TENURE AND TREE MANAGEMENT ON THE DOGON PLATEAU : THREE CASE STUDIES IN BANDIAGARA, MALI

by

Rebecca J. McLain

Land Tenure Center
University of Wisconsin-Madison

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TENURE AND TREE MANAGEMENT ON THE DOGON PLATEAU : THREE CASE STUDIES IN BANDIAGARA, MALI

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INTRODUCTION

In November 1989, the Land Tenure Center (LTC) signed a contract with the U.S. Agency for International Development (USAID) mission in Bamako to conduct a study of land and tree tenure issues affecting the implementation of the village reforestation project (VRP). The VRP is the second phase of a joint effort between the USAID and the Service des Eaux et Forêts to introduce and expand the practice of agroforestry techniques in the Cercles of Mopti and Bandiagara in Mali's Fifth Region. The major goals of the land tenure study are as follows:

1) to determine the impacts of the Malian Forest Code on tree and forest management in the project area;

2) to study tree use and tree management practices at the farm level, including the role of women in tree use and management;

3) to examine the factors affecting management of community wood lots established during phase I of the VRP;

4) to monitor and evaluate the impact of phase II VRP operations in transferring skills and knowledge about agroforestry techniques to farmers in the Cercles of Bandiagara and Mopti.

This report consists of two parts. Section one of the report covers activities undertaken prior to the pilot study phase. Section two presents the findings of the pilot study carried out in the Cercle of Bandiagara during February and March 1990.

SECTION I

FIRST TRIMESTER WORK OBJECTIVES

According to the work program developed in November 1989, the following activities were to be completed during the first four months of the contract:

1) location of suitable office and housing facilities in the Mopti-Sevaré area;

2) purchase of equipment and supplies needed to implement the project;

3) field visits to the two VRP action zones as well as to the CARE/Mali forestry projects in Koro and Djenne;

4) establishment of contacts with administrative and technical officials working in conjunction with the VRP program in order to inform them that project activities would be taking place and to gather relevant information about tree-use and tree-management activities in the project zone;

5) selection of four study sites, including the two VRP action zones, one of the CARE project areas, and one zone where no major forestry interventions have occurred;

6) initiation of pilot study interviews with village leaders and individual farmers at one or more of the study sites.

A. Project Personnel

The study is to be conducted by a research team consisting of a researcher from the University of Wisconsin-Madison's Land Tenure Center (LTC) and a counterpart provided by the Service des Eaux et Forêts. The LTC's representative, Rebecca McLain, arrived in Mali in mid-November. At that time a work program was developed in conjunction with Dr. Steven Lawry, also of the Land Tenure Center.

A sociologist affiliated with the INRZFH was assigned as the Service des Eaux et Forêts counterpart. In November, however, INRZFH submitted a list of the conditions that would have to be met before the counterpart could accept the position. In early December, USAID submitted a counterproposal, calculated in light of budgetary constraints and fieldwork requirements, to the Direction Nationale des Eaux et Forêts. To date no response has been received to the counterproposal. As a result, the research "team" currently consists solely of the LTC representative.

In January, a full-time research assistant was hired to serve as an interpreter and guide for the project. Additional assistants will be hired on a part-time basis during future stages of the project.

B. Office Facilities and Equipment

Four weeks were set aside for the LTC representative to find housing and purchase the equipment and supplies needed to conduct field operations. However, due to unanticipated delays in the delivery of funds and equipment, field operations were delayed until the fourth week in January.

C. Initial Contacts

Upon my arrival in Mali, introductory meetings were arranged with USAID/Bamako staff members to discuss the project objectives and implementation plans. Similar meetings took place with staff members of the Direction Nationale des Eaux et Forêts working in conjunction with the village reforestation project. A meeting with the proposed counterpart and his supervisor occurred on 14 November 1989, at which time the conditions of work and the proposed role of the counterpart were discussed. Negotiations for the counterpart arrangement are still in progress.

A preliminary visit to the Direction Nationale des Eaux et Forêts in Mopti was made in November. The general outlines of the research program and its applicability to the phase II activities were discussed with Mr. Dicko, the regional director, and Mr. Modibo Traore of USAID. The search for appropriate housing and office facilities was initiated during this preliminary visit.

A follow-up visit to the Mopti area was made in early December with Bather Koné, co-manager of the VRP. Field visits were made to the stations of Fatoma and Bandiagara, at which time the researcher was introduced to the Chefs de Cantonnement of Mopti and Bandiagara and their staff. Contacts were also made with the Commandant de Cercle de Bandiagara and representatives from Opération Pêche/Mopti, Opération Riz/Mopti, Opération de Développement de l'Elevage dans la Région de Mopti, and the Service de Développement d'Agriculture. Arrangements for housing and office facilities were finalized during the follow-up visit.

D. Document Review

While awaiting the arrival of the project vehicle and project operating funds, a review of the literature on Malian land-use and land-tenure issues was undertaken. A number of documents had been shipped from the United States for this purpose. In addition, a search of relevant project papers and reports was completed at the USAID office in Bamako. A list of potentially useful documents located in the International Livestock Center for Africa and the Institut d'Economie Rurale collections

in Bamako was begun. Other library collections in Bamako were not examined due to time and budgetary constraints.

E. Conferences and Meetings

As part of the process of getting familiar with forestry issues in Mali, I attended several conferences and workshops sponsored by organizations active in natural resource management. Brief summaries of these meetings are provided below.

Natural Resource Management Support Workshop

In November 1989, the LTC researcher attended a workshop on natural resource management sponsored by the Comité de Coordination des Actions des Organisations Non-gouvernementales au Mali and by CARE/International. The purpose of the workshop was to identify natural resource management priorities in Mali and the needs of nongovernmental organizations involved in natural resource management projects. The pilot project phase will last two years.

Land tenure and its constraints on project implementation was cited as one of the more important issues which should be addressed by the proposed pilot studies. The role of women in decision-making, another of the LTC's research topics, was also mentioned as an issue of concern.

A number of participants in the workshop were interested in being kept up-to-date on the progress of the land tenure/village reforestation project in the fifth region. Given the interest expressed in land tenure issues, I recommend that member organizations of the CCA be included among the participants in the land tenure seminar to be held in January 1991.

2. Annual Meeting of the Forestry Staff in the Fifth Region

The regional director of Eaux et Forêts in Mopti invited me to attend the annual meeting for the fifth region forestry staff on 29-30 December 1989. The purpose of the meeting was to discuss (1) the work accomplished in 1989, (2) projected activities for 1990, and (3) problems encountered during the previous year.

Of particular interest to the LTC project are the regional office's efforts to encourage greater local participation in the management of forest resources. For example, the Bandiagara Cantonnement is in the process of developing raffia palm management plans with villages in areas with large stands of raffia palms. Lack of funds and staff to inventory the stands poses the biggest obstacle to completing the management plans. Concern was also expressed that Eaux et Forêts needs to continue a strong role in stand management, even if the villagers share management responsibilities.

A greater role for village-based management of forest resources is also being considered in the Youvarou Cantonnement. Local agreements are

being developed between Eaux et Forêts to permit more rational management of doum palm stands. An inventory of the "bois mort" stands has been proposed, with funding provided by IUCN. In view of the IUCN representative's interest in tenure issues and the relevance of the IUCN's study to our own research, I highly recommend that a visit be made to the Youvarou area as part of our project activities.

The issue of greater village participation in forest management was also raised on a more general level with respect to the "mise en défense" plantations established throughout the region. A comment was made that villagers rarely do anything with these parcels once restorative measures have been undertaken. A suggestion was made that these parcels be turned over to the villagers for management. The villagers would develop a set of management objectives for the parcel, and a forest service agent would then review the objectives to ensure that forest service policies were adequately addressed.

Efforts to introduce village wood harvesting are also under way. For example, the Cantonnement de Bandiagara has started a campaign to establish village-based woodcutting programs. Cutting areas are to be identified by the forest service, and the formation of woodcutting associations is being encouraged. Similar actions have been started in Tenenkou, Youvarou, Bankass, and Koro.

3. Regional Conference on the Local Fishing Agreement of 1988

A regionwide conference was held from 23 to 25 January 1990 to discuss the problems associated with the local fishing agreement passed in 1988 for the fifth region and the Cercle de Niafounke. Although dealing with fishing rights, the conference was pertinent to the land tenure project in that the agreement provides a model for greater local participation in natural resource management.

The Local Fishing Agreement of 1988 represents a collaborative effort between Eaux et Forêts, regional administrators, village leaders, and fishing representatives. Regulations governing fishing in the inner delta were developed, and an enforcement system requiring the participation of village and arrondissement representatives was established.

Difficulties with administering the local fishing agreement centered primarily around the following issues: (1) The local management and surveillance committees charged with helping to implement the agreement tended to be weak and unable to resolve conflicts. A common complaint was that these committees did not meet often enough to be effective. In addition, their role was not clearly understood by the villagers. (2) Public awareness efforts were inadequate in some areas, particularly where nonlocal fishermen are prevalent. A mechanism of informing the latter of the rules needs to be established. This is particularly important since in many cases these migratory fishermen have more efficient equipment than local fishermen. (3) Many villagers still do not recognize the sovereignty of the state in matters of water ownership. The question of

"maîtres d'eaux" is an issue, especially in the Youvarou and Tenenkou Cercles, where fishermen may have to get permission from the former "maîtres d'eaux" prior to the fishing campaign. (4) Enforcement capability by Eaux et Forêts is inadequate due to lack of personnel and funding. As a result, many infractions are not punished, leading to greater resentment on the part of those who are caught.

The problems encountered with administering the Local Fishing Agreement of 1988 provide some idea of the problems that could arise if local forest management agreements are developed between Eaux et Forêts and villages. In particular, the ability of villages to self-regulate their fishing resources appears to be weak. There is no reason to assume that the ability to regulate forest resources would be any stronger. Considerable care will have to be taken to ensure that the role of village management committees is clearly defined and understood by the villagers involved. Moreover, the enforcement process will have to be clearly outlined and adhered to if such local agreements are to be successful.

Outsider fishermen who fail to adhere to the rules represent one of the largest stumbling blocks to effective local management of fishing resources. Outsider woodcutters, including transhumant herders, already present similar problems in the area of forest management. The incentives that local villagers have to limit resource use in their forests often do not apply to outsider cutters. The problems encountered with the 1988 Local Fishing Agreement suggest that either an efficient reporting and follow-up system would have to be established with the nearest Eaux et Forêts post or village management committees would have to be given greater authority to deal directly with infractions committed by outsiders.

F. CARE Forestry Activities

Two agroforestry projects in the fifth region, one in Koro and one in Djenne, are currently being implemented by CARE. The CARE/Koro project has been in operation since 1984 while the CARE/Djenne project began in 1988. Because the goals of these projects are very similar to those of the VRP, field visits were made to both projects to determine how the projects operate and to what extent tree and land tenure issues have constrained project implementation efforts.

1. CARE/Koro

The CARE/Koro project is a joint effort between CARE and the Cantonnement Forestier de Koro. There are sixteen field agents working for the project in approximately eighty villages. Supervision is done on a joint basis between Eaux et Forêts and CARE.

Of the sixteen field agents, nine are directly employed by CARE while the remaining seven are employed by Eaux et Forêts. The CARE agents are involved with the project on a full-time basis whereas the Eaux et Forêts

agents devote twenty days per month to the project and ten days per month to other duties, including enforcement. Thus each Eaux et Forêts agent working on the project serves in both a police and an extension capacity. The degree to which this dual function affects the agent's ability to carry out extension activities will be examined at a later stage in the land tenure project.

The CARE/Koro project is currently trying to encourage the following types of agroforestry activity: windbreaks, alignments, border plantings, living hedges, field plantings, and, more recently, natural regeneration protection. In the latter program, seventy-six fields are now being monitored. The idea behind the natural regeneration program is to decrease the need for planting trees, which requires more inputs from both the forest service and the villagers.

CARE/Koro Tenure Issues

The unpopularity of the windbreaks program, which was the main focus between 1985 and 1987, was due in large part to tenure issues. The program was modeled after the Majjia Valley project in Niger and stressed the planting of collective windbreaks. Interest was minimal, and tree mortality rates were very high. As soon as the program was abandoned, the project director noted a great rise in the demand for windbreaks, on an individual basis only.

Due to the failure of the windbreaks program, the project no longer encourages collective plantations. If a group wishes to undertake a collective action, they are required to pay for the plants. In contrast, seedlings for private plantations are provided free of charge.

Land tenure constraints have also been encountered with soil restoration activities, which are designed to restore degraded village lands. For example, the villagers in one village began improvements on a degraded parcel during 1989. However, after the rainy season, the agents noticed that people had stopped putting manure in the microcatchments they had constructed early in the season. According to the villagers, the chef had claimed exclusive authority over the land, and the villagers decided that it was not worthwhile to work on land from which they would get no profit.

The CARE project manager also cited two cases where CARE decided not to pursue agroforestry activities because of land tenure conflicts. In both villages the customary landowners were Peul herders while the users of the land were Dogon farmers. Although the Dogons had expressed an interest in planting trees, the Peul owners were opposed to the idea. They expressed a concern that the Dogon farmers would be able to claim the land as their own if they planted trees thereon.

The fear that tree planting may increase someone else's claim to the land is not without foundation. In one village, CARE staff have observed that people are planting trees in hopes of gaining control of the land.

In this village, there is a watercourse with two dams and thus the possibility of raising garden vegetables and putting in orchards. The people farming the land have shown a strong interest in putting in live hedges around their gardens. Although CARE agents told the villagers that they could plant only on land that was their own, they later discovered that some farmers were planting hedges on land that was not theirs in order to gain control over the land.

The participation of women in CARE/Koro activities is also affected by land tenure issues. In many cases land belongs to the husband and not to the wife. However, women have shown an interest in planting trees on the individual parcels that they farm independently, even if the land belongs to their husbands. For example, women will plant trees on degraded peanut fields which they farm independently in preference to planting on better land farmed jointly with their husbands.

2. CARE/Djenne Agro-sylvo-pastoral Project

The CARE/Djenne project has been in operation since 1988 and currently is active in the arrondissements of Djenne Centrale, Sofara, Konio, and Mougna. A total of twenty-four villages are participating at the present time. Although forestry activities are an important part of the project, other efforts such as vegetable gardening, bougoutière regeneration, and water and soil conservation are also encouraged.

Forestry activities focus on the planting of live hedges, shade trees, field trees, and fruit trees. Natural regeneration demonstration plots have also been established, and an animal corridor planting program is being developed. In addition, mini- and micro-nurseries are being encouraged as a means to decentralize tree production.

As in Koro, the Djenne project managers cited the difficulties of collective action. In general they have found group actions difficult to organize and even more difficult to follow up. In cases where village or group actions are called for, CARE has focused on helping the group develop systems for distributing the workload in an efficient and timely manner.

CARE/Djenne Tenure Problems

The CARE project staff have encountered some difficulties relating to tenure issues. Many of the problems are due to Djenne's location in an important transhumance zone. In October-November, the transhumance herds arrive in the area, forcing the farmers to keep a close watch on their fields. Newly planted seedlings are particularly vulnerable at this time. Nontranshumant herds are also a problem once the rainy season is over and village animals are allowed to run free. Animal corridor plantings, in which thorny species are used for live hedges to protect farms along animal paths, are being used as a means to reduce some of these conflicts.

The pond improvements have also generated some conflicts. During the drought, farmers expanded their fields into the land which had once been covered by water. The herders who used to use these areas for dry-season forage are now being shut out of their former pasturage.

Interviews with villagers also revealed that land tenure issues are a factor in land-use decision-making in the Djenne area. One woman who has begun a vegetable garden in a village north of Djenne indicated that she has not planted fruit trees in her garden because she borrows the parcel from a relative and it is not clear that she would benefit from planting the trees.

The CARE/Djenne project manager cited an example of tree tenure conflict in Soumatogo. The example predates CARE's participation in the area but is instructive, nonetheless. About twenty years ago, a farmer planted a number of raffia palms on land that he was borrowing from someone else in the village. The owner voiced no objections at the time, but now that the palms are ready for harvest, he claims that the palms belong to him.

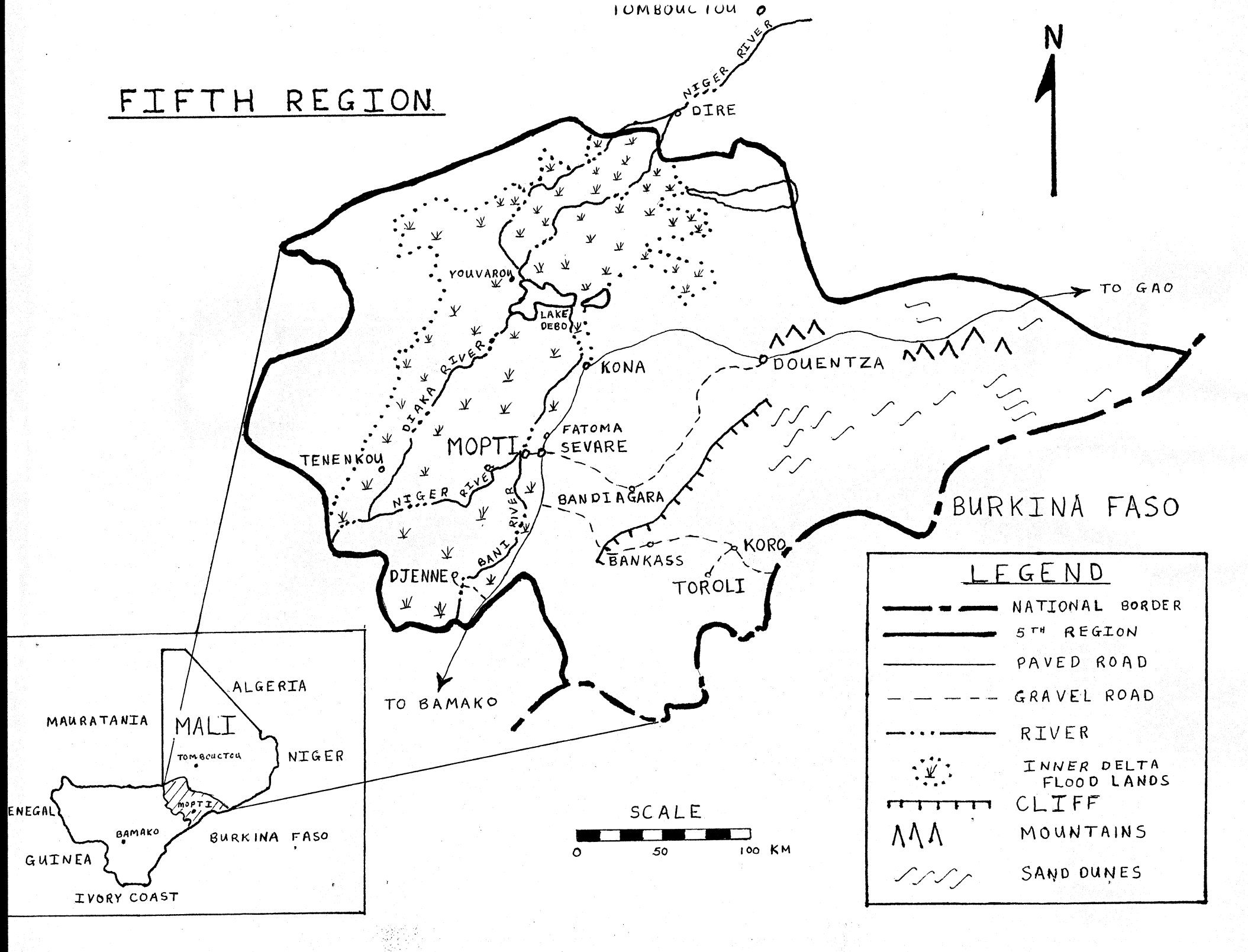
The above examples of tenure-related problems in the CARE project areas indicate some of the issues that the VRP may encounter as project activities are implemented. Areas likely to be most problematic are discussed later in this report.

G. Selection of the Land Tenure Study Sites

Based on field visits and discussions with Eaux et Forêts and USAID staff members, four zones were selected for in-depth studies of tree tenure and tree management patterns (see figure 1). The four zones are the Arrondissement Central de Bandiagara (Bandiagara), the Arrondissement de Fatoma (Mopti), the Arrondissement de Toroli (Koro), and the Arrondissement de Konna (Mopti).

Both the Arrondissement Central de Bandiagara and the Arrondissement de Fatoma were chosen because the Village Reforestation Project's activities are concentrated in those areas. In addition, the two areas represent two of the predominant ecozones, the inundated plains and the Bandiagara plateau, found in the fifth region. Culturally the areas are also quite distinct, with Fulanis dominating the Fatoma region and Dogons dominating the plateau.

The Arrondissement de Toroli was selected because of CARE's relatively long history of agroforestry work in the Cercle de Koro. In addition, the Seno plain is an important ecozone, distinct from both the inner delta and the Bandiagara plateau. The area also continues to receive a considerable influx of new farmers. Thus land and tree tenure factors are likely to be extremely crucial in the encouragement of agroforestry activities.


FIFTH REGION
TOMBOUCTOU
NIGER RIVER
DIRE
N
YOUVAROU
LAKE DEBO
DIAKA RIVER
KONA
DOUENTZA
TO GAO
TENENKOU
MOPTI
FATOMA
SEVARE
NIGER RIVER
BANI RIVER
BANDIAGARA
BURKINA FASO
BANKASS
KORO
TOROLI
DJENNE
TO BAMAKO
ALGERIA
MAURATANIA
MALI
TOMBOUCTOU
NIGER
MOPTI
SENEGAL
BAMAKO
BURKINA FASO
GUINEA
IVORY COAST
SCALE
0
50
100 KM
LEGEND
NATIONAL BORDER
5TH REGION
PAVED ROAD
GRAVEL ROAD
RIVER
INNER DELTA FLOOD LANDS
CLIFF
MOUNTAINS
SAND DUNES

The fourth zone, the Arrondissement de Konna, will serve as a control to the other three zones. No major forestry projects have been funded in the Konna area. Thus comparisons can be drawn between areas with high levels of funding for agroforestry activities and areas with low levels of funding. The Konna area is an inundated zone, so that two inundated zones and two uninundated zones will be represented in the study.

SECTION II

PILOT STUDY RESULTS: ARRONDISSEMENT CENTRALE DE BANDIAGARA

The study of tree tenure and forest code policy issues in Mali's fifth region will be conducted in two major phases: a pilot study and a general survey. The pilot study will provide in-depth information about tree management and land and tree tenure at the village and farm level. A total of twelve villages, distributed equally among four arrondissements in the fifth region, will be included in the pilot study. A minimum of five farmers in each arrondissement will be interviewed.

The second phase of the study will consist of a survey of a larger sample of farmers located in the four arrondissements. The information obtained during the pilot study phase will be used to develop a general survey questionnaire designed to elicit information as to the relative importance of specific types of tree management and tree tenure characteristics in the fifth region.

This report summarizes the findings of the pilot study work conducted in the Arrondissement Central de Bandiagara. The results of the pilot studies in the remaining three arrondissements will be provided in future reports.

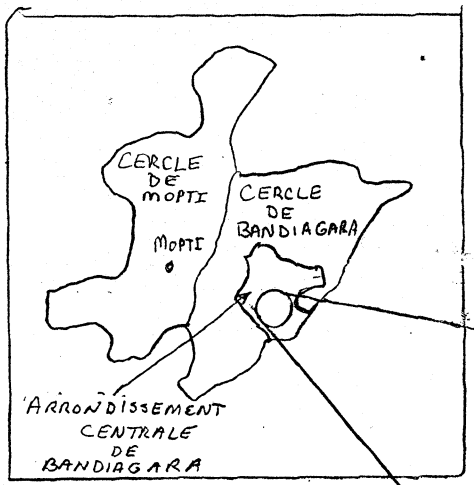
A. Selection of Study Site

Fieldwork for the pilot study phase was begun in February 1990 in the Arrondissement Central de Bandiagara. This arrondissement was chosen as the first study site for two reasons: (1) it is one of the VRP action zones, and (2) the project interpreter is a native of Bandiagara and has family connections in a number of villages in the area. The fieldwork was thus made easier since one member of the team was already known by the villagers.

B. Methodology

The study took place in the villages of Songho, Doukombo, and Kalibombo, all participants in VRP phase I activities (see figure 2). A series of interviews covering the topics of land tenure, tree tenure, forest management, and forest regulation were conducted with each village council. In addition, a tour of each village and its surroundings was made in order to gain a better understanding of the environmental situation and types of tree use activities occurring in the area. Interviews with village women were also conducted in Doukombo and Kalibombo.

RESEARCH STUDY AREAS
ARRONDISSEMENT CENTRALE
DE
BANDIAGARA



N

BENNDIELI

TO DOUENTRA

TOUGOUME

SONCHO

DOURO RIVER

BORO

KALIBOMBO

KOKOLO

TO JANGA

KORI-KORE

TILLE

YAME RIVER

YAME RIVER

YAWAKANDA

DOUKOMBO

Yame River

BANDIAGARA

VEDIE

SIDI-SIBI

SOKOLO

BOGOLO

DIOMBOLOLEYE

SASSAMBOUROU

TEGOUROU

BODIO

LEGEND

- GRAVEL ROAD
- DIRT ROAD
- DIRT TRACK
- INTERMITTENT STREAM
- CLIFF OR OUTCROP
- VILLAGE
- TOWN
- STUDY AREA

SCALE:

0 5 10 KM

The village interviews provided a wealth of information about general tree management and land use practices. In order to obtain detailed information on these topics, in-depth interviews were conducted with five farmers. Data on the environmental, tenure, and tree management characteristics of each farmer's fields were recorded. The farmers were also asked questions about their understanding of the Forest Code and its impacts on their use of forest resources.

Because the Bandiagara region was the first area studied, the villages served as "guinea pigs" for the development of a suitable set of questions which could be used for the other pilot study zones. The questionnaires were revised as I became more familiar with the land tenure and tree tenure characteristics of the area. Consequently, certain information gathered in Kalibombo and Doukombo was not gathered in Songho, the first village studied. In addition, more detail is available on Doukombo since the research team spent more time there than in the other two villages.

The reader should also bear in mind that the research activities are only partially completed. The data and conclusions drawn may thus be revised as new information is obtained.

1. Problems Encountered

The biggest obstacle to conducting research in the Bandiagara area is its extreme linguistic diversity. Although the villages of Songho, Kalibombo, and Doukombo are located within 10 kilometers of one another, each village has a dialect that is virtually incomprehensible to residents of the other villages. The terms used to describe land tenure categories as well as the names of trees themselves are often completely different between the three villages. The effort required to gather information is thus three times greater than that required in an area where only one language is spoken.

Another difficulty encountered was the great distances between fields. It is not uncommon for a farmer to cultivate one or more parcels located 6 to 8 kilometers from the village. Even if a dirt track exists in the area, travel to and from the fields can be very time consuming. Thus a minimum of one day, and possibly two or three, has to be scheduled for each farm visit.

A third problem, totally unanticipated, was the presidential visit, which occurred in mid-March. Ordinarily the workload slackens in February and March and villagers are readily available for interviews. However, this year most village leaders were busy preparing for the up-coming visit, and villagers also were very occupied with community garden, tree planting, and road improvement activities. As a result, several interviews had to be rescheduled, and others, cancelled entirely.

Mistrust on the part of the villagers is also an obstacle that researchers face in this area. Villagers are particularly wary of subjects

related to Forest Code enforcement. It takes time to build up a relationship of trust which will allow one to ask questions as to what problems the villagers encounter with the forest service and how those problems might be resolved.

C. Geographical Setting

1. Physical Geography

The Arrondissement Central de Bandiagara is located in the southeastern portion of the Bandiagara plateau, a large sandstone escarpment which runs in a northeast-southwesterly direction for a distance of about 200 kilometers through central Mali. The plateau terrain is rugged, broken by numerous rock outcrops and steep gorges. The soils are primarily shallow and very rocky, with bedrock often close to the surface. Productive farmland is concentrated along the floodplains of the Yame and Douro rivers and their tributaries.

The climate of this part of the plateau is Sudanian, with an average annual rainfall between 500 and 600 millimeters. Rainfall is erratic, however, with rains beginning as early as May and ending as late as November. Generally the rainy season lasts from June through September. There is a cool dry season from December to February, followed by a hot dry season from March to May.

The two major rivers, the Yame and the Douro, are intermittent watercourses. The lack of adequate year-round water supplies is a major limiting factor for both agricultural production and reforestation activities. However, a series of dams and improved wells have been constructed in the area in recent years, allowing some villages to expand into dry-season vegetable production. Fruit tree production is also popular in areas with a year-round water supply.

Despite the ongoing deforestation, there is still a substantial tree cover in the arrondissement. Acacia albida (balanzan), Butysperum parkii (karité or shea butter tree), Parkia biglobosa (néré), Balanites aegyptica (desert date), Lannea microcarpa (raisinier), Tamarindus indica (tamarind tree), and Adansonia digitata (baobab) are but a few of the species found in both cultivated and uncultivated areas. Various species of Combretum dominate in fallow areas and in the scrublands where soils are too thin to farm. Stands of Borassus aethiopum (raffia palms) are concentrated along the Yame, and baobabs can be found both in fields and along watercourses. The areas north of Kalibombo and west of Doukombo are heavily used by woodcutters from local villages and Bandiagara town.

2. Cultural Geography

The town of Bandiagara dominates the area politically and economically. Two weekly markets are held in Bandiagara, which is also the main source of the few manufactured goods found in the outlying villages. The

nearest medical and educational facilities are located in Bandiagara, as are various governmental offices, including the Cantonnement Forestier.

An all-weather graveled road links Bandiagara to Mopti, the regional capital, 75 kilometers to the west. The roads to the outlying villages in the Arrondissement Central are poor at best and often impassable in the rainy season. Goods are transported primarily by donkey cart or by headload.

The arrondissement is populated mostly by Dogon farmers, with a few permanent and semipermanent Fulani settlements. Transhumant nomads camp in the area during the rainy season when the inner delta is flooded. With the exception of the Fulani encampments, the inhabitants are concentrated in villages. Small outlying farming hamlets, both temporary and permanent, are frequently associated with the larger, older villages.

The three pilot study villages are located within 15 kilometers of Bandiagara. Songho, the largest of the villages, lies approximately 15 kilometers east of Bandiagara. Doukombo, the oldest and most prosperous village, is adjacent to the main road about 8 kilometers east of Bandiagara. Kalibombo,* the smallest and least prosperous of the three villages, is situated on a rocky cliff about 7 kilometers north of Bandiagara. All three villages are inhabited primarily by Dogons, and agriculture is the major economic activity.

D. Economic Activities

1. Agricultural Production

Major Crops. The agricultural production system follows a common pattern in the three villages. The most important crops are millet and sorghum, which are grown primarily for home consumption. Fonio (Digitaria exilis) is also an important cereal crop. Peanuts, sesame, dah (Habiscus sabadariffa), cowpeas, Bambara nuts, and tobacco are also grown in all three villages.

Dry-season vegetable production is a crucial agricultural activity in Doukombo, where water is available for much of the year. Onions are the predominant dry-season crop, though a variety of other vegetables, including tomatoes, cabbage, carrots, lettuce, nightshade (Solam aethiopicum), hot peppers, and potatoes, are also cultivated. In Kalibombo and Songho, where water is limited, only farmers with access to garden plots in neighboring villages or hamlets are active in dry-season vegetable production.

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* The village referred to on the maps as "Kalibombo" is actually called "Kalme" by its inhabitants. The term "kalibombo" refers to a nearby river gorge which used to be densely covered by a plant called "kali" (kali = a native plant, species unidentified; bomo = stream).

Agricultural Calendar. Agricultural activities are concentrated between May and December, except for vegetable production which extends into March. Fields are cleared, boundaries are reestablished, and water conservation structures are repaired between April and mid-June. Millet and sorghum are sown as early as May, although the bulk of the field preparation is done in June and July. Weeding takes place in August and September. The harvest season begins in September and continues into November and December.

In Doukombo, the first garden season begins in September. The September gardens consist mostly of onions and hot peppers. The cold season gardens, which are started in December, contain a much greater variety of vegetables, including cabbage, potatoes, tomatoes, cowpea leaves, and the like. The vegetable harvest is usually completed by late March, when the hot dry season gets under way.

Division of Agricultural Tasks. Most of the work in the fields is done by men. Women are responsible for preparing and bringing meals to the workers in the fields. Men clear and prepare the fields for planting. At planting time, the men prepare the seed mounds or ridges while women and children follow behind to sow the seeds. Weeding is usually done by men unless labor is scarce. The cereal crops are cut by men, but both women and children participate in bundling and transporting the crop to the granaries. Women do most of the work in their personal fields, with the exception of clearing.

2. Livestock Production

Livestock production is still an important part of the Dogon farming system even though many of the larger animals died during the last drought. The families that still own cattle use them primarily for milk production. In Doukombo, cows are usually given over to Fulani herders, who take care of them in return for a portion of the milk. In Songho, however, cows are watched by village herders and kept in cattle corrals outside the village at night.

Horses are even rarer than cows, primarily because there has not been enough surplus millet in recent years. Donkeys, which are often used to pull carts or to transport goods, are more common than horses, though still rare.

Sheep and goats are kept by villagers in all three study sites, though their numbers are said to have decreased considerably in the last fifteen years. In all three villages, sheep and goats are kept in stalls inside the family compounds at night. The manure is later transported to the field to renew soil fertility.

Pasturage methods for sheep and goats vary depending on the season and the village. During the rainy season, each family in Kalibombo and Songho is responsible for providing a herder to ensure that the animals do not damage the fields. In Doukombo, each family contributes money to

pay for a Fulani herder to care for the animals until the fields are harvested. The herder is paid in cash and millet.

As soon as the fields are harvested, the villagers of Kalibombo allow their sheep and goats to run free. In Doukombo, each family assigns a young boy to watch the herds or, if labor is scarce, the animals are allowed to run free.

In Doukombo, women are the major owners of small ruminants, which they raise for market. Doukombo men rarely own goats, and the sheep they raise are primarily for feasts. In contrast, both men and women own sheep and goats in Kalibombo. However, men are more likely than women to raise goats. In Kalibombo, as in Doukombo, animals are raised primarily for their manure, for feasts, and for paying taxes.

3. Major Nonagricultural Activities

Many residents of the Arrondissement Central participate in nonagricultural activities in order to earn extra cash. The residents of Doukombo have taken advantage of the demand for building stone in Bandiagara to turn the rocky outcrops which surround the village into a resource instead of a liability. A village cooperative has been formed to quarry stone for export to Bandiagara. Individuals interested in making a little money will also cut and haul stone on demand. Stone quarrying is also practiced in Kalibombo, though on a lesser scale and primarily for village use.

Most men in Kalibombo are professional weavers during the dry season. The work is usually done on a piecework basis, with a middleman in Bandiagara supplying the materials. Weaving is also practiced in Doukombo but is less important since dry-season vegetable gardening has been introduced.

Both men and women in the two villages are active in petty commerce. Women are especially active in the Bandiagara market, where they sell a variety of food items, including wild and domestic fruits, vegetables, and processed foods. Most women in Kalibombo also earn money by cutting and selling firewood in the Bandiagara market.

4. Out-migration

Seasonal and permanent out-migration is a common phenomenon, especially in villages with no year-round irrigation water. Younger men between the ages of 15 and 35 often leave their villages to seek work in more prosperous areas to the south. Segou, Bamako, Ivory Coast, and Senegal are the most common destinations. Sometimes the migrants return in the rainy season to help cultivate the family millet fields, but many migrants never come back. This exodus of young people has created a tremendous labor shortage during the rainy season, so that agricultural laborers can command as much as 1,000 CFA per day, even in the most remote locations.

E. Land Tenure System in the Central Arrondissement of Bandiagara

Despite local differences in terminology, the basic land tenure system is nearly identical in the three villages. Each village has a reasonably well-defined territory radiating in a roughly circular direction from the village. Farming hamlets and even other villages can be found within the village territory, and disputes as to who controls such lands are not uncommon. In general, fallow and uncultivated bush is more common as one gets farther from the village. However, fields can be found near the village boundaries, and large uncultivated areas are sometimes found adjacent to the residential section of the village territory. Heavily forested areas, however, are usually located near the edges of the village land.

1. Land Tenure Categories

Table 1 summarizes the land tenure categories for cropland in each village. Four basic types of field exist: village, extended family, individual man's, and individual woman's fields. A brief description of each tenure type as well as a description of categories peculiar to certain villages is given below.

Village Fields (ba-debou; anda-wuru; ba-ginne-mine). Agricultural decisions for the village field are made by the village headman, with input from a designated field manager. Although the crop is traditionally reserved for certain uses, the headman ultimately controls the division of the harvest. The village field is worked collectively.

In Songho, each family is required to contribute a worker and food on the workdays announced by the village "griot." In Doukombo, all able-bodied villagers are required to participate in the village fields; in Kalibombo, the village field is cultivated by all the males in the elected field manager's age set.

Millet and sorghum are the main crops grown on the village fields. Once harvested, the grain is stored in a communal granary until it is needed. In Songho, the communal grain is sent to the children who attend school or it is sold and the proceeds deposited in the village treasury to pay for fines or special village needs. In Doukombo, village grain is lent to families which had a poor harvest, is sold or lent to neighboring villages which had a poor harvest, or is sold with proceeds being used to pay village fines or other village expenses. In Kalibombo, the village crop is used to provide food to official visitors. A portion of the crop is sold and the proceeds are deposited in the village treasury to help the community meet its expenses.

Family Fields (debou-yala; ginna-wuru; poroba-mine). The family fields belong to all the surviving males in a family, whether present in the village or not. The oldest male is the nominal decision-maker, though in practice he often designates a younger or more able male relative as manager.

TABLE 1

Field Tenure Categories in Three Dogon Villages: Songho, Doukombo, and Kalibombo

TYPE OF TENURE AND CHARACTERISTICS	LOCAL TERM		
	Songho	Doukombo	Kalibombo
VILLAGE FIELD			
-Use decisions made by village headman -Farmed by villagers on collective basis -Crops used for the village's needs	ba-debou	anda-wuru	ba-ginne-mine
LINEAGE FIELD			
-Use decisions made by eldest male in extended family -Farmed on a collective basis by extended family -Crops used for the extended family's needs	debou-yala	ginna-wuru	poroba-mine
INDIVIDUAL FIELD			
-Use decisions made by individual owner or user -Farmed on individual or household basis -Crops used on an individual or a household basis	kona-tangou-yala	goujou-wuru	jom-mine
WOMAN'S FIELD			
-Use decisions made by woman user -Farmed by woman user -Crops used to fulfill user's needs	yoiga-yala	nya-wuru	ele-wuru

The main crops grown on the family fields are millet, sorghum, and fonio. Peanuts, cowpeas, and sorrel are also grown. The work is done on a collective basis, with all able-bodied family members participating. Certain days of the week are designated for cultivating the family fields. The harvest, which is put into a family granary, is controlled by the oldest male in the family. Parcels within the family field are sometimes given to specific family members to farm on an individual basis.

Individual Fields (kona-tangou-yala; goujou-wuru; jom-mine). Many adult males cultivate their own private fields in addition to the extended family fields. This is particularly true in large families. The holder cultivates the parcel either alone or with the help of his spouse(s) and children. Decisions as to what to plant, when to plant, and how to distribute the harvest are made by the user of the individual field. Some individual fields are fixed parcels which are farmed by the same person year after year. Other individual parcels are borrowed from other landholders on a seasonal basis only.

Individual Women's Fields (yoiga-yala; nya-wuru; ele-mine). Most women also cultivate small parcels on their own. The parcels are generally used primarily for peanut production, although other crops including okra, sesame, cowpeas, sorrel, and cereals are also grown. The women's parcels are usually located within the boundaries of the family field, though women sometimes acquire temporary rights to other parcels. Sometimes the boundaries of the parcels remain unchanged for a number of years; at other times the parcel's location changes from year to year.

Other Types of Fields. Each village quartier also has a field which is controlled by the head of the neighborhood. The quartier fields, known as ba-wunu-wuru, are farmed collectively by the residents of the area, and the crops go into a quartier granary. Control of the quartier lands rests in the hands of the head of the neighborhood.

Gardens. Information on garden tenure was drawn primarily from Doukombo, where gardening is a major activity in the dry season. With few exceptions, gardens are cultivated strictly on an individual basis, even if a common enclosure is constructed.

Two categories of gardens are recognized in Doukombo: "woujou ana" or male gardens, and "woujou ya" or female gardens. The woujou ana includes fruit trees whereas the woujou ya does not. The woujou ana is called the male garden because it is more permanent and therefore requires that the owner have a stronger claim to the land.

Both men and women farm woujou ya but very rarely does a woman have a woujou ana. Cultivators of a woujou ya are often not the owners of the land and generally have access to the land for three to four months per year at the most. At the end of the gardening season, the borrowed woujouya reverts to the owner(s) for the rainy season. A borrower of a woujou ya may or may not get access to the same land every year. Sometimes the borrower gives the owner a portion of the harvest, but he is

not obligated to do so. Control reverts to the landowner on the user's death unless the woujou ya is also a family field or an individual field for the user, in which case it is divided among the owner's heirs.

In contrast, the woujou ana is considered a year-round proposition since the trees may bear fruit even during the hot season. Depending on the extent of tree cover, the woujou ana may also be used to grow rainy season millet. Most woujou ana are used by their owner(s) or a designated manager. The woujou ana is divided among the owner's heirs upon his death.

If a woujou ana owner leaves the area, often he will place his garden in the hands of a manager. The garden's manager is then in charge of all planting decisions; in effect, the garden becomes his for an indefinite period.

Uncultivated Land. Each village has areas which are no longer cultivated or which have never been cleared. (Short-term fallow falls into the field category.) Songho, for example, has a sacred forest, where tree cutting and cultivation are forbidden. Cultivation is forbidden in the bush immediately north of Doukombo in order to provide the villagers with toilet facilities. The ravine known as "Kalibombo" is also restricted from farming since the village animals obtain their water in that area.

Cultivation is also forbidden on the animal corridor, or burtol, which cuts through the territory of the three villages. The burtol is used by Fulani herders bringing their herds through the region. The boundaries of the burtol are well-defined, and farmers are subject to fines if their fields cross the corridor limits.

Areas of forest and scrubland are also found within each village's territory. Clearing of these lands is regulated by Eaux et Forêts regulations, which stipulate that a clearing plan must be approved and a clearing tax paid before any trees or shrubs can be removed. Uncultivated lands are valued by the villagers for their grazing and forest resources.

2. Land Acquisition

Native Villagers. Villagers in this area obtain farmland primarily through inheritance or borrowing. Inherited land is referred to as "oy" in Doukombo and "ba-mine" in Kalibombo. When the family head dies, control of the family lands passes to the oldest surviving male. Individual lands belonging to the deceased either become family lands, with the eldest male as the decision-maker, or are divided equally among the deceased's brothers and sons. Women cannot inherit land.

If a villager's inherited lands are insufficient, he will borrow land from a relative or neighbor. If no suitable land is available within the village, he will approach residents of other villages. For example, villagers in Kalibombo borrow land from villagers in Boro, and villagers in

Songho borrow land from villagers in Doukombo. Borrowed land is referred to be "mine-obou" in Kalibombo and as "dindiri" in Doukombo.

Both unmarried and married women can borrow land. It is not uncommon for unmarried women to borrow part of their father's land to cultivate their individual fields. Land borrowed by a woman reverts to the lender or his heirs upon her death. In contrast, rights to use land borrowed by male villagers from fellow villagers are sometimes (though not always) passed on to the borrower's heirs. In theory, land that is borrowed cannot be lent out to a third party.

Stranger Farmers. Two types of "stranger" farmer were observed: "strangers" who had moved permanently into the village, and "strangers" who resided in other villages but who farmed village land. Both types of stranger farmer bor- row the land they farm.

In Songho and Doukombo, the resident stranger wishing to acquire land has two options: if his host family has sufficient land, he will borrow land from that family or their relatives; if these families have insufficient land, the stranger will ask the village headman for land. The village headman will either lend the stranger some of his own land or will ask another villager to lend him land. Loans from the headman are considered more secure than loans from other villagers. A similar process occurs in Kalibombo, except that the stranger's request must first be approved by the oldest male villager and the village council.

According to the three village councils, requests to borrow land are usually granted, particularly if the stranger farmer has relatives in the village and expresses an interest in settling in the village. There is usually a two-to-three-year trial period for the stranger to decide whether he will stay in the area. If he marries a woman from the village, has children with her, pays the village taxes, and participates in village activities, his children are considered villagers and can inherit his use rights to the land. If he dies without children, the land reverts to the lender or to the village if the lender has died without heirs.

Nonresident farmers can also borrow land from villagers. A number of Bandiagara residents farm borrowed millet fields in Kalibombo. Songho residents borrow millet fields on a long-term basis and garden plots on a short-term basis from Doukombo residents. Villagers from Yawakanda, Kassa, and Tabagolo also borrow garden plots from Doukombo villagers on a seasonal basis.

In Doukombo, a borrower of millet land is supposed to give the owner a "fagot" of millet at the end of the harvest, but villagers stated that this does not always happen. The gift of millet is supposed to serve as a reminder that the land does not belong to the borrower. In contrast, the farmers interviewed stated that gifts for the use of seasonal garden plots were not obligatory, though most felt that it was respectful to give the lender a small portion of the harvest. It appears that gifts are

more likely to be required of stranger-farmer borrowers, whether village residents or not.

During the past, stranger farmers in Songho were required to give the village headman a bundle of millet in return for the use of borrowed land. This rule is no longer enforced, though the borrower has the option to give the lender of land a small gift after the harvest. A similar situation has evolved in Kalibombo.

Borrowed land can be taken back if the lender feels he needs the land, or if he feels the borrower is trying to claim the land as his own. Of the five farmers interviewed, two reported that they had been forced to take back land lent to nonresident borrowers. In one case, the farmer had lent out a portion of the family field to an old woman from Koro. When the woman died, her grandson wished to continue farming the land. However, the lender refused--even though the family was suffering from a labor shortage--on the basis that the borrower might eventually claim the land as his own.

Another farmer lent out a portion of one family field to a resident of another village. However, after a number of years, the borrower tried to claim the land as his own. The lender finally took back the land and lent it to a fellow villager instead.

Other Modes of Land Acquisition. In Doukombo, a father can give his heirs land outright even while still alive. This land will become theirs upon his death. In Kalibombo, gifts of land are no longer encouraged due to a recent problem encountered when a nonresident who had been given a gift of land put in a well on the property. He then tried to purchase the plot in order to solidify his claim. The villagers refused to agree to the sale and took back the land so as not to set a precedent for future sales.

According to the village leaders and villagers interviewed, land is not rented, sharecropped, pledged, or sold in any of the three villages. However, both house lots and garden plots are sold in Bandiagara town. Land suitable for fruit orchards is also sold in the Goundaka area, a short distance west of the study area.

F. Tree Use, Tree Tenure, and Tree Management

1. Tree Use

The inhabitants of the Central Arrondissement of Bandiagara rely heavily upon trees and tree products to meet their needs. Both wild and domestic trees provide products which are consumed at home, exchanged for goods or services, or sold in the market for cash. The importance of tree products in Dogon villages is clearly illustrated in table 2, which lists the uses of twenty-two of the most important trees in the area. The list is by no means complete since certain widely used species which have not

TABLE 2

Some Uses of Trees in the Arrondissement Centrale of Bandiagara

SPECIES	PARTS USED AND USES		PRIMARY HARVESTERS*
Acacia albida	Fruit:	Fodder (common)	M/W/C (H)
	Leaves:	Fodder (common)	M/W/C (H)
	Wood:	Construction	M
		Firewood	W/M
		Door and window frames	M
	Bark:	Medicine (stomach ache)	M/W
	Tree:	Beehive holder	M
		Shade	-
Adansonia digitata	Fruit:	Food, sauce, glue	C/W
	Leaves:	Sauces	M/W
	Wood:	Firewood (rare)	W
	Bark:	Ropes	M
		Masks	M
Azdirachta indica	Leaves:	Medicine (malaria)	M/W
	Wood:	Firewood	F
	Tree:	Shade (compound/roads)	-
Balanites aegyptica	Fruit:	Food	W
	Leaves:	Fodder (common)	Herders
		Medicine	M/W
	Seeds:	Food and Oil	W
	Wood:	Tool handles	M
		Firewood	W
	Branches:	Fencing	M
	Roots:	Medicine	M/W
Borassus aethiopum	Fruit:	Food	W/M
	Shoots:	Food	W/M
	Leaves:	Baskets, fans, mats	M/W
	Branches:	Furniture	M
		Fencing	M
	Wood:	Construction (houses)	M
	Roots:	Medicine	M/W
Butyrosperum parkii	Fruit:	Food	W/C
	Nuts:	Butter/medicine/soap	W
	Wood:	Firewood	W/M
	Tree:	Shade	-

[continued]

[Table 2, Some Uses of Trees, cont.]

SPECIES	PARTS USED AND USES	PRIMARY HARVESTERS*
Carica papaya	Fruit: Food/medicine	W/M
	Leaves: Medicine	W/M
Ceiba petandra	Capok: Pillows, fire-starter	M/C
	Fruit: Food	C
	Seeds: Food	C
	Leaves: Medicine (eyes)	C/W
	Fodder	C
	Tree: Shade	-
Combretum glutinosum	Wood: Firewood	W/M
Combretum micranthum	Wood: Firewood	W/M
	Construction	M
Diospyros mespiliformis	Fruit: Food	M/W/C
	Leaves: Fodder	C
	Wood: Firewood	M/W
	Tool handles	M
	Tree: Shade	-
Hyphanae thebaica	Fruits: Food	C
	Leaves: Baskets, boxes	W/M
	Wood: Gates, dam crosspieces	M
Khaya senegalensis	Fruit: Toys	C
	Leaves: Fodder	C
	Wood: Carvings, mortars	M
	Firewood	W/M
	Bark: Medicine (stomach ache)	M/W
	Roots: Medicine (stomach ache)	M/W
Lannea microcarpa	Fruit: Food	W/M
	Juice	W/M
	Leaves: Fodder (rare)	herders
	Seeds: Oil	W
	Wood: Construction	M
	Firewood	M/W
	Bark: Dye	M/W
	Masks	M
Mangifera indica	Fruit: Food	M/W/C
	Leaves: Medicine	M/W
	Wood: Firewood	M/F
	Tree: Shade	-

[continued]

[Table 2, Some Uses of Trees, cont.]

SPECIES	PARTS USED AND USES		PRIMARY HARVESTERS*
Parkia biglobosa	Fruit:	Sauce	M/W/C
	Leaves:	Medicine	W/M
	Seeds:	Food	W
	Wood:	Construction	M
		Firewood	W/C
	Roots:	Medicine	W/M
Prosopis juliflora	Leaves:	Medicine	M/W
	Branches:	Fencing	M
	Wood:	Firewood	W
	Tree:	Shade	-
Psidium guajava	Fruit:	Food	M/W
	Leaves:	Medicine	M/W
	Wood:	Construction	M
		Firewood	M/W
Sclerocarya birrea	Fruit:	Food	W/M
		Fermented juice	W
	Nuts:	Food	W
	Leaves:	Fodder	W/C
	Wood:	Axe handles	M
		Firewood	W
	Bark:	Medicine	M
Tamarindus indica	Fruit:	Food (dege)	W/M/C
		Medicine	W
	Leaves:	Food (dege)	W
		Medicine	M
	Wood:	Sculptures/plates	M
		Firewood (dead wood)	W
Vitex doniana	Fruit:	Food	M/W/C
	Wood:	Firewood	M/W
	Tree:	Shade	-
Zizyphus mauritania	Fruit:	Food	W/M
	Leaves:	Fodder	M (herders)
	Roots:	Medicine	M/W

* M=men, W=women, C=children, H=herders (usually men or boys).

yet been clearly identified were not included. A few of the more important uses and preferred species are described below.

Trees are an important source of food and sauce flavorings. Fruits and leaves of the baobab (Adansonia digitata) and the tamarind (Tamarindus indica) form the basis of two of the most common sauces. The grape-like fruits of Lannea microcarpa are eaten fresh or dried for processing into juice served at funerals. The raffia palm (Borassus aethiopum) fruits are eaten and the shoots are cultivated and consumed. Fruits of the néné (Parkia biglobosa) are another popular ingredient for sauces, and shea butter (Butyrosperum parkii) fruits are eaten and the nuts used to make a type of butter. The desert date (Balanites aegyptica), black plum (Vitex doniana), and Sclerocarya birrea fruits are also highly valued for food.

If sufficient quantities of the above products are harvested, the surplus is sold. Exotic fruit trees such as guavas, mangoes, lemons, and papayas are relatively uncommon in the Central Arrondissement, but villagers fortunate to own such trees generally sell the fruit in nearby market towns.

Trees also serve as a source of materials for constructing buildings, gates, fences, furniture, animal troughs, beehives, utensils, and tool handles. The raffia palm (Borassus aethiopum) is particularly valued as a source of construction materials. Quarter rounds of raffia palm serve as the main roof support in most Dogon houses. Other species used for construction are Anogeissus leiocarpus and Pterocarpus lucens.

Doum palms (Hyphanae thebaica) are used for gates and to dam watercourses to slow the flow of water over fields. Tamarindus indica and Khaya senegalensis wood is valued by sculptors and carvers of kitchen utensils. Karité wood is preferred by charcoal makers. Wood from the Acacia albida is used to make beehives, stools, mortars, and doors. Poles of Zizyphus mauritania are used to construct homes and sheds.

Live branches from the desert (Balanites aegyptica) are the preferred material for tool handles. Branches of the raffia palm are used for constructing furniture, gates, and fences. Balanites aegyptica branches are widely used to fence off gardens and to protect young trees from animal damage. Thorn branches of all types are valued as fencing material.

Leaves of the raffia palm are used to make a variety of household items. Men weave baskets from raffia palm leaves and use strips of raffia to tie fence and shed supports together. Women construct fans, mats, and small boxes out of raffia leaves. Doum palm leaves are also used to make boxes. Men use doum palm leaves to weave baskets.

Rope is made from baobab bark, which is stripped off by specialists trained to remove the bark without destroying the tree. Bark from other bushes and trees is used to tie bundles and assemble fences and sheds. Bark of the Lannea microcarpa tree is used to make dye, and the seeds are used to tan leather.

Trees, particularly fruits and leaves, are an essential source of dry-season fodder for Dogon livestock. Fulani herders in the area also rely heavily on leaves and fruits to feed their animals. Acacia albida is the most valued forage tree. Both its fruits and its leaves are used for forage. The fruits are also sold in the market, usually by men or boys. Other important forage species are Sclerocarya birrea, Pterocarpus lucens, Balanites aegyptica, Celtis integrefolia, and Zizyphus mauritania.

Trees are an important source of firewood for household consumption and sale. The preferred firewood species for household consumption are Combretum glutinosum and Combretum micranthum. Diospyros mespiliformis is also popular. The wood of most species is used for firewood if the tree is already dead and lying on the ground when the collector passes by. Other major sources of fuelwood are millet stalks and dry cattle dung.

Trees are quite literally the pharmacy of the village. Virtually all trees in the area have some kind of medicinal value. For example, leaves of the Ceiba petandra are used to treat eye problems, bark and roots from the Khaya senegalensis are used to treat stomach aches, Sclerocarya birrea bark is used to treat diarrhea, baobab leaves are placed on burns, and neem leaves are boiled and the water given to people suffering from malaria. Oils extracted from the seeds of Lannea microcarpa, Balanites aegyptica, karité (Butyrosperum parkii) are used to make soaps and lotions.

In addition to their value as a source of raw materials, food, and fodder, trees are also valued for other reasons. Trees are highly valued for their shade qualities, especially in household compounds, in public gathering areas, and along roads and trails. Neem trees often planted in compounds and along roads for shade. Large Ceiba petandra, mangoes, and karité are particularly appreciated for their shade. A certain number of shade trees is considered useful in fields as well. All five of the farmers interviewed deliberately protect Acacia albida trees in their fields in order to have a place to rest out of the sun during the cropping season. Combretum glutinosum and Caliotropis procera are preserved at the edges of fields, particularly if there are few other trees in the area.

Field trees are also valued for their ability to renew soil fertility. Farmers know, for example, that livestock will be attracted to fields with forage trees such as Acacia albida and Balanites aegyptica. By preserving a few of these and other forage trees in their fields, the farmers increase soil fertility with a minimum of effort. Fallen leaves are also used as mulch for garden plots, and fallen logs provide nutrients for the soil.

One case was encountered where a man had planted several very bushy trees of an unidentified species along a watercourse bordering his field as a means of protecting the soil from erosion. No other cases were encountered where farmers had used trees as erosion control measures.

Trees or shrubs are also used to demarcate animal paths. Euphorbia is often used for this purpose. Occasionally low-growing thorny shrubs

are used to mark field boundaries as well. Trees also serve to mark corners of fields.

2. Division of Labor in Tree Use

Although both men and women gather fruit, children are the main fruit collectors. Songho is an exception to this rule, in that women there collect only fallen fruit while men or children collect fruit that is still in the trees. If fruit trees in a farmer's field produce a large quantity of fruit, the entire household or extended family will harvest the trees at once. This rule is especially true for valuable fruits such as néré and tamarinds. In general, raw and processed fruits, nuts, and leaves destined for human consumption are sold by women.

As a general rule, men are responsible for cutting wood used for construction or carving. Construction and woodworking is also a male activity, as is the marketing of the raw and finished products. The cutting of branches, and the construction of furniture and fences, is done by men. Large-scale firewood harvesting for sale in Bandiagara or other towns is also a man's task. However, women cut wood and gather dead wood for domestic fuel and for small-scale market sales.

Children, particularly boys, frequently gather animal fodder. Adult women and men also gather fodder but usually only in conjunction with other activities.

Medicinal materials are collected by both men and women. Women, however, generally gather and process soap and lotion-making materials. They often sell the finished products in nearby markets and use the money to pay for their personal needs.

3. Tree Tenure

One of the study's objectives is to describe the tree tenure rules in the pilot zone and determine what constraints these rules may create for agroforestry actions in the area. The rights a person has to a tree depend on several factors, including the type of land tenure, the type of tree, the type of use, the quantity used, and the relationship of the tree user to the landowner. State regulations governing tree use overlie the local rules. The following sections briefly summarize some of the key tree tenure characteristics of the study villages and holdings.

Certain species are more closely regulated than other species in these three villages. The theoretical rules governing tree rights are more strictly adhered to for trees that are considered more valuable. The most valued trees are those that provide fruit for human consumption. The more important the tree is as a food source, the more closely its use is regulated.

When asked to name the most important trees, the villagers always listed fruit trees before any others. Of the fruit trees, the order of

importance given was baobab, tamarind, and raffia palm. The raffia palm is also highly valued because its wood and leaves are used to make a wide variety of items. The karité and néré are the next important, followed by Lannea microcarpa, Balanites aegyptica, Sclerocarya birrea, Vitex doniana, and Zizyphus mauritania. Other less common fruit species, such as guava, papaya, and orange trees, are also valued highly. The effect that the perceived value of trees has on tree use and management will be discussed below.

The village councils interviewed stated that trees are not owned separately from the land on which they are found. For example, specific trees are not left in inheritance to heirs unless the land is also left to them, nor do people borrow trees without also borrowing the land on which they are found. Trees are not sold, pledged, rented, or share-cropped.

The tenure status of the land on which the tree is found is thus the primary factor governing rights to plant and use the trees on that land. In theory, the person in control of the land also controls the trees on that land. This is particularly true for cutting rights but become less clear for other uses, such as fruit collection, bark removal, and the gathering of dead wood and leaves.

The village headman controls tree planting and tree use on the villages' collective fields. Cutting is strictly regulated and is generally done only if the wood is to be used for collective purposes or is made available to all the villagers on a first-come, first-served basis. If a cutting permit is obtained from Eaux et Forêts, each family or villager contributes money to pay for the permit. Such a case occurred in Kalibombo, where the villagers once contributed toward a collective cutting permit in order to cut a tree to make a public watering trough.

Fruits of important trees, such as the tamarind, baobab, karité, and néré, located on village lands are collected by all the villagers. This may be done in two ways: the headman may ask all the villagers to harvest the fruit collectively, or he may set a day on which the trees are open to all villagers on a first-come, first served basis. If the fruits are harvested collectively, they are sold and the money is deposited into the village treasury.

The fruits of less valued or the more common important trees (such as Lannea microcarpa, Sclerocarya birrea, and Balanites aegyptica) are open to collection by all villagers on an individual basis. Nonvillagers are restricted from collecting both fallen and unfallen fruits from the village field trees. This rule is strictly enforced for the important fruits but is likely to be overlooked if the collector takes only a small quantity of less important fruits, particularly if they are on the ground. Fallen branches, however, can be gathered by anyone passing through.

Control of trees located in the family-held fields rests in the hands of the family head, aided by his farm manager. Trees cannot be planted or

cut on this land without first getting the family head's approval. The family head also controls the harvesting of any products from these trees. In practice, only the collection of highly valued fruits is done under the direction of the family head. If the trees have produced a large quantity of fruit, the various households that work the land will set aside a day to harvest the fruits on a collective basis. If production is poor, the fruits are harvested by the households on a first-come, first-served basis. According to informants, women cannot plant trees on the family fields but can collect fruits on existing trees for their own benefit.

In theory, the owner of the individual field controls the planting, cutting, and use of trees on that land. Anyone wishing to cut or plant a tree on the field must first get the owner's approval. The same rule applies to the cutting of branches. Rules on planting and cutting are generally strictly adhered to.

The owner's exclusive right to fruits on the trees is generally enforced only for highly valued fruits, such as baobab, tamarind, néré, and karité, especially if they occur in large quantities. The baobab and tamarind fruits have such a high value that owners of baobabs and tamarinds will fence off their trees. Fruits of Acacia albida are often included in this restriction if the owner has a lot of livestock. Frequently household members will collect the tamarind and néré on a collective basis if the trees have produced well. Otherwise, collection is done on an individual basis.

Fruits of the Sclerocarya birrea, Balanites aegyptica, and Zizyphus mauritania trees can be collected by passersby, provided that they collect small quantities for household consumption. Although the same rule holds true for other less important fruit trees, little emphasis is placed on enforcing the rule. Such fruits are thus available to the general public, villagers and outsiders alike.

Fallen fruits are also considered the property of the field owner, but in practice passersby are free to collect fruits on the ground (with the exception of baobab and tamarind fruits). If a field owner catches someone collecting large amounts of fallen fruits in his field, he may ask the offender to stop and warn him (or her) against such behavior. Passersby can also collect dead branches, provided they are not too greedy. The same rules apply to individual land left in short-term fallow.

Control of trees on women's individual fields is vested in the hands of the person from whom she has borrowed the land. Villagers stated that women could plant trees on the land, provided they first got approval from the owner. However, such actions are discouraged: for married women, on the grounds that if they get a divorce they will go back to their village; and for unmarried women, on the grounds that "if she marries outside the village, she can't bring the trees with her."

Similarly, control over tree-cutting rests with the landowner. All members of the woman's husband's immediate household have the right to

collect fruits both on the trees and on the ground. Fallen branches can be collected by both household members and any passersby.

Woodcutting is open to anyone on areas that are not under cultivation or in short-term fallow, provided that they have a permit from Eaux et Forêts. Woodcutters are supposed to receive permission from the village head prior to logging, but in practice this is often not done. The fruits of the karité, tamarind, baobab, Lannea microcarpa, and raffia palm are reserved for villagers. Villagers collect these fruits on an individual basis only. Any passerby can collect other fruits, particularly ones that have fallen on the ground. Passersby are also free to collect fallen branches, even in large quantities.

Control of village woodlots is vested in the village headman. According to council members and other villagers, the products from the woodlot belong to all the villagers. However, none of the trees in the Doukombo or Kalibombo woodlots has been exploited.

The question as to who has what rights to what trees is least clear on borrowed lands, particularly if the land has been in the borrower's family for more than one generation. In Doukombo, borrowers are discouraged from planting trees since trees are supposed to belong to the person who plants them. Lenders are afraid that "if a borrower plants trees, he will begin to think that the land is his." This policy represents a change from tradition, in which borrowers were allowed to plant trees. People ceased letting this happen when they noticed that borrowers were starting to claim land on the basis of the trees they had planted on it.

One of the farmers interviewed in Doukombo had planted on two borrowed fields and a borrowed garden plot. The farmer moved into the area thirty-six years ago, married a village woman, and has several children who reside in the village. According to the farmer, the owners of the borrowed land have agreed to let him plant "field" trees (baobabs and raffia palms). However, he is not allowed to plant exotic fruit trees.

In Kalibombo, borrowers are allowed to plant certain types of trees, but according to the village council, they will lose the trees if the owner decides to take back the land. Exotic fruit trees, such as orange, guava, papaya, and lemon trees, however, cannot be planted on borrowed land because such plantings can "often cause misunderstandings between brothers."

A borrower's rights to harvest fruits on the borrowed land depend on the arrangements that have been made with the owner. Some lenders will give the borrower rights to use both the trees and the land, while others reserve certain trees for themselves. The length of time the borrower has been on the land also affects his rights to trees. If the land was lent to the borrower or his family by a previous generation of villagers, the borrower exercises all the rights of the landowner to the trees. In the words of one village headman, "If the ancestors gave them the land, then they can do what they want with the land. They are equals to the

rest of us." If the land was lent recently, the owner has to give his approval for the borrower to cut trees.

Some orchards are left in the hands of a manager when the owner leaves the area. The degree to which the manager controls the trees depends on the arrangements he makes with the owner. The owner can give the manager the right to sell the fruits in his name. The manager then keeps a portion of the harvest for himself and sends the money to the owner. At other times the tree products belong entirely to the manager.

4. Tree Management and Soil Conservation

Dogon farmers traditionally plant certain species of trees in their fields. Baobabs are transplanted from the wild or grown from seeds for planting in family and individual fields and gardens. Ronier seeds are also frequently planted directly in the fields. Doum palms are occasionally planted. Farmers in the area also plant fruit trees if the land is suitable. Neem and Prosopis seedlings from the Bandiagara nursery are often transplanted to compounds for shade. Among the case study farmers, one man had grafted mangoes and planted them. Table 3 provides a list of trees planted on each parcel for the five farmers interviewed during the study.

Tree protection is also part of the Dogon farming tradition. One of the most frequently protected species is Acacia albida, which is liked for its shade, its forage qualities, and its soil improvement capabilities. Farmers will deliberately refrain from cutting young Acacia albida saplings and will provide supports for the young trees if necessary. A variety of fruit trees, including the raffia palm, baobab, karité, Lannea microcarpa, tamarind, Balanites aegyptica, and néré, is also protected. A list of trees protected by the case study farmers is provided in table 4.

Usually protection consists of making sure that the saplings are not destroyed during cultivation, but sometimes farmers will make a small catchment around the base of the tree and surround them with thorny branches to prevent animals from eating and stepping on the saplings.

In addition, farmers in the study area care for trees they have planted or protected. Particularly valuable trees, such as baobabs, tamarinds, and exotic fruit trees, are watered and manured. Small water catchments are constructed around raffia palms and their lower branches are trimmed to allow them to grow better. Compound trees, such as neems and Prosopis, are trimmed to provide a better-formed canopy. Thorny species, such as Balanites aegyptica and Acacia albida, are also trimmed.

In order to survive as agriculturalists in a very inhospitable environment, Dogon farmers have developed or adopted a variety of soil improvement and conservation techniques. Manure is transported to and applied to all fields within a reasonable walking distance from the farmer's house. Rock walls are constructed across the fields to slow the flow of water during the rainy season. Terraces are constructed, and soil is

TABLE 3

Trees Planted by Case-Study Farmers

1. Trees Planted on More Than One Parcel

SPECIES	NUMBER OF PARCELS (n=18)	PERCENTAGE OF PARCELS	NUMBER OF FARMERS (n=5)	PERCENTAGE OF FARMERS
Borassus aethiopum	8	44.4	4	80
Adansonia digitata	6	33.3	4	80
Azdirachta indica	6	33.3	5	100
Citrus limon	2	11.1	2	40
Hyphanae thebaica	2	11.1	2	40

* Household compounds are included.

2. Trees Planted on Only One Parcel

Acacia macrostachya
Annona senegalensis
Balanites aegyptica
Citrus sinensis
Delonix elata
Euphorbia balsamifera
Ficus gnaphalocarpa
Mangifera indica
Parkia biglobosa
Phoenix dactylifera
Prosopis juliflora
Psidium guajava
Tamarindus indica
Vitex doniana
Henna[a]
Grenadine[a]
Woro[b]
Somgou Tambere[b]

a. English name.
b. Dogon name, species unidentified.

TABLE 4

Trees Protected by Case-Study Farmers

1. Trees Protected on More Than One Parcel

SPECIES	NUMBER OF PARCELS (n=18)	PERCENTAGE OF PARCELS	NUMBER OF FARMERS (n=5)	PERCENTAGE OF FARMERS
Acacia albida	9	50	5	100
Balanites aegyptica	6	33.3	5	100
Sclerocarya birrea	6	33.3	4	80
Combretum glutinosum	2	11.1	2	40
Lannea microcarpa	2	11.1	2	40
Selempri*	2	11.1	2	40
Poundou*	2	11.1	2	40

* Dogon name, species unidentified.

2. Trees Protected on Only One Parcel

Acacia macrostachya
Butyrosperum parkii
Calotropis procera
Combretum micranthum
Diospyros mespiliformis
Entada africana
Khaya senegalensis
Maerua crassifolia
Parkia biglobosa
Zizyphus mauritania

imported in areas too steep or too rocky to farm. Plant residues are worked into the soil to improve soil fertility. One farmer among those studied also uses tied ridges, vegetation strips, and small check dams to decrease soil erosion on one of his fields. Another farmer uses trees to reduce the velocity of water overflowing the river in one of his field. Table 5 summarizes the soil conservation and improvement techniques used by the case study farmers.

TABLE 5

Soil Conservation and Improvement Techniques Used by Case-Study Farmers

TECHNIQUE	NUMBER OF PARCELS (n=13)	PERCENTAGE OF PARCELS	NUMBER OF FARMERS (n=5)	PERCENTAGE OF FARMERS
Microdams	1	7.7	1	20
Windbreaks	2	15.4	1	20
Rock dikes	5	38.5	5	100
Crop rotation	1	7.7	1	20
Manure application	10	76.9	5	100
Work in residues	12	92.3	5	100
Passive manuring	12	92.3	5	100
Terracing	2	15.4	2	40
Soil imports	1	7.7	1	20
Tied ridges	1	7.7	1	20

* Household compounds are excluded.

Women's participation in tree planting, protection, and management is minimal in the study area. According to both village leaders and village women and their husbands, women in this area do not normally plant trees. The women stated that their knowledge of tree-planting and tree-protection techniques was minimal. Their major role in tree care activities is to water trees in the gardens and fields. None of the six women interviewed had ever planted any trees.

Both male and female informants were most interested in planting fruit trees, both local and exotic species. Baobabs, néré, karité, Vitex doniana, and raffia palms were the local species most commonly cited. The informants wished to plant these trees because they supply food for the household and products that can be sold. In addition, the raffia palm was desired for its leaves and wood. Exotic species listed included mango trees, citrus trees, orange trees, and guavas. People wished to plant these because of the marketability of the fruits. Two men said that they would like to plant Acacia albida trees for their shade and their forage.

G. The Villager's View of the Forest Code

A study of tree tenure in Mali must of necessity address the issue of state regulation of forest resources. An effort was made to determine the extent to which villagers understand their rights and responsibilities under the Forest Code. Major sources of conflict and disagreement with the Code at the village level were also discussed. The findings at this stage represent only the villager's perception of the Code and its shortcomings. The forester's view of these issues will be dealt with later in the study.

The village leaders and villagers interviewed were all aware that restrictions on cutting, de-branching, and mutilating trees exist. In addition, they were also aware of the restrictions on clearing, the requirement that all households have improved wood stoves, and the interdiction on wild fires. The process for getting a permit was quite well understood, and many people were able to quote correct rates for the different permits and taxes.

Village leaders are informed of changes in the Forest Code at administrative meetings in Bandiagara. They then transmit the information to their villages in villagewide meetings. Women are informed of the changes through meetings held by the village chapter of the UNFM.

The villagers appear to have a "worst-case" mentality in their understanding of what actions are permitted under the Forest Code. In the eyes of many villagers, for example, the interdiction on de-branching for the purposes of providing animal forage is understood as an interdiction on all de-branching, regardless of the purpose of the action, how large the tree is, or what species of tree is used.

Villagers who felt that de-branching was acceptable in certain cases said that the lower branches on trees taller than 2 meters could be trimmed. All the villagers interviewed said that branches on trees smaller than 2 meters could not be cut, though they said that agents overlook the offense if the tree is very small.

Opinions differed as to when a permit is needed to cut dead trees for firewood. Residents of two villages declared that a permit must be

purchased to cut any firewood, whether the wood is to be consumed at home or sold in the market. In contrast, residents in the third village stated that a permit was not needed if the wood was to be used for domestic purposes and the quantity cut was small. All the informants stated that purchase of permit is required to cut live trees for firewood.

The villagers were unanimous in their opinion that a permit must be purchased, or authorization obtained, to cut down any live tree or to cut any large branches from live trees, regardless of the species, the purpose for cutting the wood, or the location of the tree. According to one villager, "Whatever the tree, whether alive or dead, whether it's in your compound, your field, or the forest, whether the wood is for sale or not, the agents will bother you if you cut it without a permit."

All the informants stated that the cutting of bark and roots, whether in private fields or uncultivated areas, is against the law. However, they noted that most people continue to harvest these items secretly. Although all the informants agreed that fruit can be collected without a permit, several villagers stated that sticks could not be used to collect fruits. The rules on leaf collection were less clear: some villagers felt that leaves could be collected as long as the branches were not cut while others stated that agents would fine a person just for having leaves in his possession.

There was also some disagreement as to the rules governing a person's rights to cut trees within his own field, garden, or house compound. The informants agreed that a permit must be purchased to cut a live tree on private land. However, some villagers felt that a person can harvest dead trees on his land without paying for a permit provided that he first gets the agent's approval. Others believed that a permit must be purchased to harvest dead trees on private land. One villager stated that a permit is not required at all if the dead tree is in the household compound, while others felt that a permit must be purchased to harvest dead or live trees on compound land.

According to the villagers interviewed, a cutting permit is required to cut live trees even if you planted the tree yourself. Most villagers believed that they would have to pay for such a permit, though one village council member stated that you could get a free permit if you planted a replacement tree before the agent came out to the field to approve the cutting activity. However, in the latter case, the farmer has to pay the agent's transport costs. In the opinion of all the villagers, trees protected by farmers are subject to the same restrictions as wild trees. Essentially the villagers believe that in the eyes of the Eaux et Forêts agents, all trees are subject to the same rules regardless of where they are located or whether they are wild or planted.

The most frequently mentioned sources of conflict between villagers and forest agents were as follows: (1) the use of leaves (herders and villagers) for dry-season forage; (2) the cutting of branches to construct gardens and protect young trees; (3) the trimming of trees in fields so

that they do not interfere with crops or so they will produce better wood and fruit; (4) the need to pay for permits to cut dead trees on private land; (5) the high cost of the permits relative to benefits, particularly for wood destined for domestic uses; (6) the need to pay for permits to harvest trees planted or protected by the harvester.

Other less frequently mentioned sources of discontent with the Forest Code regulations or their administration included the following items: (1) fines for clearing land in fallow less than five years; (2) fines for clearing small areas of land adjacent to existing fields; (3) the inability to harvest live branches for tool handles; (4) fines for harvesting baobab bark and leaves; (5) the inability to burn large tree trunks too heavy to move from cleared fields.

Villagers openly acknowledge that they violate state restrictions on tree use. The need for certain materials, such as thorny fencing, live branches, leaves, and bark that can only be collected illegally, is a primary factor in the blatant disregard of these rules. The high cost of permits relative to the real or perceived benefits, particularly for domestic wood use, is another major factor that leads villagers to break the law.

For the most part, the villagers interviewed in the Bandiagara area appeared to have little disagreement with regulations restricting the cutting of live trees that grow naturally in the forests or fields. This is particularly true for trees that villagers value highly, such as fruit trees. Villagers did not appear to be opposed to the idea of paying to cut live trees for firewood and construction materials. Their main objection to these permits is their expense: they cost more than the villagers can afford to pay.

Villagers, however, did object to the idea that they have to pay to harvest trees (particularly raffia palms) that they themselves had planted. One villager summed up the general attitude: "Between the person who plants and the one who polices, he that plants suffers the most." Even more objectionable is the idea that villagers have to pay to cut dead trees in their fields, whether they planted the tree or not. As far as the villager is concerned, such trees no longer serve any purpose in the field and need to be used before they rot.

H. Implications of the Research Findings for VRP Activities

The data indicate that the land and tree tenure characteristics of the Arrondissement Centrale are likely to affect VRP efforts to introduce and expand agroforestry techniques in the area. Because control over trees is very closely linked with control over land, one would expect that farmers exercising less control over their land will be less interested in investing labor and capital in tree-planting and protection activities. In the Bandiagara region, this means that efforts to encourage

tree-planting and protection activities are most likely to run into problems if the targeted farmers cultivate borrowed land.

Certain types of borrowed land present more difficulties than others from the perspective of the tree planter. Plots that are borrowed on a seasonal basis are particularly problematic, since the lender is likely to oppose any tree-planting attempts on the part of the borrower. At the same time, the borrower's incentive to plant trees on the parcel is low, since he or she is not certain to have access to that same parcel in future years. Because so many of the garden plots along the Yame and Douro rivers appear to fall into the seasonally borrowed category, the introduction of such techniques as live hedges around garden perimeters may require encouraging collaboration between the owner of the land and the borrowers of the garden plots.

Even borrowers whose families have farmed the same plots for a number of years may run into problems if they begin planting trees. Exotic fruit plantations appear to worry the lenders the most since the planting of these trees appears to strengthen the borrower's claim to the land. In contrast, lenders are much less likely to object if long-term borrowers plant "field" trees or even local fruit trees. Natural regeneration activities are unlikely to present any problems on borrowed land, since the tradition of protecting naturally occurring trees in such fields is already widespread.

The data on tree and land tenure provide an indication as to why it is so difficult to get women in this area to participate in agroforestry activities. The incentives for women to plant trees are relatively low: not only do they not own the land on which the trees would be planted, but they also do not own the trees they plant. In addition, women rarely have experience in planting trees and are unfamiliar with tree maintenance techniques.

Since women have the right to harvest and sell fruit for their own benefit, they do have some incentive to plant fruit trees on their parcels. The CARE/Koro project staff has found that Dogon women in the Koro area are receptive to planting fruit trees, and it may be that women in Bandiagara will also be responsive to planting highly valued fruit species.

The research to date also indicates that there is a need to clarify exactly what rights villagers have to trees that they plant on their land. At the present time, many villagers appear to believe that their rights to trees on their land are essentially limited to fruit-harvesting rights. Given this belief, it is not surprising that fruit trees are the most popular species among these farmers. If the VRP wishes to encourage other types of agroforestry, villagers will need to be assured that they have additional rights as well.

Rights to trim branches are probably the most crucial in the farmer's eyes, at least in the short term. For example, one villager mentioned

that he was interested in planting a live hedge around a garden plot, but he was uncertain if he would be able to trim the branches so that it would not interfere with his crops. Similar questions arise for windbreaks, which require periodic pruning to be effective. Likewise, field trees need to be trimmed so that they do not compete with the crops. Finally, there is the question of whether villagers feel they can legally get the thorn branches needed to protect young seedlings from animals.

In the Koro area, an effort has been made to let villagers know that if they plant woodlots, they will be able to harvest the trees with a permit issued free-of-charge. The issue of free permits for harvesting planted trees needs to be clarified for Bandiagara as well. At the present time, villagers believe that they have to pay for a cutting permit even if they planted the tree they wish to cut. There is thus little incentive for villagers to participate in woodlot plantings: in their view, they do all the work to plant and care for the trees and yet still have to pay to harvest them.

During the interviews, other factors that serve to constrain agroforestry efforts in the area also emerged. In particular, the tremendous labor shortage during the rainy season greatly affects the amount of effort farmers can devote to tree planting. Less labor-intensive plantations are thus more likely to be accepted by villagers in this area. A program of actively encouraging natural regeneration is thus worth considering, since considerably less labor is required to protect trees than to plant them.

I. Future Activities

Village group and farmer interviews similar to those in Bandiagara will be conducted in the remaining study zones during the next trimester. The time required to complete each zone should be less than that required for Bandiagara since the questionnaires will need only minimal revision at this point.

Dr. Steve Lawry, of the Land Tenure Center, University of Wisconsin-Madison, will be in-country to check on the project's progress in April. A series of visits will be conducted to the pilot study research sites. In addition, the survey research design and the general survey questionnaire will be developed during Dr. Lawry's visit.