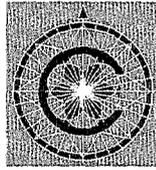


PJ-ACA-227

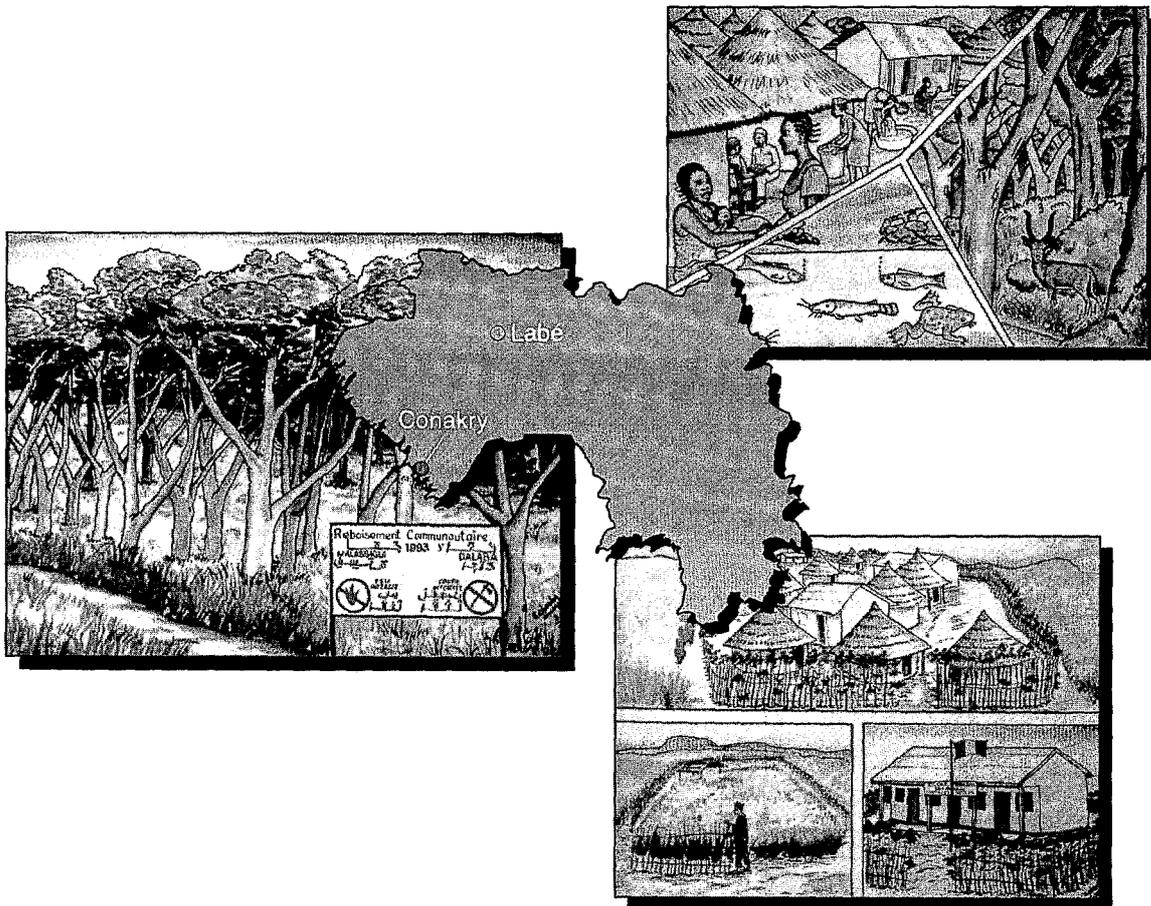


CHEMONICS INTERNATIONAL INC.



FINAL TECHNICAL REPORT
GUINEA NATURAL RESOURCES MANAGEMENT PROJECT

Contract No. 624-0219-C-2094-00



Submitted by:
Chemonics International Inc.
1133 20th Street, N.W.
Washington, D.C. 20036

February 1997

A

TABLE OF CONTENTS

	<u>Page</u>
ACRONYMS	i
EXECUTIVE SUMMARY	iii
SECTION I INTRODUCTION	I-1
A. Background and Objective	I-1
B. Financial and Human Resources Management	I-1
C. Expected Results	I-3
D. Results Achieved	I-4
SECTION II PROGRAMMATIC CONCLUSIONS AND RECOMMENDATIONS	II-1
A. Project Goal and Purpose	II-1
B. Geographic Coverage and Dissipation	II-2
C. Technical Dilution	II-3
D. Use of Incentives	II-3
E. Counterpart Institutions and Organizational Options	II-4
F. Low-Input/Organic Agriculture versus High Input and High Returns	II-4
G. Enterprise Development and Off-farm Income in Natural Resources Management	II-5
H. Credit Availability	II-5
I. Summary	II-6
SECTION III IMPLEMENTATION CONSTRAINTS AND OPPORTUNITIES	III-1
A. Project Constraints as of 1996	III-1
B. Recommended Focus for Activities in 1997 and Beyond	III-3
SECTION IV MAJOR INTERVENTIONS	IV-1
A. Natural Resources Management	IV-1
A1. Village Management Committees	IV-1
A2. Reforestation and Forest Protected Zones	IV-2
A3. Co-Management of the Nialama Forest Reserve	IV-3
A4. Live Fencing	IV-4
A5. Rock Lines and Contour Hedgerows	IV-5
A6. Compost	IV-7
A7. Chemical Fertilizer Use	IV-8
A8. Potable Water/Irrigation	IV-9
A9. Improved Crop Varieties	IV-10
A10. Integrated Pest Management, Improved Grain Storage, and Termite Control	IV-11
B. Community Enterprise Development	IV-13
B1. Dry Season Gardening and Cash Crop Production	IV-13
B2. Honey and Wax Production	IV-15

TABLE OF CONTENTS
(continued)

	<u>Page</u>
B3. Poultry Production with Introduction of Improved Roosters	IV-16
B4. Animal Health Improvement	IV-17
B5. Forest and Fruit Tree Production	IV-18
SECTION V SECONDARY INTERVENTIONS AND OTHER ACTIVITIES	V-1
A. Natural Resources Management	V-1
A1. Fire Control	V-1
A2. Multipurpose Shrub Blocks	V-2
A3. Experimental Nursery	V-2
A4. Canal Stabilization Plantings	V-3
A5. Responsible Logging	V-4
A6. Alley Farming	V-4
A7. Streambank Plantings	V-5
A8. Bamboo Blocks	V-5
A9. Protection of Biodiversity	V-6
A10. Improved Charcoal Production	V-6
A11. Night Parks and Corrals	V-7
A12. Stables	V-7
A13. Green Manure/Forages	V-8
B. Enterprise Development	V-9
B1. Animal traction	V-9
B2. Egg Production	V-9
B3. Soapmaking	V-10
B4. Indigo Dyeing	V-11
B5. Metal Works	V-12
B6. Cattle Commerce	V-13
B7. Small Commerce	V-13
B8. Credit	V-14
C. Accompanying Ventures	V-15
SECTION VI SUPPORTING ACTIVITIES	VI-1
A. Training	VI-1
A1. Counterpart on-the-job Training	VI-1
A2. Local Training	VI-2
A3. Regional Training	VI-3
A4. Long-Term Training	VI-4
B. Applied Research	VI-4
C. Monitoring and Evaluation	VI-6
D. Policy Analysis	VI-8
E. Peace Corps Volunteers	VI-9

TABLE OF CONTENTS
(continued)

		<u>Page</u>
ANNEX A	COUNTERPART TRAINING, 1993-1996	A-1
ANNEX B	REGIONAL TRAINING SUMMARY—BRFP TECHNICIANS, GNRMP	B-1
ANNEX C	LOCAL TRAINING SESSIONS, 1993-1996	C-1
ANNEX D	IN-COUNTRY TRAINING FOR DNFF AND OTHER GOG PERSONNEL	D-1
ANNEX E	PROGRESS INDICATORS OF GNRMP INTERVENTIONS	E-1
ANNEX F	ACCOMPANYING VENTURES SUPPORTING BRPs	F-1
ANNEX G	LEVEL OF EFFORT OF LONG- AND SHORT-TERM TA, 1992-1996	G-1
ANNEX H	PEACE CORPS VOLUNTEERS' ACTIVITIES DURING THE LOP	H-1
ANNEX I	TECHNICAL BULLETINS AND EXTENSION VIDEOS PRODUCED	I-1
ANNEX J	PROJECT DOCUMENTS AND PUBLICATIONS	J-1

d

LIST OF ACRONYMS

ACT	Association de Coopération Technique
AF	Agroforestry
AF/FOR	Agroforestry/Forestry
AFNETA	Alley Farming Network for Africa
AID	Agency for International Development
AMIP	Agricultural Marketing and Investment Project
APR	Agricultural Production
AWP	Annual Work Plan
BARS	Bareng Agricultural Research Station
BRP	Bassin Représentatif Pilote
BTGR	Bureau Technique de Génie Rurale
CB-NRM	Community-based Natural Resources Management
CED	Community Enterprise Development
CENAFOD	African Training Center for Development
CFEL	Centre de Formation en Elevage
CG	Comité de Gestion
CLUSA	Cooperative League of the USA
CM	Crédit Mutuel
CNA	Centre National Apicole
COP	Chief of Party
CRAB	Centre de Recherche Agronomique de Bareng
CRAF	Centre Agronomique de Foulaya
CRD	Rural Development Committee (Communauté Rurale de Développement)
DF	Diaforé Watershed
DNFF	Direction Nationale des Forêts et de la Faune
DPDRE	Direction Préfectorale de Développement Rural et Environnement
DPPF	Direction Préfectorale des Forêts et de la Faune
DS	Dissa Watershed
EE	Environmental Education
ENATEF	Ecole Nationale des Techniciens des Eaux et Forêts
EPA	U.S. Environmental Protection Agency
FAO	Food and Agriculture Organization (UN)
FDHIRD	Fouta Djallon Highlands Integrated Rural Development Project
FG	Guinean francs
FR	Forest Reserve
GE	Guinée Ecologie
GOG	Government of Guinea
GNRM	Guinea Natural Resources Management
GPS	Global Positioning System
IITA	International Institute for Tropical Agriculture
IMFDW	Integrated Management of the Fouta Djallon Watershed
IPM	Integrated Pest Management
IRAG	Recherche Agricole en Guinée
IVMC	Inter-Village Management Committee
KD	Koundou Watershed
LOP	Life of Project

LPDA	Lettre Politique de Développement Agricole
LPV	Laboratoire de la Protection Vegetale
LTC	Land Tenure Center
LTTA	Long-term Technical Assistance
M&E	Monitoring and Evaluation
MAEF	Ministry of Agriculture, Livestock and Forests (Ministère d'Agriculture, d'Elevage et des Forêts)
MARP	Participatory Rapid Appraisal (French acronym)
MC	Management Consultants
NC	National Coordinator
NEAP	National Environmental Action Plan
NGO	Nongovernmental Organization
NRM	Natural Resources Management
OAU	Organization of African Unity
OMVG	Organisation de Mise en Valeur du Fleuve Gambie
PABV	Projet d'Aménagement des Bassins Versants
PCV	Peace Corps Volunteer
PMU	Project Management Unit
PRA	Participatory Rapid Appraisal
PRAFD	Projet Régional d'Aménagement du Fouta Djallon
PRIDE	Promotion of Rural Initiatives and Development Enterprises
RC	Regional Coordinator/Coordination
RDO	Rural Development Office
REDSO/	Regional Economic Development Services Office for West and Central Africa (Abidjan)
SAGE	Section d'Appui aux Groupements d'Elevage
SAP	Sustainable Agricultural Production
SNAPE	Service National d'Aménagement des Points d'Eau
SNPRV	Service National de Promotion Rurale et de Vulgarisation
SOW	Scope of Work
SPFF	Section Préfectorale des Forêts et de la Faune
SRAI/MFD	Service de Restauration et d'Aménagement Intégré du Massif du Fouta Djallon
STTA	Short-term Technical Assistance
SWC	Soil and Water Conservation
T	Metric Tons
TA	Technical Assistance/Assistant
TDY	Temporary Duty
TR&D	Tropical Research and Development
TV	Terroir Villageois
UGVD	Guinean Volunteers for Development (Union Guinéenne de Volontaires du Développement)
USAID	United States Agency for International Development
VSF	Vétérinaires Sans Frontières
WID	Women in Development
WMU	Watershed Management Unit

EXECUTIVE SUMMARY

Background

The purpose of the Guinea Natural Resources Management (GNRM) project as stated in the project paper (PP) was “*to improve the management of natural resources in three target watersheds in the Fouta Djallon Highlands for profitable and sustainable agricultural production.*” The project formed part of a multidonor program to improve management of the Fouta Djallon watershed. It operated in three geographically dispersed watersheds (Diaforé, Koundou, and Dissa) with a project management unit based in Labé. Project activities included the following six components:

- Natural resources management (NRM)
- Community enterprise development (CED)
- Training
- Applied research
- Policy studies
- Monitoring and evaluation (M&E)

The project was implemented by the Directorate of Forests and Wildlife (*Direction Nationale des Forêts et de la Faune*, DNFF) of the Ministry of Agriculture, Livestock and Forests (MAEF) of the Government of Guinea (GOG). Technical assistance was provided through a contract with Chemonics International and a subcontract with Tropical Research and Development. Additional support was provided by the U.S. Peace Corps. Through a mission buy-in to a centrally funded project, USAID awarded a separate grant using project funds to the Land Tenure Center (LTC) to conduct land tenure studies for the project.

The GNRM project began field operations in January 1993. The two main project activities were NRM and CED, and were complemented and supported by four additional activities (applied research, policy, training, and monitoring and M&E).

Overview of Results Achieved

The GNRM project has touched the lives of each of the three watershed's estimated 8,000 residents. According to project records, most residents participated in two or more activities and were, in fact, “saturated” with activities and unable to provide much more for lack of labor and/or time. Nearly all households participated in a combination of water development, soil conservation, market farming, or small off-farm enterprise activities. The numbers of participants in activities have been enumerated (see Annex E), and nearly \$100 thousand dollars of revenues were generated—approximately \$45,000 of profits were realized directly from pilot initiatives.

Perhaps more important than the revenues or large numbers of resource users engaged are the new institutional structures created, the commercial producer groups initiated, and novel tenure contracts developed. The institution and landscape changes are testament to the increased number of productive home gardens, irrigated perimeters, and terraced fields. Capacity for watershed users to better manage their fragile resource base has been improved and live's have changed for the better in all three watersheds.

Many of the new income and organizational opportunities created will live beyond the project completion date. Numbers are provided in each technical section. The midterm evaluation team (Hagan et al., 1995) reports that villagers were consistently positive about project interventions. Villagers spoke about how they learned to work together on community efforts, such as constructing diversion dikes to protect their village from floods, and how they can use this approach for other community efforts. This degree of local involvement provides an excellent basis for a more participatory approach during the next phase.

Significant policy changes were made during the life of project that gave people more control over development decisions at a local level, and provided for greater local participation in resource management. Although a variety of fiscal policies impede sustainable land husbandry practices (e.g., cattle head taxes, tax revenue distributions) the project's approach to working with residents in the three pilot watersheds was supportive of the GOG's efforts to decentralize development and improve local responsibility for resource management. The latest efforts in more formal community-based NRM in Diaforé and Koundou proved how this decentralized approach can be further improved. The project encouraged the formation of groups to carry out economic activities, and management committees for broader community NRM activities. In addition, the project sought to work with local authorities, such as the Rural Development Committees (CRDs) and the Sous-Prefect and Prefect and their staffs.

The case studies and Participatory Rapid Appraisal (PRA) training conducted by the Land Tenure Center to identify alternative tenure rights systems was important policy work with tangible benefits to the watershed residents. Almost 70 of the innovative land contracts were introduced with the help of LTC and have proved a useful tool for assisting home gardening groups in obtaining access to land. Watershed technicians successfully negotiated such contracts in areas adjacent to water sources, where the project promoted tree planting. The community-based natural resources management (CB-NRM) experiences have also enriched the functional policy dialogue by developing new joint ventures in management in both the Nialama National Forest and Diaforé where some 13 villages were brought together to discuss zoning and management issues. Both of these activities have enriched the national dialogue about decentralized management of Guinea's bountiful but threatened resource base.

The project has enhanced the capacities of, and received support from, several local and international nongovernmental organizations (NGOs), primarily providing training for staff and villagers. Particularly useful relationships were developed with the Guinean Union of Volunteers for Development (UGVD) and the African Training Center for Development (*Centre Africain de Formation pour le Développement*, CENAFOD). UGVD staff members visited the project's three watersheds in 1993, and developed a significant and long-lasting role in managing the Nialama National Forest. *Guinée Ecologie* also provided significant support to the U.S. Peace Corps in developing pilot environmental education curriculum materials. These are important improvements in the capacity to deliver technical services at the field level.

Women and men living in the pilot watersheds were encouraged to form village-level resource management committees. The project encouraged the communities to choose both women and men for these committees. Twenty-eight such committees were established with more than 40 percent of representation by women. These committees worked to mobilize community members for community resource activities such as managed water points (springs, improved wells), reforestation around water sources, and construction of rock lines. These committees have

created an important venue for addressing local governance issues that will live well beyond the project's life.

Women have been very involved in community and family-level NRM efforts. In establishing the village-level resource management committees, the project worked to ensure that some women were on each committee. Although the women may not take a lead role in these committees, their membership has given them the opportunity to represent women, pass information from the committee to village women, and mobilize women in support of community initiatives. More concretely, some interventions, such as capped springs and improved wells, have noticeably benefited women by reducing labor time to obtain water for household needs and gardening by over 75 percent, in many cases.

Principal Conclusions

Considerable debates have occurred on the appropriateness and linearity of the project design and its logframe. There is general agreement that changes were warranted but were never enacted, even after the mid-term evaluation highlighted serious deficiencies. Whether USAID or Chemonics should have taken leadership in reconciling these design inconsistencies is now irrelevant. However, the newly developed Results Framework for this Special Objective fully articulates the expected consequences of the next partner's interventions.

The local economy in all three watersheds is based upon agriculture. The production systems, which rely largely on shifting cultivation and extensive cattle management on poor soils, must be replaced by a set of new systems based on permanent production on a smaller land base. In short, agriculture intensification on higher potential sites must occur. Such systems must incorporate production and soil conservation measures that enhance soil fertility in the short term and soil retention in future years. For such production to be sustainable, it needs to be based upon more sustainable natural resource systems, which include improved stewardship of forest and pasture resources.

Expertise in agronomy is needed to help establish the crops that can be produced profitably, along with the appropriate production technologies. At the technical assistance (TA) team level, no provision was made for an agronomist. The lack of staff members dedicated to working in production agronomy clearly had a negative impact on market crops, levels of production, and farm income, and reduced both the incentive and the resources necessary to adopt associated conservation practices. Similar deficiencies in forest management and range improvement limited progress in these areas as well.

Strategic Recommendations for Follow-on Implementation

The National Coordination Structure envisioned in the PP (covering all BRP projects) must be stimulated and become functional. A premium must be placed on improving coordination and learning between projects. Such a structure could be established in collaboration with Service de Restauration et d'Aménagement Intégré du Massif du Fouta Djallon (SRAI/MFD) but should be insisted upon by the greater donor and lending community.

The sustainability of BRP teams is uncertain given current levels of GOG funding. Direct collaboration with interested and motivated development agents at the local level (forestry agents, SNPRV extension agents, veterinarians, CRDs, and other local groups) is a more efficient use of

scarce government resources and should be considered. The role of counterpart funds should be carefully reviewed (if still a possibility). Decisions on allocations should be made crystal clear to all parties and the selected NGO(s) should be released from the use of counterpart funds for future field activities.

Although the Fouta is the water tower of West Africa, insufficient health care and illiteracy (especially for women) are two important problems in the region. If significant progress is made in these two areas, NRM issues and technologies to maintain water flow from the highlands will be easier to explain, understand, and adopt.

Future efforts should concentrate on a finite and targeted set of production packages that emphasize financial and environmental sustainability and take full advantage of proven local organization structures. These packages, and the extent to which they explicitly address environmental sustainability, can be determined only when USAID completes its Results Framework. This framework must provide a clear and transparent strategic direction that also ensures the full cooperation of projects (even if they are in other Strategic Objectives) that address critical bottlenecks in credit and small enterprise development. The hydrological importance of all project activities should be carefully evaluated for economic and environmental sustainability. Keen support for creditworthy initiatives will be important and the use of inorganic fertilizers to stimulate production must not be excluded. Extension outreach should use only local organizational capacity rather than attempting too many activities with unproven partners or artificial GOG structures that are not sustainable. If multiple watersheds are contemplated, they must at least be contiguous and should be selected according to indigenous interest and extant organizational capacity. The regional coordinating structure must be made functional.

Major Interventions: Lessons Learned and Recommendations by Project Component

Natural Resources Management

Village management committees:

- Establishing new community structures is a long and complex undertaking that ultimately requires sociological and organizational management expertise and commitment of significant project resources.
- Project designers should ensure that, for all project activities, at least one member of the proposed project personnel can provide the appropriate technical expertise.
- Pilot CB-NRM activities in Koundou (Nialama) and Diaforé should receive important additional technical and organizational development expertise during the project's next phase.

Reforestation and forest protected zones:

- Three factors must be present to establish a successful community reforestation plot: 1) a strong village structure capable of organizing and motivating people, 2) an area with minimal domestic animal pressure, or 3) an area where wildfire is rare.
- Early burning around reforestation plots or protected zones is critical.

- Intensive discussions and negotiations should take place with the *Comité de Gestion* (CG) in each village that has a reforestation plot or protected zone should occur; precise responsibilities and organizational methods need to be defined and formalized to the greatest extent possible.
- Emphasis should be placed on establishing protected forest zones instead of producing and planting a large number of seedlings for reforestation; this method is more appropriate and sustainable at the village level.

Co-management of the Nialama Forest Reserve:

- Project personnel are convinced that this initiative is one of the most promising and innovative that the project has undertaken and that it has the potential for great impact at the local and national levels.
- Finalization (including negotiation with the Inter-Village Management Committee, IVMC), submission, and approval of the management plan should be vigorously pursued by project personnel and a contract between the DNFF and the IVMC should be negotiated.
- Studies should be undertaken to analyze the feasibility of co-management initiatives for the state forest reserves near the Dissa (Souti-Yanfou Forest Reserve) and Diaforé (Bakoun Forest Reserve) watersheds.
- Forced evictions must be avoided when illegal farming occurs in state forests.
- DNFF should try to replicate the Nialama co-management model in at least one state forest reserve in each of the country's other three geographic zones.

Live fencing:

- Live fencing is the agroforestry technique offering the greatest promise in the absence of improved cattle management practices.
- At demonstration sites where significant growth has taken place, collaborator objectives should be defined and management should commence. These sites should also be used for numerous farmer-to-farmer visits.
- An accent should be placed on establishing live fences using cuttings and direct seeding as these methods are more appropriate and sustainable at the village level.

Rock lines and contour hedgerows:

- Rock lines and other erosion control structures following contour lines are sustainable, replicable, inexpensive, and environmentally sound NRM technologies for the Fouta, and have been adopted by watershed farmers.

- Erosion control and fertility management systems should receive the benefit of further economic and ecological monitoring during the follow-on activities to gauge motivational constraints and modify systems accordingly.
- Subsidies and incentives are not required to motivate people to adopt contour lines.
- Project technicians should continue to use videos, farmer-to-farmer visits, and farmer trainers to generate interest in rock lines.

Compost:

- Although compost is a sustainable, replicable, inexpensive, and environmentally sound NRM technology that effectively increases agricultural production, it may not be adopted more widely until resource availability and land use patterns change.
- The follow-on project should seek to “de-mystify” composting by promulgating the most simple and cost-effective techniques.

Use of chemical fertilizers:

- Chemical fertilizers can increase maize yields by over 100 percent but they do not significantly increase maize yields in established home gardens, or onion yields where sufficient organic matter is used.
- Even when chemical fertilizers do increase yields, farmers continue to prefer no-cost soil fertility options, such as compost or direct manure and ash applications.
- The use of chemical fertilizers should not be excluded from project activities (especially phosphorus) but their applications in sensitive environments (*bas-fonds*, in particular) should be carefully monitored and periodically evaluated.

Potable water/irrigation:

- For a project without the skilled personnel to cap springs or build wells, it is better to collaborate with existing, experienced organizations such as the *Service National d'Aménagement des Points d'Eau* (SNAPE) for such work.
- It is more sustainable to teach representatives from the *Communauté Rurale de Développement* (CRD) and village leaders to write grant proposals than to directly fund expensive activities such as wells and sources.
- Projects should require villagers to pay 50 percent of the costs of well improvement and source construction and work should not begin until the roles and responsibilities of the user groups are fully negotiated and formalized.
- Peace Corps volunteers (PVCs) should include source maintenance and water sanitation in environmental education classes in 1997.

Improved crop varieties:

- The most successful improved varieties tested were Faranah, 80/40, and Tanzanienne cassava; K9101 maize; Mamou hot peppers; and Tabuna eggplant. Peanut varieties and certain varieties of cassava (TMS) were not successful.
- Farmer field days at local research stations were very successful in generating interest and enthusiasm and should be continued during the next project phase.
- Farmers are willing to return the amount of seed supplied to them and distribute the planting material independently to neighbors and family members.

Integrated pest management, improved grain storage, and termite control:

- Follow up is critical for the para-pests formed by Centre de Recherche Agronomique de Foulaya (CRAF) and the *Laboratoire de la Protection Végétale* (LPV), and para-pests should receive enterprise training.
- The project should create audiovisual aids (video, rural radio programs) on IPM and termite control, including discussions of the life cycles of the most important local insect pests, explanations of appropriate integrated pest management (IPM) techniques, and interviews and demonstrations by trained para-pests.

Community Enterprise Development

Dry season gardening and cash crop production:

- Dry season gardening is a complicated activity requiring collaboration among three watershed technicians—SWC/SAP, CED, and WID. Agroforestry technicians are also required, as a major constraint to dry season gardening is inadequate fencing. Live fencing has been promoted as a possible solution to this constraint.
- It is easier to work with motivated individuals than with groups, as groups require more organization and often encounter difficulties regarding the division of labor and the use and management of group funds.
- The project should continue to focus on innovative land tenure contracts to allow more farmers (especially women) access to lowlands.
- The project should also increase work with producer groups to improve their organizational capacities, and teach them to negotiate their own land access and marketing agreements in the future.
- A market information system should be established to help local farmers plan opportune moments to plant and harvest their produce for maximum gains.

Honey and wax production:

- Beekeeping should be promoted in and around each *Bassin Représentatif Pilote* (BRP). Collaboration should continue with the *Centre National Apicole* (CNA).
- It is best to establish a realistic marketing network that will continue after project intervention.
- If investment cost is a constraint, beekeeping with traditional hives using improved harvesting techniques is an option for a viable honey production enterprise.

Poultry production with the introduction of improved roosters:

- Extension of the improved rooster should be continued, as the population has appreciated the difference in weight gain of hybrid chickens, especially in Diaforé and Koundou.
- Appropriate lodging and regular vaccinations have improved poultry keeping throughout the watersheds. However, elimination of local and F1 roosters must continue.

Animal health improvement:

- Although the paravet can profit from the vaccinations and treatments he performs, the activity is not a full-time enterprise.
- Animal health improvement is a worthwhile activity but should not be attempted without considerable and dedicated technical support .

Forest and fruit tree production:

- Villagers can quickly become proficient at most nursery techniques but nurseries are not a full-time activity and seedling quality will not be good without substantial follow-up.
- The production of seedlings with locally produced sacks or by bare root will require less investment capital and is more practical and sustainable. However, trees in plastic pots have a market competitive edge over bare root trees.
- There is a considerable and constant demand for fruit trees, and nursery owners should more actively pursue marketing outlets, according to client demand.
- As the nursery owners have mastered a majority of the technical aspects of seedling production, follow-on activities should intensify efforts on planning and financial management to support their profitability and autonomy.

Supporting Activities

Training

Counterpart on-the-job training:

- DNFF-sponsored and PL 480-remunerated personnel were not competitively selected and were not held adequately responsible for their actions. The GOG should initiate a system of accountability for government civil servants. Carefully developed and clearly written scopes of work should be elaborated and signed for all project staff (TA, PCV, and GOG) before giving funding.
- Project administrators should participate in annual reviews of staff performance, and make concrete suggestions for personnel improvement.
- Counterparts should be formally trained for four to six months at the beginning of the project in PRA, extension, and technical skills, to ensure that they all have the same basic knowledge and skills before beginning field activities. Watershed trips can then be more effectively used for simple follow-up, analysis, and evaluation.
- Placing one long-term technical assistant in each BRP would have reduced the amount of traveling time and could have improved the required follow-up for certain technicians and activities.

Local training:

- Experience and results from the GNRM project workshop on extension tools show that study visits are one of the most effective types of training for villagers.
- Farmers trained by the project should be encouraged to train new farmers in NRM and sustainable agriculture technologies during the life of the project, and encouraged to be as self-sufficient as possible.

Regional training:

- Training short-term technical assistants proposed in the work plan would have alleviated the TA team's pressure to find appropriate courses, and probably would have improved the selection of seminars. Any further regional training should be carefully evaluated and not undertaken unless a full rationale and plan are submitted and approved.

Long-term training:

- Four of six candidates have continued progress in their Master of Science degree programs and will return to Guinea in 1997. English language requirements for students to receive training in the United States should be carefully adhered to in the future

Applied Research

- A sufficient number of villagers should be contacted to evaluate their motivation to collaborate, to ensure that they understand the research goals, and to collect their ideas on priority themes. Research protocols should be simplified as much as possible.
- Bareng and LPVN are capable of performing “outsourced” applied research but the protocols, monitoring framework, and financial requirements must be transparently negotiated. Applied research cannot be financed through a counterpart if timeliness of data collection is important.
- Green manure and leguminous and forage plants should be introduced as beneficial in increasing soil fertility, decreasing weeds, and facilitating tilling after fallow. They can be used as animal feed that doesn't require manual labor.

Monitoring and Evaluation

- An M&E system is an integral component of all project activities, and should not have been contracted out to an independent organization. The selected subcontractor was unable to deliver sufficient and timely assistance. M&E activities should be turned over to SRAI/MFD (RAF), which should be involved in creating a database that includes GNRM project progress and environmental impact data (which should have already been created by Morlaye Keita), as well as data from GERF, Guetoya, *Haut Niger*, and *Haute Gambie*.
- An NRM M&E specialist should be requested for three to four months, to facilitate a regional conference on NRM.
- DNFF support to this important activity was not adequate and project follow-on activities should carefully evaluate to what extent GOG structures should be assigned to managing the M&E system.

Policy Analysis

- Field-based projects of regional consequence have difficulties informing the national policy debate. Without an active regional coordinating structure it was difficult to treat policy bottlenecks effecting replication of project initiatives.
- Funding and support for the co-management of the Nialama Forest Reserve, using UGVD as facilitator, should be continued. Implementing the forest management plan will need to be carefully monitored and results with policy implications fed into the national forest planning dialogue at the appropriate time and level.

Peace Corps Volunteers

- The role of PCVs in the project was not well understood by volunteers or project staff, and the original intent of their role was not well thought out. The respective PCV and counterpart roles must be well defined, and it must be clear what will be gained through their collaboration during any follow-up project.

- A broad-spectrum program such as “natural resources management” is too general and gives the PCV little direction; a more-focused program will clarify the PCV’s scope of work. Community health and environmental education volunteers should be considered for the next phase.

SECTION I INTRODUCTION

This report represents the final review of activities undertaken since November 1992. We first present an overview of the project, followed by constraints, lessons learned, and recommendations for each activity. Each technical assistant on the team provided a background on objectives, methodologies, and a detailed analysis of their activities in their individual technical reports, submitted in December 1996.

A. Background and Objective

The Guinea Natural Resources Management (GNRM) project began field operations in three watersheds in the Fouta Djallon in January 1993. The two primary project activities were natural resources management (NRM) and community enterprise development (CED). These two components were complemented and supported by four additional activities (applied research, policy, training, and monitoring and evaluation).

The goal and purpose of the project blend together in an explicit, theoretical recognition of the relationship between economic development and sustainable NRM. Although the project goal was *"to increase sustainable agricultural and value-added production by men and women for domestic and export markets,"* its purpose was *"to improve the management of natural resources in the target watersheds in the Fouta Djallon Highlands of Guinea for profitable and sustainable agricultural production."*

The project was implemented by Chemonics International and the *Direction Nationale des Forêts et de la Faune* (DNFF), with support from several subcontractors and the U.S. Peace Corps. The Chemonics contract paid for technical assistance and the operation of the project management unit (PMU) based in Labé. The institutional contract also paid for regional and long-term training, imported equipment, and logistics for seminars and workshops that took place in Labé. All watershed activities were implemented using PL-480 resources.

B. Financial and Human Resources Management

A total of 198 person-months of long-term technical assistance (LTTA) and 30 person-months of short-term technical assistance (STTA) were budgeted. A total cost of \$7,719,341 was estimated. Due to a variety of factors, 177 person-months of LTTA and 23 person-months of STTA were used, which resulted in contract costs totaling only \$6,142,785. (While this figure does not reflect the final invoice to be submitted by Chemonics, additional expenditures are expected to be minimal.)

The charts below clarify the breakdown of LOE provided through this contract:

Detailed Level-of-Effort Table: LTTA	
Scope of Work	Duration
Chief-of-party	49 pms
Soils & water conservation specialist	42 pms

Detailed Level-of-Effort Table: LTTA	
Scope of Work	Duration
Agro-forester	47 pms
Community enterprise development specialist	39 pms
Total level-of-effort	177 pm's
Total Direct Cost of Labor	\$538,003

Detailed Level-of-Effort Table: STTA	
Scope of Work	Duration
Team building specialist (D. Olson)	0.73 pms (Dec-92); 1.43 pms (Nov-95)
Women in development specialist (D. Koenig)	0.85 pm s (Jun-93)
Monitoring & evaluation specialist (W. Guyton)	1.00 pms (Sep-93)
Agricultural micro-marketing specialist (W. Kedrock)	1.19 pms (Nov-93)
Peace corp volunteer program evaluation (R. Furth)	0.58 pms (Dec-93)
Poultry specialist (D. Dupras)	0.23 pms (Feb-94)
NRM policy advisor (Ake-Assi)	0.23 pms (Mar-94)
Pest management/termite specialist (D. Faye)	0.85 pms (May-94)
NEAP institutional building specialist (F. Gilbert)	1.23 pms (May-94)
Institutional building and mediation specialist (A. Barry)	1.15 pms (Dec-94)
Video production specialist (D. Wagner)	1.39 pms (Oct-95)
Monitoring & evaluation specialist (F. Brusberg)	1.50 pms (Oct-95)
Natural forest management specialist (D. Bourque)	1.15 pms (Jan-95)
Community based NRM specialist (P. Williams)	5.12 pms (May-96)
Natural forest management specialist (P. Lowe)	2.00 pms (Aug-96)
Total level-of-effort	23 pm s
Total direct cost of labor	\$111,583

The original Guinea budget included \$607,000 for the proposed training of six Guineans to be enrolled in Master's programs in the United States. To date, the project has expended \$523,627 towards this objective. DNFF carried out the selection of the master's degree candidates. was carried out by the DNFF, the Guinean counterpart organization to USAID. Currently none of these candidates have completed their degrees, though four of the six are expected to within the coming academic year. While it was anticipated that these candidates would have finished their masters programs by the close of the project, their admission into these programs was delayed by the candidate selection process and the fact that the participants needed English language training before they could successfully enroll. Two of the candidates selected

for U.S. training are no longer enrolled in master's programs. One returned to Guinea for medical reasons. The other was unable to complete his program due to academic issues.

Over the life of the contract, \$936,890 was spent on Equipment, Vehicles and Freight. Among the major commodities purchased were computers, vehicles, motorcycles, furniture, and office equipment. All commodities were either transferred to the DNFF or to USAID at the close of the project.

C. Expected Results

By the end of the contract, Chemonics was expected to have achieved:

- Increased knowledge base for the three watershed communities in the effective management of natural resources
- Increased capacity of watershed resource users to plan and manage common watershed resources, especially water sources, forests, and pastures
- Increased adoption of NRM technologies in at least three watersheds
- Increased number of community enterprises actively participating in the marketing of surplus production, and increased marketing of agricultural outputs in domestic and regional export markets
- Approximately 30 watershed community leaders and personnel from the Government of Guinea (GOG) trained in NRM, and improved NRM skills among GOG staff and watershed community leaders
- Identification and analysis of major policy issues and constraints affecting the sustainable use of natural resources, and presentation of information to GOG policy planners and makers leading to an improved process for formulating policy

Project efforts have focused on the following interventions:

- Introduction of appropriate agroforestry practices for soil conservation, soil fertility enhancement, fodder, and other uses
- Establishment of communal reforested and protected zones
- Promotion of marketable cash crops and improved postharvest technologies
- Use of quality seeds and improved crop varieties
- Improvement of soil fertility, control of soil erosion, and better plant protection
- Organization of producers for more efficient production and marketing
- Identification of new markets for watershed produce
- Improved access to credit by farmers
- Development of small and microenterprises
- Improved access to land by women and disadvantaged people
- Improvement of farm-to-market roads in the watersheds
- Participatory management of a National Forest Reserve

D. Results Achieved

A number of indicators are used to evaluate project outputs. See Annex E for two exhibits detailing project outputs. Exhibit E-2 of Annex E includes activities and results by year. Exhibit E-2 gives the number of participants involved in project interventions. Progress indicators measure the level at which the project is establishing principal activities and can estimate the rate of adoption of promoted technologies. The project's outputs according to their objectives follow.

Objective No. 1. Increased watershed knowledge base	
Audio visual presentations	40 with 2,733 participants
Radio Rurale broadcasts	10
Informational brochures	12
Extension videos	16
Applied research	23 trials completed
Fertilizers	1,000 kg + of chemical fertilizer tested in 16 villages
Credit	three informational meetings/tours

Objective No. 2. Increased capacity to plan and manage natural resources	
Resource user groups	17 created that are functional or semi-functional, out of 31 total

Objective No. 3. Increased adoption of technologies	
Reforestation	11.19 ha planted and protected on more than 65 sites in 23 villages
Access to water	28 wells and 11 springs improved, benefiting 31 villages (6,780 people)
Improved soil fertility	141 compost piles established in 22 villages (69 men and 159 women trained), and 1,000+ kg of chemical fertilizer tested in 16 villages (100 people trained)
Soil erosion control	11,658 m of contour hedge rows and 59,329 m of rock lines established, installed in 172 <i>tapades</i> and exterior fields, and to protect 4 sources and 80 ha; more than 1,126,400 cm ³ of soil saved from erosion
Flood control	2,290 m of canals and 80 gabions protecting more than 1,000 people in 5 villages and 8 <i>tapades</i>
Fire control	9 fire breaks established
Termite control	253 mounds destroyed
Live fencing	72 sites in 29 villages of 14,596 m established
Forage blocks	29 sites in 14 villages for 2,095 m ² established
Forest seedlings	54,207 produced and planted
Cash crop production	18 ha of vegetables and fruits in production with 491 people participating
Animal health care improvement	7,388 small and large ruminants and 1,881 chickens vaccinated

Improved agricultural production techniques	106 ha of land tilled using animal traction
Integrated pest management	Non-chemical grain storage and termite-control methods identified; 253 termite mounds destroyed

Objective No. 4. Increased number of enterprises, production, and revenue	
Types of enterprises started	15 different types with 381 women and 306 men
Cash crop production	<ul style="list-style-type: none"> ■ 351 people involved (from almost zero to over 60 percent of the families of Diaforé; 18 percent of the adult population of Dissa and Koundou) ■ 18 ha of land in cash crop production ■ 26 wells at 20 sites prepared for irrigation of market crops ■ 5 springs equipped with irrigation capabilities at 5 sites, creating the potential to irrigate 4.5 ha and generate 22,500,000 FG in revenue for 230 people ■ 175.350 metric tons (T) of onions produced and approximately 130 T marketed (from 100 kg of production in 1993). Total revenue: 39,000,000 Guinean francs (FG) ■ 759 kg of chili peppers marketed for 2,277,000 FG revenue ■ 4.17 T of potatoes marketed for 2,085,000 FG revenue ■ 0.25 ha of banana planted on 5 sites ■ In 1996, 32.5 T of okra (3,778,000 FG in revenue) and 1.89 T of eggplants (2,986,000 FG revenue) marketed ■ Average increased income of 50,000 FG per participant; several farmers in Diaforé produced more than 1 T of onions in 1996 and some more than 2 T. ■ Spontaneous adoption of onion production by farmers not involved with the project in Diaforé.
Private nurseries	3,236 fruit tree seedlings sold by 14 nursery owners for 3,312,700 FG revenue
Honey and wax production	56 collaborating beekeepers; 96 Kenyan hives installed; 2 study visits and 8 training sessions; 6.03 T of honey and 230 kg of wax produced and marketed outside the watersheds for 4,458,500 FG revenue
Indigo dyeing	890,000 FG generated income for one group of 17 women
Soap production	459,000 FG profit earned for 4 groups of 22 women
Veterinary care	463,450 FG profit earned by 3 paravets from vaccinating 6,245 small and large ruminants and 1,881 chickens
Animal traction	1,542,000 FG income generated for tilling of 106 ha by 11 men
Improved poultry production	8,712,000 FG income generated by introducing 103 roosters to 74 women and 18 men; 9,586 eggs sold in Dissa; 1,260 in Diaforé for 20,200 FG profit
Cattle commerce	5,360,000 FG profit earned from the sale of 355 heads of cattle by 7 men (supported by GNRM-guaranteed loans)
Metal works	446 improved stoves sold by 4 men for 1,719,500 FG in revenue; training of 7 women village leaders to promote stove use; 2 men trained in traction plow repair

Objective No. 4. Increased number of enterprises, production, and revenue	
Types of enterprises started	15 different types with 381 women and 306 men
Improved varieties	408 farmers (137 women) tested 20 new varieties of subsistence and cash crops (50 percent of target population)
Small commerce	60 women earned 1,125,000 FG in profit
Access to credit	31 loans worth 7,611,000 FG disbursed to 78 men and 23 women; 79 percent payback rate

Objective No. 5. Training	
Long-term training	4 participants completing Master's degrees in the United States
Regional training	10 technical sessions and 2 study tours with 45 participants
Local and on-the-job training	more than 1,400 villagers and technicians participating in 97 training sessions/workshops

Objective No. 6. Policy analysis	
Two NRM symposiums held with 185 participants	
Studies completed on credit problems affecting marketing of agricultural produce from watershed areas	
Analysis done on women's work loads, followed by a workshop on income-generating activities and appropriate technologies for rural women	
Preparation of a participatory management plan for the Nialama Forest Reserve	
52 reforestation contracts signed	
12 land tenure contracts signed for landless gardeners, mostly women	

SECTION II

PROGRAMMATIC CONCLUSIONS AND RECOMMENDATIONS

This section provides an overview of some principal factors governing overall achievement of the project's goal and purpose. Under reengineering parlance, these would be the conclusions and recommendations on the accomplishments at the results level. The purpose here is to identify key issues that must be addressed during any subsequent activity conducted through either government or nongovernment channels.

A. Project Goal and Purpose

From the inception of the project design a rich dialogue took place on the linkages between the GNRM project's goal and purpose statements and the logical framework that evolved to bridge them. Much of this discussion was of a strategic importance that better fits within USAID's new reengineering principles. It is nevertheless worth reviewing, at least for historical purpose, these precepts under which the institutional contract operated.

To reiterate, the goal of the GNRM project was:

"to increase sustainable agriculture and value-added production by men and women for domestic and export markets"

while the activities cumulatively contribute to the stated purpose of

"improving the management of natural resources in three target watersheds in the Fouta Djallon Highlands for profitable and sustainable agriculture production."

At the project purpose level, NRM is seen as one avenue to sustainable agriculture. However, the linkages between predominantly subsistence farmers and the development of commercial markets to achieve the project goal are obscure. Also, the project designers apparently did not recognize that many of the current management systems—slash and burn agriculture on poor or steep slopes, late season burning for range improvement, drainage of lowlands for commercial crops—are probably unsustainable. Thus, achievement of the project goal has never explicitly addressed environmental sustainability problems identified in the project purpose. Moreover, some of the most promising natural resources interventions identified by the project and communities (e.g. natural forest management, prescribed fire, or environmental education in schools) may not have any direct impact on commercial agriculture production and were therefore not consistent with the project purpose or identified inputs.

Finally, the production functions identified in the goal and purpose do not convey the importance of the hydrological balance of the Fouta Djallon, which was and presumably remains the primary strategic *raison d'être* for OAU's Integrated Management of the Fouta Djallon Watershed (IMFDW). As a result of the ambiguous linkages between regionally important watershed management and increased interest in commercial agriculture production, staff recruitment and field activities emphasized either enterprise development and commercial agriculture production or NRM, but rarely both. The urgency to increase agriculture production targeted most activities at the more intensively managed farm landscapes: home gardens and irrigated areas. If the regional hydrology of this project is no longer of strategic importance to USAID, follow-on activities should be relieved of this tentative relationship.

Water development and soil conservation activities also strived to improve commercial production in these same areas that represent a very small part of the targeted watersheds' surface area. Consequently, few resources remained for the promulgation of technologies and human organizational systems to the extensively managed fields, pastures, and forests, where the most significant damage of regional importance occurs. Although USAID and Chemonics recognized this schism, and it was highlighted as a serious design deficiency during the 1995 mid-term evaluation, it was never reconciled at the programmatic level by USAID. Thus the field team continued to prosecute all of the original activity targets without integrating them to the fullest extent. Attempts to redirect these activities into "results packages" that focused on agriculture production systems—the chain including NRM of particular production areas, sustainable production technologies and incentives, and improved marketing—met with stiff resistance from many corners.

The movement toward community-based management of range and forest lands, a process that has been shown to require 10 to 15 years in Mali, Niger, and Senegal, began too late to be fully operational before the departure of the Chemonics team. It is the considered opinion of the entire team that the community-based approach offers the highest probability of success.

B. Geographic Coverage and Dissipation

The project has sought to develop pilot production efforts and NRM technologies with replicable potential. The three watersheds selected met the selection criteria of presenting very different socioeconomic, organizational, and ecological conditions for testing purposes. Each watershed has distinguishing characteristics that were fully exploited during project interventions. Choosing three large and dispersed watersheds had several unforeseen impacts, however.

First, the agroecological variation within watersheds, particularly given the short life of project and even shorter contract period, were so great that it defied the M&E capacity of the international and local staff. Trying to organize the collection of complex biophysical and socioeconomic data while training local counterparts for post-project continuity was difficult. Attempts to develop national capacity by using a local contractor, unfamiliar with USAID M&E requirements, exacerbated this problem. The fact that REDSO took a major and delayed role in developing the M&E system also further aggravated the situation. Although all local and international team members strived to meet identified local needs and document their results, the distance stymied coordinated data collection and development of a unified results framework and monitoring capability.

Secondly, the large distances between GNRM project watersheds (up to six hours between areas in Koundou and Diaforé!) also posed serious problems to operations, teamwork, and the systematic comparison and analysis of activities and results. The contractual stipulation requiring 60 percent of LTTA time to be spent in the watersheds was never officially relaxed—and because the average round trip to any watershed took 7.4 hours—20 percent of each advisor's time was spent "on the road" and not "in the field." The distances also aggravated the lack of technical collaboration between the CED, SWC, AF, and WID teams because the watershed technicians were often difficult to locate and program.

Thirdly, other projects attempting different organizational and technical approaches in other watersheds were unable to systematically share their experiences and results, which accounted for a very flat inter-project learning curve. Periodic attempts to formally share experiences and data

from different projects was difficult and undertaken only by the GNRM project, a hallmark and important project contribution. The three Fouta-wide workshops where all projects and actors involved in NRM interacted around various themes were initiatives originally foreseen in the IMFDW. However, these events, which should be a prominent feature of any follow-on exercise, were realized only with the field team's initiative and USAID's support.

Finally, the need to service such remote and distant watersheds using DNFF personnel required costly construction of the DNFF "*cites*," diverting enormous amounts of counterpart attention and finance from important field activities. The opportunity costs to the project of creating these artificial structures and the real recurrent cost issues that will plague any follow-on activity are enormous and need to be addressed. Determining which DNFF-supported activities can and should be continued will be a challenge for USAID and the selected NGO(s).

Justification of a pilot watershed approach was certainly based on the presumption that the expensive lessons learned would be replicated over a larger and more cost-effective area. Although there are many positive results—in fact, most activities had positive social and economic benefits—some are clearly more beneficial and replicable than others. Perhaps paramount to all the lessons is that rather than the project selecting the watershed or village, the watershed residents should select and organize around interventions of perceived importance to themselves. This will allow the follow-on team to do less goading and be more responsive over wider areas within communities more likely to succeed.

C. Technical Dilution

A quick review of this report's table of contents provides an indication of the ambitious and impressive variety of activities undertaken by the project. Although each activity had merits and specific lessons, the dilutional repercussions of attempting so many initiatives were marked by an inconsistent and opportunistic delivery of services. Transfer of technical skills to DNFF counterparts had to occur mostly "on the job" and thus took precedence over transfer of the management and communication skills so critical to long-term delivery of technical support. Although each watershed now has a cadre of technically competent field staff, they may not yet have proven their "customer" focus and found a "clientele" that would justify their funding by the DNFF without PL-480 support.

There was also an impact on the LTTA's ability to function as an effective team and on the broader question of building sustainable institutional capacity for such a wide array of diverse interventions. Because the technical advisors and their counterparts were so busy trying different methods of increasing agriculture production, creating off-farm income opportunities, or conserving natural resources, there was a reduced emphasis on improving local organizational capacity which ultimately must be tasked to support any intervention finally adopted. Toward the end of the project, the CB-NRM activities in Dissa and Koundou began to directly address this organizational capacity constraint. However, as mentioned above, experience elsewhere suggests several more years of nurturing these groups will be required if they are to become fully functional. If USAID is unable to commit to at least another five years of institutional capacity building, the number of activities and locations should be drastically reduced.

D. Use of Incentives

The three watersheds selected have rich histories in a variety of market-based activities. However, the roads in all of these watersheds long ago fell into disrepair. Limited access to

commodity markets and agricultural inputs have become a serious factor discouraging commercial enterprises throughout the Fouta. From the outset the TA teams felt justified in "jump starting" activities with a blend of direct and indirect subsidies to show residents "*les possibilités*." Using problems and solutions identified during the PRAs, the teams moved forward to initiate activities using PL-480 counterpart resources. Water sources were capped, tree nurseries established, and rock contours underwritten, initially with PL-480. Not unexpectedly, this set some precedence and heightened expectations for activities that took considerable effort to discourage and which persisted with the perennial, if always late, availability of PL-480.

The lessons here are simple and consistent with the self-help motivations identified throughout this report: provide only technical and organizational support and only to communities or groups that have articulated a problem and mutually agreed upon a solution. Financial support can be assisted through other channels as soon as groups are organized and clear roles and responsibilities are defined.

E. Counterpart Institutions and Organizational Options

Over the life of project, DNFF made substantial progress in its central operations that have had important and positive impacts at the field level. The Forestry Code and implementing policies were improved and now support more direct participation. However, financial management reforms, staff turnover, and internal administrative policies still limit this agency from achieving its full potential. Unlike most of its counterparts in other West African countries, DNFF still maintains a strong centrist structure that delegates little autonomy to its regional and watershed-specific operating units. Human resources management within DNFF could be upgraded significantly to improve the responsiveness of field staff and overall performance within projects.

Perhaps more importantly is how future efforts can best take advantage of the skills and presence of DNFF and other MAEF agencies at the local level. Without PL-480, the relationship with DNFF could be much more straightforward and business-like. Agreements between implementing NGOs and DNFF for specific services should be negotiated only where there is a comparative advantage. Other services should be considered for soil conservation and agroforestry support. The production system approach with an emphasis on financially sustainable and environmentally sound activities will need good agronomic support and attention to marketing information. Several local NGOs offer viable alternatives here.

In some areas CRDs seem to offer a good connection point with local producer groups and community organizations and provide a logical nexus for participatory rural appraisals. The *Haute-Gambie* project has had good success working with CRDs and finds that their representational structure may be cumbersome but it can be harnessed to produce lasting and decentralized benefits in ways consistent with similar experiences in Mali and Niger.

In other words, a variety of alternative assistance avenues should be explored by the next phase of the GNRM project. Organizational options should be carefully reviewed only after the Results Framework has been established and the role of DNFF clarified.

F. Low-Input/Organic Agriculture versus High Input and High Returns

There is consistent agreement that improvement in rural incomes is essential to remove pressure from fragile areas marked by shifting cultivation and poor yields. Although the project

design stressed the use of low-input agriculture for sustainability, many low-input systems are unable to provide adequate returns and are thus unsustainable. In some respects the "organic farming" technologies proffered under the project may have been diametrically opposed to local residents' aspirations and the project goal of income maximization. On higher-potential sites the use of inorganic fertilizers, particularly in areas of serious phosphorous deficiencies, may be the single-most effective intervention possible and should be explored when market conditions warrant.

The successes in onions, potatoes, and some home garden (*tapades*) commodities with existing markets will be ephemeral without fertilizers and other non-labor inputs. Improved germ plasm will also be an important input to stay ahead of the markets and pest problems. Increased emphasis on these real opportunities require substantially more agronomic support than the international and local staff could provide. Follow-on activities will need to concentrate on the real sustainability of production systems, not crops, and determine how limiting inputs can be most affordably provided.

G. Enterprise Development and Off-farm Income in Natural Resources Management

The enterprise development component took a different tact at this income-generating theme, aiming at different types of traditional options including private paraveterinary service development, poultry and egg production, tree nurseries, beekeeping, farm-market road construction, animal traction for market access, home gardens, and a slew of credit schemes which are elucidated below. Because there is apparent wide agreement that any income-generating activity would relieve pressure from fragile or unproductive lands, the project also experimented with an array of nonagriculture ventures including blacksmithing, carpentry, brick making, food and merchandise retailing, tailoring, soapmaking, and dyeing.

It was learned that most of these activities provide some development benefits to residents. Income-generation records were kept but the M&E system was unable to track the impact on land-use patterns over such a short period and wide area. The hypothesis that improved income leads to more sustainable management of the resource base was not proven. The implementers of the follow-up project should identify and track a sample of the CED assistance recipients to validate or refute this notion.

H. Credit Availability

It was also learned that it is almost impossible to keep so many different enterprise activities going with any sort of quality control and that interventions must be limited to those that can compete favorably for the limited credit available. Early recognition by the CED advisor that credit was likely to become a critical bottleneck to CED replication was never supported and other projects were expected to intervene. Therefore, the obvious enterprises that could have been easily replicated if credit had been available were replaced by an increasingly long set of alternatives. This meant the CED team had to increasingly turn to low capital and "organic" enterprises, most of which had reduced returns and required more attention.

Although the CED team was able to broker a considerable number of loans with *Crédit Mutuel*, the size of the average loan was less than \$400 and effected just over three individuals. The majority of the loans were repaid in full but many were to private nurseries where the project purchased the seedlings and thus the actual subsidy was considerable. Many loans had no direct impact on the environment or sustainable agriculture but did have the intended impact of

generating alternative income sources. The follow-up project should identify a subset of these borrowers and attempt to track the impact of the loans secured on NRM and long-term household economics.

I. Summary

In summary, future efforts should concentrate on a finite and targeted set of production packages that emphasize financial and environmental sustainability and take full advantage of proven local organization structures. These packages, and the extent to which they explicitly address environmental sustainability, can be determined only after USAID completes its Results Framework and provides a clear and transparent strategic direction. The hydrological importance of project activities should be carefully evaluated and activities in irrigation adjusted accordingly. Keen support for creditworthy initiatives will be important and the use of inorganic fertilizers to stimulate production must be considered. Extension outreach should use only local organizational capacity rather than attempt too many activities with unproven partners or artificial GOG structures that are not sustainable. If multiple watersheds are contemplated, they must at a minimum be contiguous and should be selected according to indigenous interest and extant organizational capacity.

SECTION III

IMPLEMENTATION CONSTRAINTS AND OPPORTUNITIES

This section presents the constraints project staff faced in implementing the project followed by activities recommended for 1997 and beyond.

A. Project Constraints As of 1996

- Throughout the life of the project, project staff constantly attempted to implement two types of projects at once, which sometimes led to confusion and inefficiency. A logical link between natural resources management and sustainable agricultural production exists, and these links should be stressed when selecting and promoting NRM practices; however, agricultural production and marketing should *not* be the goal of an NRM project.
- The National Coordination structure envisioned in the project paper, one that involved all *Bassin Représentatif Pilote* (BRP) projects, was never established by DNFF. Such a structure would have greatly facilitated BRP collaboration, improving project monitoring and evaluation (M&E) as well as impact and functioning. Such a structure could be established in collaboration with SRAI/MFD.
- The sustainability of BRP teams seems rather uncertain given current levels of GOG funding. Direct collaboration with interested and motivated development agents at the local level (forestry agents, *Service National de Promotion Rurale et de Vulgarisation* (SNPRV) extension agents, veterinarians, *Communautés Rurale de Développement* (CRDs), and other local groups) is a more efficient use of scarce government resources, although it is necessary to make sure that all parties are willing to work together, remain stable long enough, and become sufficiently trained. GNRM and other BRP project technicians could train these agents, and monitor and evaluate their progress.
- Although the “Fouta” is the water tower of West Africa, two of the most important problems in the Fouta seem to be insufficient health care and illiteracy, especially for women. If significant progress is made in these two areas, NRM issues and technologies to maintain water flow from the Fouta Djallon highlands will be easier to explain, understand, and adopt. Illiteracy is a significant constraint to enterprise management, a fact recognized at the project onset. The CED component began a literacy program in the BRPs, after which the Chief of Party (COP) and the RDO, considering the activity of minor importance, eliminated it from the annual work plan.
- From the initial implementation of activities, a clear policy should be maintained concerning the use of subsidies. It is much more difficult to curtail subsidies after they are started, than to decide from the beginning not to use them. In a project where the limited financial resources of the government are clearly identified as a constraint (in the project paper), and the sustainability and replicability of project interventions are a priority, subsidies are not recommended.¹

¹In the original project paper, the authors stated that, given the isolation of the target watersheds and the importance of the constraints to increased production, significant and direct economic return on project

- The management of PL-480 funds was problematic throughout the project. The COP's statement of work (SOW) should indicate his responsibility for monitoring and managing these funds in collaboration with the DNFF. Lack of transparency at the watershed level led to misunderstandings and misinformation, and often resulted in less than ideal work relationships. The system to access PL-480 funds was never clear and should have been established during the first months of the project. Trackers could have been used to make sure that requests for funding were made in a timely manner.
- In the past 18 months, PL-480 funds were available less than 50 percent of the time, and the contractor was constantly obliged to advance money to keep activities from halting completely. Alternate funding mechanisms to PL-480 should be identified for field-level work for projects that are expected to *show results at the field-level*; this is especially true for NRM projects that often have activities that are intrinsically linked to certain seasons and thus are extremely time-dependant.
- The original project paper identified soil and water conservation, crop management, livestock, and forestry technologies and interventions to be tested, evaluated, and transferred, but requested technical assistance in agroforestry/forestry, enterprise development and soil and water conservation only. In the case of the TA team, the BRP teams did not include crop production or livestock specialists, and the logical association of related interventions to DNFF support does not seem to have been considered. Collaboration with local development institutions such as the *Direction Préfectorale pour le Développement Rural et Environnement* (DPDRE) would provide a logical framework for an integrated agricultural production and marketing project. For community-based NRM objectives, a community-based natural resources management (CB-NRM) specialist or sociologist would have been an effective addition to the team.
- The project design required that team members spend 60 percent of their time in the field. This was an inefficient use of TA's time and resources, as each person spent a full work day traveling round trip to and from the BRPs ("the field" was at least three hours away). Providing sufficient technical support to counterparts was logistically difficult, as was high quality program planning and evaluation in Labé. In addition, it was physically impossible for the team to oversee project interventions in the three watersheds. Combined with the unimpressive work ethic of many members of the BRPs, progress was further reduced. Intensive counterpart training during the first four to six months of project start-up, followed by less frequent longer visits (every six to eight weeks), may have been more effective. It may also have been more effective to base each team member in a watershed, although travel time to other watersheds would increase, and program integration may have been more difficult.
- The roles of many project staff (BRP technicians, team members, Peace Corps volunteers [PVCs], and so forth) were not always well defined and often overlapped. In addition, even with different project "components," less division between specialties

investment in these watersheds will be difficult to obtain. As a result, the authors identified replicability as the key to positive economic return on investment. Moreover, the issues of reduced risk, labor constraints, and benefits spatially separated from costs suggested that the project should be especially sensitive to providing appropriate incentives at the right time to the right people, and to selectively deciding which costs the project and the villagers should assume.

would have improved project "vision." If once a month for one week the team worked together, in one BRP, better interaction and planning could have taken place.

- The DNFF should consider using an open application process for positions on rural development projects; in this way, projects would be ensured that personnel chosen could serve in the described project settings. Similarly, for contractual positions, careful screening of applicants should occur regarding their willingness and proven ability to work in isolated, rural settings. Educated Guineans prefer urban or large town settings; the members of the project's watershed teams were no exceptions.
- Written, recognized job descriptions are necessary for the steady operation of a project, the evaluation of performance (accountability), and the avoidance of conflicts resulting from differing interpretations regarding responsibilities. Lack of job descriptions for DNFF coordinators, directors, technicians, and contractuels resulted in freedom of interpretation as to what these technicians were supposed to be doing. More importantly, this void left no reference point for discussions of accountability. Carefully developed and written job descriptions for all positions should be a prerequisite for project start-up.

B. Recommended Focus for Activities in 1997 and Beyond

- **Increased collaboration and information exchange.** Schedule semi-annual meetings, exchange reports, combine activities, and divide responsibilities with other projects to increase efficiency. Representatives of other projects should be consulted before finalizing the annual work plan.
- **Farmer-to-farmer study visits.** Involve other BRP projects such as *Haute Gambie* and *Haut Niger*.
- **NRM workshop or symposium focusing on model farmers.** This would promote their accomplishments and collaboration with regional projects.
- **Activities requiring a minimum of PL-480 funding.** Village meetings with extension themes including water source protection, stream bank protection, water sanitation, community water resource management, and fire control would be highly beneficial and cost very little.
- **Five-year development plans established directly with villagers.** Reviews of these on a yearly basis would provide an M&E tool and important data for annual reports.
- **Implementation of M&E activities by the SRAI/MFD project.** Prepare a database, an analytical report reviewing progress and impact data from regional projects, and quarterly reports with data from BRP projects.
- **Extension out of the present BRPs into surrounding watersheds.** Increase impact and more efficiently use available human and financial resources. The *Haut Niger* and *Haute Gambie* projects, with a similar amount of funding as the GNRM project, potentially have a larger impact because they support several watersheds representing 15 to 20 percent of the upper watersheds of the Niger and Gambia river basins.

SECTION IV
MAJOR INTERVENTIONS

A. Natural Resources Management

A1. Village Management Committees

The objectives of the village management committees (*comité de gestion*, or CG) initiated by the project were to organize management of project-installed, community-based interventions; help project personnel promote selected interventions; and organize management of their village lands (*terroirs villageois*, or TVs).

The sizes of the committees varied, but on the average they were composed of three men and two women. The responsibility for the support and development of the CGs was given to the watershed directors, but the work that was done with the committees fell to the watershed agroforesters because, in many cases, the agroforesters needed to work on reforestation plots, protected zones, and fire control with the help of the community. In the second half of 1996, significant progress was made in CG development and TV management in the Dissa watershed due to the arrival of the short-term community-based NRM specialist.

Constraints:

- The team's lack of sociological expertise
- Lack of agreement among project personnel regarding who, on the watershed teams, should be responsible for working with and supporting the CGs
- In some cases, elected members were not dynamic, influential members of the community

Lessons learned and recommendations:

- To establish new community structures is a long and complex undertaking that requires sociological expertise and significant commitment of project resources.
- For each activity in a project design, consensus must be reached on who is responsible for developing and implementing the activity; if consensus is not reached, minimal sustainable achievement will occur.
- The Dissa watershed team should vigorously pursue development of the TV management initiative with the four pilot villages. Above all, NRM-related activities identified in the action plans should be carried out to the fullest extent possible.
- Project designers should ensure that, for all project activities, at least one member of the team can provide the appropriate technical expertise.

A2. Reforestation and Forest Protected Zones

In 1993 and 1994, the project worked with numerous villages to create community reforestation plots. With a few exceptions, these plots were established adjacent to springs.¹ In 1995 and 1996, the project gradually moved away from planting trees in a small area to creating larger, protected communal forest zones (*mise en défense*). Direct seeding was also tested on a small scale in some of these plots/zones. The goals of these two interventions were to protect the chosen sites, primarily from soil erosion; maintain spring water quality and, eventually, to increase spring flow; provide diverse forest products to villagers; and keep a small percentage of village land-use zones in permanent forest cover.

Constraints:

- Lack of upkeep and protection
- Plots/zones not a priority for the villagers
- Implementation and maintenance responsibility usually not well-defined

Lessons learned and recommendations:

- At least one of three factors is necessary for a successful community reforestation plot: 1) a strong village structure capable of organizing and motivating people, 2) minimal domestic animal pressure, or 3) rare occurrence of wildfire.
- Intensive discussions and negotiations with the CGs in each village that has a reforestation plot or protected zone should occur; precise responsibilities and organizational methods need to be defined for each village to accomplish maintenance and protection tasks.
- Watershed agroforesters should organize field training sessions on pruning methods for saplings in the plots/zones with villagers designated as having responsibility for maintenance.
- To have a long-term, beneficial effect on spring flow, reforestation plots or protected zones should be established on a significant area, at least 2 ha, at a considerable distance above the spring.
- Early burning (by the end of December at the latest) around reforestation plots or protected zones is essential; if this is not done, there is a good chance of a more destructive wildfire later.
- Emphasis should be on establishing protected forest zones instead of producing and planting a large number of seedlings for reforestation; this method is more appropriate and sustainable at the village level.
- If trees need to be planted next to springs for symbolic or other reasons, the species selected should be a short stature and/or have a deciduous habit, e.g. *Gmelina*.

¹These were areas villages were willing to take out of agricultural production. They were areas where Guinean foresters traditionally plant trees.

A3. Co-Management of the Nialama Forest Reserve

The Nialama Forest Reserve (FR) occupies over 60 percent of the Koundou watershed. Beginning in 1994, the project analyzed the possibilities for more rational and sustainable management of the forest. This included a series of studies carried out by consultants and project personnel. The goals of this pilot effort are to protect and conserve the forest resource, provide the local people with a range of forest products, generate revenue from these products, and demonstrate to the Guinean government the feasibility of this model as a means of protecting other state forest reserves.

In 1995, the project decided to pursue the co-management option (i.e. collaborative management by the state [owner of the land] and the local population). Among other activities, an action plan was written, the boundaries were re-marked, and an inventory of woody species initiated. In 1996, two additional consultants arrived to help the project establish an inter-village management committee (IVMC) and devise a preliminary management plan. A series of village meetings were held while creating the IVMC. A number of subjects were discussed and villagers were informed by DNFF personnel of their use rights in the forest. Lowland rice cultivation, allowed in the original *classement* documents, areas were also identified and demarcated.

Constraints:

- Divergent viewpoints among the local people and the DNFF as to the best use of the FR
- Lack of training and expertise in forest management principles and techniques for villagers and DNFF technicians
- Fire as a hindrance to forest development in the Nialama reserve
- Low literacy slowing down IVMC formulation

Lessons Learned and Recommendations:

- Project personnel are convinced that this initiative is one of the most promising and innovative undertaken yet and that its potential impact is great.
- Finalization, including negotiation with the IVMC, submission, and approval of the management plan should be vigorously pursued by project personnel.
- Work should proceed on developing and negotiating a model contract template between the DNFF and the IVMC even before approval of the management plan is anticipated.
- Studies should analyze the feasibility of co-management initiatives for the State Forest Reserves near the Dissa (Souti-Yanfou FR) and Diaforé (Bakoun FR) watersheds.
- The project should seek continued STTA to ensure the success of the co-management initiative; specifically, there is a need for STTA to help implement the management plan, especially demarcating village responsibility, agricultural and protected zones, including GPS work, and selecting trees to be harvested.

- The revisions of the forest map (including village responsibility zones once these are finalized) by the *Bureau Technique* at DNFF/Conakry need to be pursued by the Koundou Director and the project's Regional and National Coordinators.
- When illegal farming occurs in state forests, forced evictions should be avoided; instead, a long-term process of negotiation should begin, aimed at convincing farmers either to farm in a rational, legal (i.e. through contracts with DNFF) way, or to agree to stop farming.
- The DNFF should consider trying to replicate the Nialama co-management model in at least one state forest reserve in each of the other three geographic zones of the country.

A4. Live Fencing

Live fencing has been a mainstay of the project's Agroforestry/Forestry (AF/FOR) component. It is appropriate because it sustainably addresses many negative consequences associated with traditional dead wood fences. It was already practiced to a limited extent, albeit haphazardly, in the Koundou and Diaforé watersheds when the project began.

The goals of the intervention can be summarized as follows:

- Introduce a wide range of multipurpose species into the fences
- Diminish the time spent in annual renewal of dead wood fences
- Diminish deforestation rates
- Reduce termite populations in homegardens

Although some live fence demonstrations were installed in 1993, the activity began in earnest in 1994. Extension meetings, explaining and promoting the technique, were held in all three watersheds during 1994 and 1995. Subsequently, the project installed demonstrations with interested villagers.

Direct seeding, cuttings of local species and *Gliricidia sepium*, and transplanted seedlings were tested and promoted with live fence collaborators. Many of the 1996 sites were fences around lowland gardening plots; live fencing can facilitate production in these plots as several women's gardening groups are now forced to pay men to construct dead wood fences around their gardens.

In 1996, collaborators were asked to pay for 10 to 15 percent of the seedlings used in their demonstrations. Although many have already paid, many others still owe money to the private nurserymen for these plants.

Constraints:

- Slow growth or development of outplanted seedlings due to poor soils, termite attacks, and shading by crops and dead wood fences
- Unregulated browsing animals
- Collaborators' unwillingness to perform adequate maintenance of seedling protection after outplanting

Lessons learned and recommendations:

- Live fencing is the agroforestry technique that interests BRP villagers most.
- Local species are often not appreciated by the local population and by some Guinean foresters despite their established, traditional uses.² The appreciation and promotion of native species should be a theme in the project's environmental education program and should be inserted into all future environmental education programs throughout the country.
- At demonstration sites where significant growth has taken place, collaborator objectives should be defined (i.e. management of which products) and management commenced (pruning, lopping); quantities of biomass (green and woody) or other products should be measured and recorded on a per meter of live fence basis. These sites should also be used for numerous farmer-to-farmer visits.
- Emphasis should be on establishing live fences using cuttings and direct seeding, as these methods are more appropriate and sustainable at the village and household levels. Tests should continue for propagating *Gliricidia* by direct seeding.
- *Acacia mangium*, *Gliricidia*, *Gmelina*, and *Moringa* should be promoted on a large scale as live fence species.

A5. Rock Lines and Contour Hedgerows

The goal of promoting rock lines and contour hedgerows was to provide farmers with a sustainable technique they could use to decrease soil erosion (and resulting turbidity in neighboring streams and rivers), improve (or maintain) soil fertility (often mentioned as a priority during village surveys and during the original Participatory Rapid Appraisal [PRA]), increase agricultural production, and increase rainfall percolation (and consequently stabilize or increase local water flows). The specific objectives of the program were to increase functional awareness of soil erosion, to introduce techniques that farmers could use to control it, to demonstrate these techniques in watershed villages, and to collaborate with individuals who express interest in constructing rock lines or other types of erosion control barriers.

The project implemented one demonstration site in Diaforé (contour hedgerows) and one in Koundou (rock lines) in 1993, which were later used as farmer training sites. In 1994, the project used financial incentives to encourage people to build rock lines using A-frames, visited individual sites, and developed a technical sheet in Pular and Susu for local farmers. In 1995, the project held training courses in the use of the A-frame, distributed certificates to qualified participants, and visited individual sites. In 1996, the project used video animations, farmer trainers, formal training opportunities, individual site visits, and farmer-to-farmer visits to encourage and train new collaborators.

Shrubs at the original site at Diaforé exhibited excellent growth; consequently, the site became the focal point for farmer-to-farmer visits in 1995 and 1996. A video on rock lines and contour hedgerows was also developed and shown in many villages throughout the three

² This lesson applies to all AF/FOR interventions where native species were used.

watersheds. In 1996, as a result of these extension efforts, demonstrations were installed on a larger scale in the Koundou and Dissa watersheds.

Constraints:

- Lack of adequate seasonal labor, especially for rock lines
- Lack of understanding of benefits of the A-frame
- Land tenure insecurity where land borrowers see no reason to install rock lines in fields they will shortly abandon
- Determination of an appropriate, sustainable way to establish the hedgerows on a large-scale (direct seeding as opposed to seedling outplanting)
- Browsing by domestic animals, especially detrimental to *Leucaena leucocephala*
- Poor site selection (competition from plants on fallowed plots and animal grazing)
- Undesirable precedent set by paying villagers per meter of rock lines built
- Create habitat for pests (wild boars, snakes, and scorpions)

Lessons learned and recommendations:

- Rock lines and other erosion control structures following contour lines can be sustainable, replicable, inexpensive, and environmentally sound NRM technologies for the Fouta Djallon. They have been adopted by watershed farmers in Diaforé and Koundou and to a lesser extent in Dissa.
- Subsidies and incentives are not required to motivate people to adopt contour lines; visible results are more effective. But activities must be selected according to availability of labor.
- Project technicians should continue to use videos, farmer-to-farmer visits, and farmer trainers to generate interest in rock lines. Extension campaigns should start in February and March to give farmers time to install contour lines in April before the planting and fence building frenzies of May and June.
- *Kilés*, or work parties, common in the Fouta for planting, should be encouraged to facilitate the labor for installation of rock lines, especially over larger areas.
- Hold a meeting with model farmers in March to discuss easier ways to create contour lines and look for ways to increase adoption of the A-frame.
- Contour hedgerows, in conjunction with rock lines, can increase the cropping cycle in an exterior field, as demonstrated at the original Diaforé site.
- For areas such as Dissa where fallow regeneration is rapid, hedgerows need to be established the first year after a field is cleared.

- *Flemingia* is a fast-growing, resistant species well-suited to hedgerows; it can produce green manure in a short time span. Direct seeding tests should continue and small bare root nurseries near the outplanting sites should be tried.
- *Gliricidia* should continue to be tested using direct seeding. Seeds should be collected as late as possible in the dry season and should be sown as early as possible in the wet season. Technicians will need to closely monitor the sites where seeds are sown.
- Direct seeding of Pigeon Pea along contours should be promoted on a large scale. Its capacity for facilitating soil conservation/reinforcing rock lines and its ability to produce edible seeds should be stressed, but not its ability to provide green manure.

A6. Compost

The goal of the compost program was to provide farmers with a technique to sustainably improve soil fertility. This was often mentioned as a priority during village surveys and during the original PRA. The specific objectives of the program were to improve awareness of appropriate techniques, demonstrate them in each village, and collaborate with individuals who express interest in compost production and use. The project used village-wide demonstrations, individual site visits targeting gardening groups and technician training, farmer-to-farmer visits, individual site visits, and experimentation in homegardens and private tree nurseries

Constraints:

- Incompatibility with the agricultural calendar and labor and organizational requirements
- Potential and common direct application of relatively abundant manure and ash and/or high existing soil fertility in Dissa
- Inappropriate extension techniques

Lessons learned and recommendations:

- Care should be taken in explaining activities, especially in the initial stages. Early compost demonstrations required farmers to dig compost pits and/or build immovable brick compost bins and gave farmers the impression that compost is a complicated rather than a very simple and flexible technique.
- Although compost is a sustainable, replicable, inexpensive, and environmentally sound NRM technology that effectively increases agricultural production, it may not be more widely adopted until labor availability increases and land use patterns change.
- Using existing pits created for brick making or mud house construction is one way to facilitate the construction of below-ground compost bins. Above-ground compost bins made out of sticks are easiest to create and promote.
- The best materials to use for compost in the Fouta, and the semi-Fouta in Dissa, are manure, peanut leaves, the leaves of "Tyéwé" trees (*Daniellia oliveri*), "Tougedi" (*Calopogonium* spp.), "Puki," and ashes from palm flowers. Farmers in Diaforé also

use topsoil carried into laterite zones and deposited during the rainy season. Corn stalks and corn cobs should not be used.

- One last massive compost campaign in each village, not involving individuals, in each BRP should be conducted, accompanied by a video featuring selected model farmers. During village demonstrations, several different kinds of compost bins can be constructed and soil fertility options explained.

A7. Chemical Fertilizer Use

The goal of the chemical fertilizer program was to provide farmers with a sustainable way of improving soil fertility, increasing agricultural production, providing an incentive to decrease shifting cultivation, and possibly decreasing pressure on more fragile lands. The program's objectives were to teach people how to use chemical fertilizers in combination with organic fertilizers to improve their crop yields, explain the use of different types of fertilizers available, and evaluate their effectiveness.

The project tested chemical fertilizers (15-15-15 and TSP) in 10 onion and potato plots in Diaforé in 1994, in 5 homegardens in Diaforé in 1995, and in several applied research plots (especially for garden crops, potatoes, bananas and onions) in 1995 and 1996. Chemical fertilizer use was also discussed with 45 farmers during soil fertility and crop production trainings in Diaforé and Koundou, and distributed to 75 people with improved maize varieties in 1996. A technical sheet explaining fertilizer use was created in Pular and Susu in 1996.

Constraints:

- Risk involved in cash outlays as opposed to composting or collecting manure
- Lack of fertilizer availability in the three sous-prefectural capitals of the BRPs
- Increase in weeds
- In homegardens, and onion fields, little impact on crop yields

Lessons learned and recommendations:

- Chemical fertilizers can increase maize yields by over 100 percent (from 921 kg/ha to 2,387 kg/ha, and have a cost:benefit ratio of 1:15.
- Chemical fertilizers do not significantly increase maize yields in established homegardens or onion yields where sufficient organic matter is used.
- Even when chemical fertilizers do increase yield, farmers prefer no-cost soil fertility options, such as compost or direct manure and ash applications.
- Project technicians should no longer actively promote chemical fertilizer use, unless specifically asked by a farmer to explain its use or until market prices stimulate interest in increased input agriculture.

A8. Potable Water/Irrigation

The goal of providing potable water and irrigation systems was to improve access to drinking water, water use efficiency and conservation, agricultural production with irrigation systems and the provision of water to animals in the dry season, and the quality of life in local villages.

The objectives of the program were to increase awareness of the relationship between water quantity and NRM, provide people with technical skills and knowledge that could lead to improved water resource management, and create income-generating opportunities.

Villages provided all of the local materials and unskilled labor for the construction of wells, sources, and irrigation systems. The project provided technical support, skilled labor, and imported materials, including cement and PVC. Village management committees were formed and trained in water resource management and maintenance. Soil and water conservation (SWC)/SAP technicians received irrigation training in 1996. SWC/SAP technicians are supposed to check improved wells, sources and irrigation systems every month, and discuss problems with the maintenance committees.

Constraints:

- Limited replicability due to construction costs, expensive designs, and reliance on imported inputs and distance to transport basic materials
- Maintenance requirements and lack of organization of management committees
- Insecure land tenure for irrigation plots
- Limited skills of local masons
- Limited understanding of basic water sanitation principles

Lessons learned and recommendations:

- For a project without the skilled personnel to cap springs or build wells, it is better to collaborate with existing, experienced organizations such as *Service National d'Aménagement des Points d'Eau* (SNAPE).
- Sources should be capped and wells constructed only in the dry season. Site selection is an important element in which local knowledge should not be ignored.
- It is more sustainable, and not necessarily more time consuming, to teach representatives from the *Communauté Rurale de Développement* (CRD) and village leaders to write grant proposals than to directly fund expensive activities such as wells and sources, especially when PL-480 funds are scarce and unreliable.
- Projects should require villagers to pay 50 percent of the costs of well improvement and source construction to facilitate the transition from "project owned" to "village owned" development and to improve maintenance.

- Projects working with potable water systems should program and execute at least five water sanitation and hygiene training sessions for each system installed and encourage health centers to program similar sessions in all villages they serve and in local schools. Project technicians should collaborate with the pilot SNAPE/UNICEF program, starting in Tougué to learn water sanitation and hygiene extension techniques.
- Projects that install wells should design hingeless doors.
- In 1997, project staff should hold monthly meetings in each village receiving potable water or irrigation systems; demonstrate basic maintenance tasks to village leaders, women, and youth; and improve the functioning of village maintenance committees. Some suggestions received from village leaders and technicians include study tours to visit successful management committees and give prizes (t-shirts, calendars) to committee members with well-maintained systems.
- PCVs should include source maintenance and water sanitation in environmental education classes in 1997.
- If viable lowlands are found in Dissa, which could profit from improved management, BTGR should be contacted for no-cost implementation techniques (100 percent local labor and no cement) and the *Union Guinéenne de Volontaires du Développement* (UGVD) for organizational ideas.

A9. Improved Crop Varieties

The goal of distributing improved crop varieties was to provide farmers with a technique to improve agricultural production—often mentioned as a priority during village surveys and during the original PRA—and decrease the risks associated with insects, disease, and rainfall irregularity.

The project used applied research trials and demonstrations, farmer field days, videos, extension bulletins, agricultural surveys, formal training sessions, farmer-to-farmer visits, and large scale distribution of the most successful varieties, including local varieties, in 1996.

Constraints:

- Time required to test varieties on-station, identify appropriate varieties to test on-farm, and define the appropriate conditions for their success
- Limited number of appropriate varieties available for on-farm testing
- Difficulty in obtaining seed on time and in sufficient quantities
- Domestic and wild animal attacks

Lessons learned and recommendations:

- Because farmers are familiar with, knowledgeable about, and interested in subsistence crops, improved varieties were incredibly easy to extend. Moreover, farmers were very

good at analyzing the strengths and weaknesses of the varieties and selecting appropriate ones to suit their needs.

- The most successful varieties tested were Faranah, 80/40, and Tanzanienne cassava, K9101 maize, Mamou hot peppers, and Tabuna eggplant.
- Peanut varieties and certain varieties of cassava (TMS) were not successful.
- Farmer field days at local research stations were successful in generating interest and enthusiasm. An effort should be made to inform more people about available varieties, perhaps with displays at weekly markets and through rural radio.
- Farmers are willing to return the amount of seed supplied to them and distribute the planting material independently to neighbors and family members.
- Because planting material from research stations is limited, it may be more efficient to plant "seed banks" or multiplication fields in interested villages, which would allow more people access to new varieties, although care should be taken to ensure that the field does not become a communal field, and thus no one's responsibility.
- SNPRV can be contacted for variety identification, seed acquisition, and distribution.

A10. Integrated Pest Management, Improved Grain Storage, and Termite Control

The objectives of the IPM program were to teach people how to use preventative, mechanical, biological, botanical, and chemical means to control the most common pest problems. The project used applied research activities, environmental impact studies, formal training programs, on-site demonstrations, slides, and technical sheets to implement this activity.

Termites cause major economic damage in all three project watersheds and throughout the Fouta were identified as a priority problem by villagers during the original PRAs. Termites are recognized as a constraint by all area projects. They destroy valuable fruit trees, fences, crops, and homes. Villagers in Diaforé report total maize and fonio crop losses in some areas, with 80 percent decreases in yield. Ten to twenty percent is more common, based on visual observations of attacked maize plants). *Laboratoire de la Protection Végétale* (LPV) demonstrated that control techniques were effective in the Diaforé watershed in 1994. It is highly unlikely, however, that villagers will be organized to invite LPV to treat their termite mounds, or pay the cost of their services.

In 1995, the project conducted a study to determine the effectiveness of traditional and lower-dose chemical controls on 157 termite mounds. In 1996, the project (in collaboration with LPV, CRAF and model farmers from PABV/*Haute Gambie*) trained villagers in termite ecology and termite control using integrated pest management (IPM) strategies.

Adequate grain storage is also a serious problem, especially in the Koundou watershed where people (particularly Sarankollé) store dried maize for long periods of time. Onions in Diaforé were attacked by a fungal disease that destroyed some nurseries in 1995 and 1996 and affected 5 to 10 percent of plants in the field. Several nurseries in Koundou and Dissa were destroyed by crickets (*Zonorcerus* spp.); mealy bugs attacked cassava; caterpillars (*Helicoverpa armigera*) attacked tomatoes; and red bugs (*Dysdercus* spp) and *Podagrixena decolorata* attacked

gumbo in all three BRPs. These problems are being addressed by IPM "para-pests," villagers who were trained by CRAF to scout out major pests and recommend appropriate preventative, mechanical, biological, and botanical treatments.

Constraints:

- High cost of chemical treatments
- Dangers of chemical treatments, especially in an illiterate society
- Lack of viable, effective, alternative (non-chemical) treatments for certain problems
- Lack of understanding of termite ecology and IPM strategies on the part of the local population, technicians, and pest-control agents

Lessons learned and recommendations:

The project should make the following recommendations to local farmers:

- Decrease the effects of termites on crops, plant higher stand densities—two cassava cuttings per mound, three to four maize plants per pocket (some for you, some for the termites). Plant when the rains are well established, keep garden plots well watered, and avoid draughty soils if possible.
- Promote mechanical methods to destroy termite queens and rain water canals to destroy termite mounds.
- Install vegetable nurseries only in well-protected locations (in homegardens if necessary) and transport plants to the field to decrease insect attacks at fragile stages.
- Practice good sanitation techniques—never install nurseries repeatedly in the same place.
- Cut the disease cycle for onions by rotating fields with crops that are not intermediate hosts for onion diseases. Do not over-water onion nurseries.

The project should program the following activities in 1997:

- Follow up is critical for the para-pests formed by CRAF and *Laboratoire de la Protection Végétale* (LPV). The para-pests should be able to 1) identify their area's six most important insect pests, recognize their effects on particular crops, describe their life cycle, and identify the times of the year when they are most dangerous; 2) discuss and practice mechanical, preventive, biological, and botanical control techniques; and 3) safely apply least-toxic, Environmental Protection Agency (EPA)-approved chemical controls when necessary.
- Para-pests should receive the enterprise training they were promised, and para-pests from Diaforé, where there are considerable problems, should visit para-pests in Koundou, and para-pests from all three watersheds should visit para-pests from PABV/*Haute Gambie* in BRP Dimma.

- CRAF, CRAB, and LPV agents should go to Benin to study with the IITA-sponsored IPM program to improve their IPM skills. Training is essential for the effective development of an IPM program in Guinea, which is critical for agricultural development, especially for horticultural crops.
- The project should create audio-visual aids (video, rural radio programs) on IPM and termite control, including discussions of the life cycles of the most important local insect pests, explanations of appropriate IPM techniques, and interviews and demonstrations by trained para-pests.
- Program farmer-to-farmer visits to Koundou farmers who practice appropriate grain storage sanitation.

B. Community Enterprise Development

B1. Dry Season Gardening and Cash Crop Production

Production of cash crops such as onions, peppers, and okra has been one of the most promising interventions since the project began. Commercial-level production of tomatoes and okra was already established when the project arrived, but certain technical and marketing constraints existed. In Diaforé and Koundou, little, if any, commercial production of market vegetables existed, but a high level of interest was expressed during the PRA surveys conducted during the first months of the project.

The goal of the dry season gardening and cash crop production program was to sustainably generate income, increase agricultural production, and potentially decrease pressure on sloping lands, by increasing the productivity and exploitation of lowlands.

The objectives of the dry season gardening program were to facilitate access to appropriate gardening land, provide farmers with irrigation facilities if necessary, facilitate the acquisition of inputs (seeds and watering cans), teach agricultural production and soil fertility techniques recommended by local research stations, and help people organize to improve their production and marketing skills. The cash crop production program introduces viable cash crops into the watersheds, teaches people how to cultivate them for the least cost and most profit, and how to exploit market niches and calculate production costs and benefits.

Project staff used videos, on-site demonstrations, individual visits, guest speakers at village meetings, collaboration with nongovernmental organizations (NGOs), farmer-to-farmer visits, study trips, and formal training and analysis sessions to encourage dry season gardening and cash crop production. Subsidies were used to provide certain seeds and watering cans, although independent merchants were supposedly encouraged to provide these inputs in 1996 (no PL-480 assistance). Dry season gardens were also the sites of many integrated project activities, such as using compost, chemical fertilizer, and new crop varieties; managing water resources; practicing IPM; creating producer groups; and installing live fences.

Constraints:

- Limited access to irrigation water
- Decrease in yields due to free-ranging animals, insect pests, and theft

- Limited availability of lowlands due to land tenure insecurity and the need to protect river banks
- Difficult access to agrochemical inputs
- Long distances to important local markets
- Limited organizational capabilities of producers
- Limited knowledge of appropriate cultural practices for nontraditional crops
- Difficulty in obtaining planting material for onions, potatoes, and improved banana varieties

Lessons learned and recommendations:

- Dry season gardening is a complicated activity requiring collaboration among three watershed technicians—SWC/SAP, CED, and Women in Development (WID). Agroforestry technicians are also implicated, as one of the biggest constraints to dry season gardening is inadequate fencing. Live fencing has been promoted as a possible solution to this constraint. Adequate coordination of dry-season gardening activities is essential to their success.
- It is easier to work with motivated individuals than with groups, as groups require more organization and often encounter difficulties with division of labor, and the use and management of group funds.
- To facilitate sales and increase profits in Diaforé, plant Texas Early onions before October 15 and transplant them before December 1; to decrease insect and disease problems, recommend appropriate rotations. Onions should be stored on racks.
- The project should continue to focus on innovative land tenure contracts to allow more farmers, especially women, access to lowlands.
- Increase work with producer groups to improve their organizational capacities and teach them to negotiate their own land access and marketing agreements.
- Develop new, less-expensive irrigation models to allow more farmers to implement activities. All future irrigation projects should be tied to organized protection of water sources and riparian ecosystems.
- Control free-ranging animals, possibly with a combination of live fencing and extension messages to cattle owners. Women must incorporate fencing into their seasonal investment costs.
- Negotiate access to agricultural inputs through local merchants who are willing to supply limited quantities of important items.

- Discuss and demonstrate innovative agricultural technologies to improve production during monthly gardening group meetings.
- Teach IPM strategies to model farmers, who can then discuss and demonstrate them to local gardeners.
- Encourage community-organized road improvements and the use of entrepreneurial (private) cattle-drawn carts to facilitate market access.
- Establish a market information system to help local farmers plan opportune moments to plant and harvest their produce for maximum gains.
- CED technicians should continue to evaluate and identify viable cash crops for local farming conditions (evaluate at least three new crops per year).

B2. Honey and Wax Production

The objectives of the intervention in beekeeping was to 1) encourage and revitalize the production of honey and wax as an important income-generating activity for the zone; 2) demonstrate and promote the use of protective equipment and smokers to decrease bush fires due to traditional harvesting practices, and improve honey quality; and 3) demonstrate the use of Kenyan top bar hives as a means of beekeeping.

Koundou was the watershed where, initially, significant intervention took place. The project was fortunate to have a local business, *ApiGuinée*, in place who was interested in the purchase of honey and wax in bulk. The owner of the enterprise expressed certain minimal quality requirements for honey he would purchase.

Demonstration Kenyan hives were installed in each of the three BRPs. Participants signed contracts stating that they would appropriately manage the hives, receiving ownership two years after hives were installed. In Koundou and Dissa, beekeepers contributed a nominal fee, 16 percent of the value. In all three BRPs, woodworkers and tailors have been trained to construct improved equipment with locally available materials.

Constraints:

- Undependable collaboration with *ApiGuinée* and lack of marketing initiative by beekeepers
- No new equipment, such as smokers and beesuits, casts doubt on its sustainability
- Increased labor requirements of Kenyan hives
- Lack of demonstrated advantages to group collaboration
- Wild fires which burn Kenyan hives and destroy melliferous trees
- Difficulty in coordinating *Centre National Apicole* (CNA) collaboration

- Inconsistency in competence of CNA agents, who unintentionally pass confusing messages to beekeepers

Lessons learned and recommendations:

- Beekeeping is an activity that provides the nexus between income generation and NRM. Collaboration should continue with the CNA. They should be consulted before the 1997 work plan is finalized to determine the assistance that they will furnish. A signed contract would clarify the responsibilities of parties involved—BRP, project coordination, CNA.
- Establish a realistic marketing network that will continue after project intervention. The first year the GNRM project assisted beekeepers in transporting honey into Labé. Without a doubt, that has encouraged beekeepers and increased production the following year. However, a precedent was set and producers became less likely to arrange and pay for the transportation of their honey and wax.
- Certain equipment such as gloves and smokers are difficult to produce in the watersheds and leaders of beekeeping groups should maintain contact with the CNA to obtain these items. Labé blacksmiths can fabricate smokers, and after purchase of leather gloves in Conakry, Labé tailors can sew on a fabric sleeve creating an ideal protective glove.
- If investment cost is a constraint, beekeeping with traditional hives using improved harvesting techniques is an option for a viable honey production enterprise.
- Producing a technical manual would train both BRP technicians and beekeepers. CNA has provided the CED component with documents used during classroom training that could be integral components of this manual.
- The main advantages of beekeeper group collaboration are 1) shared purchase and use of protective equipment and smokers, and 2) collection and marketing of quality controlled honey.

B3. Poultry Production with Introduction of Improved Roosters

The objective of introducing an improved race was to increase rural income through the development of poultry-keeping as a small enterprise. Hybrid chickens are heavier at an earlier age, which creates potential to earn more money and faster from their sale. Collaborating villagers were required to build appropriate lodging, eliminate all local roosters, and vaccinate existing hens before receiving roosters. Paravets worked with the BRP technicians to ensure that villagers vaccinate on a timely basis. Improved poultry-keeping techniques, in conjunction with introducing improved roosters, increases the average farmer's income for poultry sales by 110 percent.

Constraints:

- Questionable willingness of local population to pay for the improved roosters without project subsidization
- Difficulty in quantitative monitoring

- Egg roosting characteristic bred out of hens by the F2 (second) generation
- Lack of vaccination prophylaxis contributing to a poor survival rate of roosters in 1996
- Lack of understanding by villagers and project technicians on the best management system for sustainability

Lessons learned and recommendations:

- Extending the improved rooster is expensive, time consuming, and only under certain circumstances should be continued (Diaforé and Koundou only).
- M&E methods should be improved to quantify results of the intervention.
- Information campaigns must continue for this activity to be effective.
- Undoubtedly that appropriate lodging and regular vaccinations have improved poultry-keeping throughout the watersheds. However, elimination of local and F1 roosters must continue. The F2 hen will refuse to cover her eggs, so breed local and F1 hybrid hens with pure Isa Brown roosters.
- Although considerably meatier, the improved rooster is an introduced breed and very susceptible to disease.
- Consult the poultry specialist to determine a simple brood management plan for poultry keepers.

B4. Animal Health Improvement

During the PRA studies, several villagers cited disease and lack of animal care as problems with animal husbandry. The *Centre de Formation en Elevage* (CFEL) trained veterinary auxiliaries, or paravets, in vaccination and disease identification of small and large ruminants and chickens. Villagers were requested to select animal owners who were literate in the local language, although initially the technicians thought French literacy was important, and stable in the region. Six young men were selected and trained for two weeks by specialists at CFEL. The project paid for start-up equipment, and the paravets were responsible for purchasing the veterinary supplies which amounted to about \$60. Diaforé paravets took loans from CM to make this purchase. Initially, the CFEL had offered a two-part training for the paravets. The second session involved animal health care and appropriate lodging alternatives. Instead of just training the paravets, village leaders were also invited to participate in a week-long workshop.

Constraints:

- Recruited paravets insufficiently sensitized on the part-time nature and minimal profitability of their work
- Poor selection of paravets

- Lack of willingness to pay animal protection services partly due to lack of confidence in paravets
- Limited scope of paravets' work making them incapable to treat the majority of animal pests and diseases
- Competition and difficult collaboration with local *Chef de Poste d'Elevage*
- Use of expired veterinary products causing animal mortality and casting doubt on the qualifications of the paravet
- Inconsistent availability of veterinary products

Lessons learned and recommendations:

- Paravet activities require a high degree of training and supervision and may not be warranted as "stand alone" activities owing to limited demand for services and a low willingness to pay for the same.
- Collaboration with the *Chef de Poste* or other stationed government functionaries can be problematic. Closely monitor their efficiency to maximize the activity's success.
- Although villagers understand the value of vaccination, they should be more sensitized about going through with vaccinations. Vaccination tours should be programmed and villagers well informed of the arrival of the paravet.
- SAGE is willing to train interested groups of herders. However, it requires a written request from these groups. SAGE has suggested that a technician in the BRP participate in a training program. Then the technician can conduct the initial sensitization on SAGE collaboration to improve animal health and care. As with other collaborating partners, GNRM project directors and technicians should consult CFEL and SAGE agents before finalizing the 1997 work plan.
- Any animal husbandry support must be directly linked to improved management of cattle herds, increased use of prescribed fire, and improved herd management practices.

B5. Forest and Fruit Tree Production

Private nurseries were promoted to help produce forest species for the AF/FOR component of the project. A total of 12 villagers, including one woman, were trained in the following nursery methods: making a suitable potting mixture, filling pots, treating and sowing seeds, transplanting, creating and maintaining bare root beds, pruning roots, making pots out of locally available materials, and grafting.

This experience and other projects have shown that "project" nurseries are not sustainable, and only continue as long as the project supplies input and labor. In community nurseries, tasks and responsibilities are often ill-defined and production is substandard. Although most of the revenue made by the nursery producers is from the forest species, fruit tree production and grafting has been promoted with the hope that the small enterprises will continue after the project's need for seedlings ceases. The project advanced to each nursery owner the necessary

tools and materials—seeds and plastic sacks. The cost of the equipment was deducted from the price of the seedlings at the end of the first two seasons. The materials were reimbursed after the first season. After the first year, nursery owners were strongly urged to save a portion of their revenue at *Crédit Mutuel* (CM) to encourage savings and leave open the possibility of obtaining credit in subsequent production seasons. The nursery owners took credit the following year.

Constraints:

- Initially, the necessity to import plastic sacks
- Not considered a full-time occupation, leading to a lack of motivation
- Difficulty in fostering the concept of private ownership of the nurseries
- Lack of skills and necessary efforts in marketing
- Virtually exclusive (except 0.3 percent) sale of forest seedlings to the project
- Lack of capital savings for investment the following season
- Poor planning: available fruit trees do not accommodate client needs
- Lack of resources to purchase trees during the optimum planting period

Lessons learned and recommendations:

- Villagers can become proficient at most nursery techniques in a short period.
- Nurseries are not a full-time activity for villagers and, hence, optimum seedling quality will not be attained.
- Nurserymen should be encouraged to fashion at least 50 percent of the nursery sacks required for 1997 production out of local materials.
- The production of seedlings with locally produced sacks or by bare root will require less investment capital and is more practical and sustainable. However, trees in plastic pots have a competitive edge over bare root trees.
- There is a considerable and constant demand for fruit trees, and the nursery owners should more actively pursue marketing outlets, according to client demand. Possibly once the project ceases to purchase forest seedlings, the entrepreneurs will either abandon the activity, or more aggressively pursue marketing of fruit tree seedlings.
- This activity also requires a considerable collaborative effort of AF/FOR and the CED technicians. As nursery owners master a majority of the technical aspects of seedling production, the CED technician should focus on planning, saving, and managing stock and finances to support their autonomy.
- The local community's potential to incorporate reforestation into its development plan and establish contracts with local nurseries should be investigated, in places where the CRD is adequately organized.

SECTION V

SECONDARY INTERVENTIONS AND OTHER ACTIVITIES

This section discusses the project's secondary interventions in natural resource management and community enterprise development, as well as other ventures.

A. Natural Resources Management

A1. Fire Control

Fire is an enormous problem in the project's three watersheds and negatively affects groundwater recharge and runoff within the Fouta. Not only does it represent a major force leading to environmental degradation, but village houses are often lost to this cause, especially in Dissa. The project therefore pursued fire control, primarily through early burning and firebreaks,¹ to protect selected zones from burning and to diminish environmental degradation.

Much of the early work on this intervention consisted of informal meetings with villagers to discuss the problem, and organizing and performing the work. Later, extension flyers and a video were developed on fire control for use during village meetings.

Constraints:

- Continued lack of understanding of the long-term effects of annual fires, especially late season fires, on the environment
- Technicians' and villagers' lack of organization in installing firebreaks (in several instances, reforestation plots burned in the Diaforé and Dissa watersheds)
- Fire control not a priority for villagers
- Grazing and burning occur most often on common ranges where there is no organization or perceived value in changing management practices

Lessons learned and recommendations:

- Wildfires are a complex problem that is not easily remedied. To complicate matters, many actors, some of them unknown, are involved.
- Partial burning should be tested in the Nialama FR; in other words, early burning should occur along all roads that transect the forest, along the whole border of the reserve, and on laterite zones (*bowé*) and grassy areas within its interior; the remainder of the forest should be spared from fire.
- Project technicians should work with CGs to reinforce their capacity and organization with respect to early burning; clear responsibilities regarding who will do the work

¹In Guinea, a firebreak is established by burning the zone around the area to be protected. A firebreak is not a band manually cleared of combustible materials.

should be delineated; collaboration should also continue with the local *cantonnements* to help them organize their early burning campaigns and become more flexible in their approaches to burning.

- The DNFF should consider designing and implementing a more effective nationwide awareness campaign regarding the effects of wildfire and how to prevent it. If the design were satisfactory, a donor could be found to help with funding.

A2. Multipurpose Shrub Blocks

Project personnel conceived the multipurpose shrub block intervention as a means to address several constraints cited by villagers during original surveys, namely decreasing soil fertility in *tapades* and a lack of fodder during the late dry season for domestic animals. Also, the shrub blocks were seen as an entry point for securing the collaboration of village women in agroforestry.

This intervention was introduced in the watersheds through a formal extension campaign in 1994 and 1995 using paintings, videos, and flyers. Demonstrations using nursery-produced plants were then installed in unused *tapade* corners with interested families, with the understanding that female family members would manage the blocks and their products in the future.

Constraints:

- Lack of appreciation for this activity's innovative aspects and its importance
- Little protection of blocks because men were not always willing to construct fences for an activity involving their wives
- Shrubs severely stressed from full sun on poor soils during the late dry season, which caused even evergreens to drop some of their leaves

Lessons learned and recommendations:

- A sustained and intense extension campaign with vigilant follow-up is needed for the introduction of any innovative technique in a rural development project.
- Project personnel should organize farmer-to-farmer visits to the best sites in each watershed at which they would demonstrate pruning and emphasize the use of the blocks for mulch techniques for green manure, not fodder.
- If, after the farmer-to-farmer visits, there is interest in installing more shrub block demonstrations, project personnel should formulate an appropriate, sustainable strategy for establishing new blocks (e.g. direct seeding for *Flemingia* and *Gliricidia* and cuttings for *Gliricidia*).

A3. Experimental Nursery

In July 1993, two Guinean graduates from Senegal's *Ecole Nationale des Techniciens des Eaux et Forêts* (ENATEF) were sent to the project by the director of the DNFF. The COP and the regional coordinator asked the agroforestry TA to employ them in the AF/FOR program.

They were asked to establish an experimental nursery for production of native species in Labé and to make occasional visits to the watersheds to collect seeds and to note the flowering and fruiting cycles of native trees and shrubs.

The agroforestry TA oversaw the work of the two nurserymen and helped them start the germination trials and visits to the watersheds for seed collection and field observations. Additionally, one nurseryman was proficient in grafting techniques and participated in trainings on this subject.

Constraints:

- Nurserymen's lack of an acceptable work ethic and unwillingness to do work that involved physical labor
- Inability of nurserymen to work together (one nurseryman would initiate a method and a second would change it in his absence)

Lessons learned and recommendations:

- Given current attitudes in Guinean society, it is extremely difficult to dismiss an employee.
- Clear, written, and agreed-upon job descriptions should be prepared for all project personnel; if individuals cannot adhere to these descriptions, they should be dismissed and replaced.
- The DNFF should consider establishing similar experimental nurseries in each of its four geographic regions to establish production methods for and promote native species. Seed banks and arboretums of native species could also be established in association with these nurseries. Again, it probably would not be difficult to interest donors in this activity, especially if aspects of biodiversity maintenance were stressed.

A4. Canal Stabilization Plantings

In 1993, the project helped Dow Kouratongo village in the Diaforé watershed improve a canal to divert runoff water from surrounding hills (flooding had previously been a problem in the village). To help stabilize the canal banks, the project and the villagers planted more than 500 seedlings, cuttings, and some seeds along a 0.5 km stretch of the canal. Unfortunately, the site is extremely difficult (seasonally inundated with rocky, thin soil), so the mortality was high and growth slow for plants that survived.

Constraint:

- High mortality and slow growth due to the nature of the site

Lessons learned and recommendation:

- For difficult sites (semi-laterite, seasonally inundated, etc.) selected for planting, species must be carefully chosen; native species already growing in the area are often the best choice.

A5. Responsible Logging

During original PRAs in Dissa, project personnel learned that a chainsaw operator was cutting trees in the watershed. The project reasoned that the logger would continue to cut whether he collaborated with the project or not, but if he were willing to collaborate, the project might help him develop more sustainable logging practices. In return for help from the project, he could contribute to the reforestation efforts of the local communities. Even though the logger established his own private reforestation plot (buying seedlings each year from private nurserymen) and repaid the project's loan for a chainsaw on time, he did not always provide seedlings to the villages where he cut the trees as specified in the agreement. Furthermore, he did not let the Dissa agroforester know where he was planning to cut (all cuts were to be approved by the project). In one case, he cut a large tree in a project-sponsored protected zone next to a spring.

Constraints:

- Stipulations of signed agreements not abided by
- Inadequate understanding of multinational forces discouraging sustainable forestry

Lessons learned and recommendations:

- There is no market or price premium for sustainably derived wood products.
- Project-sponsored agreements should be carefully written and monitored; specific clauses regarding sanctions must be included. If an agreement is not respected, these sanctions must be enforced.

A6. Alley Farming

The project contract specified that applied research should be carried out through collaboration with Bareng, the local agricultural research station. A researcher there had already installed on-station alley farming trials and was part of the Alley Farming Network for Africa (AFNETA) sponsored by IITA. In 1994, two alley farming trials were installed in Diaforé and Koundou watersheds, respectively. Growth at the two sites was good to excellent, especially for *Acacia auriculiformis*, *Flemingia*, and Pigeon Pea. Unfortunately, the research ran into several problems. First, PL-480 funds were unavailable for much of 1994, which effectively curtailed follow-up of the trials. Second, in 1995, research activities were streamlined, and only the Koundou site was continued. However, due to a site choice error (the plot was established in the Nialama FR before the limits were known), crop production was not possible and the researcher effectively discontinued his efforts.

Constraint:

- Poor site selection (site was in the Nialama FR)

Lessons learned and recommendations:

- The plot in Koundou should be used for two farmer-to-farmer visits. First lopping demonstrations (all saplings cut at a height of 1 to 1.5 m) should take place in early June. A follow-up visit in late September or early October should occur with the same

group to observe the mulch that was deposited and the coppicing ability of the trees and shrubs.

- Although further tests are needed, it seems that, based on experience, lopping of multipurpose trees and shrubs should be avoided during the mid- to late dry season.

A7. Streambank Plantings

In all watersheds, riparian or gallery forest areas rich in biodiversity occupy a unique niche in the landscape. These forests also serve to buffer flood events and stabilize stream banks.² To conserve and rehabilitate these forests, reforestation along streambanks occurred in the Diaforé watershed in 1994 and 1995. As an added incentive for collaborators, fruit trees were planted along with forestry species (five exotic and four native species were used). Planting in the two years amounted to 2,452 seedlings with five families participating in 1994 and eight in 1995.

Constraints:

- Minimal success due to animal grazing because seedlings were not protected

Lessons learned and recommendations:

- If protection of seedlings is a prerequisite for successful intervention, collaborators and sites must be carefully chosen. Planting should only occur at fenced in sites or where the collaborator can protect the seedlings.

A8. Bamboo Blocks

Bamboo is a multipurpose woody plant that is readily appreciated by many villagers in the three watersheds. It was decided that blocks of a large, exotic variety would be planted with interested farmers in 1994. The long-term goals of the intervention were to provide local construction materials for villagers, and protect selected areas (mainly streambanks). In 1994, 600 cuttings were planted with interested farmers in all three watersheds. In 1995, the activity was limited to Diaforé, where 395 cuttings were planted. In Dissa, farmer interest is not as high as in Diaforé and Koundou and, in fact, many villagers have claimed that bamboo plots harbor snakes and are thus unwilling to plant bamboo.

Constraint:

- Distant cutting source (Koundou and Diaforé transported cuttings all the way from Dissa in 1994 and 1995)

² Some technicians also believe that these forests increase water availability. However, these trees may have the same effect as that of large, evergreen trees next to springs; they may use quite a bit of water during the dry season and draw the water table down.

Lessons learned and recommendations:

- If farmer interest continues to be high, the Diaforé and Koundou agroforesters should organize trips to the closest bamboo-cutting source with several representative farmers from their respective watersheds.

A9. Protection of Biodiversity

Although protection of biodiversity is not specified in the contract as a goal, purpose, or output of the project, this is an important component of NRM and is addressed directly by several USAID projects throughout the world. Project personnel thus decided that project reports should address this issue.

Several AF/FOR activities contribute to biodiversity conservation. Most obvious is co-management of the Nialama FR. Successful protection or rehabilitation of riparian forests also helps maintain a unique ecosystem rich in biodiversity. Furthermore, project efforts in native tree and shrub production have made a positive contribution to biodiversity maintenance. Finally, the agroforestry TA compiled and distributed a field manual on native tree and shrub species to watershed agroforesters, thereby enhancing their knowledge and appreciation of the native flora.

Constraint:

- Difficulty in demonstrating direct economic and indirect ecological benefits to villagers to validate this argument

Recommendation:

- If biodiversity protection is an important goal for the GOG, decision makers at DNFF and other related ministries need to develop an extension strategy that can convince the rural population; this seems especially important for the rapidly dwindling riparian forests. This would include provisions for co-management and incentives for biodiversity conservation measures.

A10. Improved Charcoal Production

In the Dissa watershed, charcoal production is both an important economic and an environmentally degrading activity. Project personnel therefore tried to help watershed villagers bring this activity under control in 1996. Villagers were encouraged to organize into production groups and representatives participated in training in improved charcoal-production techniques, such as the use of the Cassamance kiln which has demonstrated superior yields to traditional charcoal-making techniques in several African countries.

Constraints:

- Too early to identify constraints and to judge this activity's success or feasibility
- Open access to common woodlands reduces value of wood and may discourage use of efficient conversion technologies

Lessons learned and recommendations:

- Improved charcoal production using Cassamance kilns should be pursued in the Dissa watershed. Measurements of conversion ratios and labor investments should be recorded. Calculations regarding wood consumption by the producer groups and consequent reforestation requirements should be finalized.
- Analysis of charcoal prices and conversion costs should be evaluated to determine long-term constraints to improved kiln use.

A11. Night Parks and Corrals

Night parks and corrals were promoted briefly in 1993 and 1994 to facilitate the collection of manure for compost and garden plots, and to address the villagers' concerns for their animals, as expressed during the 1993 PRAs. This activity was eliminated in 1995, because the project sought to focus the scope of its activities. Although many documents cite cattle head taxes as the reason people no longer practice night parks, many night parks exist outside of Diaforé in villages on the road to Fello Koundou. Transient herders in Dissa also use night parks.

Constraints:

- Project technicians believe that head taxes are the reason people no longer practice night parks
- Lack of community organization needed to encourage all members to undertake night parks and corrals

Lessons learned and recommendations:

- Selected farmers see the benefit of night parks. In Diaforé, one farmer built a night park and has found it had reduced his annual loss of three to four cows to none.
- Night parks require no financial inputs, just labor, wood, and cattle training. Technicians should discuss night parks with herders. Organizing villagers to employ herders would also help decrease fencing problems, and improve animal health and profitability. If interested, try farmer-to-farmer visits to Vétérinaires Sans Frontières (VSF) and CFEL sites.

A12. Stables

Stables were also briefly extended in 1995 for animal traction teams. The stables in Dissa are cement, which are unnecessary and expensive. Also, all of the animal traction teams have been sold and the stalls are empty. The stables in Koundou, installed by farmers trained by UGVD, are made of local materials and are occupied by the animal traction teams during the rainy season. In the dry season, the animal traction teams live in the forest.

Constraints:

- In Dissa, lack of appropriate, sustainable technology
- Open access to grazing gives impression of "limitless resource"

Lessons learned and recommendations:

- Animal traction and stable construction techniques used in Koundou by UGVD are sustainable, effective, and low risk, and should be pursued in other areas where people are interested in animal traction. A farmer in Koundou was trained by UGVD to train future farmers. His services should be used if new collaborators are identified.
- Stables and night corrals should be introduced only when CB-NRM plans are developed.

A13. Green Manure/Forages

Use of green manure and forages was selected as a possible activity in 1993, based on farmer priorities of soil fertility and dry season fodder. This was also based on project objectives of improved pasture management and agricultural production and project design document suggestions. Forage and green manure species were experimented with as part of applied research, beginning in 1993. Several species and varieties were tested on station at Centre de Recherche Agronomique de Bareng (CRAB), and in Koundou and Diaforé. The on-station trials have yielded some interesting results, related more to biomass production and seeding characteristics than to soil fertility, but the original trials in the watersheds were abandoned by collaborating farmers.

Seeds of *Mucuna* spp., *Pueraria* spp. and *Cajanus cajan* were distributed to SWC/SAP technicians in August 1995, to test in off-season garden group plots but were never used because the green manure activity was dropped from the annual work plan. A modified green manure system was used to create biological erosion-control barriers in *tapades* and exterior fields in GNRM project watersheds, although so far only shrubs have been used.

Constraint:

- Lack of interest and demonstrations to investigate effectiveness

Lessons learned and recommendations:

- *Stylosanthes* was one of the most promising species of forage on-station, and it survived late plantings, rain perturbations, a short rainy season, grazing by rabbits, and even fire in laterite zones in Diaforé in 1995-96. This species could be promoted if there were interest to establish other demonstrations or trials.
- Additional on-station research on green manures is needed on improved fallow and green manures. Their effects on crop yields and appropriate planting times and systems, before on-farm trials should be considered.
- As soon as performance trials are under way, labor inputs should be carefully monitored to determine if green manures are within the grasp of average farmers at what cost and what benefit.

B. Enterprise Development

B1. Animal Traction

Animal traction in the BRPs was promoted as an income-generating activity and as a means to save time and reduce labor costs. The project, in collaboration with ACT, began animal traction in Dissa with five farmers who obtained the bulls, plow, and attachments through credit from CM. Although the farmers later complained about the high cost of the arrangement, no one refused the opportunity to acquire the bulls, necessary equipment, and knowledge to work their own fields and rent out services to plow others. As explained in the section on credit, the intervention was poorly planned and executed.

In Koundou, the project required farmers to provide bulls and plows as a prerequisite to animal traction training. Three traction bulls and their owners' helpers were trained by a technician from UGVD. A Koundou farmer was trained and conducted two subsequent trainings for interested farmers. UGVD also trained the same farmer to build stables for bulls, and four have been built in Koundou.

A cart was lent to a Dissa traction farmer and proved profitable by facilitating transport of goods out of the watershed. The project proposed promoting similar traction trials in the other two BRPs, but technicians were pessimistic about its success.

Constraints:

- Poor programming in Dissa
- Marginal profitability
- Competition from tractor services in Dissa
- Lack of capital to pay for traction services
- Inappropriate terrain for traction services in Koundou, outside of the Nialama FR where it was initially practiced

Lessons learned and recommendations:

- Animal traction does benefit farmers in reducing time and cost of labor and generates extra income.
- Activities such as animal traction do not generate a large amount of income and the profitability and cash flow schedules of interested farmers should be sufficiently analyzed before they commit to taking credit.
- Methods used in Koundou to promote animal traction have proven sustainable.

B2. Egg Production

This activity was initially conceptualized for the Dissa watershed. Because of the proximity to the Conakry road and the lack of eggs in Sougueta, the potential for small-scale egg production was great. The project initially contacted one man and four women in Falloulaye who were interested in the activity. Soon the four women were excluded by the village notable that remained. His unfortunate assumption that the project would pay for his infrastructural requirements led to a series of misunderstandings and discussions. BRP technicians complicated

the situation by also assuming that subsidization would occur. Ultimately, the project paid for a feasibility study and training, and after a series of false promises, gave the poultry keeper a no-interest loan to purchase his initial allotment of chicken feed. Chicks were purchased in January 1996 and the keeper boasts an average daily egg to hen ratio of 80 percent.

In Diaforé, the paravet raised 25 laying hens in a chicken house constructed entirely with local materials. Disease caused serious loss to this keeper. However, he learned how to prepare chicken feed from locally grown corn, although the palm cake and calcium (shells) have to be imported.

Constraints:

- Limited amount of people benefiting initially
- Requires thorough management and marketing for success
- Feed not available, especially in isolated areas such as Koundou and Diaforé
- Marginal profitability

Lessons learned and recommendations:

- Egg production is a relatively high input and management-intensive enterprise that can be justified and recommended only in the most organized areas close to proven markets.
- Follow-up is essential to ensure sound management of the farm.
- Because of feed availability, egg production is a reasonable activity at Dissa. The Falloulaye farmer had relatively high investment costs (1 million FG), compared with the cost of the bamboo chicken house that the paravet in Diaforé built for 25 hens for 6,000 FG.
- At cost of production of 123 FG/egg (results of CED meeting, December 5, 1996), the Falloulaye farmer should sell eggs for 150 FG and make larger individual purchases of feed to cut transport costs.

B3. Soapmaking

This activity was initially identified in Dissa. The objective was to improve the quality of soap produced at the local level and to increase village women's income. The project contributed start-up costs for the small enterprise—mainly the molds, a cutting table, and the stamps. The women were requested to “reimburse” these costs into a communal revolving fund that would serve as a source to renew materials over time. Soapmaking was further promoted in Koundou and Diaforé, but all inputs were transported by the project to the production sites. Considering the constraints listed below, support for soapmaking was dropped during the last year of the project.

Constraints:

- Lack of local availability of inputs such as palm oil and caustic soda
- Poor design of cutting table and stamp
- Production too infrequent to generate significant revenue
- Lack of marketing strategy

- Variation in price, quality, and availability of caustic soda and oil
- Significant competition

Lessons learned and recommendations:

- Improved soap production is a simple technology requiring less time than traditional methods, does not require the use of wood, and results in a quality product, but that is complicated by lack of availability of inputs and market competition.
- For soap making to be successful in Dissa, marketing efforts should be intensified, accompanied by a significant increase in production, to at least 1,500 bars/month for 45,150 FG/month profit. If retailers in Kindia or Mamou are interested in bulk purchases, the Dissa group could increase their sales. They can also try other regional markets such as Linsan and Kolente.
- If production is intensively increased in Dissa where materials are more available, women have an opportunity to make additional income. However, experience has proven that the market is too saturated with locally produced soap, or the women do not have the time to produce on a regular basis.

B4. Indigo Dyeing

Dyeing was limited to one group of 18 women in the Koundou watershed. Project support to this group was to increase income-generating potential for an activity already practiced by BRP women on an individual, noncommercial basis. The project helped women organize and encouraged savings. A feasibility methodology workshop was conducted before the group activity was conducted. To increase their revolving fund, the women brought dyed cloth from Labé and sold it in the Koundou area. The project assisted with transport of cloth.

The women were trained in improved dyeing techniques to improve the quality and give them a more competitive edge at markets such as Labé and Pita. They contacted a retail store in Labé that wanted quality *lepi* cloth, which is more rare in Labé than the *bazin*.

Constraints:

- Bulk sales only possible outside the watershed
- Seasonal market
- Lack of available inputs
- Practiced only by older Sarankollé women in rural areas
- Prepared dyeing ingredients wasted if not used continuously
- Unavailability of cotton combing cards for preparing thread

Lessons learned and recommendations:

- Dying requires significant management and marketing capabilities not often found in rural Fouta Djallon.
- Group management of communal funds is possible if training, follow-up, and social dynamics are favorable.

45

- Marketing training should be a priority to ensure future contracts with potential buyers.
- Women should be encouraged to invest the money placed in their revolving fund, especially after the money exceeds 1 million FG.

B5. Metal Works

Assistance to blacksmiths was promoted in Dissa and Koundou, in the form of extension of improved stoves. After perceiving a need for locally available gardening tools, craftsmen were also trained in constructing watering cans. Initially, two Dissa blacksmiths were trained for one week in Mamou. They took a loan, with the assistance of the guarantee fund established by the project, for the tools necessary to construct stoves. Although women expressed interest in using stoves, they probably thought the project had planned to give them away, so sales were slow. Some women gave the blacksmiths an old metal barrel in exchange for one stove. A simple accounting system to keep track of material and stove stock was established with the Dissa blacksmiths when they were operational.

Koundou blacksmiths were trained in Pita and did not purchase tools like the Dissa craftsmen. During their first year, they produced and sold more than 300 stoves. However, demand was dramatically reduced.

PCVs learned how to construct mud stoves during their training, but only two have actually tried to promote the no-cost, simple technology. Project technicians were never convinced of the importance of mud stoves, citing their lack of mobility and noble class villagers' refusal to work with mud.

Constraints:

- The perceived value of fuelwood subsidized by nonrenewable collection rates off common lands discourages incentives for conservation and efficiency
- Slow sales delayed loan reimbursement and discouraged blacksmiths
- Lack of permanence of blacksmiths in the zone
- Weak extension campaign in Dissa
- Weak financial management practices; meager funds for working capital
- Required skill and quality inputs for watering can construction
- Lack of sufficient inputs (empty metal barrels)

Lessons learned and recommendations:

- Although this activity has obviously encountered problems and has resulted in slow adoption, promotion of improved stoves, mud or metal, before wood becomes scarce is the wisest policy.
- The Dissa blacksmith should be trained by the blacksmith trained from Falloulaye. As soon as the latter recognizes his potential competition, more stoves may be made available to village extension agents and for passers-by on the Conakry road.

B6. Cattle Commerce

Some merchants in Diaforé purchase cattle from local herders and resell them at nearby markets. A cash flow schedule indicated that this activity is profitable, potentially earning the merchant 500,000 FG profit.

Initially, three merchants solicited loans of 500,000 FG, one year in length, reimbursing every four months. Two reimbursed on schedule; the third was late but paid off the loan. Profit margins were less than expected, at only about 15,000 FG/head instead of 25,000 FG. A subsequent loan was distributed to a group of three men in 1994, who have still not reimbursed the debt. Profit was less a factor than the integrity of one group member.

Constraints:

- Decreased profit as a result of compromised sale of cattle after traveling several km on foot
- Poor evaluation of applicants, resulting in delinquent loans

Lessons learned and recommendations:

- This activity is important and specialized enough as to require more than the passing attention of the CED advisor and needed additional TA.
- Cattle commerce is a profitable activity that takes time, but cannot be considered a full-time activity for rural dwellers.
- Cattle in management remains the largest constraint and opportunity to the sustainable management of the Fouta Djallon's vegetative cover and hydrological function.

B7. Small Commerce

Two women's village associations requested income-generating support from the project. This was to increase the availability of imported goods such as rice, kerosene, and oil in the BRP region while generating income for village women. The project assisted by transporting commodities the first three times out to the BRPs from Labé, and by providing training in record-keeping and money management. The activity began and was most successful in Koundou, where two groups totalling 60 women earned more than 1,125,000 FG in profit.

Constraints:

- High transport costs and low profitability
- Requires strong support in management and marketing

Lessons learned and recommendations:

- Women practicing small commerce have proven their ability to link economic activities with the traditional village social structure.

- The linkage with the project goal and/or purpose is not evident and requires more coherent analysis and monitoring of the use of benefits derived from commerce.

B8. Credit

The GNRM project did not have a credit component and never intended to have one. The project opted to collaborate with established institutions that specialize in credit such as the CM and the Promotion of Rural Initiatives and Development Enterprises (PRIDE) projects. Collaboration was initiated with CM in 1993 by signing a contract, or *protocol*, between the GNRM project and CM. The project deposited a sum of 3 million FG that would act as a guarantee fund for loans taken by project collaborators.

The first loans were taken in Dissa for five pairs of traction bulls. The urgency to get activities “on the ground” and get the bulls in the field at the start of the project’s first rainy season resulted in farmers and technicians being poorly advised on CM’s policies and repayment schedules. Thus, the rate of repayment of these first loans was poor. Subsequent loans were distributed in Diaforé by a more systematic approach. Cash flows and business plans were completed before the loans were approved, followed by a one-day training/sensitization on interest rates and periodic loan repayments. Loan recovery was a problem in some instances, but in general, the BRP team furnished a painstaking effort to follow up with CM’s clients. The BRP technician in Koundou was apprehensive about involving villagers in taking loans, especially considering that the closest branch is in Labé (a distance of more than 100 km). The nurserymen deposited savings into accounts and took loans in 1995, but have since closed their accounts.

The PRIDE project conducted an evaluation of collaboration between the GNRM project and CM. It also investigated credit needs and recommended alternative strategies for the BRP to access credit.

Constraints:

- Lack of clear understanding of CM and project roles on loan follow-up and reimbursement
- Misunderstanding of DNFF technicians that “high” interest rates are a constraint to loan repayment
- Impracticality of CM membership for some BRP residents considering distance to branches, especially from Diaforé and Koundou
- Credit system designed to assist urban rather than rural enterprises
- Lack of availability of Dissa branch manager, who has since been replaced

Lessons learned and recommendations:

- Micro credit is very important in catalyzing entrepreneurial spirit that can ultimately reduce pressure on the natural resource base.
- Support should be given to the formation of village savings and credit societies (*caisses villageoises*). This recommendation is consistent with those made by the PRIDE team

that evaluated GNRM project and CM collaboration. CED counterparts participated in a six-week training in Burkina Faso on this topic, and the technicians in Diaforé and Koundou are very enthusiastic about realizing a program benefiting people in and surrounding the BRPs.

- If collaboration with CM is to continue, and the only BRP apparently interested is Diaforé, regularly scheduled information (sensitization) tours should be implemented at least six times a year.
- Collaborating project technicians and CM agents need to maintain contact several times throughout the year.
- Detailed business plans including cash flow schedules should be completed before any loans are granted to collaborators. Examination of the candidate's integrity and stability in the area must also be included in the credit worthiness evaluation.

C. Accompanying Ventures

The GNRM project was involved in the construction of BRP administrative centers and lodging for technicians, road repair, construction of schools, and other activities that although not directly related to NRM used a large portion of the project budget. See Annex F for more details on structures built to support project activity in the three BRPs.

SECTION VI SUPPORTING ACTIVITIES

This section discusses constraints to supporting activities, lessons learned, and recommendations.

A. Training

A1. Counterpart on-the-job Training

For the most part, the LTTA trained their counterparts informally or on the job during watershed visits. In turn, the counterparts trained villagers informally during site visits within the watersheds. The magnitude and importance of this kind of training is difficult to describe and quantify. Nevertheless, some general indications will be given below.

Above all, LTTA helped their counterparts develop planning and organizational skills. This included working closely with them on subjects such as production and management techniques, extension campaigns and site selection, and other work that was influenced by the seasons. A substantial effort was made to consider and be aware of activities included in the annual work plans *before* it was time to implement them. Annex A illustrates various topics reviewed with counterparts by the LTTA and some of the techniques used in this on-the-job training.

The LTTA maintained continuous supervision and training efforts through watershed visits and communication through memos and radio messages. In each BRP, the TA reviewed progress of ongoing activities with his/her counterpart. They analyzed his/her development and ability to resolve problems and encouraged counterparts to take a lead role after the departure of the TA team.

Constraints:

- BRP technicians are often hired outside the BRP and are usually hired by the DNFF and thus may not be responsive or familiar with local needs and capacity
- Inappropriate scopes of work leading to unsuitable selection of BRP technicians (CED)
- Limited amounts of hands-on training possible considering the average LTTA spent three of four days per month in each BRP
- Lack of communication among LTTA, technicians, and directors causing delays and confusion in implementing some activities
- Reassignment of posted technicians (especially the SWC/AP program)
- Some technicians' lack of motivation
- Understanding that "sustainability" is not exclusively identified with something solid and cement

Lessons learned and recommendations:

- BRP technicians should be hired as “locally” as possible to maximize familiarity with local problems and solutions.
- BRP technicians should also be more closely affiliated with local government (at the CRD level if possible).
- The GOG should initiate a comprehensive system of work standards development and performance management for civil servants, so that they get more for their money.
- Donors should insist on a system of accountability, and ensure that clear, well-written scopes of work are elaborated for project staff as a condition precedent to further funding.
- Project administrators should participate in annual performance reviews of staff, and make concrete suggestions for personnel improvement.
- Counterparts should have been formally trained for four to six months at the beginning of the project, in PRA, extension, and technical skills to ensure that they have the same basic knowledge and skills before beginning field activities. Watershed trips could then be more effective for follow-up, analysis, and evaluation.
- Placing one LTTA in each BRP would reduce the amount of traveling time and could improve the required follow-up for some technicians and activities.
- Improved efforts by the directors to be present during the TA’s last work day in the BRP could prevent misunderstanding in approaches and strategies and therefore a lack of implementation of certain activities.

A2. Local Training

The objective of farmer training was to enhance the capacity of watershed residents to improve NRM and produce and market surplus agricultural and artisanal commodities. The principal areas of training required were improved technologies, organization, and management. Annex C summarizes the local training sessions by year.

The training was carried out through sensitization or informational campaigns, using videos, posters, drawings, extension sheets, and rural radio messages. Training was also carried out through individual site visits, field days, village meetings, formal and informal workshops, demonstrations, farmer-to-farmer visits, and study tours. See Annex I for a list of the technical bulletins and videos produced by the project.

The LTTA played an important role in coordinating training activities, especially involving collaboration with other organizations working in the Fouta. In fact, the majority of work with local NGOs (UGVD, ACT, GE); government services (SNAPE, SNPRV, CNA, CFEL) and regional projects (PRAFD, FAO, SAGE, CM, AMIP, PRIDE) was related to farmer training and facilitated in Labé and Kindia. BRP technicians together with the LTTA prepared and implemented training programs.

Constraints:

- Limited availability of people due to the agricultural calendar
- Irregularity of PL-480 funding making local training difficult to plan and execute
- The breadth of mixed training messages from various technicians/partners
- Limited effectiveness resulting from lack of follow-up after training

Lessons learned and recommendations:

- Experience and results from the GNRM project workshop on extension tools show that study visits are one of the most effective types of training for villagers. Least effective are informational brochures because most of the population is illiterate.
- Farmers trained by the project should be encouraged to train new farmers in NRM and sustainable agriculture technologies during the life of the project, and encouraged to be as self-sufficient as possible.
- For all project extension programs/meetings/demonstrations, set up a board in each village with the date, the time, and the topic to be discussed, using locally appropriate symbols and Arabic characters.
- Technicians should be required to evaluate the effectiveness of workshops and training sessions by conducting periodic follow-up for at least one year after the session takes place.
- BRP technicians should review lesson plans with NGO or government agents that are implementing a training, especially if previous sessions were held with other services.
- It is best to program farmer training between January and April, or during some periods in August.

A3. Regional Training

To satisfy Objective No. 5 of the expected results framework, and to address the human resources constraint cited in the project paper, several regional training sessions were organized by the TA team and attended by DNFF technicians and contractuels. Annex B provides a summary of regional training by year. Annex D provides details on in-country training for DNFF and other GOG personnel.

Constraints:

- Lack of time and resources to identify and program a very wide variety of appropriate training courses for counterparts
- Lack of viable alternatives for such training in Francophone countries

Lessons learned and recommendations:

- Although it was hoped that the LT trainees would be returned and reintegrated into GNRM project activities, their studies have taken longer than expected. It is presently

unclear what, if any, their post-project functions will include. Hopefully, their skills can be incorporated into the next phase.

- The training STTA proposed in the training work plan would have alleviated the pressure on the TA team to find appropriate courses, and probably have improved the selection of seminars.

A4. Long-Term Training

Six DNFF fonctionnaires were selected in 1993 as candidates for master's' programs in the United States. Three of those candidates were then working with the GNRM project: Yacine Sow as regional coordinator, Abdulaye Kouyé Bah as Koundou SWC technician, and Lucien Tounkara as the Dissa SWC technician. Four of these six students have continued to progress in their Master of Science degree programs (see table below) and will be returning to Guinea in 1997. The degree program for a fifth trainee, Lucien Tounkara, was canceled in December because of weak academic performance. The sixth student, Christine Sango, was obliged to discontinue her scholarship for medical reasons, and subsequently returned to Guinea.

Table V-1. Long-Term Overseas Training Progress As of December, 1995

Name Former Position	Program (Status)	University	Estimated Date of Graduation
Yacine Sow, GNRM project regional coordinator	Forestry (enrolled in one technical course and 3 ESL)	Mississippi State University	Spring 1997
Abdulaye Kouye Bah, SWC tech/ BRP Koundou	Soil science (14 graduate credit hours plus supplementary ESL)	University of Missouri, Columbia	Spring 1997
Sidy Conde, Pasture specialist, Guetoya Project	Rangeland and ecosystem science (4 graduate credit courses)	Colorado State University	Spring 1997
Ismael Diallo, Director of community forest, Pita	Forestry (12 graduate credit hours)	West Virginia University	Spring 1997

B. Applied Research

The project worked with villagers in the three BRPs during the annual surveys to identify important constraints in their zones, discuss possible technologies to address these constraints, and determine research topics. To execute research trials, the project collaborated with the *Institut de Recherche Agricole en Guinée* (IRAG) and the Bareng and Foulaya Research Centers. The project also collaborated with the LPV in Labé and the SNPRV for some trials. Thirty trials were undertaken and 18 applied research reports submitted in three years. (See Annex J for a list of project documents and publications.)

After several trials failed because of a lack of PL-480 funding (all trials were financed through counterparts) in 1995, the GNRM project used Chemonics finances to pay for applied

research. With a stable source of funding and detailed contracts, 12 of 14 trials planned were implemented, 11 giving viable results.

Constraints:

- Failure of most trials (11 of 16) in 1993-94, due to lack of PL-480 funds
- Lack of understanding by farmers of the goals of applied research and the time necessary to properly maintain the trials, even after meeting with researchers and BRP technicians
- Lack of trust, especially at the onset, by farmers who were convinced that the harvest from trials belonged to the project, and therefore expected to be paid for their work
- Lack of appropriate plots of land to conduct trials
- Inadequate communication of project staff with other development agents in the region (FIDA, SNPRV, CRAB)
- Inadequate time to undertake on-station research of certain technologies, such as alley cropping, for resolving village-level problems
- Lack of control over research protocols; poor quality of reports

Lessons learned and recommendations:**Concerning trials:**

- Kawanzie and K9101 maize can be favorably produced in Diaforé and Koundou, and are appreciated (especially the latter) by villagers for their color, yield, taste, and resistance to disease and pests.
- Tanzania cassava is appreciated in areas where the soil fertility is high (such as Dissa), but not in gravelly, less fertile soils (such as Koundou). Faranah and 80/40 cultivated on sloping land are well liked in Dissa.
- Potatoes produced favorably in Diaforé (15 to 20 T/ha); there is no difference between the Nicola and Desiré varieties; in 1995-96, there was no difference between planting in September, December, and January. (Another year of research is recommended for viable results.)
- Ivorienne and Chinoise IV sweet potatoes are very appreciated in Diaforé, where farmers continue to plant them, but not in Koundou or Dissa (after one year of introduction).
- A variety of peanut appropriate for the Fouta has not yet been identified.
- The performance of rice varieties tested in the BRPs has not yet been determined. Initial results for those tested in 1996, CK21 and CK211, indicate that they are well

appreciated by farmers, and that they produce favorably (2,000-4,000 T/ha in Dissa), but have not yet been harvested.

- Mamou peppers and Tabuna eggplant are well appreciated in Dissa and are being extended to gardeners.
- Sand reduces stored grain losses (by up to 60 percent).
- Erosion effluent, in combination with mechanical methods, is an efficient method of termite control (60 percent efficient).
- Trials with nitrogen-fixing plants require laborious research. The most appropriate (on-station) species must be introduced and identified, and then tested in the field. *Stylosanthes guyanensis* and *Stylosanthes humulis* produced well in the Fouta, especially *S. guyanensis* that can survive on *bowal* (prevalent in Diaforé). Before introducing forage plants in rural areas, there must be intense sensitization, accompanied by field trips, training, videos, and farmer-to-farmer visits.
- Local lime (from Mali, Tougue, and Kankalabé) accompanied by fertilizers can significantly increase potato yields (from 5 T/ha to 16 T/ha), increase the pH by one unit (from five to six), and decrease Al (from 125 to 1 ppm), but an appropriate system must be found for practical use.

Concerning applied research as an activity:

- Research protocols should be simplified as much as possible.
- To have viable results, each trial should have a minimum of 18 to 20 repetition sites.
- It is best to have frank collaboration between research centers, the project, and villagers and sign contracts with everyone present. Communication through regular meetings and workshops will improve collaboration.
- There must be follow-up after the harvest to evaluate farmer satisfaction.

C. Monitoring and Evaluation

The goal of the GNRM project M&E system is to provide DNFF with the capability to monitor and evaluate project progress and the state of the environment over time. For the first two years of the project, project staff debated the complexity and nature of the M&E system required. A STTA was requested in 1993, and a very ambitious M&E plan was created in 1994. For the past two years, the M&E system has been managed by the project COP in collaboration with the subcontractor, Management Consultants, and, for the last year, the newly appointed DNFF M&E technician. During this time, significant progress has been made toward designing and implementing a much simplified M&E system.

The M&E system is composed of two basic components: a progress monitoring system designed to measure project progress toward the outputs specified in the Chemonics contract and toward goals set in annual work plans. It also is intended to measure adoption of project technologies, and be an impact monitoring system designed to measure biophysical and socio-

economic changes. This system was discussed and formulated during meetings in each watershed in May 1995, and important progress and impact data needs were identified. GNRMP staff have begun collecting preliminary progress and impact data. Progress data for 1993-1996 are presented in Annex E.

Constraints:

- Difficulty in obtaining timely data on progress indicators from the BRP
- Unquantitative, noninformational reports submitted by the BRP technicians
- Inadequate communication to BRP teams on the organization and operation of the M&E program
- Very late (1.5 years) arrival of the DNFF M&E technician
- Conflicting viewpoints on the methodology to be used for an M&E system (USAID/Conakry, STTA, USAID/REDSO, TA team)

Lessons learned and recommendations:

- An M&E system is an integral component of all project activities, and should not have been contracted out to an independent organization. In particular, watershed directors, the regional and national coordinators, and the COP should be responsible for this activity. Moreover, the basic structure of an M&E program needs to be in place by the end of Year 1.
- M&E activities should be turned over to SRAI/MFD (RAF). They should be involved in the creation of a database that includes GNRMP project progress and environmental impact data (which should have already been created by Morlaye Keita), as well as data from GERF, Guetoya, *Haut Niger* and *Haute Gambie*. An analytical report reviewing progress, impact data, and lessons learned from all PRAFD projects, and semi-annual reports that include relevant data and analyses from the BRP projects should be prepared. The SRAI/MFD team should include a sociologist to assess socioeconomic impacts and adoption levels and constraints, and collaborate with the *Service Hydraulique*, the DNE, SNPRV, and the *Inspecteur Régional* (DNFF, USAID).
- An NRM M&E specialist should be requested for three to four months to facilitate a regional conference specific to NRM. The goal of this conference should be to elaborate the minimum number of indicators required to assess environmental impacts in projects such as these, and the easiest and cheapest means to collect the necessary data. After elaborating these indicators and data collection techniques, the consultant and RAF personnel should work with and train local technicians in data collection, then collect preliminary data and analyze it with them.
- Recommendations made by the STTA who completed his assignment in September 1993 should have been adequately followed, allowing that a program be in place during the first year of the project.

- The DNFF should have been encouraged to promptly assign a qualified technician responsible for the GNRM project M&E system.

D. Policy Analysis

The objective of this activity was to address the policy constraints described in the project paper. Guinea's overall policy environment is not always supportive of sustainable NRM and enterprise development activities. The participatory rural appraisal and discussion with other projects in the Fouta Djallon have identified several examples of how present and perceived government policy decreases farmers' incentives to improve their approach to NRM or to enter the market system. Land tenure policies, especially land tenure insecurity, discourage farmers from spending time and money to improve or protect the land that they work. These policies also encourage unsustainable harvest of open access forests and rangeland. The lack of harmony among various codes and regulations is confusing. The competition among several GOG ministries for jurisdiction over portfolios and the over-politicizing of codes create additional obstacles.

By involving STTA, conducting workshops, and initiating dialog, the GNRM project addressed policy constraints linked to support to women and other disadvantaged groups in the management of natural resources, marketing surplus produce, and participatory management of the Nialama FR.

Constraints:

- Lack of confidence from BRP technicians that land use contracts can be an effective method to assist disadvantaged groups
- Inadequate understanding of women's role in agroforestry
- Lack of clarity on how to support activities primarily involving women
- Lack of clarity on best ways to link collaboration with the AMIP
- Late initiation of Nialama FR work considering that the TA team is departing and that the approach is very new for the DNFF

Lessons learned and recommendations:

- Collaborate more with existing women's groups for community reforestation and agroforestry techniques.
- Support to women's activities should be made more clear at the onset of the project. A better defined SOW for a STTA during the first year would have assisted.
- Assigning *animatrices* was beneficial to the integration of women into NRM activities. However, having no women technicians other than these *animatrices* tends to marginalize women and their activities instead of integrating them into overall project implementation.

- More concrete collaboration should have been suggested between project managers at USAID responsible for the GNRM project and AMIP.
- Funding and support for the Co-Management of the Nialama FR, using UGVD as facilitator, should be continued. The implementation of the forest management plan will need to be carefully supervised by a competent silviculturalist (DNFF, USAID). An increase in training and study trips with an accent on participatory and sustainable forest management techniques at the policy-maker level will assist in initiative progress.

E. Peace Corps Volunteers

The GNRM project's original project design included the participation of PCVs. Four PCVs began service in fall 1991; however, their arrival preceded project activities by a full year, as the inception of the project was delayed until fall 1992.

A second group of six PCVs began service in September 1993. According to their assignment description, they were to be a link between their communities and the project's technicians, helping to identify potential activities and interventions. Two PCVs were placed in each BRP, one as CED technician, who would work with the watershed CED technician and the *animatrice*, and the second as NRM technician, having as counterparts the Guinean agroforestry and soil and water conservation specialists. The job description did not state precisely what their activities would be, but suggested general areas where they could focus, especially on promoting and helping with the project's NRM and CED interventions.

The volunteer Pre-Service Training covered many topics relevant to the GNRM project's activities and interventions, including agroforestry techniques, erosion-control measures, gardening and tree nurseries, extension and environmental education, and small enterprise development.

The job description changed once again for the third generation of PCVs who arrived in fall 1995. The three stated goals were to assist villagers in the three watersheds with GNRM project's NRM interventions; to introduce environmental education programs (mainly in primary schools); and to facilitate self-help community development projects. See Annex H for information on what PCVs were involved with during the LOP.

Constraints:

- No clear job description or counterparts for the first group of PCVs
- Unfinished houses at the time of the PCVs arrival
- No reliable means of transportation until motorcycles were procured
- No pre-service training in local language
- Inadequate communication between all branches of the project, causing a great deal of inefficiency and even blockage of effective collaboration
- Frustration of PCVs with lack of project staff accountability and incompatibility of the GNRM project's approach to Peace Corps small-scale strategies

- No clear job description for subsequent volunteers
- Lack of respect from project staff toward PCVs, who felt that they were not considered members of the GNRM project staff, making collaboration “nearly impossible”
- Inadequate program support from Peace Corps/Guinea’s administration

Lessons learned and recommendations:

- A broad-spectrum program such as “natural resources management” is too general and gives the PCV little direction; a more-focused program will clarify the scope of work for PCVs.
- The respective PCV and counterpart roles must be well defined, and it must be clear what will be gained through their collaboration. Both parties must understand their individual and collective responsibilities.
- PCVs’ involvement in large-scale projects should be reconsidered. The presence of so many other personnel often causes the PCVs to be overlooked, and they are less likely to fill an essential role. From the Peace Corps’ perspective, it makes more sense to establish longer-term programs associated with permanent local institutions.
- Future Peace Corps NRM programs should be precise and focused, with clearly defined goals, responsibilities, and tasks. The programs should be limited in scope to avoid spreading PCV efforts too thin.
- Consideration must be given to the PCV-counterpart relationship, including factors such as current and future job responsibilities of the counterpart, benefits the PCV and counterpart have to offer each other, potential obstacles that may arise to hinder their collaboration, and type of system or structure in which the two will work.
- An APCD devoted solely to natural resources and the environment is essential. The various agencies, ministries, or other organizations involved with NRM programs (including Peace Corps) must be more closely coordinated, and especially must maintain regular communication.
- Many elements are essential in PCV site placement, including motivation of counterparts, officials, and the population; actual community need of development assistance; and other past and present development projects or activities.
- PCVs and project staff did not well understand the role of PCVs in the project, and its original intent not well thought out. It was thought that volunteers would work with NRM or CED technicians in the watersheds, but with the existence of the TA team they often felt their presence to be rather superfluous. The project could perhaps have requested community health extension volunteers or environmental education to collaborate with the project on NRM activities, rather than require Peace Corps/Conakry to create a program that it was ultimately not able to support. As soon as this problem was recognized, it should have been promptly addressed with a meeting between PCVs, Peace Corps/Conakry, the COP/TA team, the USAID project manager, the regional and national coordinators, and the BRP directors.

ANNEX A
COUNTERPART TRAINING, 1993-1996

Topic	Techniques
Lopping and pruning	Field practice
Production of several exotic, nitrogen-fixing shrubs	Demonstration; discussion
Extension	Review of project approach; MARP; field practice
Water quality analysis	Demonstrations and discussions in the field
Soil fertility analyses	Demonstrations and discussions in the field
Crop-production techniques	Demonstrations and discussions in the field
Yield calculation	Demonstrations and discussions in the field
Improved variety analysis	Demonstrations and discussions in the field
Soil, water, and crop-production impact data collection and analysis	Demonstrations and discussions in the field
Inexpensive irrigation and source capturing techniques	Demonstrations and discussions in the field
IPM	Demonstrations and discussions in the field
Identification and use of N ² fixing plants	Demonstrations and discussions in the field
Analysis of applied research activities	Surveys of collaborators and trials in progress; discussions with research personnel
Enterprise identification	MARP; discussions with villagers; regional market studies; feasibility studies
Feasibility studies	Preparation of implementation of "Doing a Feasibility Study" seminar
Marketing	Preparation and implementation of marketing training with village entrepreneurs; market surveys; visit from STTA
Credit/savings	Discussion with CM representatives; use of financial calculator to determine interest rates and reimbursement schedules; CESAO seminar
Planning	Review of work plan and objectives; discussion of ongoing activities; determination of monthly work plans
Reporting	Discussion of report design and essential elements; progress indicators
Cost/benefit analysis	Theoretical and practical exercises; recordkeeping of expenses and revenue; market surveys; discussions with producers.
Cost of production/pricing	Reviewing fixed and variable costs; exercises with BRP products
Balance and profit/loss sheets	Practice in office and in the field with existing enterprises

Topic	Techniques
Cash flow schedules	Discussion of credit requests; implementation of feasibility study workshops; practice on existing enterprises
Group organization	Field exercises; support from UGVD; study tours
Activity budget request preparation	Discussion with TA
Preparation of annual work plans	MARP; workshops in Labé

ANNEX B
REGIONAL TRAINING SUMMARY - BRP TECHNICIANS, GNRMP

Subject	Participants	Objective/ Result	Trainer(s)/ Site	Duration
1993				
New Peace Corps volunteer orientation	NC, 1 TA	Review of project objectives and design with incoming Peace Corps volunteers	Thies, Senegal	1 week
Agroforestry for development	3 AF/FOR technicians	Discussion of practical agroforestry methods supporting rural development	ICRAF, Nairobi	3 weeks
Creation and management of private enterprise	DNFF Nat. Dir and NC	Theoretical course for development decision makers	Atlanta Mgt. Inst.	4 weeks
1994				
Accounting for gardening projects and plant protection	3 CED technicians	Examination of planning, budgeting, and accounting specific to gardening projects; overview of major plant pest and diseases.	<i>Centre de Formation Professionnelle Horticole</i> Dakar	3 weeks
Regenerative agriculture	3 SWC/AP technicians	Discussion and demonstration of improved soil fertility and conservation methods	Rodale, Senegal	3 weeks
Gambia NRM conference	3 WMU directors, AF and COP	Debate by a variety of development decision makers of common NRM techniques employed on current projects	USAID/AFR/A RTS/FARA, Banjul Gambia	1 week
1995				
NRM observational tour	6 villagers, 2 BRP technicians, TA <i>animatrice</i>	Exchange of experiences by technicians and villagers from NRM Benin and GNRMP. Subject areas included systematic tree harvest, nurseries, beekeeping, and erosion-control methods	NRM Project, Benin	2 weeks
Planning and management of development projects	3 BRP directors	Strategic planning and preparation for development projects; economic, social, and financial analysis; integration of computers in this analysis	Management Institute, Pittsburgh, PA, USA	4 weeks
Support to women's groups in the promotion of income-generating activities	3 BRP <i>animatrices</i>	Technical and economic analysis of income-generating activities; exchange of experiences with other development workers	CESAO, Burkina Faso	6 weeks

Subject	Participants	Objective/ Result	Trainer(s)/ Site	Duration
Visit to PCV training site	1 BRP Agroforester , 1 BRP <i>animatrice</i>	Participation in practical training sessions for Peace Corps trainees	Thies, Senegal	1 week
1996				
Village land management (<i>Gestion de Terroirs</i>)	3 AF/FOR technicians	Discussion of organization of village lands, administration of village zones, land management, and preparation of a individual study project	MARFIM, Abidjan	4 weeks
Credit and savings	3 CED technicians	Exchange of experience and discussion of mobilization of rural savings and credit, and investment, and preparation to establish local savings and credit structures	CESAO	6 weeks
Irrigation, NRM and conservation	3 SWC/AP	Demonstration and discussion of simple appropriate irrigation methods, and how conservation relates to NRM	<i>Centre de Formation Professionelle Horticole, Dakar</i>	4 weeks
NRM observational tour	1 RC, 2 BRP directors, 3 BRP technicians	Visit to project experienced in participatory development and land use management (<i>gestion des terroirs</i>)	<i>Centre de Formation Professionelle Horticole, Dakar</i>	2 weeks
14 regional/overseas short-term trainings	45 participants			44 weeks

ANNEX C
LOCAL TRAINING SESSIONS, 1993-1996

Subject	Objective/Results	Participants	Trainer(s)	Location	Length
1993					
Animal traction	Farmers could employ a pair of bulls to correctly plow land and can maintain animal health	10 farmers	ACT, Kindia	Dissa	10 days
Improved honey harvesting techniques	Beekeepers can properly use smokers, protective equipment, and know the importance honey comb selection for quality control	3 men	<i>ApiGuinée</i>	Koundou	1 day
Improved stove construction	Blacksmiths properly use tools, purchase necessary materials, and construct 2 models of improved stoves	2 Dissa and 2 Koundou blacksmiths	Local blacksmiths	Mamou and Pita	20 days
"Doing a Feasibility Study"	Participants know the 6 important steps to deciding whether an activity is economically viable	10 men and 12 women in Diaforé	BRP, TA teams	Diaforé	4 days
Study visit to gardening co-op	Farmers understood the potential of onion production in the region, certain production techniques, and organizational structures	4 men and 4 women	BRP, TA	Tougue	1 day
1994					
"Doing a Feasibility Study"	Dyers know the 6 important steps to deciding whether their activity is economically viable, and the best ways to organize their group	18 women	BRP, TA teams	Koundou	3 days
Soapmaking	2 groups can produce soap following improved techniques	11 women	Private entrepreneur	Dissa	5 days
Credit review/workshop	Borrowers understand interest rates, periodic payments, and loan depreciation. Loan reimbursement was improved through this training	5 men	CED TA	Diaforé	1 day

Subject	Objective/Results	Participants	Trainer(s)	Location	Length
Introduction to beekeeping and improved equipment	Beekeepers know how bees work as a colony to make honey and wax and could use improved equipment	15 men	CNA, BRP, TA	Diaforé	3 days
Plow repair	Blacksmiths can perform basic repairs on traction plows	2 men	Private blacksmith	Pita	7 days
Improved honey harvest and honey quality	Beekeepers can harvest honey from a Kenyan hive using improved equipment and perform necessary conditioning for maximum quality	15 men	CNA, CED, BRP technician	Diaforé	3 days
Animal traction	Farmers could employ a pair of bulls to correctly plow land and can maintain animal health	6 men	UGVD	Koundou	15 days
"Doing a Feasibility Study"	Participants know the 6 important steps to deciding the economical viability of an activity	14 men and 9 women entrepreneurs	CED, WID	Dissa	4 days
Watering can construction	Blacksmiths can rudimentarily construct watering cans	2 blacksmiths	Private blacksmith	Kindia	7 days
Grafting	Nursery owners and technicians learn basic grafting techniques for fruit trees	7 nursery owners, 3 technicians	GCP/Bel Project,	Dalaba	5 days
Logging techniques and laws	DS logger understands logging techniques most appropriate for NRM and its legal aspects	1 logger (DS)	DNFF	Kindia	5 days
Contour structures	Participating villagers can properly build contour structures along their home gardens and exterior fields	55 men and 12 women	BRP, SWC technicians	BRPs	9 days
Study Visits					
Beekeeping	Beekeepers understand the various types of hives that can be used, and learn to improve organization and marketing	8 men (Koundou, Diaforé)	ApiGuinée, CNA, Labé	Labé	1 day
NRM projects	An exchange was made between villagers and technicians of an NRM project that had been operational for several years	3 men, 2 women, 2 BRP technicians	GERF Project	Mamou	1 day

65

Subject	Objective/Results	Participants	Trainer(s)	Location	Length
Visit to Guetoya, Timbi Madina , Bareng	An exchange was made between villagers and technicians of an NRM project that had been operational for several years	9 villagers (Koundou, Diaforé) (5 men, 4 women), 1 WMU technician	Guetoya	Pita	2 days
1995					
Improved poultry keeping	Participants can maintain a small-scale poultry farm and know the requirements of laying hens	2 farmers, 1 paravet	Kahere and Sow farm	Kindia and Labé	24 days
Literacy	Village trainers understand the new pular alphabet and know ways to organize village level literacy training	18 village trainers (men)	PRAFD, FIDA	Diaforé, Koundou	6 days
Beekeeping review	Beekeepers confirmed their knowledge of basic Kenyan hive management and use of improved equipment for honey harvest	15 men	ApiGuinée, CNA	Diaforé	2 days
Credit review workshop	Participants know CMs systems and the availability use, and risks of credit	3 nurserymen, 40 men and 10 women	CM	Koundou	2 days
Improved honey harvest	Beekeepers can harvest quality honey from both traditional and Kenyan hives	60 men	ApiGuinée, CNA	BRPs	10 days
Animal traction - maximizing revenue	Farmers know how to most appropriately use and maintain their bulls for optimum income	5 men	RGTA, Kindia	Dissa	6 days
Animal care	Village leaders understand the improved animal husbandry techniques, such as improved lodging and regular preventive veterinary care	43 men and 2 women	CFEL	BRPs	15 days
Animal traction - new owners	Farmers can employ a pair of bulls to correctly plow land and maintain animal health	3 farmers	UGVD, Koundou farmer	Koundou	10 days
Stable construction	Farmer can construct a stable made solely from local materials and knows the advantages of this structure	1 farmer	UGVD	Koundou	10 days

Subject	Objective/Results	Participants	Trainer(s)	Location	Length
Beekeeping equipment construction (hives, suits)	Local craftsmen can construct Kenyan hives, protective beesuits (except gloves and shoes), and smokers (Koundou only) locally	3 tailors, 3 woodworkers, 1 blacksmith	BRP, TA	BRPs	7 days
Indigo dyeing	Dyers can produce market quality sets of <i>lepi</i> and <i>bazin</i>	17 women	Private dyers, Labé	Koundou	10 days
Marketing	Participants know the five important elements of the "marketing mix"	14 nursery owners (1 women), 5 soapmakers	BRP, TA	BRPs	6 days
"Doing a Feasibility Study"	Participants know the 6 important steps to deciding if an activity is economically viable	10 men and 12 women	BRP team, TA	Diaforé	4 days
Watering can construction	Blacksmiths can rudimentarily construct watering cans	2 blacksmiths	Private blacksmith, Pita	Pita	8 days
Composting	Growers can build their own compost pile for improving soil fertility	60 farmers	BRP SWC	BRPs	3 days
Chemical fertilizer use	Farmers know the advantages and disadvantages of chemical fertilizer and know the rates of application	12 women and 10 men	SWC TA, BRP	BRPs	3 days
Water source management	Leaders know the essential elements in managing water sources and wells, especially those improved by the project	42 members of resource user groups	SWC TA, BRP	Dissa, Koundou	2 days
(2) Grafting review	Participants perfected their grafting techniques	3 Koundou nurserymen; 11 nursery owners from Diaforé and Dissa	Experimental nurserymen	Koundou, Labé	10 days

Subject	Objective/Results	Participants	Trainer(s)	Location	Length
Study visits					
Honey/wax production	Beekeepers understand the various types of hives that can be used and learn to improve organization and marketing	6 men	CNA	Labé prefecture	2 days
Composting	Participants observed composting techniques used by an established grower	6 farmers	Private producer	Mali	3 days
Inter-BRP tour	Participants evaluated and debated the various accomplishments and potential of villagers in other BRPs	6 farmers, 6 SWC and CED technicians	TA team	BRPs	12 days
1996					
Improved charcoal production	Producers learned use of Cassamance kiln, which is more efficient than traditional methods	7 men, 1 SPFF director	ENATEF	Mamou	14 days
Nursery techniques	Participants can collect and treat seeds and establish and maintain a nursery for bare root and potted production. They also learn selected species characteristics	18 farmers, 7 local NGO members	Diaforé, DS AF/FOR	Diaforé, DS	10 days
Nursery sack production	10 percent of all nursery sacks in 1996 produced with local materials	13 nurseryowners	TA	3 BRPs	3 days
Termite control and pest management	Termite scouts review termite biology and ecology and can administer mechanical, cultural, biological, chemical, and integrated termite and grain storage pest control techniques	6 men and 1 woman	LPV, <i>Haut Gambie</i> farmer	Koundou, Diaforé	15 days
Integrated pest management	IPM scouts can identify principal pest, diseases, and weeds affecting crops and stocked goods and ways to preventive them; field practice included	7 men and 1 woman	LPV, TA	3 BRPs	17 days
Erosion control	Farmers know the importance of erosion as it relates to soil fertility and agricultural production	35 men and 10 women	TA, BRP teams	Koundou, Disa	4 days

Subject	Objective/Results	Participants	Trainer(s)	Location	Length
Rice production	Farmers can select varieties and use improved cultural techniques to better manage pest and diseases related to rice production	20 farmers	TA, BRP, Kilissi	Dissa	2 days
Onion production	Growers know major constraints and ways to improve marketing and reduce storage problems with new varieties and planting dates	52 men and 37 women	TA and BRP team	Diaforé	4 days (0.5 days/village)
Cattle management	Herders took initial steps to collaborate with SAGE for improvement of animal health care in their village	5 men	SAGE	Koundou	3 days
Enterprise development for women	Participants have the basic knowledge to sow, knit, and embroider	6 women	Tangama	Dalaba	90 days
Study Visits					
Onion production	Participants learned to improve group organization and contemplated marketing constraints and solutions	14 women and 6 men	CECI, BRP teams, TA	Lelouma Tougue DF, URPO in Timbi Madina	6 days
Potato production, conservation and marketing	Farmers understand the best ways to conserve potato seed in various periods throughout the year, can select appropriate varieties, and know marketing and production constraints	4 men, 1 woman	Farmers in Mali	Mali	3 days
Erosion control	Farmers observed erosion control methods in place and witnessed the advantages for other farmers	13 farmers	TA, BRP team, PCVs	BRPs	2 days
Compost	Farmers observed compost methods employed by model farmer in Mali	6 men and 6 women from Koundou	TA, BRP, Mali farmer	Mali	4 days
Banana production	Farmers can improve management of their banana plantations and increased their knowledge of banana culture	9 men (Dissa and Diaforé)	TA, BRP, Kilissi agents	Dissa, Kilissi	6 days

Subject	Objective/Results	Participants	Trainer(s)	Location	Length
Rice production	Koundou farmers exchanged experiences with farmers cultivating 44 ha who have been supported by UGVD	5 Koundou men	UGVD, Sagara farmers	Sagara	1 day
Sustainable agriculture	Participants reviewed variety selection, cultural techniques, and pest and disease management for rice, corn, peanuts, fonio, potatoes, and onions	29 men and 9 women	TA, BRP	Koundou, Diaforé	5 days
Village land use management and forest management	Meetings were held with village land use committees, resulting in the suggestion by farmers in Kissi to form village forest protection groups	11 men and women, 6 BRP technicians	Guetoaya, Haut Niger BRPs		4 days
96 training sessions		1,024 participants			455 days

ANNEX D
IN-COUNTRY TRAINING FOR DNFF AND OTHER GOG PERSONNEL

Subject	Objective/Results	Participants	Trainer(s)	Location	Length
1993					
Team building and work plan design	The entire GNRMP team met to improve working relationships and to discuss the methodology for the work plan	12 BRP technicians, 3 BRP directors, 3 PCVs, 4 TA	STTA	Labé	8 days
Participatory rural appraisal	This training assisted technicians to collect baseline information on the BRP villages such as major activities, constraints, and priorities	12 BRP technicians, 3 BRP directors	TA team	BRPs	15 days
Women's issues and rural animation	The fundamental importance of women's role in activities of the rural population were debated, and a methodology of general extension techniques was discussed	12 BRP technicians, 1 PCV	FAO	Labé	5 days
Tomato conservation techniques	During the workshop above, the facilitator and collaborating villagers demonstrated production of tomato puree	6 CED and WID technicians, 1 TA, 1 PCV	FAO	Labé	1 day
Tomato drying	Drying tomatoes on tarps was explained and demonstrated for potential extension purposes	Dissa WID	APEK	Kindia	5 days
Use of A-frame and water level for contour structures	Technicians learned the appropriate method of setting up contour structures in order to teach the technology to villagers	6 SWC and AF/FOR technicians	SWC TA	BRPs	3 days
Computer (WP5.1 and Lotus)	Participants gained basic knowledge of programs	7 secretaries	STTA	Labé	10 days

Subject	Objective/Results	Participants	Trainer(s)	Location	Length
Fruit tree grafting	Techniques were demonstrated and technicians practiced in order to teach the technology to private nursery owners	3 BRP AF/FOR technicians	GCP Bel	Dalaba	5 days
Literacy	Participants gained knowledge on the methodology necessary to launch a literacy program for the BRPs	6 CED and WID technicians, 3 PCV	PRAFD	Labé	5 days
Credit	Participants learned extension methodologies used by, established credit project	6 CED and WID technicians, 3 PCV	PRIDE	Labé	5 days
Computer (WP5.1 and Lotus)	Perfection of computer skills	7 secretaries	Oury, Yaya Diallo	Labé	6 days
Study visit: Bareng Research Station	Initial meeting with researchers was held at the station, and facilities were observed	6 AF/FOR and SWC technicians	TA, Bareng	Timbi-Madina	1 day
1994					
Land tenure issues	LTTA explained the essential elements of land tenure to consider on an NRM project	15 WMU technicians	LTC	3 WMUs	2 days each
Photointerpretation	Theoretical overview	1 S/W technician	Haute Gambie Project	Labé	3 weeks
Computer (DOS and WP5.1)	Researchers gained basic knowledge of DOS and WP5.1	4 Bareng technicians	Oury Diallo	Pita	2 days
English training	Participants prepared for long-term Master's studies in the U.S.	6 DNFC technicians	English Training Center, Univ. of Conakry	Conakry	5 months
NRM symposium	Development presented papers on topics related to improved NRM and enterprise development, especially targeted at the Fouta Djallon	100 participants	TA team	Labé	4 days

Subject	Objective/Results	Participants	Trainer(s)	Location	Length
WID workshop	Development agents exchanged ideas on income-generating and time-saving technologies for women	40 participants	TA team	Labé	2 days
1995					
Boundary marking and orienteering	Trainees can effectively locate and mark key points on targeted lands	Koundou AF/FOR, 4 DNFF from Lelouma	TA	Koundou	3 days
Forest inventory methods	Participants can follow principal methodology in conducting forest inventory	5 DNFF, 3 PCV, Koundou AF/FOR, 2 students	PROGERFOR, Nzerekore	Koundou	14 days
Gardening	Participants can plant and maintain garden plots, identify important pest and diseases, and set up agronomic trials	10 SNPRV technicians, 2 BRP SWC	SWC TA Foulaya researchers	Foulaya	5 days
Soil fertility	Technicians gained basic soil fertility information, including how to use visual and chemical tests to assess fertility and how to collect and analyze soil samples	4 SNPRV technicians, 2 BRP SWC	SWC TA Bareng	Bareng	3 days
1996					
Environmental Education (EE), workshop 1	Participants learned about potential EE subjects to be incorporated in the national curriculum; lesson plans were initiated	5 PCVs, 3 BRP directors, 6 teachers or school directors	<i>Guinée Ecologie</i>	Labé	4 days
EE, workshop 2	Participants evaluated program's first phase and reviewed	6 PCVs, 3 BRP directors, 14 teachers, school directors, 3 IPN technicians	<i>Guinée Ecologie</i>	Labé	3 days
Use of Dbase	Use of Dbase system was demonstrated and the data entry program that MC established was explained	3 BRP Directors, 2 TA, 1 USAID	Management Consultants	Labé	2 days

Subject	Objective/Results	Participants	Trainer(s)	Location	Length
Natural Forest Management (NFM) techniques (practical)	Inventory data was reviewed and practical approaches to establishing a forest management plan were demonstrated in the field	6 DNFF technicians from Lelouma and Conakry	STTA	Koundou	2 weeks
NFM techniques (classroom)	Details of establishing a technical forest management plan were discussed and debated; integral technical components of the Nialama forest management plan were reviewed	27 DNFF technicians and GNRM personnel from Labé, Lelouma, and Conakry	STTA	Labé	3 days
Evaluation and analysis methods for field level interventions	TA and technicians visited and discussed successful and unsuccessful intervention sites and subsequently engaged in an exhaustive and detailed analysis of the interventions including the species that were planted or otherwise tested	3 BRP AF/FOR technicians, 3 WID	AF/FOR TA	BRPs	2 weeks
Gardening workshop/ evaluation	Each BRP presented results from the past gardening seasons. Analysis of constraints and solutions was discussed, and cost of production was calculated for various crops. Plans for the 1996-97 season were prepared and presented	9 SWC, WID, and CED technicians, 3 BRP directors, 1 UGVD, 2 USAID	SWC/AP, CED, WID TA	Labé	3 days
Regional workshop: "Evaluation of Extension Methodologies and Tools"	Extension methodologies and audiovisual aids were discussed and evaluated. Seven examples of new extension materials were produced. A list of tools used was composed and those necessary to elaborate were established	40 technicians and farmers from research stations, regional projects, and GNRMP	SWC/AP TA, DNFF media technician, UGVD	Labé	4 days

Subject	Objective/Results	Participants	Trainer(s)	Location	Length
Forestry student training	Groups of 4-5 students spent two weeks in each of the three BRPs to participate in GNRMP field activities	14 ENATEF students	BRP teams		6 weeks
NRM Symposium	Papers were presented on sustainable village level activities, and discussion groups debated issues related to NRM such as improved agricultural production, enterprise development, participatory management, and women involvement	85 participants	TA, RC	Labé	4 days
Evaluation of project components	Project component interventions were thoroughly analyzed, and lessons learned and recommendations were determined. Participants also visited regional projects and services to evaluate collaboration during the LOP	3 CED and 3 SWC technicians	TA	Labé, BRPs	6 weeks
33 sessions	55 participants				330 days

ANNEX E
PROGRESS INDICATORS OF GNRMP INTERVENTIONS

Exhibit E-1. Activities and Results

Activity	Progress and Impact Indicators	Results (Progress and Impact Indicators)					
		1992	1993	1994	1995	1996	TOTAL
Information dissemination	- no. technical bulletins, extension video, rural radio programs - no participants	0	2 extension videos, 4 extension bulletins	10 extension bulletins, AV presentations: 31 with 2,444 participants	AV presentations: 16 with 936 participants		AV presentations: 40 with 2,733 participants, 14 technical bulletins, 16 extension videos, 10 Radio Rurale broadcasts
Village management committees	- no. committees operational - no. participants (♂, ♀)	0	21 committees formed with 70♂ and 52♀	27 existing committees with 87♂ and 65♀	31 committees formed composed of 94♂ and 73♀	31 committees formed composed of 94♂ and 73♀	
Improved access to potable water, and small perimeter irrigation	- no. wells and sources improved - no. beneficiaries - no. hectares open to irrigation	2 bore holes (Koundou, Dissa)	5 wells, 3 sources, 5 villages	16 wells, 9 sources, 23 villages	1 source, 4 wells, 4 villages	3 irrigation wells, 10 shallow irrigation wells (25 m ³ , Diaforé)	28 wells, 13 sources (3 with overflow irrigation), 26 villages
Construction of flood control dikes and canals	- no. meters structures - no. villages/people protected	0	1,029 m in Dow Kouratongo, 88 m in Koumbama	687 m in 4 villages (Diaforé)	475 m in 6 villages with 35 ♂, 11 ♀, and 18 children	80 gabions in 3 villages (Linsan Saran, Kokolou, Tyankoye)	2,290 m of canals and 80 gabions protecting over 1,000 people in 5 villages, 8 tapades
Erosion control with rock lines and biological erosion control barriers	- no. meters barrier built - no. participants - quantity soil saved	0 in Dissa and Koundou, existed in Diaforé	2,153 m in 2 exterior fields, Diaforé, and 755 m in a tapade, Koundou	39,310 m in 104 fields (78 sites Koundou, 23 Diaforé, 3 Dissa)	5,265 m in 20 fields	11,846 m in 45 fields	59,329 m in 172 sites

Activity	Progress and Impact Indicators	Results (Progress and Impact Indicators)					
		1992	1993	1994	1995	1996	TOTAL
Composting for dry season gardens and tapades	- no. participants/villages - no. compost bins	0	32 compost bins with 19 ♂, 44 ♀ (Koundou and Diaforé), 18 villages	41 bins (48 m ³) with 14 ♂, 41 ♀, 13 villages	26 bins (43 m ³), 63 people (40 ♀), 11 villages	43 bins (98 m ³), 13 ♂ and 24 ♀, 12 villages; in Diaforé for onion production, in Koundou for gardens and tapades (Dissa in Nov./Dec., no data yet available)	141 compost bins (262 m ³)
Termite control	- no. termite mounds destroyed - no. people trained	Traditional eradication measures used	0	83 termite mounds destroyed in 53 tapades in Diaforé	134 termite mounds treated in tapades in Koundou and Diaforé; 88 destroyed	70 mounds treated in Koundou, 12 in Diaforé	253 termite mounds destroyed

Activity	Progress and Impact Indicators	Results (Progress and Impact Indicators)					
		1992	1993	1994	1995	1996	TOTAL
Access to improved crop and gardening varieties	- quantity of seed distributed - no. varieties distributed - no. participants	some local germplasm exchange occurred	Kawanzie, Perta and K9101 maize tested; Tanzanienne cassava distributed; some cowpea, peanut and rice varieties tested	K9101 maize (Diaforé), CK 73, CK 211, CK 4 rice (Dissa), Tanzanienne, 80/40 and 30/572 cassava, Ivorienne, Chinoise IV and Coréen sweet potato varieties (Dissa), and Nicola and Desiré potatoes (Diaforé) tested	30 g Mamou hot peppers and 30 g Tabuna eggplant distributed (2,000 m ²); Tanzanienne cassava from a farmer in Dissa distributed to 10 new farmers; Ivorienne and Chinoise IV sweet potato cuttings distributed to 5 farmers in Diaforé during applied research trials	100 kg K9101 maize distributed to 167 farmers in 45 villages; 80/40, Faranah and high yielding local varieties of cassava planted with 41 farmers in 19 villages; 100 kg CK21 and 100 kg CK211 rice planted with 27 people on 1.5 hectares; 18 Farmers in Diaforé and Dissa planted 5000 m ² of 4 new banana varieties (Poyo, Grande Nene, Williams and Orichelle)	408 farmers (137 ♀) tested new varieties
Improved animal husbandry techniques	- no. technologies tested - no. participants	0		Silage racks constructed with 3 farmers in Diaforé	1 night park (Diaforé) and 8 stables (Koundou, Dissa) constructed; 45 farmers trained by CFEL	CFEL worked in Koundou to form animal husbandry (cattle) groups	

Activity	Progress and Impact Indicators	Results (Progress and Impact Indicators)					
		1992	1993	1994	1995	1996	TOTAL
Reforestation/ protection of fragile lands	- no. hectares planted - no. participants	0 sites	19 sites 3.63 ha	19 sites 2.03 ha	23 sites 3.2 ha	18 sites, 2.33 ha, extensive work on co-management plan for the Nialama FR, 25 lowlands marked, reforestation of 3 ha of Nialama	11.19 ha, 13 protected forest zones
Fire control	- no. trees planted - no. sites protected - surface area protected	0	0	15 sites subjected to early burning	15 sites subjected to early burning, 9 firebreaks around reforest. plots	15 sites, burning along roads to protect Nialama FR	15 sites annually, Nialama FR protected
Living fences	- no. meters planted - no. participants - no. gardens protected	0	1,230 m, 8 participants	3,351 m, 47 participants	5,287 m, 72 participants	4,728 m, 68 participants	14,596 m
Multipurpose shrubs	- no. meters planted - no. participants	0	370 m ² , 6 participating families	1,173 m ² , 22 families	552 m ² , 29 families	activity dropped	2,095 m ²

Activity	Progress and Impact Indicators	Results (Progress and Impact Indicators)					
		1992	1993	1994	1995	1996	TOTAL
Cash Crop production and marketing	<ul style="list-style-type: none"> - no. of participants (♂, ♀) - no. villages - surface area of production - quantity produced and sold - income generated 	tomato and okra production in DS, one onion producer in Diaforé	1 ♂ for 100 kg onion, 117 kg chili peppers, tomato and okra production.	85 ♂, 144 ♀, 984 kg onions	163 ♂, 245 ♀, 13 mt of onions, 4,550,000 FG revenue, 2,671 kg potatoes for 1,335,500 FG; 336 kg chili peppers, 200,400 FG revenue in Koundou	279 ♂, 507 ♀, 130 mt onions for 39,000,000 FG, 121 kg chili peppers for 307,250 FG in Koundou 39,625 tons of okra for 4,755,000 FG, 4.515 tons of peppers for 2,257,500 FG, 3.14 tons of eggplant for 502,400 FG	279 ♂, 507 ♀ participating, 7.6 ha of production with 491 villagers 175.35 mtons of onions for 54,163,000 FG , 912 kg of chili peppers for 1,340,000 FG, 4.174 m tons of potatoes for 2,465,500 FG In 1996, 39.625 tons of okra for 4,755,000 FG, 4.515 tons of peppers for 2,257,500 FG, 3.14 tons of eggplant for 502,400 FG
Honey/wax production	<ul style="list-style-type: none"> - no. participants - no. hives installed and harvested - kg. honey produced and sold - kg wax produced and sold - income generated 	0	7 ♂, 105 kg honey, 43 kg wax, 86,100 FG	38 ♂, 227 local hives, 48 K. hives, 1,750 kg honey, 68.8 kg wax, 1,453,400 FG	46 ♂, 349 local hives, 1,371 kg honey, 44 kg wax, 852,000 FG	56 ♂, 2.8 T honey, 80 kg. wax. 2,070,000 FG	56 ♂, 98 Kenyan hives, 6,026 kg honey, 230 kg wax. 4,458,500 FG revenue

Activity	Progress and Impact Indicators	Results (Progress and Impact Indicators)					
		1992	1993	1994	1995	1996	TOTAL
Private nurseries	- no. participants - no. forest and fruit trees produced and sold - income generated	0, some traditional fruit tree production	10,944 forest seedlings for 1,368,000, 154 fruit trees sold for 119,400 FG	20,628 forest seedlings sold for 2,578,500 FG, 1,903 fruit trees sold for 2,035,700 FG	22,635 forest seedlings sold for 3,395,200 FG, 1,365 fruit trees sold for 955,800 FG	12,593 forest seedlings sold for 2,209,850 FG, 614 fruit trees	14♂, 8 villages; 66,800 forest seedling sold for 9,551,550 FG, 4,036 fruit trees sold for 3,540,700 FG
Indigo dyeing	- no. participants - no. <i>lepi</i> and <i>bazin</i> sets produced and sold - state of the revolving fund - income generated	Individual production of <i>lepi</i>	1 group, 18♀, 90,000 FG saved	99 sets of <i>bazin</i> bought and sold, 255,000 FG in revolving fund	1 group, 17♀, 60 sets of <i>lepi</i> sold, 42 sets of <i>bazin</i> , 630,850 FG saved	1 group, 17♀, 28 sets of <i>lepi</i>	88 sets of <i>lepi</i> and 42 sets of <i>bazin</i> , 1,075,000 FG enterprise value
Cattle commerce	- no. participants (♂, ♀) - no. head of cattle sold - income generated	1♂, no loans	1♂, no loan	3♂, 211 heads of cattle sold	4♂, 144 head of cattle sold		7♂, 355 head sold, 5,360,000 FG profit

Activity	Progress and Impact Indicators	Results (Progress and Impact Indicators)					
		1992	1993	1994	1995	1996	TOTAL
Animal traction	- no. hectares plowed (♂, ♀) - no. participants - no. of pairs trained - income generated	no traction practiced	5♂, 5 villages	7♂, 45 ha for 603,000 FG	9♂, 61 ha for 894,000 FG	6♂, 45,000 FG earned by trainer	11♂, 106 ha, 1,542,000 FG
Improved roosters	- no. participants ((♂, ♀)) - no. roosters distributed- no. de villages - income generated	0	9♀, 3♂, 5 villages, 17 roosters distributed	5♂, 10♀, 8 roosters, 1,188,000 FG in revenue	19♂, 59♀, 71 roosters, 1,267,200 FG in revenue	74♀, 18♂, 28 roosters distributed, 6,256,800 FG in revenue	74♀, 18♂, 103 roosters distributed, 8,712,000 FG in revenue
Animal health improvement	- no. animals vaccinated - no. people sensitized - no. functioning paravets - income generated	no paravets some animal vaccination	6♂ trained as paravets	4,612 sm & lge ruminants and 940 chickens, 178,090 FG in profit	1,344 sm & lge ruminants and 780 chickens vaccinated, 106,200 FG profit	289 sm & lge ruminants and 161 chickens vaccinated, 22,500 FG	6,245 small and large ruminants, and 1,881 chickens vaccinated, 306,790 FG profit
Egg production	- no. participants - no. layers installed - no. eggs produced and sold - income generated	0	0	0	0	2♂, 10,846 eggs	2♂, 10,846 eggs

Activity	Progress and Impact Indicators	Results (Progress and Impact Indicators)					
		1992	1993	1994	1995	1996	TOTAL
Metal works	- no. blacksmiths trained - no. improved stoves produced and sold - no. watering cans produced and sold - income generated	stoves technology unknown	4♂, 50 stoves for 217,500 FG revenue	4♂, 174 stoves for 652,500 FG revenue	4♂, 222 stoves sold for 849,500 FG	1♂, 0 stoves	4♂, 446 stoves for 1,719,500 FG
Credit	- no. participants - no. loans and amt in FG - payback rate	no loans	7♂, 1♀, 7 loans worth 4,660,000 FG	30♂, 14 loans for 5,448,800 FG	6 new loans to 20♂, 1,411,000 FG, ave. 80% payback rate	4 new loans to 20♂ and 23♀ for 1,184,000 FG	31 loans worth 12,703,800 to 77♂ and 24♀, payback rate: 75%
Applied research	- no. trials completed	no trials	4 trials corn, sw. potato, forage, and potatoes	5 trials: 2 forage crops, potatoes, cassava, and rice	5 trials: corn, 3 veg. crops, termites	8 trial: sw. potato, 2 stylosanthese, 2 cassava, calcium, onion, and potato	22 trials
Land use contracts	- no. contracts prepared and signed	0	15 reforestation agreements between GNRMP and Cgs, 23 between landowners and Cgs, 10 contracts prepared and signed for gardening plots	4 gardening contracts	Reforestation: 13 GNRMP-CG, 10 landowner-CG	7 reforestation agreements signed, 2 gardening contracts	68 contracts signed relating to reforestation, 16 contracts for gardening

Activity	Progress and Impact Indicators	Results (Progress and Impact Indicators)					
		1992	1993	1994	1995	1996	TOTAL
Policy analysis	- no. reports on policy issues - no. seminars with policy makers		STTA report on gender issues, STTA report on marketing constraints, LTC studies in BRPs	NRM symposium with 100 participants, WID conference with 40 participants, workload of ♀ evaluated, CED report on forest products from Nialama FR, 2 STTA reports on Nialama FR management	Nialama FR action plan prepared	Formation of Assembly and Forest cooperative for Nialama FR, NRM Symposium on sustainability of village-level activities	Seminars: 1 WID, 2 NRM symposiums, 7 STTA/reports/studies on policy issues

Exhibit E-2. Number of Participants in Project Interventions

Information dissemination	2,733 participants (2,050 men and 683 women)
Village management committees	94 men and 73 women
Improved access to potable water, and small perimeter irrigation	26 villages x 150 ave population = 3,900 men and women
Construction of flood control dikes and canals	1,000 men and women
Erosion control with rock lines and biological erosion control barriers	172 sites x 8 people/family = 1,376 men, women and children
Composting for dry season gardens and tapades	141 men and women
Termite control	85 people
Access to improved crop and gardening varieties	271 men and 137 women
Improved animal husbandry techniques	45 men
Reforestation/protection of fragile lands	13 zones x 4 people = 52 men and women
Fire control	15 sites x 2 people = 30 men
Living fences	195 men
Multipurpose shrubs	29 women
Cash crop production and marketing	279 men and 507 women
Honey/wax production	56 men
Private nurseries	14 men
Indigo dyeing	18 women
Cattle commerce	7 men
Animal traction	11 men
Improved roosters	74 women and 18 men
Animal health improvement	6,245 ruminants/3 years/5 animals/family = 416 men and women; 1,881/3 years/3 chickens/family = 209 men and women
Egg production	2 men
Metal works	4 men
Credit	77 men and 24 women
Applied research	22 men and women
Land use contracts	68 contracts x 4 people = 272 people (68 women and 204 men)
Policy analysis	225 participants in NRM symposiums and WID seminars
Training	55 technicians, 1,024 villagers
Total	13,094 participant/3 activities as an average = 4,365 villagers

ANNEX F
ACCOMPANYING VENTURES SUPPORTING BRPs

Location	Activity
Dissa	<ul style="list-style-type: none"> - 1 <i>cité</i> or lodging and office facilities for BRP team - 1 market hanger - 1-2 room school house - 1-3 room school house - Reparation of water system in Sougueta - 8 capped springs and 4 improved wells for potable water - 2 PCV houses - 1 health center (PC funds)
Diaforé	<ul style="list-style-type: none"> - 1 <i>cité</i> or lodging and office facilities for BRP team - 2-3 room school houses - 1 renovated school - Reparation of difficult points on the road leading to the BRP - 2 PCV houses - 2 capped springs and 9 improved wells
Koundou	<ul style="list-style-type: none"> - 1 <i>cité</i> or lodging and office facilities for BRP team - 3-3 room school houses (1 with PC funds) - Reparation of difficult points on the road leading to the BRP - 2 PCV houses - 6 capped springs and 5 improved wells
Labé	<ul style="list-style-type: none"> - Renovation of TA office, regional coordination, and the coordinator's and M&E technician's houses

ANNEX G
LEVEL OF EFFORT OF LONG- AND SHORT-TERM TA
WORKING ON THE GNRMP, 1992-1996

Name	Function/Specialty	Period Served on GNRMP	LOE (months)
Long-term TA			
K. B. Paul	Chief of party	Sept. 1992-Oct. 1994	25
Robert Chase	Soil/water conservation	Nov. 1992-Sept. 1994	24
Thomas Erdmann	Agroforestry	Nov. 1992-Oct. 1996	48
Stephen Aversa	Community enterprise development	Nov. 1992-Dec. 1995	38
	Chief of party	Jan. 1996-Dec. 1996	10
James Campbell	Chief of party	Jan. 1995-Dec. 1995	12
Jennifer Peterson	Soil/water conservation/agricultural production	Jun. 1995-Dec. 1996	17
Short-term TA			
David Olson	Team building	Jan. 1993 Dec. 1996	1.75
Dolores Koenig	WID	Aug. 1993	0.75
William Kedrock	Marketing	Nov. 1993	1
William Guyton	Monitoring and evaluation	Sept. 1993	1
Abdulaye Barry	Institution building for Nialama FR	1994	1
Denis Bourque	Forest management	Nov. 1994	1
Daniel Wagner	Video production	Oct.-Nov. 1996	1
Eric Brusberg	Monitoring and evaluation	Oct.-Nov. 1996	1
Peter Lowe	Natural forest management	Sept.-Oct. 1996	1.25
Paula Williams	Community-based NRM	May-Oct. 1996	5

ANNEX H
PEACE CORPS VOLUNTEERS' ACTIVITIES DURING THE LOP

Volunteer	Activities
<i>1991 PCVs</i>	
Lindsey Amtmann	Preparation of Koundou baseline report (later transferred to Peace Corps Health/Community Development assignment).
Rebecca Furth	Preparation of Diaforé baseline report; gardening cooperatives; improved mud-brick stoves; primary school construction
Heather Klukkert	Preparation of Koundou baseline report (later transferred to Peace Corps Education assignment)
Trevor Taylor	Preparation of Dissa baseline report (terminated service early)
<i>1993 PCVs</i>	
Leslie Ackerman	Contour rock and shrub bands; live fencing, shrub blocks, and reforestation; gardening cooperatives; compost and organic pesticides; health education; primary school construction
Chris Irwin	Composting and organic pesticide; contour rock bands; mud-brick stoves; reforestation/live fencing; water resource management (terminated service early)
Christian Kelleher	Beekeeping; gardening cooperatives; promotion of improved stoves; reforestation; primary school construction
Heather Kidd	Gardening cooperatives; reforestation; environmental education; literacy; basic accounting; primary school construction; midwife training
Elaine MacLean	Soapmaking; gardening cooperatives; composting; promotion of improved stoves; market studies; numeracy; midwife training; numerous infrastructure projects
Joseph Trimble	Gardening cooperatives; reforestation; contour rock bands; beekeeping; primary school construction; health center construction
<i>1995 PCVs</i>	
Teresa Carta	Beekeeping; women's enterprises; environmental education; mud-brick stoves; well construction; youth center construction
Nichol DesJardins	Environmental education with gardening; various NRM interventions with "model farmer"; numeracy; English teaching; primary school construction
Bruce Herforth	Agricultural production; participatory forest management; gardening cooperative; health education; primary school construction.
Rebecca Richter	Contour rock bands; mud-brick stoves; gardening cooperative; reforestation; numeracy; road repair
Jamie Robertson	Environmental education with tree planting; reforestation; micro-dam construction; school world map project; illustration of technical information papers; NRM resource packet
Teri Tosdale	Environmental education; health education; researching wind-power project

Volunteer	Activities
Palani Whiting	Reforestation; improved-variety trials; gardening cooperatives/composting; extension; environmental education with contour rock bands; Forest Region NRM study tour

216

ANNEX I
TECHNICAL BULLETINS AND EXTENSION VIDEOS PRODUCED

Technical Bulletins Prepared in Local Languages during the LOP

1. Les blocs d'arbustes pour le fourrage et l'engrais vert (Erdmann)
2. Le reboisement et le cycle d'eau (Erdmann)
3. Les haies-vives (Erdmann)
4. Pratiqons une récolte méthodique du miel (Aversa)
5. Pour commercialiser un miel de qualité: La filtration (Aversa)
6. Comment planter un arbre qui est dans un sachet plastique (Erdmann)
7. La lutte contre les feux de brousses (Erdmann)
8. La valeur de la ressource forestière (Erdmann)
9. Comment élaborer un bilan (pour mieux gérer votre entreprise) (Aversa)
10. Comment élaborer un compte d'exploitation (pour mieux gérer votre entreprise) (Aversa)
11. Cycle de la fertilité du sol (Chase)
12. Comment un groupement de production prépare un programme de campagne (Aversa)

Extension Videos Prepared during the LOP

1. Les villageois: Le vrai moteur du développement (Chase, Baldé)
2. Actions agro-forestières (Erdmann)
3. Les trois BRP du PGRN (Chase)
4. Les avantages de la culture de la résistante de manioc contre la masaïque
5. Comment conserver la terre: Conservation des eaux et du sol (Chase, Souaré)
6. Sensibilisation sur l'importance de la ressource forestière (Erdmann, Souaré)
7. Sensibilisation sur les méfaits des feux de brousses (Erdmann, Souaré)
8. Vaccination des poules contre les New-Castle (appui aux para-vets) (Aversa, Baldé)
9. Apiculture villageoise (Aversa, Souaré)
10. Blocs d'arbustes fourragers (Erdmann, Baldé, Souaré)
11. Les haie-vives (Erdmann, Baldé, Souaré)
11. Hygiène et traitement des plaies du bétail (appui aux para-vets) (Aversa, Baldé)
12. Vaccination contre la peste caprine (Aversa, Baldé)
13. Actions: Développement des entreprises (Aversa)
14. Présentation du PGRN en langue nationale pular
15. Séminaire de formation sur la culture attelée à Koundou
16. SWC/AP interviews with farmers as final analysis

ANNEX J
PROJECT DOCUMENTS AND PUBLICATIONS_{xx}

A. Basic Project Documents (BPD)

Serial Nos.	Document Title	Author	Year
BPD 1	Plan national d'action pour l'environnement (PNAE)	PNUD/UNSO	1994
BPD 2	List of Watersheds (Fihdr)	Pilot	
BPD 3	Plan national d'action pour l'environnement	Paul, K.B. et autre/PGRN	1993
BPD 4	Présentation géographique	Fode Keita	
BPD 5	Monographies	CDE	1995
BPD 6	Inventaire préliminaire du bassin de la Rivière Kuunduet de la Forêt Classée de R.P.F Nialama	J. Denys Bourque	1996
BPD 7	Manuel Informatique (DOS et DBASE IV)	Management Consultants	1996
BPD 8	Manuel de statistiques de base	Management Consultants	1996
BPD 9	Suivi et évaluation étude de base	Management Consultants	1996
BPD 10	Volets principaux du PGRN	USAID/G	1991
BPD 11	Natural Resources Management Support Document	Chemonics	1990
BPD 12	Directives pour établir et maintenir pour le système de suivi et d'évaluation pour le Projet GRN de l'USAID-DNFF	William P. Guyton	1993
BPD 13	National Policy on Natural Resources Conservation and Development	Gaborone	1990
BPD 14	Organizing for Implementation	George Holondle	
BPD 15	Project Paper, Guinea NRM Project	USAID	1991
BPD 16	Private Sector Survey		1992
BPD 17	Bilans des activités des projets de la DNFF en Moyenne Guinée	DNFF	1993
BPD 18	Rapport d'évaluation des BRP	DNFF	1994

Serial Nos.	Document Title	Author	Year
BPD 19	Environmental Education and Communication Inventory in Guinea	Regis Maubrey	

B. Project Reports/Plans (LR)

Serial Nos.	Document Title	Author	Year
LR 1	Plan annuel de travail 1996, Vol 2	PGRN/BRP/TA	1996
LR 2	Plan annuel de travail 1996, Vol 1	PGRN/TA	1996
LR 3	Rapport semestriel 96	PGRN/TA	1996
LR 4	Plan de travail Koundou, 1995	Koundou	1995
LR 5	Plan annuel de travail, 1995	PGRN/TA	1995
LR 6	Rapport semestriel 94	PGRN/TA	1994
LR 7	Rapport trimestriel de progrès 93	PGRN/TA	1993
LR 8	Rapport de reconnaissance des BRP	UGVD	1993
LR 9	Présentations au symposium sur la GRN durabilité des actions villageoises	PGRN	1996
LR 10	Rapport des études des BRPs et leur plans de travail, propositions et recherches	BRPs et instituts de recherche	1993
LR 11	Plan de travail annuel, 1993	PGRN	1993

C. PGRN TDY Reports (PTDY)

Serial Nos.	Document Title	Author	Year
TDY 1	Rapport technique système de suivi-évaluation	F. Brusberg, T. Traore	3/96
TDY 2	Les productions de la télévision	Dan Wagner	11/95
TDY 3	Development of Forestry in the Representative Watershed of Koundu	J. Denys Bourque	4/95
TDY 4	Etude des opportunités de mise en place d'un comité inter-villageois pour la gestion de la Forêt de Nialama	Abdulaye Barry	3/95

Serial Nos.	Document Title	Author	Year
TDY 5	Atelier sur les activités rémunératrices et les technologies appropriées pour faciliter le travail de la femme rurale	PGRN/TA	3/95
TDY 6	Résultats de méthode accélérée de la recherche participative sur les bassins versants du Fouta Djallon	PGRN/TA/BRP	8/94
TDY 7	Les femmes et les rapports entre hommes et femmes	Dolores Koenig	8/93
TDY 8	Evaluation des parasites agricoles et méthodes de lutte	Faye et Knausenberger	7/94
TDY 9	L'aviculture en qualité d'activité générative de revenus	David Dupras	4/94
TDY 10	Contribution au recensement et à l'identification de quelques plantes médicinales du Fouta Djallon	Laurent Ake Assi	2/94
TDY 11	Le micro-marketing agricole dans les montagnes Fouta	William A. Kedrock	1/94
TDY 12	Les études d'impact/ l'environnement et la surveillance de l'environnement	Idrissa Samba	7/95

D. Fiches techniques

- FT-001 Construction et utilisation d'un cheval A, Phase, 1993
- FT-002 Les blocs d'arbustes pour le fourrage et l'engrais vert, Erdmann, 1994
- FT-003 Le reboisement et le cycle d'eau, Erdmann, 1994
- FT-004 Les haies-vives, Erdmann, 1994
- FT-005 Pratiquer une récolte améliorée, Aversa, 1994
- FT-006 Pour commercialiser un miel de qualité: la filtration, Aversa, 1994
- FT-007 Comment planter un arbre (qui est dans un sachet plastique), Erdmann, 1994
- FT-008 La lutte contre les feux de brousse, Erdmann, 1994
- FT-009 La valeur de la ressource forestière, Erdmann, 1994
- FT-010 Comment élaborer un bilan (pour mieux gérer votre entreprise), Aversa, 1994

- FT-011 Comment élaborer un compte d'exploitation (pour mieux gérer votre entreprise, Aversa, 1994
- FT-012 Thème: arbustes pour la production du fourrage/engrais vert, Erdmann, 1994
- FT-013 Cycle de la fertilité du sol, Chase, 1994
- FT-014 Comment un groupement de production prépare un programme de campagne, adapté par Aversa, 1993
- FT-015 Traitement phytosanitaire contre les chenilles et insectes suceurs méthodique
- FT-016 Faites du compostage
- FT-017 Sustainable Increases in Agricultural Productivity
- FT-018 Culture tomate, bareng
- FT-019 Piment Salmon, J.P Renson, 1993
- FT-020 Utilisation et fabrication artisanale de la pierre à lécher, PNUD/FAO, 1988
- FT-021 Transformation des fruits légume, fabrication de la confiture de mangue, PNUD/FAO, 1990
- FT-022 Catalogue, PNUD/FAO, 1993
- FT-023 Lutte mécano-chimique contre les termites, PNUD/FAO, 1991
- FT-024 Fiche signalétique, Guetoya, 1990
- FT-025 Liste des prix de ventes comptoir Kindia
- FT-026 Fiche synthèse de vulgarisation de pépinière villageoise, FAO Gui.
- FT-026 How to use the insecticidal properties of neem, Rebecca Furth, 1993
- FT-027 Fiches techniques CRA Bareng
- FT-028 Séminaire du projet national de vulgarisation: agricole thème: la pomme de terre, GCP/GUI
- FT-029 Conseils pratiques pour la conduite des essais en milieu paysan, Luis Beavogui, 1995
- FT-030 Cahier de l'auxiliaire de l'élevage, CFEL, 1996
- FT-031 Connaissance du milieu et rôle de la femme dans le développement socioéconomique du Fouta, PNUD/FAO

- FT-032 Fiches techniques CRA Foulaya insectes, ravageurs des culture mar. en Guinée, CRA Foulaya, 1995
- FT-033 Principales maladies des cultures; guide technique du maraîcher, S.A Bouar
- FT-034 Apiculture traditionnelle améliorée
- FT-035 Dossier théorique d'orientation, SAGE, 1994
- FT-036 Avant projet du schéma directeur d'aménagement et de gestion du BRP de Guétoya, PNUD/FAO, 1992

E. Work Plan

- WP 1 Plan de travail Dissa 93, BRP/DS, 1993
- WP 2 Plan de travail Diaforé 93, BRP/DF, 1993
- WP 3 Plan de travail Koundou 93, BRP/Koundou, 1993
- WP 4 Plan de travail Koundou 94, BRP/Koundou, 1994
- WP 5 Plan de travail Dissa 94, BRP/DS, 1994
- WP 6 Plan annuel de travail 94, BRP/DF, 1994
- WP 7 Sensibilisation/vulgarisation
- WP 8 Avant projet du plan de travail DS 93, BRP/DS, 1993
- WP 9 Récapitulation des populations du bassin
- WP 10 Section VI Annexes
- WP 11 Programme provisoire annuel de travail Koundou 93
- WP 12 Bilan des activités 86-92
- WP 13 Rapport de l'atelier sur le renforcement de travail en équipe, BT et BS, 1995
- WP 14 Localisation des actions/interventions du BRP Dissa, 1993
- WP 15 Bilans des actions
- WP 16 Appui aux renforcements des capacités des groupements villageois du PGRN, Oulin Diallo, UGVD, 1996

WP 17 Exploitation des réunions d'identifications des contraintes à DF et Koundou Oulin Diallo, UGVD, 1996

WP 18 Renseignements généraux des villages des BRP

F. Land Tenure Center Document

LTC 1 Garder l'honneur: garder la forêt: la co-gestion de la Forêt Classée de Nialama, Rebecca J. McLain, 1994

LTC 2 Les pratiques de GRN les avantages et les inconvénient Julie E. Fischer des régimes fonciers dans le bassin versant de DS, Guinée, Kevin Boerer, 1994

G. Recherche agricole

RA 1 Rapport sur l'atelier de dressage des jeunes bovins organisé à Koundou, A. Diallo, 1995

RA 2 Rapport sur les produits économiques en provenance de la Forêt de Nyalama, Bocar Sow, 1994

RA 3 Thème: Comportement du Stylosanthes Guynensis dans les bowé de DF, Maladho Diallo, 1996

RA 4 Etude de comportement des espèces fourragères légumineuses et graminées face aux autres herbes et au mode d'exploitation dans un sol n'dantari au Bareng, Maladho D. Sidibé, 1995

RA 5 Rapport de campagne de 94 sur les U.E.P des Koundou (Manioc) et de DF (pomme de terre), Bareng, 1994

RA 6 Programme d'activité 93 entre Bareng et le PGRN, Bareng, 1993

RA 7 Rapport d'activité de recherche 93 pour le CRO, Bareng

RA 8 Rapport de mission à DF, Maladho D, 1995

RA 9 Rapport de mission, PRIDE, Vita, 1995

RA 10 Programme annuel provisoire de travail, Koundou 93, BRP/Koundou, 1993

RA 11 Discours bilan du directeur général du projet de réhabilitation agricole au Fouta Djallon, 1994

RA 12 Luttés mécano-chimiques, LPV, 1994

RA 13 Research Proposals

RA 14 Rapport de campagne 93, Bareng, 1993

- RA 13 Research Proposals
- RA 14 Rapport de campagne 93, Bareng, 1993
- RA 15 Programme 94, Bareng, 1994
- RA 16 Rapport synthèse de l'enquête MARP, BRP Dissa, 1993
- RA 17 Rapport formation des techniciens CES/PA, BRPs, 1995
- RA 18 Lutte intégrée contre les insectes ravageurs et insectes vecteurs d'agents pathogènes des maladies végétales, animales et humaines, Centre Régional Agr. Niger
- RA 19 Influence de l'époque de plantation rendement de la pomme de terre, Bareng, 1995-96

H. PGRN Technical Publications (PTDP) Discussion Papers

- PTDP 1 Pépinière expérimentale, Erdmann, Sow, Bah, 1995
- PTDP 2 Rapport de l'étude collaboratrice PGRN - CM en matière de crédit et d'épargne, PRIDE, 1995
- PTDP 3 Rapport de synthèse de l'enquête de base Koundou, BBRP/Koundou, 1993
- PTDP 4 Atelier sur les étapes successive de la réalisation d'une étude de faisabilité, PGRN, 1993

I. Miscellaneous Technical Documents

- MTD 1 Les comportements de prévention du Sida au Cameroun: cas de l'utilisation des préservatifs, Bah Mdou Dian, 1995
- MTD 2 Les déterminants de l'investissement privé en Afrique subsaharienne, Bah Mdou Dian, 1993
- MTD 3 Bilan des actions des PGRN, 1993
- MTD 4 Technical Support Mission for the Fouta Djallon Agricultural Rehabilitation Project, 1992
- MTD 5 Ateliers rural
- MTD 6 Suivi évaluation, Management Consultants
- MTD 7 Condensé des activités de PRIDE, PRIDE, 1995
- MTD 8 Free University Amsterdam, J Landeck, 1991

- MTD 11 REDDA/NESDA, 1995
- MTD 12 Les systèmes d'épargne et de crédit décentralisés, M.C.D
- MTD 13 La construction des puits en A.T., M.C.D
- MTD 14 Evaluation des énergies renouvelables, M.C.D
- MTD 15 Les politiques agricoles et alimentaires en Afrique, M.C.D
- MTD 16 Résumé du programme d'aménagement et de gestion des terroirs villageois du BRP Guetoya, PNUD/FAO, 1992
- MTD 17 Schéma directeur d'aménagement et programme d'aménagement et de gestion des terroirs villageois (Texte Principal), Augustin Durand, 1992
- MTD 18 Documents disponibles au centre de documentation environnementale de Labé, 1994
- MTD 19 Diapora avant les autres, Abdoul Goudoussy Diallo