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**PILOT STUDY INVESTIGATION
OF
SOCIOECONOMICS OF NATURAL RESOURCE UTILIZATION
IN THE KABO LOGGING CONCESSION
NORTHERN CONGO**

**Final Report
Prepared for:**

**Wildlife Conservation Society
and the
World Bank**

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PROJECT SUMMARY

A pilot study designed to develop methodologies for investigating socioeconomic influences on decision-making pertaining to non-timber forest product use, specifically wildlife use, among village communities in northern Congo was conducted from April 1995 thru June 1995. The study area focussed specifically on villages associated with the Kabo logging concession located adjacent to the southern border of the newly gazetted Nouabale-Ndoki National Park. The study was part of a comprehensive series of studies administered through the Wildlife Conservation Society by the Congo Forest Conservation project intended to assist in the development of a management plan and monitoring system for natural resource conservation.

Four methodologies including census and map making, questionnaire administration, monitoring of daily activities and food consumption, and hunting activities were tested. Data resulting from the study provided information pertaining to demographics, employment, household wealth, attitudes, daily activities, food consumption, and hunting estimated rate of return and economics. Data were analyzed according to household wealth, village type, and ethnic group. Results from the study indicate the methodologies tested in this study have the potential to test research hypotheses pertaining to variables which may influence non-timber forest product use and decision-making.

As the sample sizes in some portions of the study were too small for statistical analyses and as the only one season was covered during the course of the study, recommendations were made to carry out a more comprehensive study over a one-year time period and to include additional logging and traditional villages in the study.

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BACKGROUND

The expanding deforestation of tropical forests is an issue of global concern as these ecosystems provide numerous ecological benefits including the maintenance of high levels of biodiversity of both animal and plant species (Pottinger and Burley 1992, Montalembert 1991, Hamilton 1991). Deforestation in Africa between 1981 and 1990 was 4.1 million ha/year (0.7% per year) (Singh 1993). Although central Africa maintains one of the lower rates of deforestation it actually maintains a high per capita deforestation rate (Barnes 1990).

Marshall (1991) described the exploitation of resources through industry development as a root cause for economic underdevelopment as the industries are largely based on the export of raw materials and very little local industry is generated. In addition, employment, although supported as a major incentive for adopting exploitation strategies, is consistently minimal when compared with the social costs being generated from the exploitation process (TELESIS 1991).

The Republic of Congo, located in Central Africa and bordered by Central African Republic to the north, Cameroon and Gabon to the east, and Zaire to the west and south, contains forest covering 58.2% (19,865,000 ha) of the total land area which is 1.0% of the world's tropical forests. The population of 2.4 million is found in both urban (41%) and rural (59%) areas (TFAP 1994). The economy has been in a deep recession since the early 1980's and has relied on the timber industry as a major foreign exchange earner (TFAP 1994). Although the majority of operations have historically focussed in the southern portion of the country, the depletion of resources both in West Africa and in southern Congo have resulted in exploration and development of the logging industry in the northern portion of the country (CITES 1994, Wilkie *et al.* 1992).

The projected potential for the country is 2 million cubic meters of hardwood per year, but in order for these levels of production to be achieved major revisions in extraction techniques, infrastructure, processing, management and policy will be necessary (TFAP 1994).

Although the development of logging in the northern portions of the country has been proposed by the government and industry as being able to provide development of services for local populations through economic development of the region (Wilkie *et al.* 1992), the overall contribution of such developments have been shown to have relatively low impacts on both employment rates and regional development (Marshall 1991, TELESIS 1991). As the industry proposed for development has its focus on the exploitation of particular high-value species, there is concern over the genetic erosion of the populations of these merchantable species (CITES 1994).

Logging in northern Congo is based on the exploitation of two primary species, *Entandrophragma cylindricum* (sapelli) and *E. utile* (sipo) (CITES 1994) as it is elsewhere in the region (TELESIS 1991). The biology of sapelli and sipo is described by Splatt and Stern (1957). Both species are members of the Meliaceae family and are comparable to the true mahoganies. Individual trees can reach heights of up to 60 meters with straight boles of 25-30 meters. They

are tropical hardwoods with high densities and specific gravity which are best suited for use in furniture, paneling, interior wood work and veneer but are not well suited for construction.

The primary importer for this timber is the European Community (EC) which receives 90% of all African tropical exports being received (CITES 1994). In 1988 50.7% (224,680 m³ - earning \$41,116,440) of *E. cylindricum* and 6.1% (27,115 m³ - earning \$4,962,045) of *E. utile* logs were exported from Congo (CITES 1994, FAO 1992). The exploitation of *E. cylindricum* accounts for 80% of the commercial logging operations in northern Congo (CITES 1994). Already, signs of over-exploitation of this species are being observed in the region and potential threats exist for *E. utile* as timber from this species from northern Congo maintains a higher demand on the international market (CITES 1994).

Some observers maintain that countries having large tracts of natural tropical forest should set aside 'forest estates' which are managed for provision of timber in the present and for the future (Poore and Sayer 1991). The concept of managed natural forests meets the criteria for many international scientists in terms of conservation of biodiversity, reductions of impact from disease (compared with plantations), diversification of products with the forest being subject to less impact from fluctuation in market demands and overall perceived lower costs of management (Poore and Sayer 1991). Ideally this could be the case, but it cannot occur without enforcement of national regulations concerning exploitation of wildlife and other products. This system normally results in considerable negative impacts on wildlife populations as they are used to meet the needs of providing food to the people who have been imported to the forest management area to act as laborers and to all the individuals that accompany them including their families, commercial traders, and those who come in search of employment.

Unfortunately few examples of sustainable management exist for tropical forest systems, and although it may be possible from a technical point of view to carry out sustainable utilization of forest resources using selective logging, the actual results of such processes have been disappointing (TELESIS 1991). As logging practices in northern Congo are geared to provision of supplies to export markets, the highest quality trees are selected and incentives toward maintenance of forest structures or improvements following logging are virtually non-existent. Some figures show a 70% damage to forests from the selective logging practices in the region (TELESIS 1991) while others suggest much lower levels of damage (less than 10%) for similar activities (White 1994). Not only are the vegetation structures negatively impacted by the selective logging practice but other taxa as well are lost (Johns 1985). The effects of genetic erosion of timber species has yet to be determined but it is already clear that the results of commercial logging already show a reduced genetic diversity of the merchantable species (Pottinger and Burley 1992).

The appropriateness of selective logging practices is geared toward species having a faster growth rate than those being exploited in northern Congo. The long rotation periods required for sapeli and sipo, a minimum of 85-100 years, and their relative densities in northern Congo, approximately 10 harvestable trees per hectare, suggest that selective logging of these species is unsustainable under present regimes. According to Nwoboshi (1982), for selective systems to be sustainable, it is necessary to be able to divide the system into a number of blocks equalling

the rotation length. For sapelli and sipo this would require at least 100 blocks. Additionally, it is necessary to consider the costs of such operations as well. As each 100 m³ of wood is approximately equal to ten trees and the projection for the region are 2 million cubic meters, it would be necessary to maintain 20,000 hectares in operation annually with a minimum total area of 5 million hectares being managed (accounting for swamps and loss to roads and damage).

As Congo currently maintains slightly less than 20 million hectares of forest area, and this figure includes open forest, closed forest and plantations, this is clearly an unsustainable export goal. As has been discovered elsewhere in the tropics, the use of selective logging has been unsuccessful not only due to the long regeneration times (in undisturbed areas) but also due to the large amount of damage resulting from logging operations which affects the forests ability to regenerate similar numbers and densities of the merchantable species (Nwoboshi 1982).

Clearly, there is a need to develop systems of utilization which allow for both development of the region while assuring the maintenance of the overall system for future generations. Current practices have effectively resulted in the mining of the forests for highly valued export species which result from poorly designed concession and forest revenue systems (ITTO 1993). In order for the national goal for economic development and the environmental goal for sustainable ecosystem use to occur simultaneously it is necessary to develop a diverse utilization of the forest ecosystem.

STUDY AREA

The Nouabale-Ndoki National Park was established through Presidential Decree in December 1993 (Decret no. 93-727 du 31 Decembre 1993) following a two year initial project start-up phase devoted to establishing park infrastructure and carrying out reconnaissance surveys of the region. Natural resource utilization and exploitation activities in the Kabo UFA (Unite Forestier d'Amenagement) were of interest to park management because of its location adjacent to the southern boundary of the national park. Establishment of the park included responsibility for determination of appropriate buffer zone regions within which hunting and other activities would be regulated. In order for this to occur it was necessary to investigate activities in the Kabo UFA as it was the only active logging concession adjacent to the national park. In addition the national park headquarters was established between the villages of Bomassa and Bon Coin which are located at the northern boundary of the Kabo UFA.

The Kabo UFA, found in the upper Sangha region of northern Congo (Fig. 1) encompasses an area of over 300,000 ha and is roughly bisected by the Ndoki River. It is located in a region classified as tropical dry forest, according to the Holdridge system of life zone classification. This type of forest composes nearly half, 42%, tropical open and closed forest found on the planet. It is described as an area where mean annual temperatures are greater than 17° C and mean annual rainfall is 250-2000 mm. In Africa 70-80% of the forest regions are actually tropical dry forest (Murphy and Lugo 1986). The forest in Congo is characteristic of dry forest inner equatorial regions with distinctive patterns of rainfall resulting in regular annual dry seasons. Tropical dry forests are inherently diverse in their microclimates and the

resulting vegetational structures and compositions. These forests have a relatively low resistance to disturbance but a high overall resilience.

Human habitation is among the least dense of non-arid habitats in Africa with less than 3 people per km² (Wilkie *et al.* 1992). Along the Sangha River from Ouesso north to the border of the Central African Republic (approximately 100 km) there are a number of traditional villages both north and south of the logging village established at Kabo. The total population is unknown but has been estimated to be less than 3,000. The population inhabits small villages

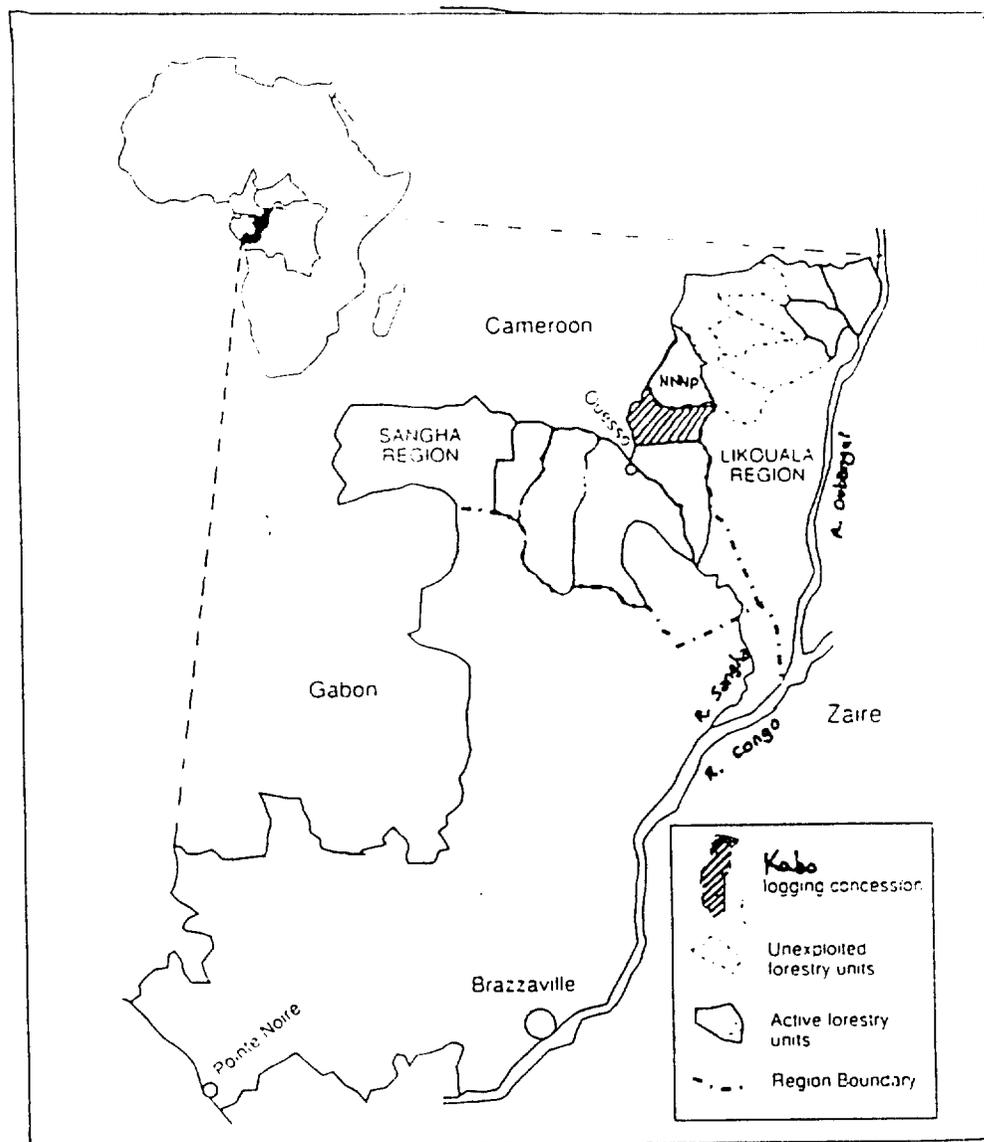


Fig. 1. Location of the Kabo logging concession and the Nouabale-Ndoki National Park in northern Congo. (from: Wilkie *et al.* 1992. *Conservation Biology* 6(4)).

and seasonal camps along the Sangha River, and there are no permanent habitations in the vast forest zone reaching east to the Oubangui watershed. The communities are composed of a mixture of Ba'aka peoples of the Babenjele and BaNgombe tribes (Pygmies) and Bantu-speaking peoples including over twenty different ethnic groups. These communities traditionally carry out hunting-gathering and small-scale agricultural activities for subsistence.

The relative inaccessibility of the northern regions of Congo have limited exploitation of hardwoods until recently. The combined effects of increased timber prices and high levels of deforestation in West Africa and the southern portion of the country have resulted in increased development plans and activities for the region. The international market has potential for playing a large role in the development of the region through provision of loans earmarked for forestry and logging operation development in the region (Wilkie *et al.* 1992). Timber concessions have been established in the region which range in size but are generally on the order of at least several hundred thousand hectares. Although Congo maintains certain restrictions on the felling and damage of both sapeli and sipo in Permanent Protection Forests (Law No. 004/74) it supports exploitation of these species and provides policy support for felling (CITES 1994). As is often the case with issues of conservation, the departments concerned with economic growth and development have more legislative influence on policy development than those departments concerned with conservation and natural resources (Johns 1985).

The Kabo UFA, although owned and operated by *Boissangha* since the 1960's was currently handed over to the *Societe Nouvelle des Bois de la Sangha* upon liquidation of the former. The primary shareholder of SNBS is *Boissangha* (53%) with the Congolese State being a senior partner (32%). SNBS was the recipient of a loan from the *Caisse Centrale de la Cooperation Francaise* in 1990 to restart operations. In four years the company had reached bankruptcy with only a skeletal processing operation continuing in the Kabo towns (NNNP 1994). The selective logging for sapelli and sipo has proven to be economically viable in the short term but results in unprofitable operations in the long term which creates overexploitation of a number of non-timber forest products by the communities established by the logging companies.

VALUATION OF TROPICAL FORESTS

Basic forest revenue systems have been outlined by FAO (1983) and include three primary components: annual ground rentals on concessions, volume based charges on the timber cuts and export charges and domestic processing incentives. These are strongly affected by market pressures (Synnott 1992) which have supported, through boycotts of tropical timbers, a reduction in the consumption of tropical hardwoods. Such moves, however, only succeed in reducing the economic benefits received from such operations and removes incentives for sustainable utilization and increases the rate at which forests are converted to more economically viable land uses (Karsenty and Maitre 1994, Eastin *et al.* 1992).

Pricing of products acts as an indicator to scarcity. By supporting decreased demands for tropical hardwoods and lower price structures disincentives for efficiency of operations and

resource conservation occurs (ITTO 1993). In many reviews, however, the economic importance of forests and merchantable timber species have not included all values of the forest and, therefore, prices reflect this undervaluation (Synnott 1992, Leslie 1987)). These economic factors have an effect on the silvicultural practices followed by operators and are important considerations for providing incentives for sustainable logging practices (Nwoboshi 1982). In determining economic structures for logging in northern Congo, and other tropical forests, price determination must include additional valuation of conservation of wildlife habitat, maintenance of watersheds, socio-cultural values and cost analysis of operations (Ledoux *et al.* 1991).

The development of logging activities in the region provides a source of foreign exchange earnings, direct and indirect employment opportunities, internal revenue generation (through concession fees and taxes), and infrastructure development. These activities are not sustainable in the long term, however, due to a reduction in competitive advantages in the region such as: high transport costs, high fuel costs, and low profitability resulting in low operating margins for the highest grade timbers and, in some cases, negative operating margins for lower grade timbers (TELESIS 1991).

Although such operations suggest an improvement of employment opportunities for local people these low profit enterprises are an unstable source of employment. A high percentage of loans are distributed between equipment purchases and upper management salaries and not toward providing jobs for the large numbers of people who are drawn to the area in hopes of finding employment. Due to these financial constraints, incentives for post-logging silvicultural practices which support forest regeneration, such as enrichment planting, are low and seldom occur (Putz 1994). Overall economic feasibility of operations with the goal of natural forest management rests on cost-benefit analyses that include ALL benefits and costs from operation procedures of the logging company to local communities and which include the global interests and concerns for protection and maintenance of these critical ecosystems and their fauna (Webb 1982).

The valuation of forests in Congo have repeatedly been undervalued as a result of excluding amenity benefits, non-timber forest products and wildlife. In addition, alternative strategies for non-consumptive and consumptive forms of wildlife utilization have not been estimated for the concession. An integrated conservation and development project is essential along with logging activities in order to ensure the protection of species following logging activities. It is anticipated, based on current harvest levels and remaining exploitable high-grade timber, that all areas of the concession will have been logged within the next ten years. In the interim, potential exists for the development of alternative utilization strategies which are ecologically sustainable and economically efficient and which will provide greater potential benefits to the local community than is currently possible.

As wildlife is the primary focus for the majority of income-generating activities projected for the region and as local populations maintain both subsistence and market use of wildlife an understanding of current densities, distributions and its relative importance in socioeconomic structure of the local community is important. The impacts on wildlife resulting from the creation of roads and increased access to forest interiors for hunters requires additional study

(Bodmer *et al.* 1994, Wilkie *et al.* 1992). It has been suggested that the relatively low damage resulting from selective logging practices may still impact forest microclimates resulting in a shift toward densities of species which are suited to exploit these disturbed areas and lower densities of species unable to cope with the habitat shifts resulting from disturbances (Johns 1985). Models which establish sustainable levels of hunting of wildlife species in tropical forest are necessary (Robinson and Redford 1994), but studies which provide information on the economics of sustainable utilization are limited (Bodmer *et al.* 1994).

The development of Kabo has resulted in the establishment of a community with unstable employment opportunities. Communities which lack cohesion can result in resource utilization behaviors that do not necessarily reflect those which would benefit the community as a whole. The exploitation of forest resources, specifically wildlife, for market purposes provides an opportunity for income generation in this unstable system.

The importance of non-timber forest products (NTFP) as a proportion of income for subsistence and as a portion of valuation in the overall value of tropical forests has been a subject of study in other areas (Chopra 1993, Gunatilleke *et al.* 1993). It has been suggested that in order to develop forestry management plans which are appropriate the management of NTFP should also be included and in order to do this the socioeconomics of NTFP use must be investigated, quantified and evaluated (Gunatilleke *et al.* 1993). In order to determine such valuations, it is necessary not simply to theorize and develop models based on basic economic activities but also to ask those involved in the decision-making process of resource utilization about their activities directly (Blinder 1990).

The values of NTFP can be determined using a variety of techniques and for an overall value it is important to include both goods and services (*e.g.* fuelwood, forest products, tourism potential, nutrient recycling, soil conservation, biodiversity preservation, maintenance of hydrological cycle) which make up the total use values and combine these with the existence value (considered to be 91% of the use value) for a total value estimation (Chopra 1993). Valuation of forest products can be carried out through direct market equivalents or through opportunity cost of labor time where the opportunity cost is determined by approximating the use value of the product (Chopra 1993).

Valuation of NTFP has been carried out by a number of researchers using different methodologies (Godoy 1993). If results of studies are to be comparable it is necessary to develop methodologies which can be carried out in different regions. These methodologies must include a measurement of both stock and flow of resources for both flora and fauna which will require the input of both resource biologists and economists (Godoy *et al.* 1993).

Although logging companies imply that there will be local economic benefits which result from industry development these communities are still largely natural resource dependent. Poverty within such communities depends upon control and distribution of benefits of the resources (Peluso *et al.* 1994). This is not to suggest that benefits should necessarily be equally distributed among all members of the community. It is important to provide substitutes for

income-generating opportunities while placing some control on the population movement as a whole such that the provision of substitutes may have the maximum potential effect.

Poverty generally results from resource dependent communities under four conditions as outlined by Peluso *et al.* (1994): (1) Regional economic structures which are dominated by single managers (government or company) invested in exploiting a single raw material; 2) isolation of resource from markets where no value added processes are available either in terms of manufacturing of equipment to extract the raw materials or in processing the raw materials once extracted; 3) absentee ownership with no commitment to the community where extraction takes place; and 4) technologies which reduce the need for labour. The conditions in Kabo certainly reflect those listed, the effects of which require investigation.

INTRODUCTION

Economic Sustainability: Considerations for Model Development

There is an express need for bringing economic valuations of non-timber forest products into the realm of management and policy development of natural resources in tropical Africa (Godoy *et al.* 1993). Inclusion of economic valuation techniques into the wildlife management arena is a developing concern among resource managers. In order for the relationship of wildlife exploitation to rural economies to be determined, however, the larger local economy must be examined - particularly if one is interested in determining the economic sustainability of both market and subsistence level hunting. Sustainability is a measure of both stock and flow of resources. Economic sustainability of wildlife exploitation is dependent upon and influenced by other economic factors such as availability of substitutes, level of access to transport and costs of extraction relative to personal income all of which may influence the decision to hunt. Thus, in order to determine the economic sustainability of hunting activity it is necessary to develop an understanding of and methodology for measuring locally significant socioeconomic parameters. This will require the development of an explicit model to be proposed which will imply what data and sample size is needed. In order for such a model to be developed it is necessary to first undertake an inventory of forest resources and their uses through a variety of methodologies in order to identify which items are representative for various use and socio-cultural groups and to establish which methodologies are most appropriate and efficient.

The model is intended to provide an economic sustainability index (ESI) which can be used in conjunction with ecological sustainability indices being developed for the project which when combined will provide an overall sustainability index for a particular area from which management decisions can be made. The ecological sustainability index will be measured through a combination of the estimated rate of return (ERR) of hunting effort and other population dynamic models. Pricing systems, marginal costs and measures of resource stock and flow will provide the basis for the ESI model. The ESI is based on economic sustainability as described by Munasinghe (1993) includes the Hicks-Lindahl concept of maintaining a stock or

capital of assets while yielding the maximum possible income. It is important to include in the valuation process the substitutability of the stocks.

In order to develop an index for the estimation of economic sustainability of hunting activities a survey including the majority of observed socioeconomic variables relevant to the hunting decision is necessary. Through a number of methodologies non-timber forest product use needs to be directly monitored and valued. From this a measurement of opportunity costs for commonly exploited products of both flora and fauna can be developed.

The model will require determination of local supply and demand curves in conjunction with quantification of producer and consumer surpluses. These will be influenced by the information concerning relative ecological sustainability of NTFP exploitation in the specific area being studied. If activities are determined to be ecologically unsustainable it will be necessary to incorporate a depletion variable into the general valuation formula created by the model. Variables being considered in the development of a utility function on which the model will be based may include the following: extraction and processing costs, transport, enforcement (as a disincentive or cost), proportion of income provided by exploitation activity, availability of alternatives and demographics.

Consideration for development of the ESI model will focus on valuation of labour input and development of a production function. The selection of an appropriate sample size in the hunting activity portion of the study will require flexibility to account for different hunting methods which may affect the standard errors. It will be necessary to distinguish between the market and subsistence hunting operations. It is assumed that there will be a greater incentive to hunt in the market hunting systems because alternatives are available.

The valuation price for the output does not diminish even without an external market due to the special valuation of game meat among people in this culture. It is important to question what is happening on the production side of the equation. Due to the fact that this type of data analysis does not provide a sampling framework from which one can extrapolate it will be necessary to sample in equal proportion of village type. The unit of observation should be the individual. In order to develop a decision making model the sample must be random. The data collected will be dictated by the model and the hypotheses in that model.

Decision making is a function of allocation of time and the alternatives available. The productivity of activities affect decision-making in terms of what is received and what drives the marginal productivity. What drives the hunting behavior involves time allocation as the crux. A critical consideration is whether or not wealth becomes a vehicle to raise the marginal product. It is important to identify which factors contribute to a differential allocation of time to the hunting activity. Which variables make certain members of the community hunt? The model is intended to predict what will happen in a region/community if certain changes occur. There are obviously a combination of rewards/benefits that result from the hunting activity, but the magnitude of whose benefits will be offset by the costs.

It is important to be able to measure the marginal product. We are looking for something objective on the constraints on life to explain the decision to hunt and we are looking for a variable to explain the external constraints to making different choices. The relative values must be established for the costs and benefits of a number of choices. It is important to establish the number of hours per unit time which are contributed to the activities available and activities should be viewed according to both age group and gender. It is important to identify separate hypotheses or conditioning variables for the goals. (*e.g.* Is wealth really the goal for hunting?)

Sustainability indices being used to monitor resource use and specifically hunting activity must be separate for each hunting condition (market vs. traditional). By looking at the conditions of the household the rate of hunting and natural resource exploitation can be determined which can influence the sustainability indices. Community regulation of hunting activity will ultimately be necessary. In order for this to be developed it is important to understand the relationship between hunters and enforcement officers. Ultimately it is necessary to develop the concept of sustainability within the community. In order to get to this point it is necessary to look at categories of animals being used and how often one finds each category.

Objectives and Hypotheses

For a number of years the conservation community and funding agencies working in tropical forests have been promoting Integrated Conservation and Development Projects (ICDPs). Often these projects have not met their objectives because conservation issues on the ground have not been properly assessed *a priori*. In most of west central Africa, logging is the major agent of change in the forest environment. Wood and meat are the two principal products extracted from natural forests. In most cases loggers and hunters base their exploitation strategies on short-term benefit rather than long-term, sustainable production. While ICDPs are usually quite interested in the sustainable production of wood and animal protein, especially in buffer zones adjacent to protected areas, they are usually not directly responsible for the management of these resources in project areas.

Many conservation projects seek to mitigate the effects of forestry and hunting practices. Often, however, their objectives and approaches conflict. The end result is parallel activities which are, in the manner practiced, opposing. If conservation programs are to succeed in west central African forests, they must take a novel, pragmatic approach to conservation which should include direct management of key resources in multiple use zones.

In order to embark on a direct management scheme data must be available which documents and quantifies to the extent possible the major observable changes that come with the implementation of conservation projects and of commercial logging operations. The data should include infrastructure development, economic impacts and changes, socio-cultural impacts and changes, detailed human population parameters, and levels of resource utilization. The Nouabale-Ndoki Congo Forest Conservation Project (CFC), which has been operational since October 1991, seeks to implement such a management scheme.

Collecting data relating to socio-cultural and economic parameters that have potential impact on wildlife exploitation and utilization within and among both traditional and logging communities can be viewed from two primary focal points: production and consumption. The production end of the market for wildlife products has been investigated initially by Blake (1994) and additional studies following similar methodology will be required. In order to fulfill the requirement for quantification of economic and socio-cultural influences on consumption of wildlife it is necessary to develop appropriate methodology. A pilot study was conducted March-June 1995 to develop such methodologies. The tasks for this pilot study were to:

Objectives

- Identify distinct social groups within each community of Bomassa, Bon Coin, Bounda, Bonga, Kabo Village, and Petet ya Mbandaka.
- Carry out a rapid rural appraisal of key dependent variables (land and property ownership, income allocation, social structure, daily activities, food consumption, household wealth, and demographics).
- Develop a methodology with selected field assistants/key informants and local community members for obtaining demographic and attitudinal information regarding wildlife and its utilization.
- Identify key variables influencing decision-making regarding wildlife utilization as part of a utility function, *e.g.* [Wildlife Use = f(personal income, community affluence, proximity to market, enforcement, attitude toward wildlife, household wealth, etc.)].
- Provide training for personnel responsible for collecting data related to the recommended ERR methodology described by Blake (1994) and expand the methodology to include economic factors.
- Investigate microeconomic factors of the bushmeat trade as it relates to acquisition and consumption in each community.

As the logging industry in Congo and individual logging concessions in particular pass through the stages of the boom-and-bust cycle, there may be a significant corresponding change in community structures and distributions. The instability of community life may result in the development of attitudes toward wildlife resources which foster decision-making geared toward consumptive utilization practices which are not sustainable. Attitudes and values held by community members toward wildlife resources are hypothesized to be different between logging and traditional communities along the Sangha River. As a result of these different valuations, it is anticipated that consumptive utilization of wildlife will differ in terms of relative impact of exploitation, processing (direct consumption vs. sold to markets for subsequent consumption) and sustainability.

Hypotheses

Godoy and Bawa (1993) give a review of basic assumptions and important hypotheses to be tested in the valuation and sustainable harvest of forest resources. Three general assumptions have been made regarding extraction of forest products: (1) Extraction of forest products by rural populations is sustainable and helps conservation; (2) Extraction of forest products by rural populations is a viable/desirable occupation; (3) Economic value of forests comes primarily from the wild plants and animals through local extraction. Extraction of forest products by local communities is not necessarily sustainable. Sustainability can only be determined by comparing the extraction rates with the rate of production. Research indicates that extraction of forest products is not necessarily desirable and is carried out until alternatives for income generation occur. The economic valuation of the forest products depends upon its connection to regional and national economic markets. Once larger markets become a factor the primary valuation of the forest comes from "wood, ecological services, amenities, and biological diversity." These assumptions are important to consider when developing methodologies for socioeconomic research as they have a potential impact on the overall goals of the management schemes to be developed which are based upon data collected. The methodologies developed, therefore, should include questions and variables which are not based on such assumptions.

Hypotheses to be considered in economic valuation studies are also described by Godoy and Bawa (1993): (1) *Specialization*: studies suggest that wealthier communities tend to decrease dependence and use of forest products and increase use of substitutes. The supply side suggests that opportunity costs of extraction of forest products rises with increased industrialization while the demand side there is a net decrease of wild plants and animals. Overall the shift is toward use of substitutes and extraction of only the most valuable plants and animals; (2) *Household income*: as incomes increase there is a shift toward decreases in forest products as a portion of that income and an increase in the economic importance of agriculture and livestock; (3) *Opportunity Cost*: the value of the forest from foraging before the forest is put to new uses changes as the economy modernizes with fewer resources overall being extracted in wealthier communities but with much higher extraction of the high valued commodities (such as wildlife); (4) *Sustainability*: extraction of forest products which are exported or for sale outside the village tends to result in depletion of such resources. Sustainability of extraction is dependent upon access to transport and extraction technology, availability of substitutes, and the end uses of the products being extracted;

Following review of the communities to be investigated and the literature the following hypotheses were developed:

- H^o: Differences in demographic and employment variables will be found according to village type and household wealth.
- H^o: Wealthier households and households within logging communities will have a higher proportion of use but will use fewer actual non-timber forest products than will villages having no employment opportunities.

- H^o: Differences in attitudes toward wildlife will be detected according to village type, ethnicity, and household wealth.
- H^o: Differences in household wealth will be detected according to village type and ethnicity.
- H^o: Differences in hunting activities and relative proportions of meat consumption will be detected according to village type, ethnicity, and household wealth.
- H^o: Opportunity cost for hunting activity will be different according to village type, household wealth, and ethnicity.

METHODOLOGY

A study was conducted in northern Congo in the Kabo UFA (Fig. 2.) from April 1995 through June 1995 to develop methodologies for monitoring socioeconomic activities and wildlife utilization. Six villages (Fig. 3.) on the Sangha River were included in the study with two villages from each of three types. Conservation villages, Bomassa and Bon Coin, are associated with the Nouabale-Ndoki National Park. No Industry villages, Bounda and Bonga, were considered to be more traditional and were not associated with any major industry which could provide alternative employment opportunities. Logging villages, Kabo Village and Petet ya Mbandaka, were two small villages found within the SNBS logging operation based in Kabo. Data for all methodologies described were collected directly by two investigators. The principal investigator was a female American with a background in wildlife biology and socioeconomic studies. The second investigator was a male Congolese who was born in Bomassa and raised in Kabo.

Three data collection methodologies were conducted in each of the six villages and are described in detail below. The three methods are as follows: (1) Village census, map making, and manioc (*Manihot esculenta*) field measurement; (2) Socioeconomic and attitude questionnaire; and (3) Daily activity, income generation, and food consumption. A hunting survey was also conducted in Bomassa and Bon Coin from 28 April to 11 June 1995.

Permission for the study was secured from the village chief of each village one month prior to visiting each village for data collection. A meeting was arranged and the details of the study activities and its purpose were discussed. Once permission was secured a date was arranged with the chief for the commencement of work. Except for the Conservation Villages, approximately seven days were spent in each village with the first day being spent arranging the camp (researchers stayed in tents) and visiting each household. Five consecutive days devoted to data collection, including spending the entire day with the head female of each household on the day when the long questionnaire was to take place. The final day was spent visiting with each family and providing alcohol and food for a celebration. Efforts were made during the study to not exchange food items or make any cash payments as it would potentially influence

the results of the study. Cigarettes, however, were distributed to individuals actively participating in data collection (daily activity, questionnaire administration, and census work).

The individual household was selected as the economic sampling unit focussed on utility maximization (as opposed to profit maximization) as there was a division of labor according to sex (House 1991). Based on initial visits and following the census activities where a more detailed observation of each household could be made, four households were selected with the following stratified sample objectives: wealthy Bantu, poor Bantu, wealthy Pygmy, poor Pygmy. This sampling strategy was used as the primary analysis categories were to be village type, ethnicity, and level of wealth. As a number of the villages maintained a small number of households it was decided that a random sampling as recommended in the WCS (1995) report "Developing an Integrated Monitoring Program for Trans-Boundary Conservation and Management in Congo, Cameroon, and Central African Republic" would not be appropriate as it would be unlikely that a random sample would produce such results.

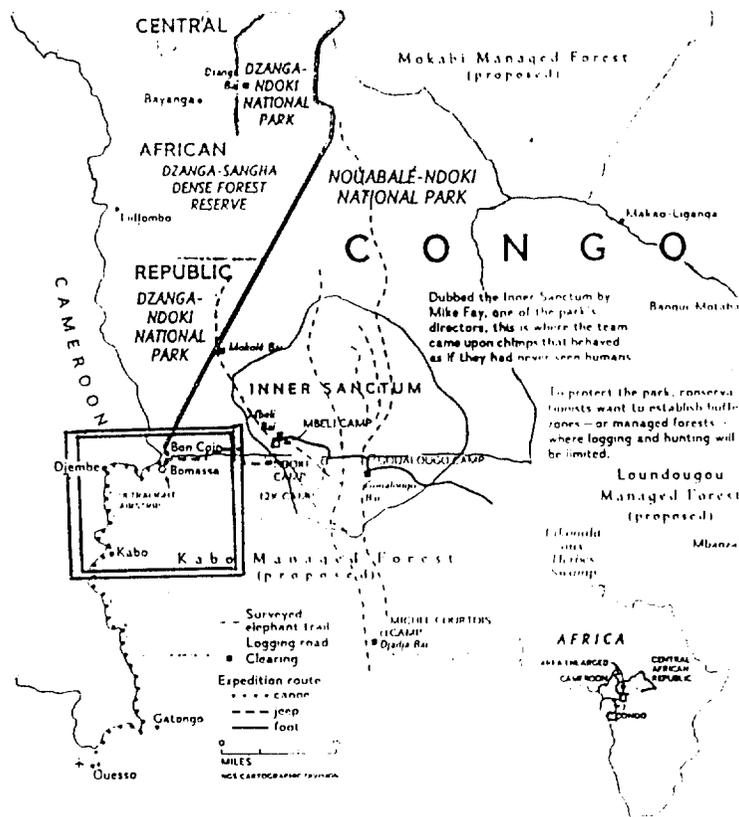


Fig. 2. Map depicting location of the Kabo UFA (study area in box), Nouabale-Ndoki National Park, and surrounding area in northern Congo. (from: Chadwick, D.H. July 1995. *National Geographic*. pg 9.)

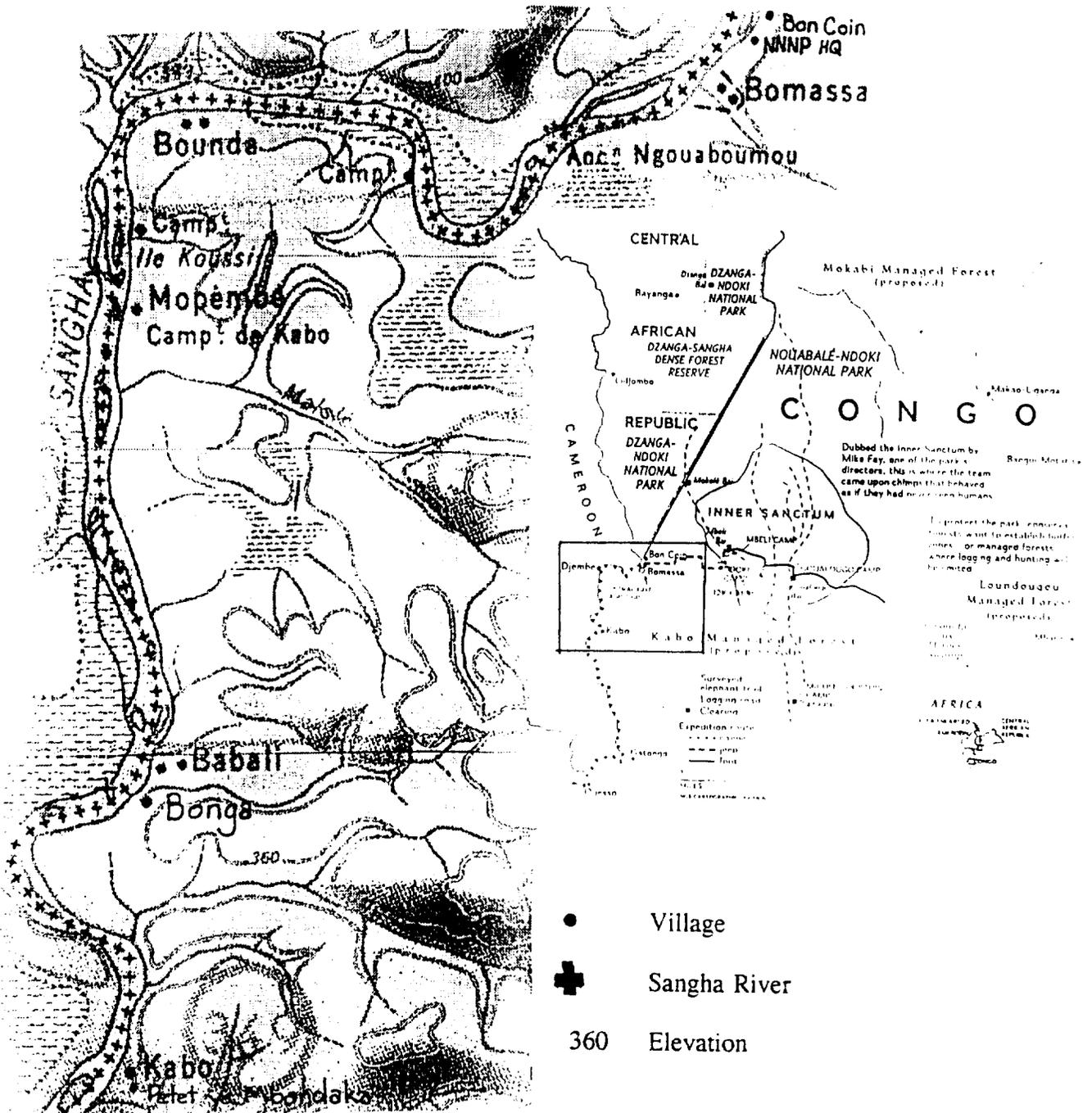


Fig. 3. Villages participating in socioeconomic survey of wildlife use in the Kabo logging concession, northern Congo.

Photographs of each household participating in the study were taken on the final day in each village. A map of each village was produced using a bitmap program. Approximately two weeks following data collection a final visit was made to each village. A laminated copy of the village map was given to the village chief and photographs were given to each of the participating households.

Census, Map Making, Manioc Fields:

The first activity following arrival in the village and camp set up was to walk around the village and locate all houses within the village. A map was drawn of all major structures, river, roads or pathways, manioc field area, and forest. A number was assigned to each household. Kitchens associated with a household were designated with the number of the house followed by a 'c'. Using a Hip-Chain^R Distance Measurer the length and width of each village was measured. String from the hip-chain measurement was collected and portions were given to each household.

The census for each village was conducted following map-making and began with household #1 and proceeded by consecutive household number. This provided investigators with an opportunity to visit with each household and begin developing rapport while also allowing a close view of household wealth used to determine which households would be selected for the other portions of the study. The census form (Appendix A-1) included the following variables: date, interviewer name, village, number, house number, surname, name, sex, age, relationship to proprietor of household, ethnic group, number of children, year of arrival in village, from what location, education level, and primary occupation. Investigators approached each household and explained the purpose of the study. Following this explanation, permission to carry out a household census was requested. If the person/persons refused a request to conduct the census was made to arrange another time that would be convenient. Some villages required more than one day to complete the census. Generally, neighbours would be asked the number of people that lived in a household and observations of wealth were made. Histories for each village were solicited from villagers during informal interviews. Data were entered using a spreadsheet program. Analysis of census data was conducted using SAS.

Manioc fields were also measured using a Hip-Chain^R Distance Measurer. Generally, measurement of manioc fields required the entire data collection period as researchers would visit fields with subjects during the study and eventually each household's fields would be identified. Measurements were made of the length and width of each field. Scale village maps which included manioc fields were produced on a bitmap program. program.

Questionnaire

A questionnaire (Appendix A-2) based on a series of questions outlined in a CFC project document for socioeconomic studies (WCS 1994) was developed. Six meetings were held over a two week period with key informant Alphonse Ngopo who is the resident schoolteacher in

Bomassa. Each question from the original list was reviewed and either deleted or expanded upon based upon opinions from Mr. Ngopo and/or observations by the investigator. The final questionnaire included six sections: demographics and movement patterns, household descriptions, food, agricultural activities, fishing activities, hunting activities, and attitudes/valuation of wildlife and the Nouabale-Ndoki National Park. As the primary objective for the study was to focus on the economics of social activities the sections concerning household descriptions and food were converted to monetary values with household items being valued according to condition, quantity, and source while food items commonly found within household diets were valued according to an estimated income and expenditure per month thus providing figures for income and expenses per household. Size of manioc fields was also monetarized according to a 100 CFA (500 CFA = US\$ 1.00) per square meter value.

The questionnaire required approximately 60-90 minutes to complete. The wife of the proprietor for each household was approached during the evening preceding the intended administration of the questionnaire, the procedure for the following day was explained and permission requested. Investigators arose before sunrise and began noting activities of the subject in a general time-allocation system. Investigators stayed with the woman throughout the day, assisting with fieldwork or forest collection activities and asking general questions. The purpose of these activities was to build rapport prior to administration of the questionnaire. As it became difficult later in the study to continue the time-allocation portion of the day these data were not analyzed. In the late afternoon following completion of the mid-day meal villagers generally rested for several hours and this time was selected as appropriate for the questionnaire. Occasionally the wife was not interested or not able to do the questionnaire and her husband would take over. Usually this would occur if the husband was present as it appeared the wife would be reluctant to respond.

Perception of differences in rural household wealth in Africa may be difficult to determine (House 1991). Based on a study described by House (1991) a value for household wealth was estimated based on a list of 21 household items according to quantity, condition, and source (paid cash, given, made themselves) of each item. Actual values for each item were given with the estimated value of the item as new on the market multiplied by the quantity, condition (very good=1.00; good=0.80, average=0.60, poor=0.40, very poor=0.20) and source (paid cash=1.00, given=0.50, homemade=0.75). Total values for each item were summed to give overall household wealth. Household wealth categories were then assigned as follows: Very Wealthy: $\geq 100,000$ CFA; Wealthy: $\geq 50,000 < 100,000$; Average: $\geq 25,000 < 50,000$; Poor: $\geq 10,000 < 25,000$; Very Poor: $< 10,000$. Thus for a household with 3 machetes, 2 which are poor and purchased with cash with the third machete being good and a gift the following value would be determined:

- $2 \text{ machetes} \times 0.40(\text{poor}) \times 1.00(\text{paid cash}) \times 4,500 = 3,600 \text{ CFA}$
- $1 \text{ machete} \times 0.80(\text{good}) \times 0.50(\text{gift}) \times 4,500 = 1,800 \text{ CFA}$
- $3,600 \text{ CFA} + 1,800 \text{ CFA} = 5,400 \text{ CFA household machete market value}$

In addition to the household wealth data, data concerning indicators of wealth was also collected. These data included house construction material, quantity and quality of clothing, type of medicine (traditional vs. pharmaceutical) used, education, size of manioc fields, number of income generating activities. Values for manioc fields were estimated according to manioc field size which was multiplied by an estimated per square meter value of 100 CFA.

The food and household item list was initially produced to determine which 25 items from a list were bought and/or sold. Following the surveys conducted in the first village of Bon Coin it was determined that monthly income generated and expenditure values could be estimated. Thus, from this list total income and expenditure values per household were calculated and analyzed according to wealth, village type and ethnic group.

Questions in the activities portion of the questionnaire were qualitative in nature and were recoded during the analysis phase to indicate either positive or negative responses where appropriate. Other questions were recoded to form two or three categories according to responses received. It was found that in many cases the questions duplicated information being collected in the Daily Activity portion of the study and were discarded from the survey.

The final section of the questionnaire concerned attitudes and valuations of wildlife. Each question was recoded according to whether or not the response given indicated a positive or negative attitude and/or effect toward conservation. Each positive response was assigned a value of +1 and each negative response was assigned a value of -1. From the responses an attitude index ranging from -15 to +15 was established. Analysis of the attitude index according to wealth, ethnic group and village type was carried out using SAS.

Daily Activity, Income Generation, and Food Consumption

Based on results of research activities during the Bon Coin survey it was decided that determination of daily activity patterns for members of each household would provide essential data in the establishment of opportunity costs for making the decision to hunt or collect other non-timber forest products. In addition, other daily activities such as food consumption and income generation could be collected simultaneously which would result in a richer database from which the decision-making question concerning wildlife use could be viewed. A data sheet was developed to incorporate all questions of interest (Appendix A-3) and this portion was included in the study.

At the end of each day (approximately 17h00), each household included in the study was visited for a 15-20 minute period. During this time, those present at the household were asked what they had done that day, what was eaten in the household and where each item of food came from, if any money had been earned, for what purpose and what was it spent on, and if any alcohol had been consumed.

These data were analyzed using SAS according to wealth, village type, and ethnic group. Graphs of the results were produced using Harvard Graphics.

Hunting Activity

In his preliminary reconnaissance survey of the Kabo logging concession, Blake (1994) tested and recommended the use of the Estimated Rate of Return (ERR) methodology for use in monitoring changes in mammal populations based on the assumption that hunting success rate reflects the relative abundance of wildlife in an area. In addition to data outlined in the report by Blake (1994), it was determined that it is possible to collect specific economic data pertaining to each hunt. The primary objective to the study is to determine what factors influence decision-making regarding wildlife use and economics are assumed to be a significant factor in that process. Data collection variables and training of personnel were, therefore, developed to encompass both the details of each hunt and the economics. Variables included in the data form (Appendix A-4) were date, hunter name, gun owner name, location of hunt, transport used, number of persons, type of hunting (snare, shotgun, other), time of departure, time of return, number shells shot, number shells lost, duiker call used, species, age class, sex, weight, total length, horn length, horn circumference, condition, pregnancy state, and a general description of the hunt which included what the hunter received for the hunter, what portion of the carcass the gun owner consumed, what portion of the carcass was sold and for what price, and what was purchased with the money earned.

Data were collected by a Bomassa hunter, Gabriel Mabolambi, from 28 April to 11 June 1995 in the villages of Bomassa and Bon Coin. Mr. Mabolambi was trained in information collection and measurement of weights and lengths of animals. Weights were taken using Pesola Spring Scales. Mr. Mabolambi visited all known hunter households in Bomassa and Bon Coin each morning and questioned each hunter as to his intention to hunt. Departure times were recorded for each hunter. Each evening Mr. Mabolambi visited each hunter household a second time to obtain detailed information for each hunt. Weekly meetings were held with Mr. Mabolambi to discuss the data collection and results of the survey.

Hunting activities in Bounda and Bonga were monitored in a similar manner with data being included with the data from the Bomassa study. Hunting in Kabo was being monitored by another conservation organization at the time of this study. Several meetings were held with the researcher during the course of data collection in the Kabo villages to ascertain the level of hunting activities in the area.

RESULTS

Census and Maps:

Results of the village census portion of the study included quantification of the following variables on a mean number per household basis: wives, females, children, husbands, males, pygmies, bantus, originals (native inhabitants), migrants (immigrants), literate, illiterate, knowledge of alphabet, students, people, employed, self employed, hunters, cultivators, commercants, housewives, labourers, and fishermen. Mean number per household in each

category for all villages studied are shown in Tables 1.1 and 1.2. Households surveyed had a mean of 5.34 persons, were roughly equal in number of pygmies and bantus, native inhabitants and immigrants, males and females. Large differences were found in literacy with a mean 0.32 persons per household (PPH) being literate and a mean 4.19 PPH being illiterate. Another large difference was found between employed (0.32 PPH) and self employed (2.56 PPH) individuals. Mean number PPH for all occupations identified was found to be less than one except for housewives (1.61 PPH), with fishermen (0.56 PPH) and hunters (0.33 PPH) being the second and third highest values, respectively.

Table 1.1. Analysis results of demographic variables for all individuals (Total) and by ethnic group, Bantu and Pygmy, of village census carried out for six villages in the Kabo logging concession of northern Congo. Values for each variable are given in mean number of persons per household within each category.

VARIABLE (NUMBER PER HOUSEHOLD)	TOTAL (N=90)		BANTU (N=48)		PYGMY (N=41)	
	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
WIVES	1.23	1.19	1.17	1.42	1.29	0.87
FEMALES	2.67	1.99	2.52	1.96	2.85	2.07
CHILDREN	1.97	2.55	2.65	3.12	1.29	1.65
HUSBANDS	1.11	0.79	1.00	0.83	1.24	0.73
MALES	2.68	1.81	2.40	1.90	3.00	1.69
PYGMIES	2.59	3.50	0.23	1.04	5.41	3.32
BANTUS	2.71	3.28	4.69	3.28	0.44	1.14
ORIGINAL	2.49	2.51	2.15	2.45	2.95	2.53
MIGRANT	2.86	2.60	2.77	2.51	2.90	2.74
LITERATE	0.32	0.80	0.58	1.03	0.02	0.16
ILLITERATE	4.19	3.20	3.10	2.93	5.54	3.03
ALPHABET	0.71	1.29	1.08	1.53	0.27	0.78
STUDENTS	0.53	1.05	0.77	1.24	0.27	0.71
PEOPLE	5.34	3.29	4.92	3.43	5.85	3.13

Table 1.2. Results of employment variables from village census for all individuals, Pygmies, and Bantus. All values are given as mean number of persons per household.

VARIABLE (NUMBER PER HOUSEHOLD)	TOTAL (N=90)		BANTU (N=48)		PYGMY (N=41)	
	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
EMPLOYED	0.32	0.56	0.40	0.57	0.29	0.54
SELF EMPLOYED	2.56	1.90	1.96	1.89	3.29	1.68
HUNTERS	0.33	0.67	0.13	0.53	0.59	0.74
CULTIVATORS	0.06	0.23	0.06	0.24	0.05	0.22
COMMERCANTS	0.16	0.65	0.21	0.68	0.00	0.00
HOUSEWIVES	1.61	1.22	1.31	1.13	2.00	1.20
LABOURERS	0.20	0.48	0.21	0.46	0.20	0.51
FISHERMEN	0.56	0.86	0.46	0.77	0.66	0.96
PEOPLE	5.34	3.29	4.92	3.43	5.85	3.13

Results of demographic variable data according to ethnic grouping are shown in Table 1.1. For bantu households showed lower per household mean number of people in all categories except for number of children per person (2.65 for Bantus and 1.29 for Pygmies), literacy (0.58 PPH for Bantus vs. 0.02 for Pygmies), knowledge of alphabet (1.08 PPH for Bantus vs. 0.78 PPH for Pygmies), and students (0.77 PPH for Bantus vs. 0.71 PPH for Pygmies). Results of employment categories showed higher values for Bantus in the following categories: employment (0.40 PPH Bantu vs. 0.29 PPH Pygmy), commercial traders (0.21 PPH Bantu vs. 0.00 PPH Pygmy), and labourers (0.21 PPH Bantu vs. 0.20 PPH Pygmy). Pygmy households showed higher mean values for self employment (3.29 PPH Pygmy vs. 1.96 PPH Bantu), hunters (0.59 PPH Pygmy vs. 0.13 PPH Bantu), and fishermen (0.66 PPH Pygmy vs. 0.46 PPH Bantu).

Comparisons of results according to village type are shown in Tables 1.3 and 1.4. Conservation villages showed the highest means for females (2.94 PPH), students (0.79 PPH), knowledge of alphabet (1.06 PPH), employment (0.48 PPH), labourers (0.45 PPH), and fishermen (0.85 PPH). No Industry villages had the highest mean number of people per household in the following categories: wives (1.86 PPH), husbands (1.71 PPH), males (3.79 PPH), Pygmies (5.00 PPH), native inhabitants (3.36 PPH), illiterate (6.57 PPH), self employed (4.36 PPH), hunters (1.36 PPH), cultivators (0.14 PPH), and housewives (2.07 PPH). Logging villages maintained the highest mean number for number of children per person (2.52), literacy (0.65 PPH), and commercial traders (0.33 PPH). Graphs for demographics and employment variables according to village type and ethnic group are shown in Figure 4.1 - 4.4

A chi-square analysis for each variable was carried out with village type (conservation, no industry, or logging) and ethnic group (bantus or pygmy) as independent variables. Results of the chi-square analysis are shown in Table 1.5 which includes only those dependent variables which had a significant difference among villages or between ethnic groups. The results indicate that the greatest differences found was usually between logging and no industry towns and a number of differences were detected according to ethnic group.

Differences in mean number per household according to village type were found in a number of variables. Logging towns had less wives per household, lower number of fishermen and a higher literacy rate. No Industry towns had a higher number of husbands per household, higher self employment and lower employment, higher number of hunters per household, and a higher illiteracy rate. Conservation towns had a higher number of labourers and a higher number of persons knowing the alphabet.

Differences in mean number per household according to ethnic grouping were found in a number of variables. Pygmies had a higher self employment rate, higher number of hunters and housewives, and a higher per household illiteracy rate. Bantus had higher per household means for both literacy and knowledge of the alphabet.

The last variable analyzed was age groups according to village type. Results of this survey are shown in Table 1.6 and are graphed in Figure 4.5. Results of this portion of the census indicate populations which were generally higher in the younger age groups and which decrease rapidly. Results, however, should be read with caution as ages for most individuals in the census were estimated by the investigators as most people did not know the year of their birth. The results show that Conservation villages had an overall younger population with very few individuals in the older age groups while No Industry villages had a higher proportion of individuals found within the older age groups.

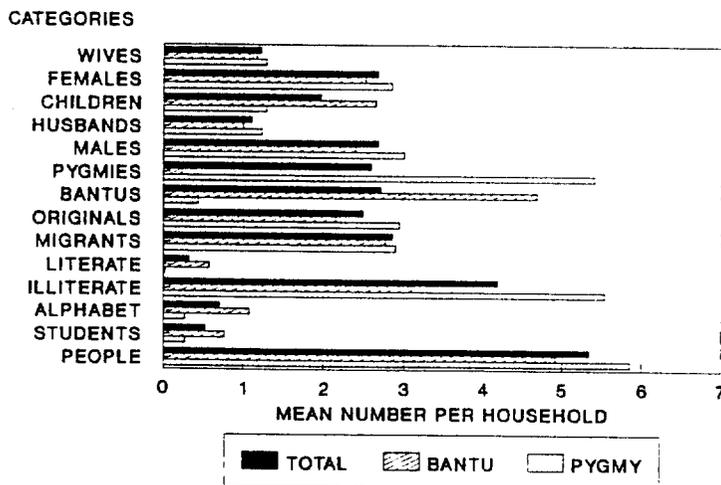
Table 1.3. Results of analysis for demographic variables according to village type for villages studied in the Kabo logging concession, northern Congo. All values indicate mean number of persons per household found within each category.

VARIABLE (NUMBER PER HOUSEHOLD)	CONSERVATION VILLAGES (N=33)		NO INDUSTRY VILLAGES (N=14)		LOGGING VILLAGES (N=43)	
	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
WIVES	1.61	1.41	1.86	1.29	0.74	0.69
FEMALES	2.94	2.09	2.86	1.70	2.40	2.01
CHILDREN	1.25	1.75	0.80	1.09	2.52	2.93
HUSBANDS	1.24	0.75	1.71	0.99	0.81	0.59
MALES	2.88	1.73	3.79	2.08	2.16	1.62
PYGMIES	2.91	3.66	5.00	3.28	1.56	3.06
BANTUS	2.91	3.24	1.64	3.56	2.91	3.23
ORIGINAL	2.79	2.57	3.36	2.44	1.98	2.42
MIGRANT	3.03	2.58	3.29	2.89	2.58	2.55
LITERATE	0.00	0.00	0.07	0.27	0.65	1.07
ILLITERATE	4.55	2.96	6.57	3.13	3.14	2.99
ALPHABET	1.06	1.46	0.00	0.00	0.67	1.29
STUDENTS	0.79	1.14	0.00	0.00	0.51	1.10
PEOPLE	5.82	3.15	6.64	3.30	4.56	3.27

Table 1.4. Results of data analysis for employment variables from census of villages in the Kabo logging concession, northern Congo. All values shown indicate mean number of persons per household found within each category.

VARIABLE (NUMBER PER HOUSEHOLD)	CONSERVATION VILLAGES (N=33)		NO INDUSTRY VILLAGES (N=14)		LOGGING VILLAGES (N=43)	
	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
EMPLOYED	0.48	0.67	0.00	0.00	0.30	0.51
SELF EMPLOYED	2.64	1.80	4.36	2.34	1.91	1.41
HUNTERS	0.00	0.00	1.36	0.93	0.26	0.49
CULTIVATORS	0.03	0.17	0.14	0.36	0.05	0.21
COMMERCANTS	0.00	0.00	0.00	0.00	0.33	0.92
HOUSEWIVES	1.76	1.12	2.07	1.38	1.35	1.19
LABOURERS	0.45	0.67	0.00	0.00	0.07	0.26
FISHERMEN	0.85	1.03	0.79	0.97	0.26	0.54
PEOPLE	5.82	3.15	6.64	3.30	4.56	3.27

BASIC DEMOGRAPHICS OF ETHNIC GROUPS CONGO RIVER VILLAGES



ETHNIC GROUP EMPLOYMENT CONGO RIVER VILLAGES

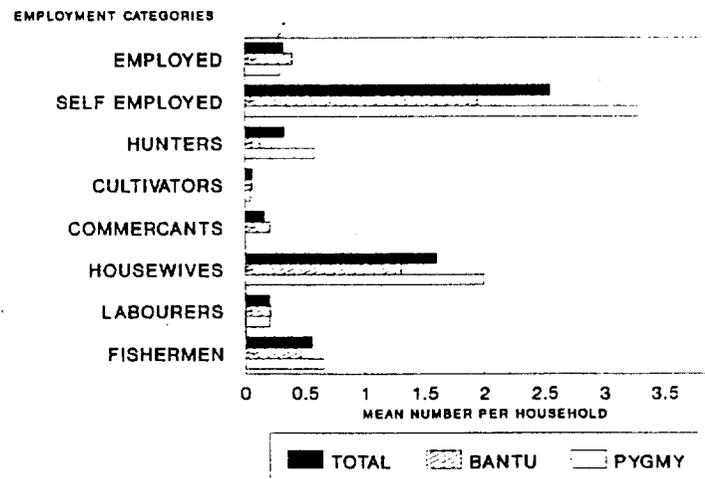


Fig. 4.1. Demographics by Ethnicity

Fig. 4.2. Employment by Ethnicity

Fig. 4.1-4.2. Graphs depicting demographics and employment variables from the village census for villages in the Kabo logging concession of northern Congo according to total persons, Bantu households, and Pygmy households.

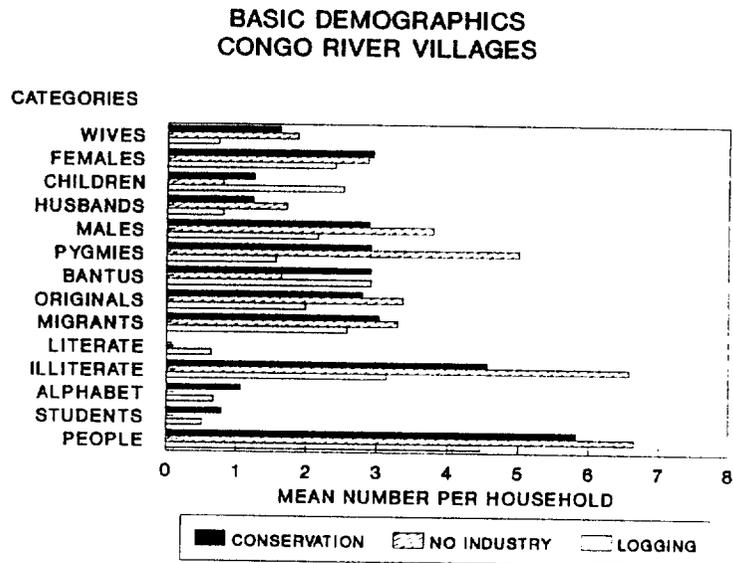


Fig. 4.3 Demographics by Village

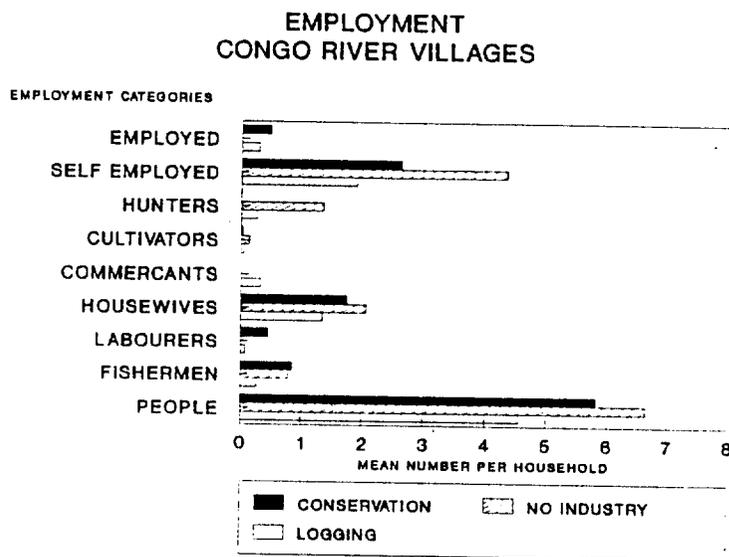


Fig. 4.4. Employment by Village

Fig 4.3-4.4. Graphs depicting employment from village census of villages in the Kabo logging concession, northern Congo. Results are shown according to village type: Conservation, No Industry, and Logging.

Table 1.5. Results of demographic and employment variable chi-square analysis for village census study of villages in the Kabo logging concession, northern Congo. Variables having statistically significant differences according to either village type or ethnicity are shown. 'ns' indicates a relationship which was not statistically significantly different.

DEPENDENT VARIABLE (MEAN #/ HOUSEHOLD)	VILLAGE TYPE	ETHNIC GROUP	TOTAL PR > F	COMMENTS
PEOPLE	ns	ns	ns	
WIVES	0.0004	ns	0.0216	low (0.714) in logging towns
HUSBANDS	0.0006	ns	ns	high (1.714) in no industry towns
EMPLOYED	0.0283	ns	ns	low (0.000) employment in no industry towns
SELF EMPLOYED	0.0001	0.0209	0.0014	high (4.357) in no industry towns; pygmies high (3.293)
LABOURERS	0.0007	ns	ns	high (0.455) in conservation towns
HUNTERS	0.0001	0.0045	0.0001	high (1.357) in no industry towns; high (0.5854) in pygmy households
FISHERMEN	0.005	ns	ns	low (0.238) in logging towns
HOUSEWIVES	ns	0.0301	ns	high (2.0) in pygmy households
ILLITERATE	0.0011	0.0052	0.0040	high (6.571) in no industry towns; high (5.537) among pygmy households
LITERATE	0.0003	0.0058	0.0013	high (0.667) in logging towns; high (0.583) among bantu households
ALPHABET	0.0313	0.0072	ns	high (1.061) in conservation towns; high (1.083) among bantu households

Table 1.6. Age groups of all individuals censused in villages within the Kabo logging concession, northern Congo. Values shown indicate mean number of persons within each age category per household.

AGE (NUMBER PER HOUSEHOLD)	CONSERVATION VILLAGES (N=33)		NO INDUSTRY VILLAGES (N=14)		LOGGING VILLAGES (N=43)	
	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
0 TO 10	1.70	1.45	1.64	1.45	1.56	2.07
10 TO 19	0.91	1.26	0.79	1.12	0.47	0.70
20 TO 29	1.18	0.88	1.07	1.00	0.53	0.74
30 TO 39	0.94	1.20	0.86	1.03	0.58	0.79
40 TO 49	0.58	0.83	0.57	0.94	0.26	0.49
50 TO 59	0.27	0.52	0.86	1.23	0.47	0.77
60 TO 69	0.15	0.44	0.86	1.10	0.35	0.53
70 TO 79	0.09	0.38	0.00	0.00	0.05	0.21
80 TO 89+	0.00	0.00	0.00	0.00	0.00	0.00

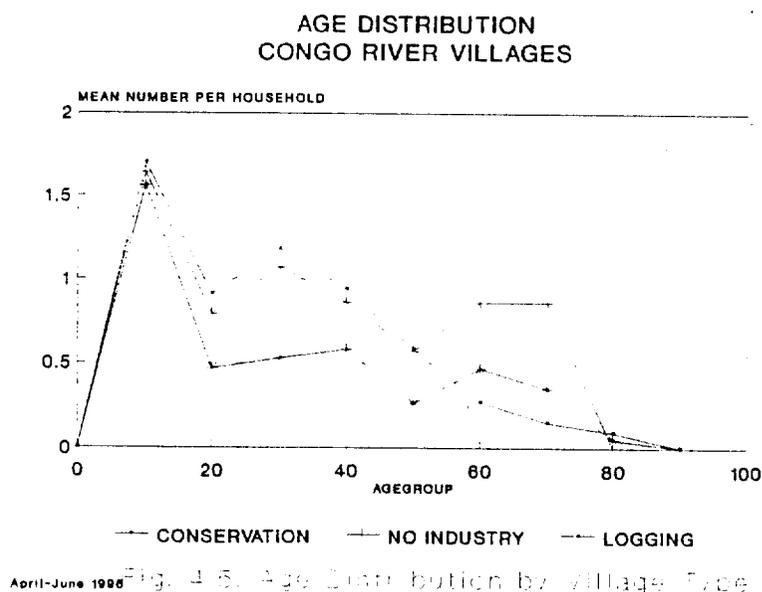


Fig. 4.5. Age Distribution by village type

Fig. 4.5. Graph of age groups according to mean number of persons per household within each age group for all villages studied in the Kabo logging concession, northern Congo.

Results for each village were calculated and are shown in Tables 1.7 and 1.8. Following is a description of the census results for each village, village histories, and general descriptions of employment, agriculture land area, and hunting activity as determined through the census and map-making activities.

Bon Coin: (02°13'N)

Bon Coin had six occupied households and was established in 1987 by the village chief, Mr. Pascal Mbanze. The village is located several hundred metres south of the Central African Republic border. The majority of inhabitants had been living in CAR and moved to the village as a result of forced repatriation due to a border dispute between Congo and CAR. Two of the households in the village were Bantu with the remaining four being Pygmy households. The map of the village (Fig. 4.6) includes descriptions of houses and manioc fields for each household. Specific results on analyzed variables for Bon Coin are shown in Tables 1.7 and 1.8.

A higher mean number of Bantus per household than Pygmies and more males (4.33 PPH) than females (2.83 PPH) was found. As would be expected based on the village history, there were more immigrants (5.67 PPH) than native inhabitants (1.50 PPH). The literacy rate was zero but the highest PPH value for knowledge of alphabet (2.67 PPH) and students (2.17) was found in Bon Coin.

In terms of employment, Bon Coin also maintained the highest employment rate (0.50 PPH) among village and had one of the highest fishermen (0.83 PPH) rates. Bon Coin had the second highest total number of people (7.17 PPH) living in a household.

The majority of households in the village maintained a manioc field with a total area of 26,726.24 m² and all employment in the village was provided by the Nouabale-Ndoki project. The two known 12 gauge shotguns in the village were owned by the Bantu households in the village. The proprietors of the four other households, all of which were Pygmy, were all reported hunters.

Bomassa: (02°12'N)

Bomassa was originally located on the Cameroon side of the Sangha River near Molongodi which is in CAR approximately 3-4 km north of its present location in Congo. The current site of Bomassa was established in the late 1940's or early 1950's. It is a relatively large village with 39 houses/buildings, 27 of which were occupied. Thirteen households were owned by Bantus and 14 were owned by Pygmies. A map of the village with descriptions of houses is shown in Figure 4.7. A second map (Figure 4.8) shows location, size, and ownership of all manioc fields associated with Bomassa village.

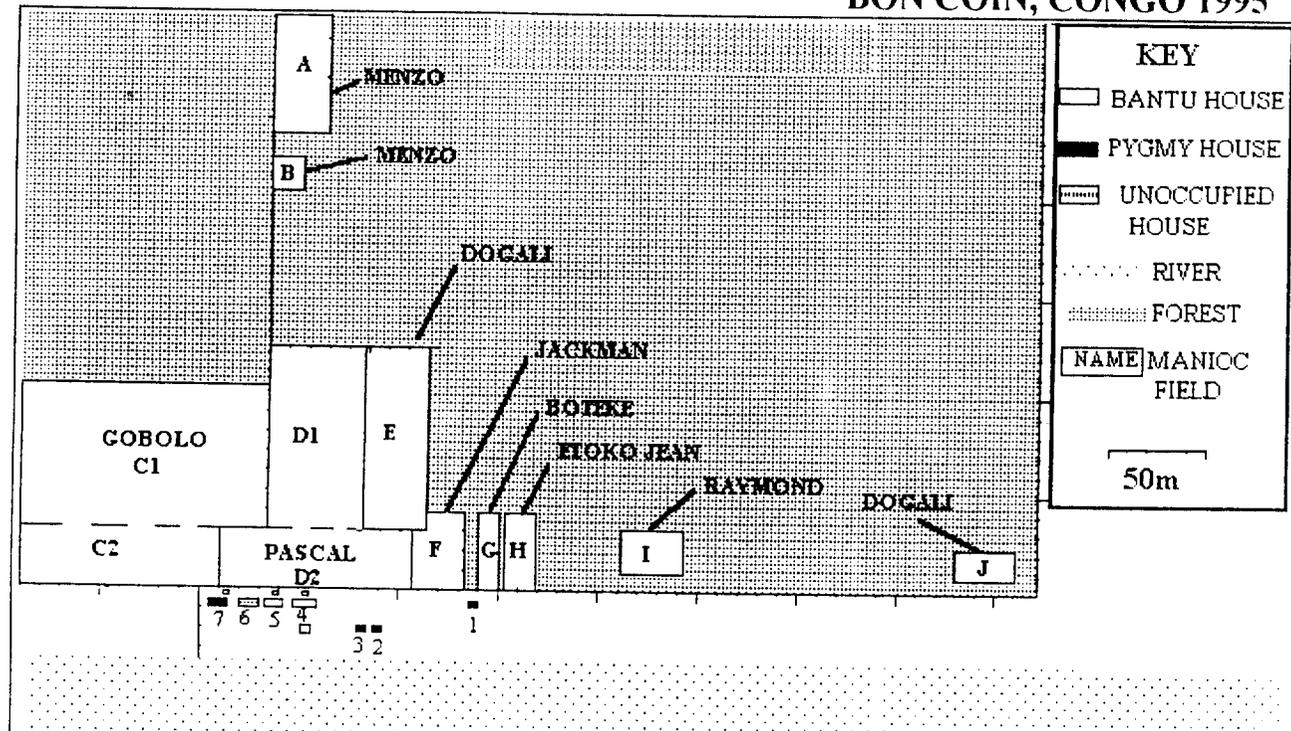
Table 1.7. Results of demographic variables for all villages studied in the Kabo logging concession, northern Congo. Values shown indicate mean number of individuals per household. Values in parentheses () indicate standard deviations for each value.

VARIABLE (NUMBER PER HOUSEHOLD)	CONSERVATION VILLAGES		NO INDUSTRY VILLAGES		LOGGING VILLAGES	
	BOMASSA (N=27)	BON COIN (N=6)	BOUNDA (N=9)	BONGA (N=5)	KABO (N=31)	PETET YA MBANDAKA (N=12)
WIVES	1.70 (1.49)	1.17 (0.98)	1.56 (0.73)	2.40 (1.95)	0.71 (0.64)	0.83 (0.83)
FEMALES	2.96 (2.30)	2.83 (0.75)	2.56 (1.13)	3.40 (2.51)	2.19 (1.87)	2.92 (2.35)
CHILDREN			0.5 (1.00)	2.80 (1.64)	2.93 (3.19)	1.50 (1.98)
HUSBANDS	1.19 (0.62)	1.50 (1.22)	1.67 (0.71)	1.80 (1.48)	0.84 (0.58)	0.75 (0.62)
MALES	2.56 (1.55)	4.33 (1.86)	3.33 (2.18)	4.60 (1.82)	2.13 (1.61)	2.25 (1.71)
PYGMIES	2.93 (3.85)	2.83 (2.93)	5.56 (3.17)	4.00 (3.61)	0.16 (0.73)	5.17 (3.81)
BANTUS	2.59 (3.32)	4.33 (2.66)	0.33 (1.00)	4.00 (5.34)	4.03 (3.15)	0.00 (0.00)
ORIGINAL	3.07 (2.73)	1.50 (1.05)	3.89 (2.37)	2.40 (2.51)	2.03 (2.63)	1.83 (1.85)
MIGRANT	2.44 (2.33)	5.67 (2.07)	2.00 (0.71)	5.60 (3.97)	2.29 (2.33)	3.33 (3.03)
LITERATE	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.20 (0.45)	0.90 (1.16)	0.00 (0.00)
ILLITERATE	4.56 (3.13)	4.50 (2.26)	5.89 (2.62)	7.80 (3.90)	2.35 (2.21)	5.17 (3.81)
ALPHABET	0.70 (0.95)	2.67 (2.25)	0.00 (0.00)	0.00 (0.00)	0.94 (1.44)	0.00 (0.00)
STUDENTS	0.48 (0.80)	2.17 (1.47)	0.00 (0.00)	0.00 (0.00)	0.71 (1.24)	0.00 (0.00)
PEOPLE	5.52 (3.34)	7.17 (1.60)	5.89 (2.62)	8.00 (4.24)	4.32 (3.07)	5.17 (3.81)

Table 1.8. Results of analysis of employment categories for each village studied in the Kabo logging concession, northern Congo. Values shown indicate mean number of persons per household with standard deviations shown in parentheses ().

VARIABLE (NUMBER PER HOUSEHOLD)	CONSERVATION VILLAGES		NO INDUSTRY VILLAGES		LOGGING VILLAGES	
	BOMASSA (N=27)	BON COIN (N=6)	BOUNDA (N=9)	BONGA (N=5)	KABO (N=31)	PETET YA MBANDAKA (N=12)
EMPLOYED	0.48 (0.70)	0.50 (0.55)	0.00 (0.00)	0.00 (0.00)	0.35 (0.55)	0.17 (0.39)
SELF EMPLOYED	2.59 (1.72)	2.83 (2.32)	3.89 (1.83)	5.20 (3.11)	1.52 (1.06)	2.92 (1.73)
HUNTERS	0.00 (0.00)	0.00 (0.00)	1.11 (0.93)	1.80 (0.84)	0.03 (0.18)	0.83 (0.58)
CULTIVATORS	0.00 (0.00)	0.17 (0.41)	0.22 (0.44)	0.00 (0.00)	0.06 (0.25)	0.00 (0.00)
COMMERCEANTS	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.45 (1.06)	0.00 (0.00)
HOUSEWIVES	1.74 (1.16)	1.83 (0.98)	1.67 (1.00)	2.80 (1.79)	1.06 (0.93)	2.08 (1.51)
LABOURERS	0.48 (0.70)	0.33 (0.52)	0.00 (0.00)	0.00 (0.00)	0.10 (0.30)	0.00 (0.00)
FISHERMEN	0.85 (1.03)	0.83 (1.17)	0.89 (1.05)	0.60 (0.89)	0.35 (0.61)	0.00 (0.00)
PEOPLE	5.52 (3.34)	7.17 (1.60)	5.89 (2.62)	8.00 (4.24)	4.32 (3.07)	5.17 (3.81)

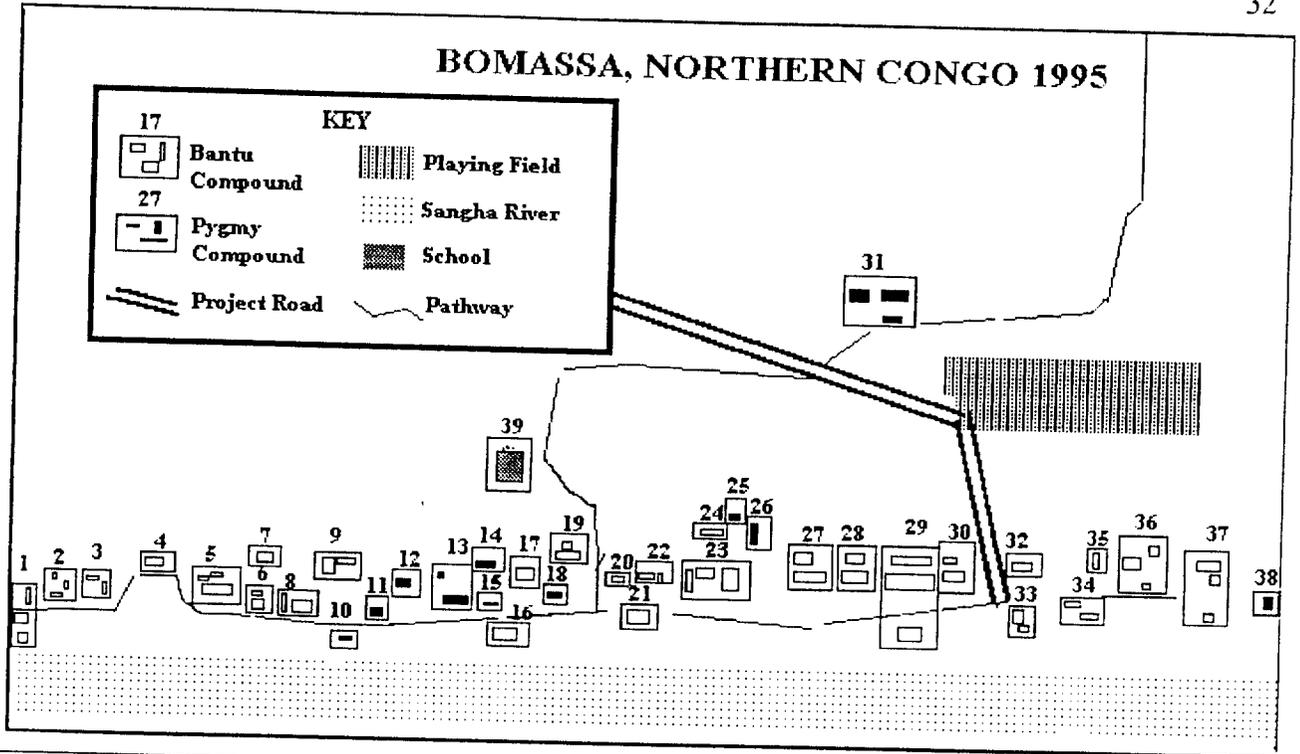
BON COIN, CONGO 1995



#	NAME	HOUSE	CUISINE	TOILET
1	Menzo, Gabriel	wood, leaves, tuile		
2	Sangoua, Mathias	mud, wood, tuile		
3	Dogali, Francois	mud, wood, tuile		
4	Mbanze, Pascal	wood plank, tuile	mud, wood, tuile	wood, bache, tuile
5	Gobolo, Gaston	mud, wood, tuile	mud, wood, tuile	
6	Maison en construction			
7	Mokango, Raymond	wood plank, tuile		

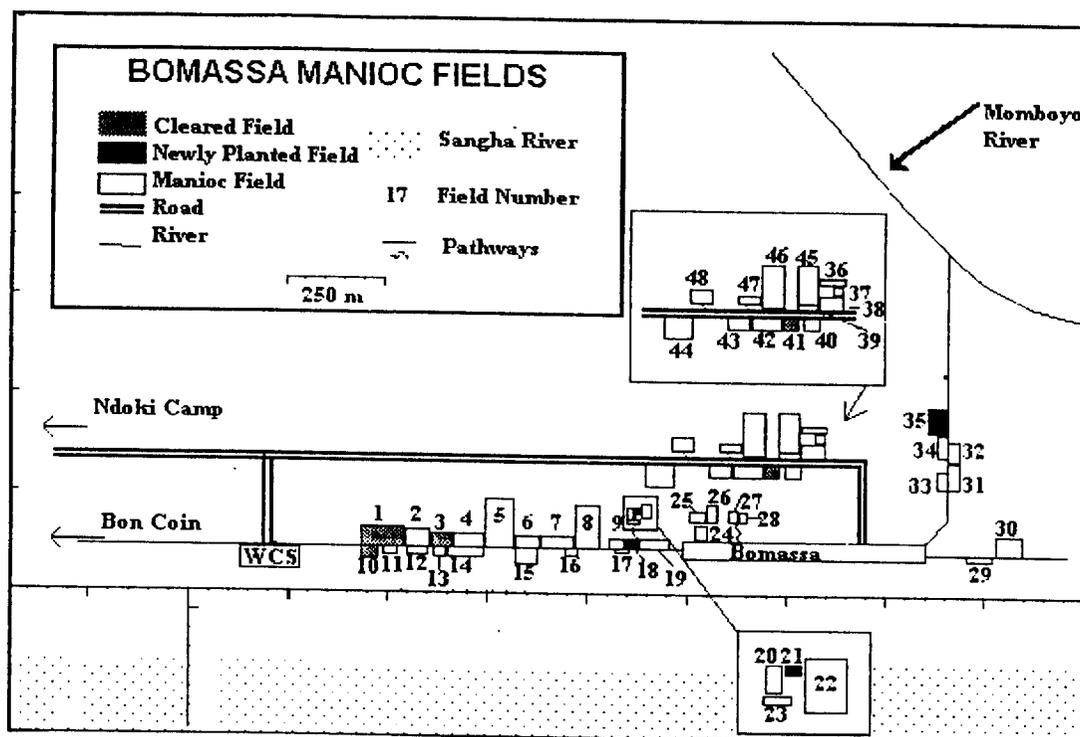
#	NAME	L x W (m)	AREA	GROWTH
A	Menzo, Gabriel	61 x 28	168.00	old
B	Menzo, Gabriel	18 x 16	288.00	new
C1	Gobolo, Gaston	72.9 x 134	9768.60	old
C2	Gobolo, Gaston	110 x 29.2	3212.00	old
D1	Apa, Marguerite	92.9 x 48	4459.20	old
D2	Apa, Marguerite	97.2 x 29.2	2838.24	old
E	Dogali, Francois	92.9 x 30	2787.00	clearing
F	Jackman	39 x 25	975.00	new
G	Boteke	39 x 10	390.00	just planted
H	Etoko Jean	39 x 17.5	682.50	new
I	Raymond	33.2 x 21	697.20	old
J	Dogali	30.7 x 15	460.50	old

Figure 4.6. Map, description of houses, and manioc fields for the village of Bon Coin, northern Congo.



#	NAME	HOUSE TYPE	CUISINE	TOILET	#	NAME	HOUSE TYPE	CUISINE	TOILET
1	Project House	mud. wood. tuile	mud. wood. tuile	planks	21	Lounga (commercante)	mud. wood. tuile		
2	Project House	plank. tole	plank. tuile	plank. tole	22	Ipete, Paul	mud. wood. tuile	mud. wood. tuile	
3	Mbebouti, Fidel	plank. tole	mud. wood. tuile	mud. wood. tuile	23	Nguende, Auguste	wood. plank. tuile		wood
4	House under construction	wood. tuile			24	Mobone, Silvan	mud. wood. tuile		
5	Project House	wood. plank. tuile	plank. tuile	plank	25	Mobayi, Emmanuel	wood. tuile		
6	Nguembo, Francois	mud. wood. tuile	wood. tuile		26	Yoka, Gabriel	mud. wood. tuile		
7	Dala, David	wood. tuile			27	Ngopo, Alphonsee	wood. plank. tuile	wood. tuile	
8	Project House	wood. plank. tuile	wood. plank. tuile	wood. plank. tole	28	Abandoned House	mud. wood. plank. tuile	wood. plank. tuile	
9	Gozo, Victor	wood. plank. tuile		wood. tuile	29	Tambomo, George	wood. plank. tole	wood. plank. tuile	
10	Ekogno, Bernard	mud. wood. tuile			30	Komaka, Fidele	wood. plank. tole	wood. plank. tuile	
11	Boussol, David	mud. wood. tuile			31	Balinga	mud. wood. tuile		
12	Ndokanda, Marcel	mud. wood. tuile			32	Kyoto University	wood. plank. tole		
13	Mbame, Maurice	mud. wood. tuile	wood. tuile		33	Meguessa, Marcel	wood. plank. tuile	wood. plank. tuile	
14	Bakombo, Gilbert	mud. wood. tuile	wood. tuile		34	Boukar (commercant)	wood. plank. tuile		
15	Ndoukou, Jean-Claude	mud. wood. tuile			35	Abandoned House	mud. wood. tuile		
16	House under construction	wood			36	Project Transit House	wood. plank. tole		wood. plank. tole
17	House under construction	wood. plank			37	Kionga, Ezaie	wood. plank. tole	wood. tuile	wood. tole
18	Deide, Florent	mud. wood. tuile			38	Manzele, Catherine	wood. leaves		
19	Nguebo, Jean	wood. plank. tole	wood. tuile	wood. tuile	39	School	wood. plank. tole		wood. plank
20	Ndinga, Jean-Marie	mud. wood. tuile							

Figure 4.7. Map and description of houses for the village of Bomassa, northern Congo.



#	NAME	#	L x W (m)	AREA	GROWTH	#	NAME	#	L x W (m)	AREA	GROWTH
1	NGUENDE, AUGUSTE	23	105 x 55.3	5806.50	New	25	LIMOYE, MADELEINE	29	55.5 x 46.9	2602.95	Old
2	MONZOMBO, FELIX	10	61 x 30.9	1884.90	New	26	JEANE (Commercante)	26	55 x 30	1650.00	Old
3	JOKIN, GABRIEL	29	50.6 x 39.9	1563.54	New	27	BEH, LAZARE	5	35 x 25.1	878.50	Old
4	BAKEMBE, EUGENE	18	76.2 x 28	2133.60	Old	28	NGAMA, RENE	16	30.3 x 25	757.50	Old
5	MBAME, MAURICE	13	125 x 67.8	8475.00	Old	29	MANZELE, CATHERINE	38	60 x 15	900.00	Old
6	BAKOMBO, GILBERT	14	64.1 x 30	1923.00	New	30	MANZELE, CATHERINE	38	73.5 x 50	3675.00	Old
7	NGUENDE, AUGUSTE	23	89.4 x 30	2682.00	Old	31	KOMAKA, FIDELE	30	73.2 x 30	2196.00	Old
8	IPETE, PAUL	22	112.3 x 63.9	7175.97	Old	32	KOMAKA, FIDELE	30	58.6 x 30	1758.00	Old
9	ASSOULA, GERTRUDE	27	34.5 x 25.8	890.10	Old	33	JEANE (Commercante)	26	49.7 x 25.1	1247.47	Old
10	KIONGA, EZAI	37	48 x 27.7	1329.60	New	34	YOKA, GABRIEL	26	55.8 x 25.1	1400.58	Old
11	NDOKANDA, MARCEL	12	40.4 x 22.8	921.12	Old	35	MBEBOUTI, FIDELE	3	71.7 x 48.9	3506.13	New
12	LOM, DAVID	11	56.7 x 24.3	1377.81	Old	36	BALINGA	31	70.3 x 20.1	1413.03	Old
13	NGAMO, DEDE	6	36.4 x 26.9	979.16	Old	37	NDINGA	20	30.7 x 25.9	795.13	Old
14	EMELL, JEAN CLAUDE	15	97.3 x 26.9	2617.37	New	38	NDJABOTI, LOUISE	29	65.2 x 35.4	2282.00	Old
15	NGUEBO, JEAN	19	57.9 x 40	2316.00	Old	39	MOKOUBE, EMMANUEL	4	57 x 16.9	963.30	Old
16	NGUENDE, AUGUSTE	23	34.5 x 20.8	7176.00	Old	40	NGOPO, ALPHONSE	27	45.3 x 32.8	1485.84	New
17	NGUEMBO, FRANCOIS	6	35.5 x 12	426.00	Old	41	KIONGA, EZAI	37	42.8 x 32.8	1403.84	New
18	DALA, DAVID	7	34.5 x 28	966.00	New	42	KOMAKA, FIDELE	30	78.9 x 42.3	3337.47	Old
19	AYEYE, VICTOR	6	30 x 225.8	774.00	New	43	MEGUESSA, MARCEL	33	58.4 x 42.3	2470.32	Old
20	MONZOMBO, FELIX	10	31.3 x 25	782.70	Old	44	MEGUESSA, MARCEL	33	78 x 58	4524.00	Old
21	NDILI, MARTINE	10	11.7 x 10.9	127.53	New	45	NGUEBO, JEAN	19	102.5 x 57.9	5934.75	Old
22	DALA, DAVID	7	41.9 x 35.5	1487.45	Old	46	NGOPO, ALPHONSE	27	110.2 x 63.3	6975.55	Old
23			25 x 17.5	437.50	Old	47	KOMAKA, FIDELE	30	61.6 x 26.6	1638.56	Old
24	MBEBOUTI, FIDELE	3	42 x 30	1260.00	Old	48	LIMOYE, MADELEINE	29	60.9 x 40.5	2466.45	Old

Figure 4.8. Map depicting location and ownership of all manioc fields associated with the village of Bomassa, northern Congo.

Census results for demographics and employment of Bomassa are found in Tables 1.7 and 1.8. Households in Bomassa had a higher mean number of females (2.96 PPH) than males (2.56 PPH), Pygmies (2.93 PPH) than Bantus (2.59 PPH), and native inhabitants (3.07) than immigrants (2.44 PPH). The literacy rate was zero but Bomassa maintained the third highest rates for knowledge of the alphabet (0.70 PPH) and students (0.48 PPH) compared with the other villages in the study. Bomassa had the highest labourer rate (0.48 PPH) and second highest employment rate (0.48 PPH) among villages. It also had the second highest fishermen rate (0.85 PPH) of all villages surveyed.

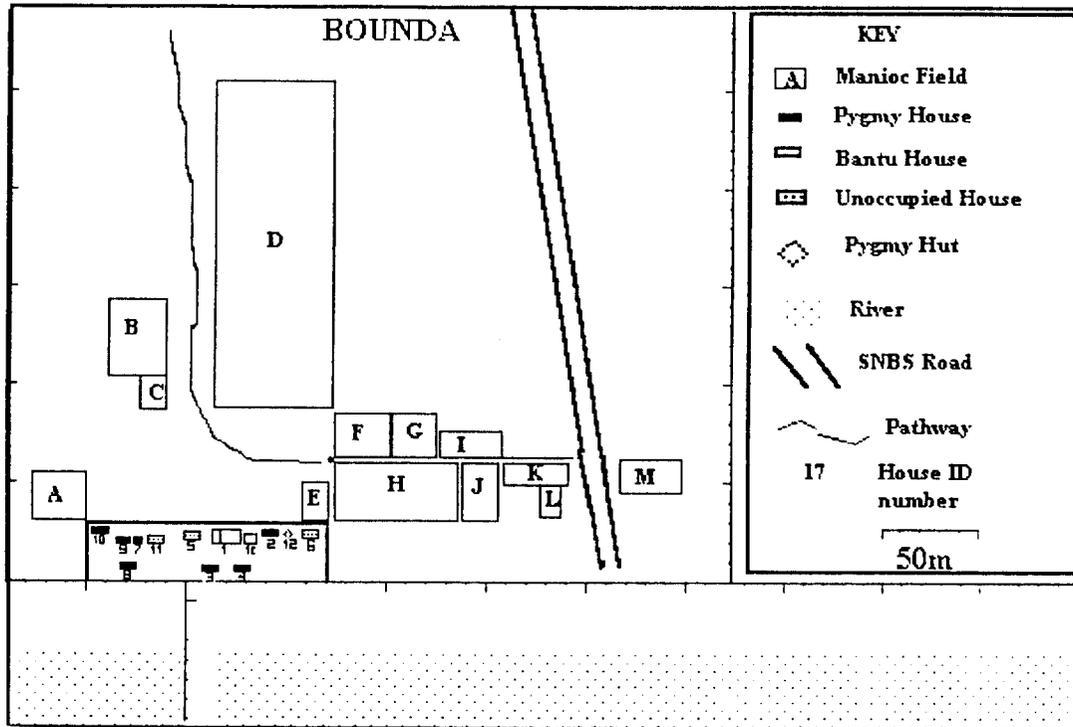
Employment in Bomassa was provided by the Nouabale-Ndoki project. The majority of households maintained at least one manioc field with a total village field area of 111,074.72 m². There were six 12 gauge shotguns reported in the village.

Bounda (02°11.977'N, 16°05.720E):

The creation of Bounda village is estimated to be more than 80 years ago. It was originally a Baya village with Mr. Boigbone as chief. The chief's younger brother, Mr. Nganzou, was married to a Bomassa woman, Madame Zabouka. Madame Zabouka's brother, Mr. Nganzoke, decided to come to Bounda to live with his brother-in-law. Upon the death of Mr. Nganzou, Mr. Nganzoke, became the chief of the village and a number of Baya left the village. After the death of Mr. Nganzoke, Mr. Albert Ngbona, who was the son of Mr. Nganzoke, became the chief of the village. The emigration of certain villagers resulted for personal reasons. In 1992 Mr. Ngbona died and his wife, Madame Albertine Adada became the effective chief of the village. Madame Adada's twin sister, also called Albertine, and her husband Mr. Pascal Libanga came to live in Bounda from CAR. These three were the only Bantus living in Bounda at the time of the study. A map of Bounda and its associated manioc fields is shown in Figure 4.9. Twelve households were in the village, three of which were under construction.

Results of the census are shown in Tables 1.7 and 1.8. Bounda had a higher mean per household for males (3.33 PPH) than females (2.83 PPH), Pygmies (5.56 PPH) than Bantus (0.33 PPH), native inhabitants (3.89 PPH) than immigrants (2.00 PPH), and husbands (1.67 PPH) than wives (1.56 PPH). There were no values for literacy, students, or knowledge of alphabet. Mean number per household for illiteracy matched that for number of people total (5.89 PPH). According to employment categories, highest values were found for housewives (1.67 PPH), hunters (1.11 PPH), and fishermen (0.89 PPH). Bounda had the second highest value for hunters of all villages.

No person in the village reported having a job in the formal sector. The majority of households maintained a manioc field with a village total area of 17,408.97 m². One 12 gauge shotgun reported in the village was owned by Madame Adada #1. Information received revealed the presence of a .458 calibre elephant gun, in the village owned by a resident of Ouesso who maintained a house and field in the village. The gun was controlled by Madame Adada #1. This village was reported to have been responsible for a known 8 elephant deaths since January 1995.



#	NAME	HOUSE	CUISINE	TOILET
1	Adada, Albertine	wood, plank, tuile	wood, plank, tuile	
2	Mongoto, Marcel	wood, leaves, tuile		
3	Doungo, Pascal	wood, leaves, tuile		
4	Bossenga, Gilbert	wood, leaves, tuile		
5	House under construction	wood		
6	House under construction	wood		

#	NAME	HOUSE	CUISINE	TOILET	#	NAME	L X W (m)	AREA	GROWTH
8	Boyamoke, Mathieu	wood, leaves, palm, tuile			A	Billet, Jean-Bosco	27 x 25	675	old, new
1C	Ngamou, Jacqueline	wood, plank, tuile			B	Adada, Albertine II	38.6 x 29.9	1154.14	new
9	Adouma, Fragonard	wood, mud, tuile			C	Boyamoke, Mathieu	13.9 x 7.9	109.81	new
10	Billet, Jean-Bosco	wood, leaves, tuile			D	Adada, Albertine I	167.7 x 60	10062	new
11	House under construction	wood			E	Ngamou, Jacqueline	20 x 13	260	old
12	Hut	wood, leaves, palm, tuile			F	Josephine Balouma	29.4 x 23.4	687.96	old
					G	Wambou, Madeleine	23.4 x 21.7	507.78	old
					H	Josephine Balouma	61.9 x 29.7	1838.43	old
					I	Mongoto, Marcel	32 x 12.7	406.40	old
					J	Lenga	29.7 x 19	564.30	old
					K	Ayi Bobisi	33 x 11.7	386.10	old
					L	Mototo	16.5 x 11.3	186.45	new
					M	Adouma, Fragonard	31.7 x 18	570.6	old

Figure 4.9. Map, description of houses, and manioc fields for the village of Bounda, northern Congo.

Bonga (2°04.902'N, 16°05.218E):

The village of Bonga was created around 1991 by the current chief Mr. Antoine Kobo who was the chief of Kabo village and is still considered to be the customary chief of that village since the death of his father, Mr. Gozo. Following the establishment of the logging company at Kabo, Boissangha in the late 1960's, Mr. Kobo was confronted with difficulties in finding enough land close to the village for his manioc fields due to the large number of people moving into Kabo who were being employed by the logging company and who were establishing manioc fields. Mr. Kobo decided to leave Kabo and established a new village at HOB0 but moved the village a second time to Bonga due to an island that was in front of the village and did not permit villagers to see a long distance. The village of Bonga is dominated by a bantu population and does not consider the two pygmy households maintained in the village.

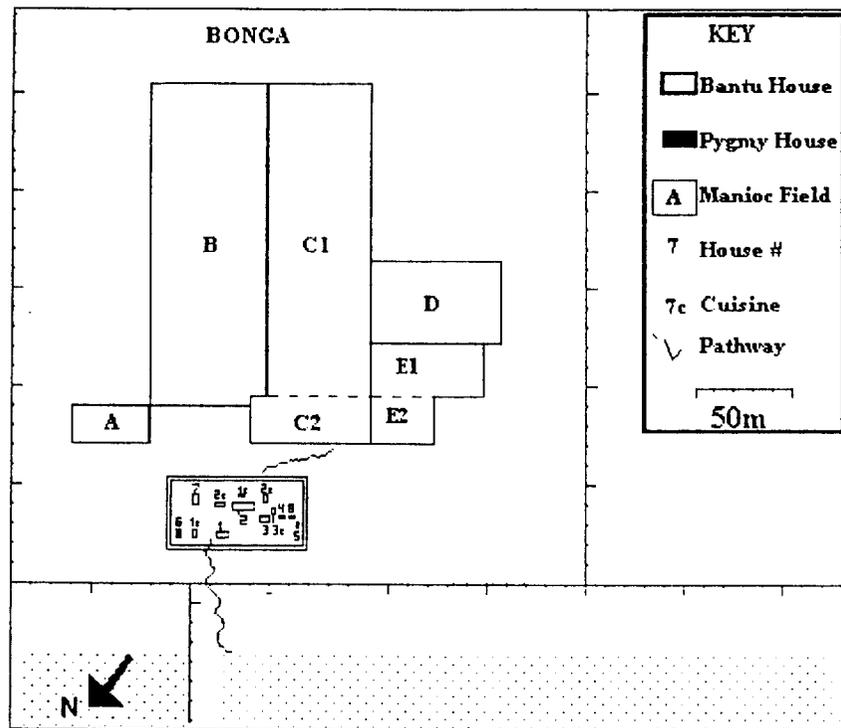
There were five occupied households in the village of Bonga and two unoccupied households. A map of the village and its associated manioc fields is shown in Figure 4.10. Results of the census are found in Tables 1.7 and 1.8. Bonga had higher mean number per household values for males (4.60 PPH) than females (3.40), wives (2.40 PPH) than husbands (1.80 PPH), immigrants (5.60 PPH) than native inhabitants (2.40 PPH). Bonga had the highest per household illiteracy rate (7.80 PPH) but was only one of two villages that actually had a literacy value (0.20 PPH). Perhaps due to the large number of individuals living in the chief's house, Bonga had the highest mean total number of people per household (8.00 PPH) and the second highest number of children per person (2.80 PPH).

In terms of employment Bonga had the highest number of hunters (1.80 PPH) and housewives (2.80 PPH) as well as people categorized as self employed (5.20 PPH). There were also a relatively high number of fishermen reported (0.60 PPH).

No person in Bonga reported having a guaranteed source of income. The majority of inhabitants maintained a manioc field with a total village field area of 29,683.70 m². Three 12 gauge shotguns were reported in the village all of which were owned by the chief. It was discovered during the study that the chief also owned a .375 calibre elephant gun.

Kabo Village: (02°3'N)

This village is associated with the logging company's establishment at *Kabo Chantier*. It is what remains of the original village of Kabo which was established prior to the logging operation in the 1960's. In addition to the *Chantier*, the logging company maintains a second community, *Kabo Scierie* which also has a small village associated with it housing persons not employed by the logging company. The original site of the village was actually where logging company management housing was located at the time of the study and was moved when the logging company established operations. The majority of villagers did not work for the logging company though children were able to attend the school at the *Chantier*. Originally, *Boissangha* (BS) was the company responsible for logging operations at Kabo but this company went bankrupt and operations were taken over by *La Societe Nouvelle des Bois de la Sangha* (SNBS) in June



#	NAME	HOUSE	CUISINE	TOILET
1	Mokote, Emile	wood, plank, tuile	wood, plank, tuile	
2	Kobo, Antoine	wood, plank, tole	wood, plank, tuile	wood, plank, tuile
3	Nguessa, Nestor	wood, plank, tuile	wood, mud, tuile	
4	Kokendo, Mbawe	wood, mud, tuile		
5	Ebonga, Francois	wood, mud, tuile		
6	Abandoned House	wood, mud, tuile		

#	NAME	L X W (m)	AREA	GROWTH
A	Moutimo, Helene Jerome	38.5 x 20.9	804.65	new
B	Kaka, Henriette Emilienne	184.5 x 61	11254.50	old
C1	Apeimbou, Jane	169.5 x 61.7	10458.15	old
C2	Apeimbou, Jane	70.7 x 25.0	1767.5	new
D1	Sonji, Therese	66.7 x 43	2868.10	old
E1	Bioumbou, Jacqueline	66.7 x 25.6	1707.52	old
E2	Bioumbou, Jacqueline	32.8 x 25.1	823.28	old

Fig. 4.10. Map, description of houses and manioc fields for the village of Bonga, northern Congo.

1990. There were 64 households/structures in Kabo Village 31 of which were occupied. All households in Kabo Village with the exception of one Arab household, were owned by Bantus. The remaining houses were abandoned. A map of Kabo Village is shown in Figure 4.11.

Results of the census for demographics and employment are found in Tables 1.7 and 1.8. They showed that Kabo Village had the lowest mean number per household for wives (0.71 PPH) and Pygmies (0.16 PPH) as well as total number of people per household (4.32 PPH) and the second lowest for husbands (0.84 PPH). It had the highest literacy (0.90 PPH) and number of children per person (2.93 PPH). Males (2.13 PPH) and females (2.19 PPH) were almost equal as were native inhabitants (2.03 PPH) and immigrants (2.29 PPH).

Employment (0.35 PPH) and labourers (0.10 PPH) in Kabo Village were the third highest of all villages. Kabo Village was the only one in the study which had commercial traders (0.45 PPH) which was the highest employment category as compared with hunters (0.03 PPH), fishermen (0.35 PPH), or cultivators (0.06 PPH).

Of the 31 households occupied in Kabo Village no person reported working directly for the logging company. Most individuals reported having a manioc field and derived a portion of their income from selling products at the local market. Kabo was the only village visited that maintained a permanent market area which was occupied for several hours each day. Kabo Village was the only village in the study that had shops with commercial goods for sale. Most people were reluctant to report ownership of shotguns but it was ascertained from a resident of the village that there were an estimated 85 12-gauge shotguns, three .458 calibre elephant guns, one .375 calibre magnum elephant gun, and one 10.75mm elephant gun currently under operation from Kabo Village, *Scierie*, and *Chantier*.

Petet ya Mbandaka:

The history of this village was not able to be determined though it was known to exist since the establishment of BS which most likely was the cause of its establishment. This village was composed of 29 households, nine of which were either abandoned or under construction. All inhabitants of this village were Pygmies and the majority were of the Bambenzele group. This was the largest of three pygmy villages associated with the Kabo complex. A map showing the location of this village in relation to the other portions of Kabo and including the manioc fields for those households interviewed in the questionnaire is shown in Figure 4.12.

Demographic and employment results of the census for Petet ya Mbandaka are shown in Tables 1.7 and 1.8. They showed the lowest mean number of husbands (0.75 PPH) and second lowest mean number of wives (0.83 PPH) compared with the other villages. Number of females (2.92 PPH) and males (2.25 PPH) were similar. Only Pygmies (5.17 PPH) lived in this village. The number of children per person (1.50 PPH) was lower than Kabo and Bonga but higher than Bounda. A higher mean number of immigrants (3.33 PPH) lived in Petet compared with mean number of native inhabitants (1.83 PPH). All individuals were reported illiterate (5.17 PPH) and nobody was reported to be literate, have knowledge of the alphabet, or was attending school.

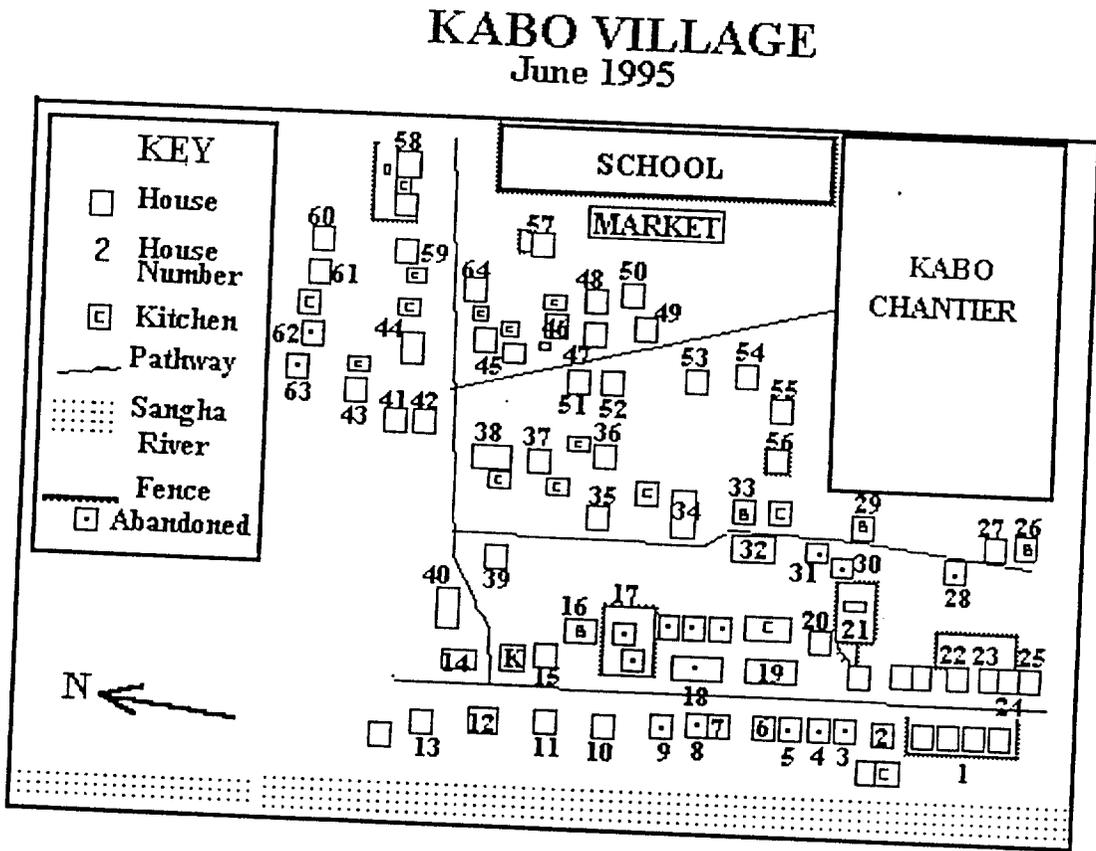


Fig. 4.11. Map of Kabo Village and housing descriptions, northern Congo.

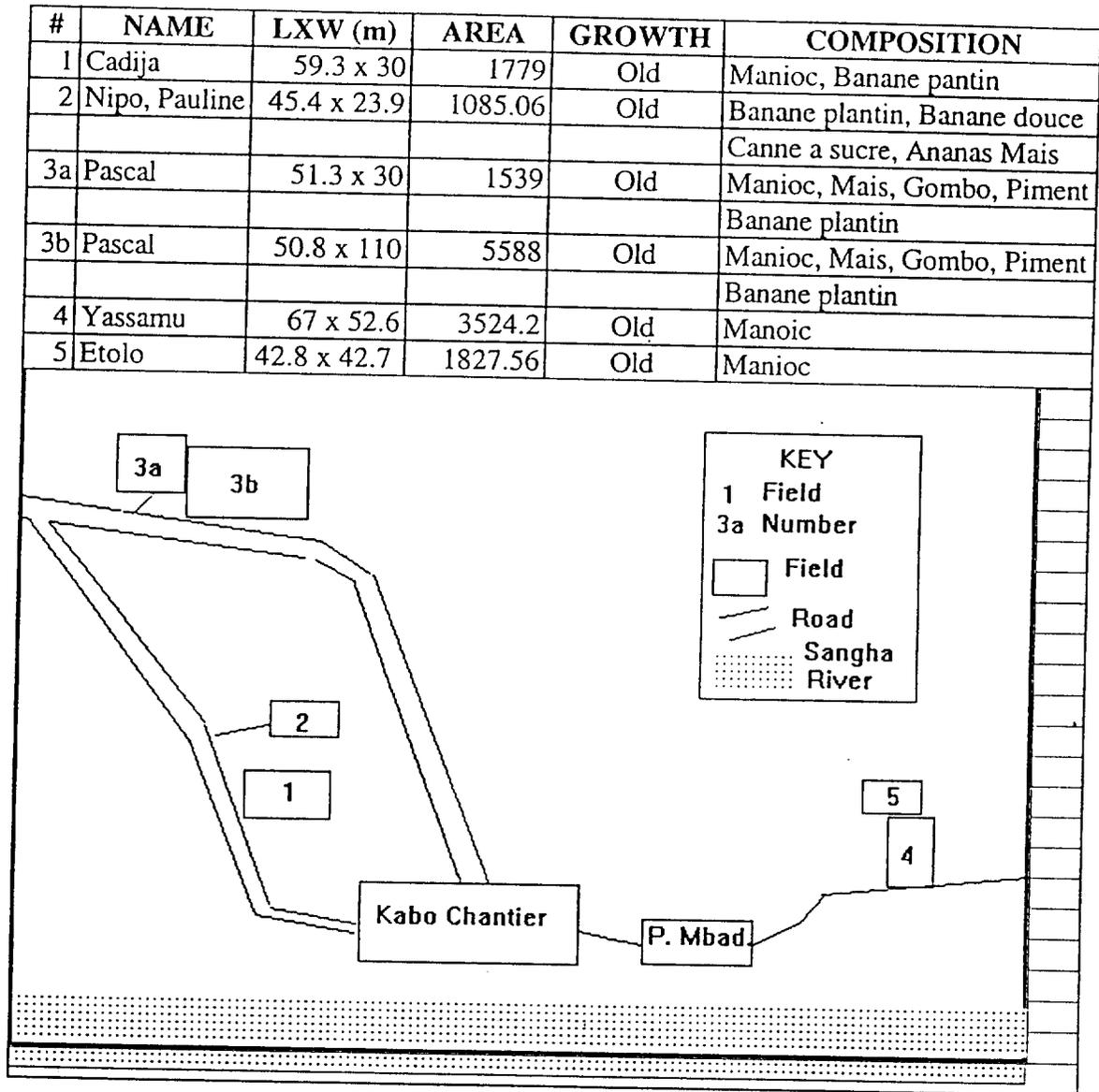


Fig. 4.12. Map showing location of Kabo Village and Petet ya Mbandaka with manioc fields for individuals participating in the questionnaire and their relative location in the logging town of Kabo, northern Congo.

Employment levels (0.17 PPH) were higher than the No Industry villages but lowest among Conservation and Logging villages. There was a relatively high number of hunters (0.83 PPH) and housewives (2.08). No other categories besides self employment (2.92 PPH) contained values.

There were a few individuals in the village who reported having employment with SNBS the majority, however, appeared to devote their efforts to hunting, cultivating, and collecting large quantities of high-valued forest products for sale at the local market. Many individuals had their own manioc fields but a number of women reported receiving manioc for working in fields of bantu women living in *Kabo Chantier*. There were no shotguns reported in this villages. Those reporting hunting activities included visiting the *Chantier* or Kabo Village in order to collect the gun for hunting. One hunting expedition was canceled due to rain and dependence on SNBS transport to the forest. When questioned regarding hunting activities the majority of hunters reported travelling one to three hours by truck into the forest before they would be able to find wildlife for hunting.

Questionnaire:

Analysis of the questionnaire data was complex due to its qualitative nature. Many responses were recoded as described in the methodology section. From the new variables two separate analyses were carried out according to wealth, village type, and ethnicity. Both regression and chi-square analyses were carried out and are described in the following section.

Regression Analysis:

Household Wealth, Income, Expense, Attitude:

The questionnaire results for household wealth, manioc field value, monthly income, and monthly expenditure are shown in Table 2.1. Also shown in the table are the monthly net income which was derived by subtracting monthly expenses from monthly income and the attitude index values. Twenty eight households participated in the questionnaire with 6 households from Bon Coin, 7 from Bomassa, 4 from Bounda, 4 from Bonga, 5 from Kabo Village and 2 from Petet ya Mbandaka. Mean attitude index values were +5.5 for Bon Coin, +1.6 for Bomassa, -1 for Bounda, +0.3 for Bonga, +3.2 for Kabo, and +0.5 for Petet ya Mbandaka. Values for monthly income, expenses, and net income were not calculated for Bon Coin as monthly estimates were not requested.

The data from this table were used in regression analyses to determine the relationship between a series of variables derived from the questionnaire. Table 2.2 shows the results of this analysis. No significant relationship was determined between the attitude index and any of the monetary categories of household wealth, value of manioc field, monthly income, or monthly expenses. Figure 5.1 graphs the results of all four comparisons. Comparisons made among the four monetary categories resulted in two regression analyses indicating significant relationships. Using household wealth as the dependent variable a relationship was indicated between both the

Table 2.1. Results of village questionnaire. Household wealth pertains to valuation of common household goods. Value of manioc field is based on a 100CFA per square meter estimated value. Monthly income and expenses were estimated by individuals based on a list of food and other necessities. Attitude index is based on a total possible range of -15 to +15 with negative values reflective negative attitudes and lack of knowledge of conservation concepts while positive values represent positive attitudes and presence of knowledge of conservation concepts.

VILLAGE ID	ETHNIC GROUP	HOUSEHOLD WEALTH	VALUE OF MANIOC FIELD	MONTHLY INCOME	MONTHLY EXPENSES	MONTHLY NET	ATTITUDE INDEX
BON COIN-1	BANTU	50,760	726,753	9,000	*	*	3
BON COIN-2	PYGMY	16,500	45,600	*	*	*	1
BON COIN-3	BANTU	573,520	1,298,060	*	*	*	10
BON COIN-4	PYGMY	34,440	162,375	*	*	*	5
BON COIN-5	PYGMY	28,560	162,375	*	*	*	9
BON COIN-6	PYGMY	9,800	69,720	*	*	*	5
BOMASSA-1	BANTU	12,180	0	*	*	*	1
BOMASSA-4	PYGMY	22,600	201,243	4,100	9,383	-5,283	2
BOMASSA-5	BANTU	101,360	476,613	74,000	45,858	28,141	-2
BOMASSA-6	BANTU	12,120	43,750	30,500	17,008	13,491	4
BOMASSA-7	BANTU	99,600	717,597	89,000	13,291	75,708	1
BOMASSA-8	BANTU	106,680	1,566,450	6,000	26,175	-20,175	5
BOMASSA-9	PYGMY	21,320	847,500	7,500	7,833	-333	0
BOUNDA-1	BANTU	146,700	1,006,200	46,000	18,150	27,850	2
BOUNDA-2	PYGMY	26,660	40,640	27,300	16,616	10,683	-1
BOUNDA-3	PYGMY	7,620	56,430	20,200	10,487	9,712	0
BOUNDA-4	PYGMY	33,280	10,981	32,500	14,275	18,225	-5
BONGA-1	BANTU	203,880	1,222,565	167,000	26,483	140,516	1
BONGA-2	PYGMY	22,740	0	58,900	2,233	56,666	-5
BONGA-3	BANTU	29,200	286,810	25,750	7,283	18,466	2
BONGA-4	BANTU	55,660	1,125,450	102,000	22,200	79,800	3
KABO-1	BANTU	166,160	711,800	45,000	2,650	42,350	4
KABO-2	BANTU	79,280	0	*	35,700	*	-1
KABO-3	BANTU	99,120	0	75,000	60,333	14,666	6
KABO-4	BANTU	4,330	108,745	*	1,475	*	4
KABO-5	BANTU	33,120	0	152,000	64,420	87,579	3
PETET-1	PYGMY	6,460	182,756	4,000	4,033	-33	2
PETET-2	PYGMY	38,160	352,420	12,000	12,833	-833	-1

Table 2.2. Regression analysis results for comparisons of attitude and wealth variables determined from villages in the Kabo logging concession, northern Congo. NS indicates a relationship between variables that is not statistically significant.

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	INTERCEPT	R ²	PROB > F
ATTITUDE INDEX	0.00(HOUSEHOLD WEALTH)	0.155	0.0825	NS
ATTITUDE INDEX	0.00(VALUE OF MANIOC FIELD)	0.214	0.0987	NS
ATTITUDE INDEX	-0.00(MONTHLY INCOME)	1.131	0.0001	NS
ATTITUDE INDEX	0.00(MONTHLY EXPENSES)	0.003	0.1097	NS
HOUSEHOLD WEALTH	0.08(VALUE OF MANIOC FIELD)	28,687	0.4229	0.0026
HOUSEHOLD WEALTH	0.92(MONTHLY INCOME)	23,703	0.4358	0.0021
HOUSEHOLD WEALTH	0.72(MONTHLY EXPENSES)	50,448	0.0488	NS
MONTHLY EXPENSES	0.12(MONTHLY INCOME)	15,339	0.0611	NS
VALUE OF MANIOC FIELD	4.27(MONTHLY INCOME)	275,730	0.1325	NS
VALUE OF MANIOC FIELD	-1.66(MONTHLY EXPENSES)	498,998	0.0037	NS

value of the manioc field ($R^2=0.4229$, $\text{Prob} > F=0.0026$) and monthly income ($R^2=0.4358$, $\text{Prob} > F=0.0021$). Figure 5.2 shows a graph of the results of these analyses. Also shown in Figure 5.2 are two graphs of household wealth and monthly income and monthly expenses. It is noted that values of both wealth and income are an order of magnitude higher than values for monthly expenses. Final analyses were conducted using the value of the manioc field as the dependent variable and monthly income and expenses as the independent variable. A graph (Fig.5.3.) of regression analyses results for value of manioc fields and both monthly income and expenses for villages surveyed in northern Congo was produced. Although the results were not statistically significant the graphs appear to indicate the possibility for a relationship.

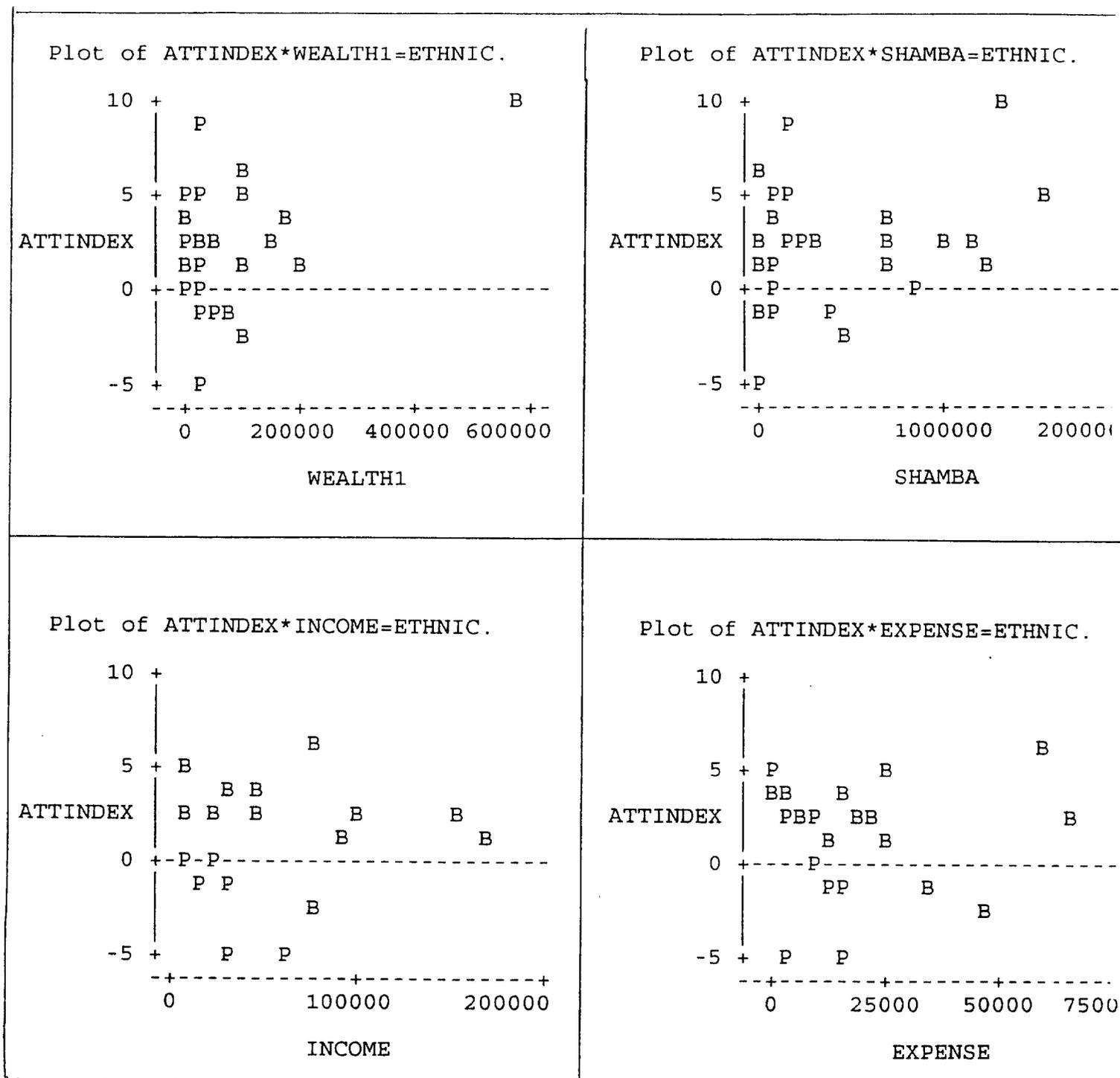


Fig. 5.1. Graph displays of the regression analysis for Attitude Index (ATTINDEX) and various wealth variables in a questionnaire survey of villages in northern Congo. Wealth1 = Household Wealth; Shamba = Value of Manioc Field; Income = Estimated Monthly Income; and Expense = Estimated Monthly Expense. Ethnicity is used as the symbol for each data point where P = Pygmy Household and B = Bantu Household.

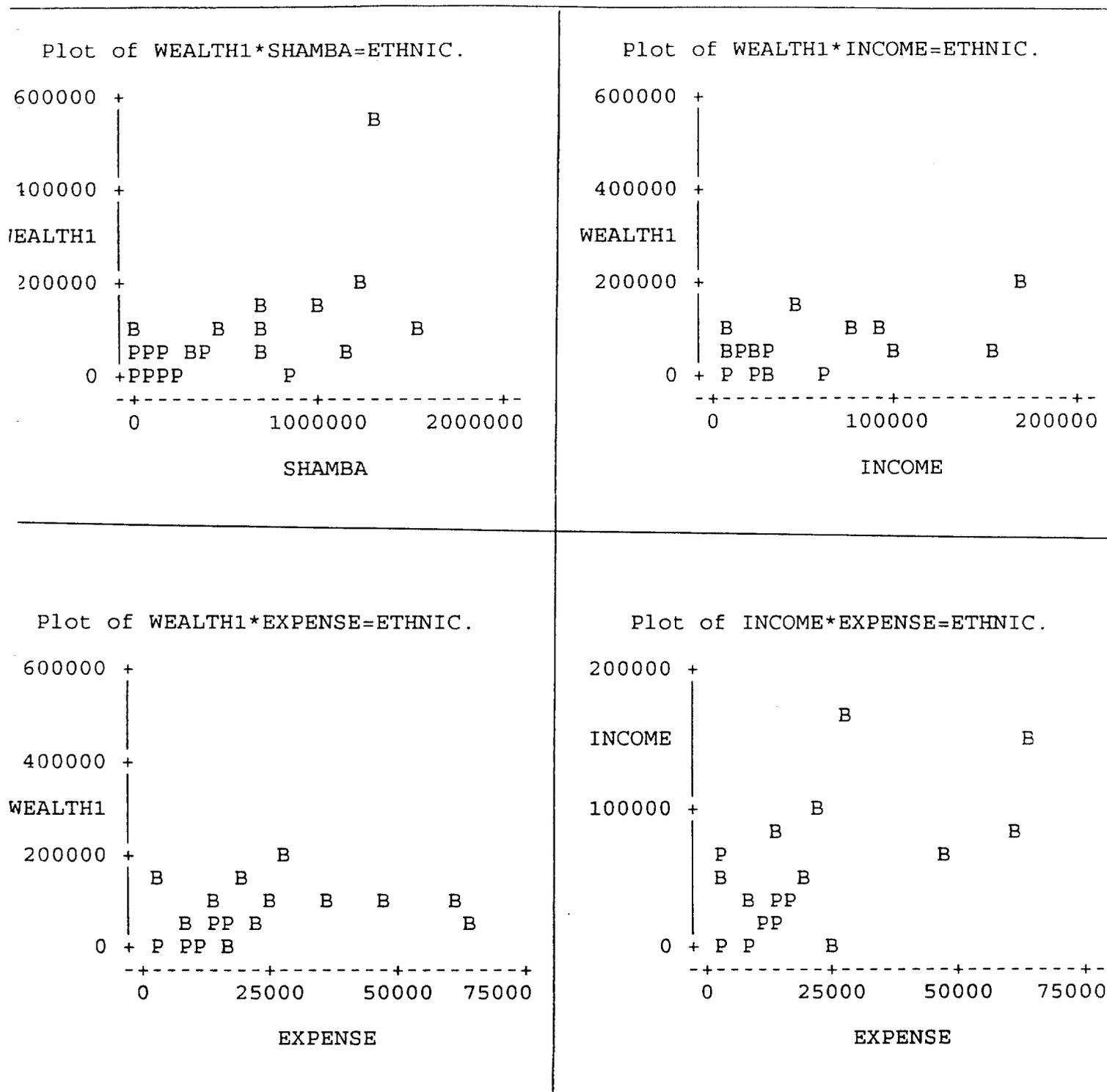


Fig. 5.2. Graphs depicting results of the regression analysis on specific questionnaire results for northern Congo villages in the Kabo logging concession. Wealth1=Household Wealth; Shamba= Value of Manioc Field; Income= Estimated Monthly Income; Expense= Estimated Monthly Expense. Relationships for Wealth1 x Shamba and Wealth1 x Income were significant.

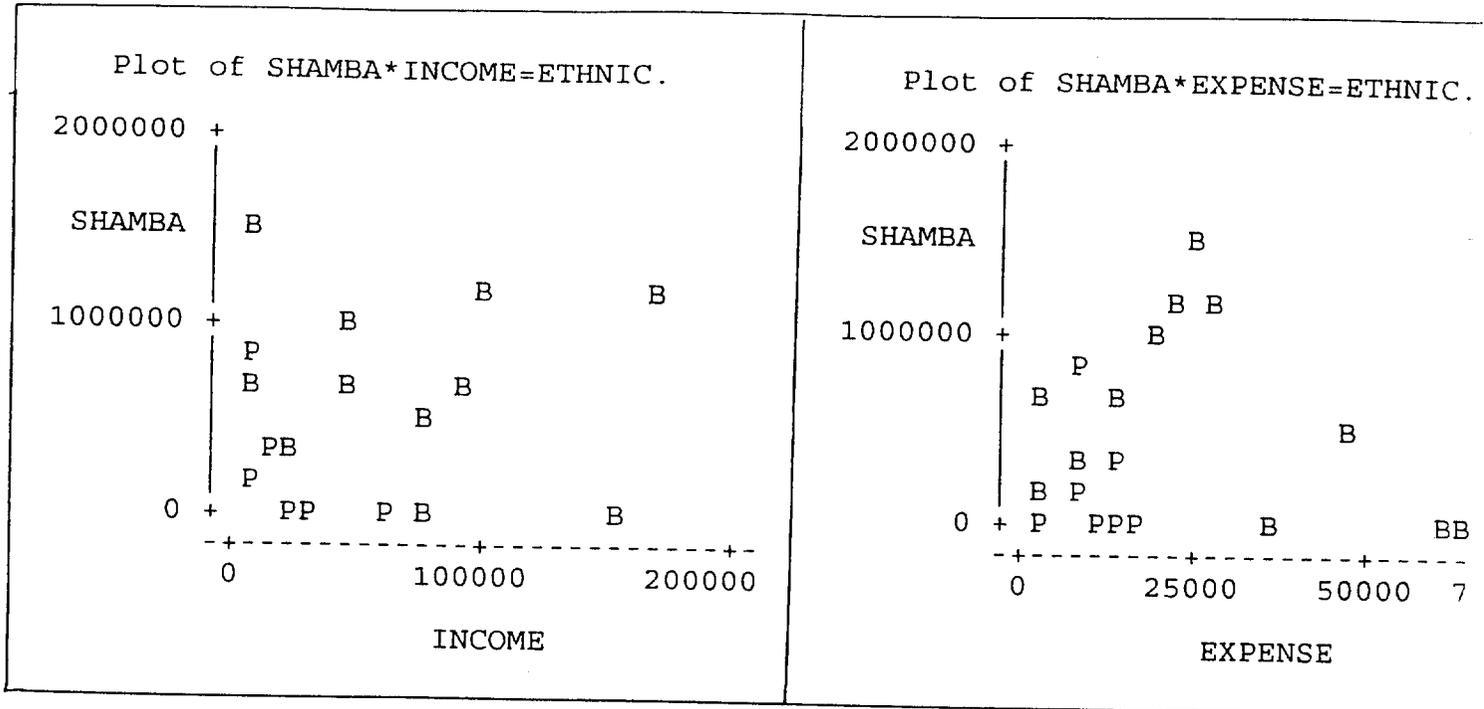


Fig. 5.3. Graph of regression analyses for value of manioc fields (SHAMBA) and both monthly income and expenses for villages surveyed in northern Congo. Results were not statistically significant. Data points represent bantu (B) and pygmy (P) households.

Chi-Square Analysis:

Wealth, Ethnicity, Village Type

Chi-square analysis was carried out for each question in the questionnaire. Three analysis categories were used: village type, ethnic group, and wealth. Table 2.3 shows percentages of participants in each category. The breakdown according to wealth was evenly distributed among the five wealth categories. Conservation villages had a higher relative percentage of both very wealthy and poor households while both Logging and No Industry villages showed a more even distribution of wealth. A clear distinction among wealth categories was more noticeable in the breakdown by ethnicity with no pygmy households being present in either the wealthy or very wealthy categories and the highest percentages of households being present in the wealthy (17.86%) and very wealthy (21.43%) bantu households.

Fishing, Agriculture, Hunting

Table 2.4 shows those questions from the questionnaire with a statistically significant chi-square result. Comments for each question are included which explain the cause of the difference in responses received for the question. Three questions in the fishing activity, one question in the agricultural activity, and three questions in the hunting activity portions of the questionnaire had results which were significantly different in at least one of the three categories

(wealth, ethnicity, village type). Results for all seven questions were significant according to village type. One concerning fishing was also significantly different according to household wealth and one question in the hunting activity section had significantly different results according to ethnicity.

Only people in conservation villages reported having fished on the day of the questionnaire, logging villages did not report smoking their fish, and only conservation villages reported fishing at night. Respondents in both Conservation and No Industry villages tended to trade agricultural products while those in Logging villages reported selling their agricultural products. All respondents in conservation villages reported that they did not hunt with snares while those from Logging and No Industry villages reported hunting with snares. Respondents in Logging villages said they did not hunt in Cameroon while all those in No Industry villages said they did. Only wealthy households reported fishing at night.

Food Purchase and Selling

Table 2.5 shows those responses on the foods purchased and sold portion of the questionnaire which were significantly different in the chi-square analysis. Of the 25 items listed, only six showed a statistically different response rate according to village type while 17 were statistically different according to ethnic group and 10 were significantly different according to household wealth category. Differences among bantu households and pygmy households were indicated by a number of items. Bantus tended to buy items such as meat, fish, koko (*Gnetum spp.*), palm nuts (*Elaeis sp.*), mushrooms, peke (*Irvingia gabonensis*), and kerosene. Pygmies tended to purchase manioc, alcohol (ngolongolo), palm wine (*Raffia sp.*), and cigarettes while they tended to sell palm grubs, koko, palm nuts, honey, mushrooms, and peke.

Differences among buying and selling activities according to wealth were also in evidence. Poorer households tended to purchase manioc while wealthier households purchased a number of items including: palm nuts, honey, peke, and kerosene. Wealthier households tended to sell manioc and meat while poorer households tended to sell forest products including: koko, palm nuts, honey, and mushrooms.

Table 2.3. Household categories of wealth, ethnicity, and village type for village questionnaire carried out in the Kabo logging concession, northern Congo. Values are in percentage of households surveyed found in each category.

VILLAGE/ETHNIC CATEGORY	VERY POOR	POOR	AVERAGE	WEALTHY	VERY WEALTHY
CONSERVATION VILLAGES	3.57	17.86	7.14	7.14	10.71
LOGGING VILLAGES	7.14	0.00	7.14	7.14	3.57
NO INDUSTRY VILLAGES	3.57	3.57	10.71	3.57	7.14
BANTU	3.57	7.14	7.14	17.86	21.43
PYGMY	10.71	14.29	17.86	0.00	0.00

Table 2.4. Chi-square analysis results for questions from the village questionnaire carried out in villages in the Kabo logging concession, northern Congo which show statistically significant differences in response. Values shown indicate Prob > F for responses.

QUESTION	ETHNIC	VILLAGE TYPE	HOUSEHOLD WEALTH	COMMENTS
FISHING ACTIVITY				
DID YOU FISH TODAY?	*	0.001	*	Only people in conservation village said yes
DO YOU SMOKE THE FISH THAT YOU CATCH?	*	0.028	*	Most people said yes except in logging villages
DO YOU FISH DURING THE DAY OR AT NIGHT?	*	0.017	0.032	Only conservation villages reported fishing at night; only wealthiest households fish at night
AGRICULTURAL ACTIVITY				
WHAT DO YOU DO WITH THE PRODUCTS OF YOUR FIELD? (SELL, EAT, TRADE)	*	0.010	*	Most responded trading but logging villages responded selling
HUNTING ACTIVITY				
DID YOU HUNT TODAY?	0.017	0.001	*	Most respondents reported no
WHAT DO YOU DO WITH THE MEAT? (EAT, SELL, TRADE)	*	*	*	Most respondents said they eat the meat while few reported selling
ARE THERE MORE, THE SAME, OR FEWER ANIMALS TODAY THAN IN PREVIOUS YEARS?	*	*	*	Most Bantus said less, all Pygmies said either the same or more; Conservation villages reported more; Poorer people reported more while wealthier people reported less
DO YOU HUNT WITH SNARES?	*	0.003	*	Only people in conservation villages reported no
DO YOU HUNT IN CAMEROON?	*	0.037	*	All respondents in no industry villages reported yes while all respondents in logging villages reported no, respondents in conservation villages were equally distributed

Table 2.5. Results of chi-square analysis for food items bought and sold by households according to wealth category, village type, and ethnicity. Values shown reflect Prob > F for differences in responses.

FOOD ITEMS BOUGHT AND SOLD	ETHNIC	VILLAGE TYPE	HOUSEHOLD WEALTH	COMMENTS
BUYS MANIOC	0.004	*	0.013	Most Pygmies buy manioc, fewer Bantus buy manioc; Poorer households buy manioc
SELLS MANIOC	*	*	0.042	Wealthier households sell manioc
BUYS NGAINGAI	*	0.040	*	Only bought in logging towns
SELLS NGAINGAI	*	0.040	*	Only sold in logging towns
BUYS MANIOC LEAVES	*	0.037	*	Most get from own field
SELLS MANIOC LEAVES	*	0.039	*	Not sold in logging villages
BUYS NGOLONGOLO	0.008	*	*	All Pygmies said yes, Bantus evenly divided
BUYS PALM WINE	0.034	*	*	Most Pygmies said yes, Bantus evenly divided
SELLS PALM WINE	*	0.008	*	Few in logging villages, Almost all in no industry villages
BUYS FISH	0.034	*	*	All Bantus reported yes, Pygmies divided
BUYS MEAT	0.013	*	*	All Bantus reported yes, Pygmies divided
SELLS MEAT	*	*	0.035	Very few poorer households sell meat
SELLS PALM GRUBS	0.009	*	*	Most Bantus said no, most Pygmies said yes
BUYS KOKO	0.003	*	0.028	Most Bantus said yes, most Pygmies said no; nobody in wealthier households said yes
SELLS KOKO	0.000	*	0.000	All Pygmies said yes, most Bantus said no; most poor households said yes, all wealthy households said no
BUYS PALM NUTS	0.010	*	0.025	Most Bantus said yes; all wealthy households said yes
SELLS PALM NUTS	0.001	*	0.021	Most Pygmies said yes and most Bantus said no; most wealthy households said no and most poor households said yes
BUYS HONEY	*	*	0.031	Most wealthy households said yes
SELLS HONEY	0.017	0.033	*	Most Bantus said no, most Pygmies said yes
BUYS MUSHROOMS	0.049	*	*	Most Bantus said yes
SELLS MUSHROOMS	0.001	*	0.011	Most Pygmies said yes
BUYS PEKE	0.034	*	*	Most Bantus said yes
SELLS PEKE	0.001	*	*	Most Pygmies said yes
BUYS KEROSENE	0.010	*	0.017	Most Bantus said yes; most poorer households said no
BUYS CIGARETTES	0.017	*	*	All Pygmies said yes; Bantus were divided

Needs Index and Attitudes

The final sections of the questionnaire to show significant results in the chi-square analysis were the index of needs section from the household wealth portion of the questionnaire and certain questions from the attitude portion. Results and comments of the chi-square analysis are shown in Table 2.6. Analysis categories included ethnic group, village type, and household wealth. From a total of 22 questions having significantly different results in at least one of the three categories, 15 were found for village type, 7 for ethnic group, and only 5 for household wealth.

Responses that showed a significant difference according to ethnicity were mainly associated with needs index. Pygmies tended to have poorer roofing material, clothing which was in poor condition and relatively few in quantity, never reported using pharmaceutical medicines and all reported selling forest products. Bantus tended to have more toll roofs, better condition and more clothing, used pharmaceutical medicines, and very few sold forest products. In the attitudinal results, all Bantus reported the forest providing advantages and said they would either buy their food or fish if the forest did not exist. Pygmies were evenly divided in their response to whether or not the forest provided advantages and said they would either fish or didn't know what they would do if the forest did not exist anymore.

Differences found according to household wealth showed no pygmies in the wealthy or very wealthy categories, no manioc fields above 1 million CFA in value were found outside of the wealthy or very wealthy categories, poor people had fewer clothing than wealthier people, and only average to very poor people tended to sell forest products. The only response which was significantly different according to wealth among the attitude questions pertained to changes in life due to the presence of the Nouabale-Ndoki project with most wealthy people responding yes.

The majority of differences found in responses was among village types. Conservation villages tended to have mud or wood houses, responded "no" to the forest presenting risks. Most felt their life had changed since the presence of the Nouabale-Ndoki project began and said that people benefitted from the project. Most people felt positively about the national park and said they would fish for their subsistence if the forest no longer existed.

Logging villages tended to have wooden houses, few people selling palm wine or fishing for a living. They tended to say that the forest presented risks, preferred the logging village over the forest, didn't know if changes had occurred since the presence of the Nouabale-Ndoki project and didn't know who benefits from the project. They didn't know if hunting should be restricted in the national park and had no opinion about the national park or putting a road through it. They said they would just buy their food if they didn't have the forest.

Table 2.6. Results for chi-square analysis of questionnaire responses pertaining to indices of needs and attitudes toward wildlife. Values shown are for Prob > F values in the chi-square analysis.

QUESTION	ETHNIC	VILLAGE TYPE	HOUSEHOLD WEALTH	COMMENTS
ETHNICITY	*	*	0.008	No pygmies in the wealthy or very wealthy categories.
VALUE OF MANIOC FIELDS	*	*	0.002	No manioc fields above 1 million CFA in average, poor, or very poor wealth categories
TYPE OF HOUSE MATERIAL	*	0.000	*	Logging villages with cement or wood houses, conservation villages with mud or wood houses, no industry villages with leaves, palm tile and few wood houses
TYPE OF ROOF MATERIAL	0.019	*	*	Only one pygmy house with toll roofing
CLOTHING CONDITION	0.001	*	*	Pygmy clothing fair to very poor; Bantu clothing fair to very good
CLOTHING QUANTITY	0.009	*	0.032	Pygmies and poor people had few clothing; Bantus and wealthy people had lots of clothing
TYPE OF MEDICINE COMMONLY USED	0.018	0.037	*	Only Bantus used pharmaceutical medicines, no industry villages did not use pharmaceutical medicines
SELLS FOREST PRODUCTS	0.000	*	0.007	All Pygmies and only some Bantus sold forest products; very poor-average wealth people sold
PERMANENT SOURCE OF INCOME	*	0.040	*	No household in no industry villages had a permanent source of income
SELLS PALM WINE	*	0.008	*	Most people in no industry villages sold palm wine while few people in logging villages did
ACQUISITION OF FISH	*	0.046	*	Nobody in no industry villages purchased fish while few in logging villages actually fished
PRODUCES PALM WINE	*	0.008	*	Same as above
DOES THE FOREST PRESENT RISKS?	*	0.001	*	Most people in conservation and no industry villages said no; most people in logging villages said yes or they didn't know
DOES THE FOREST GIVE ADVANTAGES?	0.005	*	*	All Bantus said yes while Pygmies were evenly distributed between yes and no
THE FOREST OR VILLAGE (LOGGING) WHICH DO YOU PREFER?	*	0.013	*	Nobody in logging villages preferred the forest while the majority of no industry villages preferred the forest
ARE YOU INTERESTED IN WORKING FOR A LOGGING COMPANY?	*	0.022	*	All respondents in no industry villages said no the other village types had equal distribution
HAVE THERE BEEN CHANGES IN YOUR LIFE SINCE THE NOUABALE-NDOKI NATIONAL PARK PROJECT BEGAN?	*	0.015	0.028	Most people in logging and no industry villages said they didn't know; majority of conservation village said yes; most answered yes by wealth
WHO BENEFITS FROM THE PROJECT?	*	0.015	*	Most people in conservation villages said yes, rest didn't know
IS IT NECESSARY TO RESTRICT HUNTING IN THE NATIONAL PARK?	*	0.001	*	Most people in conservation villages said yes, rest didn't know
WHAT DO YOU THINK ABOUT THE NATIONAL PARK?	*	0.015	*	Most people in conservation villages answered positively, rest didn't know
WHAT DO YOU THINK ABOUT PUTTING A ROAD THROUGH THE NATIONAL PARK?	*	0.000	*	Most people in conservation villages said no (due to increased access to poachers), rest didn't know
WITHOUT THE FOREST WHAT WOULD YOU DO FOR YOUR SUBSISTENCE?	0.011	0.017	*	Bantus said they would either buy their food or fish, Pygmies said they would fish or they didn't know; Conservation villages said they would fish, Logging villages said they would buy their food

No Industry villages tended to have houses of leaves and palm tile with very few wooden houses, did not use pharmaceutical medicines, and nobody had a permanent source of income. Most people sold palm wine, nobody reported purchasing fish. They said the forest did not present risks and preferred the forest to logging villages. They didn't know if there had been changes since the Nouabale-Ndoki project began and didn't know who benefits from the project. They also didn't know if hunting should be restricted in the national park or about the national park in general and didn't know if a road should be built through it.

Daily Activity Study

Activities

The results of the daily activity pattern study were analyzed numerically according to percentage of responses reported for each activity. As actual times were not associated with each activity it is important to note that the results reflect the number of entries for each activity only and are not a reflection of time spent performing the activity. Twenty households in 5 villages (Bon Coin was not included) participated in the study which covered twenty days during the project period. Only twenty days were involved as data were collected for two villages, Kabo Village and Petet ya Mbandaka, on the same five days. Results were derived from 1,118 entries for activities of 88 adults which were broken down into 22 different categories. The 22 activities identified among the five villages are described below:

- Away: staying in another village;
- Community: chief taking care of community problem;
- Craft: construction of housing or utility materials;
- Fields: working in manioc fields;
- Fishing: fishing;
- Food Prep: preparation of food including cleaning, waiting for boiling, serving;
- Forest: collection of forest products;
- Hospital: visiting health care facility;
- Hunting: time from departure to return to village for hunting;
- Labour: working in a daily wage-earning job;
- Mulenge: making palm wine;
- Ngolongolo: making manioc alcohol;
- Moved: packed household and left village;
- Personal Care: fixing hair, bathing, etc.;
- Play: children above 15 years of age considered to be playing;
- Rest: sitting, sleeping, or not involved in any activity;
- Sick: inactive due to illness;
- Spirit: pursuing activities pertaining to cultural spiritual practices;
- Visiting: visiting other households and talking with others without working;
- Washing: washing dishes and/or clothes;
- Water: collecting water;
- Wood: collecting wood.

During analysis data for all individuals under the age of 15 years were discarded as the majority of entries were recorded simply as play. The results, therefore, reflect activities

performed by 88 adults from approximately 6h00 in the morning to approximately 18h00 in the evening. The results were calculated according to ethnic group, village, and household wealth category.

Daily Activity by Ethnic Group

Results of the daily activity study according to ethnic group are shown in Table 3.1. All categories described are listed in the table. The highest percentage values for number of entries for Pygmies in descending order were: Rest (23.73%), Food Preparation (10.80%), Forest (10.64%), Sick (10.64%), and Fields (8.67%). The highest percentage values for Bantus in descending order were: Rest (26.23%), Away (13.41%), Food Preparation (10.06%), Fields (8.88%), and Mulenge (7.89%). Pygmies had a higher number of entries for Craft (3.93%), Hunting (2.62%), Labour (7.36%), Moved (4.42%), Water (1.15%), and Wood (2.13%). Bantus had a higher number of entries for Fishing (6.51%), Hospital (0.20%), Ngolongolo (1.18%), Personal Care (0.99%), Visiting (4.93%), and Washing (3.36%).

Daily Activity by Village

Results of the daily activity study according to village are shown in Table 3.1. The top five activities by percentage of entries are listed below in descending order by village:

- Bomassa: Rest (23.33%), Fields (13.33%), Labour (13.33%), Fishing (10.48%), Food Prep and Sick (10.00%);
- Bounda: Rest (24.15%), Forest (12.56%), Food Prep (11.11%), Craft (9.66%), Fields and Away (7.73%);
- Bonga: Rest (24.71%), Away (15.23%), Mulenge (11.21%), Food Prep (8.91%), Fields (6.32%)*;
- Kabo: Rest (24.07%), Mulenge (12.96%), Labour (11.73%), Away and Food Prep (9.26%), Sick (7.41%);
- Petet ya Mbandaka: Rest (28.27%), Sick (15.71%), Food Prep (14.14%), Fields (11.52%), Hunting (8.38%).

Daily Activity by Wealth

Results for daily activities in all categories according to wealth are shown in Table 3.2. The top five activities by percentage of entries are listed below in descending order for each household wealth category:

- Very Poor: Rest (25.16%), Forest (10.96%), Craft and Food Prep (10.06%), Fields (9.43%), Hunting (8.18%);
- Poor: Rest (20.62%), Sick (15.12%), Mulenge (9.62%), Moved (9.28%), Forest (8.93%);
- Average: Rest (28.35%), Food Prep (15.98%), Fields (10.31%), Sick (7.73%), Forest (6.70%);
- Wealthy: Rest (25.99%), Food Prep (11.86%), Labour (10.73%), Away (10.17%), Fishing (9.04%);
- Very Wealthy: Rest (25.47%), Away (18.73%), Fields (11.61%), Food Prep (8.99%), Mulenge (7.49%).

Table 3.1. Daily activities carried out by individuals surveyed in northern Congo from May - June 1995 according to ethnic group and village. Values shown indicate percentage of entries found within each category and do not reflect percentage of time spent carrying out such activities.

ACTIVITY	BANTU	PYGMY	BOMASSA	BONGA	BOUNDA	KABO	PETETYA MBANDAK	TOTAL
AWAY	13.41	3.11	0.00	15.23	7.73	9.26	1.57	7.78
COMMUNITY	0.00	0.16	0.00	0.00	0.00	0.00	0.52	0.09
CRAFT	0.99	3.93	0.95	1.15	9.66	0.00	1.57	2.59
FIELDS	8.88	8.67	13.33	6.32	7.73	6.17	11.52	8.68
FISHING	6.51	2.29	10.48	3.74	4.35	0.62	1.05	4.20
FOOD PREP	10.06	10.80	10.00	8.91	11.11	9.26	14.14	10.47
FOREST	0.59	10.64	4.76	5.75	12.56	0.00	6.28	6.08
HOSPITAL	0.20	0.00	0.00	0.29	0.00	0.00	0.00	0.09
HUNTING	1.78	2.62	0.00	2.59	0.00	0.00	8.38	2.24
LABOUR	5.33	7.36	13.33	1.15	6.76	11.73	3.66	6.44
MULENGE	7.89	6.73	5.24	11.21	1.45	12.96	1.05	6.53
NGOLONGOLO	1.18	0.00	0.95	0.86	0.00	0.62	0.00	0.54
MOVED	0.00	4.42	0.00	7.76	0.00	0.00	0.00	2.42
PERSONAL CARE	0.99	0.49	0.48	0.29	0.48	1.85	1.05	0.72
PLAY	1.78	0.65	0.00	1.15	0.00	5.56	0.00	1.16
REST	26.23	23.73	23.33	24.71	24.15	24.07	28.27	24.87
SICK	4.34	10.64	10.00	2.01	8.21	7.41	15.71	7.78
SPIRIT	0.59	0.00	0.00	0.00	0.00	1.85	0.00	0.27
VISITING	4.93	0.49	4.29	4.31	0.00	1.85	0.52	2.50
WASHING	3.36	0.49	1.43	1.15	0.96	5.56	1.05	1.61
WATER	0.39	1.15	0.00	0.00	2.42	1.23	1.05	0.81
WOOD	0.59	2.13	1.43	0.86	2.42	0.00	2.62	1.43

Table 3.2. Results of daily activity study showing activities carried out by individuals surveyed in the northern Congo according to household wealth. Values shown indicate percentage of entries found within each category of activity and do not reflect percentage of time spent performing these activities.

ACTIVITY	TOTAL	VERY POOR	POOR	AVERAGE	WEALTHY	VERY WEALTHY
AWAY	8.00	1.26	3.09	4.12	10.17	18.73
COMMUNITY	0.09	0.00	0.00	0.52	0.00	0.00
CRAFT	2.67	10.06	1.72	1.55	2.26	0.37
FIELDS	9.01	9.43	7.22	10.31	6.21	11.61
FISHING	4.23	1.26	3.44	2.58	9.04	4.87
FOOD PREP	10.57	10.06	7.90	15.98	11.86	8.99
FOREST	5.24	10.96	8.93	6.70	0.00	0.37
HOSPITAL	0.09	0.00	0.00	0.00	0.00	0.37
HUNTING	2.30	8.18	0.00	3.09	0.56	1.87
LABOUR	6.43	5.03	7.90	6.19	10.73	3.00
MULENGE	6.25	6.92	9.62	6.18	1.13	7.49
NGOLONGOLO	0.55	0.00	0.00	0.00	0.56	1.87
MOVED	2.48	0.00	9.28	0.00	0.00	0.00
PERSONAL CARE	0.74	0.63	0.34	0.52	2.26	0.37
PLAY	1.19	0.00	1.37	0.00	0.00	3.37
REST	24.72	25.16	20.62	28.35	25.99	25.47
SICK	8.00	3.77	15.12	7.73	6.78	3.75
SPIRIT	0.28	1.89	0.00	0.00	0.00	0.00
VISITING	2.57	0.63	0.69	1.03	7.34	3.75
WASHING	1.83	1.26	0.00	1.03	5.08	2.61
WATER	0.83	1.26	0.34	2.58	0.00	0.37
WOOD	1.47	2.52	2.41	1.55	0.00	0.75

Household Food Consumption

Results from the daily food consumption were derived from the same study as daily activities. The results are based on food items consumed in 20 households from five villages over a 20 day period. Twenty days were involved as data were collected from both Kabo Village and Petet ya Mbandaka from the same five day period. Results are given in percentage of entries for each food item from a total of 274 entries. Table 3.3 shows values for nine food items which comprised over 90% of the food consumed. The remaining items listed during the course of the study were discarded from the analysis. It is important to note that values reflect number of times an item was listed and do not reflect relative quantities of food consumed. For all households the five food items with the highest number of entries are listed in descending order as follows: Manioc (30%), Palm Nuts (17.2%), Koko (12.0%), Fish (11.3%), and Meat (8.4%).

Food Consumption by Ethnicity

Food consumption was analyzed by ethnic group; the results are shown in Table 3.3. The five food items found with the highest percentage of entries are listed below according to ethnic group:

- Bantu: Manioc (22.13%), Fish (15.57%), Palm Nuts (14.75%), Koko (13.93%), Meat (12.30%);
- Pygmy: Manioc (36.18%), Palm Nuts (19.08%), Koko (10.53%), Fish (7.89%), Meat and Wild Yams (*Dioscorea spp.*)(5.26%).

Food Consumption by Village

Food consumption was also analyzed by village; the results are shown in Table 3.3. The five food items found with the highest percentage value of entries are listed below by village:

- Bomassa: Manioc (30.00%), Palm Nuts (21.67%), Fish (15.00%), Koko (10.00%), Meat and Mushrooms (6.67%);
- Bounda: Palm Nuts (18.52%), Manioc (16.67%), Koko and Wild Yams (12.96%), Fish, Mushrooms, and Plantains (7.41%), Peke (5.56%);
- Bonga: Manioc (24.33%), Palm Nuts (18.92%), Meat (14.86%), Koko (13.51%), Fish (9.46%);
- Kabo: Manioc (24.39%), Fish and Koko (21.95%), Meat (7.32%), Palm Nuts (4.88%), all others 0.00%;
- Petet: Manioc (60.00%), Palm Nuts (17.78%), Meat (8.89%), Fish (4.44%), Koko (2.22%), all others 0.00%.

Table 3.3. Food items consumed by households in village survey northern Congo. Values shown indicate percentage of entries for each category and do not reflect actual quantities of food consumed.

FOOD	TOTAL	BANTU	PYGMY	BOMASSA	BONGA	BOUNDA	KABO	PETET YA MBANDAKA
FISH	11.3	15.57	7.89	15.00	9.46	7.41	21.95	4.44
KOKO	12.0	13.93	10.53	10.00	13.51	12.96	21.95	2.22
MANIOC	30.0	22.13	36.18	30.00	24.33	16.67	24.39	60.00
MEAT	8.4	12.30	5.26	6.67	14.86	1.85	7.32	8.89
MUSHROOMS	2.9	1.64	3.95	6.67	0.00	7.41	0.00	0.00
PALM NUTS	17.2	14.75	19.08	21.67	18.92	18.52	4.88	17.78
PEKE	4.0	4.92	3.29	5.00	6.76	5.56	0.00	0.00
PLANTAIN	2.6	1.64	3.29	1.67	2.70	7.40	0.00	0.00
WILD YAMS	2.9	0.00	5.26	1.67	0.00	12.96	0.00	0.00

Food Consumption by Household Wealth

Food consumption as analyzed by household wealth categories is shown in Table 3.4. The five highest percentage values for food items are listed below according to wealth category:

- Very Poor: Koko (24.14%), Palm Nuts (20.96%), Manioc (17.24%), Fish (13.79%), Plantains and Wild Yams (6.90%);
- Poor: Manioc (36.36%), Palm Nuts (20.00%), Koko (12.73%), Fish (10.91%), Mushrooms (5.45%);
- Average: Manioc (29.42%), Palm Nuts (21.57%), Wild Yams (9.80%), Fish and Koko (7.84%), Mushrooms (5.88%);
- Wealthy: Manioc (31.57%), Fish (21.05%), Koko (15.79%), Palm Nuts (13.16%), Meat (2.63%);
- Very Wealthy: Manioc (22.22%), Meat (18.52%), Palm Nuts (12.96%), Koko (11.11%), Fish and Peke (7.41%).

Source of Food

For each food item listed the source acquiring the food was noted and was broken down into four categories: child, husband, wife, or other. Other referred to items that were either purchased, were given to the family, or were traded for other items. Results for this portion of the study are shown in Table 3.5. The majority (46.0%) of food consumed was received by either purchase, trading or as a gift. Wives contributed the second highest percentage (34.7%) of food items followed by husbands (15.7%) and children (3.6%).

Table 3.4. Results of daily food consumption according to wealth for villages surveyed in northern Congo. Food indicates specific food items consumed, Source indicates the providing source of the food, and Cost indicates how the food was paid for. Values shown indicate percentage of entries found in each category.

FOOD	TOTAL	0-10,000	10-25,000	25-50,000	50-100,000	100,000+
FISH	11.5	13.79	10.91	7.84	21.05	7.41
KOKO	13.2	24.14	12.73	7.84	15.79	11.11
MANIOC	28.2	17.24	36.36	29.42	31.57	22.22
MEAT	6.6	3.45	1.82	3.92	2.63	18.52
MUSHROOMS	3.5	0.00	5.45	5.88	0.00	3.70
PALM NUTS	17.6	20.96	20.00	21.57	13.16	12.96
PEKE	4.4	3.45	7.27	1.96	0.00	7.41
PLANTAIN	3.0	6.90	1.82	3.92	0.00	3.70
WILD YAMS	3.5	6.90	1.82	9.80	0.00	0.00
SOURCE						
CHILD	4.4	17.24	0.00	9.80	0.00	0.00
HUSBAND	15.9	13.79	23.64	19.61	7.89	11.11
WIFE	37.4	31.03	41.82	54.90	26.32	27.78
OTHER	42.3	37.93	34.55	15.69	65.79	61.11
COST						
CASH	17.2	13.79	3.64	7.84	47.37	20.37
GIVEN	21.6	27.59	29.09	7.84	18.42	25.93
KOKO	0.4	0.00	1.82	0.00	0.00	0.00
LABOUR	4.4	6.90	3.64	9.80	0.00	1.85
MANIOC	3.5	0.00	0.00	0.00	0.00	14.81
SHELLS	0.9	0.00	0.00	0.00	0.00	3.70
TIME	52.0	51.72	61.82	74.51	34.21	33.33

Table 3.5. Food providing sources for daily food consumption in villages surveyed in northern Congo according to ethnic group and villages. Values shown indicate percentage of entries found for each category.

SOURCE	TOTAL	BANTU	PYGMY	BOMASSA	BONGA	BOUNDA	KABO	PETET YA MBANDAKA
CHILD	3.6	0.00	6.58	0.00	0.00	18.52	0.00	0.00
HUSBAND	15.7	13.11	17.76	21.67	25.68	12.96	0.00	8.89
WIFE	34.7	24.59	42.76	40.00	24.32	38.89	24.39	48.89
OTHER	46.0	62.30	32.89	38.33	50.00	29.63	75.61	42.22

Source of Food by Ethnicity

The results of the study according to the two ethnic groups are shown in Table 3.5. Bantus received food through other means almost twice as often (62.30%) as Pygmies (32.89%). Pygmy wives (42.76%) and husbands (17.76%) contributed more of the food consumed than did bantu wives (24.59%) or husbands (13.11%). Only pygmy children (6.58%) contributed food to the household. Results are depicted in Figure 6.1a.

Source of Food by Village

Villages tended to differ in the distribution of food sources. Generally wives contributed more food to the household than did husbands with the exception of Bonga where husbands (25.69%) contributed slightly more than wives (24.32%). Values for food received by cash payment, trading, or being given were highest for Kabo (75.61%), Bonga (50.00%), and Petet ya Mbandaka (42.22%). Only children in Bounda contributed food to the household (18.52%). No husbands directly contributed food to the household in Kabo and husbands in Petet ya Mbandaka contributed the least amount (8.89%) as compared with the remaining villages. Results of this portion of the study are shown in Table 3.5 and are depicted in Figure 6.1b.

Source of Food by Household Wealth

The results of food source according to household wealth category are depicted in Table 3.4. Wealthy (65.79%) and Very Wealthy (61.11%) households tended to obtain their food according to the other category. Husbands directly contributed the least food to the household in both Wealthy (7.89%) and Very Wealthy (11.11%) households. Wives contributed the most food to the household in both Average (54.90%) and Poor (41.82%) households. Contribution of food by husbands was also highest in the Poor (23.64%) and Average wealth (19.61%) households. Children contributed food in both Very Poor (17.24%) and Average (9.80%) households. Results are shown in graphic form in Figure 6.1c.

DAILY FOOD INTAKE PROVIDING SOURCE

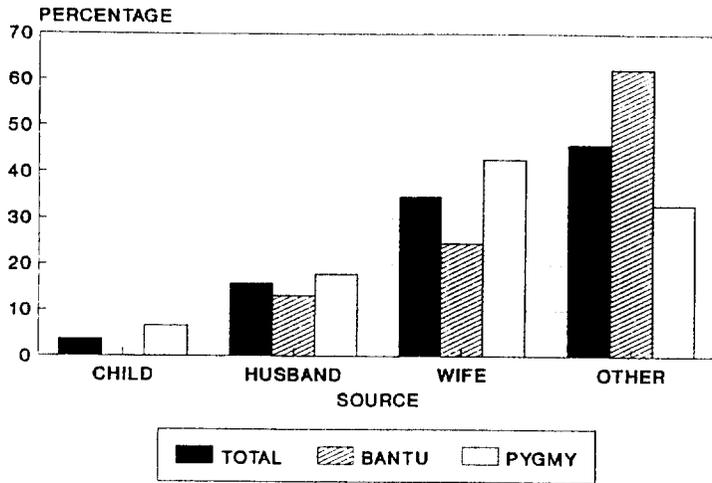


Fig. 6.1a. Food Source by Ethnicity

DAILY FOOD INTAKE PROVIDING SOURCE

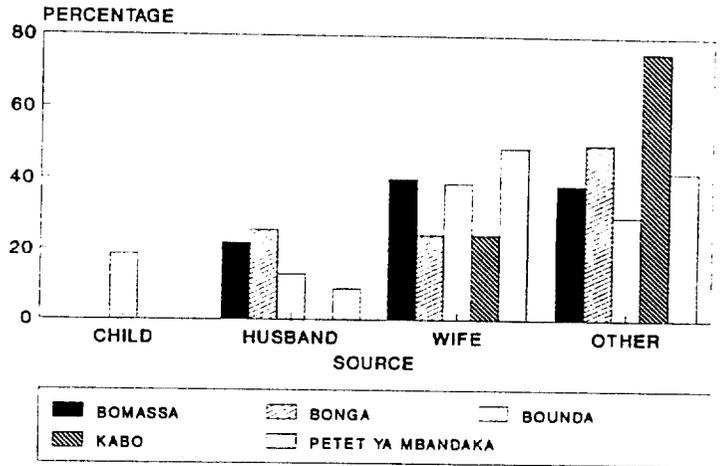


Fig. 6.1b. Food Source by Village

DAILY FOOD INTAKE SOURCES ACCORDING TO WEALTH

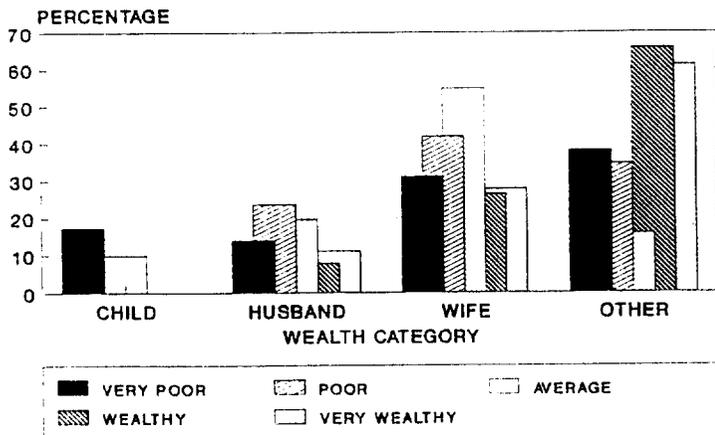


Fig. 6.1c. Food Source by Wealth

VERY POOR-10,000; POOR-10-28,000;
 AVERAGE-28-60,000; WEALTHY-60-100,000;
 VERY WEALTHY-100,000+

Fig. 6.1a-6.1c. Graph of person or source providing food to households in northern Congo according to ethnic group, village, and household wealth. Percentages reflect percentage of total entries found in each category.

Cost of Food

As this study was intended to investigate economics of wildlife use it became apparent early on during data collection that trading and gift giving were common activities among village households. It was decided, therefore, to include values for food consumed according to separate categories. These categories were analyzed in the same manner as the previous portions of the study to determine if differences occurred in results according to ethnic group, village, and household wealth. Eight categories were determined for cost of food: cash, given, labour (worked to receive the food directly), koko, manioc, peke, shotgun shells, and time (person spent time gathering, hunting, harvesting, etc.). Results are shown in Table 3.6. Time (47.1%) was the highest percentage for cost followed by given (27.0%), cash (15.0), and labour (6.2%).

Cost of Food by Ethnicity

Table 3.6 gives the breakdown of percentage of total items according to ethnic grouping. Bantus paid for their food with time (34.43%), receiving as gifts (30.33%), cash (24.59%), and manioc (7.83%). They also paid with shotgun shells (1.64%) and labour (1.64%). Pygmies also paid for their food for the majority of items with time (57.24%) followed by being given (24.34%), labour (9.87%), and cash (7.24%). Data are shown in graph form in Figure 6.2a.

Cost of Food by Village

Results are shown in Table 3.6 for cost of food items within each village surveyed. Bomassa households earned food primarily through effort of time (60.00%) followed by receiving as gifts (25.00%), cash (13.33%), and labour (9.87%). Bounda maintained the highest percentage for food cost through time among all villages (62.96%) followed by receiving as gifts (24.07%), labour (7.41%), and cash (3.70%). Bonga maintained a lower value for cost of food in time (39.19%) with the remaining highest percentage costs of food being given (29.73%), manioc (10.81%), and labour (8.11%). The results for Kabo were different with only three categories of cost for food. The highest percentage cost for Kabo was cash (46.34%) followed by food being given (29.27%), and time (24.39%). In Petet ya Mbandaka time was again the highest cost category for food (44.44%) followed by food being given (26.67%), cash (15.56%), and labour (13.33%). Figure 6.2b shows the results of the analysis of food cost categories by village.

Cost of Food by Household Wealth

Household wealth categories and their associated percentage of food costs are shown in Table 3.5. Distribution of costs followed similar patterns with time commanding the highest percentage of total cost for food in all wealth categories except for Wealthy households (34.21%) where cash (47.37%) was the highest percentage category. For Average (74.51%), Poor (61.82%), and Very Poor (51.72%) time was the highest percentage food cost category. Very Wealthy households tended to have a diversity of food payment options including cash (20.37%), manioc (14.81%), shotgun shells (3.70%), and labour (1.85%) but also received a large portion of their food as gifts (25.93%). Only Poor families used Koko to pay for food (1.82%). Figure 6.2c shows the results of this portion of the study.

Table 3.6. Results of daily food consumption study indicating cost categories used for payment of food items according to ethnic group and village. Values shown indicate percentages of entries found in each category.

COST	TOTAL	BANTU	PYGMY	BOMASSA	BONGA	BOUNDA	KABO	PETET YA MBANDAKA
CASH	15.0	24.59	7.24	13.33	6.76	3.70	46.34	15.56
GIVEN	27.0	30.33	24.34	25.00	29.73	24.07	29.27	26.67
KOKO	0.4	0.00	0.66	0.00	1.35	0.00	0.00	0.00
LABOUR	6.2	1.64	9.87	1.67	8.11	7.41	0.00	13.33
MANIOC	3.3	7.83	0.00	0.00	10.81	1.85	0.00	0.00
PEKE	0.4	0.00	0.66	0.00	1.35	0.00	0.00	0.00
SHELLS	0.7	1.64	0.00	0.00	2.70	0.00	0.00	0.00
TIME	47.1	34.43	57.24	60.00	39.19	62.96	24.39	44.44

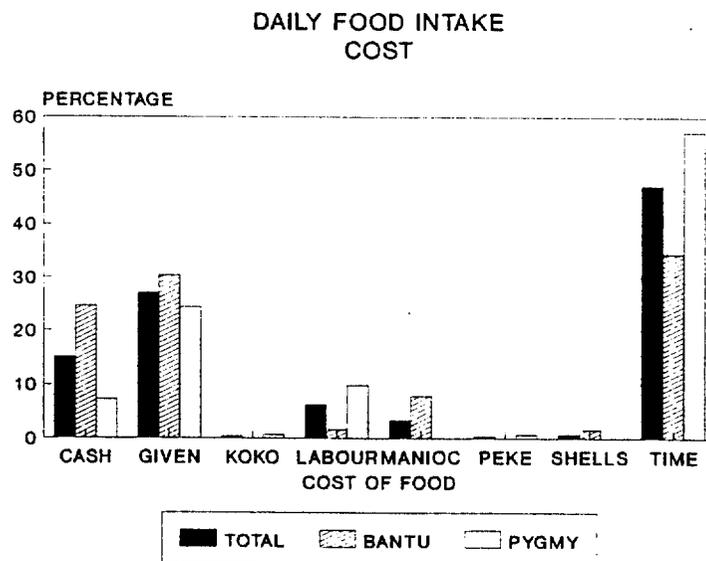


Fig. 6.2a. Food cost payments by ethnic group

Fig. 6.2a. Graph depicting results for daily food consumption payment categories (COST) according to ethnic group. Percentages indicate percentage of entries found for each category.

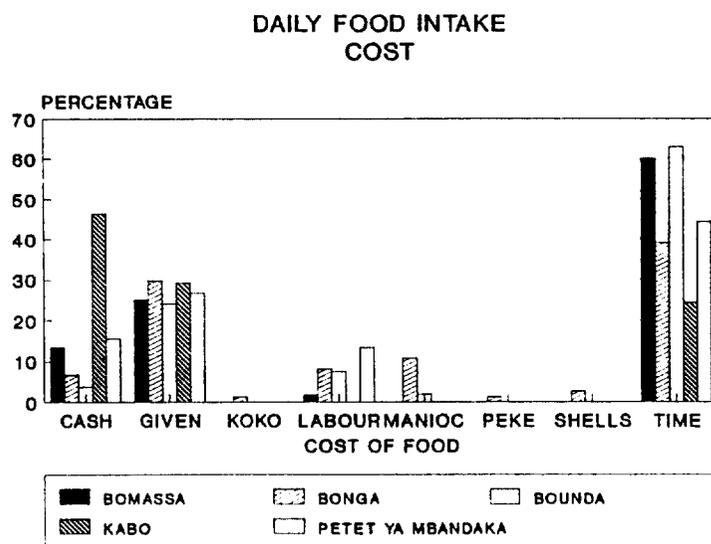


Fig. 6.2b. Food cost payments by village

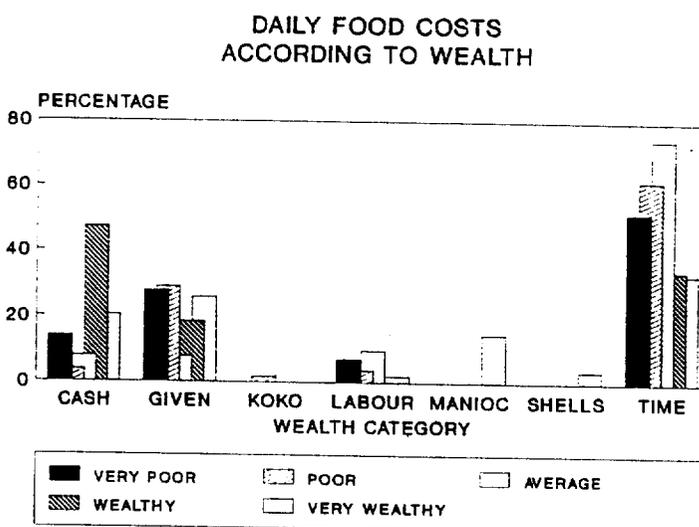


Fig. 6.2c. Food cost payments by wealth

VERY POOR--10,000; POOR-10-25,000;
 AVERAGE-25-60,000; WEALTHY-60-100,000;
 VERY WEALTHY-100,000+

Fig. 6.2b & 6.2c. Graphs depicting results for daily food consumption payment categories (COST) according to village and wealth. Percentages indicate percentage of entries found for each category.

Hunting Estimated Rate of Return and Economics

Data were collected for 33 hunts which took place between 28 April and 11 June 1995. Hunters were from the villages of Bon Coin and Bomassa. Details of each hunt were collected and documented by a local hunter. Information was collected and recorded daily by the hunter with weekly meetings held to review data and hunting activities. Although snare hunting was reported to be taking place by residents of Bomassa and Bon Coin the hunter was reluctant to give details of snare line locations or names of the persons responsible for the snares. All hunts reported, therefore, were carried out with 12 calibre shotguns and one hunt which used a dog and a lance.

During the data collection it was clear that the majority of hunts were carried out by hunters who did not own the guns they were hunting with. For each hunt, both the hunter name and the person who sent the hunter (*i.e.* the gunowner) were recorded. During data collection it was found that it was possible to determine how the carcass of each animal was distributed, how much money was earned by the gunowner and hunter for selling specific portions of the carcass, and how the money earned was spent. Details for the distribution and earnings of each hunt are shown in Appendix B-1. Details of the hours and estimated rate of return (ERR - KG/HOUR) for each hunt are shown in Appendix B-2.

From the data collected a number of variables were derived. Body parts given to the hunter by the gunowner were assigned a monetary value based on the actual market in Bomassa as were the shotgun shells shot and lost and the meat consumed by the gunowner. All values were combined to produce a value for total cost of the hunt. This value was subtracted from the actual cash earned by the gunowner for selling the meat from the hunt to give a value for total cash earned per hunt.

These values reflect only cash or cash equivalent values for hunting activities in Bomassa and Bon Coin. Opportunity costs for hunter time were not incorporated in the equation. Results are shown in Table 4.1. Hunters received a mean cash equivalent value of 878.48 CFA (S.D. 1015.31 CFA) for their hunting effort. Gunowners received a mean cash equivalent of 1787.71 CFA (S.D. 1697.48 CFA) and a mean actual cash value of 377.10 CFA (S.D. 1852.44 CFA). There was a mean 1.33 animals caught and 0.33 animals lost per hunt. Hunters spent a mean 9.21 hours per hunt resulting in a mean ERR of 2.36 kg/hour for all hunts and 1.9 kg/hour for hunts with a 12 gauge shotgun.

Details of species hunted are shown in Table 4.2. Eighteen (46.15%) males and 12 (30.76%) females were hunted and nine (23.07%) animals were lost. Of the animals hunted, 58.97% were from the genus *Cephalophus* (duikers), 17.95% were from the genus *Cercocebus*, and 10.26% from the genus *Cercopithecus*. The remaining five species hunted were from hunts yielding a single individual: *Colobus guereza*, *Manis tetradactyla*, *Potamochoerus porcus*, *Tragelaphus spekii*, and *Hyemoschus aquaticus*.

Table 4.1. Results of hunting activity analysis for Bomassa, Bon Coin, and Bonga villages in northern Congo. Values shown are mean CFA (500 CFA = \$1.00 US).

VARIABLE	DESCRIPTION	MEAN (N=33)	STANDARD DEVIATION
OWNCONPH	VALUE OF MEAT CONSUMED BY GUN OWNER PER HUNT	1251.52	1314.31
EARNEDPH	TOTAL VALUE OF ITEMS RECEIVED BY HUNTER (PAID BY GUNOWNER)	878.48	1015.31
PRICEPH	TOTAL PRICE EARNED BY GUNOWNER PER HUNT	1410.61	1542.51
COSTPH	COST OF CARTOUCHES USED PER HUNT + EARNEDPH	1652.90	1082.93
ECONPH	TOTAL CASH EARNED PER HUNT = COSTPH - PRICEPH	377.10	1852.44
TOTALPH	TOTAL ECONOMIC VALUE EARNED BY GUNOWNER = OWNCON + ECONPH	1787.71	1697.48
ANLOSTPH	NUMBER OF LOST ANIMALS PER HUNT	0.33	0.54
NANIMALS	NUMBER OF ANIMALS CAUGHT PER HUNT	1.33	0.60
HOURS	NUMBER OF HOURS PER HUNT	9.21	4.84
WEIGHTPH	TOTAL WEIGHT OF ALL ANIMALS CAUGHT PER HUNT	15.08 KG	20.94
ERRPH	ESTIMATED RATE OF RETURN PER HUNT	2.36	3.40

Table 4.2. Animals hunted in Bomassa, Bon Coin, and Bonga between 28 April 1995 and 11 June 1995. Values shown are percentage of total animals hunted according to sex and species.

SCIENTIFIC NAME	FEMALES	MALES	LOST	TOTAL	TOTAL BY GENUS
<i>Cephalophus callypigus</i>	5.13 (n=2)	7.69 (n=3)	2.56 (n=1)	15.38 (n=6)	58.97 (N=23)
<i>Cephalophus dorsalis</i>	0.00 (n=0)	5.13 (n=2)	0.00 (n=0)	5.13 (n=2)	
<i>Cephalophus leucogaster</i>	7.69 (n=3)	2.56 (n=1)	2.56 (n=1)	12.82 (n=5)	
<i>Cephalophus monticola</i>	7.69 (n=3)	7.69 (n=3)	5.13 (n=2)	20.51 (n=8)	
<i>Cephalophus nigrifrons</i>	0.00 (n=0)	2.56 (n=1)	2.56 (n=1)	5.13 (n=2)	
<i>Cercocebus albigena</i>	2.56 (n=1)	5.13 (n=2)	5.13 (n=2)	12.82 (n=5)	17.95 (N=7)
<i>Cercocebus galeritus agilis</i>	2.56 (n=1)	2.56 (n=1)	0.00 (n=0)	5.13 (n=2)	
<i>Cercopithecus cephus</i>	0.00 (n=0)	2.56 (n=1)	2.56 (n=1)	5.13 (n=2)	10.26 (N=4)
<i>Cercopithecus neglectus</i>	0.00 (n=0)	2.56 (n=1)	2.56 (n=1)	5.13 (n=2)	
<i>Colobus guereza</i>	2.56 (n=1)	0.00 (n=0)	0.00 (n=0)	2.56 (n=1)	2.56 (N=1)
<i>Manis tetradactyla</i>	0.00 (n=0)	2.56 (n=1)	0.00 (n=0)	2.56 (n=1)	2.56 (N=1)
<i>Potamochoerus porcus</i>	2.56 (n=1)	0.00 (n=0)	0.00 (n=0)	2.56 (n=1)	2.56 (N=1)
<i>Tragelaphus spekii</i>	0.00 (n=0)	2.56 (n=1)	0.00 (n=0)	2.56 (n=1)	2.56 (N=1)
<i>Hyemoschus aquaticus</i>	0.00 (n=0)	2.56 (n=1)	0.00 (n=0)	2.56 (n=1)	2.56 (N=1)
TOTAL	30.76 (N=12)	46.15 (N=18)	23.07 (N=9)	100.00 (N=39)	

DISCUSSION

This pilot study was designed to develop methodologies which would provide information regarding the socioeconomics of wildlife use within village communities in the Kabo logging concession in northern Congo. Of particular interest were methodologies which would be able to address the hypotheses regarding differences among village types and household wealth and between the two ethnic groups for attitudes toward wildlife, hunting activities, and meat consumption as well as general utilization of non-timber forest products. The sample sizes for this pilot study were too low in several cases to be able to detect differences which were statistically significant. Although several portions of the study were analyzed statistically and did show some significant differences, the following discussion of the results and the hypotheses is primarily based on observable trends in the data.

Although arguments which support logging in tropical forests include providing employment opportunities for local communities (TELESIS 1991), the results of this pilot survey indicate that higher relative employment was found in Conservation villages than in either the Logging or No Industry villages. These results suggest that employment opportunities for local communities are not necessarily highest through industrial use of the forest and potential exists for alternative uses of the forest which provide more employment opportunities to local communities. Establishment of these high level employment opportunities within the Conservation villages was based on a strategy with two primary premises: (1) Only individuals from the local community are hired and trained for both skilled and unskilled labour positions whenever possible; individuals from outside the local community are hired only when training would not provide the individual with the necessary skills to perform the duties of the position (*i.e.* higher education is required); and (2) The population of the community is controlled by the community members themselves based on enlightened self-interest, that is although the prospect generally acts as a magnet within regions where employment opportunities are limited and the economy is increasingly focussed on cash, the village population recognizes the importance of maintaining the same relative village size and composition for maximum benefits to be received.

The data from this pilot study support results found in other studies (Godoy and Bawa 1993) showing that wealthier households have a high proportion of use of fewer but highly valued forest products such as meat, koko, and palm nuts. It is suggested, therefore, that based on the higher population densities and increased pressure on fewer items that those items are at risk of being overexploited as suggested by (Godoy and Bawa 1993). The data also support the second portion of this hypothesis with the logging villages using high amounts of forest products such as meat, koko, and mushrooms as compared with other villages and showing no record of use of other products such as mushrooms, peke, plantains, or wild yams, suggesting that they use higher quantities but a smaller variety of non-timber forest products.

Although the data did not support the hypothesis that attitudes toward wildlife among different household wealth groups are different, it did show indications of a difference in attitudes according to village type with Conservation villages having the highest positive attitude, No Industry villages having a neutral to negative attitude, and Logging villages having a slightly positive attitude. Also supported was the hypothesis that a difference in attitude would be detected between ethnic groups. Bantus had a higher positive attitude than did Pygmies who had

a slightly positive attitude. Results of this survey, however, are not conclusive due to the limited sample size and to the subjectivity and untested quality of the attitude questions from which the attitude index was derived.

Differences were detected in household wealth according to both village type and ethnic group. Conservation villages had the highest percentage of households in the Wealthy and Very Wealthy categories while both Logging villages and No Industry villages maintained roughly equal distribution among the five wealth categories. It is noteworthy that Logging villages had fewer households in the Very Wealthy category than did the No Industry villages. This is probably due to the fact that those individuals surveyed in the No Industry village who maintained obvious signs of wealth and were, therefore, selected to participate in the questionnaire, all owned shotguns. As households in each village were selected according to a stratified sample of visible signs of wealth and ethnicity these results were expected, except for the Conservation villages where, despite the selection process, there are a disproportionate percentage of households in the highest wealth categories. Differences in wealth according to ethnic group indicate that the highest percentage of Bantu households are found in the Wealthy and Very Wealthy categories while no pygmy households have more than Average wealth. Very few bantu households were Very Poor. Pygmy households are more commonly of Average wealth.

People in the Logging villages spend more time hunting than do people in either Conservation or No Industry villages. People in No Industry villages spend more time hunting than those in Conservation villages. Thus, of all villages, Conservation villages have the lowest hunting activity. Hunting activity is higher in pygmy households than bantu households. Highest hunting activity occurs within Very Poor and Average wealth households. Wealthy and Very Wealthy households hunt less than poorer households.

Meat consumption is higher in bantu households than in pygmy households. Meat consumption is also higher in Logging villages than in either Conservation villages or No Industry villages. Meat consumption is highest in Very Wealthy households than in any other wealth category. Average and Very Poor households also maintain higher percentages of meat consumption than either Poor or Wealthy households. Despite the fact that Very Wealthy and Wealthy households consume large quantities of meat, and the highest proportion of Very Wealthy and Wealthy are found in Conservation villages, the Conservation villages actually maintain a lower relative consumption of meat.

Opportunity costs for hunting activity is anticipated to be higher within communities where more alternatives for income generation and provision of basic needs are available. The data from this study do not allow for quantification of opportunity costs of activities but do suggest that with the higher employment potential found in Conservation communities there is a higher opportunity cost for hunting as is evidenced by the lower hunting activity found. Among households in Logging communities and the higher employment potential as compared with No Industry villages there is a higher hunting activity despite the increased opportunity costs (fewer options exist for people in No Industry villages).

The results from this study suggest that the methodologies employed are useful in testing hypotheses pertaining to the socioeconomics of wildlife use in village communities found in the

Kabo logging concession in northern Congo. Modification of the studies will be required to increase efficiency of data collection and are presented in the Conclusions and Recommendations.

The tasks detailed for the pilot study were achieved through the combination of the four separate studies detailed in this report. Distinct social groups according to wealth, employment, and ethnicity were identified for each village using the census and economic portion of the questionnaire. A rapid rural appraisal of economic variables was conducted and the most appropriate variables identified through the village questionnaire. Key informants were incorporated into the development of methodologies and specifically into development of the questionnaire and hunting activity studies. Field assistants were trained in both data collection and data analysis techniques. It was found that employment of individuals from the local community was very effective in facilitating data collection. A discussion of each methodology employed is given below.

Census, Map Making, Manioc Fields

The census activity yielded a wealth of information regarding households and provided researchers with an opportunity to build rapport with members of each household. It provided researchers with the opportunity to identify households for participation in the questionnaire. The map making and measurement of manioc fields required a minimal relative amount of time but yielded information which was relevant - as manioc field sizes are related to household wealth and as other portions of the Nouabale-Ndoki National Park management scheme rely on use of aerial surveys. Maps can be compared with results of the surveys and monitored over time with results from annual census. Among the villages an estimated 30% - 40% of households were unoccupied. With the mean number of persons per household variables devised from the census, populations for villages can be estimated. These data combined with data from other portions of the study could be used to estimate quantities of forest products, including wildlife, being extracted from the forest in the region and can be compared with results of aerial surveys of forest composition and condition.

Questionnaire

The methodologies employed in this study were primarily based on a variety of interviewing techniques from in-depth structured interviews to unstructured interviews. The results of these interviews may provide essential information for the development of management strategies and policy regarding wildlife and other non-timber forest product use (Raval 1994). During the interviewing process attempts were made to avoid 'nutshelling' and allow for non-responses to questions while the effects of potential cultural mis-hearing were offset by conducting all interviews in conjunction with a local resident translator (Mitchell and Slim 1991). Training of interviewers is an essential part of the development of interview-based research activities (Dijkstra 1987) and it was determined that a minimum one month training period for both data collection and data analysis would be required to train interviewers for this study.

The questionnaire developed for this study proved to be more comprehensive and time-consuming than was effective for data collection. Certain portions of the questionnaire yielded more useful information such as: household wealth; manioc field size; specific food items which are bought and sold (manioc, ngolongolo, palm wine, fish, meat, palm grubs, koko, palm nuts,

honey, mushrooms, peke, kerosene, and cigarettes); basic needs index categories (housing materials, type of medicine used, etc.); and attitude questions. Statistically significant differences among villages were found for activity, basic needs, and attitude type questions while a larger portion of the food items bought and sold type questions showed differences according to household wealth and ethnic group.

Daily Activity and Food Consumption

As undervaluation of tropical forests has occurred through not incorporating the value of NTFP to local communities so has the quantification of demand for such products not been determined. It is important to study this factor for both a more accurate valuation of these products as well as to establish estimates for consumption by rural communities. From this and studies providing information for production of products sustainable use levels can be determined as rural communities must share responsibility in management of the forests and its products if they are to continue to depend upon them for subsistence (Appasamy 1993).

Total quantities of NTFP will have to be determined for quantification of monetary values for such items (Gunatilake *et al.* 1993) and determination of values for their role as a proportion of total income generated. The daily activity study, however, is useful in showing percentage of items found in the diet found within households. Average quantities consumed can be estimated and total values determined. As communities shift toward cash economies the value of and exploitation of particular NTFP increases as they are marketed and is reflected in the relative contribution toward household income based on gathering (Moreno-Black and Price 1993). The results of the study were similar to results found in other studies which suggest that time from labor is the highest input in certain African communities (Dvorak 1992) except for Logging communities which acquired a large proportion of their food through payment of cash. An important consideration in investigations concerning decision-making is the assumption of common goals often made by investigators carrying out participatory research. In reality the opposite may be the case as described by Ramphole (1990) "...people living on the edge of survival in a highly competitive socio-economic milieu tend to act as 'economic beings', and their actions are guided by a rational assessment of how best their interest would be served in both the short-and long-term'. Results of the daily activity study reflect such a situation.

The daily activity study yielded essential information in the determination of levels of hunting activity and meat consumption across villages, ethnic groups, and wealth categories. It was clear that proportions of time spent could be determined without actually measuring the amount of time spent in each activity. Although it has been suggested that it is important to quantify amount of time spent in each activity (Guantilleke *et al.* 1993) it is possible to determine relative proportions of time using this methodology. From these results and based on a larger sample size it may be possible to determine actual opportunity costs for various activities which is necessary for development of the economic sustainability index (ESI) discussed in the introduction. This study also yielded useful information concerning food consumption with relative proportions of foods consumed resulting. The source and cost of food portions of the study provide information pertaining to opportunity costs as well and could be useful in the development of values for opportunity costs of activities.

Hunting ERR and Economics

Hunting studies performed in other tropical forest systems suggest overharvesting results in communities where economic development strategies have been implemented but can be sustainable in areas where traditional hunting regimes (low human densities, widespread location of villages, and subsistence markets) are involved (Bodmer et al. 1994, Vickers 1991). Employment of local hunters for data collection concerning hunting activities has proven successful in other studies in Africa (Marks 1994).

This methodology proved to be very effective in determining both estimated rates of return for hunting effort and the economics of hunting within the Bomassa/Bon Coin communities. Quantification and valuation of hunting effort will be essential in the development of opportunity cost valuations and the relative effects on decision-making regarding the hunting activity and could not be determined from the limited sample size from this study.

CONCLUSIONS AND RECOMMENDATIONS

The methodologies developed from this pilot study meet the criteria called for concerning socioeconomic information necessary for management of non-timber resources in tropical forests (Gunatilleke *et al.* 1993) including: types of plant and animals species extracted, seasonality, processing and marketing, and the relationship of activities to both economic and demographic variables. Unlike a number of studies (Godoy *et al.* 1993) use of these methodologies may be appropriate in other similar regions thus providing the ability to compare results which are based on accurate measurements of costs, quantities, and prices of wildlife and other NTFP resources.

Determination of opportunity costs for hunting activities will be dependent upon both shadow prices which account for a differential income distribution in rural communities as compared with national goals and returns per productive unit of labor as opposed to land considering the abundance of land availability (Munasinghe 1993). The opportunity costs of time will be estimated for households based on an agricultural production function as described by Jacoby (1993). Incorporation of economics to environmental conservation is critical as it investigates the development of external diseconomies (increased costs to inhabitants of the region without compensation in the marketplace) which result from the establishment of exploitation industries such as logging (Katzman and Cale 1990). The development of alternative economic benefits through other forms of utilization internalizes the external diseconomies resulting from logging and provides incentives for alternative behavior as long as populations are controlled (Katzman and Cale 1990). The ultimate goal for conservation is to ensure that all those benefitting from the use of the resource are contributing to the resource as appropriate (Katzman and Cale 1990).

Incorporating the economics of NTFP use into decision-making requires management and policy development which allows for the costs of improved environmental quality at the margin to be equal to the willingness-to-pay by the local inhabitants (Oates 1990). This valuation must incorporate consideration for future generations (Oates 1990).

RECOMMENDATIONS

- (1) In order for adequate sample sizes of data to be collected, this study should be continued to cover seasons and additional logging and traditional communities (including Makao) over a one year period of time. Total number of villages present in the Kabo UFA should be determined. Sample sizes based on relative proportions of total population within the study area will be established. Two logging villages should be included in the study to allow for at least one degree of freedom for statistical analysis of data. As four to five households can be incorporated per village the number of villages to be included in the study will be based on estimated percentage of individuals in traditional or no industry villages and from this, total number of villages to be studied will be established. Final analysis should be based on a rotating panel design.
- (2) The census, map making, and manioc field measurement techniques should be carried out as described in this report with no recommended changes.
- (3) The questionnaire should be modified to only include the following: basic demographic information, economic needs index, household wealth index, and attitude index questions. It should require a maximum of 30 minutes to administer. Sample sizes should be increased to include additional households within each village for attitude analysis.
- (4) The daily activity study should be continued within each village with sample sizes reflective of proportion of population within the Kabo UFA (*i.e.* more households from logging villages). Average weights of food consumed should be determined from a sample of households.
- (5) The hunting ERR and economic study should be continued as described but should be expanded to incorporate all villages being studied.
- (6) Results of this study should be combined with results from studies being carried out by Nouabale-Ndoki National Park for estimation of stock of resources in order for sustainability of extraction of resources quantified in this socioeconomic study to be determined.

LITERATURE CITED

- Appasamy, P.P. 1993. Role of non-timber forest products in a subsistence economy: the case of a joint forestry project in India. *Economic Botany*. 47(3):258-267.
- Barnes, R.F.W. 1990. Deforestation trends in tropical Africa. *Afr. J. Ecol.* 28:161-173.
- Blake, S. 1994. A Reconnaissance Survey in the Kabo Logging Concession South of the Nouabale-Ndoki National Park, Northern Congo. Unpub. report to USAID, WCS, Government of Congo, World Bank, and GTZ. 46pp.
- Blinder, A.S. 1990. Learning by asking those who are doing. *Eastern Economic Journal*. 16(4):297-306.
- Bodmer, R.E., T.G. Fang, L.M. I, R. Gill. 1994. Managing wildlife to conserve Amazonian forests: population biology and economic considerations of game hunting. *Biological Conservation*. 67:29-35.
- Chopra, K. 1993. The value of non-timber forest products: an estimation for tropical deciduous forests in India. *Econ. Bot.* 47(3):251-257.
- CITES. 1994. Include in Appendix II of the Convention all species of *Entandrophragma*. Proposal to the Convention on International Trade in Endangered Species of Wild Fauna and Flora submitted by Germany. 18pp.
- De Montalembert, M.R. 1991. Key forestry policy issues in the early 1990s. FAO. *Unasylva*. 42(166):9-18.
- Dijkstra, W. 1987. Interviewing style and respondent behaviour an experimental study of the survey-interview. *Sociological Methods and Research*. 16(2):309-334.
- Dvorak, K.A. 1992. Resource management by West African farmers and the economics of shifting cultivation. *Amer. J. Agr. Econ.* August:809-815.
- Eastin, I.L., A. Addae-Mensah and J. De-Graft Yartey. 1992. Tropical timber boycotts: strategic implications for the Ghanaian timber industry. FAO. *Unasylva*. 43(170):39-44.
- FAO. 1992. Forest products prices 1971-1990. FAO Forestry Paper 104. Food and Agriculture Organization of the United Nations. Rome, Italy. 254pp.
- FAO. 1983. Forest revenue systems in developing countries. FAO Forestry Paper 43. Food and Agriculture Organization of the United Nations. Rome, Italy. 261pp.

- Godoy, R.A. and K.S. Bawa. 1993. The economic value and sustainable harvest of plants and animals from the tropical forest: assumptions, hypotheses, and methods. *Econ. Bot.* 4(3):215-219.
- Godoy, R.A., R. Lubowski, and A. Markandya. 1993. A method for the economic valuation of non-timber tropical forest products. *Econ. Bot.* 47(3):220-233.
- Gunatilake, H.M., D.M.A.H. Senaratne, and P. Abeygunawardena. 1993. Role of non-timber forest products in the economy of peripheral communities of Knuckles National Wilderness Area of Sri Lanka: a farming systems approach. *Econ. Bot.* 47(3):275-281.
- Gunatilleke, I.A.U.N., C.V.S. Gunatilleke, and P. Abeygunawardena. 1993. Interdisciplinary research towards management of non-timber forest resources in lowland rain forests of Sri Lanka. *Econ. Bot.* 47(3):282-290.
- Hamilton, L.S. 1991. Tropical forests: identifying and clarifying issues. FAO. *Unasylva.* 42(166):19-27.
- House, W.J. 1991. The nature and determinants of socioeconomic inequality among peasant households in southern Sudan. *World Development.* 19(7):867-884.
- ITTO. 1993. The international tropical timber trade and forest conservation. *Tropical Forest Management Update.* 3(2):9-10.
- Jacoby, H.G. 1993. Shadow wages and peasant family labour supply: an econometric application to the Peruvian Sierra. *Review of Economic Studies.* 60:903-921.
- Johns, A.D. 1985. Selective logging and wildlife conservation in tropical rain-forest: problems and recommendations. *Biological Conservation.* 31:355-375.
- Karsenty, A. and H. Maitre. 1994. Logging practices and sustainable management in tropical forests: towards new regulations. *Bois et Forêts des Tropiques.* 240(2):37-51.
- Katzman, M.T. and W.G. Cale Jr. 1990. Tropical forest preservation using economic incentives a proposal of conservation easements. *BioScience.* 40(11):827-832.
- Ledoux, C.B., J.E. Baumgras, J. Sherar, T. Campbell. 1991. Production rates and costs of group selection harvests with a christy cable yarder. pp. 75-84 in B.J. Stodes and C.L. Rawlins, eds. Forestry and environment...engineering solutions. Amer. Soc. Agric. Eng., ASAE Publ. 09-91. viii +252pp.

- Leslie, A.J. 1987. The economic feasibility of natural management of tropical forests. pp 178-195. in F. Mergen and J.R. Vincent. eds. *Natural Management of Tropical Moist Forests: Silvicultural and Management Prospects of Sustained Utilization*. Yale University, School of Forestry and Environmental Studies, New Haven, CT. 212 pp.
- Mareno-Black, G. and L.L. Price. 1993. The marketing of gathered food as an economic strategy of women in northeastern Thailand. *Human Organization*. 52(4):398-404.
- Marks, S.A. 1994. Local hunters and wildlife surveys: a design to enhance participation. *Afr. J. Ecol.* 32:233-254.
- Marshall, G. 1991. FAO and tropical forestry. *The Ecologist*. 21(2):66-72.
- Mitchell, J. and H. Slim. 1991. Listening to rural people in Africa: the semi-structured interview in rapid rural appraisal. *Disasters*. 15(1):68-72.
- Munashinghe, M. 1993. Environmental issues and economic decisions in developing countries. *World Development*. 21(11):1729-1748.
- Murphy, P.G. and A.E. Lugo. 1986. Ecology of tropical dry forest. *Ann. Rev. Ecol. Syst.* 17:67-88.
- NNNP. 1994. Integrated conservation project Kabo forestry concession northern Congo: a proposal. Noabale-Ndoki National Park, Wildlife Conservation Society internal document. 34pp.
- Nwoboshi, L.C. 1982. *Tropical silviculture: principles and techniques*. Ibadan University Press. Ibadan, Nigeria. 333pp.
- Oates, W.E. 1990. Economics, economists, and environmental policy. *Eastern Economic Journal*. 16(4):289-296.
- Peluso, N.L., C.R. Humphrey, and L.P. Fortmann. 1994. The rock, the beach, and the tidal pool: people and poverty in natural resource-dependent areas. *Society and Natural Resources*. 7:23-38.
- Poore, D. and J. Sayer. 1991. *The management of tropical moist forest lands: Ecological Guidelines, Second Edition*. IUCN, Gland, Switzerland and Cambridge UK. 78pp.
- Pottinger, A.J. and J. Burley. 1992. A review of forest biodiversity research in Africa. *Journal of Tropical Forest Science*. 5(2):291-307.
- Putz, F.E. 1994. Towards a sustainable forest. ITTO. *Tropical Forest Update*. 4(3):7-9.
- Ramphela, M. 1990. Participatory research - the myths and realities. *Socio Dynamics*. 16(2):1-15.

- Raval, S.R. 1994. Wheel of life: perceptions and concerns of the resident peoples for Gir National Park in India. *Society and Natural Resources*. 7:305-320.
- Robinson, J.G. and K.H. Redford. 1994. Measuring the sustainability of hunting in tropical forests. *Oryx*. 28(4):249-256.
- Singh, K.D. The 1990 tropical forest resources assessment. *Unasylva*. 44(174):10-20.
- Singh, K.D. 1993. The 1990 tropical forest resources assessment. *Unasylva*. 44(174):10-20.
- Splatt, H.A. and W.L. Stern. 1957. Survey of African woods III. *Tropical Woods*. 107:92-128.
- Synnott, T.J. 1992. The introduction of basic management into tropical forests. pp 91-95. in F.R. Miller and K.L. Adam eds. *Wise Management of Tropical Forests*. Oxford Forestry Institute, Department of Plant Sciences. University of Oxford, Oxford, England. +280pp.
- TELESIS. 1991. Sustainable economic development options for the Dzanga-Sangha Reserve Central African Republic. Telesis (USA) Inc., Providence, Rhode Island. 171pp.
- TFAP. 1994. Tropical Forestry Action Programme update, TFAP. FAO, Rome, Italy, pp 33-36.
- Vickers, W.T. 1991. Hunting yields and game composition over ten years in an Amazon Indian territory. in: J.G. Robinson and K.H. Redford (eds.) *Neotropical Wildlife Use and Conservation*. University of Chicago Press, Chicago, Ill. pp53-81.
- WCS (Wildlife Conservation Society). 1995. Developing an integrated monitoring program for trans-boundary conservation and management in Congo, Cameroon, and Central African Republic. Final Technical Report. Biodiversity Support Program. 8pp.
- Webb, L.J. 1982. The human face in forest management. pp 159-175 in E.G. Hallsworth. ed. *Socio-economic Effects and Constraints in Tropical Forest Management*. John Wiley & Sons Ltd. UK. 233 pp.
- White, L.J.T. 1994. The effects of commercial mechanized selective logging on a transect in lowland rainforest in the Lope Reserve, Gabon. *Journal of Tropical Ecology*. 10:313-322.
- Wilkie, D.S., J.G. Sidle, and G.C. Boundzanga. 1992. Mechanized logging, market hunting and a bank loan in Congo. *Conservation Biology*. 6(4):570-580.

APPENDIX A

DEMOGRAPHIE ET DEPLACEMENTS

FICHE NO.:	ENQUETEUR:
DATE:	VILLAGE:
NOMS:	MARCHE PROCHE:
NOM:(SURNAME)	21. A QUELLES VILLAGES AVIEZ-VOUS VISITE?(WHAT VILLAGES HAVE YOU VISITED?)
PRENUM:(NAME)	
SEX:	22. POURQUOI?(WHY?)
AGE:	
EPOUSE:(SPOUSE)	23. POUR COMBIEN DE TEMPS?(FOR HOW LONG?)
ENFANTS:(CHILDREN)	
OCCUPATION:	24. AVEZ-VOUS DEJA TRAVERSE LA NDOKI, POURQUOI, COMBIEN DE FOIS ET AVEC QUI?(HAVE YOU CROSSED THE NDOKI, WHY, HOW MANY TIMES, WITH WHOM?)
EDUCATION:	
LEU DE NAISSANCE:(PLACE OF BIRTH)	25. AVEZ-VOUS DEJA TRAVERSE LA MONDIKA, POURQUOI, COMBIEN DE FOIS ET AVEC QUI?(HAVE YOU CROSSED THE MONDIKA, WHY, HOW MANY TIMES, WITH WHOM?)
#ANNEES RESIDENCE:(# YEARS RESIDENCE IN VILLAGE)	
VILLAGE DES PARENTS:(PARENTS' VILLAGE)	26. AVEZ-VOUS DEJA TRAVERSE LA DJEKE, POURQUOI, COMBIEN DE FOIS ET AVEC QUI?(HAVE YOU CROSSED THE DJEKE, WHY, HOW MANY TIMES, WITH WHOM?)
VILLAGE DES GRANDPARENTS:(GRANDPARENTS' VILLAGE)	
ETHNIE:(ETHNIC GROUP)	27. AVEZ-VOUS DEJA TRAVERSE LA WALLI, POURQUOI, COMBIEN DE FOIS ET AVEC QUI?(HAVE YOU CROSSED THE WALLI, WHY, HOW MANY TIMES, WITH WHOM?)
ETHNIE DES PARENTS:(PARENTS' ETHNIC GROUP)	
ETHNIE DES GRANDPARENTS:(GRANDPARENTS' ETHNIC GROUP)	28. AVEZ-VOUS DEJA TRAVAILLE DANS UNE SOCIETE? COMBIEN DE TEMPS? QUEL GENRE?(HAVE YOU WORKED FOR A LOGGING COMPANY, HOW LONG, WHAT JOB?)
PERSONNES DANS MAISON:(# IN HOUSE)	
DATE ET RAISON POUR RESIDENCE:(DATE AND REASON FOR ARRIVAL)	29. AVEZ-VOUS DEJA TRAVAILLE DANS UNE AUTRE PLACE? COMBIEN DE TEMPS? QUEL GENRE?(HAVE YOU WORKED ELSEWHERE? HOW LONG? WHAT JOB?)
EST-CE QUE VOUS ETES ORIGINAIRE ICI, MAIS ETES-VOUS TOUJOURS DANS CE VILLAGE? (ARE YOU ORIGINALLY FROM HERE BUT ARE YOU ALWAYS IN THE VILLAGE?)	
OU EST-CE QUE VOUS AVEZ VOYAGE, POUR QUEL MOTIF ET PENDANT COMBIEN DE TEMPS? (WHERE HAVE YOU VISITED, FOR WHAT REASON, AND FOR HOW MUCH TIME?)	30. AVEZ-VOUS DEJA VISITE LA SALINE DE MBELI OU D'AUTRES CLARIERES? POURQUOI? COMBIEN DE FOIS? AVEC QUI?(HAVE YOU VISITED MBELI CLEARING, WHY, HOW MANY TIMES, WITH WHOM?)
SI VOUS ETES PARTI POUR PLUS QU'UN AN, POURQUOI ETES-VOUS REVENU? (IF YOU LEAVE FOR MORE THAN ONE YEAR WHY DID YOU RETURN?)	
REMARQUES:	

ECONOMIE

INDICE DES BESOINS (NEEDS INDEX)	INDICE DES BIENS (GOODS INDEX)			
OURRITURE(FOOD NORMALLY EATEN IN HOUSEHOLD)	PRODUIT	#	CONDITION	PRIX
TYPE DE MAISON(HOUSE WALL AND ROOF MATERIALS)	MARMITE(COOKING POT)			
ETEMENTS (CONDITION/QUANTITE)(CLOTHING-CONDITION/QUANTITY)	FILET(FISHNET)			
EAU(DRINKING WATER SOURCE)	MOUSTIQUEAIRE MOSQUITO NET)			
MEDICAMENTS(MEDICINE TYPE NORMALLY USED)	PIROGUE (CANOE)			
REVENUE EN ESPECES(SOURCES OF INCOME)	MATELAS (MATTRESS)			
PROPRIETAIRE DE TERRAIN(LAND OWNER/SIZE OF MANIOC FIELD)	LIT (BED)			
EDUCATION (ENFANT/EPOUSE)(CHILD/SPOUSE EDUCATION)	TABLE (TABLE)			
ACTIVITE LUCRATIVE (INCOME GENERATING ACTIVITIES)	CHAISSE (CHAIR)			
ENDEZ-VOUS QUELQUES PRODUITS DE LA FORET? OU? PRIX?(DO YOU SELL FOREST PRODUCTS? WHERE? PRICES?)	FAUTEUIL (ARMCHAIR)			
ENDEZ-VOUS LE MANIOC? COMBIEN ET QUEL PRIX?(DO YOU SELL MANIOC? HOW MUCH AT AT PRICE?)	CUILLERE (SPOON)			
AVEZ-VOUS UNE SOURCE PERMANENTE POUR GAGNER LA REVENUE?(DO YOU HAVE A PERMANENT SOURCE OF INCOME - I.E. A WAGE-EARNING JOB)	MACHETE (MACHETE)			
APPORTEZ-VOUS QUELQUES PRODUITS DE LA FORET AU MARCHE? OU? PRIX?(DO YOU BRING FOREST PRODUCTS TO MARKET? WHERE? PRICE?)	HACHE (AXE)			
COMBIEN COUTE LE TRANSPORT AU MARCHE ALLEZ ET RETOUR?(HOW MUCH DOES JOURNAD TRIP TRANSPORTATION COST TO MARKET?)	TASSE (CUP)			
ENDEZ-VOUS LE VIN DE PALME?(DO YOU SELL PALM WINE?)	MIRROIR (MIRROR)			
ENDEZ-VOUS LE ALCOOL DE MANIOC/MAIS?(DO YOU SELL NGOLONGOLO-MANIOC WINE?)	CHAMP (MANIOC FIELD)			
AVEZ-VOUS UNE AUTRE SOURCE DE REVENUE?(DO YOU HAVE ANOTHER/OTHER SOURCE OF INCOME?)	CHAUSSURES (SHOES)			
	LAMPE TORCHE (FLASHLIGHT)			
	POSTE RADIO (RADIO)			
	SAGAIE (SPEAR)			
	LINGE (BEDSHEETS)			
	FUSIL (SHOTGUN)			

ALIMENTATION

QUESTIONS	PRODUIT	A*	V*	P*	#
AVIEZ-VOUS MANGE DU POISSON AUJOURD'HUI? HIER? LAQUELLE?(DID YOU EAT FISH TODAY, YESTERDAY, WHAT TYPE?)	AUBERGINE(EGGPLANT)				
	PATE D'ARACHIDE(PEANUT BUTTER)				
QUE FAITES-VOUS POUR PROCURER CET POISSON (ACHETER, DONNER, TROUVER)?(HOW DID YOU GET THIS FISH -BOUGHT, GIVEN, FISHED?)	MANIOC(MANIOC)				
	NGANGNA(LEGUME)				
AVIEZ-VOUS MANGE DE LA VIANDE AUJOURD'HUI? HIER? LAQUELLE?(DID YOU EAT MEAT TODAY, YESTERDAY, WHAT TYPE?)	PONDOU(MANIOC LEAVES)				
	ALCOHOL DE MAIS(ALCOHOL)				
OÙ AVIEZ-VOUS FAIT POUR PROCURER CETTE VIANDE (ACHETER, CHASSER, DONNER, TROUVER)?(HOW DID YOU GET THIS MEAT - BOUGHT, HUNTED, GIVEN?)	VIN DE PALME(PALM WINE)				
	SEL(SALT)				
AVIEZ-VOUS MANGE LE MANIOC AUJOURD'HUI? HIER? QUEL FORME? D'OU VIENT CE MANIOC?(DID YOU EAT MANIOC TODAY, YESTERDAY, HOW WAS IT PREPARED, WHERE DID IT COME FROM?)	SUCRE(SUGAR)				
	POISSON(FISH)				
AVIEZ-VOUS MANGE DU KOKO AUJOURD'HUI? HIER? ACHETER OR PAR LA CUEILLETTE?(DID YOU EAT KOKO TODAY, YESTERDAY, BOUGHT OR COLLECTED YOURSELF?)	VIANDE(MEAT)				
	MPOKOLU(PALM GRUBS)				
AVIEZ-VOUS MANGE D'AUTRES LEGUMES AUJOURD'HUI? HIER? ACHETER, CUEILLETTE, CHAMP?(DID YOU EAT OTHER VEGETABLES TODAY, YESTERDAY, BOUGHT, COLLECTED, FROM YOUR FIELD?)	KOKO(<i>Gnetum spp.</i>)				
	NOIX DE PALME(PALM NUTS)				
AVIEZ-VOUS UTILISE L'HUILE DE PALME AUJOURD'HUI? HIER? ACHETER, CUEILLETTE, CHAMP?(DID YOU USE PALM OIL TODAY, YESTERDAY, BOUGHT, COLLECTED?)	MIEL(HONEY)				
	CHAMPINON(MUSHROOMS)				
QUELS SONT D'AUTRES TYPES DE NOURRITURE QUE VOUS MANGE D'HABITUDE?(WHAT TYPE OF FOOD DO YOU NORMALLY EAT?)	MALOMBO(FOREST PRODUCT)				
	PEKE(SEEDS)				
QUELE GENRE DE NOURRITURE ACHETEZ-VOUS AVEC D'ARGENT?(WHAT TYPE OF FOOD DO YOU BUY WITH MONEY?)	SAVON(SOAP)				
	PETROLE(KEROSENE)				
PRODUISEZ-VOUS LE VIN DE PALME? COMBIEN DE LITRES PAR SEMAINE? COMBIEN COUTE UN VERRE? COMBIEN DE TEMPS POUR PREPARER CHAQUE LITRE?(DO YOU MAKE PALM WINE, HOW MANY LITRES PER WEEK, WHAT COST PER GLASS, HOW MUCH TIME TO PREPARE EACH LITRE?)	VETEMENTS(CLOTHING)				
	CIGARETTES				
FABRIQUEZ-VOUS LE NGOLO-NGOLO? COMBIEN DE LITRES PAR SEMAINE? COMBIEN COUTE UN VERRE? COMBIEN DE TEMPS POUR PREPARER CHAQUE LITRE?(DO YOU MAKE ALCOHOL, HOW MANY LITRES PER WEEK, WHAT COST PER GLASS, HOW MUCH TIME TO PREPARE EACH LITRE?)	MARMITE(COOKING POTS)				
	ASSIETTES(DISHES)				
	CHAUSSEURS(SHOES)				

A = ACHATS(BUYS-ESTIMATED MONTHLY EXPENSE), V = VENTES(SELLS-ESTIMATED MONTHLY COME), P = PRIX(AMOUNT), # = QUANTITES

ACTIVITES

LA PECHE	L'AGRICULTURE
VIEZ-VOUS PECHE AUJOURD'HUI? HIER?(DID YOU FISH TODAY, YESTERDAY?)	1. COMBIEN DE CHAMPS AVEZ-VOUS? OU SONT-ILS? QUEL MESURE?(HOW MANY FIELDS DO YOU HAVE, WHERE ARE THEY, WHAT SIZE?)
A PEU PRES, COMBIEN DE POISSON TUEZ-VOUS ET QUELS ESPECES?(HOW MANY FISH DO YOU NORMALLY CATCH?)	2. QUEL SONT LES PRODUITS QUE VOUS AVEZ CULTIVES DANS VOS CHAMPS L'ANNEE PASSEE?(WHAT DID YOU PRODUCE LAST YEAR?)
QUE FAITES-VOUS AVEC LES POISSONS QUE VOUS PECHEZ?(WHAT DO YOU DO WITH THE FISH YOU CATCH?)	3. COMBIEN DE TEMPS UTILISEZ-VOUS UN CHAMP?(HOW LONG CAN YOU USE A FIELD?)
A QUI VENDEZ-VOUS LES POISSONS?(TO WHOM DO YOU SELL YOUR FISH?)	4. Y'A-T-IL PLUS DES CHAMPS DANS CE VILLAGE MAINTENANT Q'AVANT?(ARE THERE MORE FIELDS IN THIS VILLAGE NOW THAN BEFORE?)
FUMEZ-VOUS LES POISSONS DE VOTRE PECHE?(DO YOU SMOKE YOUR FISH?)	5. QUE FAITES-VOUS AVEC VOS PRODUITS DU CHAMP? (VENDRE, MANGER, PARTAGER)?(WHAT DO YOU DO WITH THE PRODUCTS OF YOUR FIELD - SELL, EAT, TRADE?)
COMBIEN DES FILETS AVEZ-VOUS, QUEL SORTE?(HOW MANY AND WHAT TYPE OF NETS DO YOU HAVE?)	6. QUAND VOUS FAITES LE MAIS, VOUS LE MANGEZ OU VOUS L'UTILISEZ DANS LA PRODUCTION D'ALCOOL?(WHEN YOU GROW MAIZE DO YOU EAT IT OR USE IT IN MAKING ALCOHOL?)
ENTRE LA CHASSE ET LA PECHE, QUELLE EST L'ACTIVITE QUE VOUS PRACTIQUEZ LE MIEUX?(BETWEEN FISHING AND HUNTING WHICH DO YOU DO BEST?)	7. EST-CE QUE VOUS FAITES DE L'ELEVAGE?(DO YOU DO HUSBANDRY OF ANY TYPE?)
Y'A-T-IL TOUJOURS BEAUCOUP DE POISSON DANS LA RIVIERE PLUS, EGAL OU MOINS QU'AVANT?(ARE THERE MORE, THE SAME, OR LESS FISH IN THE RIVER NOW THAN BEFORE?)	8. Y'A-T-IL TOUJOURS BEAUCOUP DE PRODUITS/LEGUMES DE LA FORET (KOKO ETC.) PLUS, EGAL OU MOINS QU'AVANT?(ARE THERE MORE, LESS, OR THE SAME AMOUNT OF FOREST PRODUCTS TODAY COMPARED WITH BEFORE?)
PECHEZ-VOUS LA NUIT OU LE JOUR?(DO YOU FISH DURING THE DAY OR AT NIGHT?)	9. CHANGE BEAUCOUP LE TERRAIN A COTE DU VILLAGE QU'AVANT? COMMENT? POURQUOI?(HAS THE LAND NEAR THE VILLAGE CHANGED MUCH, HOW, WHY?)
SI VOUS NE PECHEZ PAS, POURQUOI?(IF YOU DON'T FISH, WHY NOT?)	10. QU'EST-CE QUE C'EST LES PROBLEMES QUE VOUS AVEZ AVEC LE CHAMP MAINTENANT?(WHAT PROBLEMS EXIST IN THE FIELDS?)

TES:

ACTIVITES

LA CHASSE

VIEZ-VOUS CHASSE AUJOURD'HUI? (DID YOU HUNT TODAY? YESTERDAY?)	11. CHASSEZ-VOUS AVEC DES CABLES? (DO YOU HUNT WITH SNARES?)
POUR COMBIEN D'HEURES CHASSEZ-VOUS DANS LA JOURNEE? OU? COMMENT? EC QUELS MOYENS? COMBIEN DES CARTOUCHES UTILISEZ-VOUS POUR COMBIEN DES ANIMAUX? (DESCRIPTION OF HUNTING: HOURS, LOCATION, METHOD, # SHELLS/ANIMAL)	12. CHASSEZ-VOUS AVEC UN FILET? (DO YOU HUNT WITH A NET?)
	13. CHASSEZ-VOUS AVEC L'ARBALETE? (DO YOU HUNT WITH A CROSSBOW?)
Y A-T-IL COMBIEN DES FUSILS DANS CE VILLAGE? UNE CARTOUCHE COUTE COMBIEN DANS CE VILLAGE? (HOW MANY SHOTGUNS ARE IN THIS VILLAGE? A SHELL COSTS HOW MUCH IN THIS VILLAGE?)	14. QUE SAVEZ-VOUS DES REGLEMENTS DE CHASSE? (WHAT DO YOU KNOW ABOUT HUNTING REGULATIONS?)
	15. EST-CE QUE LA CHASSE EST CONTROLEE AUTOUR DE VOTRE VILLAGE? (IS HUNTING CONTROLLED IN YOUR VILLAGE?)
SI VOUS AVEZ UNE ARME, QUELLES SORTES D'ANIMAUX TUEZ-VOUS AVEC? (IF YOU HAD A GUN WHAT TYPE OF ANIMALS WOULD YOU HUNT?)	16. CHASSEZ-VOUS A LA NDOKI? (DO YOU HUNT AT THE NDOKI?)
	17. SUR L'AUTRE COTE DE LA NDOKI? (NEAR THE NDOKI?)
QUEL MOYEN DE CHASSE UTILISEZ-VOUS LA PLUS SOUVENT? (WHAT HUNTING METHOD DO YOU NORMALLY USE?)	18. CHASSEZ-VOUS AU CAMEROUN? (DO YOU HUNT IN CAMEROON?)
	19. Y'A-T-IL PLUS DES ANIMAUX A AU CONGO OU AU CAMEROUN? (ARE THERE MORE ANIMALS IN CONGO OR CAMEROON?)
CHASSEZ-VOUS SURTOUT AU CAMEROUN OU AU CONGO? (DO YOU HUNT IN CAMEROON OR CONGO?)	20. QUELLE EST LA PERIODE D'OUVERTURE DE LA CHASSE? EST-CE QUE C'EST OUVERTE ACTUELLEMENT? (WHAT IS THE OPEN HUNTING SEASON? IS IT ACTUALLY OPEN?)
	21. SI VOUS ETES ALLE A LA CHASSE DIX FOIS VOUS RENCONTRIEZ UN AGENT DES EAUX ET FOREST COMBIEN DES FOIS? (IF YOU HUNTED TEN TIMES HOW MANY TIMES WOULD YOU MEET AN ENFORCEMENT AGENT FROM THE MINISTRY?)
Y'A-T-IL PLUS, AUTANT, OU BIEN MOINS D'ANIMAUX AUJOURD'HUI QU'AVANT? POURQUOI CE CHANGEMENT? (ARE THERE MORE, LESS, OR THE SAME AMOUNT OF ANIMALS NOW THAN BEFORE? WHAT IS THE REASON FOR THE CHANGE?)	22. LA MEME QUE NO. 21 MAIS AU CAMEROUN (SAME AS NO. 21 BUT IN CAMEROON?)
	23. ETIEZ-VOUS DEJA ARRETE POUR FAIRE LA CHASSE? (HAVE YOU BEEN ARRESTED FOR HUNTING?)
CHASSEZ-VOUS LA NUIT? (DO YOU HUNT AT NIGHT?)	24. CONNAISSEZ-VOUS QUELQ'UN QUI S'EST FAIT ARRETE DEJA POUR FAIRE LA CHASSE? (DO YOU KNOW ANYONE WHO HAS BEEN ARRESTED FOR HUNTING?)
	25. QUELS SONT LES ANIMAUX QUE LES GENS DE VOTRE VILLAGE NE MANGENT OU CHASSENT PAS? POURQUOI? (WHAT ANIMALS DO PEOPLE IN YOUR VILLAGE NOT EAT OR HUNT? WHY?)
COMBIEN D'ANIMAUX TUEZ-VOUS CHAQUE CHASSE? QUEL TYPE? COMBIEN DE CARTOUCHES PAR CHAQUE ANIMAL? COMBIEN DES HEURES CHAQUE CHASSE? (HOW MANY ANIMALS DO YOU SHOOT, WHAT TYPE, HOW MANY SHELLS/ANIMAL, # HOURS?)	25. QUELS SONT LES ANIMAUX QUE LES GENS DE VOTRE VILLAGE NE MANGENT OU CHASSENT PAS? POURQUOI? (WHAT ANIMALS DO PEOPLE IN YOUR VILLAGE NOT EAT OR HUNT? WHY?)

REMARQUES:

ATTITUDES ET EVALUATIONS

CONSERVATION ET LA FORET

QUI EST LE PROPRIETAIRE DE LA FORET DERRIERE LE VILLAGE? (WHO OWNS THE FOREST BEHIND THE VILLAGE?)	11. EN DEHORS DE LA VIANDRE, QUE MANGEZ-VOUS? (WITHOUT MEAT, WHAT WOULD YOU EAT?)
	12. LA FORET, L'AGRICULTURE, LA PECHE, QUE PREFEREZ-VOUS? POURQUOI? (THE FOREST, AGRICULTURE, FISHING, WHICH DO YOU PREFER?)
LA FORET PRESENT-ELLE DES RISQUES? LESQUELS? (DOES THE FOREST PRESENT RISKS? WHAT KIND?)	13. EN DEHORS DE LA FORET QUE FAITES-VOUS POUR VOTRE SUBSISTANCE? (WITHOUT THE FOREST WHAT WOULD YOU DO FOR YOUR SUBSISTANCE?)
Y A-T-IL DES AVANTAGES DE LA FORET DERRIERE LE VILLAGE? LESQUELS? (ARE THERE ADVANTAGES TO THE FOREST? WHAT KIND?)	14. METTEZ-EN ORDRE LES PRODUITS DE PREMIERES NECESSITES QUE VOUS TIRES DE LA FORET (NOURRITURE, MEDICAMENTS, MATERIAL DE CONSTRUCTION). (PUT IN ORDER THE PRIMARY IMPORTANT FOREST PRODUCTS THAT YOU USE - FOOD, MEDICINE, CONSTRUCTION MATERIALS)
	15. PRECISEZ LES PRODUITS (NOURRITURE) DE PREMIERE IMPORTANCE QUE VOUS CONNAISSEZ/UTILISEZ. (PUT IN ORDER THE FOODS OF MOST IMPORTANCE THAT YOU KNOW/USE.)
Y A-T-IL DES ANIMAUX INTERDITS DU VILLAGE? (ARE THERE ANIMALS WHICH ARE FORBIDDEN IN THE VILLAGE?)	16. INTERESSEZ-VOUS AU CHANTIER FORESTIER? POURQUOI? (ARE YOU INTERESTED IN LOGGING? WHY?)
CONNAISSEZ-VOUS LE MOKELE-MBEMBE? VOUS L'AVEZ VU DEJA? OUI? (DO YOU KNOW THE FOREST MONSTER? HAVE YOU SEEN IT? WHERE?)	17. ENTRE LA VIE EN FORET ET D'ETRE EMPLOYE D'UNE SOCIETE, LAQUELLE PREFEREZ-VOUS? POURQUOI? (BETWEEN LIFE IN THE FOREST AND EMPLOYMENT WITH A LOGGING COMPANY WHICH WOULD YOU PREFER? WHY?)
	18. CONNAISSEZ-VOUS LA CONSERVATION DE LA NATURE? EXPLIQUEZ? (DO YOU KNOW ABOUT NATURE CONSERVATION? EXPLAIN?)
Y A-T-IL DES ANIMAUX QUI SONT IMPORTANT POUR LA COMMUNAUTE? POURQUOI? (ARE THERE ANIMALS THAT ARE IMPORTANT FOR THE COMMUNITY? WHY?)	19. CONNAISSEZ-VOUS LE PROJET NOUABALE-NDOKI? QUI EST LA PROPRIETAIRE? (DO YOU KNOW THE NOUABALE-NDOKI PROJECT? WHO OWNS IT?)
Y A-T-IL DES ANIMAUX QUI POSENT UN PROBLEME POUR LA COMMUNAUTE? (ARE THERE ANIMALS WHICH GIVE PROBLEMS TO THE COMMUNITY?)	20. POURQUOI ON A CREE LA RESERVE? IL Y A QUELQUES CHANGEMENTS DAN LA VIE L'ARRIVEE DU NNP COMMENCE? LESQUELLES? (WHY WAS THE PARK CREATED? HAS LIFE CHANGED SINCE THE PROJECT BEGAN? HOW?)
	21. QUI SONT CE QUI BENEFICENT DU PROJET? COMMENT? (WHO BENEFITS FROM THE PROJECT? HOW?)
LES ANIMAUX QU'ON TROUVE ICI, ON PEUT LES TROUVER PARTOUT? POURQUOI? (ARE THE ANIMALS FOUND HERE, IS ONE ABLE TO FIND THEM EVERYWHERE? WHY?)	22. EST-CE QU'IL FAUT INTERDIRE LA CHASSE DANS LA RESERVE? L'EXPLOITATION FORESTIERE? (SHOULD HUNTING AND LOGGING BE RESTRICTED IN THE PARK?)
SANS ANIMAUX CHANGERAIS VOTRE VIE? (WITHOUT ANIMALS WOULD YOUR LIFE CHANGE?)	23. QUEL PENSEZ-VOUS DE LA RESERVE? (WHAT DO YOU THINK ABOUT THE PARK?)
	24. WHAT DO YOU THINK ABOUT PUTTING A ROAD THROUGH THE NATIONAL PARK? IS LOGGING A GOOD OR BAD THING?
SANS LEGUMES DE FORET CHANGERAIS VOTRE VIE? (WITHOUT PLANTS FROM THE FOREST WOULD YOUR LIFE CHANGE?)	25. IF YOU RECEIVED 10,000 CFA WHAT WOULD YOU BUY? IF YOU RECEIVED 1000 CFA WHAT WOULD YOU BUY?

RES:

RECENSEMENT DE CHASSEURS

DATE	CHASSEUR	LOCATION	TRANSPORT	# PERSONNES	TYPE FUSIL	HIRE DEPART	HIRE RETOUR	NO.TIREE/PERDU	APPELEZ?
ESPECES	CLASSE D'AGE	SEXE	POID	LONGEUR (mm)	CORNES (mm)	CIRCON (mm)	CONDITION	ETAT	MACHOIRE
DATE	CHASSEUR	LOCATION	TRANSPORT	# PERSONNES	TYPE DE FUSIL	HIRE DEPART	HIRE RETOUR	NO.TIREE/PERDU	APPELEZ?
ESPECES	CLASSE D'AGE	SEXE	POID	LONGEUR (mm)	CORNES (mm)	CIRCON (mm)	CONDITION	ETAT	MACHOIRE
DATE	CHASSEUR	LOCATION	TRANSPORT	# PERSONNES	TYPE DE FUSIL	HIRE DEPART	HIRE RETOUR	NO.TIREE/PERDU	APPELEZ?
ESPECES	CLASSE D'AGE	SEXE	POID	LONGEUR (mm)	CORNES (mm)	CIRCON (mm)	CONDITION	ETAT	MACHOIRE
DATE	CHASSEUR	LOCATION	TRANSPORT	# PERSONNES	TYPE DE FUSIL	HIRE DEPART	HIRE RETOUR	NO.TIREE/PERDU	APPELEZ?
ESPECES	CLASSE D'AGE	SEXE	POID	LONGEUR (mm)	CORNES (mm)	CIRCON (mm)	CONDITION	ETAT	MACHOIRE

25

APPENDIX B



DATE	ID	CHASSEUR	RECEIVED	SENT BY	CONSUMED	LOCATION	TYPE OF HUNT	# HOURS	SCIENTIFIC NAME	PART	FORM	DESTINATION	PRICE PURCHASE
11-May-95	101A	Aye	intestines	Adada, Albertine	head and tail	Bounda (South)	CB 12	9 00	<i>Cercopithecus cephus</i>	body	smoked	Kabo	2000
15-May-95	102A	Makembe	zero	Adada, Albertine	zero	Bounda	CB 12	7 50	<i>Cercopithecus cephus</i>	zero			
17-May-95	103A	Kolo, Martin	all	Kolo, Martin	all	Cameroun	CB 12	18 40	<i>Colobus queleza</i>	all	fresh	home	0
18-May-95	104A	Kolo, Martin	all	Kolo, Martin	all	Bonga	Snare	0 30	<i>Manis tetradactyla</i>	all	fresh	home	0
18-May-95	105A	Bedwa	1/4 head (head, intestines for Ebounga who carved the meal)	King, Bernard	1,4	Bonga (East)	CB 12 - Jacklighting	14 00	<i>Cephalophus dorsalis</i>	2,4	fresh	Kabo	2000
18-May-95	105B	Bedwa	zero	King, Bernard	all	Bonga (East)	CB 12 - Jacklighting	14 00	<i>Cephalophus monticola</i>	zero			
17-May-95	106A	Mokote	zero	Kobo	zero	Cameroun	CB 12	17 24	<i>Cercopithecus cephus</i>	zero			
19-May-95	107A	Ebounga Mombolambi	head, intestine	Kobo	1,4	Bonga (East)	CB 12 - Jacklighting	0 57	<i>leucogaster</i>	3,4	fresh	Kabo (2,4) Bonga (1,4)	3000
28-Apr-95	108A	Gabrielle		Mombolambi, Gabrielle		Momboyo	CB 12	11 00	<i>Potamochoerus porcus</i>				
3-May-95	109A	Bakembe	zero	Mombolambi, Gabrielle	all	Cameroun	CB 12	5 00	<i>Cercocebus galentus</i>	zero			
3-May-95	109B	Bakembe	all (ate half) hind leg (trade for fufu)	Mombolambi, Gabrielle	zero	Cameroun	CB 12	5 00	<i>Cercocebus albigena</i>	2,4	fresh	Bomassa	750
4-May-95	110A	Mbekelo	head, intestines	Mombolambi, Gabrielle	front leg	Songo	CB 12	9 00	<i>Cephalophus callipygus</i>	2,4	fresh	Bomassa	2000
7-May-95	111A	Sangoua	2 cigarettes	Apa	zero	Mombi	CB 12	5 00		zero			
8-May-95	112A	Itoko	head, intestines	Apa	?	Wali	CB 12	10 00	<i>Cercopithecus neglectus</i>	zero			
8-May-95	113A	Mbekelo	5 cigarettes	Mbebouti	zero	Momboyo	CB 12	12 00	<i>Cephalophus callipygus</i>	zero			
8-May-95	114A	Makembe	head, intestines, filet head, front leg (750)	Ngopo	all legs	Momboyo	CB 12 - Jacklighting	11 00	<i>Cephalophus dorsalis</i>	zero			
13-May-95	115A	Mopaka	bananas, 250 salt)	Ngopo	front leg, intestines	Momboyo	CB 12 - Jacklighting	7 00	<i>Cephalophus callipygus</i>	2,4	fresh	Bomassa	2000
14-May-95	116A	Mendjo	head, front leg	Apa	?	Wali	CB 12	8 30	<i>Cephalophus callipygus</i>				
15-May-95	117A	Mobaye	1 pair shorts	Les gens du bateau	all	Bekeha	CB 12	15 00	<i>Cephalophus monticola</i>				
15-May-95	117B	Mobaye	1 shirt	Les gens du bateau	all	Bekeha	CB 12	15 00	<i>Cephalophus monticola</i>				
15-May-95	117C	Mobaye	1 cartouche	Les gens du bateau	all	Bekeha	CB 12	15 00	<i>Cercocebus galentus</i>				
17-May-95	118A	Ekogno	1 front leg, head	Ngopo	all	Momboyo	CB 12 - Jacklighting	10 00	<i>Cephalophus monticola</i>	zero			
17-May-95	118B	Ekogno	head, intestine, 1 pack cigarettes	Ngopo	intestines	Momboyo	CB 12 - Jacklighting	10 00	<i>Cephalophus monticola</i>	4,4	fresh	Bomassa	1000
21-May-95	119A	Mendjo	cigarettes	Komaka	2 hind legs	Wali	CB 12	11 00	<i>Cephalophus callipygus</i>	2 front legs	fresh	Bomassa	2000
21-May-95	120A	Mbebouti	zero	Mbebouti	zero	Momboyo	CB 12	8 00	<i>Cercopithecus neglectus</i>				
21-May-95	120B	Mbebouti	zero	Mbebouti	zero	Momboyo	CB 12	8 00	<i>Cephalophus monticola</i>				
21-May-95	121A	Ndinga and a dog	head, front leg, filet (dog got the intestines)	Idokanda	front leg	Ile Nguoumou Elongu (Cameroun)	Dog and lance	9 00	<i>Tragelaphus speki</i>	2 hind legs 1 hind, 2 front	fresh	Bomassa	4000
21-May-95	122A	Moya	1 front leg, 2 hind legs all (sold for 1500 CFA and bought a T-shirt for his wife)	Muslim poacher	1 front leg		Snare		<i>Cephalophus callipygus</i>			Bomassa	fufu
23-May-95	123A	Mbekelo	zero	Rene and Gabi	zero	Momboyo	CB 12	11 00	<i>Cephalophus monticola</i>	zero		Bomassa	fufu
23-May-95	123B	Mbekelo	zero	Rene and Gabi	split between them	Momboyo	CB 12	11 00	<i>Cephalophus leucogaster</i>	1 hind leg	fresh	Bomassa	1000
24-May-95	124A	Mobaye	zero	Mobaye	zero	Cameroun	CB 12	7 00	<i>Cercocebus albigena</i>	all	fresh	Bomassa	1500 (to be sent on 1800 cigarettes)
24-May-95	124B	Mobaye	all	Mobaye	all	Cameroun	CB 12	7 00	<i>Cercocebus albigena</i>				
24-May-95	124C	Mobaye	zero	Mobaye	zero	Cameroun	CB 12	7 00	<i>Cercocebus albigena</i>				
24-May-95	125A	Gabrielle	zero	Gabrielle	zero	Cameroun	CB 12	6 00	<i>Cercocebus albigena</i>				
25-May-95	126A	Gabrielle	all	Gabrielle	1 front leg	Cameroun	CB 12	6 00	<i>Cephalophus nigrifrons</i>	2 hind legs (2000), 1 front leg	fresh	Bomassa	2000 (to be sent to Queen to purchase 3000 cartouches)
25-May-95	127A	Makembe	5 cigarettes	Alphonse Ngopo	zero	Songo (5 km)	CB 12	6 00	<i>Cephalophus Cephalophus</i>	zero	zero	zero	zero
26-May-95	128A	Mbekelo	head, intestines	Fidele Komaka	1 hind leg	Momboyo	CB 12	9 00	<i>leucogaster</i>	2 front legs (2000), 1	fresh	Bomassa	2000
28-May-95	129A	Itoko	zero	Marcel	zero	Wali trail	CB 12	5 00	<i>Hyaenoscus aquaticus</i>	all	fresh	Bomassa	3000 part debts
26-May-95	129A	Itoko	1 front leg, 1 hind leg, intestines (sold legs for 2000)	Marcel	1 front leg, 1 hind leg, head	Wali trail	CB 12	5 00	<i>Cephalophus nigrifrons</i>				
28-May-95	130A	Mbekelo	1 front leg, intestines, head (sold leg for 1000 and bought 500 CFA worth of soap)	Fidele Komaka	1 hind leg	Momboyo	CB 12	10 00	<i>Cephalophus leucogaster</i>	1 front leg, 1 hind leg	fresh	Bomassa	bought 5 2000 cartouches

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DATE	ID	LOCATION	CHASSEUR	HR. DEPA RT	HR. RETU RN	# HOUR S	SCIENTIFIC NAME	AGE CLASS	SEX	WEIGHT	KG/H R	TYPE OF HUNT
11-May-95	101A	Bounda (South)	Aye	06h00	15h00	9:00	<i>Cercopithecus cephus</i>	Adult	M	*4.5 kg	0.5	CB 12
15-May-95	102A	Bounda	Makembe	07h00	14h50	7:50	<i>Cercopithecus cephus</i>	LOST	LOST		0	CB 12
17-May-95	103A	Cameroun	Kolo, Martin	06h00	00h40	18:40	<i>Colobus guereza</i>	Adult	F	4.7 kg	0.25	CB 12
18-May-95	104A	Bonga	Kolo, Martin	06h30	07h00	0:30	<i>Manis tetradactyla</i>	Adult	M	2.6 kg	5.2	Snare
18-May-95	105A	Bonga (East)	Bedwa	19h00	09h00	14:00	<i>Cephalophus dorsalis</i>	Subadult	M	15.4 kg		CB 12 - Jacklighting
18-May-95	105B	Bonga (East)	Bedwa	19h00	09h00	14:00	<i>Cephalophus monticola</i>	Adult	F	5.2 kg	1.47	CB 12 - Jacklighting
17-May-95	106A	Cameroun	Mokote	06h00	23h24	17:24	<i>Cercopithecus cephus</i>	LOST	LOST		0	CB 12
19-May-95	107A	Bonga (East)	Ebounga	20h00	20h57	0:57	<i>Cephalophus leucogaster</i>	Adult	F	14.4 kg*	14.4	CB 12 - Jacklighting
28-Apr-95	108A	Momboyo	Mombolambi, Gabrielle	06h00	17h00	11:00	<i>Potamochoerus porcus</i>	Adult	F	*80 kg	7.27	CB 12
3-May-95	109A	Cameroun	Bakembe	12h00	17h00	5:00	<i>Cercocebus galeritus agilis</i>	Adult	M	*10 kg		CB 12
3-May-95	109B	Cameroun	Bakembe	12h00	17h00	5:00	<i>Cercocebus albigena</i>	Subadult	M	*6 kg	3.2	CB 12
4-May-95	110A	Songo	Mbekelo	07h00	16h00	9:00	<i>Cephalophus callipygus</i>	Adult	M	*17.5 kg	1.94	CB 12
7-May-95	111A	Mombili	Sangoua	09h00	14h00	5:00		LOST	LOST		0	CB 12
8-May-95	112A	Wali	Itoko	08h00	18h00	10:00	<i>Cercopithecus neglectus</i>	Adult	M	*6.5 kg	0.65	CB 12
8-May-95	113A	Momboyo	Mbekelo	06h00	18h00	12:00	<i>Cephalophus callipygus</i>	LOST	LOST		0	CB 12
8-May-95	114A	Momboyo	Makembe	19h00	06h00	11:00	<i>Cephalophus dorsalis</i>	Subadult	M	*15 kg	1.36	CB 12 - Jacklighting
13-May-95	115A	Momboyo	Mopaka	17h00	24h00	7:00	<i>Cephalophus callipygus</i>	Subadult	M	*12 kg	1.71	CB 12 - Jacklighting
14-May-95	116A	Wali	Mendjo	08h30	17h00	8:30	<i>Cephalophus callipygus</i>	Adult	M	*17.5 kg	2.06	CB 12
15-May-95	117A	Bekeha	Mobaye	18h00	09h00	15:00	<i>Cephalophus monticola</i>	Adult	M	*7 kg		CB 12
15-May-95	117B	Bekeha	Mobaye	18h00	09h00	15:00	<i>Cephalophus monticola</i>	Adult	F	*5.5 kg		CB 12
15-May-95	117C	Bekeha	Mobaye	18h00	09h00	15:00	<i>Cercocebus galeritus agilis</i>	Subadult	F	*7 kg	1.3	CB 12
17-May-95	118A	Momboyo	Ekogno	18h00	04h00	10:00	<i>Cephalophus monticola</i>	Subadult	M	*4 kg		CB 12 - Jacklighting
17-May-95	118B	Momboyo	Ekogno	18h00	04h00	10:00	<i>Cephalophus monticola</i>	Adult	F	*5.5 kg	0.95	CB 12 - Jacklighting
21-May-95	119A	Wali	Mendjo	06h00	17h00	11:00	<i>Cephalophus callipygus</i>	Subadult	F	*12 kg	1.09	CB 12
21-May-95	120A	Momboyo	Mbebouti	09h00	17h00	8:00	<i>Cercopithecus neglectus</i>	LOST	LOST		0	CB 12
21-May-95	120B	Momboyo	Mbebouti	09h00	17h00	8:00	<i>Cephalophus monticola</i>	LOST	LOST		0	CB 12
21-May-95	121A	Ile Ngoumou	Ndinga and a	07h00	16h00	9:00	<i>Tragelaphus spekii</i>	Adult	M	*100 kg	11.11	Dog and lance
21-May-95	122A	Elongo (Cameroon)	Moya				<i>Cephalophus callipygus</i>	Adult	F	*15 kg		Snares
23-May-95	123A	Momboyo	Mbekelo	07h00	18h00	11:00	<i>Cephalophus monticola</i>	Adult	M	*7 kg		CB 12
23-May-95	123B	Momboyo	Mbekelo	07h00	18h00	11:00	<i>Cephalophus leucogaster</i>	Subadult	F	*15 kg	2	CB 12
24-May-95	124A	Cameroun	Mobaye	10h00	17h00	7:00	<i>Cercocebus albigena</i>	Adult	M	*9 kg		CB 12
24-May-95	124B	Cameroun	Mobaye	10h00	17h00	7:00	<i>Cercocebus albigena</i>	Adult	F	*7 kg		CB 12
24-May-95	124C	Cameroun	Mobaye	10h00	17h00	7:00	<i>Cercocebus albigena</i>	LOST	LOST		2.29	CB 12
24-May-95	125A	Cameroun	Gabrielle	10h00	16h00	6:00	<i>Cercocebus albigena</i>	LOST	LOST		0	CB 12
25-May-95	126A	Cameroun	Gabrielle	10h00	16h00	6:00	<i>Cephalophus nigrifrons</i>	Subadult	M	*5 kg	0.83	CB 12
25-May-95	127A	Songo (5 km)	Makembe	18h00	24h00	6:00	<i>Cephalophys leucogaster</i>	LOST	LOST		0	CB 12 - Jacklighting
26-May-95	128A	Momboyo	Mbekelo	08h00	17h00	9:00	<i>Cephalophus leucogaster</i>	Adult	F	*15 kg	1.67	CB 12
28-May-95	129A	Wali trail	Itoko	19h00	24h00	5:00	<i>Hyemoschus aquaticus</i>	Subadult	M	*10 kg		CB 12 - Jacklighting
28-May-95	129B	Wali trail	Itoko	19h00	24h00	5:00	<i>Cephalophus nigrifrons</i>	Subadult	?	*7 kg	3.4	CB 12 - Jacklighting
28-May-95	130A	Momboyo	Mbekelo	07h00	17h00	10:00	<i>Cephalophus leucogaster</i>	Adult	M	*17 kg		CB 12
28-May-95	130B	Momboyo	Mbekelo	07h00	17h00	10:00	<i>Cephalophus monticola</i>	LOST	LOST		1.7	CB 12