41.6	1.4
Warthog	74	13	1	9	12	0.3	10	10	0.3
Baboon	94	17	1.6	15	19	0.5	-	-	-
	554			78			101		
Small Game									
Cane rat	333	19	6	81	33	3	119	13	4
African giant rat	267	15	4	106	43	4	155	17	5
Porcupine	389	23	6	27	11	1	56	6	2
Pangolin	-	-	-	2	1	0.1	42	5	14
Flying squirrel	18	1	0.3	16	6	0.5	46	5	2
Squirrel	608	35	10	17	7	0.6	308	34	10
Bat	110	6	2	-	-	-	168	19	6
	1725			249			894		

Table 50 (continued)

Reptiles									
Python	204	36	3	-	-	-	4	1	0.1
Crocodile	51	9	1	5	33	0.2	18	6	0.6
Monitor lizard	74	13	1	5	33	0.2	45	15	2
Cobra	51	9	1	-	-	-	59	20	2
Puff adder	50	9	1	-	-	-	49	17	2
Night adder	52	9	1	-	-	-	54	18	2
Tortoise	85	15	1.4	5	33	0.2	66	22	2
	567			15			295		
Mollusc									
African giant Snail	7			16			408		
Game Birds									
Guinea fowl	1217	81	20	14	18	0.5	44	70	1
Francolin	294	19	5	65	82	2	19	30	0.6
	1511			79			63		

Table 51. Wild animals used by farmers for ritual purposes in Nigeria in 1986.

Ecological zone	Species	Part used	Used for	How often in a year
	<u>Big Game</u>			
Rain forest	Red flanked dunker	leg	Ritual sacrifice	1
	Red river hog	leg	Ritual sacrifice	1
	Bush buck	whole	Ritual sacrifice hunter's burial	1
	<u>Small Game</u>			
	Porcupine	whole	Ritual sacrifice	1
	Pangolin	head	Ritual sacrifice	1
	<u>Reptiles</u>			
	African giant snail	whole	Ritual sacrifice	1
	<u>Birds</u>			
	Parrot	feather	Masquerade ritual ceremony	1
	Guinea fowl	whole	Ritual sacrifice	1
	<u>Big Game</u>			
Dediduous	Red river hog	whole	Ritual sacrifice	1
	<u>Small Game</u>			
	African giant snail	whole	Ritual sacrifice	1
	<u>Reptiles</u>			
	Crocodile	whole	"Glokun" ritual	1

Table 51 (continued)

Ecological zone	Species	Part used	Used for	How often in a year
	Big Game			
Savanna	Leopard	skin	Ritual sacrifice	1
	Lion	skin	Thunder ritual	1
	Elephant	sole	Ritual for rain	1
	Roan antelope	skin & horn	Ritual dancing	1
	Western hartebeest	skin & horn	Ritual dancing	1
	Small Game			
	Cane rat	blood	Ritual sacrifice	
	Bird			
	Guinea fowl	feather	Thunder ritual	

Wild Animals Used for Healing and Preventive Medicine in Nigeria

Data obtained on wild animals utilized for healing and preventive medicine in the three ecological regions are shown in Table 52. Twenty-three species were used in the three regions; of this number, 9 (40 percent) were big game, 7 (30 percent) small game, 6 (26 percent) reptiles, and 1 (4 percent) birds. Of the total species used, 13 (57 percent) were from the rain forest, 4 (17 percent) deciduous, and 6 (26 percent) from the savanna region.

The result shows was a significant difference among the rain forest, deciduous, and savanna regions regarding use of animals for healing and preventive medicine. The only common animal that was used in the three regions was the python. In the savanna and deciduous regions birds were not used, while in the rain forest region birds were included. Carnivores (hyenas, civet cat, and leopard) were included in the lists of animals used in the savanna and rain forest regions, but were not preferred in the deciduous region.

Wild Animals Used for Invoking and Appeasing Traditional Gods and Witches in Nigeria

Table 53 shows the species that are used for invoking and appeasing traditional gods and witches in Nigeria. Out of 26 species utilized in the three regions, 11 (42

Table 52. Wild animals used by Nigerian farmers for healing and preventive medicine, 1986.

Ecological zone	Species	Part used	Used for	How often in a year
	Big Game			
Rain forest	Gray duiker	Intestine	Stomach-ache	As needed
	Aardvark	Bone	Backache	As needed
	Warthog	Legs	Prevention of lameness	As needed
	Leopard	Skin	Ingredient for curing snake poison	As needed
	Gorilla	Penis	Drug for prevention against poison	As needed
	Small Game			
	Pangolin	Head	Used in stopping bleeding	As needed
	Squirrel	Hair	Used for prevention against poison	As needed
	Civet cat	Anus	Prevention against convulsions	As needed
	Reptiles			
	Tortoise	Whole	Used for chest pain	As needed
	Puff adder	Intestine	Prevention of adultery in women	As needed
	Python	Bone	Curing of backache and spinal cord diseases	As needed
	Crocodile	Intestine	Prevention against poison	As needed
	Birds			

Table 52 (continued)

Ecological zone	Species	Part used	Used for	How often in a year
	Birds			
	Francolin	Bone	Used to cure delay in walking of children	As needed
	Big Game			
Deciduous	Buffalo	Bone	Prevention of vomiting	As needed
	Small Game			
	Porcupine	Intestine	Used for stomachache	As needed
	Squirrel	Whole	Ingredient for prevention of convulsions in children	As needed
	Reptiles			
	Python	Fat	Ingredient to cure rheumatism	As needed
	Big Game			
Savanna	Bush buck	Head	Ingredient to cure leprosy	As needed
	Water buck	Skin and placenta	Prevention of sleeping sickness	As needed
	Hyena	Bone	Invoke witches	As needed

Table 52 (continued)

Ecological zone	Species	Part used	Used for	How often in a year
	<u>Small Game</u>			
	Patas monkey	Skull	Ingredient to cure whooping cough	As needed
	Mongoose	Anal	Invoking bad spirit and witches	As needed
	<u>Reptiles</u>			
	Python	Fat	Used in traditional medicine to cure broken bones and joints	As needed

Table 53. Wildlife species used by Nigerian farmers for invoking and appeasing traditional gods and witches, 1986.

Ecological zone	Species	Part used	Used for	How often in a year
	Big Game			
Rain forest	Bush buck	Whole	Appeasing witches	As needed
	Gray diuker	Hoof	Invoking witches	As needed
	Red river hog	Whole	Appeasing traditional god	As needed
	Leopard	Bone, eyes & skin	Protection against and invoking witches	As needed
	Small Game			
	Porcupine	Spines	Invoking witches	As needed
	African giant rat	Whole	Appeasing witches	As needed
	Reptiles			
	Tortoise	Whole	Appeasing the god of oracles and sea	As needed
	Snail	Whole	Appeasing the god of Iron	As needed
	Python	Head	Invoking witches	As needed
	Big Game			
Deciduous	Buffalo	Nose	Invoking witches	As needed
	Chimpanzee	Left hand	Invoking witches	As needed
	Gray duiker	Hoofs	Invoking witches	As needed

Table 53 (continued)

Ecological zone	Species	Part used	Used for	How often in a year
	Small Game			
	African giant rat	Whole	Appeasing traditional god	As needed
	Porcupine	Intestine	Invoking witches	As needed
	Reptiles			
	Puff adder	Tail	Invoking witches	As needed
	Tortoise	Whole	Appeasing god	As needed
	Cobra	Tail	Invoking witches	As needed
	Birds			
	Parrot	Whole	Invoking witches	As needed
	Owl	Whole	Invoking witches	As needed
	Francolin	Head	Invoking witches	As needed
	Big Game			
Savanna	Buffalo	Head	Appeasing traditional god	As needed
	Elephant	Tusk	Appeasing god of thunder	As needed
	Warthog	Blood	Appeasing traditional god	As needed
	Gray duiker	Hoof	Invoking witches	As needed
	Reptiles			
	Monitor lizard	Whole	Invoking witches and protection against witchcraft	As needed

Table 53 (continued)

Ecological zone	Species	Part used	Used for	How often in a year
	Birds			
	Hooded vulture	Head	Invoking witches	As needed

percent) were big game, 4 (15 percent) small game, 7 (27 per-cent) reptiles, and 4 (15 percent) were birds. Of the total animals used, 9 (35 percent) were from the rain forest, 11 (42 percent) from the deciduous, and 6 (23 per-cent) from the savanna region. This shows that more animals were used in the deciduous than other regions and that most of the animals utilized were big game and reptiles. Results show that in the three regions the gray duiker was the common animal used for invoking witches. There was a significant difference among the three regions regarding species used for appeasing traditional gods. Birds were not used in the rain forest for invoking witches, but were included in the deciduous and savanna regions.

<u>Wild Animals Used for Aphrodisiac and Potency in Nigeria</u>

Table 54 shows the wildlife species and parts used for aphrodisiac and potency in three ecological regions in Nigeria. Out of 33 species that were confirmed, 13 (40 percent) were big game, 9 (27 percent) small game, 9 (27 percent) reptiles, and 2 (6 percent) birds. These results show that big game were preferred for use as an aphrodi-siac, followed by small game and reptiles. Of the total species utilized, 11 (33 percent) were from the rain forest, 10 (30 percent) deciduous, and 12 (36 percent) from the savanna region. There appears to be no significant

Table 54. Wildlife species used by Nigerian farmers for aphrodisiac and potency in men in Nigeria, 1986.

Ecological zone	Species	Part used	How often in a year
	Big Game		
Rain forest	Aardvark	Bone	As needed
	Chimpanzee	Penis	As needed
	Gorilla	Bone	As needed
	Baboon	Penis	As needed
	Small Game		
	Tree Hyrax	Whole	As needed
	Squirrel	Penis	As needed
	Reptiles		
	African giant snail	Bottom	As needed
	Tortoise	Whole	As needed
	Cobra	Head and tail	As needed
	Crocodile	Scale	As needed
	Birds		
	Parrot	Whole	As needed
	Big Game		
Deciduous	Warthog	Penis	As needed
	Gorilla	Bone	As needed
	Buffalo	Penis	As needed
	Small Game		
	Cane rat	Heart	As needed
	Mona monkey	Penis	As needed
	African giant rat	Tail	As needed
	Reptiles		
	Puff adder	Head and tail	As needed
	Tortoise	Whole	As needed
	Lizard	Red head	As needed

Table 54 (continued)

Ecological zone	Species	Part used	How often in a year
	Birds		
	Guinea fowl	Feet	As needed
	Big Game		
Savanna	Buffalo	Tail	As needed
	Water buck	Eyes	As needed
	Aardvark	Bone	As needed
	Manatee	Penis	As needed
	Hyena	Bone	As needed
	Rhino	Tusk	As needed
	Small Game		
	Patas monkey	Penis	As needed
	Cane rat	Whole	As needed
	Squirrel	Penis	As needed
	Honey badger	Bone and penis	As needed
	Reptiles		
	Crocodile	Head	As needed
	Lizard	Red head	As needed

difference in the species utilized for aphrodisiacs in the three zones surveyed.

Wild Animals Used for Fertility in Women

Table 55 shows the preferred wild animals used for fertility. Thirty-four species were utilized in the three regions surveyed; out of this number, 11 (32 percent) were big game, 10 (30 percent) small game, 12 (35 percent) reptiles, and 1 (3 percent) birds. Therefore, more reptiles were utilized than other species. Fifteen (44 percent) of the total animals used were from the rain forest, 10 (30 percent) deciduous, and 9 (26 percent) from the savanna region. This analysis reveals that more wild animals were utilized for fertility in the rain forest than in the deciduous and savanna regions.

Table 56 shows the composition of wild animals used by Nigerian farmers for medicinal purposes. Most of the big game used were bush buck, gray duiker, leopard, chimpanzee, warthog, and gorilla. Small game used include mona monkey, porcupine, cane rate, and African giant rat. Dominant reptiles used were crocodile, python, and monitor lizard. Birds used include the guinea fowl, parrot, hooded vulture, and owl.

Table 55. Wild animals used by Nigerian farmers for fertility in women, 1986.

Ecological zone	Species	Part used	How often in a year
	Big Game		
Rain forest	Chimpanzee	Placenta	As needed
	Warthog	Flesh	As needed
	Bush buck	Tail and legs	As needed
	Grey duiker	Flesh	As needed
	Small Game		
	Civet cat	Flesh	As needed
	Bat	Whole	As needed
	Porcupine	Spines	As needed
	Pangolin	Whole	As needed
	Cane rat	Whole	As needed
	African giant rat	Whole	As needed
	Reptiles		
	African giant snail	Whole	As needed
	Cobra	Intestine	As needed
	Puff adder	Intestine	As needed
	Python	Flesh	As needed
	Crocodile	Scale	As needed
	Big Game		
Deciduous	Baboon	Flesh	As needed
	Grey duiker	Bone	As needed
	Small GAme		
	Squirrel	Whole	As needed
	Mona monkey	Placenta	As needed
	Cane rat	Whole	As needed
	Reptiles		
	Python	Intestine	As needed
	Puff adder	Head and tail	As needed
	Tortoise	Flesh	As needed
	Snail	Whole	As needed

Table 55 (continued)

Ecological zone	Species	Part used	How often in a year
	Birds		
	Guinea fowl	Whole	As needed
	Big Game		
Savanna	Water buck	Skin and placenta	As needed
	Warthog	Intestine	As needed
	Bush buck	Flesh	As needed
	Leopard	Tail	As needed
	Elephant	Liver	As needed
	Small Game		
	Porcupine	Intestine	As needed
	Reptiles		
	Crocodile	Scale	As needed
	Monitor lizard	Flesh	As needed
	Python	Flesh	As needed

Table 56. Composition of wild animals used by Nigerian farmers for medicinal purposes in 1986.

Species	Savanna Region Farmers (N = 240)		Deciduous Region Farmers (N = 120)		Rain Forest Region Farmers (N = 120)	
	#	%	#	%	#	%
Big Game						
Elephant	4	14	-	-	-	-
Water buck	4	14	-	-	-	-
Bush buck	3	10	-	-	4	18
Leopard	3	10	-	-	2	9
Warthog	3	10	1	8	3	14
Hyena	2	7	-	-	-	-
Buffalo	2	7	3	23	-	-
Gray duiker	1	3.4	3	23	4	18
Roan antelope	1	3.4	-	-	-	-
Lion	1	3.4	-	-	-	-
Western hartebeest	1	3.4	-	-	-	-
Aardvark	1	3.4	-	-	2	9
Chimpanzee	1	3.4	1	8	3	14
Manatee	1	3.4	-	-	-	-
Rhino	1	3.4	-	-	-	-
Drill monkey	-	-	-	-	-	-
Baboon	-	-	3	23	-	-
Gorilla	-	-	1	8	1	4.5
Red river hog	-	-	1	8	2	9
Red-flanked duiker	-	-	-	-	1	4.5
Kob	-	-	-	-	-	-
	29		13		22	
Small Game						
Cane rat	2	22	2	18	2	17
Patas monkey	2	22	-	-	-	-
Mona monkey	1	11	2	18	-	-
Porcupine	1	11	2	18	4	33
Squirrel	1	11	2	18	2	17
Mongoose	1	11	-	-	-	-
Honey badger	1	11	-	-	-	-
African giant rat	-	-	3	27	1	8
Pangolin	-	-	-	-	-	-
Hare	-	-	-	-	-	-
Bat	-	-	-	-	1	8
Civet cat	-	-	-	-	1	8
Tree lyrax	-	-	-	-	1	
Flying squirrel	-	-	-	-	-	-
	9		11		12	

Table 56 (continued)

Reptiles						
Crococile	2	29	1	9	2	17
Python	2	29	2	18	4	33
Monitor lizard	2	29	-	-	-	-
Lizard	1	13	1	9	-	-
Tortoise	-	-	3	27	3	25
Puff adder	-	-	3	27	2	17
Cobra	-	-	1	9	1	8
Night adder	-	-	-	-	-	-
	7		11		12	
Mollusc						
African giant snail	-		1	8	3	20
Birds						
Guinea fowl	1	50	1	25	1	25
Hood vulture	1	50	-	-	-	-
Francolin	-	-	1	25	1	25
Owl	-	-	1	25	-	-
Parrot	-	-	1	25	2	50
	2		4		4	

Species Hunted for Ritual Purposes and Appeasing Traditional Gods and Witches

Table 57 shows the preferred wild animals used for ritual purposes and appeasing traditional gods and witches in the regions surveyed. Twenty-three species were hunted in the three zones; 11 (48 percent) were big game, 5 (22 percent) small game, 5 (22 percent) reptiles, and 2 (9 percent) were birds. Out of 23 species hunted, 8 (35 percent) were from the rain forest, 5 (22 percent) deciduous, and 10 (43 percent) were from the savanna region.

This indicates no significant difference between reptiles and small game hunted for ritual purposes and appeasing traditional gods and witches in the regions surveyed. There is a significant difference between big game and other species. Big game were utilized most often and most of them were hunted from the savanna region.

Species Hunted for Healing or for Preventive Medicine

Wild animals utilized for healing or for preventive medicine in the three ecological zones surveyed in Nigeria are shown in Table 58. Twenty-six species were reported hunted; 15 (58 percent) were big game, 5 (19 percent) were small game, 5 (19 percent) were reptiles, and 1 (4 percent) was a bird. Of the total species hunted for medicinal uses, 10 (38 percent) were hunted from the rain forest, 5 (19 percent) from the deciduous, and 11 (42 percent) from the savanna region.

Table 57. Wild animals taken by Nigerian hunters for ritual purposes, and traditional gods and witches, 1986.

Ecological zones	Species	Part used	Used for	How often in a year
	Big Game			
Rain forest	Bush buck	Whole	Hunters' burial	1
	Red river hog	Whole	Sacrifice	1
	Gray duiker	Hoofs	Invoking witches	As needed
	Red-flanked duiker	Hoofs	Invoking witches	As needed
	Small Game			
	Mona monkey	Whole	Sacrifice	1
	African giant rat	Whole	Sacrifice	1
	Hare	Whole	Appeasing traditional god (mbiam)	1
	Reptiles			
	Snail	Whole	Appeasing traditional god	1
	Big Game			
Deciduous	Gray duiker	Whole	Appeasing traditional god	1
	Warthog	Whole	Appeasing traditional god	1
	Small Game			
	African giant rat	Whole	Sacrifice	1
	Reptiles			
	Crocodile	Blood and head	Sacrifice	1
	African giant snail	Whole	Appeasing traditional god	1

Table 57 (continued)

Ecological zones	Species	Part used	Used for	How often in a year
	Big Game			
Savanna	Elephant	Sole and tail	Praying for rain	1
	Bush buck	Blood	Ritual sacrifice	1
	Gray duiker	Whole	Ritual sacrifice	1
	Roan antelope	Whole	Ritual sacrifice	1
	Hyena	Whole	Invoking witches	As needed
	Small Game			
	Porcupine	Spines	Ritual sacrifice	1
	Reptiles			
	Monitor lizard	Head and tail	Invoking witches	As needed
	Night adder	Head and tail	Invoking witches	As needed
	Birds			
	Guinea fowl	Whole	Ritual sacrifice	
	Francolin	Whole	Ritual sacrifice	

Table 58. Species taken by Nigerian hunters for healing or for preventive medicine, 1986.

Ecological zones	Species	Part used	Used for	How often in a year
	Big Game			
Rain forest	Red-flanked duiker	Hoof and skin	Prevention of witchcraft	As needed
	Gray duiker	Hoof and skin	Prevention of witchcraft	As needed
	Bush buck	Hoof and skin	Prevention of witchcraft	As needed
	Small Game			
	Flying squirrel	Hair	Prevention of fire burns	As needed
	Drill monkey	Skull	Ingredient to cure whooping cough	As needed
	Reptiles			
	Python	Bone	Backache	As needed
	Cobra	Head	Immunity against bad wishes from enemy	As needed
	Puff adder	Head	Immunity against bad wishes from enemy	As needed
	African giant snail	Whole	Safe delivery in pregnant women	As needed
	Birds			
	Vulture	Feather	Prevention of witchcraft	As needed

Table 58 (continued)

Ecological zones	Species	Part used	Used for	How often in a year
	Big Game			
Deciduous	Buffalo	Bone	Cure convulsions in children	As needed
	Warthog	Penis	Aphrodisiac	As needed
	Small Game			
	Porcupine	Intestine	Ingredient used to cure stomachache	As needed
	Pangolin	Whole	Aphrodisiac	As needed
	Reptiles			
	Python	Bones	Cure fracture and backache	As needed
	Big Game			
Savanna	Water buck	Placenta	Safe delivery in pregnant women	As needed
	Grey duiker	Skin	Stomachache	As needed
	Roan antelope	Skin	Prevention of witchcraft	As needed
	Kob	Skin	Prevention of witchcraft	As needed
	Warthog	Nose	Prevention of witchcraft	As needed
	Baboon	Bones	Prevention of witchcraft	As needed
	Hyena	Skin	Prevention of witchcraft	As needed

Table 58 (continued)

Ecological zones	Species	Part used	Used for	How often in a year
	Elephant	Tail	Prevention of witchcraft	As needed
	Bush buck	Head	Used to cure leprosy	As needed
	<u>Small Game</u>			
	Porcupine	Spines	Earache	As needed

From this analysis, more big game were hunted for medicinal uses than other species. Data indicate that most of the wildlife species hunted were from the savanna and rain forest regions.

Table 59 shows the composition of wild animals taken by Nigerian hunters for medicinal uses. The dominant big game taken for medicinal purposes were the gray duiker and bush buck. African giant rat and porcupine were the dominant small game, while the python and monitor lizard were the major reptiles taken. Birds taken include the guinea fowl, francolin, and hooded vulture, while the African giant snail was another wildlife species used.

Table 59. Composition of wild animals taken by Nigerian hunters for medicinal purposes in 1986.

Species	Savanna Region Hunters (N = 60) #	%	Deciduous Region Hunters (N = 30) #	%	Rain Forest Region Hunters (N = 30) #	%
Big Game						
Elephant	2	10	-	-	1	14
Water buck	2	10	-	-	-	-
Bush buck	2	10	-	-	2	28
Leopard	-	-	-	-	-	-
Warthog	2	10	2	50	-	-
Hyena	3	14	-	-	-	-
Bufallo	-	-	1	25	-	-
Gray duiker	3	14	1	25	2	28
Roan antelope	3	14	-	-	-	-
Linx	-	-	-	-	-	-
Western harte-beest	-	-	-	-	-	-
Aardvark	-	-	-	-	-	-
Chimpanzee	-	-	-	-	-	-
Manatee	-	-	-	-	-	-
Rhino	-	-	-	-	-	-
Drill monkey	-	-	-	-	1	14
Baboon	2	10	-	-	-	-
Gorilla	-	-	-	-	-	-
Red river hog	-	-	-	-	-	-
Red-flanked duiker	-	-	-	-	1	14
Kob	2	10	-	-	-	-
	21		4		7	
Small Game						
Cane rat	-	-	-	-	-	-
Patas monkey	-	-	-	-	-	-
Mona monkey	-	-	-	-	1	25
Porcupine	2	100	1	33	-	-
Squirrel	-	-	-	-	-	-
Mongoose	-	-	-	-	-	-
Honey badger	-	-	-	-	-	-
African giant rat	-	-	1	33	1	25
Pangolin	-	-	1	33	-	-
Hare	-	-	-	-	1	25
Bat	-	-	-	-	-	-
Civet cat	-	-	-	-	-	-
Tree lyrax	-	-	-	-	-	-
Flying squirrel	-	-	-	-	1	25
	2		3		4	

Table 59 (continued)

Reptiles						
Crocodile			1	50	-	-
Python			1	50	1	33
Monitor lizard	1	50	-			
Lizard			-			
Tortoise			-		-	-
Puff adder			-		1	33
Cobra			-		1	33
Night adder	1	50	-		-	
	2		2		3	
Mollusc						
African giant snail			1		2	
Birds						
Guinea fowl	1	50	-	-		
Hooded vulture	-		-	-	1	100
Francolin	1	50	-	-		
Owl	-		-	-		
Parrot	-		-	-		
	2		-		1	

Chapter VIII

SUMMARY

The study was designed to determine: (1) which species were being used by the people, in what quantity, and during what season; (2) the effect of religion, culture, and tribal festivals on the game species utilized; (3) differences in the game species utilized or consumed in different ecological zones; (4) which game species and parts of wild animals are utilized for healing and preventive medicine in each ecological zone; and (5) the economic and recreational values of the utilized wildlife.

Three ecological zones surveyed for consumptive uses of wildlife resources in Nigeria were savanna (Bauchi, Plateau, Niger, and Kwara states), rain forest (Oyo and Cross River states), and deciduous (Anambra and Bendel states). For nonconsumptive uses, three national parks (Kainji Lake National Park, Yankari, and Jos Wildlife Park) and four zoological gardens (Ibadan, Jos, Enugun, and Ogba) were surveyed. Data were collected from farmers, hunters, and visitors in each of the conservation areas through a person-to-person questionnaire interview.

The chi-squared and "t" tests of independent samples were used to test the significance of differences concerning utilization of wild animals relative to ecological zones, availability and preferability of species, and farmers'and hunters' characteristics. The null hypotheses of no differences were applied against 122 variables independently. Eighty-four were determined to be significant at the 0.05 level of confidence.

This study confirmed that the most available wild animals in the three zones surveyed were small game and most of them were located in the savanna region. This study indicates that a major portion of the animal protein consumed by farmers and hunters in the regions came from wild animals. Preferred were small game (rodents) and big game (duikers) and were used more in the savanna than the other zones.

Wildlife species were used more often during installation ceremonies (of a new chief, Emir, Oba, and Obis) than in other cultural festivals. Most species used for installation ceremonies were used in the rain forest more than any region surveyed. During Muslim festivals in Nigeria, farmers rarely use wildlife species, but some were used to supplement income. Christians used many different wild animals for religious festivals, but more were used during the Easter period in the deciduous region than the rain forest and savanna regions.

Hunting frequency based on quarterly periods (January - April, May - August, and September - December) of the year in the regions showed that more hunting was done several times a week in all the zones throughout the quarters. There was no significant difference among big game, small game, and reptiles hunted during the rainy and dry seasons. The hunters' survey indicated that more animals were hunted during the rainy season than during the dry season.

Fifty percent of the wild animals killed by hunters in the three regions were consumed at home, and these included big game, small game, and reptiles. Out of the three regions surveyed, more wild animals were hunted and used for medicinal purposes in the rain forest than in the savanna and deciduous regions.

Species hunted in the past two market periods (a fortnight) of the hunters' survey confirmed that most of the kills were from the savanna, and the species hunted included both small and big game. Revenue from the sales of wild animals came mainly or almost exclusively from the savanna region, and most of the revenue was generated mostly from the sale of big game meat and products.

Expenditures per visitor in the three national parks showed more per capita expenditures from foreigners than from Nigerians. The number of nights stayed in the national parks and game reserves is the major factor in determining how much money visitors spend. Children visited the zoological gardens more than the parks. The percentage of adult females that visited the park was lower than that of adult males.

Chapter IX

CONCLUSION

This chapter draws its conclusion from the analytical results of the farmers' and hunters' survey through testing of hypotheses. An interpretation of the relationship between the ecological zones and each criterion's variables are emphasized.

Hypothesis Testing

There were 122 hypotheses stated to determine the relationships of utilization of wildlife species as related to different ecological zones, seasons, religions, and cultural festivals, availability and preferability of species, frequency of hunting per year, and different demographic characteristics of farmers and hunters. Concluding statements relating to each hypothesis are presented in this section along with a statement of acceptance or rejection.

Hypothesis 1

Rodents are utilized more in the deciduous and rain forest regions than in the savanna region.

An analysis of the results of the chi-squared test of independence among the three levels of ecological zones and the small game in Table 19 indicated there were significant differences in small game utilized between deciduous and rain forest regions together and the savanna regions. Because one or more significant findings were identified, the null hypothesis was rejected.

Hypothesis 2

The proportion of game meat in the diet decreases from the southern to the northern ecological zone.

Findings revealed a significant difference in big and small game consumed at home in the rain forest, deciduous, and savanna regions. Because all but one of the variables tested significant, the hypothesis was strongly rejected.

Hypothesis 3

The use of wild meat by people increases as one moves away from major cities (32 + km away from major city).

The chi-squared in Appendix 0 revealed one or more significant differences. On this basis, the null hypothesis was rejected.

Hypothesis 4

There are no significant differences in the consumption of warthogs and baboons during Christian and Muslim festivals.

According to the findings of the study, a significant difference exists between the numbers of small game consumed during Christian religious festivals and those consumed during Muslim religious festivals. One or more significant findings were identified so the null hypothesis was rejected.

Hypothesis 5

Utilization of wildlife is related to the ecological zone in which people live.

Findings of the study showed that the pattern of consumption of wild animals was not related to what species were common in each of the ecological zones. One or more significant findings were identified, the null hypothesis was rejected.

Hypothesis 6

Wild meat is utilized more during the dry season than the rainy season.

The result of the chi-square test showed there were significant differences in consumption of species utilized in the rain forest, deciduous, and savanna regions during both seasons. Since one or more variables tested significant, the null hypothesis was rejected.

Hypothesis 7

The cane rat is widely accepted and utilized for food by more tribes than the African giant rat.

Analysis of the data revealed that 57 percent of the respondents preferred the cane rat, while about 43 percent preferred the Africa giant rat. From this finding, the null hypothesis was refected.

Hypothesis 8

More game animals are utilized for food during cultural festivals than during religious festivals.

Comparisons of chi-squared tests for both festivals revealed that significant relationships existed; therefore, the null hypothesis was rejected.

Hypothesis 9

Farmers and hunters in the deciduous and rain forest regions are more educated than those in the savanna.

Analysis of the results of the chi-squared tests revealed significant differences in the level of education between farmers and hunters in the deciduous, rain forest, and savanna regions. But their level of education differed significantly from farmers and hunters of the savanna region; therefore, the null hypothesis was rejected.

Hypothesis 10

There is no difference in number of dependents per farmer in the rain forest, deciduous, and savanna regions.

Findings of the study revealed there was no difference in the number of dependents in all regions. There were no significant differences revealed in any of the three chi-square tests, so the hypothesis was accepted.

Hypotheses were not tested on non-consumptive uses. Conclusions on these aspects revealed that expenditures per visitor in the three national parks surveyed show more per capita expenditures from foreigners than Nigerians. The number of nights stayed in the national parks and game reserves was the big determinant of how much money visitors spent.

Children visited the zoological gardens more than the parks. The percentage of adult females visiting the parks was lower than the percentage of adult males visiting the parks.

Chapter X

RECOMMENDATIONS

This chapter is divided into two sections: the first section discusses recommendations on consumptive aspects, while the second part makes recommendations on non-consumptive uses through the national parks and zoological surveys.

In Chapter V of this dissertation, it was concluded that expenditures per visitor in the three national parks show more per capita expenditures from foreigners than Nigerians (Table 8). Efforts should be intensified to internationally promote with advertisements the tourist attractions in addition to Nigeria's wildlife. Examples of tourist attractions include historical monuments and famous cities, Nigerian carvings, items of archeological, geological, and cultural interest.

For most of Nigeria's conservation areas to be attractive to international visitors, *in situ* infrastructure is needed. This would include an efficient communication system between game reserves, national parks, and airports. Others are suitable accommodations and catering facilities, and well-trained tourist staff to handle the visitors. Tourist guides in the form of maps, booklets, posters, and brochures must be available at international and local airports, hotels, and in all government-established secretariats and offices.

The number of nights stayed in the national parks and game reserves is the principal determinant of how much money is spent in the park (Tables 5 and 6). National parks and game reserves should embark on public enlightenment in major cities in Nigeria to educate people about wildlife conservation. Films and recorded video cassettes about Nigerian wildlife programs and tourist potentials should be available for viewing throughout the world.

Wildlife conservation education should be incorporated into the school curricula at all levels of education. Wildlife clubs should be well organized in junior high and high schools. Students from junior high and high schools should be given an opportunity to visit at least one conservation area before the completion of their six-year education program.

The national park concept can only work properly in most African countries if it is practiced as an integrated multiple land-use system. This system is one of the lasting solutions left for Nigerian conservation areas. The population of Nigeria--about 100 million with an annual increase of 2.5 percent--is high. If this trend continues unabated with the current land-use area measurements shown in Appendix B, in two to three decades there will be nothing left to conserve because most of the land areas will have been used for various agricultural and industrial purposes.

The multiple-use areas should thus accommodate grazing; residences; and tribal hunting by the local people; and tourism, organized mainly by local residents; as well as wildlife management coordinated with livestock. This corresponds to IUCN Category VIII, which is that the entire wildlife conservation unit should be managed as a single entity with distinctive land uses for the national park, the protected areas, and the multiple-use areas.

The Nigerian populace should be educated about the newly promulgated wildlife law through various news media all over the country. This law, on paper, gave protection to most endangered and threatened wildlife species. However, there is no law to prevent hunters from carrying locally made guns, nor is there any control on local hunting.

Game cropping and sport hunting should be organized in some of the existing game reserves which are inaccessible to tourists either because of rugged terrain (Obudu, Mambilla-Gashaka game reserves) or where the river systems have made it impossible to build roads. Other game reserves (Ifon and Meko game reserves) could be set aside for controlled hunting to supply meat for the people in rural areas.

Wildlife domestication projects should be embarked upon especially for species consumed and preferred by farmers (cane rats and snails). Game ranching should be established in the three ecological zones.

This study shows the importance of wild animals for rural populations as a source of food and medicine and as objects for cultural and religious ceremonies. Since these animals require adequate habitat to survive as a renewable resource, it is strongly suggested that maintaining such wild areas be considered in land use planning for all development projects.

This study was only concerned with wildlife utilized during the rainy and beginning of dry season. It is suggested that similar research be conducted during the peak of the dry season to provide additional information so the annual use of wildlife in Nigeria is better understood. Similar studies should also be conducted in the other smaller ecological zones (Sahel and Mangrove areas).

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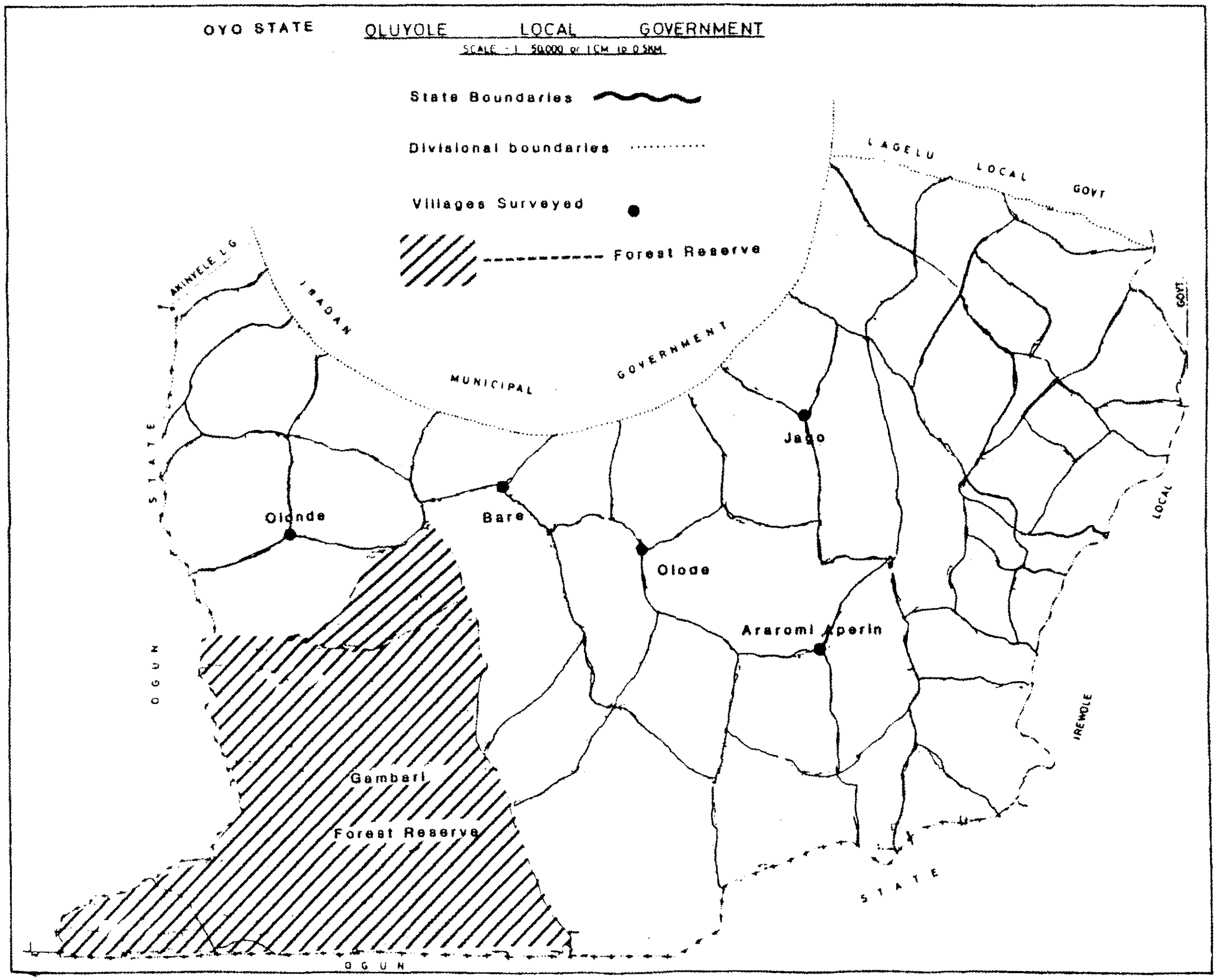
APPENDICES

APPENDIX A

Maps of the local government areas showing the villages surveyed in utilization of wildlife resources in Nigeria from July to November 1986.

Figure 7. Villages surveyed in Oluyole County, Oyo State, Nigeria.


OYO STATE
OLUYOLE LOCAL GOVERNMENT
SCALE - 1: 50,000 or 1CM to 0.5KM
State Boundaries
Divisional boundaries
Villages Surveyed
Forest Reserve
LAGELU LOCAL GOVT
AKINYELE L.G
IBADAN MUNICIPAL GOVERNMENT
GOVT
STATE
OGUN
Olonde
Bare
Jago
Olode
Araromi Aperin
Gambari Forest Reserve
LOCAL
IREWOLE
OGUN
STATE

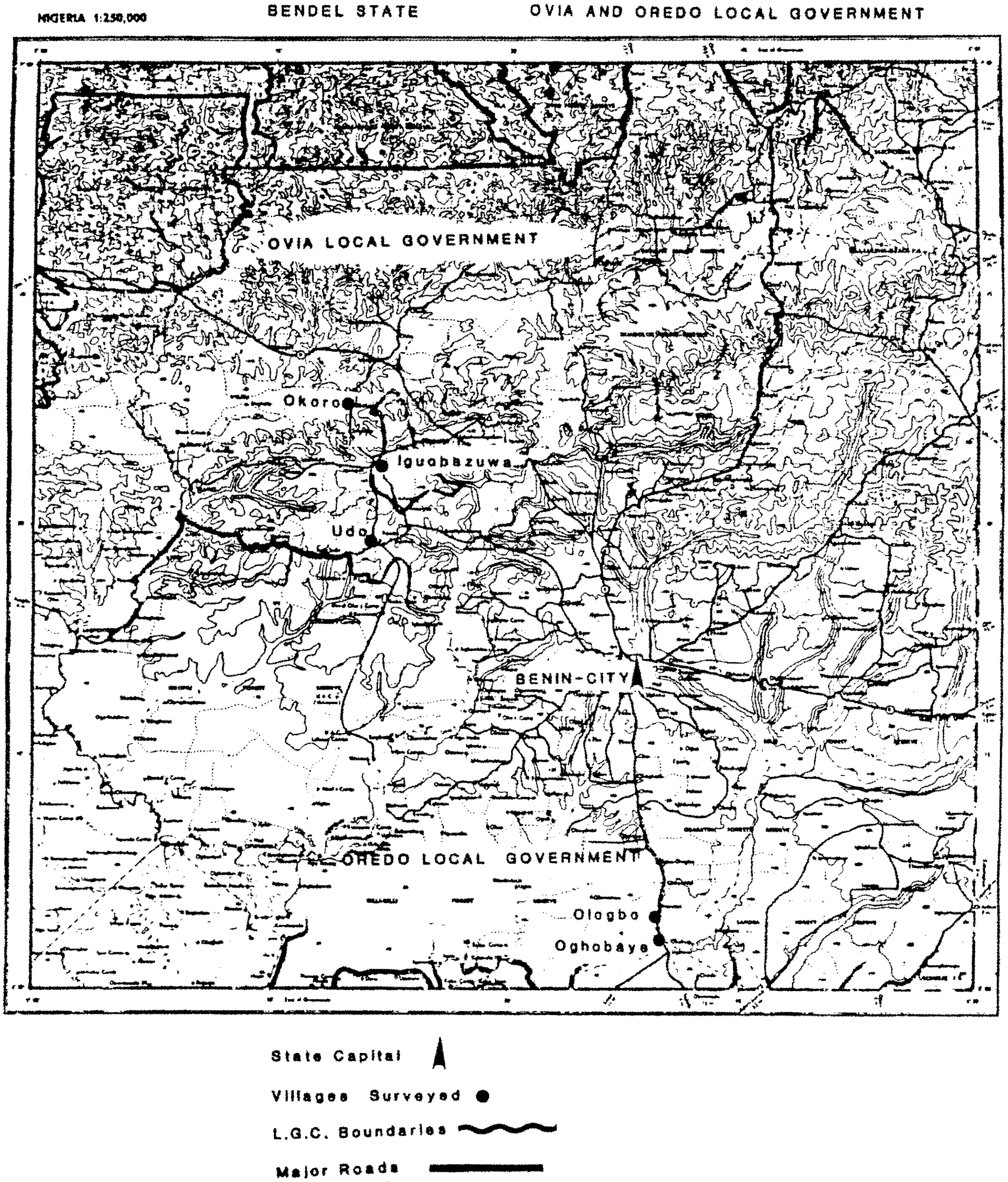


Figure 8. Villages surveyed in Ovia and Oredo Counties, Bendel State, Nigeria.

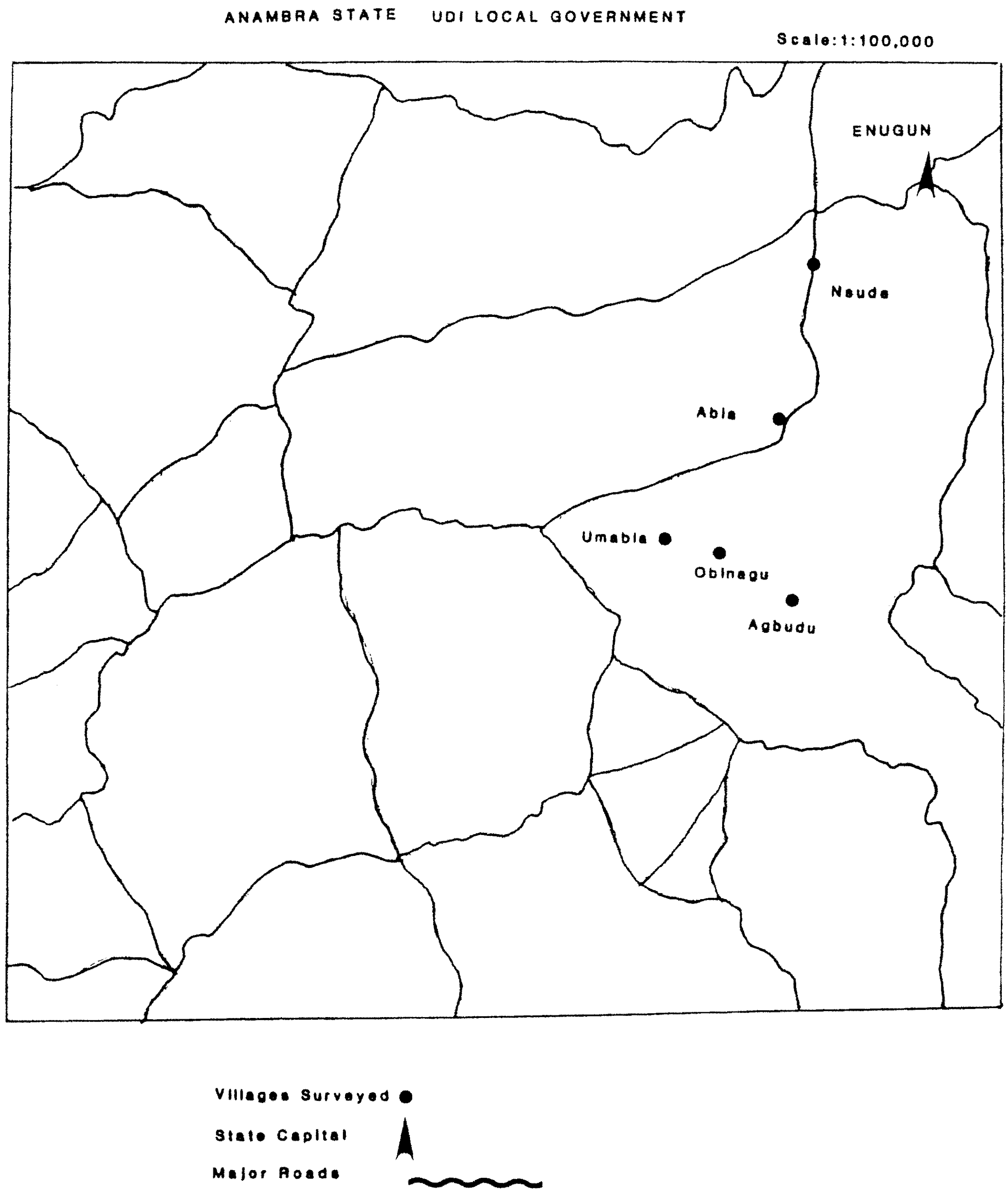


Figure 9. Villages surveyed in Udi County, Anambra State, Nigeria.

Figure 10. Villages surveyed in Akampa County, Cross River State, Nigeria.

CROSS RIVER STATE AKAMKPA LOCAL GOVERNMENT

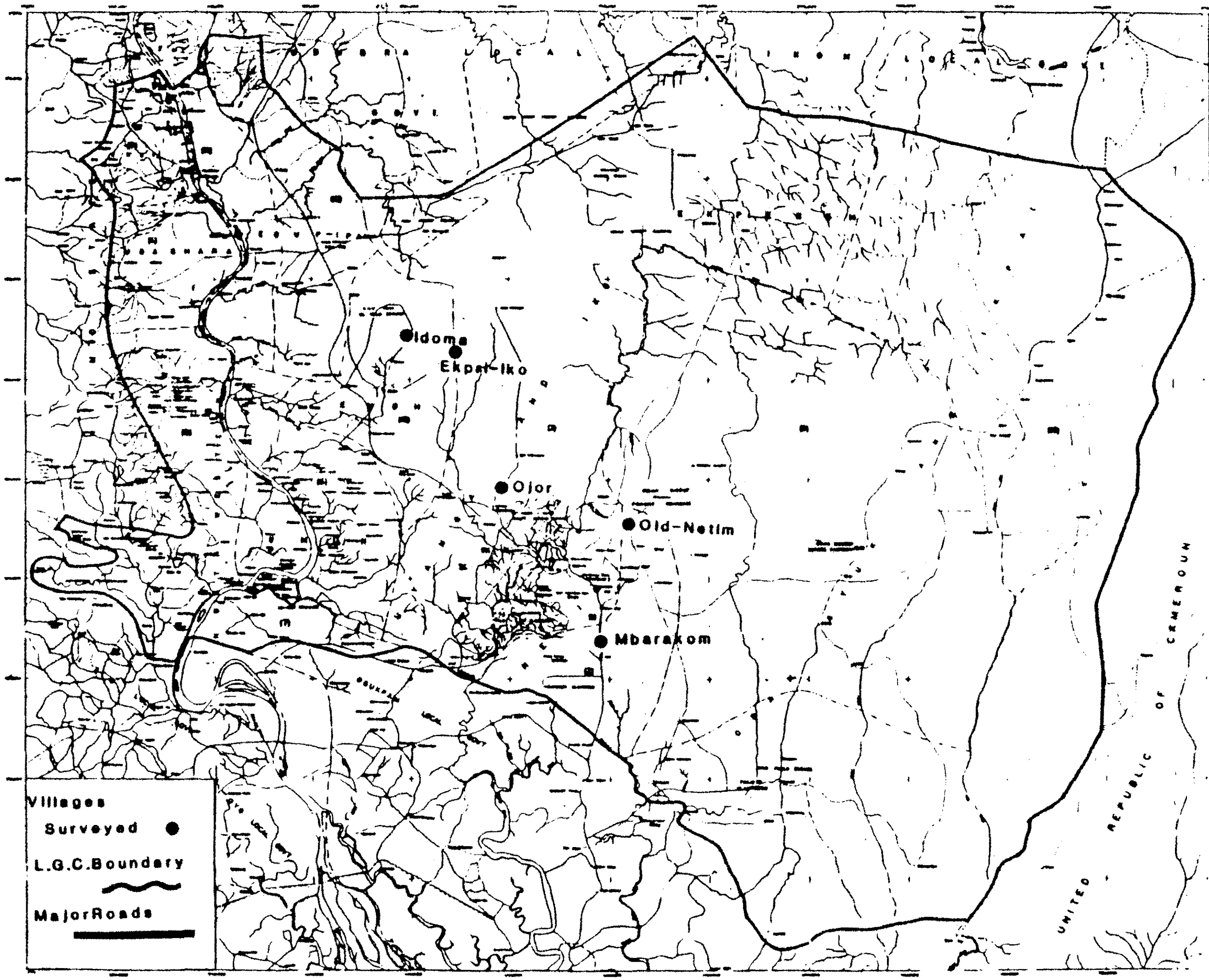


Figure 11. Villages surveyed in Alkeleri County, Bauchi State, Nigeria.

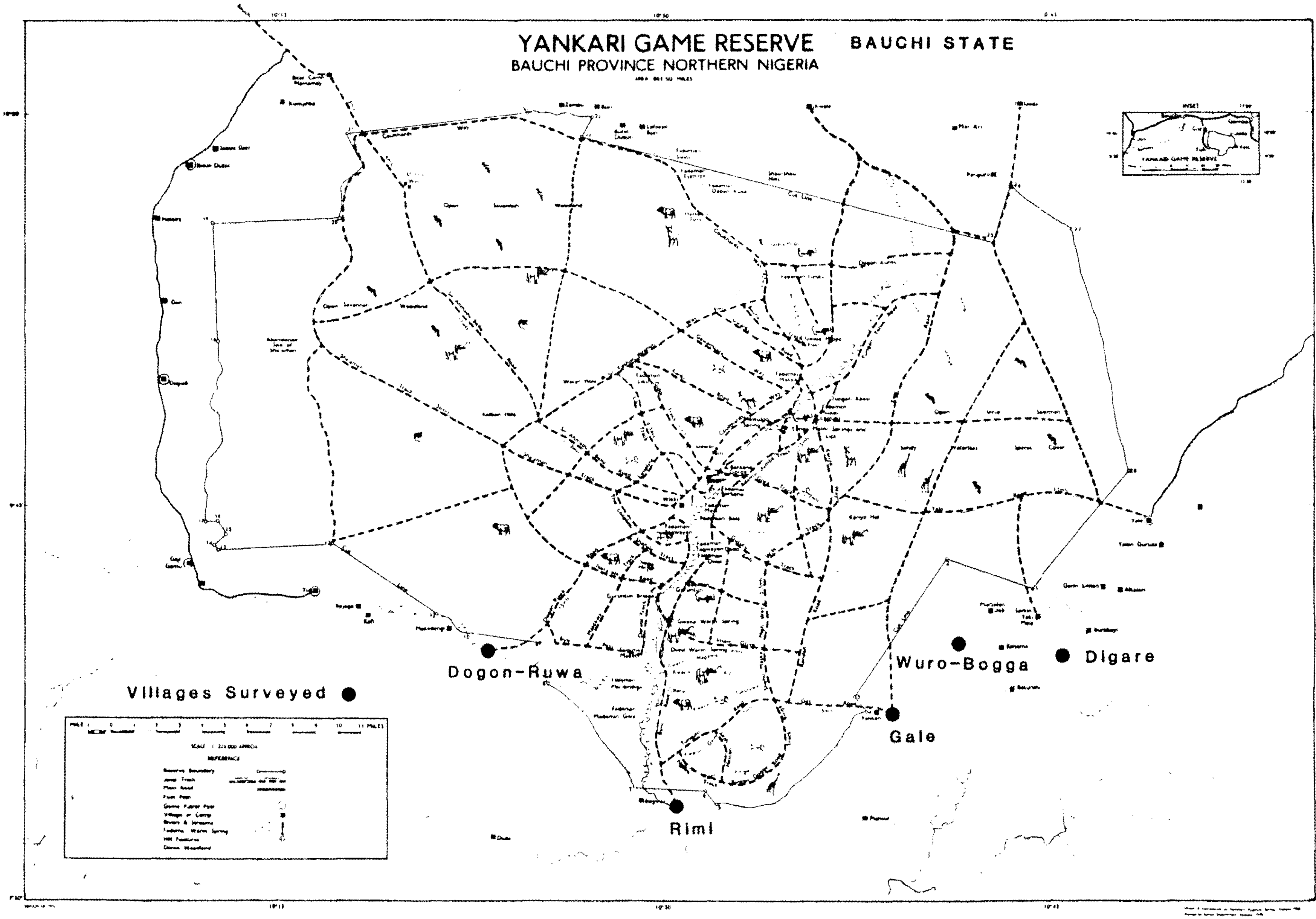

YANKARI GAME RESERVE
BAUCHI STATE
BAUCHI PROVINCE NORTHERN NIGERIA
Villages Surveyed
Dogon-Ruwa
Rimi
Gale
Wuro-Bogga
Digare

Figure 12. Villages surveyed in Zuguma and Borgu Counties, Kwara and Niger States, Nigeria.

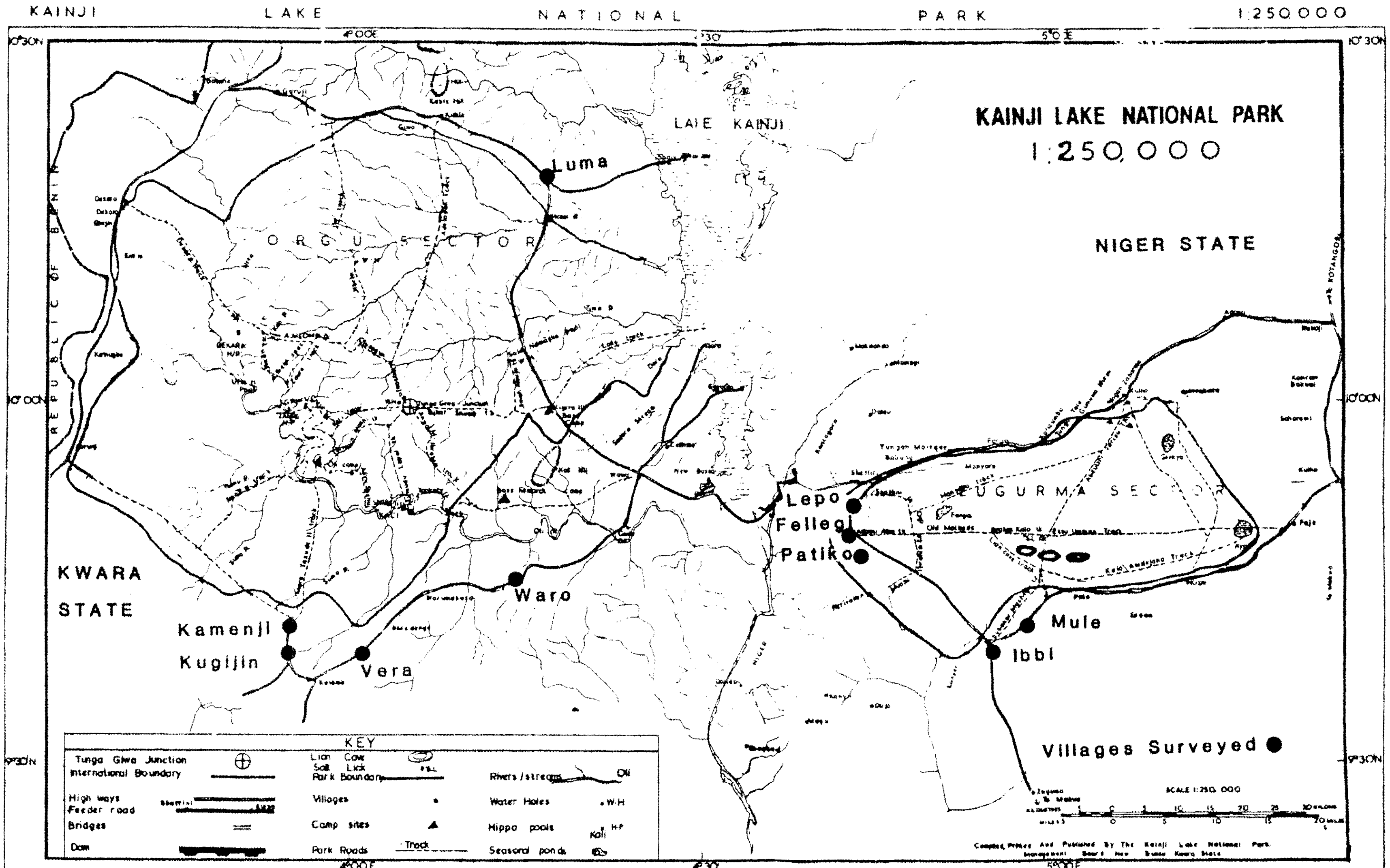
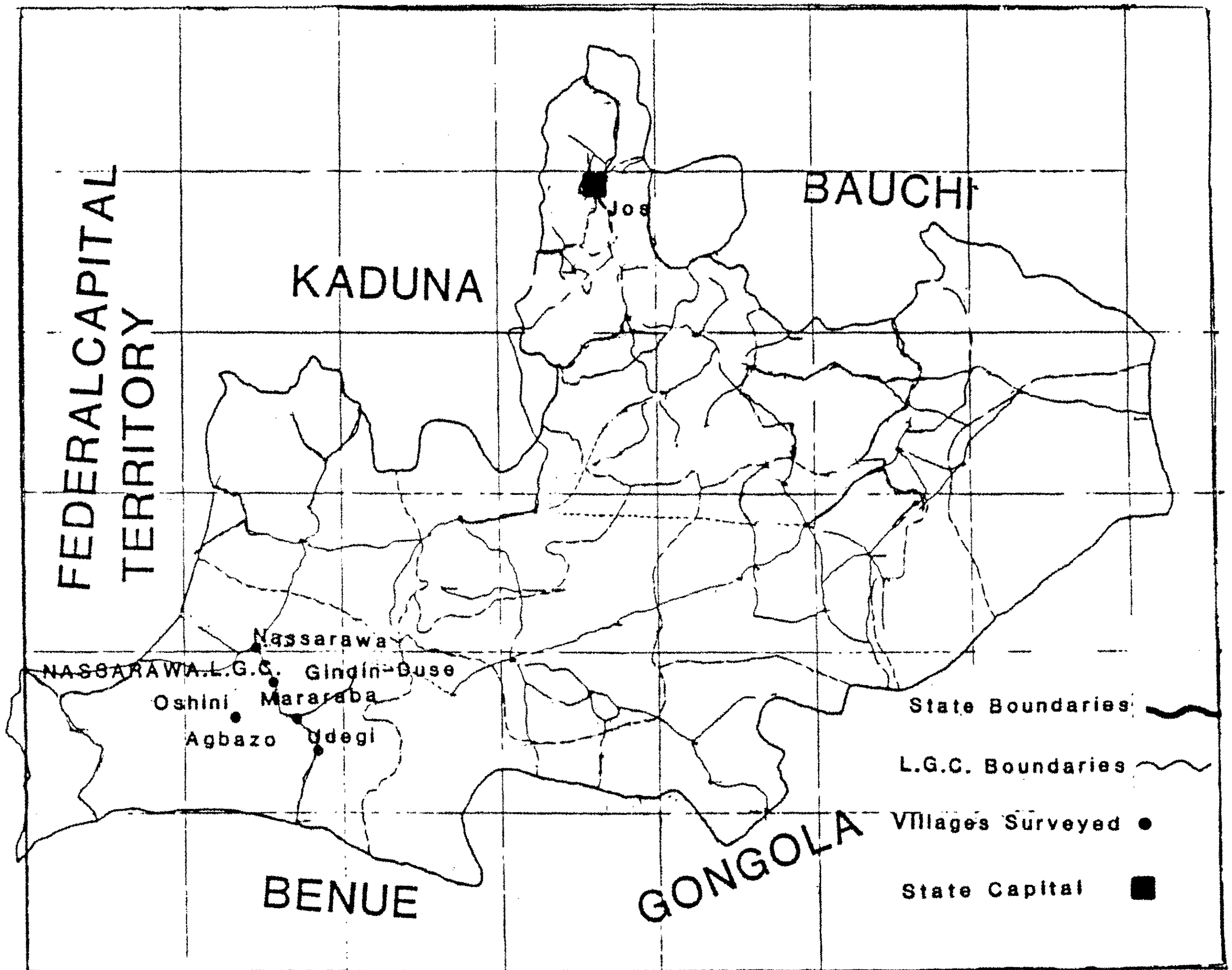

KAINJI LAKE NATIONAL PARK 1:250,000
KAINJI LAKE NATIONAL PARK
1:250,000
LAKE KAINJI
NIGER STATE
KWARA STATE
REPUBLIC OF BENIN
ORGU SECTOR
ZUGURMA SECTOR
Luma
Lepo
Fellegi
Patiko
Waro
Kamenji
Kugijin
Vera
Mule
Ibbi
Villages Surveyed
KEY
Tunga Giwa Junction
International Boundary
High ways
Feeder road
Bridges
Dam
Lion Cave
Salt Lick
Park Boundary
Villages
Camp sites
Park Roads
Track
Rivers / streams
Water Holes
Hippo pools
Seasonal ponds
4°00'E
4°30'
5°00'E
10°30'N
10°00'N
9°30'N

Figure 13. Villages surveyed in Nassarawa County, Plateau State Nigeria.

PLATEAU STATE

LOCAL GOVERNMENT COUNCIL AREAS



PSM 008

Scale 1:500,000or 1.014 to 8miles(12.8kms)

APPENDIX B

The major land use within and around the states where the survey was conducted is mainly used for agriculture and industrial development. Large segments are gazetted government reserves, some of which are national parks, game reserves, and proposed game reserves. Appendix B shows the land use and vegetation area measurement in Nigeria.

Land Use and Vegetation area measurement.

ANAMBRA STATE

Classification	Area in ha	% of State
Grassland, grassland	2 813	0.16
Grassland, aquatic	313	0.02
Grassland, shrub	2 032	0.12
Grassland, wooded shrub	78,125	4.57
Wooded shrub grassland/woodland transition	161 093	9.43
Woodland, broadleaved	41 094	2.41
Forest, mature disturbed	15 624	0.91
Forest, immature	79 532	4.66
Forest, swamp	42 344	2.48
Forest, riparian	80,468	4.71
Forest, oil palm	91 564	5.36
Forest, mosaic - oil palm/swamp	8 750	0.51
Farmland, over 60% intensity	674 841	39.52
Farmland, mosaic - Farmland/immature forest	60 938	3.57
Farmland, mosaic - Farmland/swamp forest	87 500	5.12
Farmland, mosaic - Farmland/Oil palm	90 312	5.29
Farmland, mosaic - Farmland/wooded shrub grassland and patches of woodland	140 781	8.25
Farmland, mosaic - Farmland/immature forest/oil palm	29 844	1.75
Forestry plantations	2 344	0.14
Water	469	0.03
Rivers and creeks	6 563	0.38
Built up areas	10 469	0.61
T O T A L	1 707 813	100.00

Total area of Forest Reserves in State	136 259	7.98

Land Use and Vegetation Area measurements

BAUCHI STATE

Classification	Area in ha	% of State
Grassland, grassland	15 625	0.24
Grassland, shrub	42 347	0.65
Grassland, wooded shrub	541 412	8.27
Grassland Shrubland transition	150 313	2.29
Shrubland & Thicket, non-thorny	22 344	0.34
Shrubland & Thicket, non-thorny/thorny	42 187	0.64
Wooded shrub grassland/woodland transition	2 815 323	42.99
Woodland, broad leaved	303 911	4.64
Forest, riparian	66 564	1.02
Farmland, over 60% intensity	1 234 790	18.86
Farmland, 30% to 60% intensity	1 051 258	16.05
Farmland, mosaic- Farmland/riparian forest	7 656	0.12
Farmland, mosaic- Farmland/wooded shrub grassland and patches of woodland	229 534	3.50
Water	11 408	0.17
Rivers and creeks	5 781	0.09
Built up areas	8 282	0.13
T O T A L	6 548 735	100.00

Total area of forest reserves within State	730 799	11.16

Land use area measurements.

BENDEL STATE

Classification	Area in ha	% of State
Grassland, grassland	2 813	0.06
Grassland, aquatic	3 281	0.08
Grassland, wooded shrub	1 719	0.04
Grassland, grassland with scattered trees	5 156	0.13
Wooded shrub grassland/woodland transition	52 814	1.36
Woodland, broadleaved	5 000	0.13
Forest, mature	271 249	6.98
Forest, mature disturbed	104 688	2.70
Forest, immature	38 750	1.00
Forest, swamp	701 251	18.03
Forest, riparian	47 187	1.21
Forest, rubber	448 283	11.53
Forest, raffia palm	63 749	1.64
Forest, mosaic - mature disturbed/immature	117 812	3.03
Forest, mosaic - rubber/swamp	251 719	6.47
Forest, mosaic - oil palm/swamp	6 407	0.16
Mangrove	347 032	8.92
Farmland, over 60% intensity	268 906	6.91
Farmland, mosaic - farmland/ immature forest	21 719	0.56
Farmland, mosaic - farmland/ swamp forest	37 812	0.97
Farmland, mosaic - farmland/ rubber forest	29 844	0.77
Farmland, mosaic - farmland/ wooded shrub grassland and patches of woodland	61 875	1.60
Farmland, mosaic - farmland/immature forest/oil palm forest	145 938	3.75
Farmland, mosaic - farmland/swamp/rubber forest	171 094	4.40
Farmland, mosaic - farmland/immature forest/rubber forest	488 282	12.55
Plantations, forestry	58 126	1.50
Plantations, crop	25 467	0.65
Water	3 437	0.09
Rivers and creeks	89 374	2.30
Built up areas	17 813	0.46
TOTAL	3 888 284	100.00

Total forest reserve area within State — 653 771 — 16.81

Land use area measurements

BENUE STATE

Classification	Area in ha	% of State
Grassland, grassland	780	0.01
Grassland, aquatic	56 094	1.23
Grassland, shrub	23 125	0.50
Grassland, wooded shrub	51 562	1.13
Grassland, mosaic - grassland/ farmland	4 688	0.10
Wooded shrub grassland/ woodland transition	822 970	18.07
Woodland, broadleaved	194 066	4.26
Woodland, mosaic - broadleaved/riparian forest	44 532	0.98
Forest, mature	10 625	0.23
Forest, mature disturbed	22 812	0.50
Forest, immature	4 687	0.10
Forest, swamp	33 907	0.74
Forest, riparian	174 843	3.84
Farmland, over 60% intensity	470 313	10.33
Farmland, 30% to 60% intensity	43 437	0.95
Farmland, mosaic - farmland/immature forest	11 563	0.25
Farmland, mosaic - farmland/swamp forest	115 938	2.54
Farmland, mosaic - farmland/riparian forest	87 188	2.00
Farmland, mosaic - farmland/wooded shrub grassland and patches of woodland	1 911 092	42.00
Farmland, mosaic - farmland/immature forest/oil palm forest	399 999	8.79
Plantations, forestry	1 250	0.27
Water	2 501	0.55
Rivers and creeks	46 720	1.02
Built up areas	6 562	0.14
T O T A L	4 552 817	100.00
Total forest reserve area within State	182 350	4.00

Land use area measurements

BORNU STATE

Classification	Area in ha	% of State
Grassland, dry	151 877	1.27
Grassland, grassland	37 346	0.31
Grassland, aquatic	407 500	3.42
Grassland, shrub	1 583 443	13.30
Grassland, wooded shrub	2 754 231	23.12
Grassland shrubland transition	1 580 161	13.26
Shrubland and thicket, non-thorny	1 250	0.01
Shrubland and thicket, thorny	8 438	0.07
Shrubland and thicket, non-thorny/thorny	620 943	5.21
Wooded shrub grassland/woodland transition	2 043 443	17.15
Woodland, broadleaved	373 282	3.13
Farmland, over 60% intensity	862 195	7.24
Farmland, 30% to 60% intensity	1 432 697	12.02
Plantations, forestry	156	001
Plantations, crop	2 656	0.02
Plantations, irrigation projects	2 188	0.02
Plantations, mechanised farming	1 251	0.10
Plantations, rainfed agriculture	313	0.002
Water	35 470	0.30
Built up areas	14 374	0.12
TOTAL	11 913 214	100.00
Total forest reserve area within State	697 840	5.85

CROSS RIVERS STATE

Classification	Area in ha	% of State
Grassland, aquatic	11 406	0.42
Grassland, montane	5 313	0.20
Grassland, shrub	3 906	0.14
Grassland, mosaic - upland wooded shrub grassland/ riparian forest	35 938	1.32
Wooded shrub grassland/ woodland transition	127 187	4.67
Woodland, broadleaved	22 033	0.81
Forest, mature	710 313	26.10
Forest, mature disturbed	77 345	2.84
Forest, immature	6 249	0.23
Forest, swamp	195 938	7.20
Forest, riparian	17 657	0.65
Forest, oil palm	129 844	4.77
Forest, raffia palm	10 469	0.38
Forest, mosaic - mature disturbed/immature	222 969	8.19
Forest, mosaic - mature disturbed/oil palm/farmland	94 062	3.45
Mangrove	72 186	2.65
Farmland, over 60% intensity	324 847	11.93
Farmland, mosaic - farmland/immature forest	252 344	9.27
Farmland, mosaic - farmland/riparian forest	16 563	0.60
Farmland, mosaic - farmland/oil palm forest	238 750	8.77
Farmland, mosaic - farmland/wooded shrub grassland and patches of woodland	13 125	0.48
Farmland, mosaic - farmland/immature forest/oil palm forest	45 469	1.67
Plantations, forestry	4 219	0.15
Plantations, crops	33 907	1.24
Water	1 250	0.45
Rivers and creeks	42 657	1.57
Built up areas	5 469	0.20
T O T A L	2 721 415	100.00
Total forest reserve area within State	607 036	22.30

Land use area measurements

GONGOLA STATE

Classification	Area in ha	% of State
Grassland, grassland	313	0.003
Grassland, aquatic	340 632	3.60
Grassland, montane	225 001	2.38
Grassland, shrub	37 190	0.40
Grassland, wooded shrub	744 534	7.87
Grassland, mosaic - grassland/farmland	51 095	0.54
Grassland, mosaic - upland wooded shrub grassland/ riparian forest	535 000	5.66
Grassland shrubland transition	32 344	0.34
Wooded shrub grassland/ woodland transition	3 030 005	32.05
Woodland, broadleaved	1 409 064	14.90
Woodland, mosaic - broadleaved/riparian forest	200 469	2.12
Forest, mature disturbed	104 219	1.10
Forest, riparian	286 880	3.03
Farmland, over 60% intensity	322 041	3.41
Farmland, 30% to 60% intensity	571 556	6.04
Farmland, mosaic - farmland/immature forest	625	0.006
Farmland, mosaic - farmland/acquatic forest	27 656	0.30
Farmland, mosaic - farmland/riparian forest	7 031	0.07
Farmland, mosaic - farmland/wooded shrub grassland and patches of woodland	1 445 160	15.29
Plantations, forestry	469	0.005
Plantations, crops	2 188	0.23
Water	25 158	0.26
Rivers and creeks	39 689	0.42
Built up areas	14 535	0.15
T O T A L	9 452 854	100.00
Total forest reserve area within State	243 137	2.57

Land use area measurements

IMO STATE

Classification	Area in ha	% of State
Grassland, grassland	8 438	0.73
Grassland, aquatic	313	0.03
Grassland, wooded shrub	9 844	0.85
Wooded shrub grassland/ woodland transition	79 844	7.00
Forest, mature disturbed	2 813	0.24
Forest, immature	25 469	2.21
Forest, swamp	50 313	4.36
Forest, riparian	19 688	1.70
Forest, oil palm	396 719	34.40
Forest, raffia palm	11 875	1.03
Forest, mosaic - oil palm/swamp	4 375	0.38
Forest, mosaic - mature disturbed/oil palm/farmland	3 438	0.30
Farmland, over 60% intensity	345 313	30.00
Farmland, mosaic - farmland/immature forest	104 219	9.03
Farmland, mosaic - farmland/oil palm forest	8 281	0.72
Farmland, mosaic - farmland/immature forest/oil palm forest	68 594	6.00
Plantations, forestry	1 406	0.12
Plantations, crops	4 853	0.42
Water	938	0.08
Rivers and creeks	313	0.03
Built up areas	6 406	0.55
T O T A L	1 153 442	100.00
Total forest reserve area within State	12 035	1.04

Land use area measurements

KADUNA STATE

Classification	Area in ha	% of State
Grassland, grassland	4 062	0.59
Grassland, shrub	176 741	2.54
Grassland, wooded shrub	780 481	11.25
Grassland shrubland transition	16 562	0.24
Subland & thickets, non-thorny/thorny	46 098	0.66
Wooded shrub grassland/ woodland transition	1 723 446	24.83
Woodland, broadleaved	102 503	1.48
Forest, mature disturbed	2 344	0.34
Forest, riparian	·626	0.01
Farmland, over 60% intensity	2 198 285	31.68
Farmland, 30% to 60% intensity	1 313 757	19.00
Farmland, mosaic - farmland/wooded shrub grassland and patches of woodland	530 941	7.65
Plantations, forestry	8 283	0.12
Plantations, shelterbelts	781	0.01
Plantations, crops	1 407	0.02
Plantations, livestock projects	469	0.01
Water	5 158	0.07
Rivers and creeks	-	
Built up areas	27 341	0.40
T O T A L	6 939 285	100.00
Total forest reserve area within State	882 519	12.72

Land use area measurements

KANO STATE

Classification	Area in ha	% of State
Grassland, grassland	37 665	0.86
Grassland, shrub	147 194	3.36
Grassland, wooded shrub	230 938	5.28
Shrubland & thickets, non-thorny	9 532	0.22
Shrubland & thickets, non-thorny/thorny	13 123	0.30
Wooded shrub grassland/woodland transition	335 936	7.67
Woodland, broadleaved	6 875	0.15
Farmland, over 60% intensity	2 173 594	49.69
Farmland, 30% to 60% intensity	1 352 969	31.00
Farmland, mosaic - farmland/wooded shrub grassland and patches of woodland	1 719	0.04
Plantations, forestry	6 564	0.15
Plantations, shelterbelts	3 752	0.08
Plantations, irrigation projects	6 875	0.15
Water	17 968	0.41
Rivers and creeks	7 500	0.17
Built up areas	22 190	0.50
T O T A L	4 374 394	100.00
Total forest reserve area within State	197 979	4.52

243

Land use area measurements

KWARA STATE

Classification	Area in ha	% of State
Grassland, grassland	4 533	0.08
Grassland, aquatic	56 726	0.94
Grassland, wooded shrub	212 816	3.54
Shrubland & thickets, non-thorny/thorny	781	0.01
Wooded shrub grassland/ woodland transition	3 800 945	63.23
Woodland, broadleaved	118 594	1.97
Forest, immature	626	0.01
Forest, riparian	152 501	2.53
Forest, oil palm	3 438	0.06
Farmland, over 60% intensity	89 064	1.48
Farmland, 30% to 60% intensity	166 096	2.76
Farmland, mosaic - farmland/immature forest	15 469	0.25
Farmland, mosaic - farmland/wooded shrub grassland and patches of woodland	1 301 752	21.65
Farmland, mosaic - farmland/immature forest/oil palm forest	2 188	0.04
Plantations, forestry	781	0.01
Plantations, crops	4 063	0.07
Plantations, irrigation projects	8 282	0.14
Water	40 781	0.68
Rivers and creeks	16 406	0.27
Built up areas	15 466	0.25
T O T A L	6 011 308	100.00
Total forest reserve area within State	1 369 860	22.79

Land use area measurements

LAGOS STATE

Classification	Area in ha	% of State
Grassland, aquatic	5 781	1.64
Forest, swamp	122 503	34.86
Forest, riparian	4 531	1.29
Forest, raffia palm	22 189	6.31
Mangrove	4 220	1.20
Farmland, over 60% intensity	15 157	4.31
Farmland, mosiac - farmland/immature forest	62 813	17.87
Farmland, mosaic - farmland/swamp forest	19 533	5.56
Plantations, crops	1 095	0.31
Plantations, mechanised farming	781	0.22
Water	1 875	0.53
Rivers and creeks	70 157	19.96
Built up areas	20 781	5.91
T O T A L	351 416	100.00
Total forest reserve area within State	2 657	0.75

Land use area measurements

NIGER STATE

Classification	Area in ha	% of State
Grassland, aquatic	94 850	1.41
Grassland, wooded shrub	421 560	6.26
Grassland, mosaic - grassland/farmland	1 719	0.02
Wooded shrub grassland/woodland transition	3 508 599	52.14
Woodland, boradleaved	492 970	7.32
Forest, mature disturbed	12 658	1.19
Forest, riparian	164 849	2.45
Farmland, over 60% intensity	133 003	1.97
Farmland, 30% to 60% intensity	636 596	9.46
Farmland, mosiac - farmland/wooded shrub grassland and patches of woodland	1 206 850	17.93
Plantations, forestry	4 378	0.06
Plantations, crops	3 594	0.05
Water	17 968	0.26
Rivers and creeks	16 875	0.25
Built up areas	12 189	0.18
T O T A L	6 728 658	100.00
Total forest reserve area within State	436 575	6.49

Land use area measurements

OGUN STATE

Classification	Area in ha	% of State
Grassland, grassland	625	0.03
Wooded shrub grassland/woodland transition	268 439	15.62
Woodland, broadleaved	40 001	2.33
Forest, mature disturbed	58 905	3.43
Forest, immature	17 032	0.99
Forest, swamp	60 466	3.52
Forest, riparian	38 438	2.23
Forest, rubber	4 688	0.27
Forest, raffia palm	30 311	1.76
Forest, mosaic - mature disturbed/immature	106 562	6.20
Mangrove	1 718	0.10
Farmland, over 60% intensity	46 251	2.70
Farmland, mosaic - farmland/immature forest	585 782	34.10
Farmland, mosaic - farmland/swamp forest	1 717	0.10
Farmland, mosaic - farmland/wooded shrub grassland with patches of woodland	208 751	12.15
Farmland, mosaic - farmland/immature forest/rubber forest	198 438	11.55
Plantations, forestry	18 907	1.10
Plantations, crops	18 750	1.09
Plantations, rainfed agriculture	781	0.04
Water	-	
Rivers and creeks	3 906	0.22
Built up areas	7 501	0.43
TOTAL	1 717 969	100.00

Total forest reserve area within State	271 099	19.78

ONDO STATE

Classification	Area in ha	% of State
Grassland, aquatic	2 344	0.11
Wooded shrub grassland/ woodland transition	21 244	1.06
Woodland, broadleaved	3 281	0.16
Forest, mature	313	0.02
Forest, mature disturbed	164 219	8.18
Forest, immature	27 655	1.37
Forest, swamp	119 375	5.94
Forest, riparian	2 032	0.10
Forest, oil palm	7 968	0.39
Forest, rubber	156	0.01
Forest, raffia palm	65 470	3.26
Forest, mosaic - mature disturbed/immature	347 188	17.30
Mangrove	4 062	0.20
Farmland, over 60% intensity	29 689	1.48
Farmland, mosaic - farmland/immature forest	622 186	31.00
Farmland, mosaic - farmland/wooded shrub grassland with patches of woodland	283 438	14.12
Farmland, mosaic - farmland/immature forest/oil palm forest	36 719	1.83
Farmland, mosaic - farmland/immature forest/rubber forest	248 595	12.38
Plantations, forestry	4 532	0.22
Plantations, crops	10 469	0.52
Plantations, irrigation projects	469	0.02
Water	469	0.02
Rivers and creeks	625	0.03
Built up areas	4 532	0.22
T O T A L	2 007 030	100.00
Total forest reserve area within State	330 163	16.45

Land use area measurements

OYO STATE

Classification	Area in ha	% State
Wooded shrub grassland/woodland transition	1 320 939	35.80
Woodland, broadleaved	258 130	7.00
Forest, mature disturbed	85 939	2.33
Forest, immature	4 219	0.11
Forest, riparian	1 250	0.03
Forest, mosaic - mature disturbed/immature	58 751	1.59
Forest, mosaic - mature disturbed/oil palm/farmland	13 750	0.37
Farmland, over 60% intensity	51 874	1.40
Farmland, 30% to 60% intensity	2 032	0.05
Farmland, mosaic - farmland/swamp forest	770 625	20.88
Farmland, mosaic - farmland/wooded shrub grassland with patches of woodland	1 072 187	29.06
Plantations, forestry	13 281	0.36
Plantations, crops	2 501	0.06
Water	3 282	0.09
Rivers and creeks	-	
Built up areas	30 469	0.82
T O T A L	3 689 229	100.00
Total forest reserve area within State	697 972	18.92

Land use area measurements

PLATEAU STATE

Classification	Area in ha	% of State
Grassland, grassland	2 658	0.05
Grassland, aquatic	21 402	0.38
Grassland, shrub	35 316	0.64
Grassland, wooded shrub	732 193	13.24
Grassland, mosaic - grassland/farmland	24 217	0.44
Shrubland & thickets, non-thorny	6 407	0.11
Shrubland & thickets, non-thorny/thorny	6 406	0.11
Wooded shrub grassland/woodland transition	1 744 540	31.55
Woodland, broadleaved	502 339	9.08
Forest, mature disturbed	2 189	0.04
Forest, swamp	1 406	0.02
Forest, riparian	142 662	2.58
Farmland, over 60% intensity	756 629	13.68
Farmland, 30% to 60% intensity	1 168 913	21.14
Farmland, mosaic - farmland/wooded shrub grassland with patches of woodland	337 500	6.10
Plantations, forestry	1 250	0.02
Water	6 093	0.11
Rivers and creeks	14 532	0.26
Built up areas	22 500	0.40
TOTAL	5 529 152	100.00
Total forest reserve area within State	436 738	7.90

Land use area measurements

RIVERS STATE

Classification	Area in ha	% of State
Forest, swamp	589 060	33.30
Forest, riparian	13 593	0.77
Forest, oil palm	96 406	5.45
Forest, raffia palm	4 688	0.26
Forest, mosaic - oil palm/swamp	104 209	5.90
Mangrove	543 596	30.73
Farmland, over 60% intensity	232 030	13.12
Farmland, mosaic - farmland/oil palm forest	46 875	2.65
Plantations, forestry	156	0.01
Plantations, crops	9 064	0.51
Water	5 001	0.28
Rivers and creeks	119 375	6.75
Built up areas	4 688	0.26
T O T A L	1 768 751	100.00
Total forest reserve area within State	135 949	7.68

Land use area measurements

SOKOTO STATE

Classification	Area in ha	% of State
Grassland, grassland	14 844	0.16
Grassland, aquatic	139 534	1.51
Grassland, shrub	366 888	4.00
Grassland, wooded shrub	1 496 105	16.27
Shrubs & thickets, non-thorny/thorny	1 278 458	13.90
Shrubs & thickets, complex shrub land and thickets, thorny & non thorny/grassland	184 219	2.00
Shrubs & thickets, mosaic - thorny/non-thorny/farmland	48 125	0.52
Wooded shrub grassland/woodland transition	1 727 818	18.80
Woodland, broadleaved	23 594	0.25
Forest, riparian	12 345	0.13
Farmland, over 60% intensity	1 985 615	21.59
Farmland, 30% to 60% intensity	1 714 088	18.64
Farmland, mosaic - farmland/wooded shrub grassland with patches of woodland	87 500	0.95
Plantations, forestry	3 126	0.03
Plantations, irrigation projects	1 250	0.01
Plantations, livestock projects	156	0.001
Water	62 187	0.67
Rivers and creeks	8 594	0.09
Built up areas	41 560	0.45
T O T A L	9 196 006	100.00
Total forest reserve area within State	1 970 329	21.42

Land use area measurements

FEDERAL CAPITAL TERRITORY

Classification	Area in ha	% of State
Grassland, grassland	781	0.12
Grassland, shrub	625	0.09
Grassland, wooded shrub	7 500	1.15
Wooded shrub grassland/woodland transition	172 661	26.41
Woodland, broadleaved	56 095	8.58
Forest, mature disturbed	13 129	2.00
Forest, riparian	7 969	1.22
Farmland, over 60% intensity	469	0.07
Farmland, 30% to 60% intensity	1 719	0.26
Farmland, mosaic - farmland/wooded shrub grassland with patches of woodland	392 501	60.04
Built up areas	312	0.04
T O T A L	653 761	100.00
Total forest reserve area within State	24 691	3.77

APPENDIX C

WILDLIFE UTILIZATION SURVEY
Federal Department of Forestry
Ministry of Agriculture

SECTION I: IDENTIFICATION

1. Village: ____________ 2. Distance to Town: ____________

3. State: ____________ 4. Ecological Zone: ____________

5. Respondent's Name: ____________

6. Number of Dependents in Compound: ____________

7. Tribe: ____________ 8. Religion: ____________

9. Language: ____________ 10. Years of Schooling: ____________

11. Occupation of H.H. Head (in order of importance):

a. ____________

b. ____________

c. ____________

FARM CHARACTERISTICS:

12. Crops Raised:

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13. Plantation Crops Raised:

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14. Livestock Raised:

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SECTION II: AVAILABILITY

Which of the following species are living in your area and how common are they?

Species	(15) Common	(16) Rare or Scarce	(17) Used to be but no longer found here	(18) Never were here	(19) Don't Know
BIG GAME Elephant					
Buffalo					
Roan Antelope					
Bushbuck					
Kob					
Waterbuck					
Gray Duiker					
Warthog					
Baboon					
SMALL GAME Cane Rat					
African Giant Rat					
Porcupine					
Armadilo (scaly anteater)					
Flying Squirrel					
Squirrel					
Bat					
REPTILES Python					
Crocodile					
Monitor Lizard					
Cobra					
Puff Adder					
Night Adder					
Tortoise					
African Giant Snail					
BIRDS Guinea Fowl					
Francolin					
FISH					

SECTION III: CONSUMPTION

We would like to ask you about your household consumption of wild game for food.

Species	(20) Which do you use during rainy season	(21) Which do you use most often rainy season	(22) How many times in a month do you consume	(23) Which do you prefer to eat	(24) Which Are unacceptable to eat
BIG GAME Elephant					
Buffalo					
Roan Antelope					
Bushbuck					
Kob					
Waterbuck					
Gray Duiker					
Warthog					
Baboon					
SMALL GAME Cane Rat					
African Giant Rat					
Porcupine					
Armadilo (scaly anteater)					
Flying Squirrel					
Squirrel					
Bat					
REPTILES Python					
Crocodile					
Monitor Lizard					
Cobra					
Puff Adder					
Night Adder					
Tortoise					
African Giant Snail					
BIRDS Guinea Fowl					
Francolin					
FISH					

What animals do you eat during each of the following religious festivals?

	CHRISTIAN			MUSLIM		
Species	(25) Christmas	(26) Harvest	(27) Easter	(28) Id-el-Kabir	(29) Id-el-Fitr	(30) Id-el-Maulud
BIG GAME Elephant						
Buffalo						
Roan Antelope						
Bushbuck						
Kob						
Waterbuck						
Gray Duiker						
Warthog						
Baboon						
SMALL GAME Cane Rat						
African Giant Rat						
Porcupine						
Armadilo scaly anteater						
Flying Squirrel						
Squirrel						
Bat						
REPTILES Python						
Crocodile						
Monitor Lizard						
Cobra						
Puff Adder						
Night Adder						
Tortoise						
African Giant Snail						
BIRDS Guinea Fowl						
Francolin						
FISH						

What animals do you eat during cultural festivals?

Species	(31) Masquerades	(32) Marriage Ceremony	(33) Birth Ceremony	(34) Death Ceremony	(35) Installation Ceremony	(36) Other
BIG GAME Elephant						
Buffalo						
Roan Antelope						
Bushbuck						
Kob						
Waterbuck						
Gray Duiker						
Warthog						
Baboon						
SMALL GAME Cane Rat						
African Giant Rat						
Porcupine						
Armadilo scaly anteater						
Flying Squirrel						
Squirrel						
Bat						
REPTILES Python						
Crocodile						
Monitor Lizard						
Cobra						
Puff Adder						
Night Adder						
Tortoise						
African Giant Snail						
BIRDS Guinea Fowl						
Francolin						
FISH						

37 Which game species do you use for ritual uses?

Species	Part Used	Used For	How often in a Year

38. Which game species do you use for healing, or for preventative medicine?

Species	Part Used	Used For	How often in a Year

39. Which game species do you use for invoking and appeasing traditional gods and witches?

Species	Part Used	Used For	How often in a Year

40. Which game species/parts make men potent?

Species	Part

41. Which game species/parts make women fertile?

Species	Part

42. Do you hunt during the rainy season?

Yes |_______| No |_______| (Go to #41)

43. If yes, how often do you hunt in one month?

(44) List Species Hunted	(45) How Many do You Shoot per Month (Average)

46. Do you trap during the rainy season?

Yes |_______| No |_______| (Go to #44)

If yes:

(47) List Species Trapped	(48) How Many do You trap per Month (Average)

49. Do you fish during the rainy season?

Yes |________| No |________|

If yes:

50. How often do you fish in a week?

51. Do you hunt, fish or trap wildlife?

Primarily for sale |________|

Primarily for home consumption |________|

52. Are certain animals taken only for sale of meat?

Yes |________| No |________| (Go to #49)

53. If yes, which ones? ____

____

____

54. Are certain animals taken primarily for sale of trophies, hides, skins, other parts?

Yes |________| No |________|

If yes, which ones? ____
____
____

55. Do you keep any wildlife as pets?

Yes |________| No |________|

If yes, which species and how many? ______________________________
____
____

56. Do you hunt or trap wildlife in order to sell live animals?

Yes |________| No |________|

If yes, which species? ____
____
____

HUNTER SURVEY
Federal Department of Forestry
Ministry of Agriculture

1. Village: ____________ 2. Distance to Town: ____________

3. State: ____________ 4. Ecological Zone: ____________

5. Respondent's Name: ____________

6. Number of Dependents in Compound: ____________

7. Tribe: ____________ 8. Religion: ____________

9. Language: ____________ 10. Years of Schooling: ____________

11. Occupations of H.H. Head (in order of importance):

a. ____________ c. ____________

b. ____________ d. ____________

12. We would like to know how many times in a week (market period) you hunt, for each month of the year. (check one)

Month	Every Day, All Day	Every Day, 1/2 Day	Several times a week	Once A Week	Less Than Once A Week
January					
February					
March					
April					
May					
June					
July					
August					
September					
October					
November Rat					
December					

Which of the following species are living in your area and how common are they?

Species	(13) Common	(14) Rare or Scarce	(15) Used to be but no longer found here	(16) Never were here	(17) Don't Know
BIG GAME Elephant					
Buffalo					
Roan Antelope					
Bushbuck					
Kob					
Waterbuck					
Gray Duiker					
Warthog					
Baboon					
SMALL GAME Cane Rat					
African Giant Rat					
Porcupine					
Armadilo (scaly anteater)					
Flying Squirrel					
Squirrel					
Bat					
REPTILES Python					
Crocodile					
Monitor Lizard					
Cobra					
Puff Adder					
Night Adder					
Tortoise					
African Giant Snail					
BIRDS Guinea Fowl					
Francolin					
FISH					

We would like to ask you about your household consumption of wild game for food.

Species	(18) Which do you hunt <u>regularly</u> during the rainy season	(19) Which do you hunt <u>regularly</u> during dry season	(20) How Much of the Animals You Kill Do You: Eat At Home	(21) Sell to Village Households	(22) Sell at the Market
BIG GAME Elephant					
Buffalo					
Roan Antelope					
Bushbuck					
Kob					
Waterbuck					
Gray Duiker					
Warthog					
Baboon					
SMALL GAME Cane Rat					
African Giant Rat					
Porcupine					
Armadilo (scaly anteater)					
Flying Squirrel					
Squirrel					
Bat					
REPTILES Python					
Crocodile					
Monitor Lizard					
Cobra					
Puff Adder					
Night Adder					
Tortoise					
African Giant Snail					
BIRDS Guinea Fowl					
Francolin					
FISH					

What animals do you hunt for specifically of the following religious festivals?

Species	CHRISTIAN			MUSLIM		
	(23) Christmas	(24) Harvest	(25) Easter	(26) Id-el-Kabir	(27) Id-el-Fitr	(28) Id-el-Maulud
BIG GAME Elephant						
Buffalo						
Roan Antelope						
Bushbuck						
Kob						
Waterbuck						
Gray Duiker						
Warthog						
Baboon						
SMALL GAME Cane Rat						
African Giant Rat						
Porcupine						
Armadilo scaly anteater						
Flying Squirrel						
Squirrel						
Bat						
REPTILES Python						
Crocodile						
Monitor Lizard						
Cobra						
Puff Adder						
Night Adder						
Tortoise						
African Giant Snail						
BIRDS Guinea Fowl						
Francolin						
FISH						

What animals do you hunt for specifically cultural festivals?

Species	(29) Masquerades	(30) Marriage Ceremony	(31) Birth Ceremony	(32) Death Ceremony	(33) Installation Ceremony	(34) Other
BIG GAME Elephant						
Buffalo						
Roan Antelope						
Bushbuck						
Kob						
Waterbuck						
Gray Duiker						
Warthog						
Baboon						
SMALL GAME Cane Rat						
African Giant Rat						
Porcupine						
Armadilo scaly anteater						
Flying Squirrel						
Squirrel						
Bat						
REPTILES Python						
Crocodile						
Monitor Lizard						
Cobra						
Puff Adder						
Night Adder						
Tortoise						
African Giant Snail						
BIRDS Guinea Fowl						
Francolin						
FISH						

35. Which game species do you hunt for ritual uses such as appeasing traditional gods and witches?

Species	Part Used	Used For	How Often in a Year
BIG GAME Elephant			
Buffalo			
Roan Antelope			
Bushbuck			
Kob			
Waterbuck			
Gray Duiker			
Warthog			
Baboon			
SMALL GAME Cane Rat			
African Giant Rat			
Porcupine			
Armadilo (scaly anteater)			
Flying Squirrel			
Squirrel			
Bat			
REPTILES Python			
Crocodile			
Monitor Lizard			
Cobra			
Puff Adder			
Night Adder			
Tortoise			
African Giant Snail			
BIRDS Guinea Fowl			
Francolin			
FISH			

36. Which game species do you hunt for healing, or for preventative medicine?

Species	Part Used	Used For	How Often in a Year
BIG GAME Elephant			
Buffalo			
Roan Antelope			
Bushbuck			
Kob			
Waterbuck			
Gray Duiker			
Warthog			
Baboon			
SMALL GAME Cane Rat			
African Giant Rat			
Porcupine			
Armadilo (scaly anteater)			
Flying Squirrel			
Squirrel			
Bat			
REPTILES Python			
Crocodile			
Monitor Lizard			
Cobra			
Puff Adder			
Night Adder			
Tortoise			
African Giant Snail			
BIRDS Guinea Fowl			
Francolin			
FISH			

37. During the past two market periods,

Species	How Many of Each Did You Kill?	If Sold, What Price Did You Get?	Where Sold?	Whole Animal or Part? (identify part)
BIG GAME Elephant				
Buffalo				
Roan Antelope				
Bushbuck				
Kob				
Waterbuck				
Gray Duiker				
Warthog				
Baboon				
SMALL GAME Cane Rat				
African Giant Rat				
Porcupine				
Armadilo (scaly anteater)				
Flying Squirrel				
Squirrel				
Bat				
REPTILES Python				
Crocodile				
Monitor Lizard				
Cobra				
Puff Adder				
Night Adder				
Tortoise				
African Giant Snail				
BIRDS Guinea Fowl				
Francolin				
FISH				

38. Are certain animals taken primarily for sale of trophies, hides, skins, other parts?

Yes |______| No |______|

If yes, which ones? ______

39. Do you keep any wildlife as pets?

Yes |______| No |______|

If yes, which species and how many? ______

40. Do you hunt or trap wildlife in order to sell live animals?

Yes |______| No |______|

If yes, which species? ______

NATIONAL PARK, ZOOLOGICAL GARDEN
GAME RESERVE QUESTIONNIARE

Complete one questionnaire for each group or individual entering the park, zoo or reserve.

1. Name of Park, Zoo or Researve ______________________________

2. Day of Week (circle) S M T W TH F S   3. Date __________

4. Number of people in the group:

   Adults (over 15) |____|

   Children (0-15) |____|

   Total |____|

5. Method of transportation:

   Personal Car |____| On Foot |____|

   Government Vehicle |____| Other (specify)

   Bus |____| ______________ |____|

6. Where they came from:

   Location/City ______________________________

   Number of miles ______________________________

7. Admission fees paid ______________________________

8. Will they stay overnight?

   Type of lodging ______________________________

   Approximate cost of lodging ______________________________

   Approximate cost of meals ______________________________

   Number of nights stayed ______________________________

APPENDIX D

CHECKLIST OF MAMMALS, BIRDS, REPTILES, AND MOLLUSCS USED FOR THE FARMERS'AND HUNTERS' SURVEY CONDUCTED IN NIGERIA, 1986

(Nomenclature based on Jean Dorst 1969; Child 1973; Walsh and Wells 1969; Adeola 1983)

MAMMALS

CHIROPTERA

Eidolon helvum (Kerr 1792)	Straw-colored Fruit Bat

PRIMATES

Gorilla gorilla	Gorilla
Pan troglodytes	Chimpanzee
Cercopithecus mona	Mona Monkey
Papio anubis (Fischer 1820)	Dog-faced Baboon
Erthrocebus patas (Schreber 1774)	Red Patas Monkey
Mandrillus leucophaeus	Drill Monkey

PHOLIDOTA

Manis gigantea (Illiger 1815)	Giant Pangolin

LAGOMORPHA

Lepus capensis (Linnaeus 1758)	Hare

RODENTIA

Anomalurus spp.	Flying Squirrel
Funisciurus anerythrus (Cuvier 1833)	Red Side-striped Squirrel
Xerus erythropus (Desmarest 1817)	West African Ground Squirrel
*Cricetomys gambianus** (Waterhouse 1840)	Giant Pouched Rat
Hysterix cristata (Linnaeus 1758)	Crested Porcupine
Thryonomys swinderianus (Temminck 1827)	Cutting Grass

CARNIVORA

Mellivora capensis (Schreber 1776)	Ratel, Honey Badger
Viverra civetta (Schreber 1776)	African Civet
Herpestes ichneumon (Linnaeus 1758)	Egyptian Mongoose
Atilax paludinosus (Cuvier 1829)	Marsh Mongoose
Mungos gambianus (Ogilby 1835)	Gambian Mongoose
Crocuta crocuta (Erxleben 1777)	Spotted Hyena
Panthera leo (Linnaeus 1758)	Lion
Panthera pardus (Linnaeus 1758)	Leopard

TUBULIDENTATA

Crycteropus afer (Pallas 1766)	Aardvark

PROBOSCIDEA

Loxodonta africana (Blumenbach 1797)	African Elephant

HYRACOIDEA

Dendrohyrax arboreus (A. Smith 1827)	Tree Hyrax

SIRENIA

*Trichechus senegalensis** (Link 1795)	African Manatee

ARTIODACTYLA

Hippopotamus amphibius (Linnaeus 1758)	Hippopotamus
Phacochoerus aethiopicus (Pallas 1766)	Warthog
Syncerus caffer (Sparrmann 1779)	Buffalo, Bush-cow
Tragelaphus scriptus (Pallas 1766)	Bushbuck
Cephalophus rufilatus (Gray 1846)	Red-flanked Duiker
Cephalophus monticola	Maxwell's Duiker (Gray)
Cephalophus grimmia	Common or Grey Duiker
Kobus ellipsiprymnus (Ogilby 1833)	Defassa Waterbuck
Kobus kobus (Erxleben 1777)	Buffon's Kob
Hippotragus equinus (Desmarest 1804)	Roan Antelope
Alcelaphus buselaphus (Pallas 1766)	Western Hartebeest

*Recorded outside Game Reserve but assumed to extend into it.

BIRDS

ACCIPITRIDAE

Trigonoceps occipitalis	White-headed Vulture
Gyps bengalensis	White-backed Vulture
Neophron monachus	Hooded Vulture
Gypohierax angolensis	Palm-nut Vulture

PHASIANIDAE

Francolinus albogularis	White-throated Francolin
Francolinus bicalcaratus	Double-spurred Francolin
Numida meleagris	Guinea-fowl

PSITTACIDAE

Poicephalus senegalus	Yellow-bellied Parrott

STRIGIDAE

Tyto alba	Barn Owl
Otus scops	African Scops Owl
Otus leucotis	White-faced Scops Owl
Bubo africanus	Spotted Eagle-owl

REPTILIA

CHELONIA

Kinixys belliana	Hinged Tortoise

CROCODILIA

Crocodulus niloticus	Nile Crocodile
C. cataphractus	Narrow-snouted Crocodile

SQUAMATA

Varanus niloticus	Nile Monitor
Agama sp.	Red-headed Agama
Python sebae	Rock Python
P. regius	Royal Python

MOLLUSCA

Archachatina marginata	African Giant Snail

APPENDIX E

Chi-squared test of independence on three ecological zones relative to availability (common, scarce, no longer, never, don't know).

Big Game

	Savanna	Deciduous	Chi-squared	Accept or reject
Common	1904	374		
Scarce	67	176	*1047.45	Reject
No longer found	98	116	df = 4	
Never	80	370		
Don't know	8	44		

	Savanna	Deciduous	Chi-squared	Accept or reject
Common	1904	395		
Scarce	67	101	*907.98	Reject
No longer found	98	134	df = 4	
Never	80	399		
Don't know	8	34		

	Savanna	Deciduous	Chi-squared	Accept or reject
Common	374	395		
Scarce	176	101	* 24.42	Reject
No longer found	116	134	df = 4	
Never	370	399		
Don't know	44	34		

Small Game

	Savanna	Deciduous	Chi-square	Accept or reject
Common	1976	775		
Scarce	30	61		
No longer found	8	2	*117.5	Reject
Never	132	2	df = 4	
Don't know	5	0		

	Savanna	Deciduous	Chi-square	Accept or reject
Common	1976	763		
Scarce	30	69		
No longer found	8	7	*138.66	Reject
Never	132	1	df = 4	
Don't know	5	0		

	Savanna	Deciduous	Chi-square	Accept or reject
Common	775	763		
Scarce	61	69		
No longer found	2	7	3.7 NS	Accept
Never	2	1	df = 3	
Don't know	0	0		

Reptile

	Savanna	Deciduous	Chi-square	Accept or reject
Common	1704	787		
Scarce	167	152		Reject
No longer found	20	10	*34.09	
Never	23	10	df = 4	
Don't know	6	1		

	Savanna	Deciduous	Chi-square	Accept or reject
Common	1704	705		
Scarce	167	167		
No longer found	20	27	*121.28	Reject
Never	23	55	df = 4	
Don't know	6	5		

	Savanna	Deciduous	Chi-square	Accept or reject
Common	787	705		
Scarce	152	167	*46.84	Reject
No longer found	10	27	df = 4	
Never	10	55		
Don't know	1	5		

Bird

	Savanna	Deciduous	Chi-square	Accept or reject
Common	480	200	*84.71	Reject
Uncommon	0	40	df = 1	

	Savanna	Rain forest	Chi-square	Accept or reject
Common	480	185	*119.10	Reject
Uncommon	0	55	df = 1	

	Deciduous	Rain forest	Chi-square	Accept or reject
Common	200	185		
Uncommon	40	55	2.95 NS	Accept
			df = 1	

* = Significant at the .05 or greater level of confidence

NS = Non-significant

APPENDIX F

Chi-squared test of independence on three ecological zones relative to consumption during the rainy season.

Big Game

	Savanna	Rain forest	Chi-square	Accept or reject
U.R.S.	82	46	19.23	Reject
U.M.R.S.	979	235	df = 1	

	Savanna	Deciduous	Chi-square	Accept or reject
U.R.S.	82	45	17.44	Reject
U.M.R.S.	979	238	df = 1	

	Dedicuous	Rain forest	Chi-square	Accept or reject
U.R.S.	45	46	.02	Accept
U.M.R.S.	238	235	df = 1	

Small Game

	Savanna	Rain forest	Chi-square	Accept or reject
U.R.S.	35	115	100.44	Reject
U.M.R.S.	987	529	df = 1	

	Savanna	Deciduous	Chi-square	Accept or reject
U.R.S.	35	132	120	Reject
U.M.R.S.	987	540	df = 1	

	Deciduous	Rain forest	Chi-square	Accept or reject
U.R.S.	132	115	.69	Accept
U.M.R.S.	540	529	df = 1	

Reptile

	Savanna	Rain forest	Chi-square	Accept or reject
U.R.S.	88	177	85.03	Reject
U.M.R.S.	423	212	df = 1	

	Savanna	Deciduous	Chi-square	Accept or reject
U.R.S.	88	81	12.37	Reject
U.M.R.S.	423	211	df = 1	

	Deciduous	Rain forest	Chi-square	Accept or reject
U.R.S.	81	177	22.36	Reject
U.M.R.S.	211	212	df = 1	

Game Bird

	Savanna	Rain forest	Chi-square	Accept or reject
U.R.S.	35	40	60.30	Reject
U.M.R.S.	436	77	df = 1	

	Savanna	Deciduous	Chi-square	Accept or reject
U.R.S.	35	57	100.81	Reject
U.M.R.S.	436	76	df = 1	

	Deciduous	Rain forest	Chi-square	Accept or reject
U.R.S.	57	40	1.97	Accept
U.M.R.S.	76	77	df = 1	

APPENDIX G

Table 48. Chi-square test of independence on three ecological zones relative to preferability (preferred and unpreferred).

Big Game

	Savanna	Rain forest	Chi-square	Accept or reject
Preferred	1013	204	1.45	Accept
Unpreferred	431	102	df = 1	

	Savanna	Deciduous	Chi-square	Accept or reject
Preferred	1013	323	98.26	Reject
Unpreferred	431	13	df = 1	

	Savanna	Deciduous	Chi-square	Accept or reject
Preferred	204	323	94.55	Reject
Unpreferred	102	13	df = 1	

Small Game

	Savanna	Rain forest	Chi-square	Accept or reject
Preferred	712	331	23.53	Reject
Unpreferred	67	3	df = 1	

	Savanna	Deciduous	Chi-square	Accept or reject
Preferred	712	470	37.71	Reject
Unpreferred	67	2	df = 1	

	Rain forest	Deciduous	Chi-square	Accept or reject
Preferred	331	470	.71	Accept
Unpreferred	3	2	df = 1	

Reptile

	Savanna	Rain forest	Chi-square	Accept or reject
Preferred	630	133	51.91	Reject
Unpreferred	436	225	df = 1	

	Savanna	Deciduous	Chi-square	Accept or reject
Preferred	630	193	45.52	Reject
Unpreferred	436	283	df = 1	

	Rain forest	Deciduous	Chi-square	Accept or reject
Preferred	133	193	.99	Accept
Unpreferred	225	283	df = 1	

Game Birds

	Savanna	Rain Forest
Preferred	332	49
Unpreferred	0	0

	Savanna	Deciduous
Preferred	332	115
Unpreferred	0	0

	Rain Forest	Deciduous
Preferred	49	115
Unpreferred	0	0

APPENDIX H

Table 49. Chi-square test of independence on three ecological regions relative to wild animals used during cultural festivals.

Big Game

	Savanna	Rain Forest	Chi-square	Accept or Reject
Masq.	394	138	345.40	Reject
Marr. Cer.	232	31	df = 4	
Birth Cer.	170	25		
Death Cer.	261	25		
Inst. Cer.	91	146		

	Savanna	Deciduous	Chi-square	Accept or Reject
Masq.	394	28	274.07	Reject
Marr. Cer.	232	25	df = 4	
Birth Cer.	170	16		
Death Cer.	261	51		
Inst. Cer.	91	116		

	Rain Forest	Deciduous	Chi-square	Accept or Reject
Masq.	38	28	14.83	Reject
Marr. Cer.	31	25	df = 4	
Birth Cer.	25	16		
Death Cer.	25	51		
Inst. Cer.	146	116		

Small Game

	Savanna	Rain Forest	Chi-square	Accept or Reject
Masq.	178	41	273.06	Reject
Marr. Cer.	61	23	df = 4	
Birth Cer.	34	18		
Death Cer.	105	51		
Inst. Cer.	34	233		

	Savanna	Deciduous	Chi-square	Accept or Reject
Masq.	178	34	241.75	Reject
Marr. Cer.	61	26	df = 4	
Birth Cer.	34	21		
Death Cer.	105	64		
Inst. Cer.	34	203		

	Deciduous	Rain Forest	Chi-square	Accept or Reject
Masq.	34	41	4.15	Accept
Marr. Cer.	26	23	df = 4	
Birth Cer.	21	18		
Death Cer.	64	51		
Inst. Cer.	203	233		

Reptiles

	Savanna	Rain Forest	Chi-square	Accept or Reject
Masq.	182	29	23.72	Reject
Marr. Cer.	44	11	df = 4	
Birth Cer.	36	4		
Death Cer.	102	9		
Inst. Cer.	37	20		

	Savanna	Deciduous	Chi-square	Accept or Reject
Masq.	182	20	73.36	Reject
Marr. Cer.	44	4	df = 4	
Birth Cer.	36	2		
Death Cer.	102	16		
Inst. Cer.	37	37		

	Deciduous	Ran Forest	Chi-square	Accept or Reject
Masq.	20	29	12.40	Reject
Marr. Cer.	4	11	df = 4	
Birth Cer.	2	4		
Death Cer.	16	9		
Inst. Cer.	37	20		

Game Birds

	Savanna	Rain Forest	Chi-square	Accept or Reject
Masq.	91	7	66.31	Reject
Marr. Cer.	86	0	df = 4	
Birth Cer.	36	4		
Death Cer.	102	7		
Inst. Cer.	37	24		

	Savanna	Deciduous	Chi-square	Accept or Reject
Masq.	91	11	81.69	Reject
Marr. Cer.	86	3	df = 4	
Birth Cer.	36	6		
Death Cer.	102	8		
Inst. Cer.	37	36		

	Deciduous	Rain Forest	Chi-square	Accept or Reject
Masq.	11	7	2.29	Accept
Marr. Cer.	3	0	df = 4	
Birth Cer.	6	4		
Death Cer.	8	7		
Inst. Cer.	36	24		

APPENDIX I

Chi-squared test of independence on three ecological zones relative to species used during Muslim religious festivals.

	Savanna	Rain Forest	Chi-square	Accept or Reject
Id-el-Kabir	299	6	41.07	Reject
Id-el-Fitr	124	12	df = 2	
Id-el-Maulud	444	85		

	Savanna	Deciduous	Chi-square	Accept or Reject
Id-el-Kabir	299	1	26.74	Reject
Id-el-Fitr	124	0	df = 2	
Id-el-Maulud	444	32		

	Deciduous	Rain Forest	Chi-square	Accept or Reject
Id-el-Kabir	1	6	4.83	Accept
Id-el-Fitr	0	12	df = 2	
Id-el-Maulud	32	85		

Small Game

	Savanna	Rain Forest	Chi-square	Accept or Reject
Id-el-Kabir	137	5	88.94	Reject
Id-el-Fitr	21	25	df = 2	
Id-el-Maulud	127	118		

	Savanna	Deciduous	Chi-square	Accept or Reject
Id-el-Kabir	137	2	55.02	Reject
Id-el-Fitr	21	0	df = 2	
Id-el-Maulud	127	59		

	Deciduous	Rain Forest	Chi-square	Accept or Reject
Id-el-Kabir	2	5	11.78	Reject
Id-el-Fitr	0	25	df = 2	
Ed-el-Maulud	59	118		

Reptiles

	Savanna	Rain Forest	Chi-square	Accept or Reject
Id-el-Kabir	88	5	11.18	Reject
Id-el-Fitr	14	4	df = 2	
Id-el-Maulud	101	27		

	Savanna	Deciduous	Chi-square	Accept or Reject
Id-el-Kabir	88	7	.06	Accept
Id-el-Fitr	14	1	df = 2	
Id-el-Maulud	101	7		

	Deciduous	Rain Forest	Chi-square	Accept or Reject
Id-el-Kabir	7	5	6.32	Accept
Id-el-Fitr	1	4	df = 2	
Id-el-Maulud	7	27		

Game Birds

	Savanna	Rain Forest	Chi-square	Accept or Reject
Id-el-Kabir	88	2	5.97	Accept
Id-el-Fitr	62	3	df = 2	
Id-el-Maulud	178	19		

	Savanna	Deciduous	Chi-square	Accept or Reject
Id-el-Kabir	88	0	5.80	Accept
Id-el-Fitr	62	0	df = 2	
Id-el-Maulud	178	7		

	Deciduous	Rain Forest	Chi-square	Accept or Reject
Id-el-Kabir	0	2	-	-
Id-el-Fitr	0	3	-	-
Id-el-Maulud	7	19	-	-

APPENDIX J

Chi-squared test of independence on three ecological regions relative to species consumed during Christian religious festivals.

	Savanna	Rain Forest	Chi-square	Accept or Reject
Christmas	191	39	113.77	Reject
Harvest	75	26	df = 2	
Easter	110	174		

	Savanna	Deciduous	Chi-square	Accept or Reject
Christmas	191	26	135.76	Reject
Harvest	75	36	df = 2	
Easter	110	183		

	Deciduous	Rain Forest	Chi-square	Accept or Reject
Christmas	26	39	4.37	Accept
Harvest	36	26	df = 2	
Easter	183	174		

Small Game

	Savanna	Rain Forest	Chi-square	Accept or Reject
Christmas	125	42	157.12	Reject
Harvest	31	29	df = 2	
Easter	45	238		

	Savanna	Deciduous	Chi-square	Accept or Reject
Christmas	125	35	205.72	Reject
Harvest	31	29	df = 2	
Easter	45	294		

	Deciduous	Rain Forest	Chi-square	Accept or Reject
Christmas	35	42	2.95	Accept
Harvest	29	29	df = 2	
Easter	294	238		

Reptiles

	Savanna	Rain Forest	Chi-square	Accept or Reject
Christmas	104	26	27.87	Reject
Harvest	15	13	df = 2	
Easter	43	19		

	Savanna	Deciduous	Chi-square	Accept or Reject
Chrstmas	104	16	72.46	Reject
Harvest	15	14	df = 2	
Easter	43	85		

	Deciduous	Rain Forest	Chi-square	Accept or Reject
Christmas	16	26	28.63	Reject
Harvest	14	13	df = 2	
Easter	85	19		

Game Birds

	Savanna	Rain Forest	Chi-square	Accept or Reject
Christmas	6	15	11.04	Reject
Harvest	22	7	df = 2	
Easter	41	33		

	Savanna	Deciduous	Chi-squre	Accept or Reject
Christmas	6	17	5.37	Accept
Harvest	22	17	df = 2	
Easter	41	50		

	Deciduous	Rain Forest	Chi-square	Accept or Reject
Christmas	15	17	180	Accept
Harvest	7	17	df = 2	
Easter	33	50		

APPENDIX K

Chi-squared test of independence on three ecological regions relative to species hunted during rainy and dry seasons.

Big Game

	Rain Forest	Deciduous	Chi-square	Accept or reject
Rainy season	43	229	168.97	Reject
Dry season	95	15	df = 1	

	Rain Forest	Savanna	Chi-square	Accept or reject
Rainy season	43	84	2.48	Accept
Dry season	95	129	df = 1	

	Deciduous	Savanna	Chi-square	Accept or reject
Rainy season	229	84	159.04	Reject
Dry season	15	129	df = 1	

Small Game

	Rain Forest	Deciduous	Chi-square	Accept or reject
Rainy season	52	165	126.10	Reject
Dry season	76	2		

	Rain Forest	Savanna	Chi-square	Accept or reject
Rainy season	52	102	1.71	Accept
Dry season	76	198	df = 1	

Table 52 (continued)

	Deciduous	Savanna	Chi-square	Accept or reject
Rainy season	165	102	183.99	Reject
Dry season	2	198		

Reptiles

	Rain Forest	Deciduous	Chi-square	Accept or reject
Rainy season	53	212	141.83	Reject
Dry season	74	5	df = 1	

	Rain Forest	Savanna	Chi-square	Accept or reject
Rainy season	53	98	00	Accept
Dry season	74	136	df = 1	

	Deciduous	Savanna	Chi-square	Accept or reject
Rainy season	212	98	163.22	Reject
Dry season	5	136	df = 1	

Game Birds

	Rain Forest	Deciduous	Chi-square	Accept or reject
Rainy season	13	47	34.41	Reject
Dry season	42	13	df = 1	

Table 52 (continued)

	Rain Forest	Savanna	Chi-square	Accept or reject
Rainy season	13	32	5.90	Reject
Dry season	42	40	df = 1	

	Deciduous	Savanna	Chi-square	Accept or reject
Rainy season	47	32	15.64	Reject
Dry season	13	40	df = 1	

APPENDIX L

Chi-squared test of independence on three ecological regions relative to species consumed at home, sold in the village, and on the market.

Big Game

	Rain Forest	Deciduous	Chi-square	Accept or reject
Eat at home	15	33	1.62	Accept
Sold in village	5	7	df = 3	
Sold in market	28	69		
All combined	76	141		

	Rain Forest	Savanna	Chi-square	Accept or reject
Eat at home	15	26	10.57	Reject
Sold in village	5	13	df = 3	
Sold in market	28	83		
All combined	76	98		

	Deciduous	Savanna	Chi-square	Accept or reject
Eat at home	33	26	9.78	Reject
Sold in village	7	13	df = 3	
Sold in market	69	83		
All combined	141	98		

Small Game

	Rain Forest	Deciduous	Chi-square	Accept or reject
Eat at home	86	150	68.85	Reject
Sold in village	5	5	df = 3	
Sold in market	16	13		
All combined	57	2		

Table 53 (continued)

	Rain Forest	Savanna	Chi-square	Accept or reject
Eat at home	86	210	41.78	Reject
Sold in village	5	10	df = 3	
Sold in market	16	18		
All combined	57	28		

	Deciduous	Savanna	Chi-square	Accept or reject
Eat at home	150	210	14.58	Reject
Sold in village	5	10	df = 3	
Sold in market	13	18		
All combined	2	28		

Reptiles

	Rain Forest	Deciduous	Chi-square	Accept or reject
Eat at home	61	107	40.41	Reject
Sold in village	21	0	df = 3	
Sold in market	22	60		
All combined	23	50		

	Rain Forest	Savanna	Chi-square	Accept or reject
Eat at home	61	121	29.32	Reject
Sold in village	21	3	df = 3	
Sold in market	22	54		
All combined	23	37		

Table 53 (continued)

	Deciduous	Savanna	Chi-square	Accept or reject
Eat at home	107	121	6.11	Accept
Sold in village	0	3	df = 3	
Sold in market	60	54		
All combined	50	37		

Game Birds

	Rain Forest	Deciduous	Chi-square	Accept or reject
Eat at home	35	57	19.35	Reject
Sold in village	3	0	df = 3	
Sold in market	8	3		
All combined	9	0		

	Rain Forest	Savanna	Chi-square	Accept or reject
Eat at home	35	57	7.66	Accept
Sold in village	3	0	df = 3	
Sold in market	8	6		
All combined	9	6		

	Deciduous	Savanna	Chi-square	Accept or reject
Eat at home	57	57	6.40	Accept
Sold in village	0	0	df = 3	
Sold in market	3	6		
All combined	0	6		

APPENDIX M

"T" test of independence on three ecological zones relative to the numbers of animals killed.

Big Game

	Rain Forest	Deciduous	"T" Test	Accept or Reject
Aver.	8.00	6.24	1.87	Reject
s^2p	11.06	10.72	df = 358	

	Rain Forest	Savanna	"T" Test	Accept or Reject
Aver.	8.00	17.49	19.77	Reject
s^2p	11.06	33.46	df = 358	

	Savanna	Deciduous	"T" Test	Accept or Reject
Aver.	17.49	6.24	23.43	Reject
s^2p	33.46	10.72	df = 358	

Small Game

	Rain Forest	Deciduous	"T" Test	Accept or Reject
Aver.	36.5	22.89	3.47	Reject
s^2p	1659.22	277.61	df = 358	

	Rain Forest	Savanna	"T" Test	Accept or Reject
Aver.	36.5	40	.90	Accept
s^2p	1659.22	277.61	df = 358	

	Savanna	Deciduous	"T" Test	Accept or Reject
Aver.	40	22.89	10.24	Reject
s^2p	277.61	134.91	df = 358	

Reptiles

	Rain Forest	Deciduous	"T" Test	Accept or Reject
Aver.	31.34	28.84	.80	Accept
s^2p	811.01	1088.11	df = 358	

	Rain Forest	Savanna	"T" Test	Accept or Reject
Aver.	31.34	12.56	6.83	Reject
s^2p	811.01	192.71	df = 358	

	Savanna	Deciduous	"T" Test	Accept or Reject
Aver.	12.56	28.84	-1.65	Accept
s^2p	192.71	1088.11	df = 358	

Game Birds

	Rain Forest	Deciduous	"T" Test	Accept or Reject
Aver.	4.46	6.77	-4.71	Reject
s^2p	16.41	12.75	df = 358	

	Rain Forest	Savanna	"T" Test	Accept or Reject
Aver.	4.46	31.62	-21.38	Reject
s^2p	16.41	275.88	df = 358	

	Savanna	Deciduous	"T" Test	Accept or Reject
Aver.	31.62	6.77	22.14	Reject
s^2p	275.08	12.75	df = 358	