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NATURAL RESOURCE MANAGEMENT IN
THE FOUTA DJALLON WATERSHED, GUINEA:

A PRE-FEASIBILITY STUDY CONDUCTED FOR THE
U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

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Consultants to IIED - North America
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PREFACE

This study is sponsored by the Environmental Planning and Management Cooperative Agreement, between the U. S. Agency for International Development (USAID) and the International Institute for Environmental Development (IIED), Washington, D.C.

The main purpose of this consultancy is to examine the feasibility of USAID's participation in the multi-donor Regional Project for the Integrated Management of the Fouta Djallon Watershed Project (IMFDW).

The team wishes thank all of the people who took time to help us with this work and to the people of the Fouta Djallon who were extremely hospitable and patient with our questions. Special thanks are extended to Joe Hartman (USAID/Guinea) and Souleymane Diaby (Acting Coordinator for RAF Project), who endured with us a somewhat difficult trip to the Fouta Djallon and were more than helpful in locating documents, scheduling meetings, and providing useful insights about Guinea and the IMFDW.

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ACRONYMS

AID	U. S. Agency for International Development
BRP	Bassin Representatif Pilote (Representative pilot watershed basin)
BRT	Bassin Representative Temoin (Representative control basin)
CFPP	Community Forestry Pilot Project
EEC	European Economic Community
FDHRIDS	Fouta Djallon Highlands Restoration Integrated Development Service
FAO	United Nations Food and Agriculture Organization
GOG	Government of Guinea
IIED	International Institute for Environment and Development
IMFDW	Integrated Management of the Fouta Djallon Watershed
MARA	Ministry of Agriculture and Animal Resources
OAU	Organization of African Unity
OMVG	Organisation pour le Mise en Valuer de la Gambie (Gambia River Basin Development Organization)
PCV	U. S. Peace Corps Volunteer
RAF	Regional Africa project (United Nations)
USAID	U. S. Agency for International Development
UNDP	United Nations Development Program
UNEP	United Nations Environmental Program
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNSO	United Nations Sudano-Sahelian Office
VITA	Volunteers in Technical Assistance
WMO	United Nations World Meteorological Organization

1 - INTRODUCTION

1.1 GENERAL OVERVIEW

The Fouta Djallon massif in Middle Guinea has long been an area of regional concern. Referred to as the "watertower of West Africa", the Fouta Djallon mountains and plateaus contain the sources and headwaters of several major rivers in West Africa. It has long been believed that resource management practices in the Fouta Djallon have downstream implications, thereby affecting neighboring countries of Guinea-Bissau, Gambia, Senegal, Mali, Mauritania, and Niger.

The Fouta Djallon covers more than 60,000 square kilometers and thus comprises approximately one-quarter of the land area of Guinea (Map 1). Elevations in the Fouta Djallon range up to 1,500 meters, with over 13,000 square kilometers being located more than 900 meters above sea level (Nelson et al. 1975).

The Fouta Djallon contains the headwaters of the Gambia River as well as those of the Bafing, which feed into the Senegal River. The Koliba-Courabal, Tinkiedo, Kolente, Kaba, and Konkoure Rivers also originate here. Although most headwaters of the Niger River are located in the mountains in Upper Guinea, one tributary, the Tinkisso, begins in the Fouta Djallon.

Great regional concern developed during the 1970s over the drought in neighboring Sahelian countries. Many people believe that erosion, sedimentation, and deforestation in the Fouta Djallon was responsible for declining water flows in the Senegal, Gambia, and Niger Rivers, and thus partially responsible for the drought and sedimentation problems downstream.

In response to this concern, in 1981 the Organization of African Unity (OAU) began working with a variety of United Nations agencies, the Government of Guinea (GOG), and governments of adjacent countries to develop the Integrated Management of the Fouta Djallon Watershed (IMFDW) Project.

The first phase of this project, from 1984 to 1987, received funding from the United Nations Development Programme (UNDP), the United Nations Sudano-Sahelian Office (UNSO), the OAU, and the Government of Guinea. During this phase a baseline of preliminary studies and maps for the Fouta Djallon highlands was generated, and a general approach to resource restoration and management was developed.

The project has been designed to improve resource management practices in the Fouta Djallon, both to address the larger desertification issues in West Africa and to contribute to the improvement of the lives of the residents of the Fouta Djallon area.

As a follow-up to the general studies, a multi-donor coordinated effort has been conceived for development interventions in resource management, such as agriculture, livestock, and forestry. In 1987, donors were asked to consider funding integrated resource management projects in twelve different paired watersheds located throughout the Fouta Djallon. For each pair of watersheds, one watershed could serve as a pilot zone for interventions, while the other would serve as a control. Results of interventions can thus be assessed, and promising interventions replicated throughout the Fouta Djallon.

EXECUTIVE SUMMARY

The Fouta Djallon massif, an area of over 60,000 ~~hectares~~ ^{2 kms² ?} in middle Guinea, contains the headwaters of the Gambia and Bafing (Senegal) Rivers, as well as one tributary of the Niger River. Concern about the erosion of the Fouta Djallon and subsequent downstream impacts has been expressed since the 1940's. Neighboring countries potentially affected by activities in the Fouta Djallon include Guinea-Bissau, Gambia, Senegal, Mali, and Niger.

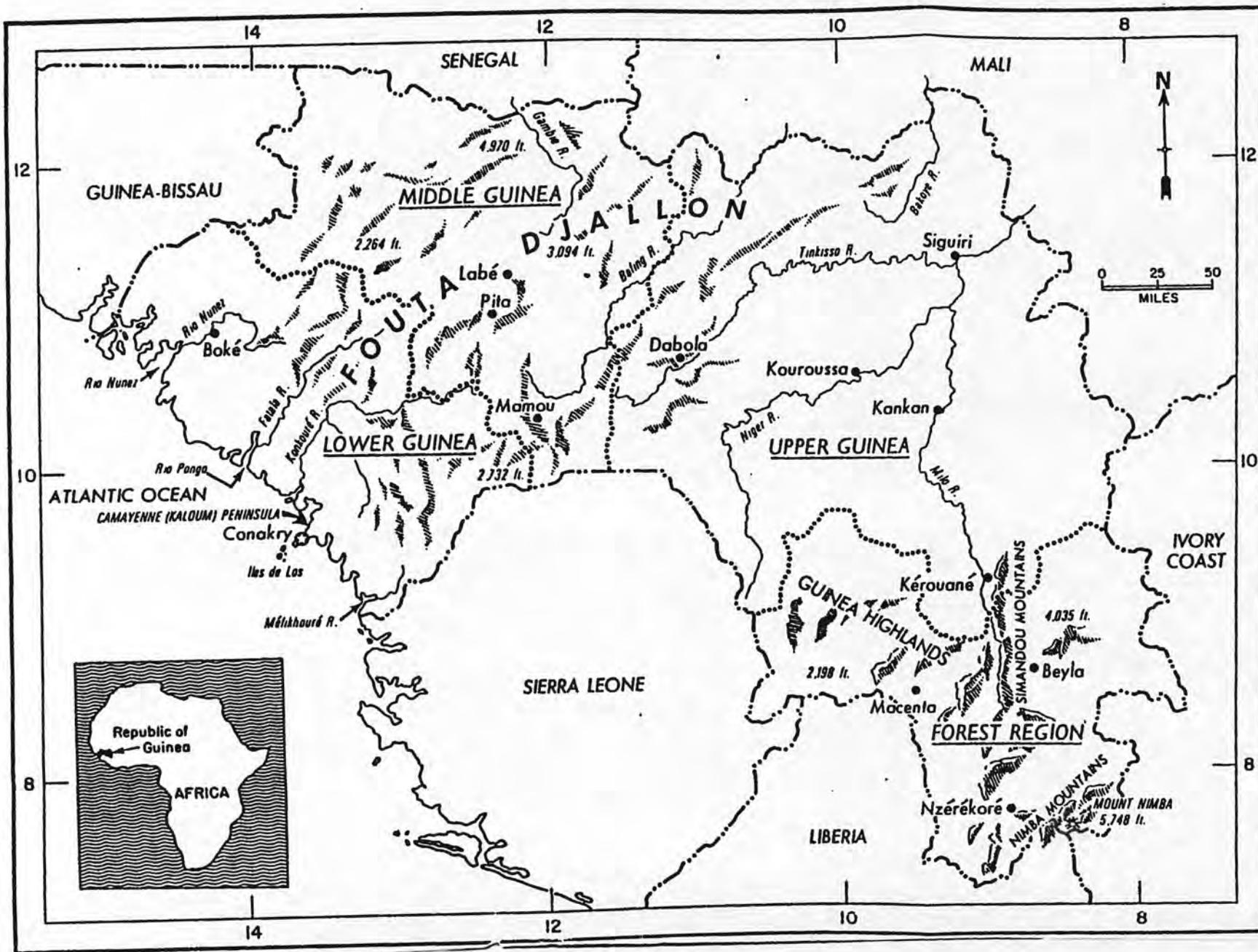
The Government of Guinea and the Organization of African Unity, working with United Nations agencies, began developing an integrated management project for the Fouta Djallon in 1981. The Government of Guinea is now inviting several foreign donors to finance twelve pilot watershed management projects in the region as part of the larger integrated project. USAID has been asked to undertake activities in the Diaforé and Koundou watersheds.

The pre-feasibility study team spent a month in Conakry and the Fouta Djallon region to assess the feasibility of USAID intervention. The team reviewed available information and met with many local experts, government officials, and farmers in the Fouta Djallon.

Evidence available suggests that the Fouta Djallon highlands is an area at environmental risk. Few studies have yet been done to assess the erosion and sedimentation rates in the Fouta Djallon. Available data have not yet demonstrated regional erosion impacts, but the potential exists for significant impacts in the future. Declining rainfall and declining soil fertility have severely reduced agricultural yields. As human population levels have doubled within the past 40 years, traditional practices of soil management have proved inadequate to maintain agricultural productivity. Fallows have been shortened from 9-15 years to 5-7 years. The soils in the Fouta Djallon are already severely degraded. Possibilities for sustainable development of this region are already at risk.

Recent economic and policy reforms have been undertaken in Guinea to revitalize the agricultural sector and promote incentives for individual smallholder production. These changes may intensify agriculture in the Fouta Djallon. Given the fragile nature of the existing resource management practices in the Fouta Djallon, it seems that such intensification could -- unless properly managed -- further accelerate existing problems with declining soil fertility, declining agricultural yields, and environmental degradation.

The proposed project is not only feasible, but highly desirable. By acting soon, efforts could be taken to stabilize and upgrade the resource base currently at risk in the Fouta Djallon. By ensuring that resource management in Fouta Djallon does not collapse, as has happened in the Sahel, such steps would also minimize the environmental risks for the larger West Africa region. The proposed project would support USAID/Guinea's larger economic and policy reform objectives, through better management of the resource base upon which sustainable agricultural development depends. The project also meets Agency objectives of promoting natural resource management and biological diversity.



MAP 1. GEOGRAPHIC REGIONS OF GUINEA
(Adapted from: Nelson et al. 1975).

Several donors have already responded to the Government of Guinea's request for assistance with this project. UNDP is funding one watershed, and the French (FAC) are funding two watersheds. Assistance for other watersheds is under consideration by the European Economic Community (EEC), the Italians, the Canadians, and the Gambia River Basin Development Organization (OMVG).

In addition, the UNDP is considering financing some additional follow-up regional studies. The OAU plans to pursue similar watershed projects on the borders of, or within, neighboring countries.

The US Agency for International Development (USAID) has been invited by the Guinean Government to consider funding of projects for watersheds pairs No. 8 (Diaforé and Kabari) and No. 9 (Koundou and Kambara). This document assesses the feasibility of such an USAID intervention.

1.2 HISTORICAL BACKGROUND TO THE DEVELOPMENT OF THE FOUTA DJALLON PROJECT

Concern about the degree of erosion in the Fouta Djallon began to be expressed by several observers in the 1940s and 1950s. In 1959, the 3rd InterAfrican Soils Conference was held in Dalaba, in the southern central part of the Fouta Djallon. The conference called for action to halt this erosion. Similar concerns were voiced at the 1960 meeting of the 15th Session Technical Cooperation Commission for Sub-Saharan Africa.

This appeal was later picked up and echoed in other conferences. In 1979, the 33rd Session of Council of Ministers of Organization of African Unity (OAU) invited the Secretary General of OAU to coordinate with the Secretary General of United Nations to develop a regional project for the Fouta Djallon. In 1981 the Organization of African Unity (OAU) and United Nations began developing the current regional project.

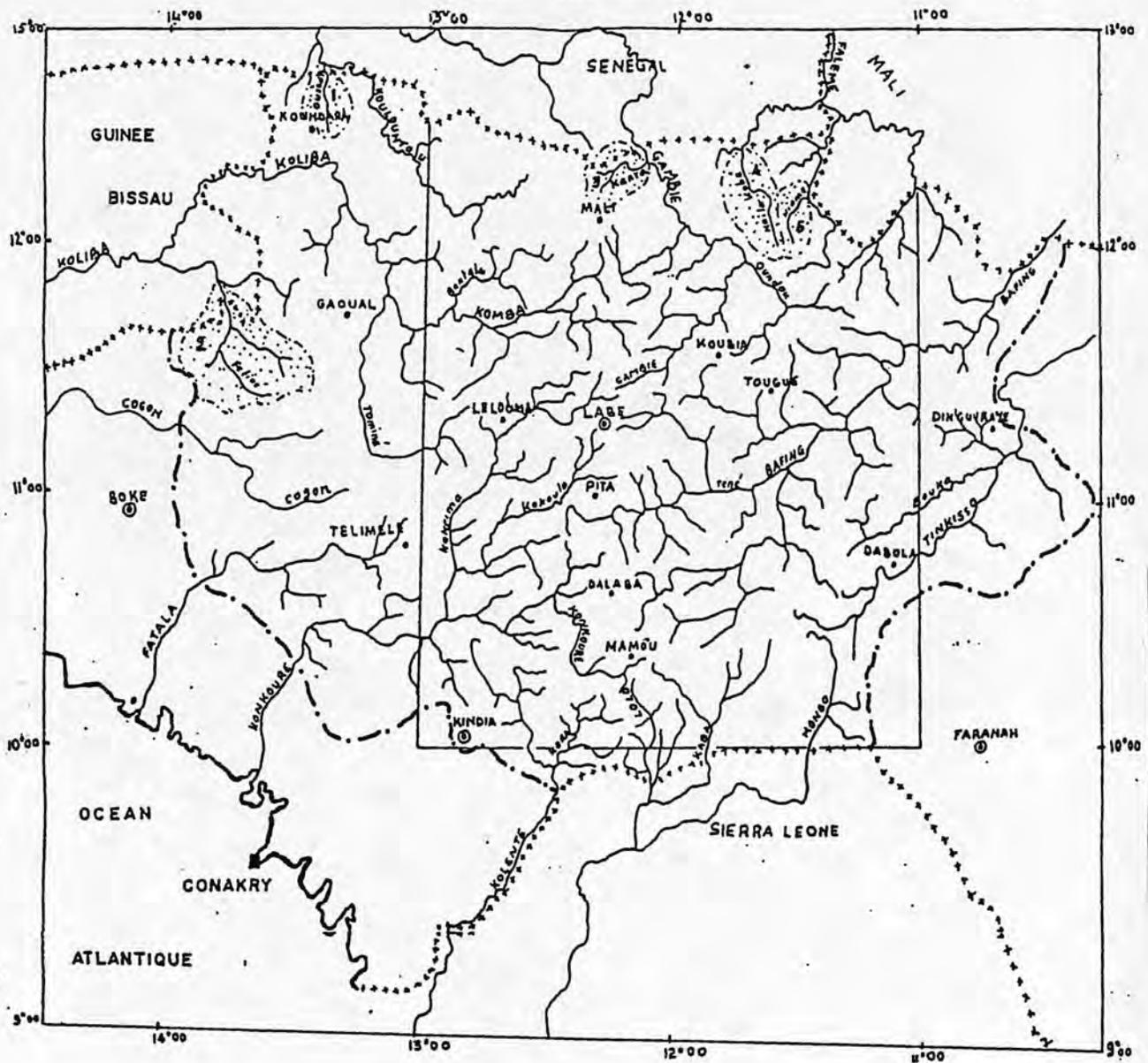
1.3 THE INTEGRATED MANAGEMENT OF THE FOUTA DJALLON WATERSHED (IMFDW) PROJECT: BASIC CONCEPT AND APPROACH

Because of the number of institutions and sources of funding involved, the history and structure of Integrated Management of the Fouta Djallon Watershed (IMFDW) Project is quite complex. Different sub-projects of the overall project are being financed, managed, and implemented by different organizations. Coordination between these sub-projects is being sought through three different coordinating bodies.

The project is conceived of as having both regional, or "horizontal", dimensions, and local, or "vertical" dimensions. The vertical aspects of the project are the in-depth studies and development interventions for the 12 pilot watersheds and their controls. The regional, horizontal dimensions of the project involve, first, baseline studies of the entire Fouta Djallon area, second, extension of development efforts throughout the Fouta Djallon, and third, extension into neighboring countries.

The first phase of the IMFDW Project -- from 1984 to 1986 -- prepared baseline studies and maps for the project zone (Map 2). This phase was funded by UNDP and UNSO, each providing US\$ 500,000 for a total US\$ 1 million. The United Nations agencies labeled this sub-project as a regional African project, RAF/081/060. The Food and Agriculture Organization (FAO) executed the project. FAO provided a Technical Advisor, who was based in Labé.

MAP 2. ZONE OF INTEGRATED MANAGEMENT OF THE FOUTA DJALLON WATERSHED PROJECT
(From: OAU 1987).



KEY

- National Frontier
- - - - Limits of the Fouta Djallon Highlands (60,000 km²)
- Limits of the Zone of IMFDW Project (56,000 km²)
- ⊙ Limits of Representative Frontier Basins
- Prefecture
- Province
- Rivers

During this period, the Guinean Government established the Fouta Djallon Highlands Restoration and Integrated Development Service (FDHRIDS) as an ongoing government organization. The 35 Guinean technical personnel assigned to the FDHRIDS served as the Guinean counterparts in project RAF/081/060. Twelve of these technicians have since been designated as national directors for the twelve paired watershed projects.

The Guinean Government also created two technical coordinating mechanisms for the project. The first, the National Technical Coordinating Committee, is an interministerial committee. The committee is composed of the following 16 members:

Ministry of Agriculture and Animal Resources

1. General Direction of Waters and Forests
2. General Direction of Livestock
3. General Direction of Hydrology
4. General Direction of Rural Engineering
5. General Direction of Agriculture
6. General Direction of National Service of Soil
7. General Direction of Meteorology
8. Bureau of Strategy and Development
9. Fouta Djallon Highlands Restoration and Integrated Management Service (FDHRIDS)

Ministry of Natural Resources, Energy, and Environment

10. General Direction of Natural Resources
11. General Direction of Mines and Geology

Ministry of Transportation and Public Works

12. National Geographic Institute

13. Scientific Research

14. Ministry of Economy and Finances

Ministry of Plan and International Cooperation

15. General Direction of Plan and Statistics
16. General Direction of International Cooperation

The Directeur General of Hydrology is the Permanent Secretary of the Committee. This committee has held one meeting, in Labé in 1986, to discuss the Project. Each of the committee's members has been available to provide technical assistance, as needed, to back-up the Fouta Djallon Highlands Restoration and Integrated Development Service.

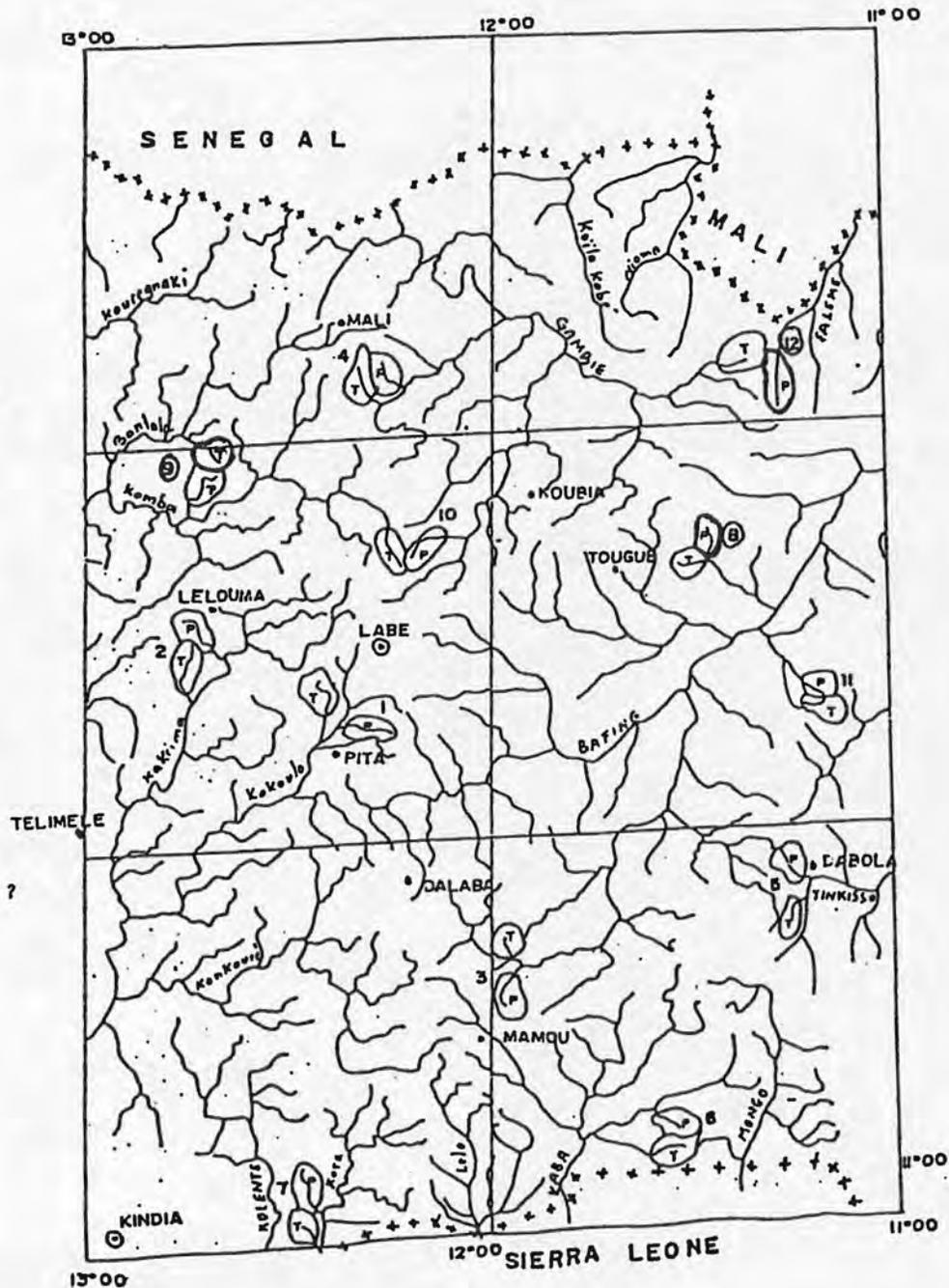
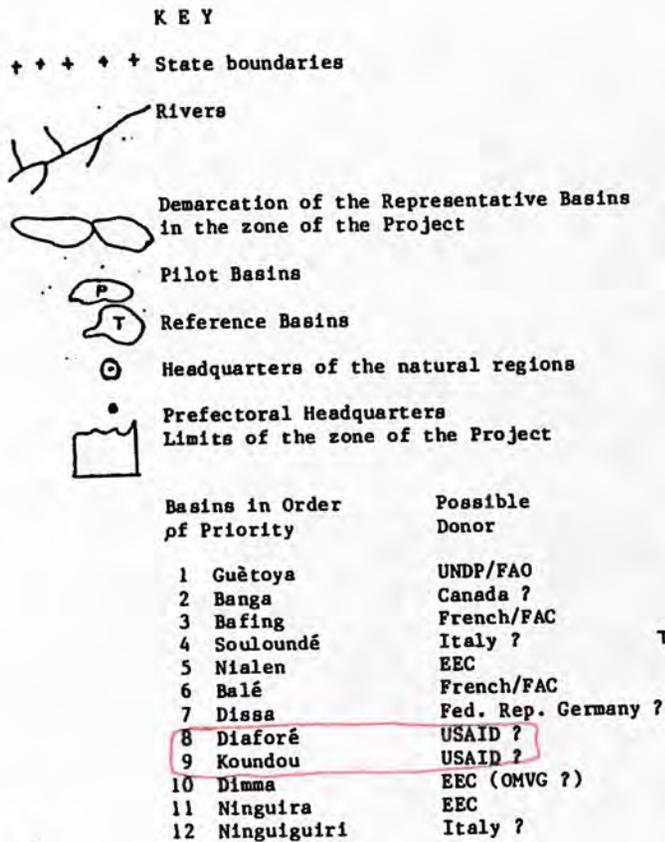
The lead government agency for the Project is the Direction of Waters and Forests, which is currently located within the Ministry of Agriculture and Animal Resources (MARA). [Prior to 18 January 1988, Waters and Forests was part of the Ministry of Natural Resources, Energy, and the Environment.] Within the Direction of Waters and Forests is located a Coordination Unit ("Cellule de Coordination") for the Project. This Coordination Unit provides technical coordination between Waters and Forests, the National Technical Coordinating Committee, and the donors financing the twelve paired watershed projects.

The OAU also established an office in Conakry for an International Coordinator, who focuses on diplomatic (rather than technical) coordination between the Government of Guinea, neighboring country governments, and the donor community.

The second phase of the project consists of efforts to develop appropriate development interventions for the twelve paired watersheds (Map 3). Each individual watershed project will operate autonomously, but within a general framework or approach. The general approach for each watershed will consist of a preliminary 6-month study of the local conditions and development priorities of the watershed's residents, and then work with the local population to try different resource management oriented interventions. Development and research activities for each pairs of watersheds will cost an estimated US\$ 2.0-2.5 million each for five-year projects. The paired watersheds have been chosen to examine a variety of different conditions. Criteria used for watershed choice included: agro-ecological representativeness, accessibility, demonstration potential, infrastructure, geographic distribution, regional character, and financing.

The third phase of the project will replicate the successful development efforts that emerge out of the second phase. These interventions will be replicated throughout the Fouta Djallon and also in related watersheds in neighboring countries.

In October 1988, UNDP plans to send a team to Guinea to design a project to follow-up on activities undertaken during RAF/081/060. This new project, RAF/087/075, is intended to do two things. First, it will complete and follow-up on some of the regional studies undertaken in RAF/081/060. Second, it will begin to explore some of the broader regional (international) issues and conduct relevant baseline research for an expansion of the overall IMFDW Project. (Some of the technical Guinean staff assigned to the Fouta Djallon Highlands Restoration and Integrated Development Service will serve as counterparts to this upcoming project).



MAP 3. LOCATION OF TWELVE PAIRED WATERSHEDS
(Adapted from: OAU 1987).

2 - ROLE OF ORGANIZATIONS (ACTIVITIES TO DATE)

2.1 DONORS

2.1.1 United Nations (FAO, UNDP, UNSO, WMO, UNEP)

Since 1979, when the 33rd Session of the Council of Ministers of the OAU invited the Secretary General of the United Nations to develop a regional project to address the erosion problem in the Fouta Djallon, the United Nations has been the forerunner in coordinating and implementing the IMFDW Project through a series of related projects, which are briefly described below.

Project No. GUI/81/002, 1981-83

<u>Location</u>	Pita/Kokoulou watershed
<u>Agencies involved</u>	Financed by UNDP and implemented by <u>FAO</u>
<u>Project objectives</u>	1) Protection of water sources 2) Firewood production 3) Forage production 4) Training

Project No. GUI/82/003, 1984-87

<u>Location</u>	Pita/Kokoulou, Fetore, Koubi, Tene watershed
<u>Agencies involved</u>	Financed by UNDP and implemented by <u>FAO</u>
<u>Project objectives</u>	To extend the results of GUI/81/002 to three more watersheds using a more integrated approach and adding the following activities: 1) Live fencing 2) Pine plantation 3) Improved woodstoves 4) Fruit tree production 5) Improved brick production 6) Wells 7) Construction of water reservoirs.

Project No. RAF/81/060, 1984-1986

<u>Location</u>	Project Headquarters at Labé and Project zone was the entire Fouta Djallon massif
<u>Agencies involved</u>	Financed by UNSO/UNDP and executed by FAO with assistance from WMO and UNESCO
<u>Project objectives</u>	1) Carry out a series of baseline studies and produce small-scale maps with regard to the natural resources and socio-political structure of the Fouta Djallon; 2) Identify twelve representative watershed basins (BRPs) to be offered to donors for financing; 3) Begin in depth studies in several basins to develop preliminary integrated management plans for the watersheds; and, 4) Training.

Project No. GUI/86/012, 1988-1992

Location

Agencies involved

Project objectives

Pita/BRP #1 Guetoya watershed

Financed by UNDP and executed by FAO

- 1) Begin to develop an integrated watershed management plan for BRP #1 Guetoya
- 2) Follow-up and monitor work in 4 other BRPs that participated in GUI/82/003
- 3) Support to the Coordinating Cell ("Cellule de Coordination")

Project No. RAF/87/075, 1989-1991 (still in design phase)

Location

Agencies involved

Project objectives

Project Headquarters will be in Labé

Financed by UNDP

- 1) Continue studies that were started in first phase of Project (RAF I)
- 2) Select five more BRPs closer to the border of Guinea-Bissau and Mali
- 3) Produce basic resource inventory maps at 1:10,000 for the five BRPs, and develop preliminary management plans for each; and,
- 4) Initiate further studies to examine regional (horizontal) aspects of the IMFDW Project.

2.1.2 European Economic Community (EEC)

The EEC has agreed, in principle, to finance watersheds number five (Nialen/Koumboulou), number eleven (Ninguira/Bobokoleya) and number ten (Dimma/Komba). OMVG may possibly collaborate with the EEC at Dimma/Komba.

The EEC is also financing a project to photograph all the pilot basins (BRPs) and all the Classified Forests in the Fouta Djallon. These aerial photographs will be made at a scale of 1:30,000. This project is already underway.

In addition, the EEC is currently carrying out studies in the Upper Niger Massif which is the principal source of water for the Niger River. The first phase of this project identified 99 watersheds, from which nine were selected for interventions of the same sort that are being proposed for the Fouta Djallon.

2.1.3 French (FAC)

A French forester is working full time at the Direction of the Water and Forests Service, as a technical consultant to the Direction.

The French have also installed teams at watershed No. 3 (Bafing/Kenegui) and No. 6 (Bale/Kouian). The teams have just begun work on the 6-month preliminary study phase at each watershed.

In addition, the French are financing the installation of a mobile saw mill in the Dalaba area to saw some of the older pine plantations that were planted during colonial times. A French volunteer is training Guinean counterparts in sawmill operation and plantation harvesting techniques.

2.1.4 Italy, Canada and the Federal Republic of Germany

Italy has, in principle, agreed to finance watershed No. 4 (Soulonde/Dengia) and No. 12 (Ninguir/Sossili).

The Canadians have submitted a Project Proposal for watershed No. 2 (Banga/Nierie). This proposal has been rejected by the GOG because it focused only on agriculture and lacked an integrated approach. The Project was to have been implemented by CECI (a Canadian NGO). The Canadians must revise and resubmit their proposal. Otherwise, the GOG will offer the project to another donor if the Canadians decide not to go ahead with it.

The Federal Republic of Germany has agreed in principle to finance watershed No. 7 (Dissa/Tambikane).

2.1.5 USAID, Community Forestry Pilot Project (CFPP) #689-0410-35, 1982-1985

The Community Forestry Pilot Project (CFPP) was a three year pilot project, designed to create communal village woodlots for fuelwood production in the area of Pita. Although the project focused mainly on fuelwood production, other activities such as agroforestry to produce forage and windbreaks were initiated on privately owned smallholders' farms during the last year of the project. In addition, six privately owned tree nurseries were established with project assistance.

Serious technical difficulties were encountered regarding selection of tree species that will tolerate the highly acidic soils of the Fouta Djallon. According to the Peace Corps Volunteers currently working around Pita, the basic low-input approach and self-help philosophy of the Project remains highly regarded by the GOG and the villagers who participated. The project was able to clearly demonstrate that local populations are receptive to new ideas, and that with a minimum of input (mainly plastic bags), villagers will invest their unpaid labor in tree-planting efforts.

2.2 OMVG ENVIRONMENTAL RESEARCH LABORATORY

Construction of the OMVG laboratory in Labé has finished, and most of the equipment and personnel are in place. Currently 10 people are paid by the GOG and assigned to the laboratory including: the Project Director, an economist, a micro-biologist, a forester, a secretary and two chauffeurs.

Operating costs for the laboratory and per diem for field trips are currently being financed by USAID/Guinea with PL-480 funds through 1992.

2.2.1 OMVG Activities

The laboratory has just begun to implement a work plan that was developed earlier this year by the Project Director and several OMVG staff from Dakar who visited Labé. According to the Project Director, Cheik Omar Diallo, the main objectives of the Laboratory are:

- 1) To carry out a series of studies in the area of two proposed irrigated perimeters;

- 2) Introduce appropriate technology to combat soil erosion and improve the lives of the Fouta Djallon population; and,
- 3) Continue to monitor erosion and sedimentation in the Gambia River Basin.

The two irrigated perimeters to be studied were selected from a total of 28 potential sites. These are Donguel-Sigon in the Prefecture of Mali and Sambailo in the Prefecture of Koundara. Although no financing has been acquired to date for either site, Diallo is optimistic that both sites will be financed in the near future. In the meantime, the laboratory will begin to carry out socio-economic studies in villages that will be affected by the perimeters in the case that funding is acquired.

We did not discuss in detail the introduction of small-scale appropriate technical intervention other than those activities already being considered by OMVG. These interventions include: biogas generation, fish culture and gully erosion control using check dams.

2.2.2 Collaboration with Gembloux University and The Research Station at Baring, Pita

The University of Gembloux in Belgium is involved in a three-year collaborative effort with the OMVG laboratory at Labé and the Baring Research Station at Pita to study soil amendments, especially the use of rhizobium and leguminous species to increase total available nitrogen in the soil. Bruno, a graduate study at Gembloux, is assigned to the OMVG laboratory and works under Professor Léon Mathieu, who coordinates the study from Belgium.

Mathieu, who has been working in the Fouta Djallon since 1982, happened to be visiting Labé at the same time that the team was there. He was more than willing to share his knowledge of the area with us. Mathieu is convinced that the major focus of any intervention in the Fouta Djallon should be to address the problem of declining soil fertility, which he thinks is the "number one problem" facing the population of the Fouta Djallon today. He further observed that while some sheet erosion occurs on the upper, cultivated slopes during the rainy season, most of the more serious erosion is associated with road building and poorly implemented soil conservation projects.

Mathieu stated that more intensive research efforts are needed to refine techniques such as alley cropping, farming systems approach, mulching, and the introduction of leguminous forage crops in the tapades and the fonio fields. He suggested that much valuable work is being done in other parts of the world that could be applied to problems of the Fouta Djallon. For example, the International Board for Soil Research and Management based in Bangkok, Thailand specializes in problems related to acidic soils and aluminum toxicity.

Finally, Mathieu suggested that some forms of irrigation might be feasible if properly researched and carried out on a relatively small-scale with individual farmers to promote dry season gardening.

APPENDIX E: DAY-TO-DAY ACTIVITIES OF TEAM AND PEOPLE CONTACTED (continued)

- JULY 23
- o Left Labé for Tougué
 - o Ibrahima Balde, Prefet of Tougué
 - o Souleymane Marga Balde, General Secretary of Decentralization
 - o Saikou Oumar Balde, Inspector, Rural Development
 - o Mamadi Diakite Kaba, General Secretary Administration
 - o Sekou II Diallo, Forest Agent, Diaforé
 - o Farma Diallo, Farmer in Tapade near Kouratongo
 - o Thierno Kalidou Diallo, District Chief, Diaforé
 - o Mamadou Bah, Assistant Sous-Prefet, Kouratongo
 - o Thierno Abdoulaye Diallo, President of the "Conseil de Sages" at Koune
- JULY 24
- o Returned to Labé from Tougué
 - o Ibrahima Sory Diallo, Forest Agent, Tougué Prefecture
- JULY 25
- o Professor Léon Mathieu, Soil Scientist, University of Gembloux, Belgium
 - o Left Labé for Lelouma
 - o Amadou Lelouma Diallo, Prefet
 - o Sally Hadji Keita, Forest Agent, Lelouma Prefecture
 - o Souleymane Bela Bah, Agriculture Agent, Lelouma Prefecture
 - o Ousamane Bakoun, Director of Livestock Service, Lelouma
 - o Mamadou Hady Balde, Director of Rural Engineering Service, Lelouma
 - o Ousamane Loppe Barry, Director of Forest Service, Lelouma
 - o Returned to Labé
- JULY 26
- o Left Labé for Linsan
 - o Morlaye Toure, Sous-Prefet of Linsan
 - o El Hadj Ibrahima Niamaga, President of Agriculture Cooperative
 - o El Hadj Mamadou, Farmer, District of Linsan
 - o Thierno Souleymane Komma, Farmer, District of Linsan
 - o Mamadou Saadio Balde, Economist, Secretary of District of Kaadye Gande
 - o El Hadj Sekou Drame, Imam of Linsan District
 - o Dian Oury Kante, Blacksmith, District of Kaadye Gande
 - o Ibrahima Balde, Farmer, District of Teli Soofi
 - o Asmaou Barry, President of Women's Cooperative and Local Director of "Feminine Condition", Linsan
 - o Fatoumata Drame, Assistant to President of Women's Cooperative
 - o Kidiatou Diaby, Social Affairs Officer, Women's Cooperative
 - o Rabiadou Diallo, Member, Officer of Women's Cooperative
 - o Returned to Labé from Linsan
 - o Binta Fady Diallo, Socio-economist, FDHRIDS, Labé
- JULY 27
- o Left Labé for Dalaba
 - o Cheick Oumar Diallo, Director of OMVG Lab
 - o Spend night in Dalaba
- JULY 28
- o Travel form Dalaba to Conakry (on the road all day due to vehicle problems)
- JULY 29
- o Conakry
 - o Draft document
- JULY 30
- o Conakry
 - o Draft document

2.3 AMERICAN UNIVERSITIES

The University of Arizona

In 1983, the Arid Lands Information Center Office of the University of Arizona prepared an Environmental Profile of Guinea for the U. S. Man and the Biosphere Secretariat of the Department of State under a contract for a series of studies with USAID/ST/FNR. These studies were carried out in specific countries to develop better information and identify critical areas of concern for AID Missions, host country officials and others.

The remote sensing center at the University of Arizona will begin a project to be financed by the National Aeronautic and Space Administration (NASA). This study is part of NASA's participation in the tropical deforestation study being conducted jointly by FAO, UNEP and the UNEP Global Resource Information Database (GRID). The title of the project is: "Monitoring Deforestation in the Guinea Highlands using GRID and EOS approach." The main objectives are:

- 1) To determine the rates, types, and primary locations of deforestation in the Gambia River headwaters during the past thirty years, and how this change has affected the physical environment; and
- 2) To evaluate a variety of remote sensing systems that could be used for monitoring deforestation in the Fouta Djallon on a continuing basis, with particular regard to the costs and the local constraints of manpower and equipment.

Charles F. Hutchison, the Principal Investigator for the project, sent a telex to the USAID office in Conakry in August 1988 (two days before the team left Conakry) stating that the Project had been approved. NASA is providing \$ 50,000 in funding. The Project staff noted in their telex that they intended to focus on watershed No. 8 (Diaforé) unless the Mission advised otherwise. The team suggested to Hartman (ADO/Guinea) that, if at all possible, both watersheds, No. 8 (Diaforé) and No. 9 (Koundou), should be included in the study.

The use of 35 mm photography and aerial video to cover both watersheds is especially recommended. This technique has already been used in Senegal and Mauritania with a high degree of success. It offers a low-cost alternative to conventional aerial photography to supplement to satellite data. These photos would be very valuable to the follow-up team and others if, in fact, USAID decides to go ahead with the Project.

In addition to the above project, the University of Arizona Remote Sensing Center has submitted an unsolicited proposal to USAID, entitled "A Remote Sensing Training Program for Natural Resources Management in Guinea". The proposed project aims primarily to train a Guinean technician in the practical use of remote sensing and geographic information systems technology. The Remote Sensing Center would like to link this proposal to the NASA financed project.

University of Michigan Center of Research on Economic Development

The University of Michigan participated in several studies under the OMVG Project. The results of these studies were published in 1985 under the title of "Water Resource Management and Gambia River Basin Development". Unfortunately, the team was not able to locate this document at the AID Mission in Guinea. Some sedimentation findings of these studies are discussed in Freeman (198) and Goodson (1987), and are summarized in Appendix B.

2.4 NGOs/PVOs

At present, few NGO/PVO organizations operate in Guinea. Several American organizations have expressed interest in starting activities. To date, however, nothing has materialized other than a woodstove activity by Volunteers in Technical Assistance (VITA). VITA also submitted to USAID a proposal for an agroforestry project in the Fouta Djallon, designed as a follow-on to the Community Forestry Pilot Project Project. This proposal has never been financed.

Other American PVOs that have shown interest in working in Guinea are Africare, the National Association of Colored Women (NACW), the African American Institute, Church World Services, Planning Assistance Inc. and Opportunities Industrialization Center International (OICI).

Two indigenous organizations, Association Guinéenne pour la Promotion Rurale (AGPR) [Guinean Association for Rural Promotion] and Association Guinéenne pour le Developpement et la Cooperation (AGUIPEC) [Guinean Association for Development and Cooperation] have been involved in natural resource related activities in the past. AGPR participated in some of the socio-economic studies financed by UNDP in the Fouta Djallon. AGUIPEC was involved in a reforestation effort in the sub-prefectures of Selouma and Dinguiraye (Liste des Organisations Non Gouvernementales Nationales Recensees et Agreees, 1987).

2.5 PEACE CORPS

Currently 13 Peace Corps Volunteers (PCVs) work in Guinea, four of whom are assigned to the CCFP Project. (This project continues to function to a limited extent in Pita and Dalaba, with funds from the Guinean government.) Several of these Volunteers have been collaborating with the FAO Project based in Pita. Supposedly all four of them will be officially assigned to the FAO Project in Pita in September 1988.

Peace Corps plans to expand its program: thirty-five new trainees will be arriving in Guinea in November 1988. Nine are foresters who will be assigned to a forestry project in southeastern Guinea (the Forest Region) being implemented by UNICEF in collaboration with the African Food Systems Initiative (AFSI) program. Twenty-seven (nine groups of three) of the new volunteers will be assigned to nine separate prefectures as AFSI teams. Besides forestry, Volunteers are presently or will be working in the health sector, teaching English (TEFL) and small business administration.

According to the acting Director, Suzanne Poland, the Washington D.C. headquarters of Peace Corps aims to increase the number of Volunteers working in Guinea to between 80 and 100 over the next several years.

3 - DESCRIPTION OF THE TWO PROPOSED WATERSHED SITES IN THE FOUTA DJALLON

The Fouta Djallon watershed is a region with distinctive physical, social, and cultural characteristics. An overview of relevant background information physical topography and land types, human history, population levels, land tenure and land use patterns, division of labor, exodus of young men, household types, and local social institutions is provided in Appendix A. Characteristics of the two proposed watershed areas are discussed below.

3.1 WATERSHED NO. 8 DIAFORE

The team held three interviews in Diaforé:

o One was conducted with a woman while sitting under a mango tree in her tapade (see Appendix A, Land use patterns). The woman's two young grandchildren were present during the interview, as was a neighbor woman and two young neighbor children;

o The second interview was held with the district chief and another older man, at a meeting place located adjacent to the first interview. Following this interview the team walked across the adjacent bowé for approximately one kilometer; and,

o The third interview was held in Koune. The meeting had been organized by the sub-prefect. When we arrived with him, two boys were beating a drum, calling villagers together. The assembled group originally consisted of 20 men, 3 women, and 18 children and youths (mostly boys). More people arrived during the course of our discussions, bringing the total up to 70-75 people, of whom 10 were women.

3.1.1 Location

The watershed of Diaforé and the adjacent control watershed, Kabari, are located between the latitudes of 11°27'N and 11°39'N, and longitudes of 11°23'W and 11°34'W. The sub-prefecture, Kouratongo, is located 40 km, by road from Tougué. The Diaforé watershed has an area of 60 km², and the Kabari watershed is 61 km².

3.1.2 Ecological characteristics

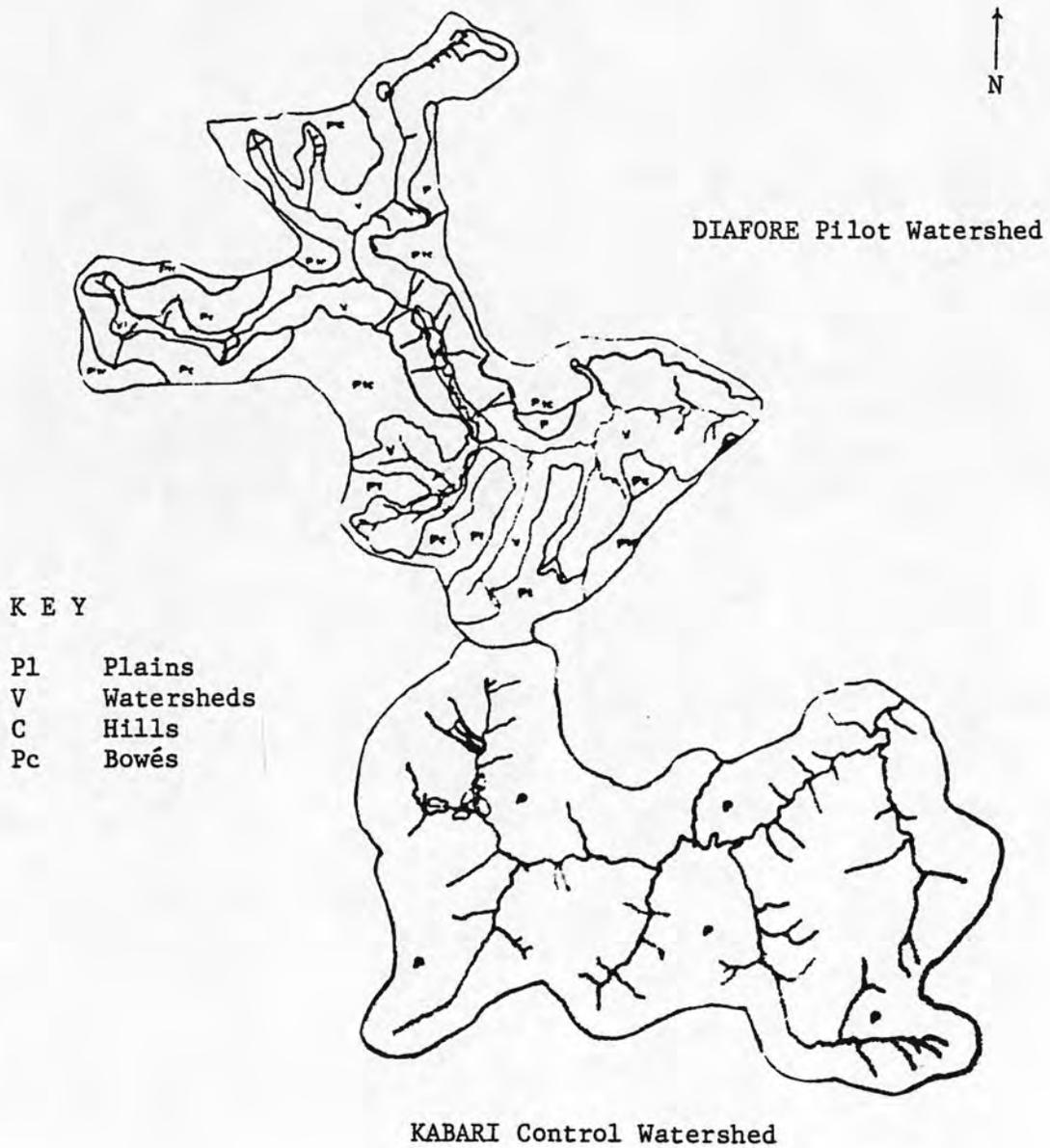
According to the RAF Project, this watershed is characterized as being dominated by broken laterite crust plateau or ironstone (Map 4). Among the Fulani people, this land is called bowé (see Appendix A). Soil is characterized as susceptible, very susceptible, and weakly susceptible to erosion.

Diaforé receives 1200 to 1600 mm rainfall per year. The watershed contains the source of the Kokoun River, which empties into the Bafing and eventually feeds into the Senegal River. Hydromorphological characteristics of the watershed have been mapped (Map 5).

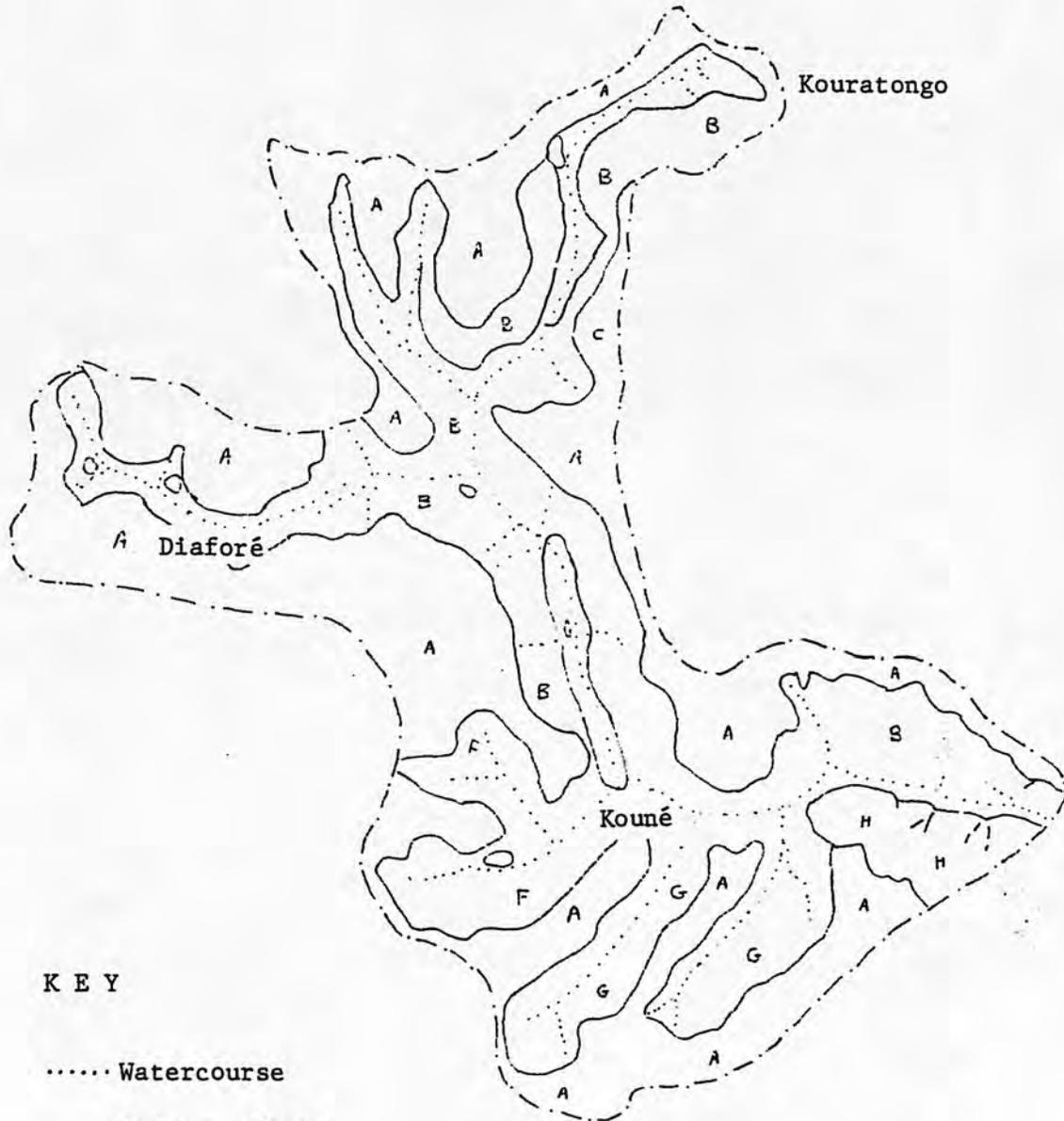
Vegetation consists of tree savanna, shrub savanna, and bowé, or laterite crust covered with grasses and scattered trees; the zone can generally be considered a transitional savanna zone. It is noticeably drier than part of the Fouta Djallon to the south and west, and has more Sahelian tree species, such as baobab trees (Adansonia digitata).

MAP 4. DIAFORE: LAND TYPES

(Photographed and reduced from map prepared by staff members of the Fouta Djallon Highlands Integrated Management Service, Labé)



MAP 5. DIAFORE: HYDROMORPHOLOGY
(Adapted from: map prepared by staff members of the
Fouta Djallon Highlands Integrated Management Service, Labé)



KEY

..... Watercourse

Between rivers

- A Intense run-off, without important erosion
- B Intense run-off, little infiltration, little erosion
- C Intense run-off, strong erosion

Underground system

- F Infiltration, sub-surface water system
- G Combination, feeding watertable
- H Weak run-off, little infiltration, little erosion

Local residents cultivate tapades, fields, and vegetable gardens, growing crops such as fonio, maize, sweet potatoes, okra, beans, hot peppers, tomatoes, spinach, and "oseille de Guinée". Fruit trees, such as oranges and avocados are cultivated, as are bananas. People raise livestock such as cows, sheep, and goats. Other resources, such as traditional medicines and honey, are collected locally.

3.1.3 Nearby Classified Forest of Bakoun

Eight kilometers to the west of Kouratongo, outside the Diaforé watershed boundaries, is located the Classified Forest of Bakoun (11°43'N, 11°32'W). This 28,000 hectare forest was legally classified in 1953. As such, it is protected, public domain land, which people are forbidden to enter or use. This forest constitutes a separate watershed basin, which feeds into the Bafing, which in turn empties into the Senegal River. Three other classified forests exist in the prefecture of Tougué: Dikoro (7,800 ha.), Bani (18,900 ha.), and Boula (21,500 ha.).

According to the prefectoral forester, Ibrahima Sory Diallo, few local residents know that Bakoun is a legally classified forest. Diallo has only met three people who actually know the boundaries of the forest.

The forest of Bakoun contains, according to local residents, a variety of wild and ferocious animals, including lions, leopards, and hyenas. (Allegedly, as the animals have become more and more restricted to this area, they have become ore fierce.) Some residents of the Diaforé watershed use this forest for slash-burn agriculture.

3.1.4 Population, local institutions, and infrastructure

The Diaforé watershed is comprised of 12 villages, with a total population of 1511 inhabitants, and thus a population density of 25 inhabitants/km² (Map 6). The basin falls within the administrative boundaries of the sub-prefecture of Kouratongo, within the prefecture of Tougué.

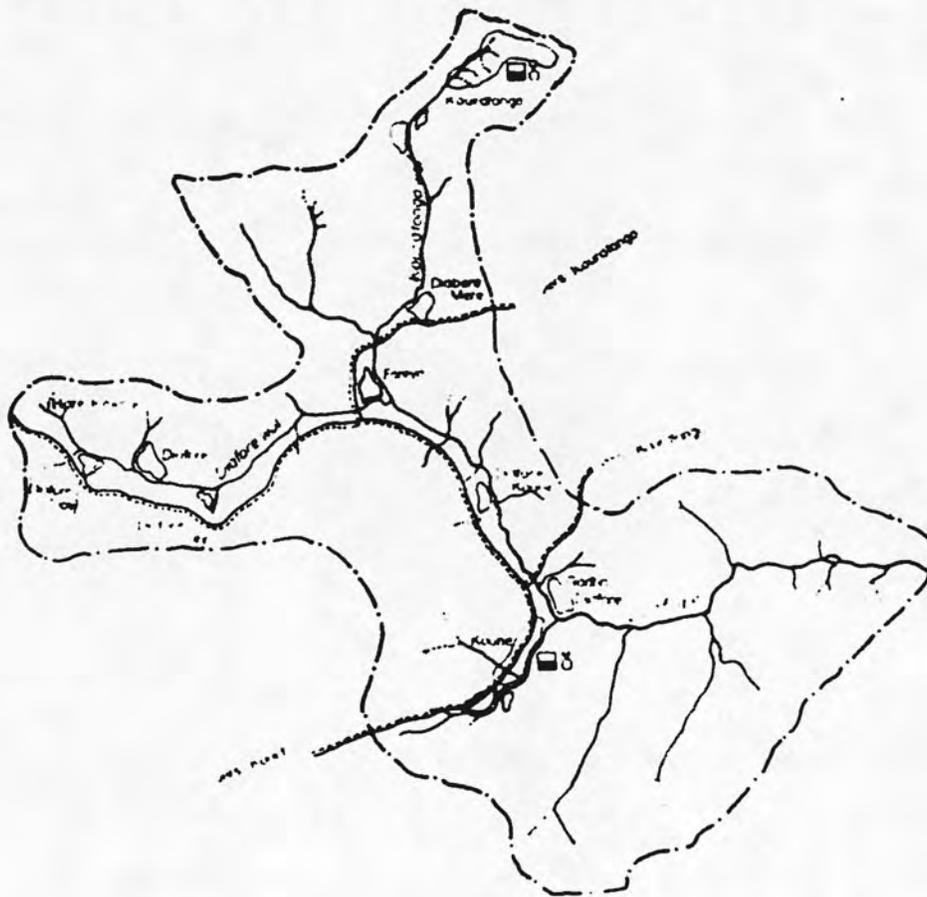
The dirt roads within the basin are considered to be passable year-round. The area has two primary schools, neither of which has a complete six-year cycle of classes. The school located at Kouratongo has three classes (first, third, and fourth years), while that at Koune has two (first and third years). Two mosques are located in Diaforé. The nearest weekly market is located at Kollet, outside the watershed area.

A health dispensary building exists at Kouratongo. In the past, this center was occasionally visited by a medical doctor and vaccination teams. According to local informants, the health center has not been used in over five years. Consequently, for medical care people are obliged to travel to either Kollet or to Tougué, which are, respectively 22 km, and 40 km from Kouratongo. Women with serious pregnancy problems must travel to Tougué.

3.1.5 Perceived environmental and social changes over time

The environmental change most noted by local residents is the drop in annual rainfall, which they began to notice around ten years ago. Now it is common for water sources and streams to run dry, whereas years ago they were permanent year-round. Some traditional wells also run dry. The difficulty in

MAP 6. DIAFORE: INFRASTRUCTURE
(Photographed and reduced from map prepared by staff members
of the Fouta Djallon Highlands Integrated Management Service, Labé)



K E Y

- Limit of watershed
- Road
- River
- Ravine
- Village
- School
- Mosque

obtaining water during the dry season affects human and livestock populations alike. When the watercourses dry up, they no longer function as natural firebreaks.

Less rainfall has brought about other changes. Chances of engaging in dry-season gardening -- and thus engaging in cultivation year-round -- are reduced. Gardening is also difficult because of insect problems.

Growing fruit trees, such as orange, mango and avocado trees, has become more difficult. While the lowered availability of water was stressed, the trees are also increasingly being attacked by termites and ants. Some trees now are dying six to eight years after being planted.

Animal pasturage is scarce during the dry season. The livestock have to walk further in search of both food and water, and become weakened. Cows now produce less milk than formerly. One woman noted that in the past, one could obtain enough milk for the family's sauce (the gravy served with the staple grain, such as fonio or rice) from two cows, whereas today it is difficult to do so with the milk obtained from five cows.

Within the past ten years, fires have been suppressed in the area. Due to awareness campaigns, the population is coming to understand that is not advisable to burn the grasses on the bowés. Consequently, the area in bowés is decreasing, as natural regeneration of shrubs and trees is beginning to invade these areas. The tree litter enriches the soil and encourages the growth of other trees. A bowé that used to extend between two villages near Kouratongo now is bisected by a small wooded area, naturally regenerated.

Availability of firewood does not seem to be a problem. One woman noted that it took her approximately an hour and a half to collect firewood and return home, and she needs to make three to four trips a week.

3.1.6 Local development priorities

When asked about their development priorities, one of the older men (a member of the council of elders, or Conseil des Sages) ranked potable water first, followed by problems with fruit trees, problems with soil fertility and declining yields (of both fonio and fruit), health, and raising livestock. Other problems added by men included problems with the young people, schools, and the exodus of young people from the area. The district chief discussed the problem of wild animals, such as lions, leopards, and hyenas, from the nearby forest attacking their livestock.

In the group meeting, a spokeswoman noted three problems of particular concern to women: the reduction in (cow) milk production, difficulties with dry-season vegetable gardens, and health problems for children and women, especially for maternal deliveries.

A grandmother noted numerous problems, especially the lack of water in the dry season, lack of pasturage, illness of children, and termite attacks on her maize plants. She felt that improved health was the point of departure, followed by improved water supplies and an anti-termite campaign. She also mentioned that as the area lacked a market, surplus ripe fruit went to waste, as each family grows enough for their own needs.

This year her husband has gone to Senegal to work at the beginning of the agricultural season: she was cultivating just her tapade (no fonio field), and looking after two young grandchildren by herself. She stated that her tapade yields have always been low, and decline as a function of distance from her huts. She tries to improve the productivity of the tapade by adding mulch around her taro plants, manure from her goats, and cow manure collected from the nearby bowé. Because of all her other work, she lacks the time to bring as much cow manure as she needs.

3.2 WATERSHED NO. 9 KOUNDOU

The team held two sets of group interviews in Linsan. When the team arrived, the Prefet and Sous-Prefet were waiting, with a group of 40-50 local men. The team decided to call a group of women together from the village and to conduct two separate interviews. After the group interviews, a tour of local fonio fields was made with the men, and a tour of tapades with the women.

3.2.1 Location

The pilot watershed basin of Koundou*, and the control watershed, Kambara, are located between latitudes of 11°39'N and 11°52'N, and between longitudes of 12°32'W and 12°47'W. The area of Koundou is 107 km².

3.2.2 Ecological characteristics

According to information assembled by the RAF Project, this watershed is characterized as being composed of five physiographic types: broken laterite crust plateau, doleritic escarpment, undulating plain, hilly plateau, and irregular plains (Map 7). The land susceptibility to erosion has been classified as susceptible, average, and insignificant.

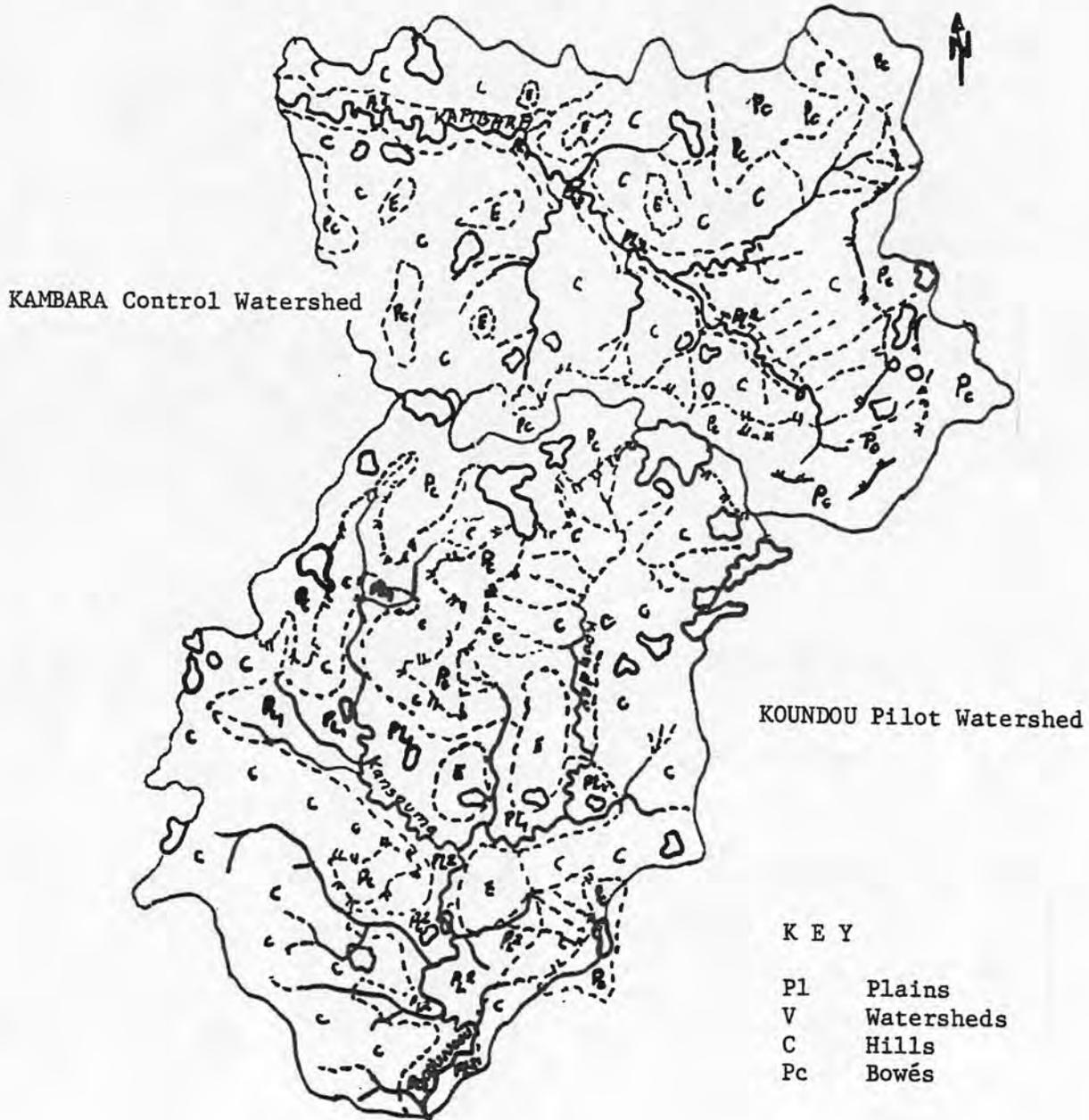
Koundou receives 1600 to 2000 rainfall per year, and has 6 dry months a year. Average temperatures for the hottest month are 20.5°C to 26°C, and the average temperatures for the coldest month is 13.9°C. The watershed is drained by the Bontola and Komba rivers, which empty into the Kolibu, which passes through Guinea-Bissau, emptying into the Atlantic Ocean.

Land is considered to be suitable for rainfed agriculture, fodder production, arboriculture (fruit trees), pasturage, and forest plantations. The vegetation is classified as savanna, shrub savanna, open forest type and is composed of dry mountain forest and islands of closed forest consisting of species such as Pterocarpus erinaceus, Terminalis macrocarpa, Azizalis africana, Coryla pinnata, Burkea africana, and Exynanthea abyssinica (Bamboo).

Local residents cultivate tapades, fields, and gardens, and raise livestock. Crops cultivated include maize, taro, peanuts, sweet potatoes, cotton,

* Kambara was originally been proposed as the pilot watershed. The Kambara watershed lies within two different prefectures (Linsan sub-prefecture in Lelouma prefecture and the Dougonnttonni sub-prefecture in Mali prefecture). Thus, to work in Kambara would involve more administrative contacts and thus be more cumbersome. The team thereby agreed with project personnel that Koundou would be appropriate as the pilot, and Kambara as the control.

MAP 7. KOUNDOU: LAND TYPES
(Copy reduced from map prepared by staff members
of the Fouta Djallon Highlands Integrated Management Service, Labé)



indigo, fonio, bananas, and fruit trees, such as avocado and orange. Some residents engage in specialized professions, such as blacksmithing and making cloth.

3.2.3 Nearby classified forests

The nearby classified forest to the watershed is Nyama, which is located about 25 km northwest of the watershed. This forest covers an area of approximately 10,000 hectares and was classified in 1942. Unfortunately, the team did not have enough time to visit the forest. According to the forester for Lelouma Prefecture, the residents know the forest boundaries.

3.2.4 Population, local institutions, and infrastructure

The Koundou watershed has a population of 4,600 inhabitants, and thus a population density of 43 inhabitants/Km². Within the basin are 18 villages, and four seasonal habitations (Map 8). The livestock population has been censused at 165 cows, 322 sheep, and 463 goats.

The basin falls within the administrative boundaries of the sub-prefecture of Linsan, within the prefecture of Lelouma. The basin has 35 km of dirt roads, and several foot paths. Local informants said, however, vehicles arrive at Linsan perhaps only once a month. The area has three primary schools, none of which has a complete six-year cycle of classes. The school located at Linsan has three classes, while the other two have only one class each. Several mosques are located in Koundou, and a weekly market is held on Tuesdays.

For the two villages of Linsan (Linsan Foulbhe and Linsan Savan), only one permanent well now has water year-round. This well is used during the dry season by between 300 and 400 women, who have to spend lots of time waiting in line for their turn to draw water.

A health dispensary, staffed by a nurse, exists at Linsan. Often, however, the nurse has no medicines. (Women interviewed at Linsan complained that the male nurse lacks the initiative to keep adequate medicines in stock.) For health care that can not be handled locally, people must travel to either Labé or Lelouma, which are, respectively, 160 km and 135 km from Linsan. Given the lack of transport facilities (noted above), the access to medical care is severely constrained.

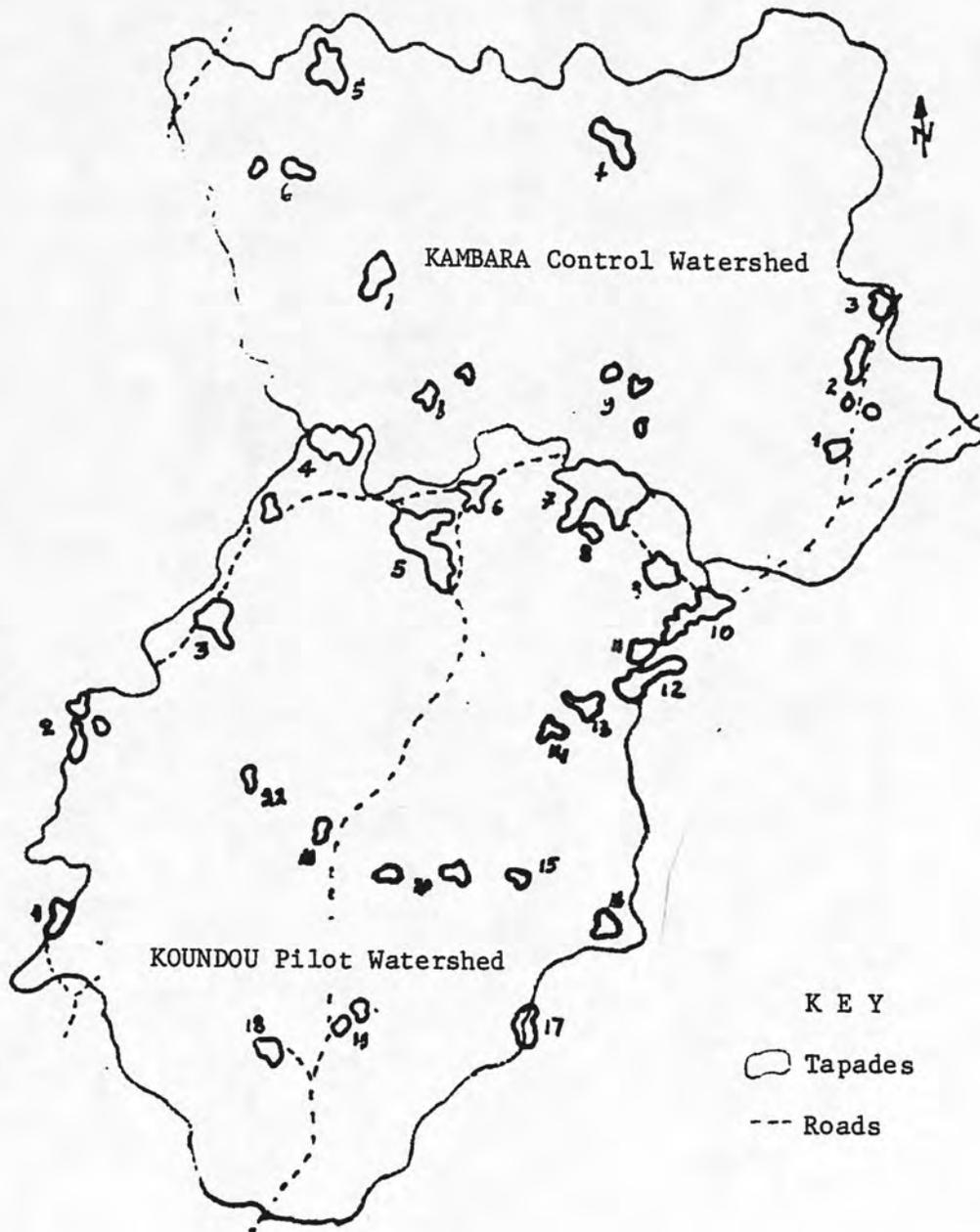
3.2.5 Perceived environmental and social changes over time

As separate interviews were conducted with village women and men, their perceptions are discussed separately. (A male interpreter and a few other men, including the Sous-Prefet, were present during the women's interview.)

Women's perceptions of change

In the area, women traditionally make and dye homespun-cotton cloth. Their traditional dye materials, such as certain types of tree bark and leaves, have become increasingly harder to obtain. The cotton and indigo plants cultivated by the women have suffered declining yields. Consequently, women now buy some of their raw materials. Whereas in the past women were able to make enough cloth for their family needs and to sell, now they cannot produce enough to have a surplus to sell.

MAP 8. KOUNDOU: SOCIO-ECONOMIC CHARACTERISTICS
(Copy reduced from map prepared by staff members
of the Fouta Djallon Highlands Integrated Management Service, Labé)



A women's cooperative, established in 1984 in Linsan, works on fabric-making and gardening activities. It currently has 34 members. The group does not yet have, but would like to obtain, sewing machines. The group's gardening activities originally focused on a collective garden, but now the members each work on their own gardens. Other villages in the area have similar women's groups engaged in the same activities.

Women noted that many water sources that used to run year-round are now seasonally dry. The village of Linsan, for example, is located around a large bowé. A stream used to run through the bowé, which was used for washing clothes and household water needs. During our visit, which was at the height of the rainy season, this area only had scattered puddles of water.

The women also discussed declining crop yields. In the past, they did not have to add manure to their tapades, whereas now they do so. Also, some crops that were formerly grown in fields, such as cotton and indigo, are now grown in the tapades. Cotton plants in the tapades now grow very slowly, in comparison with past production. The decline in crop yields have occurred over the past twenty years.

Tapade sizes have increased, and as a consequence, it has become impossible to find adequate trees for live fencing. Now most of the tapade fences are made from cut wood.

Firewood has become more difficult to obtain. Women stated that in the past firewood was available nearby. Now they have to walk down to the river lowlands, which are situated below the plateau where the villages are located. To walk there, collect wood, and return takes four hours. The amount of wood collected by one family member will meet the family's wood needs for two days. Thus women have to collect firewood every other day.

Men's perception of change

The men began by describing how declining rainfall has affected them. First they can only harvest maize once a year, whereas in the past they always had 2 harvests. They have also been forced to test different varieties of rice that are better adapted to more arid conditions. A seventy-three-year-old man stated simply that in former times they worked less and harvested more; today the reverse is true. The other concern caused by a recent drop in rainfall is that several nearby streams dry up during the dry season whereas they used to run all year long.

Several men spoke of problems with their livestock, including decreasing yields of milk and more sickness. They explained that a certain type of fly is in the area that didn't exist before. Once a cow has been bitten by the fly a red spot soon appears around the bite and the cow will die within five hours. One man noted that it takes ten cows to produce the same amount of milk that one cow produced in times past.

Declining fertility of the fields was a major concern to the men. When asked why this was happening, they responded with the following reasons: (1) more weeds today; (2) shorter fallow periods; (3) decreased rainfall; and (4) soil erosion. When asked what could be done to address the fertility problem, several mentioned that fertilizer would work if they could get it on a regular basis. One farmer suggested that people should farm less on the upper slopes and more in the lowlands. He explained that lowland soils are

richer and that he had, in fact, cleared an area of land and planted banana trees just this year. (The team visited his banana plantation on the drive out of the watershed.)

Several men stated that, in general, people are less healthy today than in the past, and that the health service is non-functional. They sometimes have to transport sick people all the way to Labé (about 3 hours by vehicle) and people often die on the way. River blindness, "tiredness", and goiters are more frequent among villagers than before, as are hernias among children.

3.2.6. Local development priorities

When asked to state their most pressing problem, the men took several minutes to discuss this question amongst themselves. They returned to the group to state that the main problem is isolation, due to lack of good roads.

Women also ranked improved roads as their first priority. Informants consider themselves to be isolated, far from other markets, health care, and other services. Because of the distance and poor quality of the roads, rarely do government functionaries visit the area. Women noted that they need access to other markets to obtain materials such as industrial textile dyes and vegetable seeds.

Other priorities for women included health, gardening, and education. In terms of health, they want an improved dispensary, with better stocking of medicines. To improve their gardening efforts the women need improved vegetable seeds and fertilizer.

Improved secular schools are important, they said, for local development: without any "intellectuals", they remarked, the community could not progress. Both girls and boys go to school, but the boys are more numerous among the students, and more likely to continue. The women noted, however, that two women from the area had graduated and become government functionaries (and work elsewhere). Currently no women functionaries work in the area.

4 - FEASIBILITY OF PROPOSED PROJECT

The team has concluded that USAID's participation in the IMFDW Project is feasible. This decision is based on a thorough search of the literature and discussions with AID Washington, the AID Mission in Conakry, GOG officials in Conakry and in the Fouta Djallon, Peace Corps Volunteers working in the Fouta Djallon, villagers and others too numerous to mention. If the team were to rank the feasibility of the Project in terms of low, medium or high, the answer would be the latter - high.

Several key issues, however, must be addressed if AID decides to participate in the Project. The feasibility of the Project depends to a certain extent on how these issues are viewed by the Africa Bureau, the AID Mission in Conakry, and the GOG. The following sections will define these issues in terms of how they affect the overall feasibility of the IMFDW Project.

4.1 TECHNICAL AND SOCIO-ECONOMIC ISSUES

4.1.1 Erosion of the Fouta Djallon

Given the importance of this issue, the team spent a considerable amount of time interviewing people and reviewing documents to arrive at the conclusions that will be put forth below. As other authors have already done so, this paper will not attempt to analyze all the data that is available to date, but will highlight some salient issues.

As J. Boulet and J. C. Talineau, ORSTOM socio-economic researchers noted, the erosion problems of the Fouta Djallon were described in the 1940s and 1950s by authors such as J. Richard Molard, J. Tricart, and J. Poquet. These observers believed that erosion problems in the Fouta Djallon were extremely serious. Boulet and Talineau argue that these early commentators provided subjective descriptions, which were exaggerated, pessimistic, moralistic, and at times contradictory. Tricart, for example, noted in 1956 that the country "is moving more and more rapidly towards total ruin" (translated from the original French, cited in Boulet and Talineau 1986a).

Their impressions, Boulet and Talineau suggest, may have resulted from confusion between long-term ancient and intense geologic erosion processes that shaped the current topography of the Fouta Djallon and West Africa, and the relatively more modest current processes of erosion. In 1980, in fact, Tricart revised his earlier opinions, and decided that erosion in the Fouta Djallon was less serious than he previously assumed.

In the 1940s Richard Molard commented on the enormous gullies forming in the soil, and argued that the Fouta Djallon was already overpopulated. (The 1943 population of 750,000 was less than half its current level of 1.6 million.) Nonetheless, in 1949 he perceptively noted that:

In 1821 Mollien described the Fouta as we see it today, just as deforested and bowalized. Our agronomists and foresters seem to err in insisting on the actual rapidity of the degradation of the soils, the deforestation, the bowalization of the Fouta. All that preceded and even provoked the coming of the Fulani...

(Translated from the original French. Richard Molard (1949), cited in Boulet and Talineau 1986a: 3.)

Thus, the Fulani, who were historically nomadic pastoralists, were probably attracted to the Fouta Djallon because of the vast areas of bowés and plains. The bowés are not, as some commentators have thought, simply the result of human activity (See Appendix A.)

Many recent observers have noted, in both the French and the English literature, that the current erosion problems in the Fouta Djallon are significant only on localized levels, and not on the scale of whole watersheds or even the larger West African region (e.g., Hesch 1985, cited in Boulet and Talineau 1986a; Boulet and Talineau 1986a; Goodson 1987; Freeman 1987).

It should be noted, however, that this interpretation is based on a few recent studies, and that no long-term erosion studies have yet been undertaken in the Fouta Djallon. Whether current erosion problems may accelerate in the next twenty or thirty years and thus develop more serious regional implications is also an issue of debate.

While both Goodson (1987) and Freeman (1987) agree that there is a lack of reliable available soil erosion data, the work done to date by GERSAR, ORSTOM, and the Harza Engineering Company (see Appendix B) indicate that the sedimentation problem is less severe than earlier reports had indicated. For example, according to the OMVG Assessment, over a 100-year period only about 0.5 percent of the live storage of the Kekreti reservoir would be lost to sediment. Under a worst-case scenario the reservoir would fill up in about 170 years; the best-case estimate indicates 16,667 years.

The data also shows that sedimentation rates for some of the smaller dams that are fed by the steeper upper valleys within the Fouta Djallon are high to extremely high. For example, a sedimentation problem is highly visible at the Kinkon dam, which provides water and electricity for Pita, Labé, and Mamou. The team observed a significant amount of sheet erosion on upper slopes that had been newly cleared and planted with fonio this year.

Mathieu (personal communication, 25 July 1988) agrees that runoff problems occur on the upper slopes during the rainy season. He believes, however, that the real problem of the Fouta Djallon is declining soil fertility, due to an increase in human population levels. This has resulted in shortened fallow periods, less available organic matter, and reduced nutrient cycling, all of which are necessary to combat soil acidity and aluminum/ferralitic toxicity.

In summary, the team feels that a serious erosion problem exists in the Fouta Djallon itself. This erosion problem, however, at present, does not seem to pose a threat to the major lower river basins in neighboring countries. Nonetheless, this conclusion does not mean that the regional impacts of the erosion issues can be ignored.

It also cannot be assumed that the situation in the Fouta Djallon will remain stable. The erosion conditions could change rapidly, i.e., over the next twenty to thirty years, as a result of increasing population levels, decreasing rainfall, or intensifying levels of agricultural production. If, due to recent changes in government policies, agricultural production begins to increase in the Fouta Djallon, more land may be cleared and fallows even further reduced, which may intensify local sedimentation problems and begin to create downstream impacts.

Currently a strong rationale exists for investing in erosion control and soil fertility programs in the Fouta Djallon to improve the lives of the local population. It is certainly worthwhile to engage in activities that will limit the degree of erosion and sedimentation that already exists.

At the same time, it might be worthwhile to carry out a multi-year research program, to measure suspended sediment concentrations at locations adjacent to proposed big and small dams within the Fouta Djallon and downstream. Such an effort would satisfy those who claim that insufficient reliable data is available to determine if erosion in the Fouta Djallon is threatening the major downstream water basins. Such research would also serve as a monitoring tool.

4.1.2 Declining rainfall

Both scientists and local residents of the Fouta Djallon agree that rainfall has been steadily declining at a rapid rate. At both villages that the team visited, people stated that declining rainfall in the last 10-15 years has caused streams to dry up, either seasonally or permanently, and is a contributing factor linked to decreased crop yields.

According to Mathieu (personal communication, 25 July 1988), a study by an ORSTOM researcher, J. Isbeque (1985), shows an approximate decline of 300 mm of annual rainfall in the Fouta Djallon over a 15 year period, beginning in 1970. Thus, some areas that used to receive 1700 mm a year, for example, now only receive 1400 mm. Other information suggests that average rainfall may have declined by 500 mm over a period of 30 years (Landeck, personal communication, 24 July 1988).*

The overall decline of rainfall in the Fouta Djallon has obvious local and regional implications. At the village level, it has meant that women have more difficulty in finding water during the dry season when adjacent streams dry up. Farmers in Diaforé complain that their fruit trees are dying for lack of rain, and that they only get one crop of maize a year while they used to get two. Livestock find it more difficult to obtain adequate water and forage during the dry season. Also, less rain could be a contributing factor in the decreasing levels of milk production among dairy cows.

At the regional level, declining rainfall patterns are the obvious cause of decrease flow in the Senegal, Gambia, and Niger Rivers, rather than sedimentation problems resulting from massive run-off in the Fouta Djallon. If in fact, the drying trend is occurring as rapidly as reports indicate, it is not too soon to begin studies to determine the ecological and socio-economic consequences in the major downstream river basins as well as in the Fouta Djallon itself.

* Boulet and Talineau (1986a), in reviewing Isbeque's study, do note, however, that interpretation of rainfall trends is rather delicate considering the data available. Mathieu noted that this report can be obtained from the ORSTOM office in Dakar, Senegal.

4.1.3 Declining soil fertility

Agriculture in the Fouta Djallon is carried out mainly on ferralitic soils, which predominate the farmland (excluding tapades and lowlands). Such soils are commonly found in humid and semi-humid tropical regions where intensive rainfalls and high temperature play a major role in soil formation. The fertility of such soils is determined by soil characteristics most affected by weathering, such as pH, cation exchange capacity, and percent base saturation. In general, the ferralitic soils in the Fouta Djallon are acidic. The topsoil has been leached of basic cations and enriched with aluminum and iron. Toxic levels of aluminum and manganese are common as well as deficiencies of phosphorus, calcium, magnesium and molybdenum (McGahuey, 1988).

Farmers interviewed in Pita, Diaforé and Koundou stated that soil fertility is steadily declining, due mainly to increased competition for farmland and shortened fallow periods. Jonathan Landeck, a Fulbright Scholar studying farmer attitudes towards soil management in the Fouta Djallon, argues that farmers are extremely aware of the relationship between the amount of organic matter in the soil and soil fertility. Despite this awareness, they are being forced to shorten fallow periods in order to feed their families. Traditional fallow periods ranged from 9 to 15 years; currently, the time allowed for field regeneration is less than half of that period (Landeck, personal communication, 24 July 1988). Consequently, yields have declined from approximately 500-600 kg/grain/ha generation ago to 200-300 kg/grain/ha today, according to farmers and officials surveyed in the Pita area (McGahuey, 1988).

In summary, highly acidic ferralitic soils are characterized by increased aluminum and iron toxicity and a lack of basic soil nutrients, such as phosphorus, calcium, magnesium and molybdenum. An effective method to buffer the effects of soil acidity is to increase soil organic matter and thereby complex the free aluminum and iron, and reduce the rate of hydrolysis (McGahuey, 1988).

Increased demographic pressure in the Fouta Djallon has forced farmers to lessen the fallow period, which is their traditional farming method to rebuild the soil and increase soil organic matter. The end result is a continuing decline of soil fertility and agricultural productivity. One should note, however, that the above scenario does not necessarily hold true for the lowlands that are dominated by hydromorphic soils rich in organic matter, nor in many of the tapades where women use mulch, manure, and compost on a regular basis to rebuild the soils.

Any strategy adopted to address the problem of declining soil fertility should begin by examining local, traditional methods to increase organic matter in the soil. Given that farmers already recognize the value of organic matter to increase fertility, and soil scientists have shown how organic matter can reverse the negative effects associated with acidic soils, it seems logical to begin by testing proven techniques such as alley-cropping, vegetative bands, compost, mulching, and live fencing on small demonstration plots within the framework of a research program.

Establishment of perennial vegetative cover in association with crops (alley-cropping, vegetable bands) could be quite effective if deep-rooted leguminous species are introduced. Several Australian acacia tree species are showing promising results at the FAO Project in Pita (Acacia auriculiformis,

Acacia mangium and Acacia holocericium are presently being tested). The advantages of associating deep-rooted, leguminous trees and crops are three-fold: (1) increase in organic matter from leaf litter and branches that could be periodically pruned back; (2) recycling of nutrients that have been leached out of the upper soil horizons; and (3) nitrogen-fixation.

These techniques and others could be tried on small demonstration plots, following the Integrated Crop Management Model approach outlined by McGahuey (1985: 62). This approach advocates working with innovative villagers to plant live fences, forage species, and trees in association with various crops on one parcel of land. The main objective would be to increase soil fertility and to maintain soil productivity. Secondary benefits, of forage production, firewood production, a permanent live fence, and perhaps improved seed, would encourage village participation.

According to Peace Corps Volunteers working around Pita, this type of approach was employed successfully by the USAID-funded Community Forestry Pilot Project. The results of this intervention were somewhat mediocre, due to the poor choice of species. The project did serve to demonstrate that farmers are willing to participate and even take certain risks if they feel that they will benefit in the long run.

Given the limited research that has been done on declining soil fertility in the Fouta Djallon, any strategy to address this problem should include a research component to complement the Integrated Crop Management Model. For example, species trials and various types of soil amendments could be referred to a research station. The knowledge gained by such research would eventually be incorporated into the Integrated Crop Management Model.

Use of fertilizer or lime should not be excluded as a possible solution. It should not, however be introduced into the demonstration plots until an in depth socio-economic feasibility study has been carried out.

4.1.4 Other environmental impacts

1. Slash-burn clearing of field fallows on the upper slopes

Traditional slash-and-burn clearing of the fallow fields on the upper slopes is a major cause of erosion in the Fouta Djallon. During the first year after burning, before adequate vegetation has regrown, these exposed slopes are subjected to runoff during heavy rains. For the remainder of the fallow period, however, these fields currently produce a sufficient amount of perennial vegetation to protect the soil from serious runoff.

As fallow periods decrease in the future, however, and the land is subjected to more frequent slash-and-burn farming, these areas will become more susceptible to severe erosion problems. Although this has not yet occurred throughout the Fouta Djallon, the team did observe some severely eroded upper slopes that had been cut and burned during this rainy season.

One technique that has been successfully used in other countries to address this problem is to construct earth or rock berms on the contour of the slopes and plant trees and perennial grasses behind the works. This technique slows down the run-off during the rainy season and provides a permanent vegetative cover to maintain soil productivity. We saw some fields at Tahira where

farmers had placed larger rocks perpendicular to the slope but not following the contour.

According to Jonathan Landeck (personal communication, 24 July 1988), people are aware of erosion problems on the steeper slopes. They do not leave trees growing in their fields during cultivation periods because of a severe bird problem in the area. Landeck emphasized that technology itself is inadequate as a solution unless it is coupled with effective extension efforts. For example, the concept of planting trees (other than fruit trees) is an alien concept to many villagers. This idea would have to be introduced on a small-scale with a few innovative farmers. Once results become obvious, other farmers might be willing to participate.

2. Impacts on forests

According to all farmers interviewed at Pita, Diaforé and Koundou, and several studies that were carried out during the first phase of the RAF Project at Labé, little noticeable change has occurred in the total area of the forest land over the last thirty five years.

The RAF Project staff members compared aerial photos from 1952 and 1979 in four representative zones located in the prefectures of Mali, Mamou, Pita and Tougué. The 1979 photos were superimposed on the 1952 photos: differences were interpreted, and noticeable changes were drawn on a map with colored pencils. According to a forester who worked on the study, the most significant land use change is more tapades today in areas of higher population; little forest area has been cleared to increase agricultural land. When asked why this has not occurred, given the increase in population, both government officials and villagers answered that strong traditional laws prohibit villagers from cultivating in existing forests.

This change in land use is also supported by comparison of data from socio-economic surveys conducted in 1955 and 1984-85. Boulet and Talineau (1986b) suggest that while the human population has grown, with increases in household size, the average size of tapades, or household gardens, has remained constant, while the average size of household agricultural fields has declined. Thus, it seems that some field areas are being converted to tapades. (For more discussion, see Appendix A, Human Population.)

Biological diversity

Although the total forest area has remained relatively stable in the last 35 years, the density of the forests and species composition have changed. How these changes have affected the biological diversity of plant and animal species is not clear. Little information is available regarding species composition or forest inventory records, which might show how the forests have changed over time.

In general, the Direction of Waters and Forests' work to date has focused primarily on planting trees from nursery stock. Little work has been carried out to manage the natural forests. If the forests are being exploited without a management plan, it is almost certain that the biological diversity of the vegetation and wild life is being compromised. The following Table shows the results of two separate surveys of wildlife (Varady, 1983).

TABLE 1
ENDANGERED OR THREATENED MAMMALS

COMMON NAME	SCIENTIFIC NAME	STATUS ¹	
		IUCN ²	FWS ³
Chimpanzee	<i>Pan Troglodytes</i>	T	T
Colobus, olive	<i>Colobus verus</i>	T	-
Eland, Western giant	<i>Taurotragus derbianus derbianus</i>	-	E
Elephant, African	<i>Loxodonta Africana</i>	T	T
Hippopotamus, pygmy	<i>Choeropsis liberiensis</i>	T ⁴	T
Leopard	<i>Panthera pardus</i>	T	E
Manatee, West African	<i>Trichechus senegalensis</i>	T	T
Mandrill	<i>Papio sphinx</i>	-	E
Mangabey, white collared	<i>Cercocebus torquatus</i>	-	E
Monkey, Diana	<i>Cercopithecus diana</i>	-	E
Wild dog, African	<i>Lycaon pictus</i>	T	-

NOTES

- 1 - T: Threatened
E: Endangered
- 2 - IUCN (International Union for the Conservation of Nature), 1978a.
- 3 - FWS (US Fish and Wildlife Service), 1980.
- 4 - IUCN, 1976.

Source: Varady (1983).

The University of Arizona will be using an Advanced Very High Resolution Radiometer (AVHRR) to monitor changes in vegetation over time. The Project will focus on a study area (180 km x 180 km) in an area northeast of Labé. These data, which have a higher temporal frequency than Landsat data, will be converted to an appropriate index of vegetation vigor, a measure of vegetation density, through a simple transformation algorithm. This method has already been employed in the Sahel as a tool to monitor "green-up" of vegetation. It will be interesting to compare the results of the RAF Project with those of the University of Arizona.

Given that no classified forests in the Fouta Djallon are presently being managed under prescribed management plans, work should begin to carry out preliminary studies and develop a prescribed management plan for a model forest to be implemented by the Water and Forest Service. This would serve as a demonstration forest, on which efforts to manage other forests could be modeled. The Forest of Bakoun is suggested for such demonstration efforts, because of its population of endangered wildlife species and its proximity to the Diaforé Watershed (No. 8).

3. Availability of firewood

The availability of firewood today as compared to the past is not clear. The firewood situation seems to vary widely from one area of the Fouta Djallon to another. In Pita, for example, a middle-aged woman interviewed stated that she spends almost twice as much time gathering firewood today than she did as a teenager. In the Koundou watershed, women spend four hours on each trip to obtain firewood. In Diaforé, however, firewood did not seem to be a problem.

Firewood is typically obtained from fallow fields. The availability of firewood may be diminishing in areas where the length of the fallow period has been shortened, or where the size of fallow fields has decreased, as more land has been converted to tapades.

Firewood is cut in the Fouta Djallon area for sale, to supply urban residents of Labé and other towns in the region. In some areas local people have sought to prevent outsiders from commercially exploiting their fuelwood sources.

Where firewood shortages occur, appropriate interventions will be necessary. The most appropriate approach might be to work with individual villagers to establish private tree nurseries to supply multi-purpose firewood trees. Such trees could be planted on private plots, or around gardens and tapades as living fences. This approach proved quite successful in the Fouta Djallon when carried out by the USAID Community Forestry Pilot Project in Pita. Selection of species that are adapted to the local environment and provide other benefits, such as forage, organic litter, or food, is essential to ensure that this approach will meet local needs.

In areas where firewood is being exploited commercially, efforts should begin to determine where the woodcutters are concentrated and how these areas could be properly managed for fuelwood and other forest products.

4.1.5. Paired watershed concept

Each of the twelve sites contains two watersheds: one which will be an experimental, "representative pilot basin" (BRP) and another that will serve as a control, or "representative witness (temoin) basin" (BRT). This approach is sometimes adopted in watershed management projects to aid in determining the effects of different soil erosion techniques. Data can be compared from "treated" and "untreated" sites between watersheds.

4.1.5.1 History of applied research/development on paired watersheds: Monitoring issues

In discussing this issue with the Director General of the Forest Service and several technical staff members at Labé, it seems that this approach is to focus on monitoring sedimentation rates in both treated and untreated watersheds. This approach to watershed management has been widely advocated by FAO. Although the idea seems logical, several issues must be addressed beforehand.

First, past experience has shown that for the data to be useful, several years of monitoring and data collection must be conducted before the project begins work in the watershed. Also, the monitoring should ideally continue for 15-20 years (John Michael Kramer, personal communication, 14 July 1988). Given all the problems of monitoring and follow-up inherent to development projects in Africa and elsewhere, it seems unlikely that proper monitoring and data collection could be assumed by the Guinean government after external project funding ends.

Another question arises when considering this paired-watershed approach. Sedimentation seems to be a local problem only in areas where people are using inappropriate farming practices on the steep upper slopes. The team did not see evidence of this situation in either of the paired watersheds visited.

In light of these concerns, USAID may want to consider an alternative approach to incorporating the pair watershed concept. For example, rapid rural assessment criteria, based on ecological and socio-economic conditions, could be developed for each of the paired watersheds. Once the criteria are established, rural assessments could be carried periodically on the treated and the untreated watersheds during the life of the Project. Such information would be useful for Project monitoring for USAID's purposes, and furthermore, it could help assess the impact of development interventions for the purposes of the larger Integrated Management of the Fouta Djallon Watershed (IMFDW) Project, prior to wider dissemination and replication of techniques.

4.1.5.2 Social feasibility of paired watersheds

The team is also concerned as to the social feasibility of a paired watershed approach. As currently envisioned, the experimental watershed sites are to be targeted for development interventions, while no development interventions would be introduced to the control sites for the duration of the project (five years). Nonetheless, it is assumed that the project team will go into the control watersheds to take periodic measurements of whatever criteria are being monitored.

Three comments on this approach seem relevant. First, it must be recognized at the onset that human behavior is very difficult to "control". Suppose that a project goes into Basin A and begins promoting alley-cropping of leguminous trees to generate green manure. Some farmers in Basin B, the control, may see what their neighbors are doing in Basin A and copy their example.

Second, questions of fundamental social justice arise. Anytime that a development project is launched, questions always arise as to why a particular group or village, and not another, receives the help. Residents of the control watershed might resent being asked to participate in a study without receiving any benefits. It might be possible, however, that residents of the control watershed would not realize they were part of an experiment, and might just think they did not luck out in getting the project.

Third, if a pair of watersheds were to be compared, then they need to be as similar as possible in social as well as ecological characteristics. The Watershed Pair No. 9, Koundou and Kambara, presents an illustration of the problem. The two watersheds were chosen as basins of the same size and same agro-ecological type. Koundou has a market, three schools, several mosques, a health dispensary, while Kambara has none of these. (The residents of Kambara travel to Koundou or other adjacent areas.) Koundou has a population density of 10 inhabitants/km², whereas Kambara has a density of 43 inhabitants/km². Thus, Koundou has a population density more than four times greater and a larger infrastructure, than Kambara, it could be argued that the two areas are already at different levels of socio-economic development or quality of life.

4.1.6 Land tenure and labor issues

Available information suggests that land tenure systems may constrain resource management efforts. William Roberts suggests that in some parts of the Fouta Djallon, few people actually own the land that they farm, and the parcels of land that they farm change from year to year (Roberts et al. 1988). Land sales in the Fouta Djallon date from as early as 1908. By the 1950s, the availability of land was becoming constrained.

If most people do not own the land they farm, they may be willing to make only limited investments in that land. Farmers, it can be assumed, will be primarily interested in activities that will provide immediate or short-term benefits at low risk. For example, alley cropping systems might prove attractive as they could produce "green manure" in a short time period, and thus enhance soil fertility and crop yields.

Women's access to land, other than their tapades, seems problematic. Men control the land in the Fouta Djallon. If land is rented or borrowed, men make the arrangements, e.g., for women's access to fields or bottomland gardens. According to Landeck (personal communication, 1988), it is all too common for women to improve bottom land gardens for a few years, growing vegetables, then once the productivity has been enhanced, the male owner of the land claims the land back, so that he can grow bananas.

If a woman's husband is absent, e.g., due to migration, she has a difficult time, and must rely on the intercession of other male relatives. It seems that a woman's access to her tapade lands may be fairly secure as long as her husband is alive. After his death, she may become an "inherited wife"

of one of her husband's kin, and thus the use of the land stays within the family.

Given the land tenure and labor systems, any efforts to improve soil fertility and agricultural productivity must involve work with both the women, who provide the bulk of the labor, and the men, who control the land. In some areas of the Fouta Djallon, public meetings of villagers may involve primarily, or only, men. The latter is true, for example, when community issues are discussed at the mosques. Some women also seem hesitant to discuss issues in front of men. Therefore, the most effective way to involve women in demonstration efforts seems to be through other women, such as women technicians, extension agents, women's cooperatives, or other groups of women.

The use of women technicians to work with women farmers has already been successfully employed in the Fouta Djallon. The FAO project in Pita works with three women Peace Corps Volunteers, stationed in Dalaba, Timbi Touni, and Pita, who work with local women on introducing fuel-efficient cookstoves. The FAO Regional Project for the Management of the Fouta Djallon in Labé has a woman on the socio-economic studies team, who has worked interviewing women.* Many Guinean women are trained in agronomy and related rural development fields, so it should be feasible to hire appropriately-trained women technicians.

The availability of labor for more intensive agricultural and resource management efforts will need to be examined more carefully. In some parts of the Fouta Djallon, many men migrate to work elsewhere. As most households do not grow enough food to cover their annual consumption, any remittances received are crucial.

Consequently, during the height of the agricultural (rainy) season, many households suffer labor constraints. As people are more apt to be sick during the rainy season, e.g., malaria, diarrhea, etc., women may have to spend precious agricultural time taking care of sick family members. Women-headed households tend to have more problems keeping their fences repaired, for example, and average lower agricultural yields than do households where the husbands are present.

If, in the long run, intensified agricultural systems permit permanent cultivation of land, then the back-breaking labor of clearing and burning fallows will be reduced. Improvement of live fencing systems could reduce the need to cut wood for fencing. By reducing this arduous work, and by increasing agricultural productivity, young men may find it more attractive to remain in the Fouta Djallon region (Landeck, personal communication, 24 July 1988).

* Binta Fady Diallo is a rural engineer, and is a member of the FDHRIDS staff. She has been trained in socio-economic survey methods, and is interested in promoting fuel-efficient cookstoves. Her husband also works for the FDHRIDS. He has been designated Director for Watershed No. 8, in Diaforé. When a development project is financed for Watershed No. 8, they will move from Labé to Tougué, and she may be interested in working there on project activities.

4.2 INSTITUTIONAL ISSUES

4.2.1 Government of Guinea

The Government of Guinea has recently launched a number of broad policy and economic reforms, aimed at decentralization and reduction of government controls on the economy and promotion of private enterprise and agriculture. The government civil service is to be cut back to one-third of its current size, from 90,000 to 30,000 employees. Education is being restructured, to emphasize primary education (in French) and reduce the emphasis on higher education. (For example, 20 of the 23 agricultural colleges in the country have been closed.) Basic infrastructure, such as roads and health services, is being rebuilt.

With reference to the IMF/DW Project, the main institutional issue is: Are Guinean technicians available with the appropriate training and orientation for such a project?

In Labé, the technicians assigned to the FDHRIDS seem to be well trained and motivated. Of 35 staff members, the best 12 have been chosen to serve as national directors of the 12 pilot watershed projects. They are already very familiar with the region, as they have been working there since the regional project began in 1984. Some personnel have already received further training.

They could, however, use more technical guidance. For example, the regional maps were prepared, but have not been completely analyzed, such as calculating the surface area of land use types.

Training in conducting socio-economic surveys was provided, but actual administration of surveys was inadequately supervised (12 surveys were incomplete and some questions were not well posed), and incomplete analysis has been done of the results (Boulet and Talineau 1986a). Additional training in socio-economic data collection techniques, such as rapid rural appraisal methods, could be useful for identifying possible project interventions, and for project implementation and monitoring (cf. Chambers 1983). Rapid rural appraisal methods can supplement more classic efforts to study local conditions, such as the "etude de milieu" (study of the setting) advocated for the initial six-month period of each watershed project.

The documentation center needs to be strengthened, in terms of both documents available and organization of materials. Efforts need to be made to ensure that a complete set of documentation is available in a central location, and that unnecessary duplication does not occur. (Staff members of the FAO Project in Pita, for example, do not currently use the documentation center in Labé, but have their own library.)

4.2.2 USAID

4.2.2.1 Country Development Strategy Statement

An Interim Country Development Strategy Statement (CDSS) was submitted to the Africa Bureau in 1987 to outline a country strategy for the Guinea office of USAID for fiscal years 1988-1990. The strategy was developed to take full advantage of the shift in economic and administrative policy that began immediately following Sekou Touré's death in 1984. To reverse the stagnation of the previous thirty years, the Guinean government initiated a wide-range of policy reforms designed to achieve a more realistic exchange rate, and encourage increased production through private enterprise.

In response to the newly adopted liberal policy reform measures, USAID/Conakry designed a series of projects to promote private enterprise and encourage further policy reform. The projects include:

- 1) Economic Policy Reform Support (EPRS/675-0219, 1986-89);
- 2) Guinea Economic Policy Reform Program - Promotion of Private Marketing and Distribution (675-0217, 1986-89); and,
- 3) Agri-business Preparation (675-0212, 1984-1988).

The Office of the AID Representative is presently, however, developing a new strategy document. At the request of AID/Conakry, Frank Correl visited Guinea in July, 1988 to develop a preliminary concept paper, entitled " US Assistance to Guinea: Some Thoughts Concerning Objectives and Strategy". Correl overlapped in Conakry with the team. We discussed his views concerning AID's role in Guinea, and whether or not the proposed IMFWD Project is logical in view of future strategies.

In general, Correl thinks that enormous progress has been made in reversing the stagnation from the previous regime. These changes are only a beginning - much remains to be done to support and strengthen ongoing Guinean efforts at economic liberalization and administrative reform. Nonetheless, USAID/Conakry should begin to move beyond economic reform issues and to address environmental concerns as an integral part of agriculture development:

Guinean agriculture has far to go to overcome the time warp of the past thirty years: farmers are industrious but not up to date. Yields are small compared to potential, and there is little available in the way of inputs, research, information or improved techniques and how to profit there from. When available, there is readiness to use it. A vast potential is waiting to be more fully realized (Correl, 1988).

The team thinks that a strong link exists between the proposed IMFWD Project and the overall development of the agriculture sector in Guinea. The main focus of the proposed project is to help farmers better manage their natural resources - mainly soils. The problems of soil acidity and soil toxicity exist throughout Guinea. Any intervention that helps farmers address these problems will effect an overall positive impact by increasing and maintaining productivity. Without sustainable management and development of the natural resource base that underlies agricultural productivity, economic and policy reforms may be undermined.

4.2.2.2 Africa Bureau/National Resources Management Support Project (NRMS)

The main purpose of the NRMS Project is to increase the quality and level of natural resources management activity in AID's country and related regional programs in Sub-saharian Africa, and in PVO programs supported by AID (Project Paper, 1987). The priority technical issues to be addressed are: vegetation loss or soil degradation, soil erosion and fertility decline and biological diversity (Plan for Supporting Natural Resources Management in Sub-Saharan Africa, 1987). The proposed IMFDW Project responds directly both to the main purpose of the NRMS Project and the technical priorities. The project will focus on restoring soil fertility in farmers' fields, address local erosion problems, and begin to devise long-term management plans for the natural forests to maintain biological diversity of the threatened vegetation and wildlife.

In all likelihood, Guinea was prioritized as a Group I Country (along with the Gambia, Madagascar, Mali, Niger, Rwanda, Senegal and Sudan) in the NRMS Project because of the regional environmental, character of the Fouta Djallon massif with regard to the major downstream river basins. In spite of the fact that there is a lack of good, available data concerning soil erosion in the Fouta Djallon, many scientists agree that the problem is a lot less severe than some documents would indicate. This does not mean, however, that no problem exists, or that given the rapid decline in rainfall and the rising population of the area that the problem will not become very real in the next twenty years. In view of the above, the team supports the Africa Bureau's Plan for Supporting Natural Resource Management in Sub-Saharan Africa and feels that Guinea should continue to be prioritized as a Group I Country.

4.2.2.3 Current budget and staffing patterns of USAID/Guinea

USAID/Conakry remains an Office of AID Representative (OAR) in spite of Washington's authorization to increase the number of Direct Hire Staff to 8 for FY 89 and FY 90. If this happens the office would receive full Mission status. According to the Administrative officer, Richard Crayne, it will be difficult to increase the present staff with existing financial resources. Crayne states that the current budget of \$1,350,000.00 would have to be raised to \$1,850,000.00 to support the additional Direct Hire Staff.

Others interviewed at USAID/Conakry agreed that lack of personnel is the main problem and any increase in their program will require an increase in staff. The other problem is office space, but AID plans to rent more floors in the building where most AID offices are presently located.

In any case, any increase in the Mission's program, be it natural resource management or otherwise, will require a significant increase in staff, office facilities and overall support.

5 - RECOMMENDED PROJECT APPROACH

5.1 GENERAL APPROACH

The general approach advocated is outlined below. This approach draws from the general framework and philosophy developed by the IMFDW Project, as well as from development experiences elsewhere in Africa.

5.2.1 Grassroot approach

The Guinean Government is strongly committed to a process of decentralization and strengthening of grassroots development efforts. The government has come to recognize that policies of the First Regime had resulted in a top-heavy government bureaucracy. Now efforts are underway to restructure the government civil service, and to encourage popular grassroots participation in development efforts, to regain public confidence in the government.

Past experience has amply demonstrated that development cannot be imposed from the outside, but must originate with the people concerned. The FAO Project in Pita, for example, has learned that when people's land is taken from them for tree plantations, all too often the trees are subsequently burnt by the disgruntled land owners.

Elsewhere in Africa, some of the most successful grassroot development efforts have been undertaken by indigenous grassroot groups and voluntary development organizations. Volunteers, such as those with Peace Corps, the United Nations, Canadian University Service Organization (CUSO), and European volunteer services, have often been very effective in facilitating rural development, as the volunteers live in their target rural communities, and come to truly understand the local people, their problems, and their constraints. Similarly, private voluntary organizations (PVOs), non-governmental organizations (NGOs), or other voluntary development organizations (VDOs) are often effective in promoting grassroot initiatives.

The US Peace Corps has recently launched an African Food Systems Initiative (AFSI) program. According to this approach, teams of volunteers work together in a given rural area, to assist with interrelated problems in rural development. Peace Corps/Guinea is currently launching such a program in the Forest Region of Guinea, and has previously assessed possibilities for such interventions in the Fouta Djallon (Friedman et al. 1987).

Such an approach might be particularly suitable for this project. One could, for example, put a team of three Peace Corps volunteers in each watershed. In Diaforé, for example, a forester could work on inventorying and assisting with the development of a management plan for the nearby Classified Forest of Bakoun, and provide technical advice on agroforestry interventions. An agronomist or horticulturalist could assist with interventions in tapades and vegetable gardens. A livestock specialist could work on efforts to improve fodder production or animal health. Such volunteers could also be available to assist with other secondary development activities in the region, such as fish farming, bee-keeping, vaccination programs, or nutrition education. (Peace Corps language teachers, for example, have recently assisted with a CCCD program for childhood vaccinations and diarrheal control.)

It would be desirable to provide some support for the volunteers in the field. One possible mechanism would be through collaboration with a private voluntary organization, such as VITA. The PVO could provide technical and logistical support in the field. A PVO technician could be based in Labé, to support volunteers working in both watersheds, and to serve as a liaison between researchers, government officials, USAID, and Peace Corps.

5.1.2 Gradual Sequential approach

The IMDFW Project is strongly committed to grassroot participation, in a gradual sequential approach. During the first phase of regional studies, staff members of the Fouta Djallon Highlands Restoration and Integrated Development Service received training in techniques for conducting social surveys (Boulet and Talineau 1985a, 1985b, 1986a, 1986b), and in extension techniques (Berthome and Mercoiret 1985.) Preliminary information on farming systems has been gathered from a small survey of 37 households in 19 different villages.

Each individual watershed project is supposed to begin activities with a six-month study of the local situation ("Etude de milieu"), to learn of the local people's needs and interests. With the local population, resource management problems and possible solutions will be identified, and priorities for development interventions will be established.

Once development interventions have been identified, local farmers will be sought for collaboration in experimental trials. The farmers will work with project personnel on participatory, action research. Interventions, such as trials with alley-cropping and mulching of fields, or growing of live fences around tapades, will be carefully monitored and assessed.

Technicians can facilitate such development in a number of ways. If properly trained, they can serve to facilitate discussions and identification of issues among rural residents. Technicians can assist with information exchange, such as between researchers (e.g., the agricultural research station at Baring) and farmers. Technicians can be responsible for monitoring field trials and obtaining research data.

If interventions prove successful on model sites, then such efforts can be replicated. Experience elsewhere in Africa has underscored the importance of successful demonstrations. If farmers can see the results on their neighbors' land, they will be more willing to take risks and try something new. With successful demonstrations, interventions can rapidly spread, as farmers will exchange their experiences. In such a situation, then, the role of the technicians becomes one of facilitating exchanges between farmers, rather than trying to "extend" new technological interventions.

5.1.3 Appropriate technological interventions

All efforts should be made to assure that proposed technology is appropriate in view of existing environmental and socio-economic constraints. For example, past studies have shown that fertilizer, when applied to the ferrallitic soils in the Fouta Djallon, can drastically improve crop yields (Brown 1962). Also, villagers in both Diaforé and Koundou expressed interest in fertilizer although most of them had never used it. Certainly an agronomist from the US would recommend fertilizer as a solution to address the problem of declining fertility in the Fouta Djallon.

Certain problems associated with the introduction of fertilizer, however, must be thoroughly investigated before fertilizer is introduced. These issues include: Is there a supply? If so, how reliable is it? At what cost? Will the increase in yield pay for the fertilizer? Are there other options such as mulching, composting, or manure, that could give the same result?

These questions may seem obvious and basic to people who have previously worked in rural development projects, but past experience has shown that, more often than not, project experts arrive with fixed ideas and interventions that may have worked elsewhere but are poorly suited to the real needs of the villagers and are ultimately rejected (Chambers 1983).

Such was the case at the FAO Project in Pita. At some point the Project technicians decided to plant pine trees in farmers' fields without asking the farmers if they wanted the trees. According to several Guineans who are familiar with the Project, serious problems ensued. Many farmers whose fields had been "donated" decided that they did not want the trees in their fields: they burned several older plantations and pulled out the younger seedlings.

The Project Director did not relate this story when we spoke with him in Pita. He did admit, however, that at the beginning of the Project many decisions were made by the Project technicians with little feedback from villagers. Now a village extension team has been created to improve the situation. To what extent this has happened is not yet obvious.

The other extreme to avoid in choosing appropriate interventions is to approach villagers with "We don't know anything, you have all the answers and we're here to learn from you what to do". Technicians must not hesitate to try new ideas or introduce new species that have worked elsewhere, but such proposals should be carried out within the framework of pilot projects or research programs. They must be tested over a period of time before being replicated and disseminated on a large scale.

Thus, applied research can be seen as a process of collaboration between farmers and technicians, both of whom have expertise to contribute (Raintree and Hoskins 1988).

5.1.4 Research/special studies

Research and special studies should be carried out to address the overall problem of declining soil fertility and other special areas of concern that come to light during the preliminary study phase or during implementation of the model sites in the two pilot watersheds.

The research component should focus on the problem of declining soil fertility in farmers' fields. Past research has already shown that one of the best ways to combat effects of acidity and aluminum toxicity is to incorporate organic matter, in the form of leaf litter, compost, or mulch, into the soil (Hue et al. 1986; McGahuey 1985). Thus, the most logical step is to test methods to increase and sustain an optimum level of organic matter to stabilize soil productivity.

The most widely accepted techniques for maintaining organic matter in the soil fall into three broad categories:

- 1) Agroforestry: A series of techniques for the establishment and maintenance of trees, grasses, and shrubs in association with crops;
- 2) Compost/mulch: A technique for adding decomposed vegetative matter or green matter to soil; and,
- 3) Alley-cropping: Planting trees or perennial plants in rows, alternating them with rows of agricultural crops. The trees are periodically pruned to provide mulch for the crops. (This method is a specific agroforestry technique that generates mulch.)

Each method has advantages and disadvantages according to the agro-ecological context within which the method is being tested. The technique or combination of techniques that is best suited to a particular area will depend primarily upon site factors such as soil, topography and vegetation.

The use of fertilizer to address soil fertility problems in the Fouta Djallon should not be excluded. For reasons already stated, however, this option should be carefully studied before it is included in the research component.

This component of the Project might best be carried out by a university that has prior research experience with West Africa soils (for example, Texas A.M./Tropsoils, University of Arizona).

The research should be designed to stress collaboration with other institutions working on similar problems. Relevant international organizations include the International Council for Research on Agroforestry (ICRAF) for agroforestry, the International Institute for Tropical Agriculture (IITA) for alley cropping, the International Board for Soil Research and Management (IBSRAM) for soil acidity/aluminum toxicity, and the Rodale Institute* for mulching and composting.

* The GOG has approached USAID in Washington and in Conakry on several occasions requesting US assistance to help develop their Agriculture Research Department. The team met with Program Chief for Agriculture Research, Saikou Sounounou Bah. We discussed in detail the IMFDW Project and the role of research to address soil fertility problems of the Fouta Djallon and possible collaboration with the Baring Research Station in Pita. Bah expressed particular interest in beginning research on organic farming methods to address the problems of soil acidity and aluminum toxicity in Guinea.

According to Bah, the Guinean Ambassador to the United States has visited the Rodale Institute in Pennsylvania. The Ambassador thinks that Rodale's regenerative farming approach could be of great interest to Guinea, because it does not use expensive imported chemical fertilizers or pesticides, which often pose significant health or environmental risks. Any follow-up effort to the prefeasibility study should include a visit to the Rodale Institute to discuss possibilities for future collaboration.

In addition, Donald Messerschmidt (personal communication, 1 September 1988) has suggested that research conducted on mountain systems and upstream-downstream impacts -- in Nepal, Peru, and elsewhere -- may be relevant to the situation in the Fouta Djallon*.

All research should be coordinated and perhaps carried out in collaboration with local research institutions, such as the OMVG lab in Labé and the Baring research station at Pita. The University of Gembloux (Belgium)'s research on several types of soil amendments is an example of such collaboration with local researchers.

Although the research component of the Project should focus on soil fertility in farmers' fields, the program should be flexible enough to conduct other special studies that might be requested from the field (BRPs). Such studies might be considered under the NRMS Project, which will finance special studies in Africa that are relevant to the natural resource sector. This could include subjects such as aquaculture, introduction of improved forage species, improved gardening techniques, or land tenure issues.

5.1.5 Contact and collaboration with other pilot projects

The basic approach of the IMFDW Project regarding work in the 12 pilot watershed basins (BRPs) is that each BRP will be autonomous from the local authorities and from each other. This approach was adopted to avoid problems between the projects and the local authorities and between donors. It should not, however, prohibit the development of a mechanism for exchanging ideas and information on a regular basis between teams working at 12 separate BRPs.

The responsibility of developing such a forum should be clearly defined. This could perhaps be done by the Coordinating Cell of the Direction of Waters and Forests. The Coordinating Cell could continue to function as a coordinating body as well as organize seminars and workshops, or publish a technical newsletter based on regular visits to the different BRPs.

5.1.6 Institutional support

In view of the present limited capacity of the USAID Office in Conakry to absorb additional administrative and logistical responsibilities, the Project should assure that a good support system is designed into the Project. Both of the target watersheds are quite isolated** : logistics will be a definite problem. If this component of the Project does not function properly, the Project will fail.

* For further information, Messerschmidt suggested contacting Jack Ives, President of the International Mountain Society; Tegelad, an Ethiopian who is President of the African Mountain Society; and Hugh Plunkett, who works for USAID/S & T/RD/RRD on the fragile lands (DESFIL) project in Latin America; and the United Nations University, which is currently researching upstream-downstream interactions.

** During the dry season, the watersheds are each more than three hours' drive from Labé, which is an eight-ten hour drive from Conakry. The airport at Labé is serviced by daily flights from Conakry on Air Guinée, but often such flights do not operate during the long rainy season.

5.2 MULTI-TIERED INTEGRATED APPROACH TO LAND AND RESOURCE MANAGEMENT/TECHNICAL CONSIDERATIONS

Given the unique bio-physical and socio-economic characteristics associated with each type of land use units, a multi-tiered approach should be adopted, to develop appropriate technical packages that may or may not overlap from one land use unit to the next. The following section briefly describes approaches and several promising interventions, based upon filed results to date and other interventions that have been proposed but not yet tested.

Each representative watersheds is unique and will require technical packages tailored to address local site conditions. For example, at Koundou considerable potential exists to develop dry-season gardening in the lowlands; Diaforé, on the other hand, is dominated by exposed lateritic formations (bowés), which are used mainly for grazing. Technical teams assigned to representative watersheds should concentrate on land use units that have the most potential to positively influence the lives of the local population.

5.2.1 Tapades

Live Fencing

The Peace Corps Volunteers assigned to the FAO Project and the Community Forestry Project in Pita stated that live fencing has much potential especially in zones where firewood is scarce. We saw several tapades where farmers have already started live fences, using sisal and other trees planted from nursery stock. According to LaFramboise, the main reason that live fences are not used more extensively is a lack of available nursery stock (Hagen, 1985). This could be resolved by establishing local private nurseries and testing species that are adapted to the area.

Soil fertility

Traditional farming methods for maintaining soil productivity in the tapades are quite effective. Farmers regularly incorporate organic matter in the form of household wastes, animal manure and mulch into the soil. Several women interviewed, however, complained of decreasing yields.

These systems might be upgraded by introducing agroforestry techniques to increase the amount of litter, animal forage, and essential plant nutrients recycled by deep-rooted trees.

Results from the Community Forestry Pilot Project have shown that tree planting in the Fouta Djallon can be somewhat problematic, due to low soil ph and aluminum toxicity. Tree species must be carefully selected and different potting mixtures tested to address these limitations: for example, trials could be conducted on the use of ash, compost or small amounts of fertilizer in the potting mixture or mixed with the back fill at the time of planting.

Forage plants such as Stylocanthes guiensis and hamata sp. are presently being tested by the FAO Project at Pita with good results.

5.2.2 Field and Fallows

Vegetative bands/alley-cropping

Some work has already begun at Pita to establish permanent vegetative bands in farmers' fields. As already mentioned, these efforts have been problematic because farmers were not properly consulted before the bands were planted in their fields. The idea remains valid, however, but should not be extended on a large-scale until results become obvious from demonstration plots.

The two major limiting factors that must be resolved before this technique will succeed are: (1) finding the right species that will grow in the acidic soils; and (2) protecting the seedlings from browsing animals.

The FAO Project is having some success with Acacia auriculiformis and Acacia mangium in fonio fields. We saw many trees, however, had been seriously browsed back.

Rock berms along the contour

This technique, which has shown good results in other parts of Africa, could be introduced using relatively simple tools to determine the contour lines, such as A-frames or water levels. If properly constructed, the berms serve to check run-off, thereby reducing soil erosion and "harvesting" water that can be used to irrigate crops, trees, or perennial plants. Under the right conditions, rock berms could be used in association with vegetative bands or alley-cropping.

Check dams

Although we observed little gully erosion during our trip to the Fouta Djallon, it apparently is a problem on some of the steep upper slopes. Check dams constructed from rock are quite effective but also costly in terms of labor.

Mathieu (personal communication, 25 July 1988) has observed that some of the worst erosion in the Fouta Djallon has been caused by "anti-erosion" programs. One should not lose sight of the fact that, in general, erosion in the Fouta Djallon is not as widespread or as severe as many people claim. Soil erosion control techniques, such as gabionage or check dams, should not be used, just for the sake of trying something different, unless it is obvious that these erosion control methods will show immediate or long-term benefits.

5.2.3 Gardens

Irrigation

Permanent water reservoirs could be established by constructing small dams that would collect water during the rainy season and be used to irrigate small gardens during the dry season, as well as providing water for household purposes, such as watering animals or washing clothes. Water for dry season gardening is becoming more and more difficult to obtain, as streams that once provided water all year long now dry up when water is needed the most. The FAO Project in Pita is planning to construct several dams to establish permanent water reservoirs. Mathieu also believes that such works could be worthwhile if done correctly.

Improved seed

Several women explained that good quality seed is difficult to obtain. Also, they would try growing different vegetables if the seed were available.

Live fencing/agroforestry

Both of these techniques are equally suited to dry season gardening as described above for the tapades.

5.2.4 Bowes

At present, no technical package has been prescribed for these areas. They are relatively stable areas that provide pasture during the rainy season. At Diaforé, where bowé represents the dominant land use unit, the villagers did not think that anything could be done to improve them. (The farmers use the bowés for pasture. The only other possible use, according to Diaforé residents, might be to mine the bauxite that may exist underneath the bowés).

5.2.5 Forests

According to the final report document for the FAO Project RAF/81/060 (Gupta, 1987), a total of 62 classified (national) forests* cover an area of 224,324 hectares in the Fouta Djallon. Aside from the classified forests, numerous other forests exist that have never been legally classified. These forests are unofficially under the jurisdiction of the local villagers and governed by traditional law.

The status of all forests in the Fouta Djallon, in terms of how they are being exploited and to what degree they have changed in recent years, is not entirely clear. As already mentioned, a comparison of 1952 aerial photos and 1979 aerial photos shows little change in the total forested area between those years. Villagers interviewed said basically the same thing - that there had been little change with respect to the total area of the forests, but the forests had changed in terms of quality and quantity of vegetation.

Forest Management

No management plans exist for any forest in the Fouta Djallon. Some forests, however, are governed by traditional laws, which are not officially recognized by the Forest Service. The FAO Project in Pita plans to develop management plans for several classified forests in the Project zone. Little has yet been done in the classified forests other than some enrichment planting of local and exotic species to supposedly upgrade the forest. Several forestry agents expressed interest in developing management plans for forests under their jurisdiction, but these technicians lack the experience and the means necessary to do so.

Before management plans can be written, it will first be necessary to carry out a series of preliminary studies and forest inventories, which will furnish the necessary information to develop the plans. The types of studies necessary for a specific forest can only be determined after discussions have been initiated with the local population to examine the history of the forest, as well as how the local population is presently using the forest.

Once the studies and inventories are completed, a management plan should be developed with the local population and a legal document created containing laws and policies governing the use of the forest. Existing traditional laws should be incorporated into the management plan as much as possible.

*Gupta's figures are not entirely accurate, e.g., Gupta lists three classified forests for Tougué prefecture, whereas the actual number is four.

6 - CONCLUSIONS AND RECOMMENDATIONS

1. Based on the literature, studies to date, interviews, and observations, the team believes that, at present, erosion and deforestation in the Fouta Djallon massif pose low threats of sedimentation problems to the major downstream river basins. The recently reduced water flow in the Gambia, Niger, and Senegal Rivers is due primarily to decreased rainfall throughout West Africa and to major erosion problems in the Sahel.
2. Given the increasing pressure being put on limited natural resources in the Fouta Djallon, due to growing population and relatively rapid decline of rainfall, however, it is conceivable that erosion problems and their subsequent downstream impacts could significantly increase over the next twenty to thirty years. Thus, a situation might arise that would be similar to the environmental degradation that is occurring in the Sahel, which began approximately 35 years ago.
3. Serious local erosion problems currently exist in the Fouta Djallon, primarily in the upper watershed valleys. This type of erosion is caused by frequent slash-and-burn agricultural practices on steep slopes. As human population levels have increased, the fallow periods have been decreased, and thus burning frequencies have risen.
4. Declining soil fertility is the major problem confronting the Fouta Djallon farmer today. With shortened fallow periods, time is inadequate to rebuild the soil. The result is an overall decrease in the soil content of organic matter and soil nutrients, and an increase in soil acidity and aluminum toxicity.
5. The forests of the Fouta Djallon are rich in plant and animal species. A wide variety of wildlife exists, including lions, leopards, elephants, and chimpanzees. At present, none of these forests are being managed within the framework of a prescribed management plan. It is certain that the biological diversity of these forests will be compromised unless steps are taken to better manage them. Efforts should be undertaken to design rational, long-term management plans, based on the particular ecological and socio-economic conditions of each forested area.
6. The "erosion of the Fouta Djallon" is thus primarily an erosion of the local people's abilities to secure sustainable livelihoods from their land. With declining rainfall, declining soil fertility, lowered crop and animal production, and declining ecological diversity, the quality of life for 1.6 million people who reside in the Fouta Djallon has significantly declined. This has contributed, among other things, to increased out-migration of young men, and increasing problems in health and malnutrition.
7. In light of these issues, the team concludes that the proposed project for the Restoration and Integrated Management of the Fouta Djallon Watershed is not only feasible, but highly desirable given the Agency's priorities. This project will meet objectives of the Africa Bureau's strategy to address natural resource management problems in Africa. Although the regional impact of the Project remains unclear today, the team thinks that if carried out in its entirety, the Project could have net positive regional impacts in the future.

In the short-term, no one will deny that serious environmental and natural resource problems in the Fouta Djallon need to, and can, be resolved today. The integrated natural resource management approach being advocated for the Fouta Djallon highlands is a logical sound approach. If this approach is carried out, first on pilot watershed basins, then replicated to the entire Massif, positive net impacts will result. These efforts will enhance the lives of women, men, and children who currently reside in the Fouta Djallon.

If, as proposed, similar integrated resource and watershed management efforts are replicated in neighboring countries, the total long-term impact of this project could be considerable.

Therefore, the team recommends that:

1. AID design a five-year (minimum) project for the integrated resource management of the Diaforé and Koundou watersheds in the Fouta Djallon massif, following the general approaches and guidelines suggested in this document.
2. In addition, AID undertake a pilot forest management project for the Classified Forest of Bakoun, which is located near the Diaforé watershed. The project could serve as a model for similar forest management efforts elsewhere in the Fouta Djallon.
3. AID support basic research concerning soil fertility issues in the Fouta Djallon and applied research concerning appropriate development interventions, and that AID support efforts to enhance collaboration among research and development activities of different organizations working in the Fouta Djallon.

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APPENDIX A
GENERAL DESCRIPTION OF THE FOUTA DJALLON (MIDDLE GUINEA)

PHYSICAL CHARACTERISTICS

The region known as Middle Guinea is principally defined by the Fouta Djallon mountain range, which stretches across most of the province. The range traverses Middle Guinea in a north-south direction, rising steeply from the west and gently from the east. The peaks are not exceptionally high; the highest, just north of Mali, exceeds 1,500 meters (m.), while a few others attain 1,200 m. Virtually, the entire region is mountainous, and a quarter of the area (13,000 sq km) lies above 900 m.

The Fouta Djallon range is composed almost entirely of sandstones, which provide rich but easily eroded soils. The hills contain prodigious deposits of bauxite -- perhaps the world's richest. Other minerals may also be contained, but to date exploitation has been limited (Varady 1983).

Laterite (ironstone) is common in the Fouta Djallon and covers considerable areas with a hard crust that supports only a minimal vegetation. This soil, however, produces pasturage during the dry season and is known as "bowé". Soil conservation is a particularly serious problem on the plateaus as the lateritic crust makes for rapid runoff of rain water, which cuts deep gullies and washes the soil down to the lower levels. Moreover, in places where the crust is loosened for cultivation, the soil tends to lose quickly any organic materials by leaching (Nelson et al. 1975).

The vegetation of the Fouta Djallon has been typed as a combination of woodland, open savannah woodland, bush and woodland and light forests, lightly wooded savannah bush (Nelson et al. 1975).

SOCIAL AND CULTURAL CHARACTERISTICS

History

The Fouta Djallon massif has been inhabited since Neolithic times. The indigenous inhabitants were originally Sousou and Dialonke cultivators and hunters. Fulani, or Peul, are believed to have migrated into the region beginning as early as the thirteenth century, having come from regions to the north and west in what is modern-day Senegal. The numbers of Fulani increased dramatically during the eighteenth century, when an Islamic holy war began in the Fouta. The Fulani eventually gained political control of the Fouta Djallon, subjected other local peoples, and established a theocracy, ruled by a spiritual leader, the Almamy. The Fouta Djallon became a center of Koranic learning. The Fulani assimilated and converted to Islam many other ethnic peoples in the Fouta Djallon (Keita 1987; Nelson et al. 1975; Varady 1983).

Traditional Fulani society in the Fouta Djallon was highly stratified. Fulani were organized into five social strata: the nobles, free Fulani, bush Fulani, the artisan castes, and slaves, some of whom lived with their masters, others of whom lived apart and did the most onerous agricultural labor. Neither the artisan nor the slaves were allowed to own land. Different types of villages existed: the misside, religious centers founded by nobles, the fulasso, settlements of noble or free Fulani, and the runde, where slaves lived. Although these social distinctions have broken down considerably over the past few decades, the runde are still generally inhabited only by descendants of former slaves (Roberts et al. 1988).

APPENDIX A: GENERAL DESCRIPTION OF THE FOUTA DJALLON (continued)

The colonial period in the Fouta Djallon began in 1859, when the French gained some rights around Boke. In 1881 a protectorate was established, through a treaty with the almamy in the Fouta Djallon. In 1897 the French gained complete sovereignty over the Fouta Djallon (Nelson et al. 1975).

During the colonial period, local head taxes were imposed and other measures were undertaken to encourage production of cash crops. From the beginning of the 20th century, efforts were made to abolish slavery and serfdom. In the Fouta Djallon, however, these traditional social relations were slow to die, especially as the slaves and artisan castes had no access to land (Nelson et al. 1975).

Guinea voted for complete independence from France in 1958. For the first 26 years, Ahmed Sekou Touré was President. Under his rule, the government was autocratic, socialist, and centralized. Many revolutionary changes were made in Guinean society. Of relevance here are the government policies concerning agricultural production, and social organization.

The First Republic instituted a series of policies to encourage collective farming and discourage individual production. Individuals were required to pay the government, as a form of taxes, 60 kilograms of rice per year per adult (household member), ten percent of their cattle, and four percent of their sheep and goats. Markets were abolished, and farmers were required to sell any surplus crops or livestock to the government at prices fixed below fair market value. Agricultural inputs and extension services were provided to collective farms, and not to individuals.

While the former objective -- of promoting collective farming -- was obtained in only scattered instances, the latter objective -- of discouraging individual farming -- was overwhelmingly achieved. Agricultural production during the first 26 years of the country's independence plummeted from its pre-independence levels. Most families grew only enough to cover their own subsistence needs and taxes. Thus, as many observers have argued, agricultural production in the Fouta Djallon during this period stagnated. Also, high degrees of male out-migration continued to occur, especially as the government discriminated against the Fulani population.

In terms of local social organization, the First Republic took steps to organize and mobilize women and youth. Throughout the country, training centers for women were established, and education of women was promoted. Similar efforts were undertaken to mobilize youth. Membership in the one political party, the Democratic Party of Guinea (PDG), was promoted. Social distinctions, such as between nobles, free Fulani, and slaves were abolished. These changes, building on those launched during the colonial era, had a profound impact on traditional social ties, and resulted in the weakening of the traditional social hierarchy (Keita 1987; Nelson et al. 1975).

On 26 March 1984, Sekou Touré died. Less than one week after his death, on 3 April 1984, the military took control of the government and Lansana Conte became President. The new government, referred to as the Second Republic, immediately began abolishing many of the institutions of the First Republic. Among the changes made were the following: (1) abolishment of the taxes in kind and mandatory sales of surplus produce and livestock to the government, (2) reduction of government control over economic life, such as the promotion of private enterprise and opening of markets, (3) abolishment of the political party, and (4) establishment of freedom of speech and of travel.

APPENDIX A: GENERAL DESCRIPTION OF THE FOUTA DJALLON (continued)

These changes have already improved individual incentives. Agricultural production levels for some crops have already dramatically increased. Many men who left the Fouta Djallon are now returning to the area to resume agriculture and raising cattle (Le Courrier 1986; Keita 1987; USAID 1987a). (According to Keita (1987), this massive return of expatriates has been accompanied by rising problems of cattle theft.) These changes suggest that agricultural production systems, which have long stagnated in the Fouta Djallon area, may soon undergo dramatic changes.

Human population

The population of Guinea was censused in 1983 to be 5.8 million. Population growth rate estimates range from 2 to 2.5 percent. (Thus, the population for 1988 would be between 6.4 and 6.6 million.) The population is dispersed among the four regions of Guinea as follows: Middle Guinea, 30 percent; Lower, or Maritime Guinea, 30 percent; Upper Guinea, 20 percent; and the Forest Region, 20 percent. Between 0.5 and 1.5 million Guineans are believed to live outside the country (USAID 1987a).

The 1984-1985 census information gave a total population for the 15 Fouta Djallon prefectures of 1,669,883 people, of whom 30 percent live in towns, and the remaining 70 percent live in the rural areas. Thus, the average population density is 27.5 inhabitants/km², and the average rural population density is 19 inhabitants per km². The population of the Fouta Djallon has more than doubled in the past 45 years: in 1943, J. Richard Molard estimated the population as being less than 750,000 (Boulet and Talineau 1986b).

Today, the majority of the Guinean Fulani population (more than 80 percent) live in the Fouta Djallon, and two-thirds of the Fouta Djallon's residents are Fulani. The other one-third of the population are descended from Dialonke, Malinke, and other groups, such as the Diakhanke, and Tenda (Nelson et al. 1975).

For 1984-85, the prefecture of Tougué had a population of 164,330, of whom 40 percent live in towns. For Tougué, the average population density was 49 inhabitants/km², and the average rural population density was 29 inhabitants/km². The Lelouma prefecture had a population of 104,920 in 1984-85, of whom 21 percent live in towns. For Lelouma, the average population density was 32 inhabitants/km² (Boulet and Talineau 1986b). Thus, both Tougué and Lelouma have population densities slightly above the overall average figures for the entire Fouta Djallon region.

Land tenure

Traditionally, land has been owned by individual men, and upon their deaths, sub-divided among their sons. In 1958, the government claimed legal title to all land, but people generally continued to use land according to old claims. Under the First Republic, however, it became possible for descendants of former slaves to acquire rights to land they had traditionally farmed, or to purchase land.

Women's access to land is through their husband or other male relatives. According to Roberts and others (1988), the households that suffer most from the existing land tenure patterns are those descended from slaves and female-headed households (where the husbands are absent). Due to long traditions of individual land rights, most people do not, in fact, own the land they actually farm (Roberts et al. 1988).

APPENDIX A: GENERAL DESCRIPTION OF THE FOUTA DJALLON (continued)

Land use patterns

In the Fouta Djallon, different categories of land are distinguished, which are put to different uses. Land immediately adjacent to the villages is used for tapades, or women's household gardens. The tapades are relatively productive areas, enriched by addition of mulch and manure. A wide variety of crops are grown in tapades, including maize, peanuts, taro, manioc, peppers, and fruit trees. Among the Fulani, it is common for the tapade fence to encompass both the tapade and the hut, whereas in other villages, the huts are grouped together, and the tapades are separately fenced.

Exterior land consists of several categories. Keita (1987), for example, distinguishes between ayinde (flat or dry land), dunkiré (stream borderlands), dantaré (workable, but exhausted soils), fello (mountain and hillside slopes), holande (compacted clay soils), and bowé (crusted laterite).

Generally, the stream borders are used for gardens, in the rainy season, but especially in the dry season. Both men and women cultivate in these areas. In some areas, women raise vegetables in their gardens, while men focus on cultivating bananas.

The ayinde, dantaré, and fello lands are used for fields. Typically land is cleared and cultivated for two to three years, then left in fallow for several years. Many observers have noted that typical fallow periods of ten to twelve years have been shortened in recent years to five to seven years. In some fields rice may be cultivated the first year, followed by fonio in the subsequent year (or two). Sorghum and peanuts may also be cultivated in these fields.

The holande and bowé are used for grazing livestock. Livestock generally are allowed to graze freely. Livestock are, however, prevented from grazing in fenced tapades or fields.

Demographic data in the Fouta Djallon suggests that over the past three decades while population size has increased, agricultural lands exploited per capita may have actually declined. In 1955, in four villages around Dantari, households had an average of 5.6 members, cultivated tapades of 0.50 hectares and exterior fields of 1.0 hectare. In 1986, data from a survey of 37 households throughout the Fouta Djallon indicated that average household size had grown to 8.7 members, tapades sizes had stayed constant at 0.50 ha., but field sizes had decreased to 0.50 ha. per household. Thus, as the population has increased and number of households have risen, more fields have been converted into tapades. The average number of cows per household had remained constant at three (Boulet and Talineau 1986b; Mission démographique de Guinée 1955).

APPENDIX A: GENERAL DESCRIPTION OF THE FOUTA DJALLON (continued)

Livestock

The Fulani have been cattle herders for centuries. It has been argued, in fact, that the Fulani may have been attracted to the Fouta Djallon area because of its vast areas of plains and bowés, which provide good pasturage.

Relevant sous-prefecture 1985 census figures suggest that the prefectures that contain the two proposed watersheds have slightly lower livestock populations than is average for the Fouta Djallon as a whole.

	COWS	HEAD/KM2	SHEEP	HEAD/KM2	GOATS	HEAD/KM2
Tougué Prefecture	29,987	8.4	6,314	1.8	10,549	3.0
Lelouma Prefecture	32,517	9.9	4,818	1.5	11,636	3.5
Fouta Djallon*	661,315	10.9	211,768	3.5	249,984	4.1

* Total for all 15 Prefectures that are wholly or partially within the Fouta Djallon region. Source: Boulet and Talineau 1986b.

Division of labor

Among the Fulani of the Fouta Djallon, much of the agricultural labor is performed by women. Men are generally responsible for clearing and burning fallow fields and cutting wood to make fences for fields and tapades. Men plow and plant fonio and rice fields; much of the other work on the fields may be done by a man's wife, or wives, and children.

Women are responsible for their own tapades. In many cases men may plant and control the fruit trees in their wives's tapades; in other cases, women will plant trees there themselves. Both women and men garden in the bottom-land areas near the streams; whereas women are more apt to grow vegetables in these gardens, men may use the areas to grow bananas.

Livestock are generally allowed to graze freely, but sometimes may be watched over by herders, typically boys. Women take care of the livestock and poultry, carry water, fetch firewood, cook, and take care of the children. Women also sell whatever surplus produce is gained from the family's agricultural efforts. (If a woman sell fruit from her husband's trees, he gets the money.)

Some men engage in artisan crafts, such as blacksmithing, woodworking, and masonry. Others may work as koranic teachers or tailors. Some women weave and dye fabric, and make baskets.

APPENDIX A: GENERAL DESCRIPTION OF THE FOUTA DJALLON (continued)

Exodus of young men

One notable social characteristic of the Fouta Djallon has been the seasonal and permanent migration of young men. Men seek paid employment in the Guinean capital, Conakry, and other Guinean towns, as well as in neighboring countries, such as Senegal, Gambia, and Sierra Leone.

This migration process began during the colonial period and continues today. During the First Republic, the out-migration of young men accelerated, as due to the government's discriminatory policies toward the Fulani population and the lack of incentives for agricultural production. Indications suggest that since the Second Republic came to power four years ago, some of these migrants are now returning to the Fouta Djallon area.

According to Jonathan Landeck (personnel communication, 1988), one reason that young men in some villages leave the Fouta Djallon is that they think that cutting trees to clear fields and to make fences, and preparing the steep rocky soils for cultivation is onerous and back-breaking work from which they receive few returns. In other villages, however, where both the soils and the agricultural yields are better, fewer young men leave.

Some of the men leave every year right after planting the fields, whereas others go away permanently. They vary in the degree to which they send remittances back to their families. In the area of Dalen, a recent survey showed that only 30 percent of the families produced enough food to cover their annual consumption needs (Roberts et al. 1988).

Household types

Fulani society remains patriarchal, patrilocal, and polygynous. Fulani households consist of a man, wife or wives, and their children, plus other members of the extended family. Each wife will receive, upon marriage, her own hut and adjacent sunturure, or tapade lands.

With the high degree of male out-migration, many households become de facto female-headed households, either for a seasonal or temporary period, or permanently. Female-headed households may also arise when a woman is widowed. She may become an "inherited wife" of one of her husband's kin, but effectively operate as an independent household head. These female-headed households face a difficult time in obtaining farm land in addition to their tapades, as they have no husbands to obtain land for them. They are typically poorer than other households. It has been estimated that one-third of the households in the Fouta Djallon may be headed by women.

Local social institutions

Health conditions in the Fouta Djallon, as elsewhere in Guinea, are very poor. The average life expectancy in Guinea is only 37 years (USAID 1987a). In the Fouta Djallon, health care seems to have deteriorated over the past few decades, as some clinics have ceased to function, and the transportation infrastructure has deteriorated. Few children receive vaccinations. During the (rainy) agricultural season, many people are sick with malaria and young children suffer greatly from diarrheal diseases. In the past few years, the government has permitted private entrepreneurs to open up pharmacies: to date, however, this seems to have made little impact on the availability of medicines in the interior of the country.

APPENDIX A: GENERAL DESCRIPTION OF THE FOUTA DJALLON (continued)

Educational systems in Guinea are also very poor, with the adult literacy estimated at 10 percent. Literacy rates among rural women are even lower. During the First Republic, education was provided in eight local languages. The Second Republic has decided to return to the policy of all education being conducted in French (USAID 1987a). In the Fouta Djallon, French education is highly valued. Facilities, however, remain very limited.

Guinea is administratively organized into four regions and 36 prefectures. The prefectures are sub-divided into sous-prefectures, which are further divided into communities or villages. Prefectures may be staffed with technicians, i.e., those with training in agronomy, forestry, or rural works.

APPENDIX B
SEDIMENTATION DATA

ESTIMATE	SEDIMENT YIELD		EROSION
	MT/KM2/YR	T/AC/YR	(T/AC/YR)
<u>Gambia River Basin</u>			
Gouloumbo 1983	2.1	0.01	0.04
Gouloumbo 1984-85	15.7	0.06	0.29
Jasinsky (Harzag Eng. Co.)	18-27	0.07-0.10	0.33-0.50
Olivry	16-20	0.06-0.26	0.29-1.29
<u>Upper Valley Basins</u>			
ORSTOM Low	50	0.18	0.92
ORSTOM High	100	0.37	1.84
GERSAR Low	200	0.74	3.68
GERSAR High	2000	7.36	36.79
<u>Fouta Djallon</u>			
Fofana	1740	6.40	32.00

SOURCE: Goodson (1987).

APPENDIX C
SCOPE OF WORK FOR FOLLOW-UP TEAM

The Project Identification Document (PID) could perhaps be written in Washington, D.C., based on information generated during the pre-feasibility study. Unlike most projects, many of the preliminary studies and necessary groundwork for the project identification phase have already been carried out by the FDHRIDS within the framework of the RAF/81/060 Project. If there is to be a follow-up team to this consultancy, it should focus on the technical and administrative details related to project design and implementation, based on the recommended approach and guidelines as put forth in this document.

TEAM COMPOSITION AND QUALIFICATIONS

All team members should have a minimum of FSI S-3, R-3 French language capability and prior African experience. Prior USAID project design and implementation experience is desirable. Given the importance of contacting women farmers in the Fouta Djallon, it would be beneficial for at least one team member to be a woman.

1. Soil scientist/researcher:
 - o Ph.D. in soil science and good knowledge of agronomy
 - o Familiarity with ferralitic tropical soils, especially with regard to acidity and aluminum/ferralitic toxicity
2. Agroforester:
 - o Master's degree (or bachelor's degree plus comparable experience) in forestry, agroforestry, agriculture, or agronomy
 - o Good knowledge of agroforestry techniques that have worked in other parts of Africa, such as alley cropping, windbreaks, taungya and live fencing
3. Forester:
 - o Master's degree (or bachelor's degree plus comparable experience) in forestry
 - o Experience in forest management in Africa
 - o Experience or knowledge of wildlife management useful
4. Social scientist:
 - o Ph.D. in sociology, anthropology, or natural resource sociology
 - o Experience in natural resource management and/or agricultural issues
 - o Experience in local, small-scale farmer participation programs and rural extension methods in Africa.

SCOPE OF WORK

Soil scientist and agroforester

- o Visit the Rodale Institute in Pennsylvania to discuss and review state-of-the-art organic farming methods and examine possibility of collaboration, with regard to the research and model site components of Project.
- o Contact the "Direction de la Recherche Agronomique" in Conakry and organize a trip to the Baring Research Station at Pita to discuss research priorities.
- o Visit the OMVG lab in Labé and meet with Project personnel and the University of Gembloux (Belgium) students assigned to the lab, to discuss research priorities and possible collaboration.

APPENDIX C: SCOPE OF WORK FOR FOLLOW-UP TEAM (continued)

- o Visit watersheds no. 8 (Diaforé) and 9 (Koundou) to spend several days at each and examine local problems with regard to agricultural productivity; develop a preliminary resource management strategy for each watershed.
- o Analyze research capability of the "Direction de la Recherche Agronomique" in terms of personnel and infrastructure and develop a strategy to address those needs within the framework of the Project.
- o Develop a preliminary 5-year work plan for a research program to address the problem of declining soil fertility in the Fouta Djallon.

Forester

- o Contact the Direction of the Forest and Water Service in Conakry and discuss forest management in Guinea in terms of accomplishments to date and the Service's strategy or approach to forest management.
- o Review the revised forestry code and examine how the code will affect any intervention in forest management.
- o Visit both watersheds with the rest of the team and participate in developing an overall resource management strategy for each watershed with respect to forested land and land not being cultivated.
- o Visit the classified forest of Bakoun with existing maps and latest aerial photography to carry out a preliminary reconnaissance, which will lead to the development of a strategy to manage the forest. This visit will include discussions with villagers living around the forest as well as within the legal limits of the forest. The preliminary strategy should attempt to define immediate priorities, such as relocating forest boundaries and preliminary studies, and develop a long-term plan with respect to initial investment costs and recurrent costs. Could the recurrent costs be covered by benefits derived by sustained yield management of the forest resources?

Social scientist

- o Review the findings of Jonathan Landeck's research in the Fouta Djallon concerning villagers' perceptions of resource management and conservation.
- o Visit both watersheds, spending several days at each, and contact local organization groups, local officials, and representative farmers. Ensure that the viewpoints of local women are adequately represented. Determine potential for collaboration between Project and the local organizations.
- o Develop a 5-year strategy/work plan to best achieve the goals of the project based on the sequential (studies, model sites, extension) approach as described in this document.
- o Identify mechanisms to ensure that all participatory development efforts will involve both women and men farmers.

APPENDIX D
USAID/GUINEA FUTURE NEEDS IN TERMS OF AFR PLAN
FOR SUPPORTING NATURAL RESOURCE MANAGEMENT AND TRAINING

Natural resource management has not been a priority to date for the Office of the AID Representative in Guinea. In light of the proposed project for the Fouta Djallon, and Frank Correl's comments suggesting that the AID/Guinea begin to address environmental problems that are associated with increasing and sustaining agricultural productivity, however, it is possible that natural resource management could play a more important role in the future. At present, the AID Office does not have a well defined strategy with regard to natural resource management and training.

The following sections will briefly examine several areas in which the NRMS project could aid USAID/Guinea to better address natural resource management related problems in Guinea. The list was developed by the ADO officer and the team, and does not necessarily reflect the views of the Office as a whole.

TECHNICAL ASSISTANCE

1. Provide a team to develop the "Phase II" studies as a follow-up to the Environmental Profile study, which was carried out by the office of Arid Lands Studies/University of Arizona in 1983. This would involve a more detailed examination of the issues, problems and priorities to provide substance for the Country Development Strategy Statement.
2. Provide follow-up team to the pre-feasibility study based on scope of work as defined in this document.

SPECIAL STUDIES

Given the interest that the GOG has shown in regenerative agriculture using the organic approach as developed by the Rodale Institute, it would be useful to finance a team of research scientists from the Rodale Institute to visit Guinea and begin discussions to: (1) examine future collaboration between the Institute and the Direction of Agriculture Research; (2) visit the Research Station at Baring; and (3) examine research priorities.

NGO/PVO SUPPORT

Given the small number of indigenous and American NGOs functioning in Guinea as compared to other African countries, any efforts to develop a strategy to encourage future NGO/PVO interventions would be useful. If USAID decides to finance a Project in the Fouta Djallon using the approach outlined in this document (NGO/PVO participation) then the NGO/PVO support question becomes more relevant.

1. SHORT TERM TRAINING

Manpower Development Project (MDP)

USAID has already been in contact with the Minister of Agriculture and Animal Resources to solicit short-term training needs with regard to natural resource management. The Ministry has sent a list of six candidates all at the B.S. level to participate in short-term training programs for the following subjects: two for Community Forest Management; two for Rural Socio-Economics and Forestry; and, two for Conservation and Restoration of Soils.

APPENDIX D: NATURAL RESOURCE MANAGEMENT AND TRAINING NEEDS (continued)

Natural Resource Management Support (NRMS)

The team asked the Direction of Waters and Forests to prioritize short term training needs that might be considered for financing under the NRMS Project. The following list was submitted:

Forestry:

- 1) Reforestation;
- 2) Natural forest management;
- 3) Management of community forests;
- 4) Soil conservation and restoration;
- 5) Nursery establishment and maintenance;
- 6) Agroforestry.

Range and livestock:

- 7) Range management;
- 8) Improved forage species;

Soils

- 9) Cartography;
- 10) Soil analysis; and,
- 11) Combat soil acidity.

This list will be formally sent to the Office of the AID Representative in a letter from the Minister. Once the letter has been received, the USAID Training Officer, Moustapha Diallo, will send a cable to Washington to inquire about short-term training courses in Africa or the United States that are relevant to the subjects. Candidates who do not speak English could first participate in intensive English programs either in the United States or Burkina Faso, or could participate in French-language courses.

Also, the team suggests that if, in fact, USAID decides to participate in the IMFDW Project, it would be advisable to send the two Directors of BRPs No. 8 and No. 9 to the US for relevant short-term training. Also, the team suggested that as a follow-up to Kenyekou's (Director of "Cellule de Coordination") short-term training with the U. S. Department of Agriculture, his assistant, Souleymane Diaby, should also participate in similar training.

2. LONG TERM TRAINING

The Mission is presently developing a Country Training Strategy based upon the Private and Public Training Needs Assessments, which are almost completed. The Country Training Strategy is being done within the framework of the Human Resource Development Assistance Project (HRDA), of which AID/Guinea has \$1,400,000.00 for FY 1988. Moustapha Diallo noted that the long term training needs of the Direction of Waters and Forests will be addressed in this Project. He thinks that the Direction of Waters and Forests has too many generalists: long-term training is needed to develop an upper level cadre (MS), who are specialized in relevant, practical fields, such as agroforestry and watershed management.

APPENDIX E: DAY-TO-DAY ACTIVITIES OF TEAM AND PEOPLE CONTACTED (continued)

- AUGUST 1
 - o Conakry
 - o Byron Bahl, AID Representative, USAID/Guinea
 - o Teddy Wood-Stervinou, Program Officer, USAID/Guinea
 - o Joe Hartman, ADO Officer, USAID/Guinea
 - o Draft document
- AUGUST 2
 - o Conakry
 - o Draft document
- AUGUST 3
 - o Mamadou Oury Bah, Director General, Water and Forests
 - o Sagna Satenin, Director of Wildlife Service
 - o Thierno Mamadou Cello Diallo, Secretary General, Ministry of Agriculture and Animal Resources
- AUGUST 4
 - o Conakry
 - o Draft document
 - o Williams departs for US
- AUGUST 5
 - o Saikou Sounounou Bah, Head of Program, Direction of Agricultural Research
 - o Joe Hartman, ADO Officer, USAID/Guinea
- AUGUST 6
 - o Conakry
 - o Draft document
- AUGUST 7
 - o Sunday
- AUGUST 8
 - o Moustapha Diallo, Training Officer/USAID
 - o Souleymane Diaby, Acting Coordinator of RAF Project
 - o Joe Hartman, ADO Officer, USAID/Guinea
 - o Draft document
- AUGUST 9
 - o Conakry
 - o Draft document
- AUGUST 10
 - o Conakry
 - o Draft document
- AUGUST 11
 - o Conakry
 - o Draft document
 - o Heermans leaves for US
- AUGUST 12
 - o Heermans arrives US
- SEPTEMBER 1
 - o Donald Messerschmidt, S&T/FENR/FSP
- SEPTEMBER 7
 - o John Gaudet, AFR/TR/ANR
 - o Mike McGahuey, AFR/TR/ANR
 - o Dwight Walker, AFR/TR/ANR
 - o Lee Hannah, AFR/TR/ANR
 - o Kirk Talbott, IIED
 - o Robert Winterbottom, IIED
- SEPTEMBER 8
 - o Brown Bag Seminar with 30-35 participants from AID, IIED, and other organizations held at IIED, Washington, DC

APPENDIX E
DAY-TO-DAY ACTIVITIES OF TEAM AND PEOPLE CONTACTED

- JULY 13
- o Bob Friedman, Economist
 - o Kirk Talbott, IIED
 - o Bob Winterbottom, IIED
 - o Heermans arrives Washington
 - o Williams arrives Conakry
- JULY 14
- o John Gaudet, AFR/TR/ARD
 - o Abdul Wahab, AFR/TR/ARD
 - o Kjell Christophersen, Economist
 - o John Michael Kramer, CARE
 - o Mike McGahuey, AFR/TR/ARD
 - o Joe Hartman, ADO/USAID/Guinea
 - o Review documents
- JULY 15
- o Annette M. Bickel, PCV
 - o Bill Roberts, Anthropologist, American University
 - o Heermans leaves Washington
 - o Williams reviews documents
- JULY 16
- o Heermans arrives Conakry
 - o Williams reviews documents
- JULY 17
- o Williams and Heermans review documents and meet with Joe Hartman.
- JULY 18
- o Mamadou Oury Bah, Director-General, Water and Forests
 - o Souleymane Diaby, Acting Coordinator of RAF Project
 - o Aliou K. Diallo, National Director of Hydraulics
 - o Suzanne Poland, Acting Peace Corps Director
 - o Denise Dauphinais, Assistant Peace Corps Director
- JULY 19
- o Frank Correl
 - o Review documents
- JULY 20
- o Review documents and discuss outline
 - o Travel to Mamou, night at Mamou
- JULY 21
- o Travel from Mamou to Pita
 - o Ibrahima Mitty Diallo, National Director of FAO Project, Pita
 - o Temba Nsuela, UN Volunteer in charge of silviculture, FAO Project, Pita
 - o M. Dioubate, General Secretary in charge of Administration, FAO Project, Pita
 - o Annette M. Bickel, PCV
 - o Laurie Clark, PCV
 - o Deborah Mcgrath, PCV
 - o C. Ken Smith, PCV
 - o Travel to Labé, night at Labé
- JULY 22
- o Sera Baka Conde, Director of FDHRIDS
 - o Alpha Bakar Bah, Director of BRP No. 9
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