# STRATEGIES FOR SUSTAINABLE DEVELOPMENT OF NON-TIMBER FOREST PRODUCTS IN SENEGAL

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**(ABSTRACT)**

In recent years, forests have been increasingly recognized as rich reservoirs for many valuable biological resources. As a result of the devastation caused by drought, clearing land for agriculture, and overexploitation of timber, there has been a growing interest in non-timber forest products (NTFPs). The Senegal Forestry Action Plan, designed to ensure sustainable forest management, stresses the importance of identifying the constraints to and opportunities for sustainable development of non-timber forest products.

This paper seeks to accomplish this and to suggest sustainable new NTFP development initiatives. First, data on products and prices from Senegal's Forestry Service and reports and other documents were examined to identify constraints to NTFP management and opportunities for NTFP development. Then, a thorough literature review of topics related to NTFPs was completed. Informal interviews with NTFP specialists were also conducted. Finally, a case study analysis examined NTFP management and utilization in conditions similar to Senegal.

Management and utilization constraints can be removed when policies involve local populations. While some policy opportunities facilitate sustainable management, further efforts must be made to involve all NTFP stakeholders. Successful programs will organize stakeholder groups or enterprises, inventory all forest resources, develop NTFP focused pilot projects including the cultivation of native NTFP species, and give gender considerations high priority.

Key words: enterprise; non-timber forest products; forest policy; income generation; Senegal.

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# CHAPTER 1

# INTRODUCTION

Forests provide a broad range of services and non-timber forest products (NTFPs), including food, medicine, fodder, fuel, and construction materials. Trees and forests are also important in symbolism, rituals, and spiritual fulfillment in societies around the world. As a result of the devastation caused by drought and overexploitation, foresters are beginning to realize that forests, especially those in arid zones, have other uses besides providing timber or fuel. The majority of Senegal's population depends on natural resources either directly as a source of food, shelter, and income or indirectly via income generated through the transport, processing, and marketing of these commodities. Senegal lies on the West Coast of Africa, and about 60 percent of the current population lives in rural areas. With 38 percent forest cover, most forest resource management programs conducted in Senegal have focused on reforestation for non-industrial purposes (e.g., a large portion of non-industrial forest use is for fuelwood). The country produces modest volumes of saw timber for domestic use. Most industrial round wood is used for agricultural posts and poles, and households depend on wood-based fuels such as firewood or charcoal (RSW 2000). In addition to timber and woody resources, NTFPs play an important role in the Senegalese society.

The most valuable NTFPs in terms of quantities and values are located in the southern, central, east, and northern regions of Senegal (see figure 1). In 1993, Senegal's Forestry Action Plan (M.D.R.H.) reported that the degradation of Senegal's forests was accelerating the process of desertification. This desertification has led to the

disappearance of valuable resources, including NTFPs. The plan also stressed an urgent need to study these NTFPs. The available information base on NTFPs is insufficient, not aggregated at a national level, and far from being comprehensive or global in scope. As the country's forests are limited in size, increased or improved NTFP management and harvest might help ease the pressure of deforestation (R. S. W. 2000).

### 1.1 Problem statement

In Senegal, increased focus on (NTFPs) could promote forest conservation and community development. Because of their high value, as well as their potential for sustainable harvesting, well-managed NTFP extraction would have few adverse effects on other forest-based flora and fauna (Belsky and Siebert 1998). The Senegal Forestry Plan (M.D.R.H 1993) stresses the urgent need to conduct research on NTFPs. So far, there have been few such studies in Africa, and none in Senegal. This constitutes a serious gap in information necessary to promote sustainable NTFPs and forest management.

The goal of this study is to find strategies for developing NTFPs that are appropriate for Senegal. I have formulated two research objectives to help direct my research. The first is to identify constraints to NTFP development in Senegal. The second is to identify government policies needed to develop NTFPs. Based on these two objectives I will suggest programs or initiatives to encourage NTFP development. My hope is that the study eventually will help provide information to fill the gap described above.

## 1.2 Methods and procedures

For the first objective, it is necessary to find other NTFP development schemes appropriate to Senegal. A natural initial step is to conduct a literature review, informal interviews, e-mail contacts, and web search to obtain an overview of NTFPs in general, and particularly in Senegal. From this, constraints to and opportunities for policy, production and management, and marketing can be identified. For the second objective, case studies suggest a holistic view for integrating all aspects of NTFPs. This provides a better understanding of how these constraints and opportunities are interrelated.

# CHAPTER 2

# BACKGROUND

## 2.1 Non-timber forest products defined

NTFPs are also known as "minor forest products", "non-wood goods and benefits", "other forest products", "secondary forest products", and "special forest products". Non-wood forest products (NWFPs), the term used by the Food Agriculture and Organization of the United Nations (FAO), includes all plant and animal products derived from wild sources and collected on forestlands, and/or from forest species (FAO 1999). The FAO term does not include firewood or charcoal. NTFPs generally consist of goods other than wood, of biological origin derived from forests or wooded lands, and trees outside forests. NTFPs are also gathered from domesticated plants in plantations or in agroforestry schemes, produced as intermediate agricultural crops. Their informal status and small volumes traded distinguish them from well-established commercial agricultural commodities such as oil palm, cocoa, coconut, rubber or coffee.

NTFPs usually differ from timber in many respects. They have: (1) greater variety of products and of species; (2) shorter frequency of harvest cycles; (3) smaller yield per unit area; (4) frequently higher monetary value per unit weight; and (5) can be easily transformed into other products (Panayotou and Ashton 1992). For example, the baobab tree leaves (*Adonsonia digitata*) are used for traditional medicines; its bark fibers are woven to make cord and rope and the juice of its fruit reduces acidity in other foods (Laarman and Sedjo 1992).

People have always used forests to gather food, medicine, fuelwood, and fiber, and depend on income from sales of these items. In subsistence and rural economies, the role and contributions of such forest products are crucial, because of their richness and variety of uses (Bodeker 1997). In some countries, harvests are sometimes restricted to meet the needs for religious/socio-cultural ceremonies (FAO 1995). According to recent estimates by the World Health Organization, more than 3.5 billion people in the developing world rely on plants as components of their primary health maintenance (Balick and Cox 1997). Indeed, some trees yield products of greater value than wood. Because of the variety of these products, more than one classification of NTFPs are possible. Systems can be based on criteria including: (1) the group of organisms from which the products originate; (2) the specific parts of plants or animals yielding valued products (roots, barks, leaves, fruits, seeds, pelts, bones, or horns); and (3) their end-uses in trade and industry (Panayotou and Ashton 1992; Palevitch 1998; Farnworth 1998).

**2.2 NTFP roles in Senegal**

The strong attachment of Senegalese people to traditional products, even within modernized urban settings, sustains the demand for traditional plant products. For instance, in the southern region 100 species of medicinal plants are traditionally used (van Damme et al. 1996). The high cost of western drugs has led the government to create a division of traditional medicine within the Ministry of Health, as well as establishing a center combining traditional and modern medicine research at Mbour (Thies region). Additionally, a non-governmental organization (NGO), Environment and Development in the Third World (ENDA Tiers Monde), in collaboration with rural

organizations in four regions (Thies, Dakar, Fatick, and Saint-Louis) has set up a program to promote use of traditional medicines. Similarly, a research group on medicinal plants based in the health and pharmaceutic department of Cheikh Anta Diop University is studying the physical-chemical, pharmacological, and toxicological elements of five widely used medicinal plants. The research results are encouraging, because an experimental phase has allowed the production, distribution and sale of many medications in Dakar region.

Despite traditional and commercial use, little attention has been paid to the socio-economic and conservation aspects of medicinal plant resources. This is probably due to the relatively small documented volumes and specialized, informal nature of their trade (Cunningham 1993). In several African countries NTFP species are often over harvested, habitat is lost due to agricultural expansion, and thousands of trees are "ring-barked" prior to commercial timber harvest. There is also a lack of knowledge of how to manage NTFPs, few long-term sustainable resource management policies, and lack of effective institutional frameworks needed to improve product management. Resolving these deficiencies will be challenging.

In 1996, NTFP production declined due to conflict in the main harvesting region (South) that prevented producers from collecting the products (D.E.F.C.C.S. 1996). These problems persist and could compromise the development of Senegal's non-timber forest products. Despite this, NTFPs play an important role in Senegal's society as reflected through:

1. Quantities commercialized annually;
2. Multiple and various exchanges along the distribution channels;

3. High demand for certain products, such as palm oil; and
4. Receipts collected through forestry and customary taxes.

**2.3 Management of NTFPs**

Management of NTFPs involves collection of seeds, planting seeds or seedlings, protection, and cultivation of timber and NTFP species. More importantly, management involves the sustainable harvest of natural forest NTFPs. NTFPs can complement timber-based strategies and offer a basis for improved forest management and utilization that is familiar to many communities (Taylor 1993). NTFPs can also provide an opportunity for local income generation less destructive to the forest environment than most timber harvesting techniques (Panayotou and Ashton 1992). While large-scale timber harvesting is mechanized and requires large capital investments, gathering non-timber products is rarely mechanized and requires relatively large amounts of labor and only modest investments.

Agenda 21, which provides a global plan for action approved by the UN Conference on Environment and Development, recognizes the role of NTFPs in sustainable forest management (van Seters 1997). This conservation strategy has two principal thrusts: prevention of the disappearance of forests and associated species, and establishment of botanical gardens (Blumberg 1998). Typically, forests are most always managed for timber, and other values are rarely considered. Economic justification is seldom presented for focusing exclusively on any other single forest use (Primack et al. 1998). The concept of multiple-use as applied to forests is based on the recognition that a variety of goods and services can be produced from the same land, either simultaneously

or serially, and that such management can greatly ensure conditions for the sustainable production of timber (Panayotou and Ashton 1992, Sheldon et al. 1997).

There is a growing awareness that the path to sustainable income should include some creativity, going beyond the realm of traditional forestry and timber production. For instance, ethnobotany has become a recognized tool in the search for new pharmaceuticals. However, the goal of ethnobotanical studies is often to produce lists of useful plants for a particular tribe, and has little to do with sustainable resource management or raising local incomes (Balick 1994,1998).

An increasing number of countries, including China, Mexico, and Thailand, have decided to integrate traditional medicine into their primary heath care systems. In these systems ethnobotanical research plays a crucial role in documenting the traditional health care practices of the country, and may help in the discovery of new drugs (Balick and Cox 1997). The Belize Ethnobotany Project initiated in 1988 has shown that the ethnopharmacological investigation and ethnobotanical surveys can lead in the near-term to the conservation of valuable ecosystems, and hopefully contribute to their maintenance in the long term.

This seems the best approach in the ethnobotanical field, although the challenge is that there are not enough trained ethnobotanists to carry out the necessary research in the face of rapid disintegration of primitive cultures (Balick 1994). The next step may be bioprospecting, which focuses on the collection and screening of biogenetic resources for commercialization. Most importantly, it could constitute the basis for a conservation strategy. While bioprospectors express optimism that they can help to implement

biodiversity conservation, their efforts may also stimulate economic growth in developing countries (Dutfield 1997).

Production of NTFPs seems particularly suitable for countries with labor surpluses; a characterization that applies to many developing countries endowed with tropical forests and predisposed to trade of NTFPs (Panayotou and Ashton 1992). In Brazil and Peru non-timber forest products yield higher net revenues per hectare than timber management, and can be harvested with considerably less damage to the forest ecosystem (Balick and Cox 1997). In general, users of timber are big industries or those in distant markets, whereas those using NTFPs are local people.

In African countries, traditional medical practitioners harvest medicinal plants selectively. According to Cunningham (1993), social taboos, seasonal and social restrictions on gathering medicinal plants, and the primitive nature of plant gathering equipment all serve to limit medicinal plant harvesting. However, in many urban areas in Africa, increased demand for traditional medicinal plant and animal materials has led to some forest management problems; primarily production and conservation (Godoy and Bawa 1993; Platt 1998; Dugelby 1998). In Senegal, shifting agriculture and higher fuelwood charcoal prices is encouraging deforestation and logging in unmanaged forests. Uncontrolled timber harvests have brought several NTFP species to the brink of extinction, and forced the need for research programs to seek solutions.

As in many countries, women have greater knowledge than men about NTFP use and potential for providing income, and play an important role in managing all forest resources (Abbott 1986). They have often gained from their ancestors information and understanding about farming practices, plants used to cure diseases, and the uses of

Senegal's biodiversity. In fact, most healers are women. Unfortunately, this knowledge is not used in forest management because Senegalese women do not generally take part in the natural resource decision-making process. This deficiency must be corrected because the successful management of NTFPs in Senegal depends in a large part on women.

In Senegal, one unit in the ENDA research program deals with medicinal plant cultivation to supply raw materials for drug production and to ensure the conservation of endangered plant species. Rural communities of Djinder (Dakar region), Kayemor (Central region), and Nabadji Civol (Northern region) actively cultivate medicinal plant products now in higher demand. Cultivation of NTFPs and high conservation priority species outside core conservation areas is essential. However, commercial cultivation of many species is not simple and unlikely to be profitable due to slow growth rates and low prices fixed by middlemen (Cunningham 1993). The cultivation of timber and non-timber products together is practical. Panayotou and Ashton (1992) and Boffa (1999) have found the following interdependencies:

1. Timber and non-timber products can co-exist in the forest;
2. Many non-timber multiple use products are derived from timber species;
3. Timber harvesting that is unplanned or excessive may be deleterious to the production of non-timber products; and
4. Harvest of some non-timber products can substantially affect the production of timber products.

Collectors of NTFPs usually collect in small quantities, use simple processing technologies, and do not seek distant or large markets. Traditional collectors tend to know a great deal about efficient resource use and harvesting practices that minimize

resource waste. However, as the products become more popular, inefficient forms of collection, processing, storage, and marketing occur (Brooks 1993).

Many NTFPs in Senegal are collected from multi-use tree species that grow in natural forests. They yield fruits (*Detarium senegalensis, Zisiphus mauritania*), exudates (*Arabic gum, sterculia setigera*), oil (palm oil, *Carapa procera*), leaves (*Combretum micrantum and glutinosum*), bark (*Khaya senegalensis, adonsonia digitata*), roots (*Cassia sibberiana, Khaya senegalensis*), flowers, and honey. The south (Ziguinchor, Kolda regions), the center (Kaolack region), and the east (Tambacounda region) are the most important NTFP harvest zones. For instance, the fruit of *Dialium guineense* and the exudates of *Sterculia setigera* are collected in Ziguinchor and Tambacounda respectively. The fruit of *Adonsonia digitata* (buy) is harvested throughout the regions of Ziguinchor, Tambacounda, Kaolack, and Kolda.

NTFPs are collected in state protected forests, and in fallow agriculture fields. In the northern region (Louga and Saint-Louis regions) *Acacia senegal* stands produce Arabic gum, a major export product. In some areas, management activities have sought to improve NTFP harvesting. In Casamance (south) an association of 22 groups works to enhance the value of local NTFPs such as *Adansonia digitata*, *Saba senegalensis*, and *Parkia biglobosa*. Plans are to regulate the local collection through the designation of appropriate harvesting periods, collection techniques, and organize local producers.

Two groups of people are involved in Senegal's NTFP collection, migrating laborers and the amateurs. In the first group, numerous young collectors from outside live with a boss (*njatige*) for whom they collect NTFPs in exchange for room and board. The amateurs tend to be local older women and children working as individuals or within

groups. For instance in the south (Kolda and Ziguinchor), young boys collect fruits of *Saba senegalensis*, *Landolphia heudelotii***,** *Detarium senegalensis*, and *Dialium guineense*; adults harvest the nuts of palms and the exude of *Sterculia setigera*; and women gather fruits such as *Tamarindus indica* or *Detarium microcarpecum* (Dieng and Babacar 1999). Both migrating laborers and local harvesters use primitive techniques, collect unripe products, and lack adequate storage systems. This affects the marketability of their NTFPs. Inefficient techniques such as gathering of products from the ground and knocking others from trees with rocks or sticks causes damage to their products.

**2.4 Marketing**

In general, NTFPs are used by local collectors or consolidated for resale, and little processing is done at the local level. The harvesting periods of NTFPs play a major role on their market prices. Multiple techniques are used for marketing depending on the product, its form or use, and the market awareness of the collectors.

Marketability is a crucial factor in determining the success or failure of local NTFP enterprises (De Silva 1997; E.W.W 1999). Many NTFPs are sold in local and regional markets. But while export markets are attractive, few NTFPs have broken through into the international marketplace. Often, constraints in the marketing process include lack of market data, ineffective channels through which the products are moved, and lack of organization of the people involved (Krambeer and Countryman 1993; Durbeck 1999).

Although NTFPs are an important source of jobs, policy makers often undervalue NTFPs and their value and volume traded is rarely reported in national and international

statistics (Kuipers 1997; de Beer and McDermott 1999). Development and validation of NTFP production and trade data requires continual consultation with many NTFP stakeholders at many levels in the sector (Iqbal 1995). Access to markets and market information such as potential yield, channels for distribution, and economic value, especially for those products not yet commercially exploited, is not common (Stern et al. 1977). In Senegal, the Forestry Service collects data based on permits sold to collectors and the volumes and or prices they report. This does not reflect the total volumes collected or marketed, as local collectors often are reluctant to report their full harvest.

No market data exists, making it difficult to help local producers of NTFPs. Table 2 shows market fluctuations of products controlled by the Senegal Forestry Service during three recent years. Traders' avoidance to buy permits during certain years (e.g., 1996, 1998) can explain these fluctuations. Another reason for this difference is that civil war (1996 -1998) in the south prevented harvest and its documentation. Instead of raising the value of trees, obtaining permits under the current system constrains the economic optimization of NTFPs. As a result, most traders risk being fined because of the high permit cost and the time needed to find a forestry office. Even if the forestry service office can be easily found, being there during office hours is a problem. This situation is made more difficult if the trader uses common transportation (e.g., bus, hired truck). The driver may not be willing to find the office and simply unloads the product where he wishes to avoid wasting time. Only collectors whose activities are visible to government forestry agents tend to buy permits. A good example is the lack of data about animal trophies. While they are lucrative to collect, they are easy to hide and market.

In Senegal, it is common to find rural assembly markets. They bring together producers of small quantities and enable them to sell their products to local or regional traders. This eliminates the need for traders to locate and often contact scattered producers. If the market is a success one can expect higher prices due to an increased number of buyers. However, despite their overall economic importance, the proportion of the final price to the NTFP producers or local processors is extremely small. One reason for this is the lack of information available to help individual producers organize production and distribution, determine profitable prices, follow supply and demand, and select appropriate markets (Hammett 1992). Improving marketing is often accomplished by expanding awareness of what marketing means, what players are involved, and how the market operates.

The market for NTFPs is usually characterized by large variation in prices due to location of production sites relative to the markets, supply and demand changes, and differing levels of producer group organization. There are three levels of prices: the producer's price, the middlemen's price, and the consumer's price. The producers claim that NTFP prices are not attractive because of the small margin of profit. Table 3 and Figure 2 show the product price structure of one NTFP, *Saba senegalensis*. To make the price attractive, it is required that one deals efficiently with middlemen and other agents. Local producers need information on all the steps shown in Figure 2 to make decisions. Table 3 and Figure 2 show that middlemen have the biggest share of the price followed by the collectors. In terms of costs, the forestry and transportation fees are the highest. Thus, in addition to the forestry permit fees, the constraints to marketing NTFPs also include the difficulty of accessing certain zones, measuring units of products (scales, jars,

and baskets) not being uniform, and a lack of storage facilities causing overstocked products to spoil at the market.

Six players are typically involved in the typical NTFP marketing channel: harvesters, consolidators, middlemen (*banabana*), brokers (*coxer*), wholesalers, and retailers (Dieng and Babacar 1999). The harvesters are generally villagers operating individually and dealing with small quantities. In some regions like Kolda and Ziguinchor, outsiders perform this activity because many groups living near the forests consider selling NTFPs as a low status job. This social perception has kept them from utilizing NTFPs for commercial purposes. But recently, the need for increased income has led local people to become more involved in commercializing NTFPs.

As mentioned earlier, women are primary consolidators of NTFPs in Senegal. They also go from village to village to gather products sold in weekly markets (*luma*) or in urban areas. Consolidators can also be harvesters who generally do not have enough money to handle large quantities. However, in the gum fields some companies equip their consolidators with small vans to secure and facilitate collection. Middlemen buy the products in rural areas and sell them in village and urban markets, according to demand. They are self-financed but in some cases also work using loans from banks. Each establishes loyalty of several collectors or consolidators through the financing they give in advance.

Brokers develop their activities in larger markets and play an important role as intermediaries between middlemen and wholesalers. Often, they partially finance the operation by paying a portion of the transport fees and taxes; they receive a commission on their activities. The wholesalers also generally operate in the larger markets and bear

little risk when the products become deteriorated or if a slump in sales occurs. Retailers, many of whom are women, get their supplies from wholesalers and generally in small quantities (S.I.D. 1991; Dieng and Babacar 1999). Retailers face a lack of storage facilities that leads to product spoilage during slow market periods or when the market is oversupplied.

Senegal does not produce sufficient NTFPs to supply local demand. Thus, as Table 4 shows, imports are necessary. This indicates mismanagement of forestland and NTFP resources. Despite the low NTFP production, efforts focus on producing export-oriented NTFPs. Senegal's major NTFP exports are Arabic gum, gum of *Sterculia setigera* (Mbep), fruits of *Combretum glutinosum* and *micranthum,* and cashew products. Major export markets include France and England (leaves of *Combretum micranthum, gum of Sterculia setigera*), India (cashew), and USA (*gum of Sterculia setigera).* In addition, several craft products including drums, masks, and wooden statuettes are sent to Europe, USA, and other African countries.

Research at Food Technology Institute (ITA) has completed many NTFP studies focusing on ways to enhance the value of NTFPs, in the effort to reduce the dependence on food imports. Many NTFP processing factories have also started operating, for example: Sitrans Jus that processes fruits of *Detarium senegalensis* and *Tamarindus indica*; Senegalese Enterprise of Vegetable Products Transformation (ESTPV) that processes *Combretum sp*; and *SOCA* makes juice of *Detarium senegalensis*. Periodical production caused by seasonal lack of supply and higher input costs, especially sugar, constrains the industry's development. The processing of NTFPs requires rigorous control. The Senegal government Hygiene Service has trouble enforcing regulations due

to lack of personnel. For instance, it is often claimed in the international market that Senegalese gum has a high contamination rate. This can negatively affect the price of the Senegalese gum.

Transport to market is difficult due to poor rural roads and involves a range of alternatives including backpack, bicycle, animal, van, train, and/or boat. Collectors often use public transportation (e.g., *cars rapides*, a type of bus) if they do not sell to middlemen at the village. One solution to transport problems may involve collectors organizing into groups to plan their activities, and share vehicles to transport their products. Another solution is the possibility of transforming (adding value) some products at the village level to decrease transport costs. For instance, collectors gathering their products at or near a common site may organize to facilitate common transport. This strategy will lower transport costs and give collectors more strength when they bargain with middlemen or wholesalers.

Most of Senegal's NTFPs are sent to Dakar, the capital city and largest market. Public transportation is the fastest means, but it can only carry small quantities and is more expensive. Middlemen who consolidate NTFPs have adequate financial capacity to rent 10-ton trucks. Seasonal boat transport between Dakar and Ziguinchor (in the south) had been an option, but now cannot satisfy the increased demand, because of its small capacity and its irregular schedule. Women prefer to group together and ship their products using the boat, as the rental fees are competitive. However, products may become spoiled because of the way they are stacked in the boat. Moreover, lack of care during loading and unloading the boat causes severe product, and therefore financial losses.

## 2.4 Policies and their implications

As regulators of economic activity, governments may set standard policies for forest use by the private sector and local communities to promote wider objectives such as equity, stability, and national security; they may also mitigate market failures and provide goods (Husch 1987, Panayotou and Ashton 1992). While government officials and technical experts are often considered key decision-makers, the ultimate decision-makers are the farmers and rural communities that use and depend upon biological resources for their income and survival (Heywood 1999).

Involving communities in the management of local forest resources ensures equity and wise use of resources. Some developmental policies and international aid initiatives have favored obtaining short-term returns from the forest, instead of fostering long-term, sustainable, and multiple-use resource policies for managing NTFPs. Management is further constrained and complicated by the lack of support services such technical training, lack of credit, and few partnerships between government, private sector, communities, and industry. Successful community management must include all stakeholders, both men and women. Involving women does not mean excluding men in the development process, but means allowing both to work together, because the major issues are equity concerns. In this regard women's tasks must not be only limited to planting trees or doing labor-intensive works, but extended to planning and decision-making process.

In Senegal, traditional tenure regimes are an important driving force of individual and community decisions about land use and trees. After independence, the government many times tried to change the centralized system of natural resource management

policies and regulations imposed on rural people. Indeed, the concentration of decision-making power in the state contrasts markedly with rural tenure systems, which generally give to individuals and groups large control over tree and forest management.

Farmers and communities have traditionally controlled harvested trees on their own lands. In contrast, the Senegalese government considered these resources to be public assets, and required fees for their commercial harvest and use. Today, the new forestry code (M.E.P.N. 1998) allows them to only declare and get free permits when moving products from their own plantations. Thus, it is obvious that the state control over forest use is a constraint to improved resources management. In Senegal, policies governing NTFPs are scattered in several sectors of the public law, often not specifically addressing NTFP enterprises or rural livelihoods. This creates confusion and does not provide adequate incentives for NTFP harvesting.

Senegal's Forestry Service is responsible for managing all forests, monitoring all operations related to harvest, transport, and commercialization of NTFPs. NTFP producers are obligated to pay for a permit before any harvesting occurs. However, producers avoid paying for permits. Permits written by the Forestry Service must accompany the products when they are moved and stored. Based on one clause in the Forestry Code, local governments are supposed to receive a portion of royalty payments for NTFPs collected from their territories. Actual receipt of these royalties could be a powerful incentive for communities to take on forest management and protection responsibilities. The Senegal Forestry Code regulates NTFP management, although some rights have been transferred to local people. The forestry code seeks to improve access to government land. Local governments now have the right to manage neighboring forests

after signing an agreement with the Forestry Service. To be more effective, the government must more fully involve local people in the decision-making process. Another policy problem involves NTFP importation. For instance, palm oil is imported from Ivory Coast, Malaysia, Indonesia, Bissau Guinea, the fruit of *Saba senegalensis* is imported from Bissau Guinea and Gambia, and the fruits of *Tamarindus indica* and *Adonsonia digitata* (locally known as *buy*) are imported from Mali. It is important to mention that all these products grow naturally in Senegal, but there is a lack of control at the borders. Middlemen import and consolidate these NTFPs within Senegal and then declare them as imported products. This allows them to only pay the customs tax, which is one-fifth the forestry tax.

# CHAPTER 3

# CASE STUDIES

Below, four different NTFP experiences are examined to help identify policies or programs that are potentially appropriate for Senegal. The two first experiences are country overview summaries for Mali and Nigeria. The third, on Tanzania, is a case study that deals with mechanisms for community-based NTFP exploitation. The last case study analyzes approaches to local natural resource management used by several French-speaking West Africa countries to identify ways of increasing rural communities' capacity for local management (see figure 3).

The three articles on Mali, Tanzania, and French-speaking countries have been selected from *Unasylva*, a periodical of the Food and Agriculture Organization of the United Nations (FAO). FAO is one of the largest specialized agencies in the United Nations system and the lead agency for agriculture, forestry, fisheries, and rural development. It was founded in 1945 with a mandate to raise levels of nutrition and standards of living, to improve agricultural productivity, and to better the condition of rural populations. *Unasylva* is an international journal of forestry and forest industries, produced quarterly in separate English, French, and Spanish editions. The journal covers all aspects of forestry using a holistic view of each subject. FAO and the European Commission Directorate-General Development also published the article on Nigeria, two institutions that have a credible worldwide reputation. The articles selected are

appropriate for Senegal because of the following reasons:

1. They are relatively recent and available;
2. They are all based on Africa, and most of them on West Africa, facilitating the adaptation of findings and fill gaps in the Senegalese NTFP literature;
3. In the Mali and Nigeria cases, NTFP production and management, marketing, and policy are interrelated giving a holistic perspective on NTFP in each country; and
4. The Tanzania and West Africa examples represent French-Speaking countries and focus on policy development and implementation from which lessons can be drawn for Senegal.

I will analyze the findings for each case using a set of relevant criteria, compare them, and draw conclusions concerning constraints and/or opportunities in production and management, marketing, and policy. Lastly, I will propose a policy framework appropriate for the current NTFP situation in Senegal.

### 3.1 Non-timber Forest Products (NTFPs) in rural Mali

The Malian Forest Service and its policies have evolved since the beginning of colonialism under the assumption that forests and their products are the property of the government (Gakou et al. 1994). However, villagers have a stake in ensuring the productive development of forest resources to meet their own needs. As a result, information on local residents' uses of NTFPs is essential to formulate successful programs for villagers' participation in the management of classified forests.

In fact, the importance of involving local people in forest management has been recently recognized. The purpose of this study was to determine the range of non-timber forest products local people use either for direct consumption or for income generation and to identify the tree/shrubs that yield these products in natural forests, fallow lands, and crop fields. A gender analysis was also conducted. For the purpose of this study the term NTFP is defined to include forest and/or tree products collected by rural people and used by them either for direct consumption or personal income generation. The emphasis is on the scale of production and the benefit for rural people. Animal products, such as bush meat, and skins are not included.

The case study research was carried out between February and May 1991 in six villages near the national forest reserve "Forêt Classée des Monts Mandingues", which is 15,000 ha in size and is located 25 km south of Bamako, the capital of Mali. The primary method of data collection was face-to-face structured interviews open-ended questions of household members using. Men and women were interviewed separately in 92 randomly selected households in six villages around the forest. One-half of the household interviews were conducted with women 15 years or older and the other half was with men over 15 years of age. Additional data collection methods used to triangulate findings included observations of NTFPs sold in the village markets, interviews with people selling specially NTFPs in villages, observations of NTFPs identified in subjects' homes during the interview process, and a literature research (primarily to verify species' names).

Because the purpose of the interviews was to determine the range of NTFPs and species being used by rural people, the authors employed an open-ended question asking

participants to name the NTFP collected in their household. If participants failed to mention a product, they were not asked about it. Thus, the goal was to identify products used by men and women in a household, not the proportion of households using a particular product. Gakou et al. report the total number of times a specific product was voluntary mentioned by the interviewees. The relative importance of products can only be inferred based on frequency of a product being mentioned. Participants were not asked to prioritize any list of products because not all subjects reported the same products; thus prioritization of a list was not feasible.

The last chapter and the conclusions include suggestions to improve NTFP management in Mali, especially the role that the Forest Service should play to achieve this improvement. Gakou et al. used three tables to illustrate their findings; these tables show:

1. NTFP groups identified during the study along with the percentages and number of times they were mentioned by interviewees;
2. Species mentioned five times or more, interviewees' major products, each collector's gender, and place collected; and
3. Frequency of products mentioned by gender.

### 3.2 Key findings regarding Mali

Seven hundred sixty-nine specific products were mentioned during the household interviews. The number of products mentioned per household ranged from 3 to 15 with an average of 8. In reference to my study, there are four major findings:

### 3.2.1. NTFPs are important to villagers

The study identified fifty-five different NTFPs coming from 108 different species. Almost all the products (ninety percent) collected are used in the household as a source of energy, utensils, tools, construction materials, food, fodder, and medicine. In the study area often affected by drought, which limits agriculture production, food accounts for fifty-four percent of the total NTFP. Among the edible products, leaves for sauces, fruits, shea nuts for oil/butter, and seeds for condiments are the most important. The high frequency of fruits may in part be due to the fact that a wide variety of fruits from many different tree/shrub species were mentioned, and all fruits from different species are reported in one category. The plant species producing food are mainly *Vitellaria paradoxa*, *Parkia biglobosa*, *Adonsonia digitata*, *Mangifera indica*, *Detarium microcarpum*, *Gardenia arubescens*, *Landolphia senegalensis*, and *Tamrindus indica*. Two-thirds of the products are sold at the city markets and village weekly markets. In these markets, women specialize in selling, including fruit, shea nut butter, seeds, condiments, scrubs to wash dishes, and brooms. Men sell furniture, fruit from planted trees, and some construction materials. Products like fodder and medicine are sold in cities, although villagers gather them for their own purposes.

### 3.2.2. Most NTFPs used by villagers come from native plant species

The villagers have identified 108 plant species producing NTFP, and most of them are native ones. However, the Forest Service only plants three exotic species: *Azadirachta indica*, *Gmelina arborea,* and *Eucalyptus camaldulensis,* which are exotic species. Planting these exotic trees does not help to promote the native species; nor does

it prevent their disappearance. Among the plant species mentioned 25 times, only *Mangifera indica* is planted; all other species are found in the wild natural forests. *Parkia biglobosa* and *Vitellaria paradoxa* are mentioned more than 100 times in the survey. Both men and women use most of these species, often for more than one purpose.

### 3.2.3. Natural forests are the dominant production sites of NTFPs

Ninety percent of the NTFPs collected are from the natural forests and the remaining ten percent are from fallow lands and crop fields. However, these natural forests are often converted to plantations growing single exotic species. This makes many NTFPs scarce or totally unavailable. Another factor that constrains the natural forest health is collection techniques. Fruits are collected from trees before they fall down using sticks to pick them, which generally causes death to the NTFP species, damages the fruits and reduces their market value.

Tree tenure is exercised on the crop fields. The trees belong to the household that cultivates the site. Products collected in the crop fields are mostly the ones collected by women: seeds for soap and condiments, leaves for sauces, fruits, and nuts for oil and butter. Men also collect fruits they pick from the trees before they fall down and collect fencing materials from crop fields. Men usually climb the trees, but women use long sticks to pick fruits. Everyone in the village, regardless of who owns the crop field, collects fruits of *vitellaria paradoxa*. Most products collected in the crop fields are also gathered in the natural forests.

### 3.2.4. There is a difference between men's forest use and women's forest use concerning the collection of NTFPs

Men report that they collected fifty-seven percent of the products they named as being collected in their household and females collected forty-three percent. Of the products reported by women, they collected eight-one percent and males nineteen percent. This shows that men and women's reports on NTFPs use are contradictory. Some important products, like firewood, are almost always mentioned by women and collected by men. Other important products like shea nut butter and seeds for condiments are mentioned by both men and women and gathered by women. Leaves for sauce and nuts/seeds for soap are primarily mentioned by women and are gathered by women. Products for furniture and construction are mentioned and collected predominantly by men. Both men and women gather products like fruit and medicine.

Men mention almost the entire range of products collected by women, but did not report knowing that women collected them as often as they reported collecting them. Women do not talk about all the products collected by men. The perceptions of both genders as to who collects more of the three regularly used items (firewood, food, and fodder) are similar. However, there are large differences in gender perception over the collection of all little used items (house materials, construction materials, medicines, other products). According to the men, women report little awareness of the construction materials collected by men for both personal use and income generation. These reports on NTFP collection demonstrate potential sources of inaccurate data collection that could inhibit NTFP sustainable management.

### 3.3 Non-Wood Forest Products (NWFPs) of Nigeria

The European Directorate-General Commission sponsored this study. In Nigeria, NWFPs are a significant natural resource component for the poor (Gbadebo and Ujor 1999). However, the sustainable conservation and management of NWFPs have been difficult to streamline in forestry for various reasons. One reason is the poor knowledge of most wild species in terms of utilization, biology, and ecology, making difficult the coordination and harmonization of their use at regional and national levels. Thus, the objectives for the study were to:

1. Define NWFPs and give an overview of the occurrence, distribution, management, and economics of NWFPs;
2. Document the major NWFPs occurring in the country;
3. Analyze the trends in consumption and trade of NWFPs; and
4. Identify and analyze the constraints to and improvements in statistical data collection for NWFP in Nigeria.

Data were collected through secondary and primary sources. Secondary data were obtained from published materials from textbooks, journals, commissioned technical papers, and others sources. Primary data such as information on major NTFPs use and trade were collected to fill the gaps in the secondary data obtained from textbooks, journals, and commissioned technical papers. A structured questionnaire was given and combined with discussions with NWFP collectors, sellers and users from selected households in the various ecozones.

### 3.4 Key findings regarding Nigeria

NWFPs form a significant resource component for the poor and NWFPs have greater variety of products than just timber. They are neglected and little known elements sustaining the rural sector. NWFPs occur in all the ecological zones of the country, and they are composed of biotic and abiotic resources of wild species of plants and animals plus soil minerals.

#### 3.4.1. Management, and economics

NWFPs have shorter harvest cycles and smaller yields per unit area of forest compared to timber. NWFPs exhibit diverse biological and ecological characteristics that make conservation practices difficult. Among the plant species many are cultivated in gardens and farms for ease of access, control, and management. Indeed, despite the fact that forests provide a home and a means of livelihood for a large number of people, the role trees play outside established forested areas and reserves is also critical. For the majority of the rural population, living away from the immediate vicinity of forested land, trees in farms and gardens have an even more significant role than the forests themselves. In addition to the numerous products they provide, these trees have an environmental role in that they act as windbreaks, protecting crops from wind damage and the soil from erosion.

The social functions of the trees include providing shade for people and animals in hot climates and constituting a focal point for family and community gatherings. However, despite the ease of access of nearby trees, households extract many products from the forests. Women and children collect from the wild and, on farms, harvest most

trees and shrubs from which foods are derived. Men are specialists in carrying out the harvest of fruit both for wine and oil to generate income.

Two factors, unplanned land use practices and poor harvesting, affect the ecological and the biological status of species producing NWFPs. Unplanned land use practices have led to destruction of food bearing plants in land clearance for agricultural production and infrastructure development and to loss of habitats and poor treatment of fruit bearing plants as weeds in cultivated areas. Poor harvesting of plants through inappropriate pollarding and pruning techniques have led to reduction in fruiting patterns and in the quantity of fruits, reduction of surface area of crowns and hence in photosynthesis thereby causing die-back in plants. Also, poor techniques have provoked the death of some plants harvested in the dry season due to water stress and bush burning.

There are two methods of forest management outlined in this report. Officials are responsible for controlling NWFP collection in protected forests, regulating the access to resources and modes of resource exploitation and utilization. Outside government-protected forests, NWFPs are controlled under common property rights. These resources are managed based on traditional beliefs, cultural practices, and ecological knowledge.

Information on NTFPs is poorly documented. As a result, the worth of NWFPs in Nigeria is difficult to estimate, especially as the prices placed on them are often localized and vary from one area to another. The value placed on NWFPs is often lower than the cost of replacement; hence their market values fail to reflect the full value of NWFPs due to under-pricing. Market prices do not reflect their full marginal opportunity cost to society. By implication, because most NWFPs are treated as free goods, they are

overused. Nevertheless, NWFPs remain central to the sustenance of Nigerians in rural areas.

### 3.4.2. Major NWFPs

As mentioned above, there is no complete list of NWFPs in Nigeria because most information about biotic species from which forest products are derived is not well documented. Moreover, the diversity of biotic resources and their utilization among different ethnic groups generates difficulty in classifying NWFPs. Based on the Gbadebo and Ujor article, NTFPs are sub-divided into utilization groups such as household utensils, domestic-industrial energy, agricultural tools, and traditional culture and medicine uses. This classification of NWFPs remains somewhat problematic because some plants fit in more than one category, such as food, medicine, forage, alcohol, industrial and edible oil, spices, and mat weaving.

The study has documented forty-two species of fruit trees, twenty species of vegetable plants, twelve species of spices, sixteen species of mushrooms, fourteen species of edible-seed bearing plants, three species of oil trees, and six species of plants for making alcohol. These data exclude numerous biotic species of medicinal value, frogs,

insects, snails, reptiles, mammals, birds, and fish. Some important flora species of NWFP are:

1. *Gnetum africana* whose main product is its leafy vegetables which are cherished for making various vegetable soups;
2. *Irvingia gabonensis,* which ranks among the five principal fruit trees and occur in traditional farms as compared to natural forests. People eat its fruits in addition to the cotyledon is being used as a soup condiment;
3. *Acacia senegal, seyal, radiana*, and *arabic* that produce Arabic gum marketed locally and exported;
4. *Vitellaria paradoxa* that produces shea butter processed into oil, fat, and meals by women using traditional methods;
5. *Balanites aegyptiaca* that humans use for fruits, leaves, seeds or nuts, and whose wood is suitable for handcrafted carvings for household use

### 3.4.3. Consumption and trade of NWFPs

The consumption pattern of NWFPs is highly influenced by socio-cultural and economic factors in vogue in the respective locations they are in use. Over ninety percent of Nigerians in rural areas and about forty percent in the urban areas depend partly or wholly on traditional medicine. In fact, the volume of local forest food consumption varies between fifty and sixty-five percent of the total food items extracted from the forests. The balance of between thirty-five to fifty-five percent is produced for the market. The products consumed and marketed are grouped into three categories including market consumption (e.g., chewsticks, Arabic gum, rattan canes, and tanning), household

and market consumption (e.g., fuelwood, dyes, wrapping leaves, and thatched materials), and household consumption (e.g. flavors, toxins, decorations, and mat leaves). Arabic gum and rattan brought in the most money.

Almost all plants in the wild used as food also appear in the list of plants used for traditional medicine, for both preventive and curative purposes. This is because plants play a dual role; they are abundant in the populated and heavily cultivated areas, and plant users have ensured conservation of the species through cultivation. Many of the plants used in traditional medicine are also used in modern medicine. For example, the National Institute of Pharmaceutical Research and Development at Abuja has worked on species known in traditional medicine for curing terminal aliments. Modern medicines are derived from active plant parts including seeds, rhizomes, leaves, fruits, roots, resins, and the whole plant. NTFPs are also used in traditional community cultural activities in the form of ceremonies and festivals. The common NTFPs used to promote the traditional culture include kola for sacrifices and prayers, and palm wine for traditional ceremonies, festivals, and relaxation.

Most species are recognized at the local level and are harnessed to meet household food security and are used as dependable sources of income. However, the methods used to process the products are poor and lead to product wastes and unattractive packaging. Men, women, and children are engaged in the processing of food. When the tasks are demanding, the men take over the processing as in the processing of gin and oil from oil palm (*Elaeis guineensis*)

NWFP trade is organized at village, urban (regional), and national levels. At the village level, exploiters of NWFPs sell to kiosks and by hawking. On market days, urban

buyers purchase the products wholesale for the urban areas. In urban areas, retailers buy from wholesalers, and the products are distributed to the urban environment. The products of national significance are Arabic gum and spices. Export products often attract government intervention in the form of fixing prices. The channeling of export products through parastatal organizations has led to low farm-gate prices, to the benefit of exporting agents. Moreover, inadequate data on the volume of products extracted and the unstable prices of those products make aggregate analysis of financial benefits difficult.

The poor infrastructure in rural areas, such as lack of all-weather roads, creates difficulties in transportation, thereby reducing prices paid for NWFPs. As a result, the prices are lower in local areas that are the centers of collection than in urban areas because of added transportation costs, market fees, and storage costs. Urban traders use this price increase to take a larger profit margin than the rural exploiters of NWFPs. However, urban merchandisers can lose over twenty-five percent of the total volume of perishable products during marketing due to preservation and storage problems. The low prices of NWFPs reflect the low inputs involved in the extraction, processing, and storage of the products. Also, these prices are lower in the harvesting season and high during off-seasons.

Gender specialization is pronounced in the marketing of NWFP. At all levels of marketing, men, women, and children are either separately or collectively involved as follows. Men are involved in marketing rattan canes, carving, Arabic gum, and agricultural and household tools. Women market leaves, fruits, nuts, seeds, bulbs, dyes, and medicinal plants. Men and women may market palm wine, charcoal, and bush meat. Children are involved in marketing chew sticks, mushrooms, and vegetables. In most

cases, women in both urban and rural areas market about eighty percent of the volume of NWFPs available.

#### 3.4.4. Data collection

Data collection has been less instructive because NWFPs have been treated as minor non-commercial forest products and are not included in the Gross Domestic Product (GDP). Also, factors that include lack of ethnobiological surveys and poaching constrain NWFP data collection. In fact, the focus of national surveys in forestry has been on merchantable timber resources and changes in the natural vegetation. As of today, there are no adequate data on forest resources in terms of types, habitats, uses, and population. Other factors such as insecure land tenure, inadequate benefit sharing from protected forests between landowners and government, and poverty among rural populations have led to a high rate of poaching on forest resources. Poaching does not favor data collection because poaching is forbidden, and for this reason the poachers do not give the information to the officials who are supposed to collect the data.

## 3.5 Creating a legal framework for community-based management: Principles and Dilemmas

With the growing movement worldwide to place the responsibility for management of forests and other natural resources in local community groups, the importance of an appropriate legal framework for community forestry is becoming increasingly recognized (Lindsay 1999). In this regard, government officials still have an important role to play. State laws have a necessary place in local management initiatives

in that these laws can help define the rules by which community-based institutions interact with outsiders to delineate the limits of state power and to protect both individual and community rights as well as societal interests.

This article considers the requisites for a legal framework to support community forestry. Lindsay points out the importance of a legal framework for community management by taking the example of community management in the Fumba peninsula of Zanzibar in Tanzania. The article then suggests some basic principles that might guide the creation of such a new legal framework, concentrating on two key elements: security (instilling confidence that rights cannot be taken away arbitrarily) and flexibility (allowing legal space to make choices adapted to local situations). Finally, Lindsay identifies the central difficulties and remaining issues.

For centuries, communities on the Fumba peninsula of Zanzibar have relied on mangroves to supply their needs, including fish and construction poles for homes and boats. Today, the mangroves are disappearing at a high rate, and little respect was being shown for traditional local knowledge regarding how these resources could be managed. Alarmed by this trend in the early 1990s, the residents of Kisakasaka village in collaboration with Zanzibar's Sub-Commission for Forestry took steps to address the problem at the community level. Villagers and foresters agreed that both locals and people from other areas have caused the destruction of these mangroves because of overexploitation.

With the encouragement of government foresters, the villagers of Kisakasaka responded to the situation by designing a new approach to the management of local mangroves. They formed a conservation committee and established a set of by-laws; the

committee established cutting periods, set up harvesting limits, a simple system of penalties for violations, and a rotation system for monitoring. As a result, outsiders' access to the mangroves was limited and subject to an entrance fee. Thus, the Sub-Commission for Forestry, understaffed and under-funded, has increasingly come to recognize the essential role of communities in forest management, although some issues arose during the process of establishing the plan. Similar experiments are starting elsewhere on the islands, and the newly adopted National Forestry Policy claims the need for more community forest management. There are of course, great uncertainties about whether the new arrangement in Kisakasaka can hold up under the immense economic and demographic pressures. It is uncertain if the incentives for participation will be sufficient to overcome the costs of organization and forbearance. It is also too early to tell if adopted rules are environmentally sound.

Another important issue is whether initiatives like the Kisakasaka one are legally sustainable and if they work under Zanzibar law. Questions like these arose from time to time during the planning process, but in the end this aspect received little attention. Since the community and the government have been working together towards a common goal in a climate of mutual trust, legal issues must be addressed to avoid future legal complications.

### 3.6 Key findings regarding Tanzania

The article identifies that security (instilling confidence that rights cannot be taken away arbitrarily) and flexibility (allowing legal space to make choices adapted to

local situations) are essential qualities for any law that will attempt to regulate community management of forest resources.

### 3.6.1. Security

The following is a list of considerations that should be taken into account in the attempt to define secure legal rights. Lindsay notes that the list is not exhaustive, and not all of the listed criteria will be relevant to any given situation:

1. Rights must be clear;
2. There must be certainty that the rights cannot be taken away or changed unilaterally and unfairly;
3. The rights should be ensured either in perpetuity or for a clearly defined period long enough for the benefits of participation to be fully realized;
4. The rights need to be enforceable against the state (including local government institutions);
5. The rights must be exclusive;
6. The government entity entering into the agreement must have clear authority to do so;
7. The law must recognize the holder of the rights; and
8. The law must provide for protection of rights.

### 3.6.2. Flexibility

While flexibility should be considered in all aspects of the design or support of community-based management, it is examined in this study with respect to three inter-related areas:

1. Management objectives and the rules that will be used to achieve them.
2. Recognition of local groups. Community managers need legal personality that is recognized by state law; and
3. Definition of management groups and areas of jurisdiction: one approach is for law to designate a local body or authority that would have control over the pre-defined area, for example a district or village council. Another approach, found especially in the context of co-management situations, is to recognize different groups formed around different functions and objectives.

## 3.7 Local Practices and the decentralized and devolution of natural resource management in French-Speaking West Africa

The article reflects on local practices and the decentralization and devolution of natural resource management in French-speaking West Africa that includes Senegal, Mali, Chad, Burkina Faso, Niger, Mauritania, Togo, Benin, Chad, and the Ivory Coast (Onibon et al. 1999). Decentralization is the relocation of administrative functions away from a central location. Devolution to community and representative local government is usually called political decentralization and can be a mechanism of community

participation (participation means here power-sharing in decision-making). The two terms are so often used together that it is easy to assume that decentralization and devolution are inextricably linked. However, although decentralization and devolution may occur together, the reverse, a coming together is also possible. For example, it is possible to decentralize administrative functions without devolving the power to make meaningful decisions.

In the article, "local practices" means local approaches, methods and techniques for managing natural resources but also, and more significantly, the roles and functions of local institutions and structures. These local institutions and structures include the Non-Governmental Organizations (NGOs), small farmers' associations, youth associations, local administrative units, traditional and local chiefs, and decentralized technical and administrative structures that are actively involved in managing the resources. In the context of decentralization and devolution, the goal of the study was to analyze to whom authority and power should be distributed.

Throughout the sub-region, communities have established customary systems for managing bodies of water, forests, and agricultural land, many of which satisfactorily balance equity and social justice, efficiency, and sustainability. Such traditional systems of natural resource management are based on institutional and regulatory frameworks that are adapted to the social and environmental conditions of their perspective milieus. Unfortunately, forestry authorities, both in colonial times and after independence, ignored customary approaches to natural resource management when designing forestry policies and drawing up broad legislative concepts and principles. Thus, communities were deprived of their legal rights with respect to management of the rural areas. Centralized

government structures put in place for forestry during the current century have often been inadequate to the task, particularly in regard to forest management. Nonetheless, almost everywhere in the sub-region, traditional institutions carry out the real functions of natural resource management.

Although the processes under way in most West African Francophone countries are not identical, they have three main features in common: the state fosters and carries them; their main stress is on the drafting of texts; and they are based on the creation and installation of decentralized institutions. For the moment, decentralization processes tend to stress the reform of territorial administration. Although the transfer of responsibility to decentralized administrative units has attracted attention, decentralization often has not resulted in the devolution of responsibility for the management of development and the environment (or forests) to traditional, local institutions. Thus, the responsibility for forest management has basically been transferred to decentralized administrative units, but the people and bodies that are in charge of this sphere in practice (the traditional institutions and their regulatory frameworks made up of local customs and practices) have not been taken into account. In reality, even if the aim is clearly stated as the transfer of authority over local spheres of responsibility to decentralized administrative units so that they can control their development, decentralization in the sub-region has often been undertaken not because it is sought by the ruling government, but because international donors have made it as a condition for aid.

### 3.8 Key findings regarding West Africa

There is evidence of significant disparities between decentralization of authority and devolution of power in forest management schemes in French-speaking West Africa.

1. Many states seem to be in the process of offloading legal responsibilities that they have been unable to fulfill properly, with no guarantee that the new holders will do any better;
2. As envisaged, decentralization processes seem quite simply to be transforming the conflict of the state versus local and/or traditional institutions into a conflict of decentralized administrative units versus local and/or traditional institutions; and
3. In certain cases it appears that the objectives of decentralization policies cannot be achieved because neo-traditional elite may exploit decentralization measures to reinforce their power at the expense of desired rural development outcomes.

# CHAPTER 4

# ANALYSIS OF CASES

All these examples have in common the importance of NTFPs for rural communities and the necessity to improve their management. The first article on Mali and Nigeria are most similar in the way the subjects are addressed. The authors have presented the articles based on surveys from which they draw conclusions. The findings focus on production and management, marketing, and policy, and each case gives information on gender issues for NTFP collection and marketing. In contrast, the other two articles on Tanzania and French-speaking West African countries focus on how to establish NTFP community management based on the authors' analysis of situations experienced in the concerned countries. The article on Tanzania is more specific than that of French-speaking West African countries and discusses the establishment of a strategy to overcome natural forest mismanagement. The findings are summarized in table 4, 5, and 6 and the analysis will follow its headings. The analysis will be based on what the articles reveal about the situation in the concerned countries rather than criticizing the articles themselves.

## 4.1 Production and Management

Silviculture can be defined as the theory and practice of controlling forest establishment, composition, structure, and growth. It is directed at the creation and maintenance of the kind of forest that will best fulfill the objectives of the manager. The

important point is that the objectives should be clearly defined and the silviculture directed to their attainment. There is also an implicit objective of working for the good of the forest as an entity, not as an end in itself but as a means for ensuring that it will be a permanently productive source of goods and benefits. NTFPs can be extracted from forest ecosystems in great quantities and using ways that do not degrade the plant community's basic reproductive functions.

#### 4.1.1. Collection location, collectors, and collection techniques

NTFP collection in the above articles used as case studies relates to natural forests, although some NTFPs are gathered in fallow and crop fields (Mali) and in gardens and farms (Nigeria). Collection from the forest in large quantities and without any management carries the risk of overexploitation, which negatively affects biodiversity. According to the articles, nothing has been done to sustain the use of the forests. However, the Tanzania article shows that a strategy has been started there to improve mangrove management.

In all the concerned countries, collectors are both villagers and urban business people. Rural people have used forests for a long time to meet many of their daily needs, especially food and medicine. In general, since they collect small quantities, they do not affect the equilibrium of the forests. However, the urban business people, because they have capital and can control transportation and other costs including permits the Forest Services require, take commercial advantage of these resources. They collect and/or sell the products from villagers and move them to urban markets. The Tanzania article

mentions that the access to the mangroves is subject to entrance permits, but no information is given about the use of the money collected for these permits.

Generally, villagers use simple techniques to gather NTFPs. In some areas, villagers set by-laws regarding the techniques to collect NTFPs. However, urban collectors who have access to many forests throughout a country and no particular ties to any one forest, and whose goals are only to make money, generally do not take care of the trees when gathering NTFPs, as villagers do. Also, since the objective is commercial, the quantities they collect are larger, increasing the negative effects on the trees, such as death. In the Tanzania article, outsiders and local villagers are responsible for the destruction of the mangrove because of overexploitation. It would be interesting to know if the outsiders are involved in the new committee that is responsible for the mangrove management. If they are not involved, they could argue that the villagers have no legal status to enforce any by-law since all forest reserves belong to the government. This can be a source of problems between villagers and outsiders who both collect products from the mangroves. That is why solving the problem of lack of clear specification of legality is needed.

#### 4.1.2. Use

The general patterns of forest use are similar around the world although the above-mentioned articles were from Africa. Communities rely on forests for food, medicine, construction materials, and other products for income. In other words, the products of the forest make up a significant portion of the livelihoods of rural people. Forests are the source of a variety of foods that supplement and complement what is

obtained from agriculture. Many trees produce oil seeds, edible leaves, and fruits rich in vitamins and nutritional elements. In this regard, dietary supplementation with NTFP plays an important role in community nutrition. Forest food is most extensively used to help meet dietary shortfalls during particular seasons in the year, such as drought, as well as during floods, famines, and wars. The role that forests play in providing food is shown in the article on Nigeria where fifty to sixty-five percent of NTFPs collected are used as food, and in the Mali article where, households use a large volume of NTFPs.

In human history, people have always relied on the use of traditional medicine as their primary source of healing. Trees are still the main sources of medicines for traditional healers, although great strides have been made in bringing modern medicine to rural areas. Unfortunately, some local medical traditions are being lost because they are communicated orally and are largely undocumented as shown in the Nigeria article. Also, many of the trees that are the main source of medicines are still considered solely as products of the wild rather than species to be cultivated. Finally, deforestation and the booming local trade in traditional medicinal plant parts are diminishing supplies of wild plants. As a result, the use of western drugs has increased. In most developing countries, both traditional and modern medicines coexist without a clear hierarchy, as shown in the Nigeria case. However, in these countries there is an increasing demand for traditional medicine in rural areas. This increasing demand is predicted to be greater in the future due to population growth. For this reason, proper management of the resources becomes necessary in order to ensure sustainable use of NTFPs.

Today, the use of chemical drugs has become dominant in mainstream medicine due to new technologies and the search for more efficiency, as shown in the Nigeria case.

However, this expansion of modern drugs relies on the availability of natural resources. At the same time, the pharmaceutical industry has rediscovered in the tropical forest chemicals for new drug development, which are used to combat cancer and HIV. The growing interest of the Pharmaceutical industry to find new drugs has generated financing for tropical forest conservation research programs. These programs involve local people as partners, and this approach may help to build a bridge between traditional and modern medicine.

NTFPs provide opportunities for the rural poor to improve their cash income, as shown in the Mali and Nigeria articles. In these articles, women and men are both shown to use NTFPs. Women, however, are often more reliant than men on forest products, obtaining from them the income needed to feed and clothe the family, as well as fuel for cooking. Earnings from NTFPs are often important as a complement to other income. Many households generate some of their income from selling NTFPs, often on a part-time basis when farm production is not enough to provide food self-sufficiency all year round. Income from NTFPs is often used to obtain cash to use for other activities that contribute to livelihoods, including the purchase of seeds.

#### 4.1.3. Data collection

There is a wealth of knowledge in many rural communities about forest species, their ecology, their management, and their uses. However, in some areas, this knowledge is disappearing as the natural resource base changes, societies change, and traditional practices die out. As a result, there is a loss of information regarding forest management, and consequently, accurate data. Moreover, the articles in question, despite the policies

they articulate for natural forest management, do not mention inventories. However, inventories, which involve the evaluation of forest resources, are an important part of forest management.

The Nigeria article reports on poaching that inhibits NTFP management and makes conservation difficult. This is because the Forestry Service centralizes all information regarding NTFPs based on permits. Since poachers hide their activities that are forbidden to avoid fines, these activities are not recorded and constitute a loss of data. Moreover, the Forestry Departments in the countries in question in this study fail to enforce the regulations because they are understaffed and under equipped. However, the Tanzania case can be a model of solution to overcome data losses because those accused of poaching are involved in the management system.

#### 4.1.4. Species and cultivation

Traditional African gardens are women's concerns. These gardens grow a mixture of perennial and annual crops well adapted to ecological conditions. Crop mixtures found in a home garden are often the result of the deliberate selection of a wide variety of plants and tree crops that occupy different layers and play supportive roles. Thus, the garden provides the household with a mixture of foods and cash crops. Therefore, mixed plant and tree cropping systems can greatly extend harvesting periods and ensure the continuous availability of some foods and medicine.

Once established, tree species require only minimal labor and inputs for maintenance, and can provide a continuous food supply without needing to be replanted. Thus, their establishment at low costs makes them appropriate for poor people who do

not have enough cash to deal with big investments. Moreover, home gardens are generally close to the houses, compared to forests that usually are far from the villages. Therefore, home gardens reduce women's workloads by reducing travel time to collect products. Indeed, the collection from forests is time consuming and sometimes requires very demanding work.

It is also a good approach to cultivate some forest species to prevent their disappearance. The cultivation of indigenous plants can be a means of maintaining the supply of useful plants for the market. Unfortunately, as reported in the Mali article, the plantation programs focus on exotic plant species due the slow growth of native species. Slow growth must not be a reason to avoid cultivating native species because in addition to their socio-economic advantages, many of them are beneficial in that they fertilize soils and protect them from erosion.

#### 4.1.5. Domestication

None of the articles have dealt with domestication. Domestication is the naturalization of the plant to human conditions and involves human-induced change in the genetics of a plant. Domestication, which is a research issue, can be an enhancement to management of trees in forests, but the level of domestication activity will ultimately be dictated by biological, policy, market, and social factors. This means stakeholders need to ascertain whether it is likely that there will be a market for the products before embarking on domestication.

#### 4.1.6. Gender

Men and women use NTFPs in many ways and for different purposes. However, in the articles in question, each gender specializes in collecting specific products. In the Mali article, many of the survey findings on men and women for NTFP collection responsibilities are contradictory. The findings are only similar on the use of firewood, food, and fodder products, and women generally handle these products. In the Nigeria article, men specialize in producing wine and oil to generate income. In all articles, gender considerations have received little attention in the implementation of NTFP management strategies. For instance, in the Tanzania article, nothing was mentioned related to gender in comments on the committee implemented to manage the mangroves. The involvement of women facilitates the improvement of these plans because women play an important role in NTFP collection, processing, and marketing, as shown in the article on Mali and Nigeria.

### 4.2 Marketing

Beyond contributing to food, medicine, and other products, NTFPs are an important resource for local income-generating activities. This is reflected in several parameters, including their diversity and the quantities sold on local markets, the number of people involved in marketing, and measurements of NTFP-related income.

### 4.2.1. Location and traders

The range of NTFPs formally marketed is considerably below those informally marketed. NTFP formal markets generally carry products such as crafts, honey, gums, resins, and also a few wild foods and medicine. The infrastructure constrains the formalization of NTFP marketing. This formalization suffers from quality that is variable and products that are available only in small quantities. The traders are generally local people and urban business people. However, as said earlier, urban business people make greater profit in marketing NTFPs because they have more financial means.

### 4.2.2. Processing, credit, enterprise, and storage facilities

Women carry out virtually all forest-related processing activities. The techniques they use are often labor intensive and physically strenuous, involving pounding, grinding, and stirring, and requiring the collection of large quantities of firewood and water. Mostly, the simple techniques they use are time consuming and include waste as shown in the Mali and Nigeria articles. The capital needed for undertaking processing activities varies and can be a major hurdle for women's participation. Generally, because they often sell their products on credit and do not calculate their profits, women can easily fall into the credit trap and lose their capital. Any factor (illness, pregnancy, and unexpected expenditure) disrupting this earning and spending can lead to impoverishment. Despite the problems that women generally face in using credit to sell their products, bank credit is vital to encouraging new enterprises or expanding existing NTFP operations. If bank credit is not available, as experienced in some countries, large scale

enterprises based on NTFP are implemented to overcome difficulties related to little or non-existing credit, transportation costs, and other marketing constraints. In all articles no bank credit was mentioned.

#### 4.2.3. Price

In general, NTFP availability and condition of acquisition, place of origin, and the kind of market govern product price. It is certain that NTFP producers face variation in prices. Organization within groups and enterprises can help rural collectors to gain increased benefits from their transactions by having greater quantities of their own products on the markets, as opposed to products brought in by urban businesses. Unfortunately, this form of organization has not been mentioned in all articles. Instead, in the Mali and Nigeria articles, it is stressed that the NTFP price is low at home markets and middlemen, who generally are urban business people, gain more benefits than local collectors who live near the forests. Also the article on Tanzania reports that poor infrastructure constrains the price.

#### 4.2.4. Data collection

Market development involves the estimation of demand, analysis of supplies, and assessment of problems and economics of transportation. This requires having data on inventories and resource's abundance, condition, distribution, and habitat. In the articles in question, especially in those of Mali and Nigeria ones, this data is inadequate and cannot help in the implementation of appropriate market strategies.

#### 4.2.5. Gender

In Mali and Nigeria, women and men specialize in processing and selling different NTFPs. In Nigeria, women market eighty percent of the volume of NTFPs. Unfortunately no case has shown whether the profit women gain is appropriate to their commitment to NTFP marketing. This information could help in learning how women affect the market, the problems they face, and what should be done to help them organize themselves, if anything.

### 4.3 Policy

Improved NTFP management cannot be limited to the implementation of improved management and conservation techniques. For NTFP management to be successful, institutional arrangements are needed to ensure that rural people's interests are taken into consideration, and that they can gain more benefits from the resources. These arrangements include land and tree tenures, and control and enforcement procedures.

#### 4.3.1. Land tenure

The tenure security that affects land is controversial in many countries. However, the merits of secure land rights for rural populations are more generally accepted. Tenure practices vary locally according to village settlement history and population density, the availability of unfarmed land, and the political authority of the chieftaincy. Five traditional common avenues of acquiring land have been identified in Africa: occupancy,

inheritance, gift, customary authority, and borrowing. Traditionally, land is not individually appropriated because it is meant for the subsistence of the group and, perhaps, for its prosperity. However, the frequency of sharecropping arrangements, land rentals, pledging, and purchases, especially in peri-urban areas and areas of high land value, has increased remarkably.

Until recently, rural tenure regimes were perceived as being unable to ensure agricultural investment and the sustainability of land use. Assuming that western models of leasehold and freehold tenure would promote tenure security, agricultural investment, and land markets, colonial and post-colonial administrations generally acted to reduce the influence of customary village authorities regarding land rights. This was done in order to achieve resource management based on centralized control. The articles on Tanzania (before the implementation of the new committee) Mali, and Nigeria illustrate these tenure regimes. A concrete step in the centralized approach was the introduction of land titling and registration, which are still thought to be prerequisites to sustainable land use. Unfortunately, in many cases land use is unplanned, as reported in the article on Mali. As a result, evidence shows that government provisions often are not adaptable to the local logic and its social and economic dimensions, and do not have the hoped for results. In this regard, the experiment started in Tanzania because of overexploitation over resources demonstrates that government provisions generally fail to enforce regulations. Mostly, government provisions run counter to rural management systems and trigger resource conflicts as shown in the Nigeria case, with negative consequences for natural resources. Land tenure is important in that the primary factor governing rights to plants and use of trees is the tenure status of the land on which farmers have permanent or temporary

rights. However, it is important to distinguish land tenure from tree tenure, since the two are often different. In many cases, ownership of land does not grant automatic rights to the trees growing upon it. This is not the case in the article on Mali and Nigeria because in these articles rural people have rights to collect and use products from their crop and fallow fields. But the access to forests in Mali and Nigeria is different in that the Forest Services are responsible for these forests, as shown in the relevant articles. That means permission is required before using these resources. It is interesting to notice that in the Tanzania article, access to the mangrove is subject to permit entrance required by the committee in charge of managing the mangroves. Unfortunately, no indication was given about how the committee uses the money.

#### 4.3.2. Management approach

Faced with a lack of human and financial resources, most Forest Services in many African countries, including those in this study, are unable to enforce the regulations properly. Moreover, some agents often take the option of integrating obscure permit requirements for their own benefit in order to supplement their meager salaries. This serves to further alienate NTFP producers and other resource users for whom forest agents are among the most disliked of government officials. As a result, there are conflicts between local people and forest managers about forestland and forest resources as shown in the Tanzania article.

One approach to establish management groups and areas of jurisdiction is for local officials to designate a local body, as shown in the Tanzania article, or authority to have control over the pre-established area, for example a district or village council.

Another approach, found especially in the context of co-management situations, is to recognize different groups formed around different functions and objectives as local authorities. For both approaches, the Tanzania article suggests security and flexibility in processing and implementing the plan.

In contrast to the Tanzania article, the article related to West African Francophone countries shows success can't be guaranteed when involving local communities in NTFP management. In this article, Onibon and al. are pessimistic about implementing successful community-based management because the traditional elite does not give up to their power that is supposed to be transferred to the community. In any case, the key to establishing efficient community management is to integrate the mechanisms that give greater local voice and control of significant decision-making. This means that local people are represented in an accountable manner. In this regard, the Tanzania article, which is the only one that promotes a community-based management approach, has not reported any power given to local communities in the committee newly responsible for the mangrove management. However, such an approach can foster the transformation required to secure and manage the disappearance of the forests, and at the same time provide more benefits to the population.

Another problem in managing NTFPs is the relationship between officials and users, as shown in the article on Mali. In this article, deficiencies are reported in government support. Unfortunately, Gakou et al. did not give further information about these deficiencies. Based on the Tanzania article, any support must start by recognizing that natural resources management should involve the populations that rely upon these resources.

### 4.3.3. Gender

No article has dealt with gender policy, but based on observations, women are most disadvantaged by rural tenure rules, as their access to land is often temporary and is a disincentive to women's investments yielding benefits in the long term. In many African countries, women are not generally landowners, and this is why they do not see any reason for planting trees. They often have difficulty in finding land on which they can plant trees. If they want to plant and have land available, they may face shortages of tree seeds or seedlings. Often the seedlings available are the ones that men prefer because women do not participate in planning meetings. If women plant and protect trees, they may not have the right to use or harvest the trees if such rights are vested in men, as is the case in many countries.

# CHAPTER 5

# CONCLUSIONS AND RECOMMENDATIONS

Forests have great potential for providing food, medicine, fodder, and fuel, as well as construction materials. To provide opportunities for local people to take advantage of these products and services, more information changes in policies and government support are needed. To improve the current Senegalese NTFP situation, add income opportunities, and increase sustainability, I propose some steps to be undertaken by the government, building on the clause in the Forestry Code that allows local communities to manage their neighboring forests through an agreement with the Forestry Service (Title 1, Chapter 1, Articles 7 and 8). These steps based on the analysis made from the literature and the cases studies are the following:

1. Inventory all natural forests to know existing NTFP potential;
2. Establish pilot projects involving NTFP management in these forests;
3. Monitor and evaluate these projects so that adjustments can be made;
4. Replicate the pilot projects throughout the country;
5. Encourage local governments to allow women access ownership to land;
6. Develop research programs to master the silviculture of native species;
7. Promote the domestication of native NTFP species;
8. Provide technical assistance to NTFP stakeholders such as marketing and business management;
9. Promote the implementation of local NTFP enterprises; and
10. Facilitate access to credit for NTFP collectors and traders.

Sustainable reliance on NTFPs creates the need to maintain and conserve biodiversity. Thus, management of NTFPs cannot be seen separately from general forest management that affects vegetation and biodiversity, as shown in the literature review. In this regard, Senegal needs to consider both timber and non-timber forest resource management, instead of focusing only on timber as the Forest Service has done in the past. In fact, it appears justified to address the assessment of NTFPs in a general way. Unfortunately, as reported in the case studies detailed and systematic data about these natural resources are lacking. Existing information is rare regarding the status of the resource base, the real impact of harvesting and collecting practices, although these practices are known to be destructive to the resources.

We learned from the case studies that one way to assess NTFPs resource base is using inventory tools, such as the Geographic Information System (GIS) to map Senegal's NTFP resources. However, conducting an inventory requires a large financial investment that Senegal is unable to make presently. Thus, a solution is to initiate pilot projects in some regions and seek donors for financing. These pilot projects should involve local population as was attempted in the Tanzania article. However, based on the lessons learned from this article, security and flexibility will be key points when planning and implementing the projects.

The impact of projects promoting the sustainable NTFPs management will have on communities should convince donors that funding such projects is a key to the combined goals of poverty alleviation, environmental protection, and biodiversity conservation. The objective of these proposed projects is to learn how to involve local communities in forest management, especially for NTFPs. Once the projects are

implemented, a regular monitoring system of all technical and administrative aspects including operations, resource use, and progress towards agreed activities should be undertaken. An evaluation after the project's completion will be used to assess the potential to extend them with local means and replicate successful strategies in other areas. This will help prevent the shortcomings noticed on flexibility and security in the Tanzania article about the way the mangrove was managed and the fear mentioned in the West African article when transferring power to local populations. Thus, the Senegal Forest Service can replicate this experience in other places throughout the country, since it will be difficult to procure donor funding for the whole country. This approach can reduce the costs related to NTFP management and encourage local community commitment to the sustainable use of their resources.

Most justifications for participatory forestry are built around the assumption that greater participation of local communities in public decision-making can improve efficiency, equity, development, and resource management. Empowering local populations will allow them to be responsible for economic, social, and ecological costs, while gaining benefits. It also reduces administrative and management transaction costs via the proximity of local participants, access to local skills and local information. Finally, it uses local knowledge and aspirations in project design, implementation, management, and evaluation for better matching of actions to needs. However, to establish community-based management, allowing local people to participate in all stages regarding the decision-making process these people must be represented in an accountable manner.

In the absence of such representation, there is a danger that decision-making could be taken over by higher status elite groups, those who can afford to take risks. In my strategy, I recommend the implementation of a committee representing diverse interests and needs of the community. Representation on this committee will reflect gender equity and other concerns, so that it can represent the community as a whole. All this strategy should be written as an agreement between local people and government officials, so that the committee can monitor and evaluate it regularly in order to make necessary adjustments. The agreement should show the objectives, how to achieve them, and indicators for evaluation.

In Senegal, as is the case in the countries studied in this paper, women are more disadvantaged regarding rural tenure rules, as their access to land is often temporary and is a disincentive to investments yielding benefits in the long term. Thus, strategy suggests that local governments should implement changes that can allow women to access land easily. Also, as in the case for land, a perception of tenure security is an important prerequisite for intensive tree management. In this regard, the Forest Service should extend the innovations in the New Forestry Code regarding rights and benefits of local populations for planting trees in order to enhance tree plantations in crop and fallow fields. But, since the native NTFP species are said to be slow growth, the Forest Service should, in collaboration with the service responsible for research, work to enhance the sivilcutural techniques of these species. This will enhance their development and hence prevent any disappearance as it might be in the Mali and Nigeria articles.

Domestication of native NTFP species is another area that needs to be developed. The domestication of NTFP species involves a move from gathering in forests to

deliberate cultivation of these species on farmland. The domestication of a chosen species involves genetic selection and the management of varieties of cultivars. Through selection, yield and quality are improved so that the price paid for the product increases. Profits from these improved cultivars growing under personal control are the incentive to plant and manage the resource sustainably.

To implement the strategy, the Forestry Service must provide access to technical assistance to improve collection and processing techniques, or indirectly by facilitating the involvement of other services that are specialized in these areas. Also, it is the role of the Forestry Service to be more proactive in terms of extension so that all stakeholders can get the necessary information and the technical assistance they need in group organization and marketing.

As experienced in some countries, as shown in the literature review, large NTFP enterprises can overcome difficulties related to small or non-existent credit, transportation costs, and other marketing constraints. This approach can provide a network for communications concerning technological advances and, perhaps, can be used to ensure more benefits to rural people. Credit is vital to encouraging new enterprises or expanding existing operations.

Lack of credit has been identified as a barrier to strengthening rural NTFP enterprises, as reported in the literature review. Micro-lending programs developed in other sectors can be explored to finance NTFP activities. The existing system in other sectors mobilizes savings within groups so that each member can receive credit. Success depends on appropriate training in financial management.

If Senegal is to encourage sustainable forest management along with equitable economic development, NTFPs need to be recognized as important tools. An inventory of all forests to identify available products and greater market transparency would be a natural starting point. Disappearance of some species with great economic and cultural value could be prevented. In addition, Senegal's forest conservation policy must be based on multiple-use and the recognition that a variety of goods and services can be produced simultaneously with sustainable production of timber. Developing community-based management and addressing gender issues in all aspects regarding NTFP is a necessity. Enhancing land tenure issues to facilitate NTFP planters to land, especially women will help to sustain NTFPs uses. Here in lies Senegal's opportunity for sustainable NTFP development.

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# Appendices

Table1. Main NTFPs used in Senegal

| **Scientific Name** | **Local name** | **Use parts** |
|---|---|---|
| *Acacia nilotica* | Nep-nep | fruit |
| *Acacia senegal* | Dakandé | sap |
| *Adonsonia digitata* | Buy | fruit |
| *Anacardium occidental* | Darcassou | fruit, |
| *Balanites aegyptiaca* | Sump | fruit |
| *Borassus flabellifer* | Ronne | leave, bunch |
| *Carapa procera* | Tulukuna | fruit |
| *Combretum micranthum* | Kinkéliba | leave |
| *Combretum glutinosum* | Raat | leave |
| *Cola cordifolia* | Ntaba | fruit |
| *Detarium microcarpecum* | Danq | fruit |
| *Deatrium senegalensis* | Ditax | fruit |
| Dialium guineense | Solom | fruit |
| *Diospyros mespiliformis* | Alom | fruit |
| *Elaeis guneensis* | teer | nut, nervure, sap |
| *Landolphia heudelotii* | Tol | fruit |
| *Parinari excelsa* | Mampatam | fruit |
| *Parinari macrophylla* | New | fruit |
| *Parkia biglobosa* | Nété | seed, fruit |
| *Saba senegalensis* | Maad | fruit |
| *Sterculia setigera* | Lalo mbep | sap |
| *Tamarindus indica* | Daqar | fruit |
| *Vitellaria paradoxa* | Karité | fruit |
| *Ziziphus mauritania* | Sidem | fruit |

(Source: Dieng and Babacar 1999)

Table 2. NTFPs harvest based on Forestry Service permits in kilograms

| **Product** | **1998** | **1997** | **1996** | **Product** | **1998** | **1997** | **1996** |
|---|---|---|---|---|---|---|---|
| Nep-nep | 2,470 | 2,645 | 4,6885 | Ntaba | 400 | 635 | 420 |
| Sidem | 102,089 | 88,425 | 167,978 | Mampatam | 380 | 628 | 490 |
| Daqar | 123,759 | 84,521 | 168,389 | Gomme mbep | 818,294 | 962,368 | 112,176 |
| Buy | 1,033,401 | 15,61120 | 532,833 | Gomme Arab | 111,703 | 119,536 | 254,553 |
| Sump | 9,868 | 6,266 | 336,499 | Huile de palme | 301,916 | 344,874 | 383,178 |
| Nere | 190,877 | 66,420 | 59,696 | Vin de palme | 13,007 | 10,550 | 295,021 |
| Netetu | 50,180 | 252,227 | 89,257 | Feuilles | 224,549 | 123,745 | 115,648 |
| Leng | 29,454 | 3,672 | 24,443 | Ecorces | 28,188 | 47,359 | 125,320 |
| Ditax | 513,911 | 9,857 | 131,577 | Racines | 21,673 | 24,777 | 81,833 |
| Maad | 9,465 | 399,802 | 515,813 | Encens | 68,266 | 2,684 | 6,685 |
| Palmiste | 2,030 | 49,347 | 70,996 | Autres gommes | 2,515 | 17,115 | 5,522 |
| Solom | 38,039 | 75,089 | 87,677 | Balais | 180,422 | 358,092 | 255,309 |
| Danq | 141,695 | 584,334 | 146,427 | Nattes | 1,300 | 1,492 | 2,074 |
| Toll | 13,838 | 13,625 | 22,596 | Vans | 3,409 | 3,596 | 2,545 |
| New | _ | 370 | - | Paniers | 2,952 | 2,281 | 1,132 |
| Alom | 64 | 3,515 | 16,250 | | | | |
| **Subtotal 1** | **226,1716** | **320,1235** | **241,7316** | **Subtotal 2** | **1,778,974** | **2,019,732** | **1,641,906** |
| **Grand Total** | **4,040,690** | **5,220,967** | **4,059,222** | | | | |

(Sources: D.E.F.C.C.S. 1999, and Dieng and Babacar 1999)

Table 3. A per ton cost structure of *Saba senegalensis*

| **Elements** | **Amount,** Francs (CFA) | **%** of Total |
|---|---|---|
| Collector margin | 25,000 | 20 |
| Forestry permit fee | 25,000 | 20 |
| Transport costs | 22,500 | 18 |
| Loading costs | 2,500 | 2 |
| Municipal fee | 1,500 | 1 |
| Travel costs | 400 | 0 |
| Broker commission | 3,125 | 3 |
| Road fees | 1,500 | 1 |
| Product loss | 6,250 | 5 |
| Middleman margin | 37,225 | 30 |
| **Total price** | **125,000** | **100** |

(Source: Dieng and Babacar 1999)

Table 4. Key imported NTFPs

| **Product** | **1998** | **1997** | **1996** | **Product** | **1998** | **1997** | **1996** |
|---|---|---|---|---|---|---|---|
| Tamarin | 684204 | 342106 | 177049 | Gomme mbep | 22941 | 3305 | 1000 |
| Buy | 3851 | 93900 | 43980 | Gomme Arab | 1000 | 26955 | 5190 |
| Gowe | 17311 | 3050 | 2200 | Huile de palme | 0 | 868955 | 1664898 |
| Nere | 4835 | 0 | 144480 | Palmier doum | 0 | 0 | 30000 |
| Netetu | 17164 | 70747 | 112332 | Feuilles ronier | 0 | 0 | 0 |
| Ecorces | 0 | 0 | 0 | Gingembre | 2488 | 328 | 16310 |
| Ditax | 0 | 0 | 98550 | Cure dent | 0 | 0 | 0 |
| Maad | 0 | 414977 | 1509890 | Kinkeliba | 0 | 0 | 0 |
| Racines | 0 | 140 | 0 | Jujubes | 0 | 2925 | 6255 |
| Solom | 0 | 0 | 0 | Karite | 97043 | 73377 | 17732 |
| Danq | 63645 | 192747 | 0 | Piment noir | 957 | 219597 | 136715 |
| Toll | 2980 | 0 | 0 | Encens | 3140 | 0 | 0 |
| Miel | 0 | 4310 | 23787 | Diguidie | 16394 | 0 | 0 |
| Vin de Palm | 60 | 0 | 0 | Huile palmiste | 60 | 0 | 0 |
| **Subtotal 1** | **794050** | **1121977** | **2112268** | **Subtotal 2** | **144023** | **1195442** | **1878100** |
| **Grand Total** | **938073** | **2317419** | **3990368** | | | | |

(Sources: Dieng and Babacar 1999 and D.F.C.C.S. 1999)

Table 5. Analysis of Production and Management

| Themes | Mali | Nigeria | Tanzania | West Africa |
|---|---|---|---|---|
| **1. Collectors** | **Both villagers and urban dwellers** | **Both villagers and urban dwellers** | **Villagers and outsiders** | |
| **2. Collection location** | **Forest/Fallow Crop fields** | **Gardens/Farms Forests** | **Forest reserves** | **Natural resources** |
| **3. Collection** | **• Native species are dominant<br>• Simple techniques that cause damage and death to NTFP species** | **• Native species are dominant<br>• Unplanned land use practices and simple techniques that cause damage and death to NTFP species** | **• Native species Overexploitation<br>• Simple techniques that cause damage and death to NTFP species** | |
| **4. Social organization** | **Individuals** | **Individuals** | **• Individuals<br>• State and community control** | **• Decentralized administrative units<br>• Traditional communities** |
| **5. Use** | **• Most are used in households and the rest sold<br>• Difference between men and women** | **• 90% in rural areas and 40% in urban areas use NTFP<br>• 50 to 65% are foods and 35 to 50 % are marketed<br>• Modern medicine. Traditional culture<br>• Women and children harvest food products<br>• Men harvest for wine and oil for income<br>• High monetary value per unit products not fully known** | | |

Table 5. Analysis of Production and Management (Continued).

| Themes | Mali | Nigeria | Tanzania | West Africa |
|---|---|---|---|---|
| **6. Data Collection** | **Inaccurate data collection and poaching inhibit management** | **• Inaccurate data make NTFP classification difficult<br>• Constrained by lack of ethnobiological survey, high rate of poaching, and mode of resource harvest<br>• Worth difficult to estimate** | | |
| **7. Species** | **• Native are slow growing<br>• 108 species producing 55 products<br>• High frequency of fruit plants** | **• Silviculture of native unknown<br>• No complete list<br>• No research in ethnobiology<br>• Short harvest cycles<br>• Small yield/unit<br>• One for different uses** | **Mangrove plant species** | |
| **8. Cultivation** | **Focus on exotic species** | **Effective in gardens and farms to ease control and management** | | |
| **9. Domestication** | | | | |
| **10. Gender** | **• Gender specialization but focus on men in terms of data collection<br>•Difference in gender perception over collection** | **• Gender specialization<br>• Men take physically demanding tasks** | | |

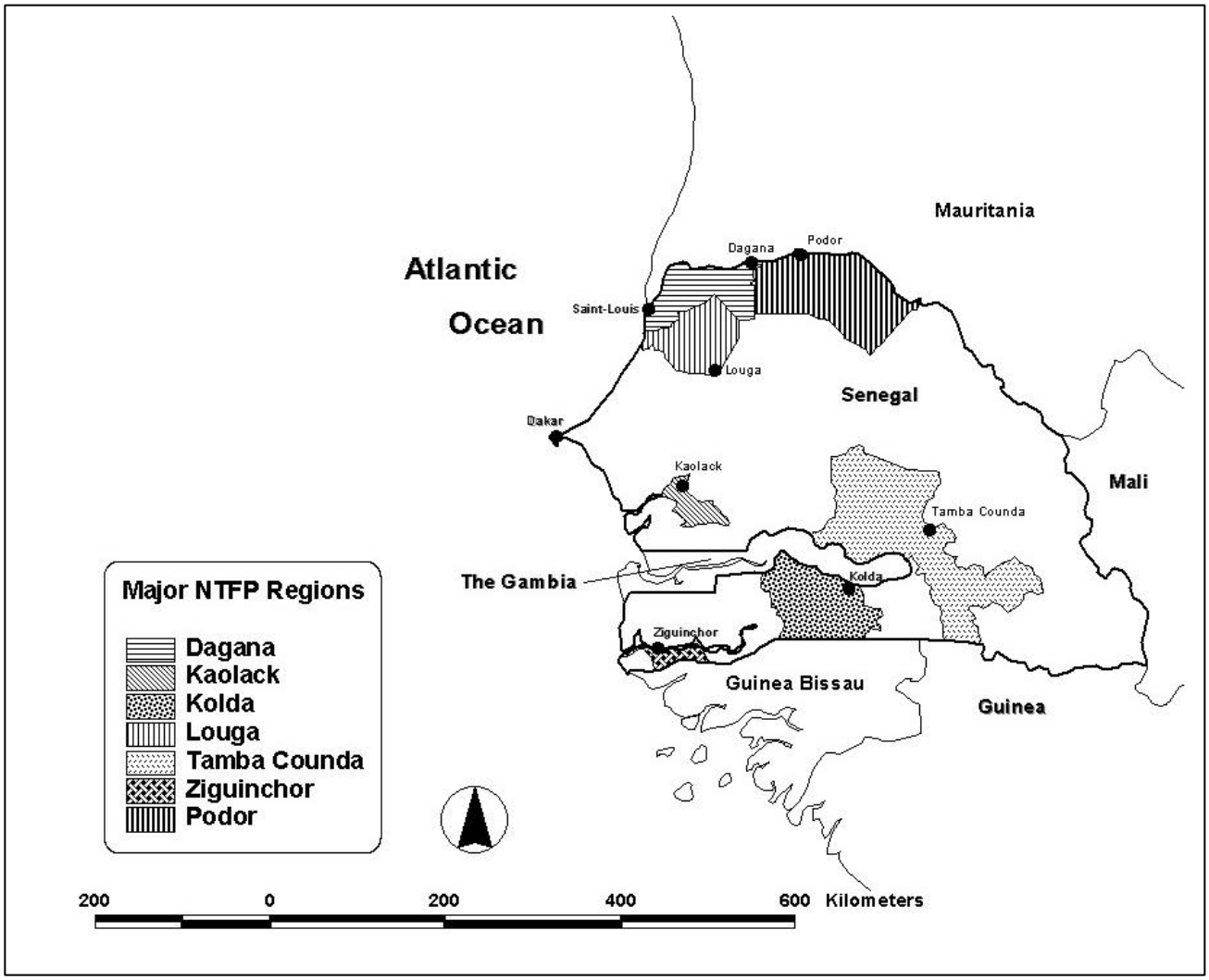
Table 6. Analysis of Marketing

| Themes | Mali | Nigeria | Tanzania | West Africa |
|---|---|---|---|---|
| **1. Location** | **Villages/Cities** | **Villages/Cities** | | |
| **2. Traders** | **Villagers and urban people** | **Villagers and urban people** | | |
| **3. Product** | **Diverse** | **Arabic gum and spices are significant** | | |
| **4. Processing** | **Simple techniques** | **Simple techniques that lead to product wastes and unattractive packaging** | | |
| **5. Price** | **• Low at farm gate<br>• Middlemen gain more benefits** | **• Low at farm gate<br>• Fixed by middlemen<br>• Constrained by poor infrastructure** | **Entrance permit** | |
| **6. Enterprise** | | | | |
| **7. Credit** | | | | |
| **8. Storage facilities** | | | | |
| **9. Data** | **Inadequate** | **• Inadequate<br>• Constrained by inadequate market strategies** | | |
| **10. Gender** | **Gender specialization** | **• Gender specialization<br>• Women in both rural and urban market 80 percent of NTFP volumes** | | |

Table 7. Analysis of Policy

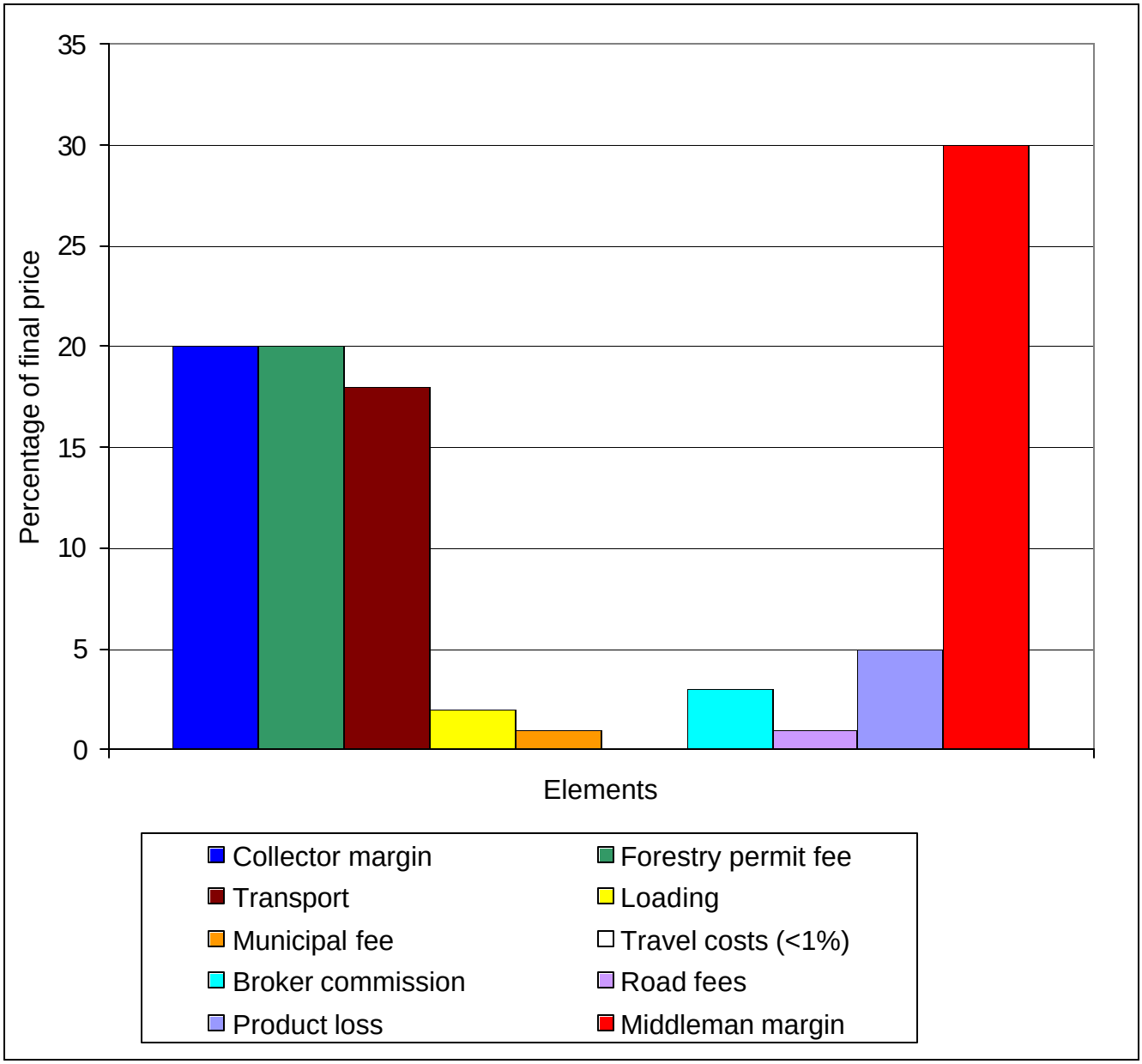
| Themes | Mali | Nigeria | Tanzania | West Africa |
|---|---|---|---|---|
| **1. Land tenure** | **• Conversion of natural forests to plantations of single exotic species<br>• Unplanned land use<br>• Individuals collect and use products from their crop and fallow fields** | **Conflicts local people/forest managers for forestland and forest resources** | **Reserves belong to government** | **State to community-management** |
| **2. Management approach** | **Deficiencies in government support** | **Access to resources regulated by government** | **• Collaboration communities/ forest Managers<br>• Shortcomings noticed: unclear rules/insecurity<br>• Great uncertainty<br>• Local management initiatives need state law<br>• Security and flexibility are central to regulate community management** | **• New responsibility to community<br>• No guarantee of success<br>• Constraint to community management: neo-traditional elite** |
| **3. Gender** | | | | |

Figure 1. Senegal Major NTFP Regions



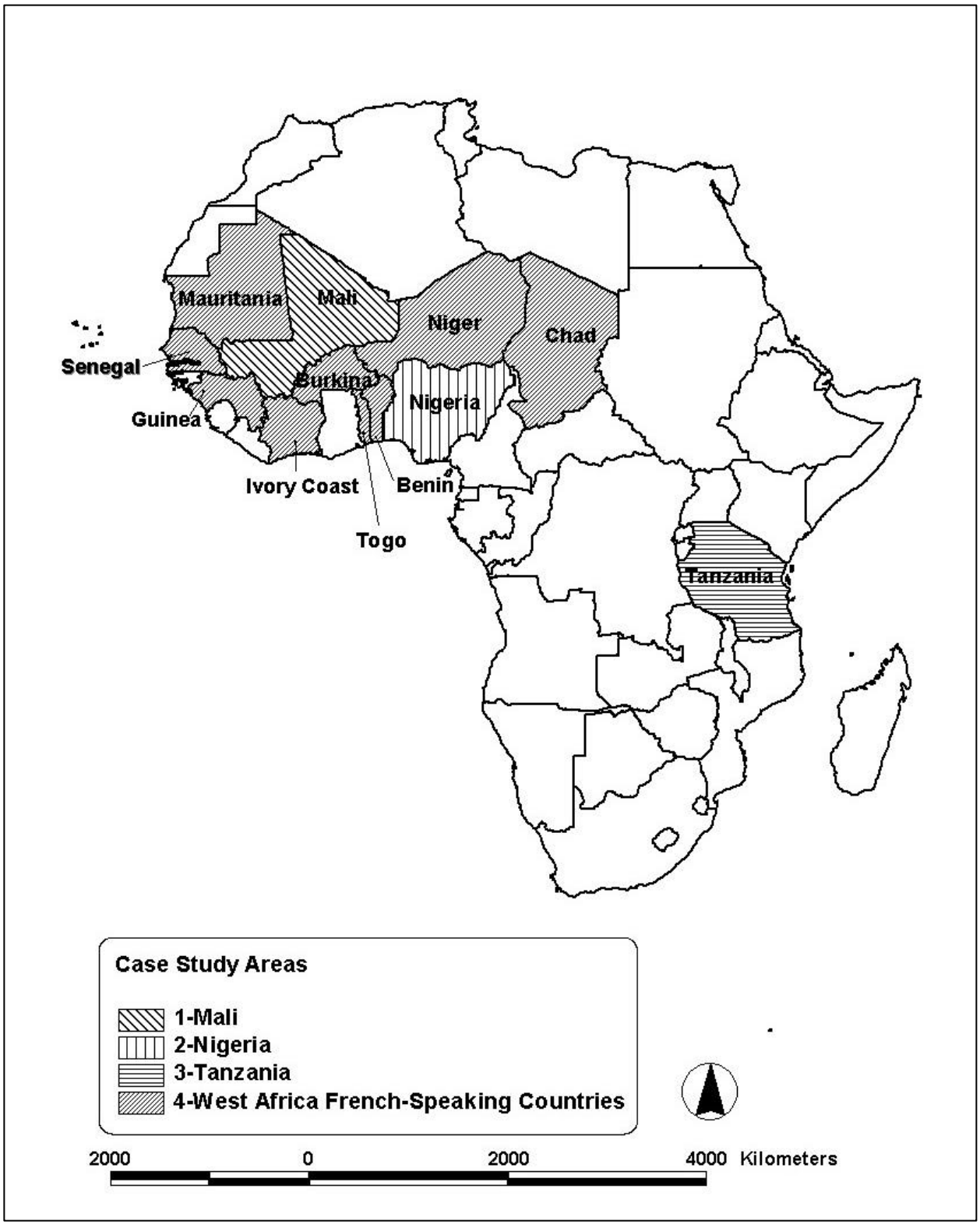

(Source: www.NewAfrica.com/maps 2001)

Figure 2. Graphic Presentation of Per Ton Cost Structure of *Saba senegalensis.*




(Source: Dieng and Babacar 1999)

Figure 3. Case Study Areas




(Source: Environmental Systems Research Institute, Inc., 1992-1999)

# VITA

Abdou Sene was born in Kaolack, Senegal on December 3, 1949. After completing his primary and secondary school, he entered Ecole Nationale des Agents Techniques des Eaux et Forêts de Ziguinchor, Senegal in 1972. He graduated in 1975 and was appointed as Forest Planner of the Commune of Joal Fadiouth and the rural community of Nguénième. In 1982 he was appointed Administrator of the Center of Podor and Personnel Manager of the Arabic Gum Project in Podor.

In 1986, he was been accepted into Ecole Nationale des Cadres Ruraux de Bambey in Senegal. Since his graduation in 1989, he has served as Office Manager of the Planning Office of the Ministry of Environment and Nature Protection, Roadside Plantings Coordinator of the Senegalese Reforestation Project (SRP-USAID), and the Pilot Program Coordinator for testing the implementation of the Community-Based Natural Resource Management Project (CBNRMP-USAID).

He participated in several international seminars and short-term training programs in the field of natural resources management in Africa and the United States. He has received several congratulatory statements for success achieved in his professional activities, and a national distinction as *Officier de l'Ordre National du Merite* received from the Senegal Head of State. His nomination as National Funds and Grants Administrator during 1996 -1998 coincided with his departure to the United States for graduate studies. In 2001, he completed a Masters in forestry at Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, VA, USA.