

Improving Domestic Markets for the Wood Products of Reforestation Programs: A Case Study of Eucalyptus in Northwestern Senegal

by

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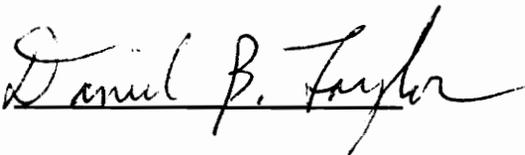
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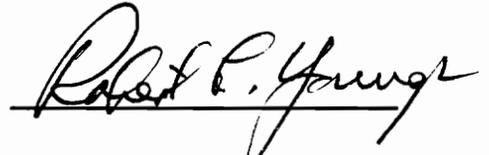
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(ABSTRACT)

There is a drastic need for reforestation in the Sahel region of Africa. International donors and local governments invest large sums of money for the purpose of planting trees. Unfortunately, the majority of reforestation efforts last only as long as the projects. Presently there is a push in the donor community to have more sustainable projects, increasing local participation and creating a situation in which reforestation efforts will continue beyond the scope of any one project.

This thesis examines the potential opportunity for the use of eucalyptus in the domestic sawn wood markets of Senegal. It is hoped that with increased economic incentives the local population will become more inclined to plant trees. It is therefore important to identify the market opportunities for the products of reforestation. In this research it has been noted that more emphasis should be placed on determining the barriers to market entry for the goods to be produced from the reforestation and providing assistance to lower those barriers.

In Senegal it is generally accepted that planting for fuel wood and housepoles does not provide enough of an economic incentive for increased local involvement in reforestation. This thesis finds that the domestic sawn wood market for eucalyptus in Senegal holds potential but will not provide tangible benefits until there are further improvements in the market infrastructure and communication to the farmer.

To increase the participation in this market the people of Senegal need to see for themselves that reforestation can be financially beneficial. Reforestation projects must have a longer-term vision and provide assistance throughout the productive cycle of the tree.

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Chapter 1

INTRODUCTION

Many reforestation efforts have been undertaken in the Sahel region of West Africa. Most of these projects have either failed or have ended as soon as the funds from the international donors are exhausted. Few of these projects have had the desired effect of long-term, independent local involvement in the process of reforestation. What has been missing in these projects is that they have failed to stimulate long-term public interest. The hypothesis of this thesis is that it is the lack of economic incentives that terminates much of the local involvement in the reforestation. After the international project ends, the local population cannot afford to reforest. How can the local government and international donors create a positive economic environment for the reforestation process?

Problem Statement

Many reasons have been given for the lack of success of internationally-funded reforestation projects in the Sahel region of West Africa. These include: the projects being too large and not addressing the issues confronting the local people; lacking sufficient local involvement in the planning stage and therefore destroying useful local flora and replacing it with exotic trees such as eucalyptus; another suggested reason is that projects are too focused on the individual growers and do not address the needs of the society (USAID, 1986; Diallo, 1992). Whatever the reason, the fact remains that most of the reforestation projects end when the international funding is exhausted.

The result of this lack of continuity is that the donor money is not as well spent as it could be. More importantly, the people who take the chance and become involved in the projects can be left without assistance to complete the growing and selling of their product in a market that is either too far away, too small, or simply does not understand or need the product.

Justification

The justification for this research lies in the belief that if the proper economic incentives are available there will be increased local involvement in reforestation. Bourke (1989) states that domestic markets hold great potential for local investment in forest industries. This research will consider only the domestic sawn wood markets for the wood of *Eucalyptus Camaldulensis* in Senegal. *E. Camaldulensis* has been the most frequently planted tree in many reforestation projects including the Senegal Reforestation Project (SRP). The sawn wood market was chosen for study for three reasons. First, it is believed that the house pole and charcoal markets in Senegal,

although active, do not provide the necessary economic incentive for large-scale local involvement (USAID, 1986). Therefore this thesis will examine the sawn wood markets that will potentially provide higher economic returns. Second, marketing through the domestic wood markets of Senegal will require considerably less infrastructure than entering international wood or pulp markets. Third, because over 90 percent of the sawn wood market consists of wood imported from the Cote D'Ivoire there would appear to be potential for domestic growers to compete with these imports due to lower transportation distances and costs.

This concern with the sustainability of reforestation projects is currently being addressed by the SRP. The Private Sector Initiative of this project is attempting to involve the Senegalese people in the reforestation effort by providing economic incentives. This is an important aspect of the project because without local initiative and involvement, the projects are not sustainable. This is clearly demonstrated by the fact that there have been about 23 international forestry projects in Senegal, spending over 50 million dollars (USAID, SRP Project Paper, 1986) with limited success from the sustainability perspective.

Objectives

The objectives of this research are (1) to evaluate the Senegalese wood product market and to identify the potential economic incentives and disincentives for reforestation; (2) to develop methods that other developing nations can use to examine their market channels for domestic wood products. Issues raised in this thesis will provide insight into the complexity of establishing sustainable reforestation projects.

Summary of Methods

In order to accomplish the objectives of this thesis it is necessary to understand the present market channels and to gauge the knowledge of the growers about the product and markets. It is also necessary to interview the wood merchants and to understand the difficulties involved in selling the product. It is for those reasons that the following three groups of people will be surveyed:

1. the farmers/villagers growing the eucalyptus;
2. the wood merchants in the towns; and
3. the wood users in the urban areas.

Each nation will face a different set of problems and constraints when attempting to develop their domestic markets. This study will identify areas of market research which countries can use to improve their reforestation efforts. A market channel model developed at Virginia Polytechnic Institute and State University will be examined as a method for a more quantitative analysis of the markets. It is expected that with models such as the one to be presented, research on markets can be conducted with the technology and knowledge that already exists in many developing nations.

Maps of the Study Site

To provide an introduction to the study area, three maps are provided on the following pages. Figure 1 shows the location of Senegal on the African continent. Figure 2 shows Senegal and its neighboring nations in more detail. Figure 3 shows the study site within Senegal. The study site was located in the northwest of Senegal. Surveys were conducted in the following towns and surrounding villages: Dakar, Thies, M'Bour, Fatick, Kaolack, Diorbel, Touba, Louga, San Louis, and Dagana.

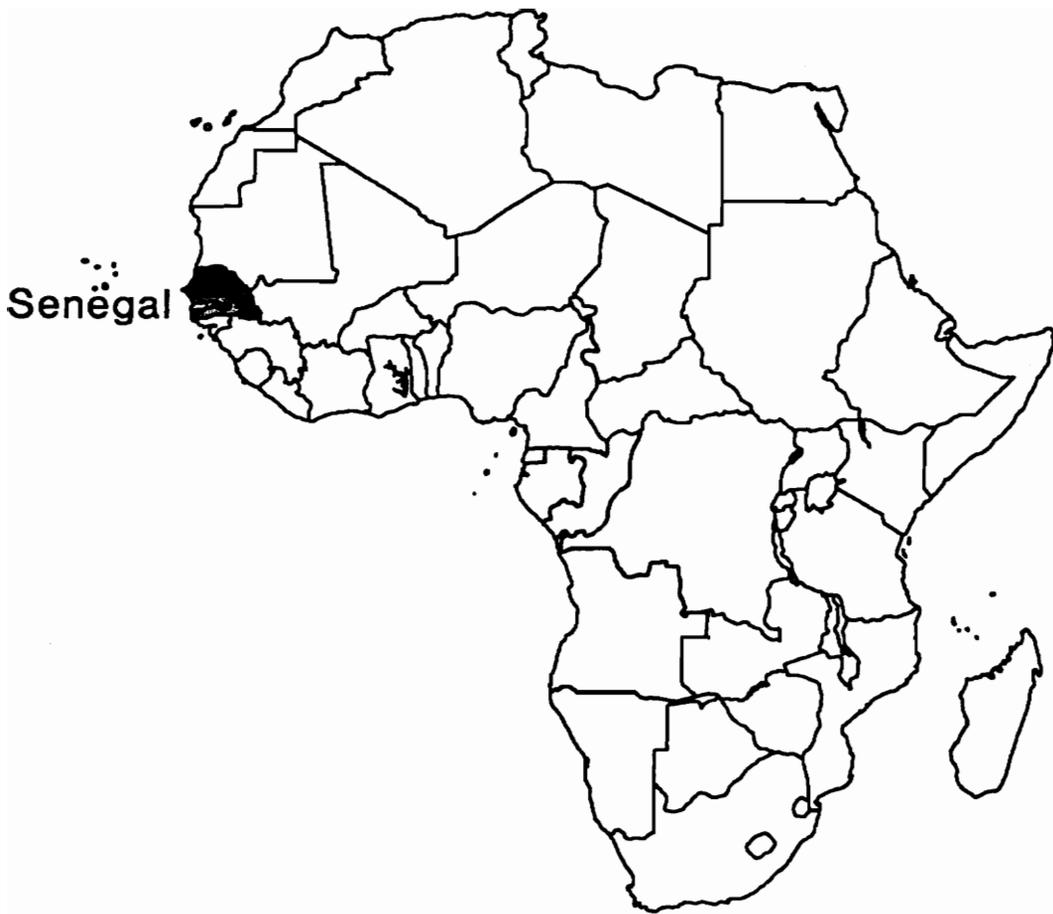


Figure 1. Senegal in the African Continent



Figure 2. Senegal and Neighboring Nations



Figure 3. Senegalese Urban Centers

Thesis Contents

Chapter 2 contains a brief introduction to the nature of markets with reference to the barriers present in the Senegalese market structure. Also included in this chapter is a discussion of the potential markets for the products of eucalyptus plantations in Senegal. Chapter 3 describes the methods of research used in this study. Chapter 4 consists of a discussion of the three sections of the Senegalese market that were surveyed: (1) the wood merchants; (2) the wood users; and (3) the wood growers. Also a market channel model will be examined as a method for conducting a more quantitative analysis of the markets. Chapter 5 summarizes the research and presents the conclusions of the study and recommendations for both future reforestation programs and further research.

Chapter 2

MARKETS

To effectively encourage the rural Senegalese to make use of the market system for their economic benefit how market^s function must be understood. This chapter will examine the function of markets and relate this to the market research requirements in the developing nations. In concurrence with the theme of this thesis, particular reference will be made to eucalyptus in the Senegalese wood markets.

Market Functions

In any trade environment markets develop. These markets may develop in forms as diverse as a meeting between two groups of nomadic pastoralists in the African desert or the sale of commodities between traders in Chicago. Markets form because people require them to fulfill a function.

What then are the functions of a market? Markets provide a forum in which people can exchange for goods and services that they cannot produce themselves, or that they cannot produce as efficiently as others. Markets essentially serve the same purpose for all people but it is because of the distinctions between urban and rural markets, free and protected markets, domestic and international markets and so forth that individual market parameters become important when analyzing the functioning of a particular market. The knowledge and ability to work effectively within a market hinges on the understanding of the market structure and the availability of accurate information.

Saxena (1991) describes the function of a market as either allocative or exploitative, the former allowing the equitable distribution of products to those in need and the latter, under which he places the wood markets of India, allows a few controlling interests to manipulate the market to their advantage. The Senegalese wood product market is primarily exploitative since it is essentially under the oligopolistic control of a few sawmills and has a unidirectional flow of products.

Market Technology

The transference of markets and market systems from one country to another is much the same as transferring industrial or agricultural technology, a basic or indigenous process already in place is removed and an allegedly more "efficient"

system is installed. The direction of this transfer is customarily from developed to less developed nations (LDC). Due to cultural, physical, financial and other misunderstood differences, many of the innovations that perform favorably in the industrial world do not function in the developing nations.

To aid in the development of a country's market system the functioning of the current market must be understood. Only after extensive study of the domestic markets and with knowledge of the desires of the local population can suggestions be made about how the local assets can best be used to compete in the national arena. Indigenous or domestic market structures have only lately become considered as important areas of potential development, Evans (1986). Bourke (1991) states that domestic wood markets do not receive the attention they deserve from governments and the forest products industries of developing countries. It may be that the most viable option, at least in the early stages of market development, is to have limited involvement in the international markets.

Market Information

The efficient functioning of a market is in part related to the following two problems: (1) the amount of information necessary to understand the processes of a particular market; and (2) the amount of information available on the processes of that market. Simple markets require less information for an adequate grasp of their nature, while complicated markets require a large amount of information to achieve a minimal understanding of their character. Information is vital to the entrepreneur in the market, without the appropriate information, opportunities will be missed and he or she may be overrun by more efficient competitors. For example Meyer et al. (1992), in a profile of the U.S. wood furniture industry distribution channels, state that with limited information firms selling wood to furniture

manufacturers and firms selling furniture will find it difficult to gauge the demands for their respective products.

Information on African markets is at best difficult to obtain. A general lack of cohesive data collection systems leaves the researcher having to depend on subjective personal accounts and on often inaccurate government documents. If the objective of the Senegalese, or any other developing country's government is to develop its national resources, then accurate collection and effective use of information should be accorded a high priority. Information on the domestic market process will enable the government of Senegal and the Senegalese entrepreneur to better understand the needs of the Senegalese consumer and in the future will facilitate their analysis of the international markets to judge their competitive ability.

Forest Product Markets

In general, forest product markets can be broken down into two categories: (1) Non-wood products, for example fruit; and (2) Wood products, or products derived from the woody segment of the tree. Historically the Senegalese have viewed both of these categories as gathered products. It is because of this cultural nuance that the growing of trees for the specific purpose of developing a market for the wood product of those trees will be difficult. The non-wood forest product markets of Senegal remain primarily gathered product markets such as nuts, fruit and fodder.

The Senegalese national forest policy, theoretically designed to reduce the cutting of wood from the remaining natural stands, has forced changes in the wood product market. Instead of cutting wood from the native forests for sawn wood products, the Senegalese import wood from the Cote d'Ivoire (Moreno, 1990). The species of wood that predominate in the market have not changed, because the natural forests of the Cote d'Ivoire are similar to those of the Casamance in Senegal.

Wood products such as charcoal and fuel wood continue to be predominately gathered products, but there are cases where the products of reforestation projects have been used for fuelwood and charcoal.

The obstacles to be overcome in changing market structure are substantial. Apart from the economic factors involved there are the political and cultural changes, such as improving the forest policy legislation and accepting a changing role for women respectively, that must take place in order for the markets to function effectively. In Senegal these changes must take place under arduous environmental constraints and in a situation where information is not readily available.

If the reforestation effort in Senegal is to be successful then there must be a large scale involvement of the local population (USAID Project Paper, 1986). This involvement would entail changes in the nature of the markets to accommodate the long maturation of the product, the cultural acceptance and use of those markets, and the availability of information to allow this to occur.

Market Research

One definition of market research is given as: ".. the systematic and objective approach to the development and provision of information for the marketing management decision-making process."(Kinnear and Taylor, 1983; p 16).

This definition is aimed primarily at the decision-makers in large corporations but contains the basic ideas relevant to successful market research. The basic idea is that a comprehensive, unbiased description of the market will lead to more effective marketing decisions. In the Senegalese context, the question is whether E. camaldulensis can substitute for the wood presently being used for products other than fuelwood. To analyze the potential markets for these products two aspects must be considered: (1) production possibilities or supply; and (2) consumer behavior or

demand.

Supply

Can the eucalyptus being planted in Senegal provide a guaranteed, consistent and adequate supply of sawn wood to meet the demands of the domestic market at competitive prices? Can the product be grown, processed and transported to market and remain price competitive with the wood imported from the Ivory Coast? How many trees will need to be planted to enable the local sawmills to compete successfully in the market?

To answer these questions it is necessary to understand: (1) the number and cost of trees being planted and the growth characteristics of *E. camaldulensis* under Senegalese environmental conditions; (2) the cost of treatment, transportation and processing of the wood; (3) sawmill capacity and throughput needed for profitable production; and (4) the level of acceptance of the product in the market.

If the market does not change and eucalyptus is not accepted as a sawn wood then there may be serious consequences of market saturation. Saxena(1991) reports on the market collapse for eucalyptus poles in villages in India. Overplanting led to an excess supply of poles and the prices fell leaving many farmers with unprofitable plantations, the result of which was that the trees were not allowed to coppice and the stumps were removed, often at great expense. This demonstrates a need to understand the potential effect on the markets that a large supply of eucalyptus would create. The number of eucalyptus and survival rates planted by the Senegal Reforestation Project (SRP) are discussed in chapter 5. Although there have been many projects that have promoted the planting of eucalyptus little is known about the growth characteristics of eucalyptus planted under the Senegalese environment. The acceptance of eucalyptus products is addressed in the following section on demand and also in chapter 5.

The import level for sawn wood, in both whole log and sawn wood forms, is an average of 26,438 cubic meters for the years 1982 through 1988. The theoretical capacity of local sawmills as estimated in Moreno, 1990 is presented in table 1 as 11,350 cubic meters per year. Since imports of sawn wood comprise 90 percent of the Senegalese demand, the demand for sawn wood is estimated at 29,375.6 cubic meters per year while the capacity of the local mills is considerably less than that figure. This indicates that in a perfect market situation, the local mills could be working at full capacity and meet barely 40 percent of the demand.

How many trees will be needed to allow these sawmills to produce at full capacity? If one eucalyptus tree, as shown in table 6, appendix B, can produce 0.110 cubic meters then approximately 267,051 trees per year will be needed. It is important to remember that these trees will need to be somewhere in the region of 15 to 20 years old to produce this size.

Table 1. ESTIMATED CAPACITY OF LOCAL SAWMILLS	
Sawmill	Capacity (m ³)
SCIENCIE	4,500
GIE DERICOURT	1,500
COUSSY	2,000
KOLDA	400
BOUTOLATTE	700
SIFAC-TOBOR	1,500
<u>BIGNOMA</u>	<u>750</u>
TOTAL	11,350

Source: *Etude de Marche pour le Bois d'Oeuvre*, Moreno A., pg 70, 1990

Demand

Important factors to consider in an analysis of the nature of timber demand in Senegal are the building trends in Senegal, tastes and preferences in wood uses and prices. Also important are the effects of population change and changing income levels.

During the two research visits to Senegal it was observed that in the construction of residential buildings in the urban areas the preferred material was brick. Wood was used as forms to retain the concrete while it set. Quantitative representation of this observation is not available at present but might be verified by examining the sales data for bricks.

Tastes and preferences for wood are governed as much by what is available in the market as they are by the preferences of the Senegalese people. The limited selection of wood available in the market may not allow the consumer to accurately express his or her desire for alternate products. Therefore altering tastes and preferences in the Senegalese wood market may be as simple as introducing new products into the market.

Many of the consumers in the wood markets indicated that the primary motivator in their choice of wood was price. With limited budgets, consumers are forced to use the cheaper products even though they might prefer to use the higher quality, more expensive products. Thus, the question to be answered concerning the effect on demand due to changes in income is: if incomes rise will the Senegalese consumer remain faithful to traditional forms of building and wood use? What the direction of income change will be and what effect it will have on the demand for wood are two important questions for future research.

With population increasing at a rate of 3 percent per annum it can be expected that the demand for wood and wood products will increase. If there is little change in the real income level and no change in tastes and preferences, then it

would appear that reforestation in Senegal is vital to avoid further destruction of the nation's soil resources and complete dependence on imported products.

Market Equilibrium and Price Setting

The Senegalese sawn wood market has some of the characteristics inherent in an oligopoly:

An oligopoly is a market structure characterized by a small number of firms and a great deal of interdependence, actual or perceived, among them. Each oligopolist formulates its policies with an eye to their effect on its rivals. Since an oligopoly contains a small number of firms, any change in the firm's price or output influences the sales and profits of competitors. Moreover, since there are only a few firms, each firm must recognize that changes in its own policies are likely to illicit changes in the policies of its competitors as well. (Mansfield E. 1988; 337).

The welfare effects of the oligopoly as stated by Gould and Ferguson (1980; 343) are that:

Firms in an oligopoly presumably produce their output at the minimum attainable unit cost. But there is no reason to believe that their output uniquely corresponds to minimum long-run unit cost. Hence oligopoly organization requires more units of resources per unit of commodity produced than are absolutely necessary. (2) Since pure economic profit normally accompanies oligopolistic market organization, price is higher than both unit and marginal cost. In whatever equilibrium is reached, the marginal valuation of buyers is greater than the marginal cost of output. If the commodity were priced at either marginal or average cost, buyers would like to purchase more than producers would be willing to sell.

Essentially what these two quotes say is that an oligopolistic market structure is controlled by a few large firms, who maneuver among themselves to regulate prices, and that prices under this market condition are higher than they would be under perfect competition. Output under oligopoly is generally lower than in perfect competition due to the control of the market by the few firms.

Firms in an oligopoly can create a barriers for new firms to enter into the market. This can be done through a temporary lowering of prices to below the marginal cost of the new businesses making it unprofitable for them to produce.

Domestic and International Markets for Eucalyptus Products from Senegal

It is clear that after understanding the mechanism of growing the plant, the potential environmental and social effects, and the processing needs of eucalyptus, the issue becomes what the potential products from which the farmer will receive financial, or other, benefits are. At this time the Senegalese farmer faces a limited set of products for the wood from his/her eucalyptus trees. But, there is tremendous potential for the products of eucalyptus and these products can be split into two sections: (1) Domestic and (2) International. These two sections can be further divided in the Senegalese context as available or not available to the farmer.

Domestic Products

Fuel wood: At present this is the largest use of wood in Senegal. Much of the rural cooking is done with wood collected from the land surrounding the village. As fuelwood becomes more scarce, the women in the village have to travel further

and further afield to collect the required amount. Reforestation can help the women in the villages by reducing the time needed to collect wood. Unfortunately, fuelwood has historically been considered a free good and gathered product, thus the incentives are not great to plant trees to fulfil this need. Another factor is that the women collecting the wood are usually not in charge of the village, and therefore their considerations are sometimes secondary. In Senegal this is changing. It was obvious during the initial visits to the plantations that women were becoming involved in reforestation activities. As educational reforms allow more women to acquire education in Senegal they will become a more dynamic force in Senegalese society. This can already be seen in the fact that some of the roadside planting¹ organizers for the SRP are women. It will be important to recognize and encourage the reforestation potential in this sector of the population.

Charcoal: The charcoal market is the primary supplier of energy to the urban markets. The villagers growing the wood are at the mercy of the oligopsonistic² control of the market by the charcoal producers. The estimated demand for fuel in Senegal is four million cubic meters of wood per year (Diallo, 1992). In any region, there are only a limited number of charcoal producers and they can strictly control the price that they offer the farmers. Most charcoal is produced in the Casamance region and transported to Dakar. *E. Camaldulensis* is said to be a good wood for the manufacture of charcoal but the price received for wood to be used for charcoal is far less than other potential products such as house poles. For example the price quoted by the buyer to the farmer for a 15 hectare field of eucalyptus in the region of Thies for charcoal was 900,000 Fcfa. The wood was finally sold for a total of 3,411,000 Fcfa as house poles.

¹ The roadside planting program is a section of the reforestation program conducted by the SRP. It encourages the planting of trees along all roadsides and awards contracts for that purpose.

² Definition: A market controlled by a limited number of buyers.

Although it would appear that the charcoal market is not the best option for the Senegalese tree planter, it is an active market, and therefore one which should be given consideration. Unfortunately this market has not provided the necessary economic incentives for unassisted local investment. There are both cultural as well as financial reasons for this lack of involvement. As mentioned above, in the countryside, fuel has always been considered a gathered product and not one that involved long-term planning. The primary charcoal markets are in the large urban centers and there is an established market channel for charcoal from the southeastern part of Senegal and the Casamance region. Presently the charcoal is produced from wood cut from the native forests and therefore incurs only the harvest costs and is free of any growing costs, which can lower the price.

If strategic planting around the urban markets can be conducted and the charcoal merchants can make profits from the reforestation plantations, then there is the possibility of increased use of reforestation for charcoal production. Eucalyptus would be an excellent species for this product since it makes good charcoal and produces a large biomass quickly.

Fuelwood, charcoal, house poles and untreated posts and stakes are the products that the Senegalese eucalyptus planter can currently market. A large potential for national economic benefit from the planting of wood comes from the products that are presently not available in the market channel such as sawn wood from eucalyptus. These products should be developed using simple technology. They will add value to the wood and bolster the national economy. The SRP round wood study notes that there has been an increased use of sawn wood in the construction of rural dwellings over the past 10 years, and that this trend has shown a sharp increase during the last few years. If this section of the market can be captured by eucalyptus products then there will be a larger market and expanded incentives for the farmer.

House poles: House poles sell for approximately 250 Fcfa per pole. A pole is roughly defined as having circumference between 18 and 44 centimeters. This sector of the market is important because it is the next logical step in the market development past fuelwood and charcoal. In a report on the use of house poles in construction completed by the SRP, eucalyptus was mentioned as a species frequently used in two regions: Kaolack and Fatick. This response is understandable since these are the two regions with the most eucalyptus plantations, and availability was mentioned in the report as the predominant factor in determining the purchase of eucalyptus poles throughout northwestern Senegal. This fact has important consequences for the market. It appears to indicate that if a product is available it will be purchased which means that eucalyptus has only to become available in the market and it will sell, at least as house poles.

Table 2 gives the annual per capita and Department consumption of round wood for the regions in northwestern Senegal, excluding Dakar. The Ronier palm (*Borassus Aethiopium*) has been by far the most popular wood used for poles in the last 10 years, 1978-88, (SRP) with 4,684 poles, 474 stakes, and 385 posts bought by survey respondents. This can be compared to eucalyptus where 336 poles and 241 stakes were purchased. Eucalyptus controls approximately four percent of the pole market in Senegal. With an estimated pole demand of 7,968,814 per year (SRP) this equates to a demand for eucalyptus poles of 318,753 per year. In 1989 the Matching Grant Program of the SRP planted a total of 118,570 eucalyptus trees of which 63,584 (53.8 percent) survived. In 1990 the SRP planted 419,643 trees, and if the survival rate is the same as the 1989 planting, 225,768 eucalyptus trees will survive to enter the pole market in six or seven years. Planting of eucalyptus in the SRP has increased each year since its inception which indicates that soon the national market for eucalyptus poles will be saturated by this project alone. Local markets with lower individual saturation levels and will have the problem sooner. The consequences of this saturation would be a decrease in price and diminished incentive to plant.

Table 2. ANNUAL ROUND WOOD CONSUMPTION BY REGION AND PER CAPITA.

REGION	PRODUCT	PER CAPITA	REGION
THIES	poles	1.30	506, 865
	posts	0.22	80, 220
	stakes	2.78	1, 186, 574
DIORBEL	poles	1.91	576, 043
	posts	0.67	218, 177
	stakes	6.65	2, 191, 224
FATICK	poles	3.06	984, 359
	posts	0.73	208, 779
	stakes	14.67	20, 094, 743
LOUGA	poles	3.76	1, 091, 991
	posts	0.32	84, 093
	stakes	10.64	2, 978, 765
ST. LOUIS	poles	4.87	1, 405, 493
	posts	0.40	130, 953
	stakes	6.35	1, 883, 175
KAOLACK	poles	5.80	2, 314, 527
	posts	0.75	297, 915
	stakes	15.45	6, 277, 742
TAMBACOUNDA	poles	6.27	1, 089, 537
	posts	0.63	115, 279
	stakes	5.65	1, 004, 924
PER CAPITA AVERAGE, and REGION TOTALS.	poles	3.91	7, 968, 814
	posts	0.50	1, 135, 417
	stakes	9.63	35, 617, 147

Source: SRP Profile of Roundwood used for Construction.

Fence posts: The essential difference between house poles and fence poles is that fence poles are placed in the ground and are therefore subject to termite damage. To combat this damage the fence poles must be treated. At this time treatment facilities are not available in Senegal, but the SRP is investigating the possibility of establishing treatment plants.

Utility poles: In the case of utility poles not only would they have to be treated, but they would have to be grown for a longer time and face a market controlled by the government because the utility company is a national company. This possibility is also being investigated by the SRP.

Sawn wood: There is a substantial sawn wood market in urban Senegal served primarily by wood imported from the Cote d'Ivoire (Moreno, 1990). Can the rural Senegalese penetrate this market by growing *E. camaldulensis*? The answer lies in whether the Senegalese can learn about the markets, can overcome the transportation problems, and whether *E. camaldulensis* can be processed properly with the milling technology available in Senegal, or whether the appropriate milling technology can be introduced, all at a price competitive with the wood imported from the Cote D'Ivoire.

International Products

The international markets that the Senegalese could possibly enter in the future would be those of wood chips and pulping. Of the two, wood chipping requires less infrastructure and capital investment and is therefore more promising. Although eucalyptus is a promising wood for both pulping and chipping, at present it is not advisable for the Senegalese to aim their reforestation efforts at entering

these markets for several reasons:

- 1. lack of infrastructure;**
- 2. lack of adequate and constant supply of wood;**
- 3. lack of processing facilities;**
- 4. prohibitive cost of establishing processing facilities;**
- 5. lack of technical knowledge;**
- 6. intensive international competition; and**
- 7. an overvalued Franc which discourages exports**

Chapter 3

METHODS

The method for this market analysis consisted of two field trips to Senegal with the remainder of the research conducted at Virginia Polytechnic Institute and State University. Because of the close association between Virginia Polytechnic Institute and State University and the Government of Senegal through the Senegal Reforestation Project (SRP), Senegal was chosen as the site for the case study. The research was conducted during two research trips to Senegal in June 1991, and during May and April of 1992. Background research was conducted at Virginia Polytechnic Institute and State University in 1991 and 1992.

The first trip to Senegal in June of 1991 was be a preliminary trip to obtain an understanding of the problem. Both Dr. Youngs and Dr. Wisdom were in Senegal to help develop an understanding of the problem. Dr. Youngs is the Home Campus Coordinator for the Senegal Reforestation Project and has made several previous trips to Senegal under that capacity. Meetings were held with the staff of the Senegal Reforestation Project, USAID/Senegal including the Mission Director Dr. Julius Coales and Agricultural Development Officer Phil Jones, members of other forestry and agroforestry development projects, and various members of the Senegalese Government attached to agricultural and forestry development. A list of officials met during the field research is given in appendix A.

The purpose of this trip was to obtain an understanding of the wood markets and to plan for conducting surveys under the local conditions. One field trip was made to the Peanut Basin area to identify some of the transportation problems and different regions to be included in the study area. The final study area is identified in figure 3, and includes the cities of Dakar, Thies, M'Bour, Fatick, Kaolack, Diorbelle, Touba, Louga, San Louis, and Dagana, as well as farms in the surrounding countryside.

Upon returning to Virginia, the method for analyzing this market was developed, including a general method for identifying important aspects of the market that could be used in other developing nations. That is, surveys were developed to be used during the second field trip to Senegal. With some modification, these surveys could be used in other developing nations. The surveys were developed with the assistance of Drs. Taylor, McDowell, Jones and Flora of the Agricultural Economics department; Drs. Youngs and Wisdom of the School of Forestry; Dr Irma Silva Barbeau generated the ideas on womens issues; also Salife Gueye, a member of the SRP private sector initiative currently enrolled at Virginia Tech, provided useful comments. Final modifications were made in Senegal with the help of the Senegalese Reforestation Project personnel. Surveys were prepared for

each section of the market channel and included the wood growers, either farmers or villages, the wood merchants, the wood users, and the wood transporters. Since many of the wood merchants were intricately involved in the transportation of their product, much of the transportation information was available through them in addition to the information presented by the transporters themselves. Translation of the surveys were done by Deborah Wagner, a Ph.D student in Agricultural Economics who had spent ten years working in Niger. English and French versions of the surveys are given in appendix B.

Research was conducted on the theory of markets and its applicability to the development of the wood markets in Senegal. Research on Eucalyptus was undertaken to ensure an adequate understanding of the problems inherent in the introduction of this species to both the physical and cultural constraints of the Sahel. A summary of this research is presented in appendix C. Background research on the culture and climate of Senegal was conducted and to extensive discussions were held with Senegalese students and staff of the SRP at Virginia Tech. This material is presented in appendix D.

After all of the background research and surveys were prepared the second field trip to conduct the surveys was made. This trip took place in April and May of 1992. The survey area was the northwest of Senegal and a research timetable was set for the trip. During this visit, meetings were again held with the people mentioned above. For the purpose of completing the surveys an interpreter from French to Wolof was hired and also a car and driver. As it turns out, it was cheaper to hire a taxi from Dakar for the trip than to rent a car. The surveys were conducted in Dakar and during a ten day field trip into the study area. The cities surveyed are given above and shown on figure 3. A list of potential contacts from the sawn wood market channel of Senegal, generated from the surveys, is given in appendix E. The members of the survey team were Frank Merry and a Senegalese assistant. The itinerary for both trips is presented in appendix F. Upon return to Virginia, the

results of the surveys were analyzed and presented in the thesis.

An issue that is sometimes overlooked in research is what part of your methods was unsuccessful. The difficulties faced in this research were that it was difficult to establish whether the answers given by the survey respondents were accurate. Also, the surveys format lent itself to an atmosphere of discussion and often information was given to questions not on the survey. It would be difficult to avoid this problem since the introductory discussion for each of the interviews was anywhere from 10 minutes to 2 hours. The surveys served well as a tool for discussion, but the respondents were often unable or unwilling to answer direct questions, preferring to be rather vague.

The surveys did not have precoded answers so the analysis of the results was more difficult but perhaps less biased. A bias may have appeared by having a foreigner present during the interviews, but some of the interviewees took this as a sign of interest. The surveys were conducted under time constraint that curtailed the number of surveys completed.

In each town, an agent of the Eaux et Forêts(E&F) was assigned to us. The agents were told to introduce us to the merchants and then to leave so as not to present during the interview. Also the interviewees were told repeatedly that there were no "correct" answers to the survey so that they might speak more freely. There will have been biases created, but, an effort was made to keep these to a minimum. This is an important issue in the wood markets of Senegal, where many of the merchants are uneducated and naturally suspicious.

Chapter 4

RESULTS

Senegalese Wood Product Channels

Results and discussion of the surveys are presented in this chapter. Actual survey responses are listed in Appendix G. Also in appendix G are notes taken during the survey interviews.

Wood Merchants

Due to the diversity of entrepreneurial activity present in the Senegal wood markets, the categorizing of all Senegalese wood merchants is impossible. Wood is sold at a variety of different levels from the woman purchasing a bundle for her daily cooking and transporting it home on her head, to merchants selling house poles for

traditional construction, to 10-ton truckloads of sawn wood sold in wood stores. The concentration of this thesis is on potential high value markets, in particular the sawn wood market.

There are two distinct categories of sawn wood merchant in Senegal; (1) the large sawmills which depend on logs imported from the Cote d'Ivoire; and (2) the smaller or middle merchant who buys wood from the sawmills and sells it to a variety of different users. The principal market for the sawmills are the middle merchant and consequently these two categories of merchant depend upon each other for survival.

Sawmills

There are six main sawmills in the Dakar area, of which three are the primary importers and suppliers of sawn wood for the entire nation. These are Societe Le Bois, LINODA, and SOA Bois. Table 3 shows the volume of wood sawn by Societe Le Bois and SOA Bois in the years 1986 through 1989. Le Bois and SOA Bois are traditional sawmills that import logs and then process them, while LINODA primarily imports sawn wood and then distributes the wood in the same manner as the other sawmills, Moreno (1990). Other sawmills of importance are La Forestiere du Maine which is a sawmill such as SOA Bois and Societe Le Bois, and IKARI which is an establishment that operates in the same vein as LINODA.

It was estimated by the owners of SOA Bois that 70 percent of their wood was sold to merchants from Dakar and that the remaining 30 percent went to the merchants from other regions of Senegal. Seventy-five percent of all middle merchants interviewed throughout northwestern Senegal said they bought their wood directly from one of the three principal sawmills mentioned above, 20 percent said

Table 3. GROSS VOLUME OF WOOD SAWN BY SAWMILLS SOA BOIS AND SOCIETE LE BOIS (Cubic Meters).

YEAR	SOA BOIS	SOCIETE LE BOIS
1986	6,800	6,300
1987	7,700	9,700
1988	8,400	9,200
1989	8,900	8,500

Source: *Etude de Marche pour Le Bois D'Oeuvre*, Moreno A., pg 10, 1990, Projet de Reboisement du Senegal, USAID N. 685-0283.

they bought in the wood parks³ of Dakar, and the remaining 5 percent bought in their local markets. Much of the wood not bought directly from the sawmills originated there and was being sold by middlemen. As mentioned in the SRP report by Moreno (1990), over 90 percent of the sawn wood used in Senegal is imported from the Cote D'Ivoire, and thus the sawmills and the government customs can control the rate of entry of wood into the markets.

The sawmills are owned and run primarily by French expatriates. The one Senegalese controlled sawmill that was visited, SCIENCIE, was experiencing quota problems with the government and was not cutting any wood at the time of the interview. As shown in table 1, SCIENCIE is the largest local sawmill with a potential capacity of 4,500 cubic meters per year. With this mill not in production the ability to process local logs decreases by almost 40 percent. In his report on sawn wood markets for the SRP, Moreno (1990) states that the reason for SCIENCIE and other local sawmills such as GIE Dericourt, La SAIB, and Etablissement MBAYE NDOYE have cut production is due to financial problems, and that some of them have changed their output due to an inability to compete with the larger sawmills.

Sawmills that have in the past used wood from the Casamance region are in the difficult position of having to find new supplies due to the reduction of the quotas for wood cutting in Senegal. Present quotas are shown in Table 4. The quotas given by the government regulate the number of trees that can be harvested from the forest each year. As an example the sawmill GIE Dericourt has a processing capacity of 450 logs per year, and as noted in Table 4 has a quota of only 90 logs per year. To fulfill his capacity the owner of GIE Dericourt stated that he bought quotas from other sawmills. Another interesting quota allocation is that of the sawmill CAFAL which is a large matchmaking company. CAFAL has a quota considerably

³ For a definition of "wood parks" see section on Dakar markets in chapter 4.

Table 4. GOVERNMENT QUOTAS ALLOCATED TO SAWMILLS FOR THE CUTTING OF LOCAL TREES IN 1992

SAWMILL	NUMBER OF LOGS PER SPECIES						
	Cail- cedrat	From- ager	Dimb	Linke	Santan	Kapo- kier	Total
CAFAL	--	--	--	--	--	1,500	1,500
SCIENCIE	55	--	10	25	20	--	110
GIE DERICOURT	45	--	10	20	15	--	90
NDRAME KOUSSY	85	10	20	35	20	--	170
BOUTOLATE	25	--	10	20	--	--	55
TOTAL	210	10	50	100	55	1,500	1,925

Source: Direction des Eaux et Forets, Republique du Senegal, 1992.

higher than other mills and uses only kapokier. A reforestation alternative that may be considered is the growing of that species or other suitable species to fulfill the needs of the CAFAL mill. The monitoring of these quotas is difficult and it has been suggested that the sawmills cut more than their allocated quotas.

It is sawmills that use wood from the Casamance that offer the immediate opportunity for the use of reforestation species grown in Senegal, rather than relying on imports from the Cote D'Ivoire, because they have the internal networks in place to collect wood in Senegal. The obstacles to be overcome in the use of reforestation species are the cost of introducing the appropriate machinery to saw the smaller logs produced by plantation species and the ability of the sawmills to sell their finished products.

Successful sawmill operations were unanimously against the use of eucalyptus as a reforestation species. Reasons given for the negative response to eucalyptus were: (1) excessive use of water; and (2) it would not grow to sufficient size to be cut as sawn wood. Although it was begrudgingly accepted that it produced good fuel wood, the attitude from this sector of the market towards eucalyptus was negative. As with any opinion expressed one must look at the factors influencing the decision. If either import levels were decreased, or eucalyptus demand increased then these sawmills would face a different market and could potentially lose their market share, resulting in decreased profits unless they are able to adapt and use the reforestation species.

At present there is only one sawmill in the survey area working with eucalyptus and it is located in the northern Senegal town of Dagana. This mill is a one-man operation capable of cutting a maximum of 6 logs a week. Each log is of approximately 40 centimeters diameter and 3 to 4 meters long from which 10 planks of 3 to 4 meters by 25 centimeters by 2 centimeters can be produced. The owner of this mill is enthusiastic about the quality and workability of the eucalyptus produced under irrigation for making furniture and after talking with some of his customers it

was noted that they were very satisfied with the quality of the wood. The constraints on production were in the machinery and finances of the mill, not the demand for the product.

Middle Merchants

To give a universal description of the "middle" merchant would be irresponsible reporting. The range of type and quantity of wood sold by these merchants is enormous. At first glance the market structure appeared to be utter chaos, but upon further inspection semblances of order became apparent.

Primary species

As mentioned before the primary species of sawn wood in the market are from the Cote D'Ivoire. These are Samba (*Triplochiton Scleroxylon*), Fraque (Fraque) (*Terminalia Superba*) and Bois Rouge (*Khaya Senegalensis*). Purchase and sale prices for the merchants by type of wood are given in Table 5. The purchase price is the price the merchant pays f.o.b. at the sawmill, and the sale price is the retail price in the markets. For example, the merchants of the Dakar markets can buy Samba at an average of 92,500 Fcfa per cubic meter and sell it at 110,000 Fcfa per cubic meter. As value is added to the product through further processing, final sale price will rise but the levels are difficult to establish due to the wide variation in products. Discrepancies may occur with prices given in other studies, these may be due to obstacles in accurate collection or price changes over time.

Table 5. WOOD PURCHASE AND SELLING PRICES FOR THE MERCHANTS IN THE DAKAR MARKETS (FCFA/M³)*

PRICE\SPECIES	SAMBA	FRAKE	BOIS ROUGE
PURCHASE	92,500	119,650	145,950
SALE	110,000	136,000	150,000

*US \$ 1 = 275 FCFA, April 1992.

Because most of the wood is bought directly from the sawmills in Dakar, price differences begin to appear when the transportation costs are added. Table 6 Shows the regional prices for the different sawn wood planks and distance of the markets from the main distribution center in Dakar. For example, it costs 680 Fcfa per meter for Samba in Diorbél which is located 150 kilometers from Dakar. The planks are of uniform width and thickness, 22 and 4 centimeters respectively.

Price Determination

In the towns of Kaolack the prices for Samba and Fraque are the same as the Dakar prices, and the price for Bois Rouge is lower than the Dakar price. Possible reasons for this are that Kaolack is a large market and economies of scale allow the prices for Samba and Fraque to be kept low. The price of the Bois Rouge is more difficult to explain, but since Kaolack is the closest large market and a point through which all trucks must travel on their way to Dakar from the Casamance, where Bois Rouge is produced, merchants may be willing to unload their wood in the Kaolack market rather than incur the extra costs of traveling to the Dakar market. The high price of Bois Rouge and Fraque in the Thiès market can be explained by the high transportation costs per kilometer and per cubic meter as shown in table 8 of 129 Fcfa/M³/Kilometer, compared to an average in the rest of the country of 23 Fcfa/M³/Kilometer. However, transportation costs obviously do not distort the prices as much for the Samba in the Thiès market, this may be due to the fact that if they raised the price much more the Samba which serves the lower price end of the market would lose its market niche as a cheap wood. In Diorbél there is little Bois Rouge sold. This may be due primarily to the cost and difficulties of transportation caused by poor roads, from Dakar and a possible lack of purchasing power in the customers, which increases the price and hinders the buying respectively.

Table 6. REGIONAL PRICES FOR SAWN WOOD (FCFA/m) AND DISTANCE TO DAKAR (kilometers).

REGIONS	SAMBA	FRAQUE	BOIS ROUGE	Distance to Dakar
DAKAR	650	800	950	0
ZIGUINCHOR	750	--	800 ^a	
DIORBEL	680	900	1,050	150
ST. LOUIS	700	900	960	300
TAMBACOUNDA	800	--	950 ^a	700
KAOLACK	650	800	920	180
THIES	650	900	1,000	85
LOUGA	650	--	--	220
FATICK	680	950	950	150
KOLDA	--	950	--	
NATIONAL AVERAGE	690	885	950	

Source: *Etude de Marche pour le Bois d'Oeuvre*, Moreno A., pg 116, 1990, Projet de Reboisement du Senegal, USAID N. 685-0283.

^a Prices based on local production

The markets of Kaolack, Thies and Louga all have the same price for Samba as in the Dakar market. One possible reason for this is the high quality of the roads connecting the markets and the proximity of the markets to Dakar.

Wood Sales

It was very difficult to establish the quantity of wood that each store sold either by species or as a total. The quantity of wood sold is simply not recorded. The only record is an estimate that the shop owner has in his head as to how much he had sold in Fcfa. When the merchant sees that his inventory is low, and if he has sufficient money, he will purchase more wood. Other than this mental information few of the middle merchants kept any other record of purchases or sales.

Increasing the inaccuracy of the answers to the question of how much wood each store sold is the lack of continuity in the demand. The merchants responded that the demand for their wood fluctuated a great deal in any one period and therefore it was difficult to estimate sales. Therefore to estimate the sale of wood in the domestic market one must use the quantity of wood imported from the Ivory Coast as a proxy.

In the wood markets of Senegal there is a certain aversion to change. This means that when a merchant enters the market and begins to understand it he will soon be able to judge which products he can sell and which remain on his shelves. The sluggish nature of the market enables the merchant to understand the market without a great deal of bookkeeping and records. Many of the wood merchants have little or no formal education yet they are able to compete successfully in the market because of its static nature.

Wood Markets

The wood stores of Senegal have many different faces. But the two most predominant are: (1) the "wood only" stores found in the larger market towns for example Dakar and Kaolack; and (2) the "mixed wood and hardware accessory" store, found in the smaller market towns such as Fatick, San Louis and Touba. In the large markets where the demand for wood is sufficient to allow merchants to survive by selling wood alone they specialize but in the smaller markets the merchants must supplement their incomes with the sale of other goods, such as cement, iron tie-rods, paint and other general hardware goods.

The Dakar Market

In the Dakar market the wood merchants group together in what are called wood "parks". There are three parks in Dakar of which it was possible to survey two. These parks are a cluster of many wood merchants, as many as 200, located side by side selling virtually identical products. The advantage of this structure lies with the consumer in that someone wishing to purchase wood knows exactly where to go to obtain it and is assured of its availability. The negative aspect as far as the merchant is concerned is that he has to compete with all the other merchants in the park for customers. The most important aspect of these parks relative to the introduction of exotic products is that there is one person in control of the market.

The organization of the park is not at first obvious but when interviewing the wood merchants, they were hesitant to answer any questions until we had talked to "le responsable du marche". This is the overseer of the market, who is responsible for setting the prices in the market. He is the largest wholesaler in the market and determines the prices for most of the products sold in the market. There is some fluctuation and bargaining around these prices and the wood is sold in a variety of

packages, but there is a definite price structure around which the merchants work. The overseer is an important figure in the market. He is looked up to for advice and knowledge. In Senegalese society elders and people such as the market overseer have great weight in determining what people believe. If eucalyptus or any other exotic is to be successfully introduced into the wood markets of Dakar, it must be done with the consent and help of the overseer.

Within the park itself there are several different operations and transformations of the wood. There are the wholesalers who buy wood from the sawmills and sell to the retailers in the park. There are small saws operating within the park which primarily process the "chute" which is the section of the log including the bark that remains when the sawmill squares large trunks (cants). There are also turners and joiners making a variety of different products such as bedposts, lamp stands, chairs, beds and other furniture from the wood. These three categories of operations create distinct sections of the parks, buying and selling from each other in addition to outside customers.

The Regional Markets

The second type of wood merchant can be found mainly in the regional markets⁴. Surveys were conducted in 10 regional markets covering all the main towns of northwestern Senegal and also some of the smaller towns. In these towns the demand for wood is not sufficient to justify the formation of wood parks. Instead the wood is sold in "hardware" shops. Since there is no park system, there is no overseer with whom discussions of product introduction could be initiated. As mentioned above, these shops must supplement their incomes by diversifying their products for sale.

⁴ Regional markets are considered to be any markets outside the Dakar area.

For all the middle wood merchants the attitude was that whatever the furniture makers and wood users demanded is what they would sell. This observation leads to the conclusion that it is indeed the wood users and final customers that are driving the market. Eucalyptus is for the most part unknown as a sawn wood to both the Dakar and regional categories of wood merchant. The only method by which the merchants will be convinced that the sale of eucalyptus will be profitable is if they see someone else selling it successfully. The implication of this observation is that programs demonstrating the product and financial backing to the merchants willing to be the first in the market is imperative to encourage the use of eucalyptus.

Financial Constraints

Of the problems mentioned by the wood merchants, the most frequent was that of financial difficulties. Because of the inconsistent nature of the supply due primarily to problems of transportation from the Cote D'Ivoire and delays in Senegalese custom procedures, the wood merchants are not assured of purchasing the wood they might need to cover their demand. The result of this wood deficit is that the wood merchant will sell all of his inventory and then, because of the problems mentioned above, will be unable to immediately purchase more wood. He will then proceed to spend the money he had allocated to buy wood as current working capital. At such a time as the wood becomes available, the merchant doesn't have enough money remaining to purchase the wood and must therefore borrow to buy wood.

The solutions to this problem are several. First the government of Senegal should try to assure a more regular supply by making the custom regulations more efficient. This is not to say that importation of wood should be actively encouraged, a situation that would have a negative impact on foreign exchange reserves, but that wood presently entering the market should be allowed to do so at a constant rate to avoid waves of products entering the market. Secondly the merchants should learn

how to better manage their resources. This solution is more difficult than the first because the merchants' resources are limited and they have no control over the supply of wood. If the reforestation products could provide a guaranteed supply of wood then they could be in a very favorable position to compete in the market.

Many of the merchants asked about increased credit schemes to help them overcome the problems of inconsistent supply. This is an area that should be examined, but since development credit programs are not always the answer to overcoming market and management problems (Adams,1984), it would be preferable for the problems of customs and supply irregularities to be addressed in addition to some form of education on forward planning for the merchants.

Travel Constraints

The merchants operating outside of Dakar face other problems in addition to the inconsistent supply of wood. The main difficulty that these merchants talked about is ordering wood from Dakar. This is a laborious and time consuming process. For example, merchants from the town of Louga, situated approximately 200 Km north of Dakar on a good road must wait up to a week for the delivery of their product. This wait takes place after having traveled to Dakar, one day, purchasing the wood and finding a suitable truck to rent, one day, and returning to Louga, one day. The reason for this delay is that the trucker must fill his lorry before he will leave Dakar. If the order is large enough he will only have to wait for the loading, one day, but if the order is not sufficient he must wait for other orders to complete his load.

The loss of time and the difficulty involved in getting to the Dakar market were the two most frequent complaints from the wood merchants outside the Dakar area. For the merchants of Thies and M'bour, located approximately 70 to 85 km distance from the Dakar markets, one full day is required to order the wood and

return. For the merchants in the towns of Kaolack, Diorbél and Touba, located approximately 150 to 200 kilometers east of the Dakar markets, it may take three to four days to travel to and from Dakar. From San Louis and Louga it may take two days. This is a tremendous loss of time and market efficiency. Strategic planting of reforestation species around the regional markets and appropriate processing facilities could make it possible for the wood merchants to avoid traveling to Dakar, and could give the wood products of reforestation a distinct marketing advantage.

Banking and Communications

The lack of effective communication and banking systems further aggravate the difficult situation for the regional middle merchants. The largest wood merchant in Fatick, a subsidiary of a larger store in Kaolack, described in great detail how much easier and safer life had become due to the bank account the company had set up in Dakar. Now instead of travelling to Dakar with thousands of Fcfa to pay for the wood, then finding a transporter and waiting for delivery, the order was placed by phone and the sawmill delivered the wood. The sawmill would draw its money from the Dakar bank account and everyone benefitted. The reason this operation is possible is because the wood merchants could order sufficient quantities of wood between the two stores in Kaolack and Fatick and had sufficient capital to take advantage of the available banking facilities.

If the communication and banking systems were improved it would translate into improved efficiency in the market. Failing this wood merchants of the regional market could organize themselves into cooperatives through which they could order sufficient quantities of wood to avoid the arduous process of wood purchasing that is presently in existence.

Purchasing Eucalyptus

How then is eucalyptus purchased in the Senegalese market? The process as described by the only eucalyptus merchant in the Dakar area, located 14 kilometers along the road to Rufisque, is thus: (1) the merchant must go and find the field owner to bargain with him about the cost of the field. This could mean travel to anywhere in Senegal. An example of the purchasing costs given by the merchant were: one million Fcfa for a four hectare field which using the SRP planting densities of 650 trees per hectare is 385 Fcfa per tree. This estimate appears high but is assuming a planting density of 650 trees per hectare and was given without reference to any definite receipts. (2) After the agreement the merchant will go and meet two or three wood cutters to discuss the cutting price. An example of the costs are 200,000 for the four hectare field or 77 Fcfa per tree. (3) The merchant may choose to only buy part of the field, and if the number of trees is limited the wood cutter will be paid 25 Fcfa per tree.

The biggest problem that the merchant encounters in purchasing eucalyptus is the difficulty in obtaining cutting permits from the regional offices of the Eaux et Forets. He stated that his inventory of eucalyptus was low and that he was not in a position to restock, but that he could sell any amount of eucalyptus for house poles that he could bring to Dakar.

The situation of this merchant illustrates the problems faced by both the eucalyptus producer and potential merchants. First the producer is at the mercy of a few buyers in the market and is therefore not in a strong position to set a price at the farm. Secondly the merchants may be unwilling to face the obstacles presented by travel and permit requirements in the purchase of the trees.

Wood Users

The sawn wood users of Senegal, primarily furniture makers, face many of the same problems as the wood merchants. Problems of sporadic supply at the beginning of the market channel are felt throughout and the wood users are no exception. It is significant that the problems of the market channel are similar for each link because if solutions can be found for one link, they may be applicable throughout the market. Characteristics of the wood users component of the market channel are discussed below:

Primary Products

Depending on the shop, one is likely to find virtually any piece of furniture from coffins to beds in the furniture shops of Senegal. The bed is by far the most popular item on display in the shops and the wood of choice for this product is Bois Rouge.

A major issue facing the furniture makers is that most of their work is done "sur commande" which means that it is done to order. This relates to a situation in which the furniture makers have little knowledge of their future market, making the advance ordering and purchase of wood difficult.

Inventory

The issues of inventory and cash flows reappear in this section of the market. Since the furniture maker has little knowledge of his future demand he is unable to buy wood in advance with the certainty of its sale. With little money for inventory and the inconvenience of travel to Dakar to purchase wood, the furniture maker will

often wait until he has a definite order before buying the necessary wood.

Adding to this problem is that the moisture content of the wood arriving from the Ivory Coast is high and it should be carefully dried before use. If the merchant has bought the wood for a specific order he will be reluctant to allow it to dry for three reasons: (1) a lack of facilities for proper drying; (2) customers that are reluctant to wait the extra 3 to 4 weeks necessary for drying; and (3) he will receive payment upon completion of the job and is therefore unwilling or unable to wait for drying.

Of the three imported woods used in Senegal, Fraque is the one that is most easily worked. Apparently it can be worked immediately upon cutting without fear of warping. This property is valuable in the Senegalese wood market and consequently Fraque is of high demand. Bois Rouge on the other hand warps easily and should be allowed to dry before use but is rarely given proper treatment with the result that products will often become misshapen as the wood dries. The third wood, Samba is a low quality white wood, it will warp, but not as much the Bois Rouge (personal discussion with Senegalese wood users), and because of its low quality is used in products where the warping is not as important a consideration, such as the interior molding of a cabinet. The attractive aspect of the Samba is that it costs less than the other two woods and in some small markets is the only wood available because people are unable to afford the more expensive woods.

Workmanship and Machinery

In each town visited there were one or two high quality furniture manufacturers. They had small shops and a varied quality of machinery. These people were genuine craftsmen and made high quality furniture under the difficult conditions of the Senegalese market. When interviewed, all of these manufacturers showed an interest in information on eucalyptus. This is not a surprise since they are

businessmen and any potentially profitable information is useful.

The most requested item by this class of merchant was new machinery. The machines they were using were usually old and in need of replacement. If provision could be made to help replace this machinery then the confidence, trust, and gratitude of these merchants will be earned. After this they may be more inclined to help in the introduction of eucalyptus into the market. The eucalyptus logs produced in the reforestation could be handled easily by these merchants. This was demonstrated by one furniture maker in Dagana who was already using eucalyptus. Thus, two problems will be solved: (1) the availability of appropriate saws and other processing equipment and techniques for the cutting and treatment of eucalyptus by the furniture makers; and (2) a means by which to introduce eucalyptus into the local markets.

Eucalyptus in the Market

With the exception of one furniture maker in the northern town of Dagana the furniture makers interviewed in northwestern Senegal had never used eucalyptus. Because the furniture makers have never used it, they are reluctant to risk experimenting with eucalyptus. To ensure that eucalyptus enters the market it will be necessary to add extra links in the market channel, an option that is considered to be undesirable by Liedholm and Mead in their paper on Small Scale Industry in *Strategies for African Development*, 1984. But if the new market channel steps can be incorporated into the present system then adoption will be less disruptive.

The new technology that will be required for the introduction of eucalyptus will be: (1) proper treatment immediately after cutting to alleviate growth stresses; (2) appropriate sawing facilities; and (3) proper treatment after sawing. Transportation for these transactions can be completed using the present transportation system so nothing new will be introduced for that step. These links

can be attained by cooperation with the furniture makers, sawmills and farmers with the proper training and financial assistance.

The greatest problem that the introduction of eucalyptus into the market faces is the length of time required to complete the procedures mentioned above. For step (1); experiments by a sawmill in Dagana indicate that eucalyptus reacts most favorably when immersed in water for three to four weeks immediately after cutting. Barnacle (1971) states that the immediate immersion of eucalyptus in water will relieve the longitudinal stresses. He goes on to say that under harsh drying conditions, such as Senegal, stresses can initiate cracks within 20 minutes of cutting which indicates the need for careful harvesting procedures in Senegal. For step (3); it was generally accepted by the wood users that under the Senegalese environmental conditions wood from the Cote D'Ivoire should be dried for two to four weeks before use in the manufacture of furniture, although this procedure was never actually done. Therefore depending on the time required for the proper drying of eucalyptus, more time will be added before eucalyptus reaches the wood users. An accurate estimate of how long the drying process will take in the Sahelian conditions is not available from either the Senegalese producers, or the relevant literature. Not only do these processes add time, they also require increased labor which will add to the cost of the final product.

These factors are serious hindrances to the introduction of eucalyptus. One solution to these problems is to place small sawmills and furniture makers in the financial position to create suitable inventories. Unfortunately, as mentioned in the section on wood inventory, the furniture makers do not have the proper drying facilities to combat both the intense Senegalese sun and the voracious Senegalese termites and the construction of such facilities would again add to the cost of the final product.

Wood Growers

Eucalyptus is being planted in Senegal. The Matching Grant section of the Senegal Reforestation Project (SRP), through which the farmers can receive a reimbursement of up to 50 percent of their planting costs, has funded a total of 118,570 eucalyptus trees planted in 1989, of these 63,584 , 53.8 percent, survived. This number of trees is based on a first year survival rate and if the farmer has a survival percentage greater than 75 he or she will be reimbursed as if there had been 100 percent survival. Over the years, other reforestation projects have been encouraging the planting of eucalyptus and other exotics for the protection of the delicate Senegalese ecosystem. Other than the eucalyptus planted with the aid of the SRP, it is very difficult to acquire an accurate estimate of the number of eucalyptus trees presently in the ground. This is due to a lack of access to information on: (1) the number of trees planted; (2) the survival rates of other reforestation programs; and (3) survival rates after first year as even in the SRP project, survival rate after the first year is not monitored. To encourage further reforestation it is important to understand why the people are planting the trees and from where they obtain their information. The answer to both of these questions lie in the extension service in the form of either the government agents from Eaux et Forets or with the members of reforestation programs such as the SRP, PRECOBA (Projet du Reboisement Communautaire du Bassin Arachidier) and others.

Extension Information

The importance of the role of the extension agents in the promotion of reforestation activities cannot be over-stated. All of the villages surveyed had received some kind of assistance from extension services albeit under the constraints

of this research project it was not possible to estimate the number of villages, if any, that did not receive extension services. Niamir (1990) claims that traditional African pastoralists have great knowledge and respect for trees and that traditional methods of natural resource management were rational and well suited to the harsh environment of the Sahel. Unfortunately, based on personal discussions with villagers, and this is also acknowledged by Niamir (1990), the planting of trees has not always been part of the African culture and therefore the villagers who obtain much of their knowledge from their elders do not have access to information on the benefits of reforestation. For the more successful eucalyptus plantations extension agents have provided the following range of information and services:

1. when and which trees to plant;
2. either where to obtain the seedlings or actual delivery of the seedlings;
3. in some cases payment covering all or part of the planting costs;
4. how and when to treat the young trees against termite damage as well as providing the necessary chemicals;
5. providing information on when to harvest. For example villagers were given the standard length of a house pole in the urban markets and told not to harvest until the trees had reached that size;
6. bringing customers to the villages; and
7. helping to decide what to do with the money from the sale of trees. For example for villages under the PRECOBA project the use of the money is decided before planting. Forty percent goes to the Commune Rurale, a rural agency run by a group of villages, which is in charge of such things as village health; 30 percent goes to the villagers who work in the plantation; and 30 percent goes to a revolving fund for further reforestation efforts. Essentially the last 30 percent is designed to free the villagers from having to borrow money for continuing their reforestation efforts.

Not all of the reforestation projects have predetermined financial distribution schemes, but the extension agents are almost always closely integrated in the village reforestation programs. They are a vital link in the reforestation efforts and should be treated as such. What then are the weaknesses of the present extension system?

1. Infrequent visits to villages due to lack of personnel, funds and extended management zone (Kowero and Temu,1985).
2. Lack of transportation (Kowero and Temu,1985).
3. Extended range of responsibilities preventing the agents from job specialization.
4. Incomplete knowledge of species used in reforestation.
5. Incomplete knowledge of market opportunities for reforestation products.
6. An ambiguous perception of the role of the extension service in the eyes of the rural population. That is they are often considered to be a form of police.

Effects of Reforestation on Village Structure

The obvious physical effect of reforestation is that there are trees growing in areas where previously there was limited vegetation. If the changes caused as a result of the reforestation are positive, such as an influx of money or improved crop production, then it is likely that the process will continue but if the changes are unfavorable, such as no market for trees or low survival rates, then not only will that village be unlikely to reforest again, the surrounding villages will also be hesitant to become involved. All of the respondents to the questionnaire said that they had learned about reforestation either from the extension service, or by seeing the neighboring villages succeed in a reforestation program.

Financial Benefits

Financial gain is a great motivator in Senegal, as it is in the rest of the world. The villagers always became more enthusiastic after the first crop of trees had been sold. This enthusiasm flows over to the nearby villages because of the tangible nature of the benefits. For one village outside Thies the gross earnings from the eucalyptus plantation consisting of 15 hectares planted in 1981 and harvested in 1990, producing 11,936 poles, was FCFA 3,411,000 (US \$12,404 at exchange rate in 6/92). This relates to approximately FCFA 286 per pole and a density of 796 trees per hectare assuming one pole from each tree. As mentioned above the money will be used in many different ways in the village community and advice on this use was given by the extension service.

Benefits to Women

The most frequently discussed effect of reforestation on women in the developing nations is that they will not have to travel as far to collect fuelwood. This point is very true in Senegal where one of the most time consuming jobs of the women in the village is the procurement of fuel. In one village the leader of the reforestation program remarked that he did not realize that women were capable of doing so much around the village. He related the change in the activities of the women to the first harvest of the eucalyptus trees when the women were given the branches to use for fuelwood after the poles had been sold. An inventory of fuelwood gave the women extra time to work around the village.

The reforestation sites visited in Senegal had varied levels of participation by the women. In some villages the entire reforestation effort was controlled by the women. The women of these villages claimed that they were the ones who used the wood and therefore they were working to better themselves. In other villages it

appeared that the women were involved in the process, and in talks held at the village they often answered questions giving an indication that they knew as much if not more than the men involved. In yet other villages it appeared that the women did not participate in the tree growing process. In these villages the wood was being grown either for commercial sale or to fulfill the house pole requirements of the village. When men were involved in the growing of the trees, money was the motivating force. The men were also always in charge of the selling of the trees and had control of the revenue from the sales in all of the villages surveyed. When women were the primary growers, the provision of basic needs such as fuelwood and environmental protection, known in Senegal as "la lutte contre la desertification", was the motivation. An interesting observation of the research was that there were no women found in the wood merchant or wood user sections of the market.

A potential long term benefit that may accrue to the women from this behavior is that with successful plantations they may eventually have an improved social position in the village. This could lead to a fundamental change in the interaction between men and women where women become more nearly equal. In the effort to reforest women are vital link and should be recognized as such. Rocheleau (1988) in *Whose Trees? Proprietary Dimensions of Forestry*, gives 5 policy suggestions to enhance the ability of women to play a role in agroforestry.

1. Broaden the concept of tenure security.
2. Recognize the importance of gathered products in the national economy.
3. Promote women in processing and marketing .
4. Give women access to decision-making about land and trees.
5. Strengthen the status and power of organizations that represent rural women.

In Senegal all of the above issues are ones of concern for women. They have limited access to land tenure. Women are the primary collectors and sellers of gathered products in the markets of Senegal. Processing and marketing of products is efficiently done with available access and technology but financial and cultural limitations are placed on improvements in these systems. In the villages many women are involved in the tree planting and growing process, but few are able to make decisions about the sale of the product. The needs of women in Senegalese society are often secondary to those of the men, and extension services for women are virtually non-existent.

Traditional Views

One of the interesting responses to the survey question of why the villagers had planted the trees was that they were hoping for financial or environmental benefits in the future. This is a concept that challenges the notion that the poor cannot afford to plan for the future because they must exist one day at a time. In fact the poor cannot afford not to plan for the future if they expect to survive past the present generation. This view was expressed by the villagers of rural Senegal indicating both a knowledge of the present state of the ecosystem and an ability to prepare for the future. Chambers and Leach (1990) describe trees as banks for the poor in which they can earn high interest rates and state that if the markets, tenure issues and rights to sell are resolved, growing trees can be an effective method of saving money for the future. Hoskins (1990) states that trees have been such an integral part of food security for so long that it is amazing that they have been so long neglected as a development issue. Both of these papers support the ability of rural people to engage in long term planning.

Market Channel Model

The suggested model for wood market analysis in developing nations is a Market Channel model designed by C. Coale and G.W. Spittle at Virginia Tech (Coale et. al., 1991) This is a spreadsheet model designed to calculate product cost and value throughout the market sectors. The model was originally designed for an analysis of market channels in Virginia. The benefits of the model are that it is simple and can be used with computer technology currently available in most developing nations.

For this thesis a brief description of the model will be presented. Figure 4 presents the spreadsheet format of the Market Channel model. In the figure it can be seen that individual budgets feed into the final market channel. Changes in individual budgets are therefore represented in the final market channel independent of other changes. The direction of the model can be reversed from that shown in figure 4 which would mean that by starting with a retail price and subtracting the costs a ceiling price could be found for the producer.

Due to a lack of accurate and reliable data, calculations will be kept to a minimum. For the results of this model to be worthwhile more accurate data must be collected. This task would be rudimentary to a project such as the SRP since it has already conducted several such surveys, but at present it is felt that the available data is not reliable enough to make definitive comments on the state of the market system. What data is available will be presented throughout the following sections. The data for each budget can be examined in as great a detail as necessary, and the more disaggregated the data then the more accurate the results of the model will become.

MARKET CHANNEL SPREADSHEET FORMAT

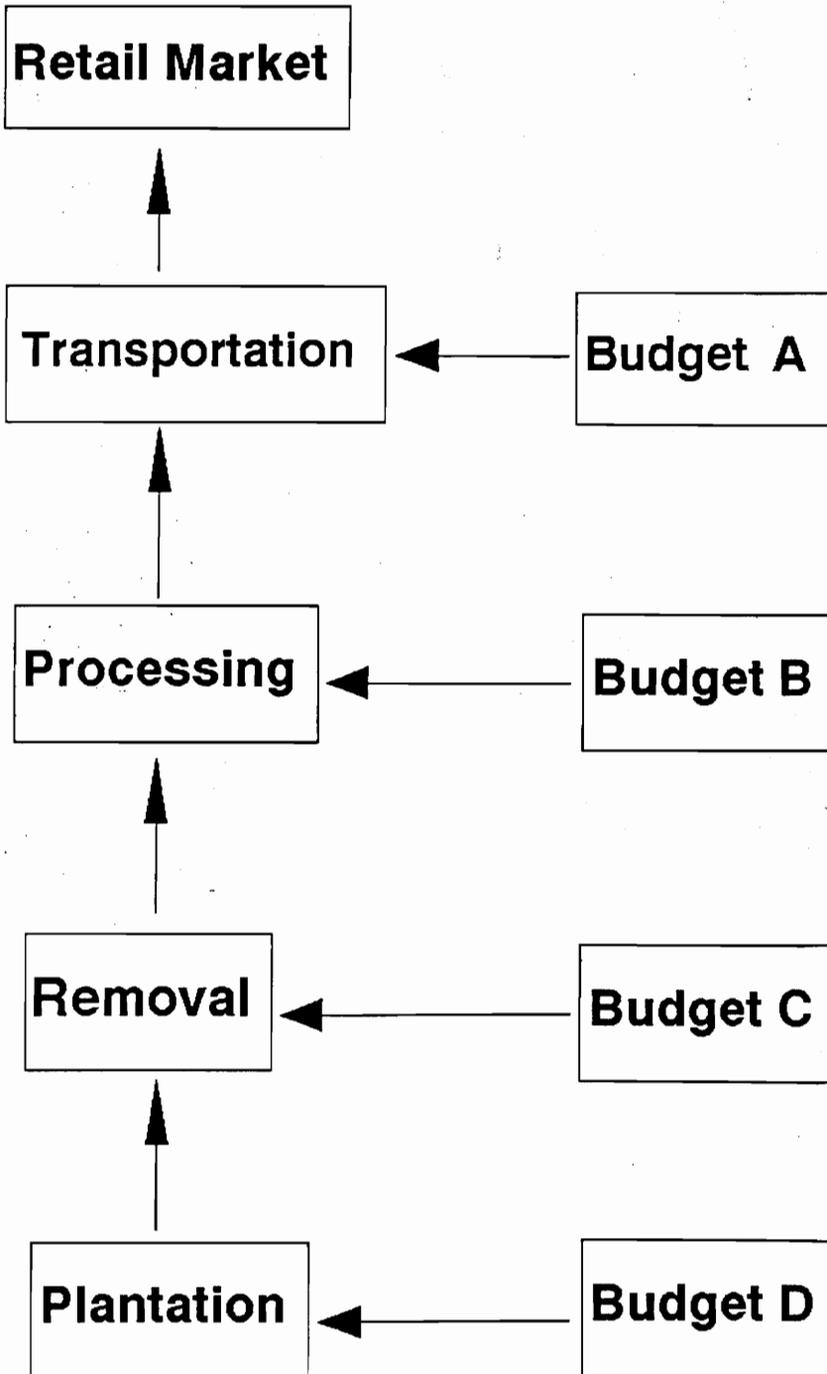


Figure 4. Market Channel Spreadsheet Format

For example, if the amount electricity needed to cut the logs or how much water is taken up when the logs are soaked is known, then this information can be attached to each log as it is processed to generate accurate estimates of total cost. Results from this model could be used to enhance the quality of information given to both the producers and sellers of the products of reforestation. The model is flexible in that it can be used for scrutinizing the market channel of any product.

Description of the Model

One of the problems faced when examining the Senegalese wood market are that many of the processing steps for eucalyptus are not in place and therefore it is difficult to attach costs to them. These steps will be noted as the model is discussed.

1. Retail Price - For this study retail price is taken as a national average of the prices for Samba (690), Fraque (885), and Bois Rouge (950) Fcfa per meter by four centimeters by 22 centimeters as given in table 4. This average price is approximately 840 Fcfa per meter with above dimensions or 95,455 Fcfa per cubic meter of sawn eucalyptus.

As is shown in appendix C, it is possible to get a certain percentage of recoverable timber from logs of different dimensions. When more information on growth and processing is collected it will be possible to more accurately estimate the quantity of recoverable wood from the eucalyptus in Senegal. Until then using the results of table C3 in appendix C it can be estimated that a log in girth class G9, which is the 110 to 119 centimeter circumference class, will produce 0.110 cubic meters of sawn wood. This means that a tree with an approximate diameter of 36.6 centimeters will yield 10,500 Fcfa worth of sawn wood.

Therefore if the retailer intends to make a profit he must buy the wood for less. A predetermined gross margin must be set for the retail level. For example if

the gross margin is 30 percent the retail merchant will purchase the wood for 7,350 Fcfa.

2. Moving down the market channel the next step will be transportation. There may be more than one transportation section in the market channel, and these may have different associated cost schedules depending on the nature of the product. But since that information is not presently available an estimate of transportation costs must be made. Transportation cost will be governed by distance, cost of inputs such as gasoline and labor which will include both driving and loading. The quantity shipped will also influence the transportation costs per unit.

A variety of different transportation estimates were given in the surveys; for example, 5 planks of length 4.5 meters by 22 by 4 centimeters, taken from Dakar to Diorbél costs 1,500 Fcfa. Personal transportation in the same vehicle is an additional 800 Fcfa. This would be an example for someone not purchasing a great deal of wood, in fact his personal transportation to and from Dakar cost more than transporting the wood he purchased.

Table 7 gives approximate transportation costs per kilometer for a cubic meter of wood originating in Dakar traveling to the different urban centers of the interior. These are rough estimates based on the replies given by wood merchants and users in the surveys. The exceptional differences noted for wood traveling to M'bour and Thiès may be explained by the fact that this wood is primarily being transported in small pick-up trucks for a short distance while the rest of the country is served by large trucks over longer routes.

Table 7. ESTIMATED TRANSPORTATION COSTS FOR WOOD PER CUBIC METER PER KILOMETER FROM DAKAR TO REGIONAL MARKETS.

TOWN	DISTANCE FROM DAKAR (km)	TRANSPORTATION COSTS PER M ³ PER KILOMETER ^a (Fcfa)
Diorbel	150	28
San Louis	300	20
Kaolack	180	17
Thies	85	129
Louga	220	18
Fatick	150	37/28 ^b
M'bour	83	145
Average	167	53/25 ^c

^a Figures do not include the loading or unloading of the truck.

^b Figures are for Bois Rouge and Samba respectively.

^c The value of 53 Fcfa including high Thies and M'bour transportation costs and the value of 23 Fcfa is without those costs.

As more information becomes available on the transportation costs the data can be placed in the appropriate budget for transportation costs in the model and alterations can be made as necessary.

3. The next step is in the processing of the eucalyptus. As mentioned above this is a process which requires a certain degree of knowledge and technology to produce a high quality product. It is in this link of the market channel that the cost analysis breaks down completely. Steps in the treatment process of eucalyptus such as proper drying, immersion in water to alleviate stress, reconditioning and others are not being done in Senegal at the present time. To introduce these steps requires money and information that is currently unavailable. One way of looking at this issue is to consider the fact that the only difference between the costs associated with sawmills currently using wood from the Casamance and one that would use eucalyptus wood is the increased treatment cost. If it is possible to identify the opportunity costs of drying the eucalyptus wood for a specified length of time, and the actual cost of say, immersing it in water for three to four weeks, then more accurate estimates of processing costs could be placed in the model.

As mentioned above, the most difficult and risky aspect of market development in developing nations is the introduction of new links in the market channel. Great care must be taken if the treatment process of eucalyptus is to be encouraged.

4. The last link in the market channel is that of production. After the cost of retail margins, transportation and processing have been removed the farmer is left with a residual figure which represents his ceiling sale price. An estimate of the cost of establishment of one hectare of eucalyptus seedlings at 43,962 Fcfa. This figure is for 650 seedlings per hectare. The cost includes labor, seedlings, fencing and a five percent contingency buffer (Diallo, 1992). This is equal to 67.63 Fcfa per tree.

Financial Analysis

Each link of the market channel can be itemized in detail so that all aspect of the costs can be incorporated into the analysis. The results on the spreadsheet will change as the individual parameters are altered to reflect changes in the markets.

For example say a farmer grows one hectare of eucalyptus with a density of 500 trees. Assume those trees can reach a diameter of 36.6 centimeters in 21 years⁵, the quantity of sawn wood that those trees will produce is 55 cubic meters. At a price of 95,455 it will be worth 5,250,025 Fcfa at the retail level. Then costs are removed such as retail gross margin of 30 percent (1,575,008 Fcfa), cutting costs of 100,000 Fcfa, transportation of 100 kilometers (137,500 Fcfa), and processing costs⁶ of 165,000 Fcfa, the remaining 3,272,517 Fcfa will be available for the farmer. If the establishment costs are 70 Fcfa per tree⁷, the hectare will cost 35,000 to start. Also one can include 10,000 Fcfa for treatment, such as clearing or anti-termite protection, in the first three years. It is possible to discount the future gains against present costs using the equation:

$$\sum \frac{FB - FC}{(1 + i)^t} - PC$$

Where:

FB = Future Benefits (Fcfa)

FC = Future Costs (Fcfa)

PC = Present Costs (Fcfa)

i = Interest Rate (%)

t = Rotation Length (years)

⁵ Under irrigated conditions in the north of Senegal eucalyptus reached a diameter of 40 centimeters in six to seven years.

⁶ Unknown, but guessed at 3,000 Fcfa per cubic meter. This is with no fixed costs for machinery, or buildings. Only variable costs such as labor, machinery upkeep, and diesel. It would take approximately 9 eucalyptus logs to produce 1 cubic meter of sawn wood.

⁷ Higher planting costs can be expected with lower tree densities

Using this method it is also possible to examine the effects of both rotation length and interest rate on the profitability of the enterprise. For example if the assumption that the trees are able to reach an estimated diameter of 36.6 centimeters in 21 years is incorrect and the true rotation length is 25 years it is necessary to have an idea of how that will affect the financial benefits of the plantation. Table 8 describes the possible net benefits for rotations of 20, 25 and 30 years at projected interest rates of 10, 15 and 25 percent. This table accurately depicts the problems of long term investments and their potential returns subject to fluctuations in interest rates. The rate of interest is a measure over which the farmer has no control yet it can drastically affect the profitability of his investment.

For comparison, Diallo (1992) estimates a present net worth of 19,492 Fcfa for eucalyptus poles in three rotations over 20 years at 15 percent interest rates. This can be compared to 154,952 Fcfa for the sawn wood over the same period and interest rates. There are two probable reasons for the discrepancy between the results: (1) The sawn wood is a much higher value product; and (2) Estimates of intermediary costs which may be too low in the example given in this thesis.

Table 8. POTENTIAL RETURNS ON INVESTMENTS IN EUCALYPTUS

ESTIMATES OF THE PRESENT NET WORTH OF EUCALYPTUS FOR THE PRODUCTION OF SAWN WOOD (Fcfa/Hectare)*.			
Rotation (years)	t=20	t=25	t=30
Interest (percent)			
i=10	441,439	257,041	142,543
i=15	154,952	54,411	4,425
i=25	-7,270	-32,638	-40,949

*The figures are estimates of the situation. Steps 2 and 3, as described above, are the areas that need more research to establish the potential for eucalyptus in the Senegalese sawn wood industry.

Chapter 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This thesis examined the opportunity for the use of eucalyptus in the sawn wood markets of Senegal. The purpose was to identify potential economic benefits of reforestation that might lead to a more sustainable reforestation effort. Chapter one presented an introduction to the objectives of the thesis. The problem identified was that even though there have been large sums of money donated for the purpose of reforestation, the success of these projects has been limited by their lack of sustained local involvement. This research sought to identify potential economic incentives and disincentives for the wood products of eucalyptus to evaluate whether farmers could make money from the growing of trees.

Chapter two examined the theory of markets with particular attention to

eucalyptus in the Senegalese market. It was noted that when examining the potential market for the wood products it is necessary to examine the markets as a whole and the suitability of the product to the market. This chapter introduced the theory of markets and identified the potential domestic markets for eucalyptus in Senegal. The potential markets were categorized into available and not available to the Senegalese farmer. Fuelwood, charcoal, and house poles comprise the available markets and fence posts, utility poles and sawn wood make up the markets considered to be not readily available to the Senegalese eucalyptus producer at this time. The sawn wood market in Senegal is described as exploitative since it is essentially under the control of a few sawmills and has a unidirectional flow of products.

Chapter three described the methods used in the research. The methodology and issues addressed in this research are applicable to many developing nations with individual alterations. The description of the methodology is given below in the section on the Method for Analyzing Wood Markets. Chapter three also presents an itinerary of the research. The process of survey development and the schedule of field trips are discussed. The research was conducted during two four-week field trips to Senegal in June 1991 and April/May 1992. Background research and survey development and analysis was conducted at Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Chapter four gave the results of the field research. These results are separated in accordance to the survey groups which were Wood Merchants, Wood Users, and Wood Growers. The interaction of these three sections of the market channel is discussed in detail. Common problems such as financial, infrastructural and educational constraints to production were examined. The Senegalese wood markets were broken down into the Dakar and Regional markets to analyze the constraints facing entrepreneurs in different towns. The main problem facing the merchants of the regional markets was a smaller demand relative to the Dakar market and difficult purchasing conditions which required travelling to Dakar to buy

their wood. The wood users faced many of the same constraints as the wood users, while the problems facing the wood growers were that they were dependant on a limited number of buyers for their product, they had little access to markets due to poor transportation and they had to depend on the extension service and international projects for information.

Chapter four also contains a discussion of a Market Channel Model designed to analyze the links in the market. This model integrates individual budgets from each of the links of the market channel and creates an overall picture of the potential market for the product. A financial analysis of sawn wood production and sale indicates the potential level of profits for this endeavor to be high. Also the effects of different interest rates and growing cycles on profits were examined. The results presented in chapter four discuss the barriers to entry in the wood markets of Senegal and some of the beneficial effects of reforestation projects at the village level. Below are the conclusions, a description of the methodology for market analysis, and recommendations of the research and suggestions for further research.

Conclusions

The overriding conclusion of this research is that although there appears to be good financial opportunities, eucalyptus will not succeed in the Senegalese sawn wood markets without considerable long-term investment in infrastructure and education from both the local government and international donors.

The establishment of eucalyptus or any other wood product of reforestation programs into the present Senegalese wood market channels will be a difficult accomplishment. The government of Senegal and international donors must take a long term view on this effort and not expect dramatic results to appear overnight.

For most reforestation projects, the focus has been on biological ability of the tree to survive under specific conditions, although this is a vitally important consideration without which the projects would obviously fail, it now appears that this alone will not produce a long-term commitment to reforestation. At present there are not enough eucalyptus trees in the ground to establish and maintain a market share in the sawn wood markets (personal discussion with members of SRP). It should be remembered that tree growing is unlike any other crop because of the length of its productive rotation. This fact must be taken into account when reforestation project are designed and implemented.

1. Although, when examining the financial analysis, it may appear that the growing of eucalyptus in Senegal for sale in the sawn wood markets may be profitable the necessary market infrastructure is lacking. The treatment and processing facilities that are a vital link in the market channel for this product are not available. If the objective of the reforestation programs in Senegal is to have people plant trees after the money from the project is gone then it is likely that since no new markets or market infrastructure has been created the eucalyptus planting may not be sustainable.

2. Therefore it is the conclusion of this thesis that when examining the potential for a particular exotic species to perform in a developing market, a vital consideration is the available market infrastructure. If the quality of the market infrastructure is ignored it may be virtually impossible to achieve a long-term self-sustaining production process for the species. The introduction of eucalyptus into Senegal fits into the category for which little or no market research has been conducted.

Theoretically the markets currently available to the producers of eucalyptus are the Charcoal and House Pole markets. In fact, both these markets have

considerable problems for the Senegalese eucalyptus producer. In the charcoal market the problems are that the market is controlled by a few buyers who are capable of setting low prices for the product. Because the farmer has few alternative sales he/she is often forced to take a low price to obtain some return from his product. Also the charcoal market has an established channel from the eastern and southern regions of Senegal, with which the eucalyptus producer has to compete for both price and consistency of supply. Lastly the Senegalese culture has not yet changed from regarding fuelwood as a gathered product to the growing of trees specifically for this purpose. The Senegalese farmer appears to generally not recognize the opportunity cost involved in the gathering of fuel by the women. The house pole market faces many of the same market constraints of the charcoal markets. But a lack of buyers is the primary constraint.

3. The lack of planting incentive produced by the charcoal and house pole markets is well recognized and is stated in the project document for the Senegal Reforestation Project. For this reason this thesis has examined the potential for eucalyptus to be used in the sawn wood markets. Unfortunately the same constraints of the charcoal and house pole markets arise in the sawn wood markets. In addition, the added problems of longer production cycles and improved technology for processing further complicate the problem. It is the conclusion of this thesis that the projects currently undertaken by the SRP aimed at eucalyptus planting in Senegal are not likely to produce a long-term system of production of eucalyptus for sawn wood. This is primarily due to the fact that there is a widespread ignorance of the market opportunities and processing techniques for the wood.

4. If objective of reforestation projects is solely to have trees planted, the numbers recorded by the SRP can be considered a success. The problem with this lies not in the administration of the current project, but rather its initial design. The

measures of project success must be changed from trees planted and those that survive for one year, to trees that reach maturity. The measure of maturity will vary for each species and product.

If the planting cycle is to be continued after the end of the project then the project length must be greater than that of the productive cycle of the species in question. If assistance is to be successful then it must be complete; which means that help must be given for all sections of the product cycle. It should not be said in ten years that the SRP planted thousands of trees but no one knows what to do with them because there is no market.

The environmental benefits of reforestation are apparent, but the economic benefits have not yet been measured. Since purely environmental concerns have not encouraged planting on a wide scale, it must be an economic incentive that will provide the motivational force. If it is possible for the benefits of reforestation to be quantified, then it will be easier for the governments and donor agencies to create programs to fill this need.

5. Planting trees for the sake of environmental concerns has merit, but as is stated in the original proposal for the SRP there must be financial incentive for the continuing encouragement of local involvement in planting. At present the only effective financial incentive from the SRP is the Matching Grant Program, the basis of which is payment after one year⁸; unfortunately, since the product cycle of the eucalyptus tree is approximately seven years to house pole dimensions, the project monitors the trees for only a small part of the cycle to maturity.

6. The growing and processing of eucalyptus must be envisioned as vertical components of an industry based on the wood products of reforestation. With the

⁸ For details of Matching Grant program see chapter 4

security to have long term financial planning that will come with long term government or donor incentives, investments such as reforestation may become viable economic alternatives for the rural Senegalese. Below is a descriptive method for analyzing the markets and some general comments and recommendations for the development of programs to help in the establishment of an industry that starts with the growing of the trees and ends at the processing and sale of that product.

Method for Analyzing Wood Markets

One of the objectives of the thesis was to develop a methodology by which developing nations could analyze their markets and determine which species will provide sustained economic benefit and therefore increase the chances of independent reforestation efforts. The method best suited to this type of analysis is the concept of the market channel analysis.

The first and most important step is determination of the physical compatibility of the species with the climate of the region. After that financial analyses such as Internal Rates of Return (IRR) and discounting can be done with the secondary data available. If potential environmental and social benefits can be measured then they should be included in economic analyses. If all the measures are favorable, then the following problems should be examined in minute detail:

1. Available market share and difficulty involved in competing for that share. For example the level of oligopolistic control that could be maintained by the Dakar sawmills. Can the product that is to be introduced into the market compete in quality or price with the products currently available. This will be a large obstacle if farmers and small merchants are expected to compete with large, established

operations.

2. Analyze the quality of the market infrastructure such as transport, banking, and communications. The quality of the roads, communication, and transportation systems will have affect the chances of successful tree farming and small industry development in the nation.
3. Most important of all the cost of improving the ability of the farmer and small industry to compete in the market must be carefully assessed. This cost is that of lowering barriers to entry into the market. When planning reforestation projects, and if an objective is to have the reforestation effort continue after the project has ended, then the costs of improving both the ability of the firms to compete and the market infrastructure must be taken into account.

The government must expect to correctly estimate and pay for improved:

- (a) infrastructure such as the roads;
- (b) subsidies to allow the small firms to compete; and
- (c) information such as the extension service.

As these factors are correctly measured and included in the effort to produce a sustainable reforestation program the cost will rise considerably. The measures of economic and financial possibilities are important, but are used to frequently with little regard to the quality of data or the applicability of the results.

The long-term costs and benefits of reforestation must be addressed and carefully planned for. If reforestation efforts are to succeed, then the ability of the farmer and small firm to compete in

the market must be assured or the time-frame of reforestation efforts will coincide with the time-frame of the projects.

Lessons Learned During Surveys

An issue that is sometimes overlooked in research is what part of your methods were unsuccessful. The difficulties faced in this research were that it was difficult to establish whether the answers given by the survey respondents were accurate. Also, the surveys format lent itself to an atmosphere of discussion and often information was given to questions not on the survey. It would be difficult to avoid this problem since the introductory discussion for each of the interviews was anywhere from 10 minutes to 2 hours. The surveys served well as a tool for discussion, but the respondents were often unable or unwilling to answer direct questions, preferring to be rather vague.

The surveys did not have precoded answers so the analysis of the results was more difficult but perhaps less biased. A bias may have appeared by having a foreigner present during the interviews, but some of the interviewees took this as a sign of interest. The surveys were conducted under time constraint that limited the number of surveys completed.

In each town, an agent of the Eaux et Forets(E&F) was assigned to us. The agents were told to introduce us to the merchants and then to leave so as not to present during the interview. Also the interviewees were told repeatedly that there were no "correct" answers to the survey so that they might speak more freely. There may have been biases created, but, an effort was made to keep these to a minimum. The potential for biasing the responses is an important issue in the wood markets of Senegal, where many of the merchants are uneducated and naturally suspicious.

Recommendations

First and foremost, having examined the problems, both biological and economic, it must be decided whether eucalyptus is the appropriate species for mass promotion in the country. If it is the case that no other local species can be used then the problems mentioned above must be addressed for the chosen exotic species. For the production of eucalyptus to be used in the sawn wood markets some recommendations are presented below:

1. Provide guaranteed markets for the products of reforestation. This can be achieved by committing to buy the product at eight years old. Thus by selling the wood at that time, or by allowing it to remain in the ground until it can be used as sawn wood, the donor or government can recuperate some its costs. Since the SRP project paper, Diallo (1992), and this thesis all claim that eucalyptus can be profitable, then the risk of this proposal to the donor institution or government is minimized. The farmer will be assured of a market and will thus be further inclined to plant. If the wood is removed immediately then the farmer will benefit further by retaining right to the coppice crop. If the crop is left in the ground then perhaps a rent can be paid to the farmer. If successful, this system should eventually encourage the entrance of entrepreneurs into the market.
2. If the Senegalese government expects an increased response to the call for reforestation and other natural resource protection programs they must improve the quality of their extension service. Without this service, the rural population has limited access to information. Frequent visits are required for both the villagers to gain confidence in the extension agents and for the extension agents to familiarize themselves with the individual needs of the villages.

3. In Senegalese society elders and people such as the market overseer have great weight in determining what people believe. If eucalyptus or any other exotic is to be successfully introduced into the wood markets of Dakar, it must be done with the consent and help of the overseer. Also, wood merchants of the regional markets should be helped to organize themselves into cooperatives through which they could order sufficient quantities of wood to avoid the arduous process of wood purchasing that are presently in existence.

4. Since many of the furniture makers have their own small saws if help is provided to selected merchants to replace antiquated machinery then the confidence, trust, and gratitude of these businessmen will be earned. After this they may be more inclined to help in the introduction of eucalyptus into the market. Thus, two problems will be solved: (1) the availability of appropriate saws and other processing equipment and techniques for the cutting and treatment of eucalyptus; and (2) a means by which to introduce eucalyptus to the final consumers.

5. Develop long term investment incentives and subsidies for farmers and businesses to start the operation of growing eucalyptus for their own processing and sale. That will help overcome the transportation and processing unknowns. A great deal of agriculture and forestry in the developed nations is profitable due to the incentives such as subsidies, government investment in infrastructure and tax breaks that the governments employ to ensure the survival of these industries. Since that is the case in the developed world, it may be unreasonable to expect developing nations to be successful without such advantages.

6. Establish guidelines for sizes and prices of wood and have that information made available to the regional markets as well as the Dakar market.

7. Try to make the price of the locally grown woods competitive with those of the imported woods.
8. Accelerate planting programs to ensure consistent supply of wood for the markets in the future.
9. Encourage strategic planting around markets to compete with products that must be transported from further afield.
10. Produce a booklet on the processing techniques and physical attributes of eucalyptus that can be distributed to wood merchants and furniture makers. Work closely with local wood users teaching processing and treatment techniques of the product.
11. Study and understand the effects of reforestation and agroforestry projects on the rural Senegalese to provide the best methods of incorporating such projects into the culture.
12. Further research should be conducted on:
 - (a) the growth habits of eucalyptus in Senegal;
 - (b) the treatment and sawing techniques for small eucalyptus under the Senegalese environmental and financial constraints. Then produce a booklet describing these methods that can be distributed to the wood merchants and the wood workers; and
 - (c) The costs and benefits of investment in the market channels for the wood products of reforestation programs.

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Appendix A

List of Officials Contacted during Field Research:

1. Inspection Regional des Eaux et Forets:

Mr. Cherif Cisse, Chef du Secteur, Kaolack
Mr. Diop, Inspecteur, M'Bour
Mr. Abdou Faye, COSPE, Diorbel
Mr. Gaye, Diorbel
Mr. Dame Kane, PRECOBA, Diorbel
Mr. Ibrahim M. Kane, Louga
Mr. Mboup, Diorbel
Mr. Amadou Mbaye Ndiaye, Inspecteur, Thies
Mr. Amadou Ndiaye, Louga
Mr. Gora Ndiaye, Inspecteur, Kaolack
Mr. Chiek Mbake Thione, Fatick
Mr. Abdou Toure, Chef de Brigade, Thies
Mr. A. Samoura, Saint Louis.

2. USAID/Senegal:

Mr. Julius Coales, Director, Dakar
Ms. Mame Coumba Diop, Project Assistant, Dakar
Mr. Phil Jones, Agricultural Officer, Dakar
Mr. Rod Kite, Economist, Dakar.

3. Senegal Reforestation Project

Mr. Mamadou Diaw, Special Assistant, Dakar
Mr. Jim Fickes, Chief of Party, Dakar
Mr. Babacar Salife Gueye, Private Sector, Dakar
Mr. Chris Kopp, Forester, Dakar
Mr. Geoffrey Livingston, Private Sector Advisor, Dakar
Mr. Amadou Moctar Niang, Project Director, Dakar.

Appendix B

Survey Forms

Farmer / village survey

Nom

Titre dans le village

Emplacement de la plantation

Nom du marche de bois le plus proche

Emplacement du marche de bois le plus proche

Combien de temps faut-il pour aller a ce marche

Quel moyen de tranport utilisez-vous pour aller a ce marche

Quel est la distance de la plantation a la route goudronne le plus proche _

La plantation appartient a un individual ou la communaute

Quel age ont les arbres _____

Combien d'acres _____

Quel est la hauteur _____

Quel est la circonference _____

Qui a plante les arbres

Combien d'arbres ont ete plantes

Combien sont morts

La premiere annee _____

La deuxieme annee _____

Pourquoi avez-vous plante les arbres

Est-ce qu'il a ete difficile de faire pousser les arbres

Pourquoi _____

Quelle traitement avez-vous donne aux arbres

D'ou venez les arbres _____

Qui vous a explique comment il faut s'occuper des arbres

Est-ce qu'on vous a dit ce qu'il faut faire avec les arbres une _____ fois qu'ils ont grandi _____

Si oui, qu'est-ce qu'ils ont dit

Avez-vous paye pour les arbres _____

Si oui, combien par arbre _____

Ou avez-vous eu l'argent _____

Est-ce qu'on vous a paye pour planter les arbres

Si oui, combien _____

Qui va recolter les arbres _____

Qui va decider quand il faut recolter les arbres

Avez-vous vendu des arbres _____

Si oui, combien dans l'annee _____

Combien d'arbres vous avez vendu pour:

bois de feu _____

charbon _____

poste pour cloture _____

poste pour construire les maisons _____

poste pour les lignes telephoniques ou electriques

bois de service _____

autre _____

A qui vous avez vendu les arbres _____

Quel age les arbres avaient quand vous les avez vendus

Qui decide quand et ou il faut vendre les arbres

Avez vous vendu les arbres sur votre ferme ou dans le marche

Quel marche _____

Pourquoi vous avez choisi ce marche _____

Quels difficultes avez-vous rencontres en allant au marche

Est-ce que les prix au marche est mieux que le prix sur la ferme

L'argent de la vente des arbres est destine a quel fin

Qui decide l'utilisation de l'argent

si vous n'avez pas vendu des arbres:

Qu'est-ce que vous avez l'intention de faire avec les arbres

Pourquoi

Est-ce qu'il sera difficile de vendre les arbres

Quels sont les possibilites de vente et d'usage pour les arbres

Avez-vous utilise khot butel

A quel fin vous l'avez utilise

Comment khot butel a compare avec d'autre bois que vous avez utilise

Est-ce que vous l'utiliserez encore

Est-ce que les gens qui l'ont achete l'ont trouve de bonne qualite

Qu'est-ce qui sont les qualites de khot butel que vous aimez ou n'aimez pas

Les femmes font-elles parties de la plantations et la commercialisation des arbres

Si oui, pour les femmes

Quels sont les benefices que vous recevez de la plantation des arbres

L'argent de co-investissement a ete utilise dans quel but

Combien de fois vous parlez avec l'agent forestier

Avez-vous recu de la formation dans la foresterie

Si oui, venant de qui

Si non, avez-vous besoin de la formation

WOOD MERCHANT SURVEY

Emplacement du marche _____

Emplacement de la boutique _____

Nom de la proprietaire _____

Quelles sortes de bois vous vendez

Espece les prix l'achetez / le vendez

_____ D'ou vous

l,achetez le bois _____

Le bois est d'origine du Senegal, Cote d'Ivoire ou d'autre pays

Si le Senegal, de quelle region _____

Est-ce que vous travaillez le bois _____

Si non, qui le fait _____

Ou est le bois travaille _____

Est-ce que le bois vous etes livre _____

Si oui, qui le livre _____

D'ou _____

Si ce n'est pas livre, vous vous deplacez pour le cherche

Comment vous l'amenez chez vous _____

Quelle quantite de bois vous vendez _____

par sorte et par jour _____

par sorte et par semaine _____

Pour quelle utilisation les gens l'achent _____

Connaissez-vous le bois de khot butel _____

Si oui, est-ce vous pensez que c'est de bonne qualite

Quels sont les utilisations de khot butel _____

D'ou vient votre connaissance de khot butel

Avez-vous deja vendu le bois de khot butel _____

D'ou le bois venait _____

Combien vous l'avez paye _____

Combien vous l'avez vendu _____

Est-ce que vous pourriez vendre plus de khot butel si l,acces a plus de khot butel

Pourquoi oui ou non _____

Est-ce que le bois de khot butel est vendu sur ce marche

Si oui, ou _____

Si non, dans quel autre marche je pourrai l'acheter

WOOD USER

Nom _____

Occupation _____

Marche _____

Où vous avez pris le bois _____

Combien de kilometres vous avez fait pour venir au marche

Combien de temps avez-vous passe sur la route

Comment le bois sera utilise _____

Quelle quantite de bois vous achetez par semaine

par mois _____

Especes, utilisation, quantite, prix paye

Qu'est-ce que vous fabriquez avec ce bois

Est-ce que vous allez revendre le bois

Si oui, ou et a qui _____

Où vendez-vous vos produits _____

Produits, prix, quantite de bois

Connaissez-vous quelque chose sur le khot butel

Pensez-vous que c'est de bonne qualite

Comment on peut utiliser khot butel _____
_____ Avez-vous
utilise le khot butel personnellement _____
Ca vous a donne satisfaction _____
Utiliserez-vous khot butel de nouveau _____
Ou est le khot butel vendu _____
Comment vous avez pris la connaissance de khot butel

TRANSPORTATION SURVEY

Marche _____
Numero d'identification du transporteur _____
Moyen de transport _____
LIVRAISONS DE BOIS
Ou avez-vous pris le bois

Le bois vous appartient ou vous le transportez seulement

Avez-vous achete le bois

A qui vous le vendrez

Faites-vous une livraison a quelqu'un de particulier

Avez-vous travaille le bois

Si non, qui l'a travaille et comment ca a ete fait

Vous faites une livraison de bois tous les combien a ce marche

Livrez-vous a d'autres marches

Si oui, ou se trouve ces marches
Marche, _____ emplacement

Ou allez-vous transporter ce bois

Avez-vous un contrat pour transporter le bois

Si oui, avec qui

Si non, ou allez-vous revendre le bois

Faites-vous le transport d'autres produits

Si oui, lesquelles et ou

Quels problèmes

avez-vous dans le transport du bois

Avez-vous déjà transporté khot butel

Si oui, ou et tous les combien

Allez-vous travailler le bois

Si oui, avez-vous utilisé khot butel

Si oui, comment vous l'avez trouvé

FARMER/VILLAGE SURVEY

1. Name:
2. title in the village
- 3 Location of plantation:
- 4 Location of nearest wood market:
- 5 location of nearest wood market
- 6 How long does it take to get to the Market:
- 7 what method of transport do you use
- 8 Distance to main road from plantation:
- 9 Plantation grown by: Individual Community
10. How old are the trees?(& acreage & height*circumference)
(eg 4yrs/2acres/6ft*30in)
- 11 how may acres
- 12 Height
- 13 Circumference
- 14 Who planted the trees?
- 15 How many were planted?
- 16 how many died the first year
- 17 how many died the second year
- 18 Why did you plant the trees?
- 19 Were the trees difficult to grow?
- 20 Why
- 21 What treatment (if any) did you give the trees?
- 22 Where did you get the trees?
- 23 Who told you how to care for the trees?
- 24 Were you given advice on what to do with the trees once they are grown?
- 25 If so what?

- 26 Did you pay for the trees? If so how much/tree?
- 27 Where did you get the money?
- 28 Were you paid to plant the trees?
- 30 if so how much?
- 31 Who will harvest the trees?
- 32 Who decides when to harvest the trees?
- 33 Have you sold any trees?
- 33 IF YES: how many in 87 88 89 90 91 92
- 35 how many for
- 36 fuelwood
- 37 Charcoal
- 38 fence posts

- 39 house poles
- 40 utility poles
- 41 sawn wood
- 42 Other
- 43 To whom did you sell the trees?
- 44 At what age did you sell the trees?
- 45 Who decides when/where and how to sell the trees?
- 46 Did you sell the trees on your farm or in a market?
- 47 which market
- 48 If not why did you chose it?
- 49 What difficulties if any did you face in getting to the market?
- 50 Would you receive a better price at the market than on the farm?
- 51 What will the money be used for?
- 52 who decides the use of the money
- 53 IF NO: What do you intend to do with the trees?
- 54 Why?
- 55 will it be difficult to sell the trees?
- 56 What are the possibilities for use/sale of trees?
 - (1)
 - (2)
 - (3)
57. Have you used the Eucalyptus?
- 58 What did you use it for?
- 59 How did it compare to other materials you have used?

- 60 Would you use it again?
- 61 Do the people who buy it from you like it?
- 62 What are the good/bad properties of Eucalyptus?

- 63 Are women involved in the planting/selling of the wood?

- . (IF SO) Pour Les femmes:
64. What are the benefits that you receive from the planting of wood?
65. What was the 'matching grant' money used for?
66. How often do you talk with the extension agent?
 never sometimes frequently always
67. Have you received any training in forestry? Y N
- 68 IFSO: From Whom
- 69 IFNOT: Do you need some?

WOOD MERCHANT SURVEY

1. Location of market:
- 2 Location of stall :
- 3 What types of wood do you sell? What are the prices
SPECIES PAY FOR/SELL FOR?
 - (i)
 - (ii)
 - (iii)
 - (iv)
 - (v)
 - (vi)
- 4 Where did you get the wood from?
- 5 Where did the wood originate: Senegal Cote d'Ivoire
Other
- 7 Do you process the wood?
- 8 If not who does?
- 8 Where is the wood processed?
- 10 Is the wood delivered to you?
- 11 If so who delivers it?
- 12 If not where do you get it?
- 13 if it is not delivered do you go and get it?
- 14 how do you get it to your store
- 15 how much wood do you sell
- 16 per day
- 17 per week
- 18 what do people buy it for?
19. Do you know anything about Eucalyptus? Y N
- 20 If yes:do you consider it a wood of good quality?
- 21 What are the uses of Eucalyptus?
- 22 Where did you get your information?
- 23 Have you ever sold it? Y N
- 24 Where did you get it from?
- 25 how much did you pay for it?
- 26 how much did you sell it for? 20
- 27 Is Eucalyptus a wood you could/would sell if you had the opportunity?
- 28 why or why not?
- 29 Is it sold in this market at all? Y N :
- 30 Y: where?
- 31 N: Do you know where I could buy some?

TRANSPORTATION SURVEY

- 1 Market:
- 2 I.D. of Transporter:
- 3 Transportation mode:
4. Where did you get the wood from?
- 5 Are you contracted to transport only?
- 6 Did you buy the wood?
- 7 Who will you sell it to?
- 8 Are you delivering to anyone in particular?
- 9 Have you processed the wood?
- 10 If not who did and where was it done?
- 11 How often do you deliver wood?
12. Where are you taking the wood?
- 13 Are you under contract to transport wood?
- 14 IFSO: By whom?
- 15 IFNOT: where will you sell the wood?
- 16 Do you transport any other products?
- 17 What products:
18. What are the problems involved in wood transportation?

WOOD USER SURVEY

- 1 Occupation:
- 2 Market:
3. One way Distance traveled to market:
- 4 Travel time:
- 5 Where will the wood be used?
6. How much wood do you buy per week/month ?
- 9 what are you making with the wood?
- 8 will you resell the wood?
9. Do you know anything about Eucalyptus?
- 10 Do you consider it a wood of good quality?
- 11 What are the uses of Eucalyptus?

- 12 Have you used it personally?
- 13 Was it successful?
- 14 Would you use it again?
- 15 Where is Eucalyptus sold?
- 16 Where did you get your information about Eucalyptus?
- 17 Would you be interested in learning more about Eucalyptus?

Appendix C

Eucalyptus Production, Processing, and Environmental Issues

Exotic Eucalyptus

Eucalyptus are widespread throughout their native Australia. There are over 500 species of eucalyptus which constitute 95 percent of the forest trees on that continent. Eucalyptus are successful exotics and are one of the most widely planted genera of trees in the world. Species of eucalyptus occur naturally in wide range of climatic conditions and can therefore be successfully transferred to a variety of different locations. The eucalyptus species are considered as successful exotics, but it must be remembered that within the genus, the individual species are adapted to particular environments, and must therefore be carefully chosen to best suit the environment into which they are being transferred (Schonau, 1991; Vandenbelt, 1992).

The first recorded exotic introduction of eucalyptus was in Britain, where individuals of the *E. obliqua* species were introduced in 1774. The next reference to the genus came some 70 years later when eucalyptus were mentioned in the 1844 *Gardeners Chronicle* (Zacharin, 1978). In the early 1800's Eucalyptus were being introduced throughout many parts of the world, some locations and dates of these transfers are shown in the table C1.

There were approximately 4 million hectares of eucalyptus grown throughout the world in 1979 (FAO, 1979). The selection of the eucalyptus species to plant, as with any other tree, is regimented by the soil, the climate, and the pests. It has been through both poor site selection and poor forestry practices that some failures have occurred in eucalyptus plantations. With an early reputation as the "wonder tree"

TABLE C1. TEN EARLY TRANSFERS

DESTINATION OF TRANSFER	DATE
ENGLAND	1774
FRANCE	1804
ITALY*	1818
BRAZIL	1825
PORTUGAL	1829
INDIA	1843
ALGERIA	1850
SPAIN	1860
CHILE	1865
ISRAEL	1885

* *E. camaldulensis* named in Italy in 1829.

Source: Zacharin, 1976.

and the savior of the world's wood supply, the eucalyptus sp. has had to overcome the negative press generated by the fact that it has not been a complete success. It is important to remember that as with the relocation of any species into both a new environmental and cultural setting, there will be specific problems to be overcome.

The ability to recognize and combat these problems lies in the understanding of the species being transferred and the effective dissemination of that knowledge to the farmers involved in the growing process.

Plantation Species

There have been many species of eucalyptus planted throughout the world for a variety of different purposes and with varying levels of success. The most frequently planted exotic species have been: *E. saligna*; *E. grandis*; *E. globulus*; *E. camaldulensis*; *E. teretecornis*; *E. urophylla (alba)*; *E. robusta*; *E. maculata*; *E. paniculata*; and *E. Viminalis* (Hillis and Brown;1984).

In Australia the most important species for wood production are the ash species and in particular *E. regnans* and *E. delegatensis*. It is also important to understand that in Australia, most of the wood used in milling comes from naturally established plantations, and while those trees may contain some defects due to age, it is not common that they have the growth defects and stresses that accompany the fast growing plantations of eucalyptus in other parts of the world. Australia is the nation most familiar with eucalyptus. The fact that they are only recently facing the milling problems associated with the short rotation eucalyptus trees, results in a lack of knowledge on how to properly mill and handle the wood in processes other than pulping. Currently much of the information on the potential for using young eucalyptus for sawn wood comes from countries such as India, Israel and South Africa that have established research programs in this field. The plantations in countries such as Brazil and Chile are predominantly for the production of pulp, a commodity for which the eucalyptus is well suited (Hills and Brown, 1984).

Although there have been significant plantings of eucalyptus outside their native Australia, large gaps still remain in the practical knowledge of processing the wood in many of the nations actively planting eucalyptus. This is an important issue in the formation of market channels for eucalyptus wood in Senegal and will be discussed in greater depth below. The first issue to be examined in a market development strategy is the production of the wood. In Senegal, the eucalyptus species of choice is *E. camaldulensis*. It is therefore important that the general

attributes of the species be known, as well as the specific issues related to its growth in Senegal.

Eucalyptus Camaldulensis

The common Australian name for *E. camaldulensis* is the River Red Gum. The species was given its scientific name after having been transported and grown in Italy. The name was given by Frederick Dehnhardt, the head gardener at the Camalduli gardens, owned by the Count of Camalduli, and located in the hills outside Naples. In his gardening books in 1829 and 1830, Frederick Dehnhardt named three eucalyptus species: *E. ambigua*; *E. gigantea*; and *E. camaldulensis* (Zacharin, 1978). The general characteristics that have made *E. camaldulensis* a popular exotic species are:

1. the ability to survive and produce on poor soils with a prolonged dry season (Awe et al,1976);
2. a tolerance of periodic flooding (Dexter et al,1986);
3. some resistance to frost (Gogate and Dhaundiyal,1988);
4. it is a vigorous coppicer; and
5. it is not edible by African animals.

Attributes that are detrimental to the economic uses and therefore widespread planting of *E. camaldulensis* are:

1. it has a less straight growth pattern than other eucalyptus species;
2. it has weak growth on highly calcareous soils (Pryor;1976,75);
3. it produces a dark colored wood requiring more bleaching in the pulp process; and

4. it suffers from growth stresses in short rotations.

To examine the potential production of wood and the formation of a market development strategy, the production and market channels must be comprehensively understood. The first step is the establishment of the eucalyptus plantation.

Plantation Establishment

It has been suggested by the Food and Agriculture Organization of the United Nations (FAO) that *E. camaldulensis* can be propagated vegetatively when young, but the process becomes increasingly difficult as the tree ages. Gurumurti et al. (1988) also describe a method of vegetative propagation of eucalyptus that should be considered for introduction to the village reforestation programs. With vegetative propagation at the village level, the need for nurseries and the potential difficulties involved with nursery establishment could be avoided. This is an important consideration that should be investigated in the Senegalese climate. The relevance of this process becomes apparent when the process involved in the production of seedlings is examined.

Eucalyptus seeds are relatively easy to store, and can remain viable for several years if air-dried and then stored in temperatures of 1 to 4 degrees Celsius. They are also capable of maintaining satisfactory germination levels for 1 to 2 years if stored at room temperature (FAO 1979). The difficulty of using eucalyptus seeds arises in the collection and germination of the trees. If the farmer is to improve and expand his/her eucalyptus plot, then the knowledge of how to produce seedlings is vital.

For example, of the plantations visited during June of 1991, only one was producing its own plants. That farmer had previously worked for a donor agency nursery and had learned the process of seedling production. His eucalyptus trees were growing very well. He was planting one hectare of eucalyptus per year and had

been doing so for the past 10 years. He was enjoying considerable success, selling his trees as housepoles on site at a cost of approximately 250 Fcfa per pole. The importance of transferring this technology to the Senegalese farmer must not be overlooked. If this man can grow eucalyptus with seeds from his trees, then there is no reason that other Senegalese villagers should not be capable of the same.

On-farm production and selection of eucalyptus is advocated by Schonau (1991). by growing their own seedlings the farmers avoid the cost of transportation, the damage to the seedlings during transportation, the bureaucracy involved in the purchase of seedlings, and would be able to selectively breed their best trees for improved performance under their particular microclimate.

The purchase of seedlings can be difficult for a Senegalese farmer. Transportation for himself to the nursery and the transportation of the seedlings back to the farm are both difficult. Furthermore the availability of seedlings can be unpredictable. Because of the enthusiastic response to a matching grant program by farmers planting eucalyptus there was a lack of seedlings (SRP personnel, 1991). The consequence of this lack of seedlings is a lost opportunity to get trees in the ground. If the market is to function effectively, there must be a consistent, available supply of inputs, in this case seedlings. In a situation of poor information collection, dependence on the distribution of seedlings from the government, private nurseries or donor nurseries may result in either too few or too many seedlings produced resulting in wasted opportunities to plant, (Kowero and Temu,1985).

If the local population is to be encouraged to plant eucalyptus they must be shown the proper planting techniques and afforded the best help available. The red tape and bureaucratic difficulties which stifle rural development in many developing nations must be minimized. A discussion of the problems inherent in the Senegalese extension system are presented in chapter 4.

Environmental Implications

In the case of Senegal the most frequently planted tree in reforestation programs is eucalyptus. As more of the reforestation projects are successful and large plantations of eucalyptus are established there will be significant environmental implications to be considered and carefully monitored, as follows:

1. *E. camaldulensis* has an extensive root system and will compete with and usually reduce vegetative ground cover. It has been suggested that some eucalyptus species may destroy the surrounding vegetation by the release of toxins from the litter, a phenomenon known as allelopathy. In an examination of this phenomenon, the FAO (1985) reports that allelopathy may in fact occur in some species and that to avoid any problems if eucalyptus are being used for erosion control, a situation in which other vegetation is beneficial, then a careful choice of species must be made. Swami Rao and Chandrashekara (1984) state explicitly that there is no chance of crops being grown near eucalyptus in areas of low rainfall due to the inhibitory toxins produced from the eucalyptus leaves.

2. If positioned correctly *E. camaldulensis* can provide a good windbreak. Adegbehin (1987) reports that eucalyptus has a windbreak efficiency of 5H, or 5 times the height of the tree, and recommends an optimum planting distance of 140 meters between windbreak rows. Saxena (1991) notes that farmers in India reported crop losses within a 10 meter radius of the eucalyptus windbreaks. Extension agents from the Eaux et Forêts interviewed in Senegal stated that the Senegalese farmers could not plant crops at all within a 5 meter radius of the trees. Therefore, when analyzing the potential benefit from the planting of eucalyptus as windbreaks, the potential crop losses must be considered.

3. The effect of eucalyptus plantations on their microclimate are ones that the rural Senegalese will appreciate. The farmers can expect that inside an established plantation of eucalyptus there will be higher humidity, lower average temperatures and moderation of extreme temperatures (FAO, 1985).

4. It is hoped that the establishment of permanent tree plantations will increase the availability of fuelwood and alleviate the environmental pressure that the gathering of wood from the indigenous forests poses to the environment.

5. With short rotation plantations of eucalyptus there is the potential for depleting the soil of many nutrients much like any other agricultural crop. Jorgensen and Wells (1986) urge caution when maintaining high productivity plantation forestry over several rotations due to its possible deleterious effect on soil nutrition. They go on to say that lengthened rotations will have beneficial effects on soil nutrition and also suggest that eucalyptus be grown in an unintensified system to avoid nutrient depletion. Chaturvedi (1983) reported that decreases in productivity have been noticed with the second eucalyptus coppice crop in India and he also states that plantation eucalyptus will maintain soil fertility if they are harvested in longer rotations or rotated with other trees. This suggestion would indicate an environmental benefit from leaving the eucalyptus in the ground longer for sawn wood production rather than early cutting just for house poles or fuel wood.

6. The issue of greatest environmental concern when planting substantial plantations of eucalyptus may be the demand that the trees will have on the available water supply (Evans, 1986). This is an issue of immense concern in India where large plantations of eucalyptus have been planted since the 1950's and where there has been a lot of negative reports on the planting of eucalyptus. It is important that transpiration rates and water tables be studied to ensure that in four to six years

from planting when the trees are beginning to mature and their root systems to develop that they do not use all the accessible water decreasing the level in the local wells.

In defense of eucalyptus, Shah (1985) states that the larger roots and the small total leaf surface of eucalyptus led to less evapotranspiration than other plantation species. However, Bari and Schofield (1991) conclude that eucalyptus significantly lowered the water table in an area of 700 millimeter annual rainfall in South Africa with tree densities ranging from 150 to 625 stems per hectare.

Dabral et. al. (1987) state that eucalyptus roots will concentrate in soil profiles that contain water and if there is no surface water they will search for groundwater. Prasad et. al. (1984) report average root sizes of 9 meters lateral and 1.4 meters tap at 5 years, and 20 meters lateral and 3 meters tap at 15 years. This pattern of root growth would indicate that the eucalyptus is principally making use of the available surface water, an argument which is supported by Tiwari and Mathur (1983) who say that generally a tree taps the moisture which is available within its root zone and transpires the same. In the same article Tiwari and Mathur state that eucalyptus species allow 70 to 88 percent more water to hit the ground than other species such as *Tectona Grandis* or *Gmelina Aborea*.

It is recognized by many participants in this argument (Shah, Jorgenson and Wells,1986; Tiwari and Mathur, 1983; Ray,1984) that because eucalyptus grows faster than other species it will be removing more water as well as other nutrients. There is no conclusive evidence for either side of the argument (Nautiyay and Reynolds,1988) but this is a serious issue to be considered in Senegal where water is the essential factor in survival.

The considerations involved in this problem are: (a) how much more water will the eucalyptus use than other tree species; (b) how many trees can an area sustain without affecting the water table; and (c) what environmental benefits, if any, will occur in terms of increased water supply and climate change through the

extensive reforestation of Senegal. In their report on the ecological effects of eucalyptus plantations, Poole and Fries (1985) state that the large scale planting of eucalyptus should not be attempted without a thorough evaluation of the social, economic and ecological consequences of the proposed planting. The authors independent mid-term report for the SRP conducted by Kramer et. al. (1990) also express concern at the lack of local species in the reforestation effort and the possible consequences of large block plantations.

Processing

The last section of the market channel before the final sale consists of the processing of the wood. The existing market for eucalyptus wood is almost all for unprocessed wood used for house poles, fuelwood, and charcoal production. The main setback to the sale of eucalyptus is the unknown processing needs of the wood. To be able to effectively enter the market the factors involved in the quality and processing of the wood must be understood and addressed. The quality of the wood must be examined, mechanisms to use small logs and the drying rates must be known. the following section relies heavily on *Eucalyptus for Wood Production* (1984), Chapters 12 (W.E. Hillis), 15 (M.W. Page) and 16 (G.S. Cambell and J. Hartley).

Wood Quality

Hillis (1984) states that in the processing of young⁹ eucalyptus logs the high level of growth stress, resulting in cracks and splits, sometimes of considerable size, is the most serious difficulty to be overcome. To avoid this problem, researchers

⁹ less than 50 years old.

from different nations have tried a variety of solutions; for example, in Italy girdling a 20-to-30 year old tree for a period before cutting reduced both the contraction of sapwood and the expansion of heartwood resulting in straighter boards. In Egypt good results were obtained by felling in the dormant period, coating the exposed ends with bitumen and immersing in cold water for a period of 6 weeks. Another option is to put tight bands around the end of the tree after felling (Hillis,1984).

Variations from "normal" wood quality that must be looked for in eucalyptus are growth stresses, tension wood, brittle heart, kino veins, knots, wetwood, discoloration and decay (Hillis,1984)¹⁰. In their discussion of the working and finishing quality of eucalyptus, Jaitly, Pant and Gupta (1983) contend that *E. Camaldulensis* can be worked to a smooth surface easily and that it can produce a high gloss after polishing that is comparable to teak. Table 11 offers a synopsis of the strength properties of mature *E. Camaldulensis*. It should be noted that the short rotation eucalyptus will have lower strength properties due to its lower density.

Sawnwood Production

The use of eucalyptus is changing in Australia. Whereas previous minimum acceptable diameters for logs were in the range of greater than 60 centimeters top diameter, the present trend is in the use of logs with top diameters as small as 25 centimeters (Page, 1984). This change is occurring due to the changing nature of the natural forests of Australia and is generating concern in the milling industry. "The decrease in log size is causing concern because in contrast to conifers, eucalyptus are not easy to mill successfully, particularly when the logs are small." (Page,1984;). In

¹⁰ Definitions: *Tension wood* - After having gone through unusual pressure while growing, wood is anatomically changed and will suffer abnormally high longitudinal shrinkage when dried. *Brittle heart* - A situation caused by growth stress, the brittle heart occurs in the central zone and leaves a section of the wood weaker than normal. *Kino veins* - Kino, also known as 'Gum', forms in pockets in the eucalyptus and is one of the common causes of degrading or rejection of the wood in Australia. The veins lower the quality and strength of the wood. *Wetwood* - Is a zone of high moisture content usually in the heartwood conducive to discoloration and decay.

India, people are said to prefer eucalyptus for sawn wood because of its straightness, attractive color, grains, absence of knots, perfection in sawing, easy availability and reasonable price (Kapur and Gupta, 1986).

Some equipment capable of processing small size eucalyptus is available but the needs of each mill must be individually assessed and the appropriate equipment fitted to fulfill those needs. For the efficient cutting of small eucalyptus logs, Pandey et al (1984) suggest the adoption of radial sawing techniques where the cut is made from the bark towards the center of the log versus tangential sawing which cuts across the log. Radial rather than tangential sawing is reported to help in the curing and decrease the amount of warping in the small eucalyptus logs. Because more wood is lost and due to the physical limitations involved in radial sawing, the minimum suggested diameter at which it is economically viable to employ radial sawing is 25 centimeters (Pandey et.al.,1984). In Table 12 Kapur and Gupta (1986) show that as the girth of the eucalyptus tree increases so to does the percentage of recoverable timber in the log. This would indicate a favorable volumetric and biomass returns when the trees are grown to larger diameters.

Table C2. MECHANICAL PROPERTIES OF MATURE WOOD OF EUCALYPTUS CAMALDULENSIS

Moisture Condition	Undried	12 %
Density (Kg m ³)	645 - 720	905 - 1010
Modulus of Rupture (MPa)	62.2 - 64.0	96.7 - 110
Modulus of Elasticity (MPa)	7750 - 8600	9700 - 11000
Compression Strength (MPa)	31.1 - 34.5	55.3 - 62.1
Shear Strength (MPa)	9.70 - 11.0	15.5 - 17.2
Hardness (side)(N)	6300 - 7100	10000 - 11100
Toughness (N m ⁻¹)	15.9 - 18.1	12.8 - 14.7
Cleavage Strength (N mm ⁻¹)	71 - 78	88 - 98
Strength Group(a)	S 5	SD 6
Shrinkage(b)	High	
Lyctus Susceptibility	Susceptible	
Description	Grain Interlocked, often wavy. Texture fine. Kino(gum) pockets frequent. Figured.	

(a) Strength groupings in line with that used in AS 1720-75 Timber Engineering Code (Australian Standard 1975); S in green condition: SD in dry condition.

(b) High, over 8 % ; medium, 5-8 % tangential shrinkage from green to 12 % moisture content.

Source: *Eucalyptus for Wood Production*, 1984, pg. 272-273, Hillis and Brown eds.

Table C3 SCANTLINGS(a) OF 6.35 cm * 5.08 cm CROSS SECTION RECOVERABLE FROM LOGS OF DIFFERENT GIRTHS.

Girth Class	Overbark (cm)(b)	Mean girth of Logs (cm)	Volume m ³	No. of scantlings	Sawn Volume m ³	Sawn Recovery %
G1	30 - 39	34.97	0.018	1.0	0.005	43.3
G2	40 - 49	44.25	0.0188	1.9	0.0095	50.7
G3	50 - 59	54.50	0.029	3.1	0.0153	54.0
G4	60 - 69	63.80	0.0396	4.6	0.023	58.6
G5	70 - 79	74.20	0.053	7.2	0.036	67.9
G6	80 - 89	83.40	0.067	9.3	0.047	68.8
G7	90 - 99	94.00	0.086	12.0	0.060	70.2
G8	100 - 109	104.86	0.107	16.7	0.084	78.4
G9	110 - 119	116.50	0.131	22.0	0.110	83.6

(a) Scantling - def.n. small beam or timber, especially one of small cross section. Dimensions of building material.

(b) Overbark - diameter of tree with bark.

Source: S.K.Kapur and B.N.Gupta, *Recovery of Scantlings from Eucalyptus Logs*, Indian Forester, 1986.

Drying Eucalyptus

The characteristic traits of eucalyptus while drying are: collapse¹¹; surface checking; high shrinkage; steep moisture gradients; and pronounced drying stresses leading to warping (Campbell and Hartley,1984). To counter these problems good seasoning practices include:

1. rapid transfer of sawn timber from sawmill into drying stacks;
2. strict attention to sound stacking practices;
3. protection of the sides and tops of air-drying stacks under severe drying conditions, a particular problem in Senegal;
4. the use of combined air and kiln drying; and
5. reconditioning¹² of collapse-prone timber after it has been dried to a moisture content of 15-20 percent.

Problems arise with the introduction of these processes into the market channel of eucalyptus in Senegal. Both the technical and financial aspects of this technology must be considered if and when the technology is transferred. It is important that the Senegalese start their own drying experiments or learn from other African nations with similar drying conditions.

¹¹ Collapse - structural change in tree cells as water is removed as the tree dries. Surface checking - cracks and abnormalities developed on the surface of the tree as it dries.

¹² Reconditioning is a process through which collapse shrinkage can be removed by steaming timber that is nearly dry for several hours in saturated steam at 100 degrees Celsius.

Appendix D

Background Information on Senegal

PHYSICAL GEOGRAPHY.

The most notable feature of the physical geography of Senegal is its flat, unchanging elevation. It is an ancient sedimentary basin in which most of the physical features have been leveled by erosion. Except for a few points in the southeast, which rise to about 500 meters, none of the rest of the country reaches more than 100 meters above sea level. This flat, expansive, dry plain leads to few changes in vegetation in the central and northern parts of the country. The southern area of Senegal known as the Casamance has the most lush vegetation in the nation and the only remaining natural tropical forest.

As in all arid and semi-arid environments water is a primary concern of both the rural and urban dwellers. This is particularly the case of Senegal where most of the agricultural and forestry practices are either river or rain fed.

Rivers

The main rivers of Senegal are, from north to south: The Senegal, which forms the northern and eastern borders with Mauritania and Mali respectively. The main tributary to the Senegal is the Faleme, which enters the Senegal approximately

120 kilometers east of San Louis. South of Dakar in the Cap Vert is the Saloum, and its tributary the Sine. These two rivers flow through part of the area known as the Peanut Basin. Heading further south into the region known as the Casamance, an area which lies south of the Gambia and north of Guinea Bissau, the main river is the Casamance. With the exception of the Senegal, much of the water from these rivers is distributed into the far western part of the nation.

- * The Senegal river begins in Guinea, travels over 2,500 miles along the eastern and northern borders of Senegal and finally empties into the Atlantic ocean in the northwest corner of Senegal, just north of the town of San Louis. The Senegal river and its tributary, the Faleme, have an average annual exploitable volume of 400,000 billion cubic meters (USAID, 1991). Although only a small portion of the potential exploitable volume is at present being used, the Senegal brings much needed relief to a large area of arid land and can be viewed as the last barrier for Senegal against the encroaching Sahara desert.

- * The Saloum and Sine rivers, located in central Senegal, are sluggish and many parts do not carry water all year round, but provide a vital resource to the production of groundnuts. Only the region closest to the coast has a continual water flow, and even that water is of poor quality.

- * The Casamance river is approximately 200 miles long and is sluggish along its entire length. The region of the Casamance receives the highest rainfall in Senegal, and this precipitation along with the water from the Casamance river combine to maintain the last remaining natural forest area of Senegal.

- * The main river in the far southeast of the nation is the Gambia, which eventually becomes the Gambia once it crosses the Senegal/Gambia border. The

Gambie starts in the southeast corner of Senegal and heads northwest towards the Gambia.

Due to the lack of change in elevation notable throughout Senegal, all of the Senegalese rivers suffer from a salinity problem. Because of the low gradients of the rivers, the average gradient for the Senegal river being only a few inches per mile (Nelson et. al. 1974), the rivers are tidal. The effects of the tides is that the water in the rivers is brackish up to 200 miles inland for the Senegal river, and 100 miles for the Casamance river.

Rainfall

Senegal has been experiencing a 50-year declining trend in precipitation (EROS Data Center, 1991). Whatever rain there is arrives during the short wet season which lasts from June to September in the North, and from May to October in the south. The prompt arrival of the rains are of primary importance to the production of a successful agricultural crop. In particular, it is important that the rains arrive on time to ensure a good groundnut crop. Without good rains, peanut production, which accounts for approximately half of Senegal's agricultural output, suffers (USDS, 1991). Peanuts are the number one earner of foreign exchange for Senegal, and therefore low peanut production has a strong negative impact on the nation's economy.

On average, during the years 1980-87, the northern 200 kilometers of Senegal, approximately all the land north of Dakar received between 200 to 400 millimeters of rain per year. A small area of land in the extreme north received an average of less than 200 millimeters. In central part of Senegal (the land south of Dakar and north of the Senegal/Gambia border), the average rainfall for the same period was between 400 to 700 millimeters per year. The Casamance region received between

700 to 1,000 millimeters per year, with some very southern areas receiving an average of greater than 1,000 millimeters per year. These same areas received averages of 400 to 700 millimeters, 700 to 1000 millimeters, and greater than 1,000 millimeters respectively during the years 1930-39 (EROS Data Center 1991).

The observation derived from this trend is that Senegal is drying. This fact is, in part, responsible for the emphasis that the government of Senegal and international donors have placed on the conservation and regeneration of Senegal's natural resources. It is hoped that reforestation and changes in agricultural practices from the current intensive, monocultural methods to more agroforestry-based systems will help maintain and even improve the soil of Senegal which has for many years been mismanaged, resulting in the excessive removal of nutrients, and the destruction of its structure.

PEOPLE IN SENEGAL

Ethnic Diversity

The people of Senegal are varied and ethnic diversity is widespread throughout the nation as it is throughout the whole of Africa. It is difficult to describe a typical Senegalese and therefore this section will examine several important aspects of the people. It is, after all, the Senegalese people who will be planting, growing and selling the trees. If an understanding of the wood markets in Senegal is to be developed, then the people who function within the present market and who will be the ones participating in any changes that take place in the market must be understood.

Ethnic Groups

This section relies heavily on material presented in Nelson et. al.(1974)

Wolof

The most prominent ethnic groups in Senegal is the Wolof, which encompass 43 percent of the population. The first mention of the Wolof group came in the mid-fifteenth century and they are said to have originated in the Adrar region of what is now known as Mauritania (Nelson et. al., 1974). The Wolofs with their warlike attitude have become the dominant group by incorporating other groups into their culture. Even with the incorporation of other groups, the Wolofs have been able to maintain a strong separate identity. The Wolof language is the most widely spoken of all the ethnic languages, with over 80 percent of the Senegalese able to speak and understand it. There is a movement to make Wolof the official language of Senegal.

Peul and Toucouleur

Other important ethnic groups are the Peul (Fulani) and the Toucouleur, which comprise 23 percent of the population. The Peul are sometimes not considered in a separate group because of their dispersion and integration into other groups such as the Toucouleur in the Senegal River valley and the Wolof in the central parts of the nation. The Peul were originally nomadic, but have since settled, mixing with other groups and only a small percentage remain nomadic. The Peul are mainly stockraisers with their largest settlements in the Senegal River valley, and in the Upper Casamance region (Nelson et. al., 1974). The Senegal River valley is also home to a large percentage of the Toucouleur group.

The Toucouleur were among the first of the Senegalese to accept the Muslim faith, which they did as early as the eleventh century. The historical homeland of the Toucouleur is the Senegal River valley, but as Senegal develops, facilitating travel,

and environmental conditions worsen, encouraging migrations, the Toucouleur are slowly moving south.

Serer

The Serer group maintain a 15 percent share of the population and are an interesting mixture of the different aspects of Senegalese culture. Formerly sharing the Senegal River valley with the Toucouleur, the Serer moved south because of the pressure generated through their refusal to accept the Muslim faith. In this southern migration they then encountered the Wolof and their assimilative tendencies. Not wishing to become part of the Wolof group, the Serer were again forced further south, finally settling in the Sine-Saloum region. Since this settlement, many of the Serer have accepted Islam, while others have either maintained their traditional beliefs or been converted to Christianity. Ex-president Leopold Senghor was a Roman Catholic Serer. The Serer are avid farmers and can maintain dense settlement patterns due to their farming ability.

Diola and Manding

The Diola, Manding, constitute approximately 12 percent and are spread throughout the nation and estimates of their size and locations are vague. But, they maintain their identities and are therefore important to recognize. The Diola are an isolated, rice-cultivating group found in the Lower Casamance. The Manding are a small part of the Manding group spread throughout West Africa, and live in the Casamance east of the Diola.

Other Groups

Finally, the last set of ethnic groups are smaller, but are important in that they exemplify the complexity of human interaction that often frustrates African nations in their quest for western-style development. These groups, consist of approximately

10 percent of the population (Nelson et. al., 1974). They are satellites of larger groups and generally have their origin in neighboring nations, and migrated to Senegal for environmental and economic reasons.

Baramba: Newcomers (1920's) from Mali, can be found in Sine-Saloum region and around Thies.

Lebou: Found mainly in the Cap Vert region from Kayar to M'bour.

Sarakole: From Ghana, found mainly in the Senegal River valley close to the Faleme river.

Diankhanke: Found in area east of Tambacounda. They were early traders who were important in developing trading routes for that area.

Bassai: A small group found west of Kedougou, they are interesting because they maintain a traditional way of life relatively untouched by outside influences.

Balante, Mandjaque and Mancagne:

Small groups from Portuguese Guinea, living in the Casamance region.

Moures: From Mauritania, who have mostly settled in urban centers.

Lebanese

The Lebanese have been trading in Senegal for many years and have had a significant effect on the Senegalese economic structure. The present day Lebanese in Senegal, mostly traders, shopkeepers, and "middlemen", are concentrated in the urban areas. There is tension between the Senegalese and the Lebanese because the Lebanese are viewed as having taken positions and profits that would have otherwise gone to the Senegalese. The Lebanese are not integrated into the cultural society of Senegal, and maintain an aloof separation that has in the past caused problems between the two cultures.

Demographic Trends

The Senegalese population is increasing at a rate of 2.7 percent per annum (USDS, 1991; USAID, 1991). Urban population increases are significantly higher than rural, indicative of a rural urban migratory pattern. There are approximately 7 million people in Senegal as of the last census in 1988. The estimate by the EROS Data Center for the present-day human, rainfed carrying capacity of Senegal using current yields, current crop area, and current mixture of production is 3,879,600 people (EROS/USAID 1991). This is only marginally above half of the existing population in Senegal.

Senegal has a work force of 3.4 million people, of which 70 percent are in either subsistence or cash crop agriculture. There are 250,000 wage earners in Senegal, of which 40 percent are in the private sector, and 60 percent are employed by the government (USDS, Background Notes: Senegal, 1991).

The population distribution is an important factor in the determination of how best to proceed in the development of a nation's natural resources. The U.S. Agency for International Development reports several significant facts about the direction of Senegalese migration and population densities. In 1976, 34 percent of the people were living in urban areas. By 1988, 39 percent of the people were living in urban areas. The Thies and Dakar regions contained 66 percent of the urban population and 35 percent of the total population in 1988. Table 9 shows the extreme differences in population densities for three areas; Dakar where there is high density and increasing urban migration; Diorbél in the peanut basin of central Senegal; and Tambacounda of the southeastern area of Senegal.

Table D1. Population Densities of Selected Cities

CITY	PERSONS PER SQUARE KILOMETER
DAKAR	2, 728
DIORBEL	142
TAMBACOUNDA	6

The population distribution pattern has important consequences in the formation of a market development strategy. Since the cost of transportation of wood and wood products in Senegal is high and the main market for sawn wood concentrated in the Dakar region, a lack of access to consumers could leave the farmers in the hinterland little or no opportunity to sell their products. The implication is that either market collection points need to be established where population densities are low, or that only people close to the market be encouraged to grow wood for sale in the domestic sawn-wood markets, as opposed to people far from the markets.

Women in Senegal

The role of women in development is receiving increased recognition. That women do much of the agricultural work previously thought to have been done by men, particularly in Africa, is becoming more apparent. Changes in the structure of Islam within Senegal means that women, who were previously denied any form of

education, are now able to attain almost the same education as men. This change within the religious structure of the nation is bound to result in women playing a larger role in family and village decisions. Womens' problems and needs are often hidden but must be addressed if they are to play a role in development.

Land Tenure in Senegal

The issue of land tenure is important in development and especially so in agroforestry and forestry development. The underlying questions that farmers face is whether they own the land, the crops, or have the right to cut trees as fits their needs. In some instances the farmer may own all or part of the tree or he may own the land but not the trees on that land, or variations on that theme. The question in forestry is accentuated because the farmer must ask himself whether he wishes to allocate money in a long term investment such as a tree crop if he is unsure of his right to reap a benefit when his investment matures.

In Senegal, the situation is complicated because, as far as the government is concerned, the land is yours if you are maintaining it in a constructive manner, for example growing annual crops. This clashes with the traditional land tenure allocation of rural Senegal which gave the right of land allocation to an elder or group of elders of the village. Both types of land tenure are undocumented and therefore subject to abuse.

Since trees are now considered to be a constructive use of the land in Senegal your land may be secure, but the ownership or right to use the trees is still unclear to the farmers being encouraged to grow trees. Due to the cumbersome paper work involved in cutting trees, which forces farmers to make long, difficult and expensive trips to the nearest towns to obtain cutting permits, many of the farmers are still under the impression that they do not control the right to remove the trees that they have grown. Because red tape and unclear rights are both large negative

externalities, these issues must be clarified if the process of reforestation is to be successful through the development of market opportunities.

RELIGION AND POLITICS

The history that formed the present day Senegal is a complicated mixture of religion and politics so intertwined that one is almost indistinguishable from the other. It is important to remember the interconnected nature of these two issues even though they are discussed under separate headings below.

Religion

Traditional religions were the accepted form of worship in Senegal until the introduction of Islam in the eleventh century. Islam was probably first established in the Senegal River valley by traveling traders from the northern Sahara. Today, approximately 94 percent of the Senegalese are Muslim. The other religions present in the nation are Roman Catholicism and some remaining traditional practices. The Senegalese maintain an open view of religion and people are not persecuted for their beliefs. Roman Catholicism has maintained a tenuous hold in a country becoming increasingly Muslim for a couple of reasons: (1) Ex-president Leopold Senghor was a Roman Catholic and encouraged religious toleration; and (2) Roman Catholic schools have been effective in educating the Senegalese elite, resulting in a high percentage of the ruling class either being Roman Catholic, or tolerant of that faith.

As the Muslim leaders become more aware of the importance of education, the unequal distribution between Muslim and Roman Catholic leaders is becoming less pronounced. Current president Abdou Diouf is a Muslim and since his election has strengthened political ties with Saudi Arabia and the rest of the Muslim world.

This has further inclined Senegal towards Islam and has put pressure on the existence of other religions in the country.

Islam in Senegal

Islam in Senegal is a unique religion. The basic aspects of the muslim faith are adhered to, but there have developed several offshoot prophets who now dominate much of the religious scene. These prophets have formed three primary sects or brotherhoods as they are known in Senegal: (1) the Mourides; (2) the Tijounai; and (3) the Quijani. Of these brotherhoods by far the most important are the Mourides. Their prophet Chiek Amadou Bamba has made the town of Touba the religious center for the Mourides and members of this brotherhood can be found through all Senegal. As the surveys were being conducted, it was noted that the majority of the wood merchants whether wholesale or retail were Mourides. When it was mentioned that a member of the survey team was a Mouride and the tone of the interview changed and people became more willing to answer. This is an important cultural aspect to be recognized in further work in Senegal and has implication for development work throughout the world. It is necessary to have an in-depth understanding of the culture into which the donor community descends with its projects. Without this understanding even the most simple projects can fail.

Politics

At the time of independence, Senegal and French Sudan (Mali) were the remaining nations of the Mali Federation, which, due to political differences concerning leadership and the distribution of power, subsequently failed and was dismantled on August 20, 1960. At this time Senegal proclaimed full independence and Leopold Sedar Senghor, a French-educated politician was elected as Senegal's first President (Klien M., 1968).

Senghor governed with then prime minister Mamadou Dia until December 1962, at which time due to political differences, Dia attempted a coup d'etat, was defeated and jailed. He was finally released in 1974. Senghor then ruled continuously until his retirement in 1980 when he appointed Abdou Diouf as his successor in the party. Senghor had been grooming Diouf as his replacement for some time and the transition of government was smooth. Leopold Senghor was the first African head of state to voluntarily relinquish his position, a fact which reflects favorably on both the man and the potential for democracy in the nation.

Since coming to power on New Year's day in 1981, Abdou Diouf has encouraged political participation and has increased Senegal's standing as an international broker between the Middle East and the West. President Diouf has moved Senegal closer to the Islamic nations of the Middle East in a way that Senghor was unable to accomplish. As a strongly democratic country with ties to both East and West, Catholicism and Islam, and with a strategic geographical location in the world, Senegal is becoming an important nation in the international political arena.

Political Administration

Senegal is divided into 10 Regions, 30 departments, and 95 Arrondissements. The governor of each region is appointed by and responsible to the president. Elections are held every five years, the last of which was on February 28, 1988. That election was won by Abdou Diouf and his Socialist Party. The Socialist Party, formerly known as the Union Progressive Senegalaise, was formed by ex-president Senghor and has been in power since independence. The 120 members of the National Assembly are elected at the same time as the president. There are 17 independent political parties in Senegal representing a widespread political involvement, but at present only two parties hold seats in the National Assembly. The two parties are the Socialist Party with 103 seats, and the Parti Democratique

Senegalaise, headed by Abdoulaye Wade, with the remaining 17 seats (Personal Discussion, 1992).

Constitutional Development

The development of the present constitutional and political situation in Senegal dates back many years into its colonial past. A few of the main coastal cities have been essentially self-governing for 200 years (Nelson et. al., 1974). As mentioned above, the French allowed some of the Senegalese elite to obtain education and training in France. Since 1914 Senegal has had representation in the French National Assembly, and although token at first, in 1919, Blaise Daigne, an early Senegalese politician, held a sub-cabinet post and had increasing influence. After the second world war, as a gesture of gratitude for military service, the Senegalese representatives were able to become more active in the French political system. Upon their return these people generally became administrators of their towns or regions and as such were able to practice the art of governing as learned in France and shaped by the African culture.

As independence approached the Senegalese constitution developed as a reflection of the experiences of the Senegalese representatives in France. After independence and the disintegration of the Mali Federation, the Senegalese constitution finally became fully operational. During the Senghor era (1960-1980) there were three distinct phases of constitutional change in Senegal:

1. The years 1960-63 were characterized by offsetting power in the hands of the president and prime minister. This balance of power changed because of a coup attempt by then prime minister Dia, after which the office of prime minister was dismantled.
2. The years 1964-75 were characterized by a single party system with repressive

tendencies. The office of prime minister was restored in 1970 and filled by Abdou Diouf.

3. During the period 1976-80, there was a return to a multiparty state and a general opening of the political system.

The concepts developed in the third phase have been continued and accelerated since Abdou Diouf came to power. The constitution of Senegal explicitly maintains the rights of the people to freedom of expression, the sanctity of the home, and the right to land, among other measures designed to ensure the proper treatment of the people by the government.

Appendix E

List of Potential Furniture Makers To Contact for Introduction of Eucalyptus.

**Senegal Bois
Dakar**

**SCIENCIE Sawmill
Dakar**

**GIE Dericourt
Dakar**

**Mr. Abib Diop
Menuiserie, Ebenisterie
M'bour Escale
M'bour**

**Mr. Omar Diouf
Meuserie, Ebenisterie, Charpenterie
Ndouk, Fatick**

**Mr. Alassane Diakhate
Menuiserie, Ebenisterie, Charpenterie
Ndoumbe Diop, Diorbel**

**Mr. Cheikh Niang
Menuiserie, Ebenisterie
Garage Mont Roland
Thies**

**Scierie Dagana
El Hadj Abdoulaye Diop
Menuisier au Quartier Diamegeune
Dagana**

**Mr. Medou Dia Fall
Menuisier, Ebeniste
Ndiambour Le Bois
Louga
Tel. 67-15-70**

Appendix F

Field Research Itinerary

ITINERARY COMPLETED 2/6/91 THROUGH 28/6/91

- 2/6 Arrive Dakar,
- 3/6 Meetings with SRP staff,
- 4/6 Meetings with SRP staff,
- 5/6 Meeting with Government of Senegal staff on SRP,
- 6/6 Interviews at sawmill GIE Dericourt,
- 7/6 Tour through Marche Sandegar (gathered product market),
- 8/6
- 9/6
- 10/6 Meeting at USAID headquarters Place D'Independence,
- 11/6 Prepare for field trip,
- 12/6 Thies, visit with Eaux et Foret agents and wood markets,
- 13/6 Visit plantation at Thiaroye outside Thies,
- 14/6 Visit Agroforestry Research Center,
- 15/6 Diorbel, wood markets,
- 16/6 Kaolack, visit Eaux et Foret agents, plantations and wood market,
- 17/6 Sokone, visit cashew plantation project,
- 18/6 Fatick, visit Eaux et Foret agents and wood markets,
- 19/6
- 20/6
- 21/6
- 22/6 Meetings with SRP staff,
- 23/6 Visit Dakar markets,
- 24/6 Visit Dakar markets,
- 25/6 Visit Dakar markets,
- 27/6
- 28/6 Leave Dakar.

ITINERARY COMPLETED 4/12/92 THROUGH 5/8/92

- 4/12 Arrive Dakar,
- 4/13 Meetings with USAID & SRP,
- 4/14 Interview and hire Senegalese assistant,
- 4/15 Survey Dakar markets,
- 4/16 Survey Dakar sawmills & markets,
- 4/17 Survey Dakar markets,
- 4/18 Review survey results,
- 4/19
- 4/20 National Holiday,
- 4/21 Prepare for field research,
- 4/22 Survey M'Bour markets and surrounding villages,
- 4/23 Survey Fatick markets and surrounding villages,
- 4/24 Survey Kaolack markets and surrounding villages,
- 4/25 Survey Diorbél markets and surrounding villages,
- 4/26 Survey Touba markets,
- 4/27 Survey Louga markets,
- 4/28 Survey Dagana markets and plantation sites,
- 4/29 Survey San Louis markets,
- 4/30 Survey Thies markets,
- 5/1 National Holiday,
- 5/2
- 5/3 Review survey results,
- 5/4 Survey Dakar sawmills,
- 5/5 Survey Dakar markets,
- 5/6 Work with assistant to analyze surveys,
- 5/7 Work with assistant to analyze surveys,
- 5/8 leave Dakar.

Appendix G

Survey Responses

The names of the respondents have been omitted in order to protect their anonymity. Blank responses mean that the questions were not answered. See Appendix B for a key to the question numbers in the English survey forms.

WOOD MERCHANT SURVEYS

Number 1

1. 14 kilometers on the road to Rufisque
- 2.
3. (i) eucalyptus poles of 12-15 cm diameter
buy at 100 fcfa per meter sell at 200-225 fcfa per meter
4. Thies, FAtick, Kaolack, Fleuve
5. Senegal
6. thies
7. no
- 8.
- 9
- 10 no
- 11
- 12
- 13 yes
- 14 by truck after the owner has obtained authorization
- 15
- 16 depends on the time perhaps 20 days without a sale or 300 poles per day
- 17 from 0 to 300 per week
- 18 masonry support, roofing poles
- 19 yes
- 20
- 21
- 22
- 23
- 24
- 25
- 26

27 yes I can sell all that I collect

28 I know the market, and I am located on the national road

29 yes

30

31 there are other places that sell, parcelle Assainis, and after the BP station coming from Dakar.

Number 2

1. Park Bel Air, Dakar

2.

3 buy by Chute(slab) 40,000 fcfa, by Dose(squared trunk) 50,000 fcfa

sell	Frake	6-8cm/22cm/4m	= 1100 fcfa
	bois rouge		= 1100
	Samba		= 800
	Dibite		= 1100
	Linke		= 1100
	Cailcedrat		= 1100
	Frake	4-6cm/22cm/4m	= 450
	Bois Rouge		= 450
	samba		= 350
	Frake	4-6cm/22cm/3m	= 250
	bois rouge		= 250
	samba		= 250
	frake	4-6cm/22cm/2m	= 200
	bois rouge		= 200
	samba		= 200

4 At all the sawmills

5 Cailcedrat and Linke from Senegal; Samba, Frake and Dibite from Cote D'Ivoire

6 Casamance

7 yes

8 The small sawmills in the parks

9 in the parks

10 no

11

12

13 yes

- 14 by horsedrawn carts
- 15 depends on the day, from 0 to 60,000 fcfa per day
- 16 0 - 60,000 fcfa
- 17 0 - 200,000 fcfa
- 18 used in joinery, doors, dressers for rooms, houses
- 19 yes
- 20 yes I once used it to make tent supports and small huts and it still stands today
- 21
- 22 I have seen it planted in the forest
- 23 yes
- 24
- 25 400 fcfa per trunk of length 2.5 meters and 9-7 cm diameter
- 26 I have used it but not sold it
- 27 with length of 2.5 meters it can be used for masonry support
- 28 because it is strong and robust
- 29 no
- 30
- 31 in the Cite Port Park

Number 3

1 Pikine, Dakar

2 Park Lambaye, Pikine

3	Species	buy(fcfa)	sell	
	samba	90,000-92,500/m3	4cm/22cm/4.5m	= 2555 fcfa
	samba		4cm/22cm/4m	= 2250
	samba		4cm/22cm/3.5m	= 1950
	Cailcedrat	115,000-117,000/m3	4cm/22cm/1m	= 850
	frake	116,650-119,650/m3		= 850
	bois rouge	125,000-130,000/m3		= 900
	Accajou	137,000/m3		= 950
	Bordi(?)			= 750

4 LEBOIS, SOA (sawmills)

5 Senegal and the Cote D'Ivoire

6 Casamance

7 yes

8

9

10 no

- 11
- 12
- 13 yes
- 14 small pick-up truck
- 15 depends on the period
- 16 from 0 to 100,000 fcfa
- 17 from 50,000 to 2,000,000 fcfa
- 18 furniture,carpentry,houses,joinery
- 19 yes
- 20 yes
- 21 masonry support
- 22 I have known about for a long time in the countryside
- 23 no
- 24
- 25
- 26
- 27
- 28
- 29 no
- 30
- 31 I do not know

Number 4

- 1 Dakar
- 2 Pikine park Touba Lambaye
- 3

Species	buy(fcfa)	size	sell
Formica	4000	2.8/1.3 mts	5500 fcfa
Bois rouge	700-850	8cm/8cm/1m	
Plywood	14,500	15mm/3.10m/1.53m	15,500
	11,500	12mm/3.10m/1.53m	12,500
	9,000	10mm/3.10m/1.53m	10,000
- 4 SOA Bois(plywood), Gambetta, Tolbiac
- 5 Senegal
- 6 dakar
- 7 yes
- 8
- 9 I have a small saw at the entrance of the park which cuts the wood

- 10 no
- 11 I go and buy it on site
- 12 in dakar itself
- 13 yes
- 14 in small pick-up trucks
- 15 depends on the period
- 16 from 50,000 - 500,000 fcfa
- 17 from 500,000 - 1,500,000 fcfa
- 18 for furniture their rooms and their houses
- 19 yes
- 20 making huts and masonry support
- 21 it was an American who first came and planted the tree in the forest of Lambaye
- 22 no
- 23
- 24
- 25
- 26 I am not sure, I do not know its market
- 27
- 28
- 28
- 30 no
- 31 I do not know

Number 5

1 Dakar

2 Pikine

3	Species	buy	sell	
	bois rouge	95,000-100,000/m3	8cm/8cm/1m	= 800 fcfa
	Frake	95,000-100,000/m3		= 800
	samba	80,000-90,000/m3	22cm/2cm/4m	= 2400

4 SOA Bois, LEbois

5 Senegal and the Cote D'Ivoire

6 Casamance

7 no

8

9 the sawmills themselves work the wood

10 no

11

12

13 yes

- 14 Small pick-up trucks
- 15 depends on the period and the quantity in stock
- 16 0 - 50,000 fcfa
- 17 50,000 - 300,000 fcfa
- 18 furniture, carpentry, beds
- 19 yes
- 20 yes
- 21 masonry support,house poles
- 22 I have known it since I was born
- 23 no
- 24
- 25
- 26
- 27 yes
- 28 for those who wish to use it for masonry supports etc.
- 29 no
- 30
- 31 no

Number 6

1	Dakar		
2	Park Pikine (wood park Overseer)		
3	Species	Buy(fcfa)	Sell(fcfa)
	frake	112,650-119,659/m3	125,000/m3
	bois rouge	140,000/m3	150,000/m3
	samba	92,000-100,000/m3	105,000/m3
	Cailcedrat	80,000/m3	92,000/m3
	santan	45,000/m3	95,000/m3

- 4 SOA, LEBOIS, LINODA, IKARI
- 5 Senegal and Cote D'Ivoire
- 6 Casamance
- 7 no it is up to the client to work the wood
- 8 the carpenters, machinists, and furniture makers
- 9
- 10 no
- 11
- 12

- 13 yes
- 14 large trucks and small pick-ups
- 15 depends on the period
- 16 from 0 - 100,000 fcfa
- 17 from 100,000 to 300,000 fcfa
- 18 furniture ,beds, dressers, doors etc
- 19 yes
- 20 yes but the machinists and merchants in the park do not know it
- 21 construction frames and masonry support
- 22 from Sine Saloum
- 23 no
- 24
- 25
- 26
- 27
- 28
- 29
- 30
- 31

Additional - There are about 200 stalls in the park. Sometimes the prices change if the stocks in the sawmills are finished. For example, this period has not been favorable because we have not had enough wood. There are blockages in Adibjan and the port of Dakar, problems with the customs. The waiting period is difficult, because during this period we use our working capital for our needs and when the orders arrive we no longer have enough money to purchase the wood. The park of Pikine functions thus: the wholesalers of the market buy from the sawmill, and sell their merchandise to the small wholesalers(etail) who then sell to the detailers in the market who do not have stalls.

Number 7

- 1 Dakar
- 2 Park Pikine
- 3

Species	Buy
Frake	80,000 - 105,000 fcfa/m ³
bois Rouge	120,000 - 125,000 fcfa/m ³
- 4 Right here
- 5 Senegal and the Cote D'Ivoire
- 6 Casamance
- 7 no
- 8 the sawmills

- 9 sawmills
- 10 no
- 11
- 12
- 13 yes
- 14 small pick-up trucks
- 15
- 16 0 - 200,000 fcfa
- 17 50,000 - 500,000 fcfa
- 18 for roofs, and others buy it to rework it
- 19 yes
- 20 I cannot say because I have never sold it
- 21 I don't know
- 22
- 23 no
- 24
- 25
- 26
- 27 I don't know
- 28
- 29
- 30
- 31

Number 8

- 1 Dakar
- 2 Park Lambaye
- 3

Species	Buy(fcfa)	sell
Samba	92,500/M3	92,500/m3
Frake	117,000-120,000/m3	125,000-130,000/m3
Cailcedrat	115,000-125,000/m3	130,000/m3
Vene	130.000/m3	145,000/m3
- 4 coming from Cote D'Ivoire and Senegal and Guinea Bissau
- 5 70% Casamance, 25% Cote D'Ivoire and 55 Guinea Bissau
- 6 Casamance
- 7 I only sell it
- 8
- 9
- 10 yes

11 those who are in charge of transportation
12 from Guinea Bissau and the Casamance
13 for the wood bought in Dakar I go myself to get it
14 in a truck
15
16 500 to 1000 kilograms
17 sometimes I can sell two truckloads of wood in one week
18 furniture, carpentry, joinery
19 yes
20
21 support
22
23
24
24
26
27
28
29 no
30
31 on the road to Rufisque near the Nestle factory and Cafal

Number 9 (Large fuelwood seller)

1 Dakar
2 Marche Thiaroye
3 Dimb, Vene Buy at 150,000 per load sell at 15,000 per tonne
4 here
5 Senegal
6 Tambacounda
7 perhaps art pieces
8
9
10 at the location of the vehicle
11
12
13 the owner of the vehicle brings the wood
14 a large truck
15
16 250 -1000 kg.

- 17 5000 kg - 20,000 kg, I buy about 2 large trucks per month
- 18 Cooking, art
- 19 yes
- 20 I Don't know its quality
- 21 stakes
- 22 from plantations
- 23 no
- 24
- 25
- 26
- 27
- 28
- 29 no
- 30
- 31 on the road to Rufisque near Nestle and Cafal

Number 10

1	Mbour		
2	mbour escale		
3	Species	Buy(fcfa)	Sell(fcfa)
	Frake	2500 fcfa unite 4m	2700
	samba	110,000/m3	117,000/m3
	bois rouge	22cm/4cm/1m - 800	900
	Prosopis	250-300 per post	500

- 4 Dakar
- 5 Cote D'Ivoire and senegal
- 6 Casamance
- 7 no
- 8 It is sawn either in Cote D'Ivoire or st the sawmills in Dakar
- 9
- 10 no
- 11
- 12
- 13 yes
- 14 large and small trucks
- 15
- 16 0 - 100,000 fcfa
- 17
- 18 construction,furniture making etc.
- 19 yes

- 20 it is a good wood for construction
- 21 masonry support, roofs
- 22 here in the forest of bandja
- 23 yes
- 24 in the forest of Bandja
- 25 400 per trunk
- 26 600 per trunk
- 27 yes
- 28 because it is very good for construction and roofs
- 29 no
- 30
- 31 at the crossing of Ndiosmone

Additional - Transport Super SG2 20,000 fcfa/load of 2 tonnes; pick-up 12,000 for a load of 1 tonne if the wood has the same density (weight) as frake.

Number 11

1 Rue Escale Mbour

2

3	species	buy(fcfa)	SIZE	sell(fcfa)
	bois rouge	115,000-125,000/m3		130,000 (planks)
	bois blanc	650	22CM/4CM/1M	675
	frake	700		850
	plywood	2,800	4mm	3,200

4 Dakar

5 Cote d'Ivoire, Senegal, Gabon

6 Casamance

7 no

8 the sawmill LEBOIS itself

9

10 no

11

12

13 yes

14 In truck of 5 and 10 tonnes

15

16 from 0 - 30,000 fcfa

17

18 furniture making, joinery, carpentry

19 I have heard people speak of it, but I do not know it
 20
 21 i don't know it well
 22
 23
 24
 25
 26
 27
 28
 29
 30
 31

Number 12

1	Fatick		
2	a Ndouck		
3	Species	Buy FCfa	Sell(fcfa)
	Samba		22cm/4cm/1m = 625
	Frake		= 900
	Cailcedrat		= 850
	Plywood	215cm/122cm/4mm	= 3,100 (?)

4 Dakar, SOA Bois, LINODA, and Casamance
 5 Senegal, Cote D'Ivoire, and Gabon
 6 casamance
 7 no
 8 the sawmills in dakar
 9
 10 yes
 11 the sawmills themselves
 12 from Dakar
 13 no
 14
 15
 16 from 0 to 15,000 fcfa
 17
 18 furniture, roofs, masonry supports
 19 Yes
 20 I have never used it
 21 house poles

- 22
- 23 no
- 24
- 25
- 26
- 27
- 28
- 29 no
- 30
- 31 one time it was sold at the police station

Additional - this business is owned by one in Kaolack in the Zinc market, the owner is called Maguette Diouf - I go to Kaolack to order wood from the main office - problems - the wood from the sawmills often comes with faults and that causes us to lower our sale prices.

Number 13

- 1 Fatick
- 2 Escale
- 3 species buy sell
samba
frake
Bois rouge

- 4 Dakar
- 5 Senegal and the Cote D'ivoire
- 6 casamance
- 7 No
- 8 I buy it in the parks
- 9
- 10 sometimes I go and get it and sometimes it is delivered
- 11 by telephone
- 12
- 13
- 14 Any vehicle
- 15
- 16 I could not say
- 17
- 18 construction of houses and furniture
- 19 yes
- 20 I have never used it

21 I do not know
 22
 23
 24
 25
 26
 27 I don't know
 28
 29
 30
 31

number 14

1 Fatick
 2 Quartier escale

3	species	size	buy	sell
	frake	4cm/22cm/1m	700 fcfa	850 fcfa
	samba	1m3	90,000	113,400
	bois rouge	1m3	126,000	126,000

4 dakar sawmills, LEBOIS, LINODA

5 Senegal, Cote D'ivoire, Gabon

6 casamance

7 No

8 the sawmills themselves

9

10 no

11

12

13 yes

14 10 tonne trucks

15

16

17 1 m3 each week

18 furniture

19 no

20

21

22

23

24
25
26
27
28
29
30
31

number 15 (mainly poles)

1 Avenue Chiek amadou Bamba, Kaolack

2 Park Passage, route de Gossasse

3	species	Buy	sell
	Crintin		1300 fcfa/pole
	Bambou		150 fcfa/pole
	Ronier		600-650/pole

4 Guinea Bissau, guinea Konakry, Senegal

5

6 Casamance, Kolda, tamba

7 no

8 they are cut in the casamance

9

10 only the ronier palm is delivered to us from guinea bissau

11 the merchants of guinea bissau

12 from guinea bissau

13 for the crintin and bambou we are in charge of the transport

14 In trucks of 10 and 20 tonnes

15

16

17 70 to 100 poles

18 roofs and piquets

19 yes

20 yes

21 it can replace the uses of the ronier palm

22 a show put on by the Direction des Eaux et Forets

23 yes

24 Gandiaye

25 they gave it to us to sell in order that they public would get become familiar with it, but i have not tried to sell it since because the people did not know it.

26

27 if there was more publicity about the wood

28

29 no

30

31 at gandiaye

Additional - Bambou permits cost 60fcfa/pole - transport costs are 35 per pole of bambou and 200 per cord of crintin

Number 16

1 Leona, Kaolack

2 marche Zinc

3 species
samba

Buy
92,500/m3

sell

22cm/4cm/1m = 600 fcfa

Frake 119,000/m3

= 800

bois rouge 135,000/m3

= 850

4 dakar, SOA

5 i do not know but I think that it is from the Cote D'ivoire

7 no

8 I comes to Senegal already sawn

9

10 no

11

12

13 yes

14 in 10 tonne trucks

15

16 I do not know, i sell all that arrives and it is difficult to keep track

17

18 furniture , carpentry, roofs

19 no

20

21

22

23

24

25

26

27

28
29
30
31

Additional - it would be good if we planted imported wood such as the samba and the frake, .. there is not a problem with the transport , but the prices are very high.

Number 17

1 Leona Kaolack

2 Marche Zinc

3	species	buy	sell	=
	samba	92,500/m3	22cm/42m/1m	
600fcfa	frake	119.000/m3		= 800
	bois rouge	135,000/m3		= 850

4 SOA

5 Senegal, Cote D'Ivoire(RCI)

6 casamance

7 no

8 it comes already sawn

9

10 no

11

12

13 yes

14 in 10 tonne trucks

15

16 we sell without keeping accounts

17

18 furniture and carpentry

19 I know of it

20 I no nothing, I have never sold it

21

22

23

24

25

26

- 27
- 28
- 29
- 30
- 31

Additional - I do not know any thing about the quality of woods, but the most useful wood is the samba because it is easy to work and is not expensive.

Number 18

- 1 Ndangane
- 2 Scierie Ndangane route de point Noir, Kaolack
- 3

species	buy	sell	
dimb		8cm/8cm/1m	= 700 fcfa
bois rouge			= 750 fcfa
vene			= 950
santan			= 725

- 4 in the forests of saloum
- 5 senegal
- 6 Sine Saloum
- 7 Yes
- 8 the workers in this sawmill
- 9
- 10 no
- 11
- 12
- 13 yes
- 14 truck or pickup mostly
- 15
- 16 for a long tim we have done no work because our quotas have been suspended
- 17 the quota could be 30 trunks and contain all three types of wood
- 18 furniture making
- 19 yes
- 20 I sawed it once, but it had many fissures and was therefore not good
- 21 Masonry support and 8/8 or 6/6 posts are possible
- 22 There was someone who had sent it from Diya near Sibassor
- 23 no
- 24
- 25

- 26
- 27
- 28
- 29
- 30
- 31 I do not know

Additional - If the sawmill is not working it is because we are no longer given quotas - they do not let us saw certain woods because they say that they are fuel woods - We have been waiting for 4 months for our quota - all the quotas are given to the large sawmills in dakar

Number 19

1	Diorbel		
2	Marche Ndoum be Diop, Rue D'Avion		
3	Species	Buy	sell
	frake	117,000/m3	22cm/4cm/1m = 850 fcfa
	bois rouge	140,000/m3	= 975
	Samba	92,500/m3	= 650

- 4 Sawmill LEBOIS in dakar
- 5 RCI
- 6
- 7 no
- 8 the sawmill
- 9
- 10 no
- 11
- 12
- 13 yes
- 14 in truck 9 It does not matter which
- 15
- 16 it depends on the period and the furniture makers who come to buy
- 17 I can sell 3 to 40 planks per week
- 18 furniture, carpentry
- 19 yes
- 20
- 21 I could not discuss it quality without having first sawn a trunk
- 22
- 23 no

- 24
- 25
- 26
- 27 no
- 28
- 29
- 30
- 31

Additional - I Could not sell eucalyptus because the trunk has too small of a circumference, such that one cannot produce posts of greater than 8/4 or 6/8. To obtain wood from the forests of the casamance, it is necessary to go to the site, loose a week to make sure that you obtain the proper quality - that is not worth the effort. Actually it is very difficult to obtain quotas(before it was easier) Before it was very easy, you just went into the woods and cut whatever trees you wanted - but with reforestation project this has all become illegal.

Number 20

- 1 Diorbel
- 2 Quartiere Escale
- 3 species buy Fcfa sell
- samba 90,000/m3
- 22cm/4cm/4m = 2,600 fcfa
- bois rouge 137,500/m3 22cm/4cm/1m =
- 1,050 fcfa
- frake 119,640/m3 = 900
- 4 LINODA, soa, LEBOIS in dakar
- 5 mostly from RCI and Gabon
- 6
- 7 no
- 8 At LEBOIS and SOA they saw the wood themselves, LiNODA imports sawn wood
- 9
- 10 no
- 11
- 12
- 13 yes
- 14 trucks of 10 tonnes
- 15
- 16 depends on the period but 0 -5 planks per day
- 17 3
- 18 Furniture, framing

- 19 yes
- 20 I do not know
- 21 no
- 22
- 23
- 24
- 25
- 26
- 27 I don't think so but I don't know the wood
- 28 no
- 29
- 30
- 31 I have never seen it sold

Additional - wood does not sell like other products(which ones sells frequently) but it is a lot more profitable. before selling was difficult because i did not understand the clients and I had not mastered the markets. but now sales are better because i have gained experience.

Number 21

1	Diourbel			
2	Rue du Dispensaire			
3	Species	buy	sell	
	Samba	92,500/m ³	22cm/4cm/4m	= 2500
	frake	119,640/m ³	22cm/4cm/1m	= 900

- 4 LINODA in particular and the other sawmills
- 5 I believe that they originate in the RCI
- 6
- 7 no
- 8 They come from Abidjan already sawn
- 9
- 10 no
- 11
- 12
- 13 yes
- 14 in tricks of 10 and 20 tonnes
- 15
- 16 Depends on the period, but from 0 to 20 planks
- 17
- 18 furniture and wood work

- 19 no
- 20
- 21
- 22
- 23
- 24
- 25
- 26
- 217
- 28
- 29
- 30
- 31

Additional - I have stopped selling Bois rouge, there is no market for it here because it warps easily

Number 21

- 1 Diourbel
- 2 Marche Ndoumbe Diop
- 3

Species	Buy	sell	
Bois rouge	140,000/m3	22cm/4cm/1m	= 900
Bois Blanc	90-95,000/m3	22cm/4cm/4m	= 2,450
- 4 LEBOIS, SOA, and in the wood parks of Dakar
- 5 it is imported but I am not sure of the origin
- 6
- 7 no
- 8 perhaps it comes sawn or perhaps the sawmills saw it themselves
- 9
- 10 no
- 11
- 12
- 13 yes
- 14 in trucks
- 15
- 16 I cannot give you exact numbers since we can go three days without selling anything
- 17
- 18 furniture and carpentry
- 19 yes
- 20

21
22 Here in Senegal in diourbel
23
24
25
26
27
28
29 no I don't believe so
30
31

Additional - I have not used eucalyptus, but it seems to me that it duplicates the use of the ronier. perhaps if the truck were larger one could use it for making furniture. It could really help the roof makers, if it had a larger trunk that would be a good thing.

I prefer to sometimes buy in the wood parks because strangely they have better prices than sawmills.

number 23

1 Escale a diourbel
2 Marche Ndoumbe Diop
3 samba buy at 90,000 fcfa/m3 sell : depends on the customer
4 LINODA, SOA, LEBOIS
5 RCI, Gabon
6
7
8 no
9 in the sawmills themselves
10 no
11
12
13 yes
14 by trucks
15
16 depends on the period
17 from 1m3 to 3m3 per month
18 furniture or roofing
19 yes
20 I have never sold it

- 21 for huts
- 22
- 23
- 24
- 25
- 26
- 27 I could try if they were made it square posts
- 28
- 29 no
- 30
- 31

Number 24

- 1 Marche Ndoumbe Diop
- 2 Diourbel
- 3

species	buy	sell	
samba	90,000/m3	8cm/6cm/4m	= 2,100
		8cm/6cm/4.5m	= 2,400

- 4 SOA bois
- 5 I do not know, perhaps RCI or Gabon
- 6
- 7 no
- 8
- 9 One buy it sawn at SOA bois
- 10 no
- 11
- 12
- 13 yes
- 14
- trucks
- 15
- 16 that is difficult to say
- 17
- 18 roofs and buildings
- 19 no
- 20
- 21
- 22
- 23
- 24

30 in the this park(could not find it)

31

additional - Transport : you must take one day on the road to go and make the order and then wait 2 -3 days to receive the wood - 15 tonnes is about 80,000 to 85,000 fcfa (transport from LINODA in Dakar to TOUBA.

It is a big problem that i have to go to Dakar to look for wood - sometimes you leave with no one to see.

Number 26

1 Touba

2 Marche Touba Gare bae Ndaw

3	species	buy	sell
	Bois rouge	100,000/m3	106,500 fcfa/m3
	Samba	90,000/m3	93,500/m3
	Frake	105,000/m3	108,000/m3

4 Dakar, IEBOIS, LINODA, SOA BOIS

5 I know that the samba comes from the RCI and that the Bois rouge comes from both the RCI and the Casamance

6 Senegal

7 no

8 the wood comes to us already sawn

9

10 no

11

12

13 yes

14 in vehicles

15

16

17 8 to 10 cubic meters and perhaps double

18 furniture, roofs, buildings

19 yes

20 yes

21 masonry support

22 here in Touba

23 yes

24 in the fields of Kaffrine (projects)

25 one pole at 600 fcfa

26 750 per pole

27 yes but the speed of the sale will depend on the period

28 because there are a lot of buildings under construction in Touba

29 yes

30

31 There are many places which sell eucalyptus in Touba, I have just finished my stock and am going to look for some in front of the big mosque. In Touba there is no limit which you can sell, you can unload and sell a truckload in less than a day. Price of eucalyptus 600 fcfa per pole if it is delivered if you get it in the countryside it costs 500 fcfa per pole and 100 fcfa to transport it. The differences in the price depend on the period

Number 27

1 Marche Khaira

2 Touba

3 Pole species	buy	sell
Teck	500	750 fcfa per pole
mangrove	550	700
ronier	600	750
bambou	135	200

4 casamance

5

6

7

8

9

10 yes

11 the sellers

12 casamance

13

14

15

16 depends on the period from 10 to 300 poles

17

18

19 yes

20 yes i think so

21 masonry support, buildings

22 At home in Ngoundiane, Thienaba Thies, and on the plantation of my father

23 no

24

25

26

27 yes because it is sold here

28 this is a good market for building construction

29 it is sold in Touba, but not in this market

30

31

Additional - I remain here, the merchants take charge of going to the bush and collecting the wood - when they return, I buy their wood.

Number 28

1 IOUGA

2 mARCHE gARAGE

3 Samba Buy 90,300f/m³ sell 100,800 fcfa/m³

4 Dakar in the parks and LINODA and LEBOIS

5 I do not Know

6

7 no

8 the sawmills

9

10 no

11

12

13 yes

14 in trucks of 10, 30, and 20 tonnes

15

16 35,000 to 200,000

17

18 furniture and buildings

19 yes

20 I do not know, I have only seen it

21 i do not know

22 from the Eaux et Forets

23 no

24

25

26

27 if the carpenters had a use for it I could sell it

28

29 no I do not know

30

31 On the other side of the market there are people who are selling a wood that

looks like it.

Additional - Transport , between 3 and 4 days - Cost , between 80,000 - 90,000 fcfa per load of 20 - 30 tonnes - unload 35,000 to 40,000. and there are some times a lot of problems

Number 29

- 1 Louga
- 2 Marche Garage
- 3 species samba sells for 2,500 fcfa for 8cm/8cm/4m
- 4 Dakar LINODa
- 5 I don't know the origin of the wood
- 6
- 7 no
- 8 linoda
- 9
- 10 no
- 11
- 12
- 13 yes
- 14 in large trucks
- 15
- 16 I do not know it depends on the period
- 17
- 18 Roofs carpentry
- 19 yes
- 20 I do not know, I know only that it is large and strong
- 21
- 22
- 23
- 24
- 25
- 26
- 27 If there were clients I could sell it
- 28
- 29 no
- 30
- 31

Additional - Transport duration , 3 to 4 days, Cost - depends on the tonnage - 110,000 to 115,000 fcfa per 30 tonne load

Number 30

- 1 Louga
- 2 Marche Garage
- 3 Samba Buy at 92,500f/m³ sell at 100,000 fcfa/m³
- 4 Dakar, Parks, LINODA, LEBOIS
- 5 RCI
- 6
- 7 no
- 8 the sawmills
- 9
- 10 no
- 11
- 12
- 13 yes
- 14 trucks of 10, 20, 30 tonnes
- 15
- 16
- 17 1 m³ per week
- 18 wood work
- 19 no
- 20
- 21
- 22
- 23
- 24
- 25
- 26
- 27 I cannot say because I do not know
- 28
- 29 no
- 30
- 31 I do not know

additional - Transport, Duration - 3 days; costs 75,000 for 10 tonnes, 100,000 for 30 tonnes - at the sawmill they do not charge for loading - in the parks they charge 15,000 for loading 20 and 30 tonnes - it costs 20,000 to unload 20 and 30 tonne trucks. N.B. in transportation , it is not only wood that is being transported, there are also metal, charcoal iron etc.

Number 31

- 1 Louga
- 2 Centre Ville
- 3

	buy	sell
Makore	145,000/m ³	1m/22cm/4cm = 1000 fcfa
Sipo	145,000/m ³	= 1000
Cailcedrat	137,500/m ³	= 900
frake	128,000/m ³	= 900
- 4 LINODA, IKARI, park Lambaye DaKar
- 5 RCI or senegal
- 6
- 7 no I only sell it
- 8
- 9
- 10 no
- 11
- 12
- 13 yes
- 14 in 10, 20, 30 tonne trucks
- 15 depends on the period.
- 16 in the months of february, March , May and June, the market is good. I am a wood worker, I work the wood and sometimes i sell a little more than 3m³ per month
- 17 The people buy around celebration time Tabaski , Magal etc
- 18 furniture, beds, libraries
- 19 yes
- 20 I have never worked it, but it seems as if it would be good
- 21
- 22 I have a friend who is a wood worker in Rosso and he said that he had made furniture partially of eucalyptus
- 23 no
- 25
- 25
- 26
- 27 I could possibly work it, but selling it would be a problem since non of the other woodworkers have the materials to work it, i am the only one with the machinery
- 28
- 29 no
- 30
- 31 no

Additional - Transport - Duration, I make the order for the wood in 1 day, receiving

the wood depends on the load of the lorry, which gathers other clients merchandize to fill its load, usually 3 - 5 days - it costs 4,000 fcfa/m³ for transport, 2,000 fcfa/m³ to load and my workers unload it for me.

Number 32

1 St. Louis

2 bayal Place de L'Independance

3 species	Buy	sell
Bois rouge	140,000-150,000/m ³	22cm/4cm/1m = 800 - 900 fcfa
Frake	119,650-130,000/m ³	= 775 - 800
samba	92,500- 95,000/m ³	= 600 - 675

4 dakar, LEBOIS, SOA,SENBOIS

5 Senegal, RCI, Gabon - Casamance In the casamance I can go myself to make the purchase, or I can telephone the sellers there.

6 Casamance

7

8 I can buy it sawn or can buy a large piece and have another sawmill cut it

9

10 no

11

12

13 yes

14 10 or 15 tonne trucks

15 I do not know, we do not keep accounts

16

17

18 wood work, buildings, masonry support

19 yes

20 I know it only by sight

21

22

23

24

25

26

27 That depends, I would have to test it in advance

28

29 no

30

31 no

Number 33

1 St Louis

2 Rue de Paris

3	Species	Buy	sell
	Frake	130,000/m3	22cm/4cm/1m = 900 fcfa
	Samba	130,000/m3	= 750
	Bois rouge	130,000/m3	= 950

4 Dakar

5 I do not know

6

7 no

8

9 Perhaps at the sellers

10 no

11

12

13 yes

14 in trucks

15

16 from 10,000 to 40,000 fcfa

17

18 Furniture,woodwork

19 yes

20 yes

21 used for medicinal purposes

22 from certain houses in St.Louis

23 no

24

25

26

27 yes I believe so

28 If people start to sell it, I will also

29 perhaps in the market

30-

31

Additional - The transport price is incorporated in the 130,000 fcfa. You give a gross sum to the merchant, and he is in charge of finding and transporting the wood. The wood is then unloaded in the market by the workers in the truck and we remove it from the market by horse and cart. Price from market to store in the cart 1000 fcfa.

Number 34

1 St Louis

2 Quartier SOR

3	species	buy	sell
	Samba		1m/22cm/4cm = 700 fcfa
	frake		= 900
	bois rouge		= 900

4 Either the sawmill or the parks of Dakar

5 RCI

6

7 No we but it sawn

8 I think it is imported sawn

9

10 no

11

12

13 yes

14 10 to 30 tonne trucks

15 In general I do not keep notes

16

17

18 Buildings and furniture

19 no

20

21

22

23

24

25

26

27

28

29

30

31

Additional - We have our own truck and therefore the price is that of paying the chauffeur, the diesel, and the repair.

Number 35

- 1 St Louis
- 2 Quartier SOR, Avenue de Gaulle
- 3

Species	Buy	sell
Frake	120,000/m ³	1m/4cm/22cm = 850 fcfa
samba	98,000/m ³	= 650
- 4 Dakar, LEBOIS
- 5 Perhaps Senegal
- 6 Perhaps Casamance or Tambacounda
- 7 We buy it sawn
- 8 The sawmill LEBOIS
- 9
- 10 no
- 11
- 12
- 13 yes
- 14 trucks
- 15 depends on the period
- 16 0 to 10 planks
- 17
- 18 roofs, doors, furniture, construction
- 19 yes
- 20 I cannot tell, I have only seen it
- 21
- 22
- 23
- 24
- 25
- 26
- 27 yes I could sell it well, if it were cut into planks
- 28
- 29 no
- 30
- 31 I do not know, because here they only sell three woods Frake, samba and bois rouge, and i do not sell the third

Additional -It is difficult to sell much because there are a lot of wood sellers, If you let the eucalyptus grow to a large size then perhaps you could get planks from it. Transport from dakar 6000 fcfa/m³ unload 1000 fcfa/m³

Number 36

1 St Louis

2

3 Species buy

bois blanc

bois rouge

frake

sell

1m/22cm/4cm = 650 fcfa

= 950

= 900

4 Dakar, SOA

5 I do not know the origin

6

7 no

8 Perhaps in the sawmill SOA

9

10 no

11

12

13 yes

14 in our truck

15

16 I do not know

17

18 beds, doors , construction

19 no

20

21

22

23

24

25

26

27

28

29

30

31

Number 37

1 St Louis

2 Pikine

3 species Buy

bois rouge

sell

1m/4cm/22cm = 900 fcfa

- samba = 600
- frake = 900
- 4 Dakar
- 5 no I do not know
- 6
- 7 we buy it sawn
- 8 I do not know
- 9
- 10 no
- 11
- 12
- 13 yes
- 14 in trucks of all categories
- 15
- 16 I cannot evaluate that
- 17
- 18 the use depends upon the needs of the buyers
- 19 yes
- 20 I have only seen it, I have never touched it
- 21
- 22
- 23
- 24
- 25
- 26
- 27
- 28
- 29
- 30
- 31

Additional - Transport - depends on the merchandise, 50,000 to 100,000 per load for 10 and 20 tonne trucks. unloading 15,000 to 20,000 fcfa

Number 38

- 1 St Louis
- 2 Pikine

3	species	buy	sell
	bois rouge	130,000-135,000/m3	1m/2.5cm/22cm = 950 fcfa
	samba	90,000-100,000/m3	= 650 fcfa

frake 120,000-119,600/m3 = 850-900
 4 Dakar, SOA, LINODA
 5 RCI
 6
 7 no
 8 the sawmills themselves
 9
 10 no
 11
 12
 13 yes
 14 trucks
 15
 16 I could not tell you exactly, But I go to Dakar once a month to look for wood
 17
 18 wood work
 19 no I have only heard people talking about it
 20
 21
 22
 23
 24
 25
 26
 27
 28
 29
 30
 31

Additional - Transport - 10 tonnes truck is 72,500fcfa. 15 tonne truck 80,000 fcfa.
 Unload 10 tonne for 7000 fcfa.

Number 39

1 St louis
 2 Pikine
 3 species Buy sell

frake	120,000/m ³	1m/2.5cm/22cm = 900 fcfa
samba	90,000/m ³	= 650 fcfa
Bois rouge	130,000/m ³	= 950

- 4 Dakar, LINODA, SOA
 - 5 Bois rouge is from senegal , but I do not know where the others are from
 - 6 Casamance
 - 7 No
 - 8 It is the sawmills that saw it
 - 9
 - 10 no
 - 11
 - 12
 - 13 yes
 - 14 trucks of all categories
 - 15
 - 16 0 to 10 planks
 - 17 sometimes you can be 10 daya without selling
 - 18 woodwork, buildings
 - 19 yes
 - 20 i know it only by sight
 - 21
 - 22
 - 23
 - 24
 - 25
 - 26
 - 27 that depends on the clients, if there was a need i could sell it
 - 28
 - 29 no
 - 30
 - 31
- Additional -0 Transport 6000 fcfa/m³ - unload 500 fcfa/tonne

Number 40

- 1 Thies
- 2 Grand Marche
- 3

species	buy	sell
samba		1m/2.5cm.22cm = 600 - 650 fcfa
frake	4m/8cm/8cm- 2,600	= 2,800
bois rouge	4* 4m/6cm/8cm - 5,500	= 6,000

4 dakar, Park Lambaye de Pikine
 5 Bois rouge is from senegal and I do not know the origin of the other woods
 6 casamance
 7 no
 8 The wood is bought already sawn in the wood park in dakar
 9
 10 Some times i telephone and it is delivered, or I go there myself
 11 the merchant who sells it to me
 12 from Park Lambaye de Pikine
 13 sometimes
 14 depends on the size of the load , either trucks or pickups
 15
 16 0 to 50,000
 17
 18 doors, masonry support, roofs
 19 yes
 20 I do not know the characteristics well
 21 I have seen people use it as masonry supports
 22 Here at thies
 23 no
 24
 25
 26
 27 I am not certain
 28 because I have never sold it
 29 In the fields located behind my store
 30
 31

Number 41

1 thies
 2 Grand Marche
 3

Species	buy	sell
samba		4m/2.5cm/22cm = 2,550
bois rouge	1 packet of 4 = 5,000	5,500
frake	5,000	5,500

4 Park Lambaye Pikine in dakar
 5 I don't know the origin
 6 I do not know
 7 no

- 8 I buy it sawn at the parks
- 9 I do not know
- 10 no
- 11
- 12
- 13 yes
- 14 trucks or Pickups
- 15
- 16 0 to 40 planks
- 17
- 18 roofs , doors
- 19 yes
- 20 yes because I have seen people buying and selling it
- 21 Masonry support in general
- 22 Here in thies
- 23
- 24
- 25
- 26
- 27 That would depend on the buying price, if it were affordable, I could
- 28
- 29 It is not sold any more
- 30
- 31

Additional - Transport - pickup 11,000 fcfa per load of 1 tonne - unload 500 fcfa per load.

Number 42

- 1 Thies
- 2 Grand marche
- 3

species	buy	sell
samba	90,000-100,000/m3	
Bois rouge	135,000/m3	
Frake	118,000-120,000/m3	
- 4 Park Lambaye pikine
- 5 no I do not know
- 6
- 7 no
- 8 the sawmills in dakar

- 9
- 10 I can Telephone and they will deliver it to me, or I can go there and get it
- 11
- 12
- 13 sometimes
- 14 trucks or pickups
- 15
- 16 I don't keep track, but i can sell from 0 to 80 planks
- 17
- 18
- 19 yes
- 20 I do not know of many things
- 21 Masonry support
- 22
- 23
- 24
- 25
- 26
- 27
- 28
- 29
- 30 In the fields
- 31

Additional - The prices of imported woods are not fixed. It is a matter of the customs and the matter of how long the wood is in port. if there is a big demand the price goes up. in general we sell the slabs.

Number 43

- 1 Thies
- 2 Grand marche
- 3

species	buy	sell
samba	85,000-90,000/m3	4m/2.5cm/22cm = 7,800 fcfa
Bois rouge	95,000-100,000/m3	1m/22cm/2.5cm = 950
Ronier	300- 500 /pole	400 - 650 /pole
Frake	95,000 - 100,000/m3	1m/22cm/2.5cm = 950 -1,000
- 4 Park Lambaye Pikine
- 5 Senegal, RCI
- 6 casamance
- 7 no

- 8 the dakar sawmills or they can also buy it sawn from the RCI
- 9
- 10 no
- 11
- 12
- 13 yes
- 14 trucks and Pickups
- 15
- 16 difficult to say from 0 to 10 planks
- 17
- 18 Furniture and roofs
- 19 yes
- 20 yes because the masons use it for supports
- 21 masonry supports
- 22 here in senegal
- 23 yes
- 24 the owner of a field sold it to me here
- 25 1 pole for 250 fcfa
- 26 1 pole for 350 fcfa
- 27 If it looks good , I can sell it
- 28 I am not sure that it can be sawn into plank
- 29 yes from time to time as masonry supports
- 30
- 31

Additional - Transport - truck, 20,000 per load of 2 to 4 tonnes
 unload 1,500 to 2,000 fcfa

It would be a good thing if you could do a promotion of senegalese woods because that would avoid high prices since there would not be the costs of custom and transport.

Number 44

- 1 Soa Bois
- 2 Rue de Rufisque Km 4
- 3

Species	sell
Samba	90,000 fcfa/m3
Frake	119,000 fcfa/m3
Bois rouge	145,000 fcfa/m3
- 4 100% for RCI
- 5
- 6

- 7 yes
- 8
- 9
- 10 no
- 11
- 12
- 13 yes
- 14 by boat
- 15
- 16
- 17 8000 m3 per year
- 18 wood work, carpentry
- 19 yes
- 20 no it is good for posts and paper, poles and nothing more
- 21
- 22
- 23
- 24
- 25
- 26
- 27 no, you must understand the qualities of the wood
- 28
- 29
- 30
- 31

Additional - The Samba is workable with circumference of 1.2 - 1.3 meters it is sellable, but with the small eucalyptus it is not possible. It is necessary to find markets. forests of eucalyptus must produce at least 30,000 m3 per year. 70 % of our sales are in Dakar 30 % to the regional markets. there are other sawmills that work only senegalese woods, when you give them a quota of 10 feet, they will cut 500 feet it is a disaster for senegal

FARMER/VILLAGE SURVEYS

Number 1

1 name

2 overseer of the eucalyptus plantation

3 village of Mbelonguithie, arrondissement gandjaye

4 fatick, Gandjaye, and Kaolack

5

6 15 to 20 minutes

7 in car

8 30 kilometers

9 to the rurale community

10 13 years

11 9.6 hectares

12 average height 10.1 meters

13 average circumference 35 cm

14 the villagers of Mbelong

15 625 plants per hectare - 187 plants per hectare survived , $187 * 9.6 = 1791$ trees

left

16

17

18 We planted after getting advice from the E&F

19 to the contrary it was very quick

20 because it was a time when there was a good rain

21 they gave us DIELPOUDRE (for termites) to treat

22 the trees come from E&F

23 the E&F agents

24

25 they gave them to us and promised us that we would benefit

26 they told us that at maturity we could cut the trees, sell them and used the money

27 solve the problems of the village

28 no

29

30

31 at the beginning they paid us

32 with necessities sorghum, rice, wheat etc

33 we did

34 the Eaux et Forets agents

35

36

37

38

39

40

41

42 The agents of the Eaux et Foret(E&F) have told us when to sell , they have also helped us find clients, but you can also sell if you find the clients yourself

43 not any more

44

45

46

47

48 to resolve the problems of the village and to buy new trees for reforestation

49 the rural council

50 it will be decided after consultation

51 because there are many parties involved in the plantations

52 that will be difficult at the village level, because the wood can be used at 3 poles per day - if not it will be necessary to sell them in town and the distance and lack of knowledge of the tree will cause problems

53 it depends on the potential demand

54 no but I am sure that it can be used for the construction of huts and houses

55

56

57

58

59

60 no they are not interested

61

62

63

64

64

66 at the beginning, they came here very regularly, but as the trees neared maturity,

67 they came less and less frequently

68

69 yes from the E&F agents

70

Additional - Actually it is the agent from PRECOBA in particular who has worked with us. He comes all the time. It is Kane, the agent, who shows and tells us what we should do. the agent of the E&F is not bothered with us any more. PRECOBA works

with the agent of the Rural Community(Communaute Rurale) . the rural Council appropriate finances for reforestation - 200,000 to 300,000 fcfa the plants are bought with the budget of the Rural Community and distributed to the villagers. Rural Community consists of villages which want to plant. After the money has been earned, it is used thus: 40% goes to the Rural community for general benefit ie health; 30% goes to the villagers who worked on the trees and 30% is allocated to further reforestation. This is predetermined by the PRECOBA project

Number 2

1

2 **President of the committee on the Protection of Nature**

3 **Malikunda- Bamabara**

4

5

6

7

8

9

10

11 6 hectares, 3 hectares, 3.5 hectares , wind break 1.9 km on three sides

12

13

14

15

16

17

18

19

20

21 the E&F agents have given us chemical products and showed us how to use them - DUSBAN last year and in other years phinitrition 25% for protection of the vegetation

22

23

24

25

26

27

28

29 no

30

31 the villagers
32 it was decided after a conversation with Chiek Cissoko , the minister
33
34
35
36
37
38
39
40
41
42
43 to other villages
44 9 years old
45 i do
46 we sell them right here
47 right here
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67 many times we have frequent contact
68
69 an agent of the E&F
70

Additional - the eucalyptus will be sold to people who want to construct their houses and huts, we have planted them, it was an E&F agent who showed us how to plant them. The authorities have promised that the wood will belong to us when it is mature. We will sell it to resolve the problems of the village for example medicines, purchase of chemical products for the fields to prevent termites

Number 3

1

2 overseer of the plantation

3 at Ngana Ndiogou

4 we have not looked for markets, we sell to who ever comes here

5 Kaolack , Sibassor, Gandjaye

6 10 -12 km you pay 50 fcfa to go in a car

7 by horse and cart or car

8

9

10 20 hectares planted in 1978, 10 in 1979, 20 in 1980

11

12

13

14 the E&F gave us the seedlings, we planted the trees at 4*4 spacings

15 I knew the exact number of trees that have been planted, but I have forgotten

16

17

18 the E&F came with the plants and told us about the fuelwood problem and that it would be wise to reforest

19 the trees were not difficult to plant

20 they were treated first and i was chosen as responsible for the garden

21 it was a powder and other products in broken form and red color distributed by the E&F

22 the E&F maybe kaolack

23 After having planted and treated it was left up to me to take care of the plantation i was not told how to take care of the trees after that

24 no one has advised us on the use of the trees once they got big

25

26 They brought them to us, but I am not sure if they were bought or not

27

28

29 yes

30 I have forgotten the amount, but after each work the E&F came and paid us

31 I am not yet sure, but there are some trees that have reached maturity and are starting to deteriorate, I spoke with the president of the rural community and we cut them and gave the wood to the women for fuel
32 I am not sure, but we re depending on the E&F agents
33 not from in this plantation , but the one at Ndiansrene we have sold a few
34 i don't know
35
36
37
38
39 some but I am not sure of the quantity
40
41
42
43 I do not know
44 they were the trees planted in 1983 (9yrs)
45 I do not remember
46 no
47
48
49
50
51 That is not up to us, but to the director of the E&F who knows what to do with this money
52
53 If it is not possible to sell them, we will ask the E&F to allow us to use them for the construction of our houses and for fuel wood
54 because they are strong and robust
55 I think not, the price is affordable
56 There are possibilities for sale because occasionally cars stop and ask if the trees are ready for sale
57 yes
58 to fix my house and to make a bench
59 the prosopis is harder and resist the sun better, but the eucalyptus is straighter
60 of course
61 yes
62 It is in General a very good tree, I have only compared it to a very hard wood(prosopis)
63 no
64 many things money, sorghum, meat and fish
65 the E&F agents will tell us what use to put the money

66 sometimes they come, but only to visit

67

68 yes the agents of E&F

69

Additional - When the E&F agents came with the eucalyptus seeds I did not know any thing, but now things are very positive. I have made a nursery from which I have sold and that made me a lot of money and i have often worked in collaboration with the E&F agents, and that has been good - this is all because I am very interested in my work

Number 4 <COSPE is an Italian agroforestry project >

1

2 Joint overseer of the plantation

3 near the village

4 the market of Ndoulo

5 at ndoulo

6 walking, 1 hour in car 50 francs or in our own horsecart

7 horsecart, walk., car

8 not very far

9 to every one

10 about 2 years

11

12

13

14 we did and the E&F agents

15 I have forgotten

16 A lot of them died because there was no rain that year

17 it was better there were rains

18 to gain future profits

19 no

20 the ground was not hard and it was easy to plant

21 we put some powder on them

22 The agents of COSPE

23 the agents who brought us the seeds

24 they told us to keep an eye on the trees and to cut off the leaves that appeared on the bottom of the trunk

25

26 I do not think so

27

28
29 no I do not believe so
30
31
32 Normally I believe that it will be the COSPE agents who decide
33 no
34
35
36
37
38
39
40
41
42
43
44
45 perhaps the COSPE agents
46
47
48
49
50
51 It will be used after consultation with the COSPE agents
52 after consultation, perhaps the COSPE agents
53 we will contact the COSPE agents so that they can tell us
54 because they will be better educated on these problems than we are
55 no, I believe that it will be easy to sell the trees
56 It is expected that the COSPE agents will show us all the possibilities
57 not yet , they have not matured
58
59
60
61
62
63 yes it is the women in the majority who have taken part in the plantation
64
65
66 the COSPE agents come often to see how our work is going
67
68 yes up till now it has been a continual process

69

Additional - The eucalyptus plantation has had no effect on the quality of the other crops

Number 5

1

2 Overseer of the plantation,also present - overseer of the women and president of the women

3 Diollo

4 Ndoulo

5 3km

6 walking 1-2 hours

7 walking or by horsecart

8 2 km

9 it is owned by the community, but before the field was mine

10 3 seasons

11

12

13

14 us and the COSPE agents

15 we have forgotten , but by all means we have enlarged the number of trees last season

16 about 50

17 about 10

18 to make a profit and for the leaves which can be used in medicine, it can be drunk as a tea

19 no that was not at all difficult

20 because it was done in the wet season (winter)

21 they gave us powder depending on the presence of predators

22 COSPE

23 COSPE

24 not yet

25

26 no

27

28

29 They gave us a little money last year from the SRP

30 46,650 fcfa

31 the decision will be from the COSPE agent

32

33 no, not yet

34

35

36

37

38

39

40

41

42

43

44

45

46

47

48

49

50

51 after consultation with COSPE the money will be used for the needs of the community

52 after consultation with COSPE agent

53

54

55 There is always a solution

56 There are many possibilities, houses, utility poles etc.

57 no

58

59

60

61

62

63 yes

64 as yet there have been no benefits, because the profits have not yet been realized

65

66

67

68

69 yes

Additional - It was the COSPE agents who introduced this wood into the village - we had no idea about it. we would be very interested in having other information

WOOD USER/PURCHASER SURVEYS

Number 1

- 1 Sawmill, Sciencie
- 2 casamance <located in Dakar>
- 3 600 km from casamance to dakar
- 4
- 5
- 6 100 board feet quota, capacity of 20 to 25 m³/day

species	quantity	price
cailedrat		
Linke		
Vene		
Dimb		
- 7 make huts, furniture, carpentry, horsecarts
- 8 yes to wholesalers
- 9 yes
- 10 but we do not know its characteristics
- 11 I do not know
- 12 no
- 13 no
- 14 no
- 15 no
- 16
- 17 yes

Number 2

- 1 Wood worker
- 2 park Lambaye Pikine
- 3 I am right here
- 4
- 5 at the clients house or for what they order, furniture carpentry or doors
- 6 0.5m³ or the client might bring his own wood

species	quantity	price
frake	0.45m ³	4.5m 5,400 per plank
vene	0.03 m ³	2m 2,000 to 2,500
bois rouge	0.02m ³	
- 7 yes by hand and machine

8 yes to the potential clients and after an order

9 yes

10 I do not know, I have never worked it

11 Masonry support and huts

12 no

13

14

15

16 in the house

17 yes

Number 3

1 Societe Lebois

2 Scierie et Negoce - RCI

3 by Boat

4 boats arrive all the time it takes three days from RCI

5

6 1,100m³ december 92, 375m³ january, 450 february, 335 march average of 628m³ per month

7 samba masonry support, bois rouge and frake woodwork

8 yes to entrepreneurs and local sellers

9 yes, but it should be left in the ground for a longer time

10 my work is with wood of long veins

11 therefore it could be used, but for future generations

12 no they are to young

13

14

15

16 I have known it for 10 years

17

additional - they make pirogues with samba and that is a very good market

Number 4

1 woodworker

2 Darou Salam at Thiaroye

3 I work here

4

5 wood work , door, in Houses etc

6 Frake 1- 2 M³ bois rouge 3-4m³

7 yes

8 yes to other joiners and on order to the clients

9 no

10

11

12

13

14

15

16

17 yes

Number 5

1 woodworker

2 park Lambaye Pikine

3 buy the wood and work it here

4

5 that depends on the order

6 Frake, bois rouge, samba, cailcedrat

7 furniture, carpentry etc

8 I work on order

9 yes but I have never worked with it

10 no

11

12 no

13

14

15

16

17 no one uses it in the market

Number 6

1 Joiner, furniture maker

2 pARK ALMBAYE dAKAR

3

4 I work here and buy in the dakar sawmills

5 windows doors and furniture

6 frake 2-2.5 m3 per week, bois rouge 0,5 m3 per week

7 yes with machines and manually

8 yes to potential clients and on order

9 yes

10 I don't know I have never worked with it

- 11 I do not know
- 12 no
- 13
- 14
- 15 I do not know
- 16 the leaves are used to chase away the mosquitoes
- 17 yes

Additional - The Frake is the most popular of all the woods

Number 7

- 1 wood work
- 2 Mbour escale
- 3 83 km
- 4 one entire day
- 5 wood work and joinery
- 6 depends on the orders on average from 0.5 m³ to 1 m³
buy bois rouge @ 150,000f/m³, frake @ 136,000f/m³, Samba @ 110,000f/m³. Frake
used most then Bois rouge then samba
- 7
- 8 no
- 9 yes
- 10 it is not yet used in furniture
- 11 masonry support
- 12 yes
- 13 yes
- 14 yes
- 15
- 16 in the plantations of Mbour, the hotels and the community woods
- 17

Additional - transport depends on the volume - trucks from 14,000 to 50,000 fcfa,
1m³ 14,000 in small pickup and around 2m³ in a larger truck for 50,000

Number 8

- 1 wood worker
- 2 menuiserie de la petit cote
- 3
- 4
- 5

6 Bois rouge 4m/22cm/2.5cm = 900 fcfa, frake = 875, sipo = 900

7 we buy planks and make furniture etc.

8 no

9 yes

10 I have never worked it

11 I have seen people use it as poles and for making charcoal

12 no

13

14

15

16 I saw it in the field of my brother in law

17 yes

Additional - buy wood at DAKAR - 10,000 to 12,000 from dakar in pickup trucks, takes half a day

Number 9

1 Furniture maker

2 rue escale

3

4

5

6 Bois rouge , frake

7

8

9 yes

10 I do not know it well

11 posts, huts etc

12

13

14

15

16

17

Additional - buy the wood in Mbour in the park of Madou Fall, the quantity depends on the commande - in Mbour you don't find real parks, only wholesalers, Eucalyptus is generally pushed by the NGOs.

Number 10

1 furniture and wood worker

2 Quartier Peulka, Fatick

3

4

5

6 buy 6 planks per month - 1. Cailcedrat 1m/22cm/4cm = 850fcfa, 3. samba = 750, 2. frake = 850

7

8 no

9 yes

10 I do not know, I have never used it

11

12

13

14

15 in the country to make houses

16

17 yes

Additional - the problem is that there is no uniform price for wood. the merchants fix the price to their advantage

Number 11

1 Furniture and wood worker

2 Ndouk Fatick

3 42 km to go to Kaolack

4 4 hours

5 furniture etc

6 depends on the order but from 50,000 to 100,000 fcfa per month. Bois rouge 100 in fatick 850 in kaolack, samba 750 in fatick 600 in kaolack, frake same as bois rouge, vene 2000 in kaolack for 22cm/4cm/1m. plywood 2.22m/1.42m/4mm = 3400 fatick 3000 kaolack

7

8 very rarely but to the workers to pay them

9 yes

10 it is good as long as you put it somewhere there are no termites

11 huts

12 yes

13 yes my hut has been up for 7 years

14 yes but only in building huts

15 in the fields

16 in the field

17 yes

Number 12

1 Furniture

2 Pikine Dakar

3 next door in the shop next to mine

4

5 furniture doors table chairs

6 depends on the period, from 5 to 10 planks per week, Samba pay 22cm/1m/4cm = 650 , Bois rouge 950, frake 8cm/8cm/1m = 900

7

8 no

9 yes

10 I don't know it quality , I have never worked it

11

12

13

14

15

16

17 yes

Additional - I would like to know more because I have seen others planting it in different regions

Number 13

1 wood worker

2 Rue de la Mosque

3 I buy it from the merchants who go to dakar to get it

4

5 beds etc

6 Bois rouge 1m 950, frake 1m 950, samba 4m 2500

7

8 no

9 yes

10 It is good, excellent for masonry support

11 masonry support

12 no

13

14

15

16 there are people who rent it here

17 yes

Number 14

- 1 Woodworker
- 2 Rue de la Mosque
- 3 near here, from the merchants who get their wood from dakar
- 4
- 5 beds , shelves etc
- 6 depend on the order I can buy up to 30,000 fcfa per week
- 7
- 8 not yet , but perhaps when I get more capital
- 9 yes
- 10 I think it is of good quality, but I have never used it in furniture making
- 11 posts, it has not yet been sawn
- 12 no
- 13
- 14
- 15
- 16 in the plantations of projects
- 17 yes

Number 15

- 1 wood worker
- 2 Ndoumbe diop
- 3 dakar I day, Mbake half day, casamance, it is the merchants who go and get the wood
- 4
- 5 furniture, depends on the order
- 6 difficult to say bois rouge 1m 1100, frake 1m 950 fcfa
- 7
- 8 no
- 9 yes
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17

Additional If the wood was larger, then I think you could use it for woodwork because it is solid. transport from mbake 350 fcfa for the wood 350 fcfa for myself. 1 load is 5 planks of 4.5 mts. you pay the loading 2000 per load in dakar very expensive. then you pay the transport 1500 per load and 800 for myself

Number 16

- 1 wood worker
- 2 Ndoumbe diop, diourbel
- 3 right here
- 4
- 5 woodwork
- 6 depends, from 2 to 5 planks per week
- 7
- 8 no
- 9 yes
- 10
- 11 I have never used it but i think it can be used for posts
- 12 yes for masonry supports
- 13 yes it is resistant
- 14 yes
- 15 right near me, renting and perhaps selling also
- 16 I have seen it for a long time since the first plantation s were started
- 17 yes it would be a great advantage to know more about eucalyptus

Number 17

- 1 wood worker
- 2 Ndoumbe Diop Diourbel
- 3 right here
- 4
- 5 wood work
- 6 depends from 0 to 4 planks per week - bois rouge 1m 1000 fcfa, samba 4m 2600, frake 1m 1000 fcfa
- 7
- 8 no
- 9 yes
- 10 I have never used it
- 11 People use it for masonry support
- 12 one time I was given it
- 13 It was not for me
- 14
- 15 no

16 I saw it when a building was being built
17 yes

Number 18

1 WOOD WORKER

2 rue d'anon Diourbel

3 In the hardware store, or rarely i go to Kaolack 63 km away

4 one day

5

6 depends on the order Bois rouge 900 fcfa/m, frake 900, bois blanc 4m 4500

7

8 no

9 yes

10 I do not know too much about it

11 I know that people use it to make huts

12 no

13

14

15

16

17 yes

Number 19

1 Wood work

2 Kaolack marche Zinc

3 dans le marche

4

5 wood work

6 depends on the period, from 150,000 to 300,000 fcfa per week - samba 1m 625,
frake 1m 850, bois rouge 1m 850, vene 1m 1000, santan 850

7

8 no

9 yes

10 I do not know because i have never used it

11

12

13

14

15

16

17 yes, as an artisan, I would greatly like to see more growing of senegalese trees such as the eucalyptus for use in wood work, that would be a great promotion for senegal

Number 20

1 Wood work

2 Garage Mont Roland

3 In thies ar dakar, approximately 70 km

4 1 day

5 furniture etc

6 depends on the order frake 1m/22cm/4cm 900, bois rouge 1,000, vene no fixed price, samba 675 fcfa

7

8 no

9 yes

10 I have never worked it

11 no I do not know

12 no

13

14

15

16

17 yes

It take 4.5 to 5.0 meters of planks to make a bed

Number 21

1 wood worker

2 Pikine

3 Right here

4

5 beds, dressers etc

6 about 60 m per day - Bois rouge 1m/22cm/4cm 975, samba 650, frake 975

7

8 no

9 no

10

11

12
13
14
15
16
17 yes

ADDITIONAL UNEDITED NOTES TAKEN DURING SURVEYS.

These are notes taken during the surveys as additional responses to either survey questions or general discussion. Names have been omitted to protect anonymity. These notes are presented in this section to retain all the data gathered in the surveys.

NOTES FROM WOOD WORKER

Used as a frame wood eucalyptus tree is pretty good but less than mangrove which becomes stronger with age. In contrast, the heart of the eucalyptus pole rots as time passes.

The characteristics of the red timbers are quite different - the Sipo (acacia seyal?) is the best, then the Cailcedrat (*Khaya Senegalensis*) grown in senegal, the last being the Makore of both Cote D'Ivoire and Gabon.

As to the question of whether eucalyptus can be used as sawnwood - I think it would be very difficult unless people could produce a plank of at least 20 cm wide. To the best of my recollection eucalyptus can be used as a medicine against cold and fatigue - its leaves are boiled and drunk.

Problems encountered in the wood market - Very often when we order the wood, there is no supply available because the ships have not yet arrived or the customs have not finished their checks on the goods. By the time the wood becomes available, we have run out of money and are therefore forced to find the money to purchase the wood. The only alternative is to purchase expensive wood on the black market. A good joiner or furniture maker should have an adequate stock of wood which translates into having a large sum of money available at any time.

Technical Problems - problems of a technical nature met by joiners and furniture makers in Senegal are that the rates of humidity in the wood coming from the sawmills is very high. The wood should be dried for at least 2-3 months after arriving from the sawmills for proper drying. We have problems when our customers are impatient for their product and we are forced to use wood that is not completely dry - this wood fissures when one works it.

The red wood is strong but bends if not properly dried. Only Fraque can be cut and used immediately. When building tile roofs, one must avoid redwood because it will

bend under the heat and the tiles will collapse. Makore is advised for carpenters.

WOOD WORKER

My wood comes from Koussanar - The different steps I have taken to obtain my wood are :

I went to Eaux et forets and paid 12000 fcfa for a permit to cut trees. The permit to cut Cailcedrat is 12000, and the permit to cut Santan, Dimb, and Vene is 8000. (Vene is illegal to cut).

From Koussanar to Tambacounda the transport charges are 50,000 fcfa - and from Tambacounda to M'Bour the costs are 200,000 per "charge" (Charge = approx. 10 tons, but can be as high as 16 tons depending on the lorry and wood.)

To discharge the lorry, it costs 1650 per 100 kg.

Also there is a cost of 350 fcfa paid to the wood cutters for 100 kg of fuel wood. - The cutting of trees destined for fuelwood is confined to the Peuhls, and the cutting of wood to be used in sawnwood is done by the "laobes" - In the past the cutting of trees was essentially confined to the Laobes who were alleged to have mystical powers with which they would lure the spirits of the forest into allowing them to cut the trees. But with the lack of jobs and opportunities, this tradition is slowly dying and other groups are now cutting wood. The laobes are still the only ones who cut and carve wood.

There are two categories of forest in Senegal - 1. the protected forest where you can cut trees according to quotas given by the E@F - 2. the forbidden forests where no quotas are given (Thies, Fleuve, Sine-Saloum, Cap-Vert).

Trees that should be promoted are the Cailcedrat of the senegalese trees - this tree produces a red timber from which high quality furniture can be made.

Dimb from which you can make mortars and sawn wood.

Vene - furniture handles and pestles (illegal)

Xirr - redwood for carving, pestles and mortars.

Santan - wood basins, planks and sawn wood.

Tomboyeri - sawn wood second only to Cailcedrat.

Kadd - can make pirogues, mortars etc good fodder.

Ebene - Carving wood

As for eucalyptus, it is not used as fuel wood, it has no consumable fruit and give little shade. It has been imported and grown in plantations. I have heard of people

using it as poles and frame wood, but there is still mostly just plantations.

Neem is good as well since it gives excellent shade and grows quickly.

Eucalyptus is not used as a carving wood.

DAGANA EUCALYPTUS SAWMILL.

Eucalyptus trees are really workable if they are 6-8 years old they scarcely split at this age. In a rainy or irrigated area their trunks can reach upwards of 40 cm diameter from which I can produce 6 planks of 2.5 cm thickness. It is worth mentioning that the eucalyptus tree possesses two diameter readings, one at the top and one at the bottom - it is the top, smaller, measurement that constrains the number of planks that can be cut from a trunk.

Soaking step - it is necessary to cut the eucalyptus trees and then put them immediately into water (the river) for 3-4 weeks to avoid the fissures. But, I am obliged to cut and saw directly. If i have a good stock of timber i can dry the wood for 3-4 weeks, but if not i must coat the wood in used car oil to help the timber stay straight. Since I do not have a vehicle to take the timber to the river, I cannot afford the soaking step of the process. And also without a vehicle I am forced to abandon some trees in the interior of the forest.

Personal experiments - With a friend we have done 3 experiments on eucalyptus:

1. Tree cut and sawn immediately.
2. Tree cut, dried for two weeks and then sawn.
3. Tree cut, soaked for 3-4 weeks and then sawn.

The best results came from the third experiment, followed by the second, then the first.

Eucalyptus possesses all the characteristics of oak wood.

The last time I went to Thiago to purchase some Eucalyptus trunks of 40 cm diameter, the costs were:

trunk - 2500 fcfa

cutting and transportation - 7500 fcfa

The quantity of wood sawn per week depends on the orders and the power of my

engine (2.5 hp). When the engine warms up I am obliged to stop work. I need an engine of 15-20 hp to be able to work efficiently. Because of the problems with my engine I cannot cut more than 6 trunks per week - the engines are often destroyed because of the over use.

If I had transportation, i would travel throughout senegal looking for Eucalyptus. There are plantations from Niango podor to Dagana.

Mr. Diop is very confident of himself when he states that eucalyptus can be worked at 6 years old - Constraints here are the diameter of the wood - Diop is using irrigated plantations, that may be producing wood of 40 cm diameter at 6-8 years. in different regions of the country this may not be possible

Mr. Diop had built his sawmill entirely by himself using parts and engines discarded from the rice industry at Richard Toll (30 Km away).

In discussion with one of Diop's clients it was said that the furniture was of excellent quality.

FURNITURE MAKER.

I have been to Mauritania Cote D'Ivoire and Gabon - my knowledge of the trees from the Casamance is wide. In the past the people did not know the fraque timber, it was thanks to me that this timber was introduced into the senegalese market.

Almost all of the timber used in Senegal comes from the Cote D'Ivoire - The Sipo wood is better than the Cailcedrat.

the policy of wood trading is very loose, the prices are not fixed and the merchant take advantage of that and we suffer from it - the prices of the senegalese woods are adjusted upwards to meet the prices from the Cote D'Ivoire.

I have never worked eucalyptus, but it would be interesting to do so.

The timber purchases in M'Bour is more expensive than that of Dakar.

	Dakar Prices	M'Bour Prices
Fraque	116,000 f/m ³	165,000 f/m ³
Red wood	150,000 f/m ³	190,000 f/m ³
Samba	80,000 f/m ³	135,000 f/m ³

I can buy timber at Dakar or M'Bour depending on the amount of work that I have to do.

"This guy is a classic example of bad survey responses there is no way that he has introduced fraude into the entire senegalese market - it is my opinion that his judgement is biased."

M'BOUR PLANTATION -

Eucalyptus plantation - Village consumption - the women have been using this eucalyptus as fuel wood for the past 3-4 months and we have really benefitted from their using the wood. In the past we did not realize that the women would be of such great help.

One part of the money earned from the sale of eucalyptus timbers was given to buy medicines for the maternity hospital - Another part was given to the village chief in order to purchase anti-malaria medicine for the rainy season.

We have used "phinitriton" for protection of the trees against termites - given to us by the E@F agents. (Eucalyptus tree are susceptible to termite damage up to 3-4 years from planting)

The E@F agents have shown us how to cut the trees and how to sell them - we must cut the trees into 3-4 meter poles and use the trees that are not straight for fuel wood.

If the diameter of the tree is too big, we have been advised to transform it into charcoal, and have been taught the carbonization techniques.

We obtained the eucalyptus seedlings free from the E@F - they have also promised to build nurseries where the villagers can buy seeds or young plants. - A training program for nurseries was held for the villages for which 2 villagers from each village were chosen. they were then sent to PREVINOBA (a reforestation project) at Thies. On their return they were given seeds and plastic bags to start their own nursery.

In the past we did not know that you could make furniture from eucalyptus, but during the president's visit, the E@F exhibited some furniture made from Eucalyptus.

RESEARCH PLANTATION OUTSIDE M'BOUR

"Here we visited a research station conducting trails on growing different trees - the manager was very nice but did not want to give us any information about how the trees were doing - it is incredible that at a government research station we were told that the results of the trails were secret - how can the Senegalese government expect to have information spread throughout the country if they are themselves denying access to information. it is not the fault of the station manager, but of there GOS."

Research Plantation area - 160 ha. Started in 1976.

Exotic Species grown - almost 40 different species, almost all of which have died.

Local Species - ie acacia nilotica and acacia sclerosperma

Eucalyptus Camaldulensis - Our studies have shown that E.C. does not do well in this region because of a lack of water. (approx rainfall 1990 - 297mm, 1991 - 370mm)

Species doing well in trails : acacia nilotica, prosopis juliflora.

DISCUSSION WITH E@F AGENT ON AUTONOMOUS REFORESTATION PROJECT OF THE BANJA FOREST. MBOUR.

The project was not renewed because the costs were prohibitive and the results were poor.

- In fact the soil is too dry and we needed big engines to break it which used large quantities of diesel.

- To alleviate the problem of wind, the residents of Niayes (have stopped eating beans) have grown eucalyptus for windbreaks but the results have been that crops grown within 5 meters of the eucalyptus trees did not do well - the conclusion was that the eucalyptus was too competitive and that crops must be grown at least five meters from the trees. (visits to dagana villages where there was plenty of water indicated that they could grow crops between the trees for many years without problems). This was the main drawback of eucalyptus.

But there were advantages to growing the eucalyptus also - the E.C. grows quickly, and had been exploited 3 times in 15 years, it was concluded that the rapid growth compensated for the extra water used.

Problems growing Cailcedrat - the essential problem is that the shepherds/cattlemen cut the leaves from the tree to feed their herds, and leave the tree devastated - after about two years of this treatment, the Cailcedrat will no longer give seeds.

FATICK

- In Fatick, one can find merchants that buy small quantities of eucalyptus that they sell in rural areas. (did not see)
- In the rural areas, the eucalyptus is grown primarily for local consumption and cart making.
- in fatick, the wood is all sold in the hardware store setup. and there are not many of them 6-10 max.

WOOD SELLER

Largest wood seller in Fatick - galvanize building affiliated with store in Kaolack. Sells carpenter accessories. but mainly wood.

In the past we would go to dakar to purchase the wood but owing too the relationships that we have woven with such sawmills as LINODA and SOA, we are able to pay on account in a bank in Kaolack and the timber is then delivered to us. This step is of great help to us since we don't have to travel with the money and face the associated risks. It can also save us the travel time.

Use of eucalyptus - Used in building houses. people go to the plantations and bargain with the owners - once there is an agreement on the price of the trees they are cut by wood-cutters.

The main problem that we face as wood merchants in Fatick is that Fatick is a run-down region with little resources. People can scarcely afford to buy timber and therefore we must stock our timber for a long time and lose a great deal to termites. One must have great courage to be a wood merchant in Fatick.

merchant

We have no particular trouble selling timber.
I would advise the authorities to grow fraque and Samba.
" this was a young guy and answers a may be vicarious"

THIRD MERCHANT

The timber often arrives with defects and as a result we have problems selling it - we have no choice, the sawmills deliver the timber in bulk.

The market is good or bad depending upon the season. Slower in rainy season.

Information given by a Forestry Agent in Fatick.

Different categories of plantations -

1. There are individual plantations supervised by the forestry agents
2. There are rural (communal) plantations financed by the service forestier - mainly in restoration areas or in the protected forests.

It was commented that the villagers can cut trees if they give a promise to the authorities to reforest

the Mayecor forest has lost all of its wood to drought.

PRECOBA (PROJECT DE REBOISSEMENT COMMUNITAIRE DANS LE BASIN ARACHIDIER).

Rural plantation in a village in Gandiaye.

- plantation size 9.6 ha.
- Arrangement planning to oversee the plantations.
- tends to compensate for the lack of fuel wood .
- Plantation not doing well because of the quality of the soil - said to be too saline and not acceptable for good eucalyptus growth. But the villagers can produce poles from the eucalyptus.
- Recently had an inventory and some rearrangement has been done - also a seminar on how to cut the trees has been arranged.

The main problem noted for the villagers is the lack of selling opportunities. nothing has so far been done in this area.

An advertisement program through Radio Kaolack has been planned, with invitation to the wood merchants to visit the different planting sites in different villages.

KAOLACK

old guy selling different wood products on the side of the road)

The eucalyptus tree is not yet known to the wood workers. In fact it can produce sawn timber of a high quality. In the past I have made furniture with eucalyptus, and it is far better than the ronier as poles. With a big trunk of eucalyptus you can obtain 11/8 cm, 8/8 cm or 6/4 cm beams - it is stronger than Samba (so what) - The unique problem encountered by the eucalyptus is its lack of knowledge and official advertisement. The authorities should speak about it through the radio, and show cutting sequences and furniture on the television. It is difficult to convince the buyers of the quality of the product, because they think that we are just trying to sell our goods. If a promotional program is undertaken I am sure that within 2 years there will be a boom in the eucalyptus market. I am doing my best to here to make people aware of the eucalyptus products for both my country's sake and mine - it is grows in both salty and salt-less soils.

From mr. Cisse - There are not many plantations of eucalyptus, and the there is a problem in selling the wood, but the villagers know the wood well and appreciate it as fuel wood.

TRANSPORTER

- Transportation circuit:

My load comes from the Dakar harbor station. I am based in Pikine (just outside Dakar) - the wood merchant contacted me at Pikine to go to the harbor next to SONACOS in Bel Air (main Port).

- Transportation cost - 45,000 fcfa/lorry load. (Dakar - Kaolack)
9 ton Berliet Truck - No. DK 31832

- Loading duration - Thursday from 10am to 6pm ; there was a long queue of cars - I arrived in Kaolack on Friday at 7am - the workers began to unload at 9am and it may take until 6pm.

- I am not a special transporter and will transport anything anywhere.

CONTROL STATIONS IN KAOLACK

A station at which all passing transporters must stop to check their permits.

Origins - Casamance : freshly cut wood / sawnwood
Guinea Bissau : Sawn wood only.
From Baria (Fatick) dead wood only.

Can stay for about 3 months without seeing any freshly cut wood, but see sawn wood about once a week.

The E@F fix the number of quotas given to the organizations (cooperatives, sawmills, societies) the quota level is decided in relation to its collaboration (bribes) its dynamism and it's reforestation spirit.

The wood passing through the control station is mostly in 20 ton lorries. The truckers have the choice of either going throughout the Gambia (Customs, ferry, duties, but shorter distance) or driving around via Tambacounda (Large diesel and time costs).

The quotas allow the organizations to cut a certain number of trees per year they have been decreasing (see notes on Dericourt).

Once wood has been cut it is no longer under the auspices and protection of the E@F and can therefore be used freely. Therefore Vene, which is illegal to be cut can be found throughout the senegalese wood market.

TRANSPORTERS AT KAHONE CONTROL STATION.

the costs depend on the distance traveled - for instance we have just come from Senegal Oriental and are going to Dakar - costs : 650 fcfa/bag of charcoal , 5000 fcfa/m3 for deadwood.

- transportation frequency - in 1990 there were around 40 trucks passing per day with wood, but the authorities have limited the exploitation in order to preserve the forests products.

Trucks from Koussanar - 10 per day
Koupentoume - 15/day
Kafrine - 2-3/day
Casamance - 0-5/day

Nature of wood transported - fuelwood constitutes the major part of the transportation of wood (5-15 trucks/day) and sawn wood constitutes a very minor part. Most transportation going from the regions to the Dakar market.

TOUBA - In touba, every one is a wood salesman and sells wood from his garage or hardware store.

LOUGA

4th Interview--

Transport - it is up to the merchant to make his choice in hiring a truck. There is a queue of trucks lined up for the privilege to take requests. You may get any kind of lorry 10- 20- or 30 ton. you just have to give the transporter the invoice and then you wait until his lorry is full and ready for departure - therefore you cannot know when you will be receiving your merchandise - if the transporter needs other clients to fill his load your wait may be 3-5 days.

I would like access to improved saws and machinery - maker of quality furniture

----- in each town there is one or two excellent , innovative furniture makers that would be the ones to contact if the EC plan got off the ground. -----

RICHARD TOLL (Near Dagana) -- these notes are not good quality --

Before the drought season there were no joiners working the local species - these were under the control of the small craftsmen and wood cutters ie Laobes -- when the drought came the authorities forbade the cutting of green trees and the exploitation permits were severely limited. This situation forced the joiners to turn to other species: Mr Diop a genuine joiner has tried his hand with many species including eucalyptus and Neem.

-- It is very difficult for the forestry agents to exercise their control because off the distances and difficulty in travel involved. Some times we must go 50 km into the depth of there woods to control the illegal exploitation.

DAGANA 28/4/92

In the fields with a forestry agent.

- Many of the plantations of dagana and the surrounding regions have been undertaken by women - for fuelwood and even just against desertification

- There is a great demand for eucalyptus as windbreak for the commercial vegetable production - the river basin soils are covered in rice and many different small plots of vegetables which suffer from the strong winds. - the demand for eucalyptus seedlings far outweighs the supply in this area.

ST LOUIS 29/4/92

1. The wood of teak and Vene produce wood of good quality but it is generally beyond the financial reach of the local Senegalese. If the eucalyptus can be grown as an alternative it may be useful.

I was born here in St Louis - in the past eucalyptus was grown all along the riverside and the wood was used as fuelwood.

- There is no particular market where eucalyptus is sold- they were occasionally sold when one happened to fall down.

14 KM ON THE RUE DE RUFISQUE

Merchant selling Eucalyptus poles

To obtain the poles the merchant should go and find the field owner to bargain with him about the cost of the field. After agreement, he goes to meet 2 or 3 wood cutters to discuss about the cutting price (for a 4 hectare field it would cost 1,000,000 fcfa, and the cutting price is 200,000 fcfa) If some times the field does not have good trees - you should not discuss for the whole field, but you can chose some trees - and if the number is limited you will pay the wood cutter per tree 25 fcfa.

- The bad trees which are not straight will be transformed in to charcoal, the eucalyptus gives an excellent charcoal (carbonized when wet) - it is also an excellent fuel wood, but difficult to split

- We have a lot of troubles to get eucalyptus because of the permit problems encountered. My stock is over and there is a demand I cannot meet.

MAKING CHARCOAL

The exploitant must hire some wood cutters, he has to pay a tax to the E&F of 3000 fcfa per wood cutter. Plus the permit costs 225 per bag. loading costs 50fcfa per bag (filling and loading) - the salary for the wood cutters is 400 fcfa per bag which

includes cutting and carbonization. Transport costs 650 - 700 fcfa per bag from tambacounda to dakar with around 200 to 350 bags per truck.

selling - the charcoal is sold to intermediaries at 1,900 fcfa per bag but really only earn 1815 fcfa because it is necessary to pay the intermediaries 50 f per bag commission and 35 f per bag for unloading.

CAILCEDRAT

The merchant is given the quotas by the big sawmills which have previously paid forestry taxes of 12,000 per tree - Then the merchant goes to the Casamance to find the exploitants who sell the wood by the cubic meter. - @ 21,000/m³ - the transport costs are 350,000 fcfa for 8 trunks. Once in Dakar they go back to the sawmills to sell the wood at a price of 42,000 fcfa/m³

SCIENCIE

Our vocation is to import wood from the Ivory coast, but we had matters in dispute with the authorities - since then our activities have slowed down and we are now mainly confined to treating the wood from the Casamance, different from that of the Cote D'Ivoire.

- We now hear that the forests of the Ivory coast are running down - Currently Gabon stands to be the only country with an important potential for wood. The Senegalese merchants must begin to explore this new market, even though there are a problem of taxes - Mr. Cissoko, E&F minister, had promised to solve the problem - but up till now, nothing has been done.

BEL AIR PARK OVERSEER

the overseer of the park

As for the cost of the timbers there is a leveling of prices. There are small machinists in the parks to work the wood The Chute or cants leftover when the wood is sawn in the sawmill - There are 62 stalls in the park -

Crintin comes from casamance

charcoal from tamba, Kolda, Kounghoul supplies the Kaolack market only

Ronier from tamba and Casamance, but now it is forbidden to cut it, mainly sold in the markets of Touba, Louga and Kaolack in Bulk.

Vita

Frank David Merry was born in Port of Spain, Trinidad, on October 18, 1963. In 1974 his family moved to Venezuela where they have been raising cattle and water buffalo on Hato La Ceiba, Estado Cojedes. He completed his high school at Rossall School, Lancashire, England and received his Bachelor of Science in Agricultural Economics at the University of Florida in 1989.

A handwritten signature in black ink that reads "Frank Merry". The signature is written in a cursive style with a large, looping initial "F" and a small horizontal line at the end.