PD-AAW-029

ENERGY INITIATIVES FOR AFRICA

PROJECT NUMBER 698-0424

ANNUAL REPORT

FY 1986

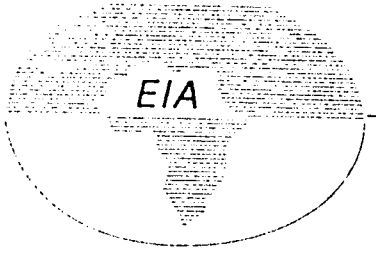
SUBMITTED TO:

Program and Regional Operations Staff
Office of Technical Resources
Africa Bureau
Agency for International Development

SUBMITTED BY:

Energy/Development Internationa
1015 - 18th Street, N.W.
Suite 802
Washington, D.C. 20036

November 1986



ENERGY INITIATIVES FOR AFRICA
ENERGIE: INITIATIVES EN AFRIQUE
U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT 698-0424
ENERGY/DEVELOPMENT INTERNATIONAL

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TABLE OF CONTENTS

I. INTRODUCTION

This Annual Report summarizes the activities of EIA in its last full fiscal year. EIA staff have fine-tuned their approaches to achieving project objectives both in the field and in Washington. Through effective systems of communication, planning, and logistics spread across three offices, the EIA Project has built a framework to support related efforts after the staff depart.

Major successes over the past year include assisting donors to coordinate their activities through joint efforts in project design and implementation, and engaging the private sectors of client countries in dissemination of improved cookstoves and charcoal kilns. Further activities with the private sector will be one of EIA's major thrusts in the coming year. Another will be the publication and distribution of EIA technical studies and manuals -- fifty have been written so far -- so as to broaden the audience that can benefit from the EIA Project worldwide.

A measure of the Project's success is the level of demand for EIA services. In FY 1986 EIA staff undertook 52 trips to 20 countries in Africa. Because EIA travel to a country occurs only at the request of the local USAID Mission, these figures clearly indicate the demand for EIA services as well as the responsiveness of EIA staff.

Specific technical assistance achievements within the EIA priority areas provide examples of the Project's ability to contribute to existing knowledge. This report describes

accounts of program activities. Some of the highlights include:

Technical Assistance Activities in FY 86

- Forestry Sector Development Project Pre-Implementation Assessments (Mali)
- Solar Energy Laboratory Evaluation (Mali)
- Economic and Financial Analysis Training in Wood Economics (Mali, Senegal, Burkina Faso)
- Forest Resource Analysis and Planning Model for the Sahel countries, under an arrangement with CILSS (Sahel)
- Final Evaluation of Peat Carbonization and Briquetting (Burundi, Uganda)
- Charcoal Export Analysis in West Africa (Ivory Coast, Liberia)
- Computer Training for Forest Service Technicians (The Gambia)
- Presentation of Photovoltaic Refrigeration Study for Health Clinics (Guinea)
- Peri-Urban Forestry Study (Kenya)
- Improved Institutional Stoves for Schools and Hospitals (Kenya)
- Energy in Rural Enterprises Survey (Kenya, Rwanda)
- Introduction of Fuel-Efficient Charcoal Cookstoves (Mali)
- Charcoal Production Training (Rwanda)
- Energy Advisor Training and Project Design (Somalia)
- Technical and Business Advisory Services for energy-intensive small businesses (Malawi)
- Forestry Assessment (Sudan)
- Biomass As Energy Statistical Methodologies (United Kingdom)

II. 1986 OVERVIEW

Despite the uncertain outlook for the life of EIA at the opening of FY 1986, the Project team survived the continued uncertainty of budget cuts through scrupulous planning. During the February meeting in Rome, E/DI, EIA staff, and USAID participants discussed three scenarios of early project termination. A matrix that prioritizes Project activities in each of the three EIA offices was created. This flexible response mechanism has enabled EIA staff to react quickly to the potential effects of the proposed Gramm-Rudman-Hollings legislation.

Among the achievements at the planning meeting was this identification of priority activities through the end of the Project. Based on experience with previous budget cuts, AFR/RA elected to honor existing commitments without incurring new liabilities. Other planned activities were streamlined and refocused to accommodate alternative levels of financing. Budget cuts forced EIA field staff to exercise strict discipline in project implementation.

While the debate over funding has occupied the Washington staff throughout the year, field personnel have sought to optimize the use of remaining funds through a full project agenda. This continuity was achieved through reallocating field staff time to high priority projects as well as attracting outside funds from other AID offices, donor organizations, and government ministries. These factors mitigated the effects of budget cuts and allowed the Project to maintain progress toward its triad of objectives: responsiveness to Missions, contributions to existing knowledge, and impact on current and future projects.

A. Approach to Achieving Objectives

The field staff redefined the approaches through which these objectives, defined at the 1985 Gisenyi Meeting, were to be achieved. In so doing, the Project has built strong bridges between key parties at various levels of the development process. These approaches, which have proven to be accomplishments in their own right, include:

- Pursuing Cooperation Among the Missions, REDSOs, World Bank, and FAO
- Publishing a Series of EIA Manuals to Build a Lasting Foundation of Knowledge in Energy Development

1. Pursuing Cooperation Among the Missions, REDSOs, World Bank, and FAO

In pursuing the objectives of AID, EIA has in many cases simultaneously served the interests of the World Bank and other donor agencies. Key donors that have benefitted from EIA activities include:

- World Bank -- Malawi, Niger, Rwanda, Madagascar, Kenya, Sudan, Zaire, Uganda, and Somalia
- FAO -- Senegal, Mali, Sierra Leone, and Burkina Faso
- IDRC -- Kenya, Uganda, Somalia, and Malawi
- European Community -- Madagascar and Kenya

EIA has served primarily as a facilitator for these donors, but also has provided technical expertise in the design phase of various programs. EIA staff have assisted donor agencies to coordinate their activities and thereby make more effective use of the unique resources and interests of

each. In the process, both the system of coordination amor donors and the EIA network have been strengthened.

Cooperation between the World Bank and AID is especiall important due to their overlapping interests and their dis tinct resources. Typically, EIA staff, with USAID Missic concurrence, have performed a feasibility study or prepare the technical design for a project, whereupon the World Ban has managed and funded project implementation. In each case EIA has produced a discrete output that satisfies the needs o both donor agencies. Types of joint activities have include the design of World Bank agroforestry and stoves projects participation in a multi-donor forestry sector assessment review of studies for projects, and providing interim fundin for an energy planning advisor.

With an FAO consultant, EIA staff have examined th forestry project planning process in a number of Saheliar countries and assisted local foresters in conducting wooc economics studies. These studies will form the basis for a joint AID/FAO wood economics workshop, described later in this section. EIA staff also produced the workshop on project evaluation being used by these local foresters.

2. Publishing a Series of EIA Manuals to Build a Lasting Foundation of Knowledge in Energy Development

In the past year the EIA Project has produced a large number of reports, manuals, and computer models for public distribution. Among the more significant publications are:

- Production and Consumption of Wood Energy in Kenya with Particular Reference to Agroforestry, by Keith Openshaw

- Energy Conservation Workbook for Transportation, by Seyoum Solomon, D. Michael Bess, and Andres Doernberg
- Forest Resource Analysis and Planning Model, and User Manual, by E/DI Staff
- Will Wood Work?, by Asif Shaikh and Ed Karch
- Annotated Bibliography of Factors Affecting Pumping and Irrigation in Africa, by John Gallup
- Production and Marketing Strategy for the ATS Metal Stove, by Max Kinyajui
- Regional Charcoal Market Study: Europe, United Kingdom, and West Africa, by Nicolas Engalichev
- Intermediate Financial Institutions, by Kenn Ellison
- Small-Scale Pumping for Agriculture In Developing Countries, by Jim Westfield
- The Casamance Kiln, by Ed Karch, Michael Boutette, and Kjell Christophersen (published by the University of Idaho)

To date, EIA has received over 100 requests for these and other publications from USAID Missions, other donors, energy professionals worldwide, and many others. Appendix A gives abstracts of selected publications, while Appendix B lists all EIA publications and those requesting them.

In the past year the EIA Project has produced a set of computer models and accompanying manuals, including:

- Forest Resource Analysis and Planning Model (FRAP)
- Breakeven Model
- Charcoal Production Model (CHAR IIA)
- Woodfuels Road Transportation Model

These models, which are described in Appendix A, serve both as economic analysis guides and computer training tools for local energy planners. They are written with the Lotus programming language so are relatively easy to learn and use. Though these models were developed specifically for Africa, they are suitable for application in many developing countries worldwide.

B. The EIA Priority Areas

1. Wood Economics

EIA has attempted to broaden the understanding of Africa's supply and demand for woodfuels by introducing economics into the planning of forestry projects. (Woodfuel management practices which are encouraged by EIA staff include planting trees on agricultural land in agroforestry systems, e.g., controlling natural forests, farm trees, woodlands and plantations, as well as converting some of the natural forests into plantations.) EIA accomplishments and activities in wood economics over the past year have included:

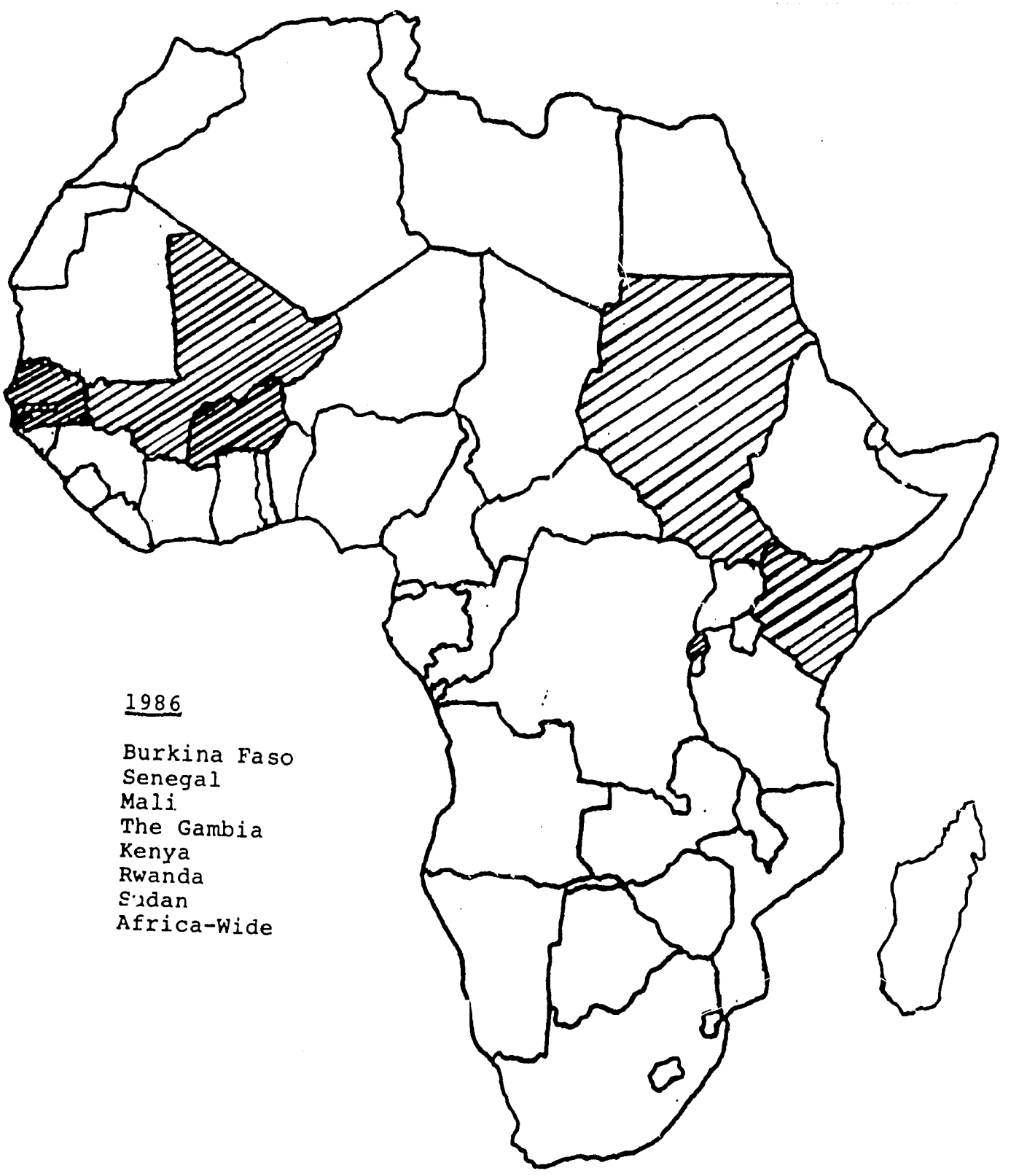
- Planning studies for the Mali Forestry Sector Development Project
- Farm tree planting in Rwanda
- Application of the FRAP model for training purposes in The Gambia
- Forestry sector review and project design assistance in Sudan
- Participation in the Kenya Peri-Urban forestry assessment

2. Energy Conservation/Fuel Substitution

EIA staff have undertaken a number of activities of

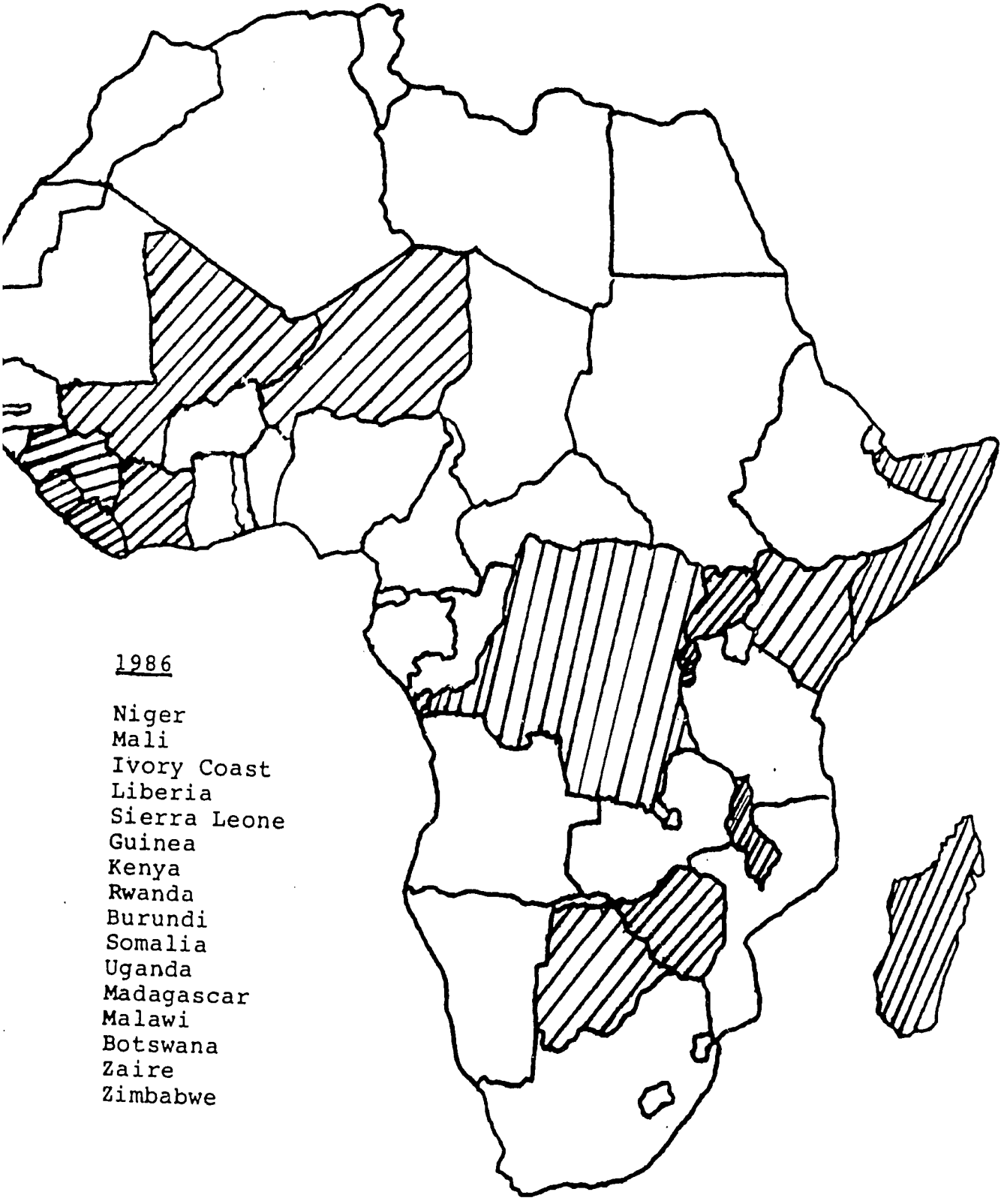
COUNTRIES PARTICIPATING

IN WOOD ECONOMICS ACTIVITIES



COUNTRIES PARTICIPATING

IN FUEL SUBSTITUTION/ENERGY CONSERVATION ACTIVITIES



concern to USAID Missions in the area of Energy Conservation/ Fuel Substitution, including:

- Energy conservation audits in electric utilities (ECOWAS)
- Energy planning unit and household energy program in Madagascar
- Planning of "rapid" water pumping assessments to take place in Kenya, Botswana, and Zimbabwe
- Implementation of peat carbonization trials in Burundi and Uganda
- Rural enterprise energy utilization survey in Kenya and Rwanda
- Statistical methods for biomass used as energy analysis
- Training of charcoal producers in Rwanda
- Renewable energy technologies review in Mali
- The second quarterly report of Ivory Coast Energy Conservation subproject completed
- Groundnut shell briquetting advice in Sudan
- Final evaluation of Liberia energy advisor subproject
- Small hydropower for agricultural processing in Madagascar (ongoing)
- Financing of energy efficiency improvements for rural enterprises in Malawi (ongoing)
- Presentation of study of power systems for rural clinics in Guinea

These activities are described in a later section of this report.

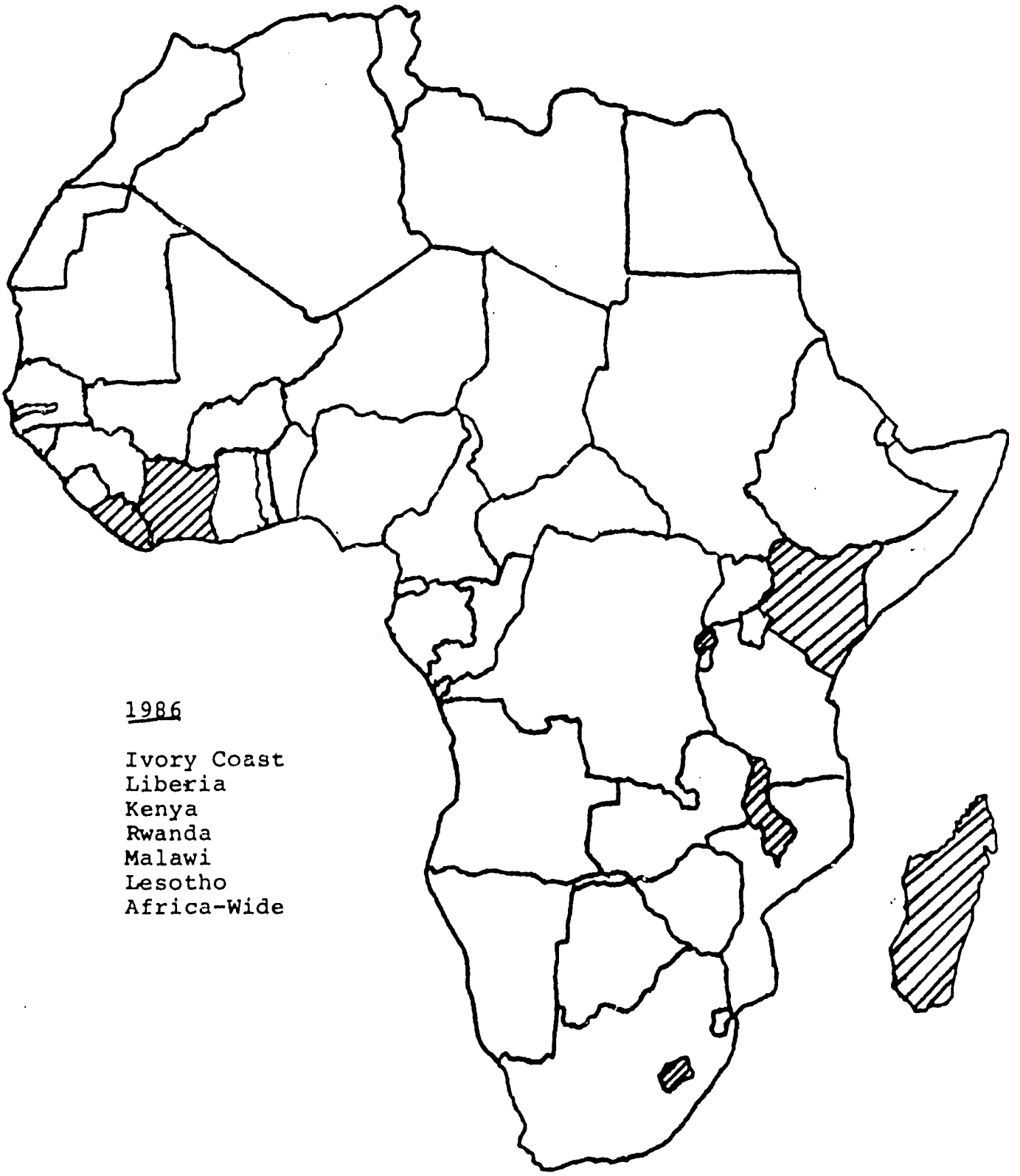
3. Local Enterprise Development (Charcoal and Cookstoves)

Among the most visible and self-sustaining projects are

COUNTRIES PARTICIPATING

IN LOCAL ENTERPRISE AND DEVELOPMENT:

CHARCOAL AND COOKSTOVES ACTIVITIES



EIA's activities in the dissemination of fuel-efficient cookstoves as well as in the promotion of charcoal production and transportation, where appropriate. These projects, which complement EIA's efforts in wood economics and energy conservation/fuel substitution, show great potential to thrive after EIA is closed out. Specific accomplishments and activities in this area include:

- KENGO subproject for cookstoves production and marketing throughout Africa
- The Casamance Kiln manual
- Charcoal export analysis for Liberia and Ivory Coast
- Evaluation of marketing of fuel-efficient energy technologies in Lesotho
- Study tour of Malawian stoves technicians in Kenya
- Stoves assistance to Missions in Somalia and Rwanda
- Assessing charcoal from coconut in Madagascar

C. Highlights of Africa-Wide Technical Accomplishments

In addition to the country specific activities listed above, EIA has made progress in several areas having Africa-wide implications. One of these is the examination of the possibility of exporting charcoal from several West African countries to importing countries in Africa and Western Europe. This has long been a topic of considerable interest to many donor organizations, such as the World Bank, FAO, and USAID. EIA funded a report, "Regional Charcoal Market Study," which has broadened the platform from which EIA staff have launched many relationships with local charcoal producers. EIA staff continue to provide technical assistance, especially in the

area surrounding Abidjan, using the manual as a guide to determine under which conditions it would be possible to penetrate export markets.

EIA staff have fostered dissemination of the Casamance charcoal kiln in East Africa. This kiln, which was developed in the late 1970s in the Casamance region of Senegal, is more energy efficient and profitable to operate than traditional kilns and has been well accepted by local charcoal makers. Charcoal producers in Rwanda have been trained in its use by EIA staff in conjunction with a World Bank consultant.

For three years E/DI and EIA staff have developed and promoted improved cookstoves in numerous African countries. Having identified wood energy use as an important factor in the deforestation of the Sahel, EIA staff have assisted target groups in stove design, program development and production quality control, and have coordinated and supported the activities of other donors in this regard. EIA's Regional Improved Stoves Subproject serves as a focal point for these efforts, hosting training sessions and visits from government officials and private producers.

Particular attention has been devoted to biomass due to its importance as an energy source throughout Africa. EIA staff have presented papers concerning biomass at various meetings and workshops sponsored by the UN, World Bank, Commonwealth Development Council, and other organizations. At a workshop involving several donors in the United Kingdom, EIA staff emphasized the need for materials on biomass production and consumption so as to develop training programs for energy planners and government officials. EIA staff will continue to pursue this topic through follow-up workshops.

D. Workshops in Major Program Areas

EIA plans to hold two technical workshops in FY 1987: one on wood economics hosted by the EIA/Abidjan office, and another on fuel-efficient cookstoves organized by the Nairobi office. The objectives of these technical workshops are: (a) to exchange technical information on African issues; (b) to share lessons learned; and (c) to influence those who make decisions regarding project design and funding in EIA's priority areas.

Wood Economics Workshop. Three national teams chosen by EIA field staff are currently performing an analysis of the role of economics in forestry project planning using a guidebook developed by EIA staff. Workshop participants sponsored by FAO in cooperation with USAID will develop a standardized methodology for analyzing forestry projects.

Fuel-efficient Cookstoves. A program of considerable interest to governments and donors alike, cookstove development and dissemination will serve as the focus of a second EIA workshop. EIA staff plan to stress the importance of performing a marketing study prior to developing a local stove design, and actively promote self-sustaining programs that involve the private sector. Participants will perform a cost-benefit analysis of long-term research and testing programs. This workshop will contribute to the development of a regional cookstove dissemination effort in Africa.

In addition to these technical workshops, EIA Washington is planning a third workshop to be attended by a range of EIA participants. The purpose of this gathering is threefold: to identify and promote the lasting achievements of EIA; to identify lessons learned from EIA to apply in designing related projects; and to find common institutional channels through which to sustain the networks developed by EIA. This

workshop will include participants from USAID, the World Bank, and other organizations with whom EIA has worked. It will serve as the final forum to influence the next phase of energy development in Africa.

III. PROGRAM DESCRIPTION

This section reviews EIA's major activities during FY 86. The section has three components:

A. A matrix that groups activities (e.g., completed, current, and planned) by country into program areas,. indicating the nature of the undertaking (e.g., technical assessment, project development, training, or information sharing).

B. Technical assessments, grouped by geographic areas and by country within those areas.

C. A section on subprojects, describing each obligated subproject with data on funding levels, objectives, and current status.

1986 EIA ACTIVITIES BY PROGRAM AREA

Wood Economics

Fuel Substitution
Energy Conservation

Local Enterprise Development:
Cookstoves and Charcoal

A. 1986 EIA ACTIVITIES BY PROGRAM AREA

	Wood Economics	Fuel Substitution Energy Conservation	Local Enterprise Development: Cookstoves and Charcoal
SAHEL			
Burkina Faso	FAO National Team Study - TG		
Niger		ECOWAS Audits - TG	
Senegal	FAO National Team Study - TG		
Mali	FAO National Team Study - TG Forest Policy Analysis for AID Project Design - PD	Solar Laboratory Evaluation - TA	
The Gambia	Forest Resources Model Use - TG		
CILSS	Forest Resources Model - TA		
COASTAL WEST AFRICA			
Ivory Coast		Energy Conservation Plan - TA Energy Conservation Subproject - PD	Charcoal Export - TA
Liberia		Energy Planning Advisor - PD	Charcoal Export - TA
Sierra Leone		ECOWAS Audits - TG	
Guinea		Presentation of Photovoltaic Power Study - TA	
ECOWAS		Energy Audits in Utilities - PD	

PD--Project Development; TA--Technical Assistance; TG--Training; IS--Information Sharing

A. 1986 EIA ACTIVITIES BY PROGRAM AREA (continued)

	Wood Economics	Fuel Substitution Energy Conservation	Local Enterprise Development: Cookstoves and Charcoal
EASTERN AND SOUTHERN AFRICA			
Kenya	Peri-Urban Forestry - PD	Energy in Rural Enterprises - TA	KENGO Subproject - PD Bellerive Foundation, Appropriate Technology International, and the ITDG - IS
Rwanda	Farm Tree Planting - PD	Energy in Rural Enterprises - TA	Charcoal Production - TA
Burundi		Peat Carbonization Trials - TA	
Somalia		Energy Planning Advisor - PD	
Sudan	Forestry Assessment - TA		
Uganda		Peat Production - TA	
Madagascar		Hydro-Power Subproject - PD World Bank Energy Assessment - TA	
Malawi		INDEFUND Subproject - PD Energy in Enterprises - TA	Charcoal Stoves - TA
Lesotho			Marketing Energy Technologies - PD
Botswana		Rapid Pumping Assessments (planned) - TA	
Zaire		World Bank Energy Planning Advisor - PD	

PD--Project Development; TA--Technical Assistance; TG--Training; IS--Information Sharing

A. 1986 EIA ACTIVITIES BY PROGRAM AREA (continued)

	Wood Economics	Fuel Substitution Energy Conservation	Local Enterprise Development: Cookstoves and Charcoal
EASTERN AND SOUTHERN AFRICA (continued)			
Zimbabwe		Rapid Pumping Assessments (planned) - TA	
AFRICA-WIDE			
	Wood Economics Wrap-up (planned) - IS Forest Resources Model Workbook - IS Transportation of Wood/ Charcoal Model Workbook - IS Small-Scale Charcoal Production Model Workbook - IS	Conservation Wrap-up (planned) - IS U.N. Biomass for Energy Statistics - TA	Charcoal Workbook - IS Charcoal/Stoves Wrap-Up (planned) - IS

PD--Project Development; TA--Technical Assistance; TG--Training; IS--Information Sharing

B. Technical Assessments

1. Sahel

The following assessments have been planned and/or executed in conjunction with the Sahelian Missions, the Sahel Development Program and CILSS.

a. Mali Forestry Sector Development Project (FSDP) - Pre-Implementation Assessments

In January 1986, EIA consultants completed two assessments that will pave the way for the Mission's proposed $14 million FSDP project. A third study on forest products marketing was cancelled due to the Mali/Burkina Faso war. The studies examine forest products pricing policy and recurrent costs for the purpose of increasing agricultural production and fuelwood supply. These studies, finalized and/or translated by EIA/Abidjan and the consultants in August 1986, are available in English and French at the Washington, D.C. office.

The assessment of forest policy investigates the marketing and pricing structure of woodfuels to ascertain the effects of forestry legislation on the sale of wood products. Though these products are sold in a free market setting, retail prices do not reflect the cost of replacing national stands. This situation is largely the result of low or unenforced taxes on wood products. The report recommends a number of measures including a revised fee structure and a new approach to managing natural forests that includes village participation.

The study on recurrent costs identifies long-term cost factors that impede the development of the forestry sector in Mali, as well as practical solutions for their control. The

EIA consultant made several recommendations, including the initiation of forestry-related activities to increase agricultural production, new technical approaches, and administrative/political arrangements, as well as the creation of a regional forestry fund.

b. Evaluation of the Solar Energy Laboratory

The AID Mission in Mali requested EIA to provide an economist to participate in the evaluation of the Solar Energy Laboratory funded by AID. The consultant provided by EIA spent two weeks in-country reviewing 11 different renewable energy technologies.

c. Wood Economics

The EIA-initiated agreement between FAO and AID (represented by EIA) on the Wood Economics activity was formalized in February 1986. FAO will use the results of this collaboration as a springboard to justify a long-term training program in forest economics for Sahelian and other developing country foresters. EIA staff joined the FAO consultant during the two-week field visits with the three national teams, identified earlier by EIA/Abidjan, from Senegal, Mali, and Burkina Faso.

FAO will attract funding for this effort from various donors. The Sahel office will contribute funds through FAO to support the national teams while they prepare their studies. These studies will form the basis for a joint AID/FAO workshop that will be held in the Spring of 1987 to focus on fuelwood and forestry-related issues pertinent to the Sahel. The delay of the workshop until Spring is due to the timing of FAO funding.

The national teams are examining past as well as ongoing forestry projects in their respective countries to evaluate the role of economics in the planning and appraisal of forestry projects. These projects supply community energy needs as well as protect other natural resources. The teams have been assisted in their task by a "How To" guide developed by EIA/Abidjan. The objective of the reports produced by each national team is to increase the awareness of national forestry planners and donors of the fact that the application of economics is as important as the consideration of biological factors in forestry project planning.

d. Energy and Forestry Models

To facilitate their energy planning tasks throughout the Project, EIA staff have developed several computer models. These models, accompanied by instruction manuals, are useful beyond this initial application as analytical tools. Among the models are four that deal directly with the wood economics issues that will be discussed in the 1987 Spring workshop, co-sponsored by EIA and FAO:

(1) Small-Scale Charcoal Production (Char III)

(2) Transportation of Wood and Charcoal (TACOW)

(3) (Breakeven) -- An analysis of wood production required to break even on investments, given a certain set of assumptions.

(4) Forest Resources Assessment and Planning Model (FRAP)

EIA supported an E/DI consultant for three weeks to make these and other models, developed by the EIA/Abidjan office, more user-friendly, as well as to draft the accompanying manuals. EIA staged a presentation for REDSO staff on use of the models and their utility for REDSO work. Manuals and

disks are available through the EIA contractor office in Washington, D.C.

2. Coastal West, Eastern, Southern, and Central Africa

a. Burundi Peat

In April 1986, EIA staff conducted peat carbonization and briquetting trials at the request of the Mission. These tests were performed to identify the optimal cooking fuel. Specifically, the tests determined:

- Locally available binders for briquetting.
- The suitability of equipment in use.
- Physical and chemical characteristics of materials for economic evaluation.

EIA staff concluded that to produce clean fuel for indoor cooking, the peat charcoal should be briquetted. The vegetable binder, which grows locally in Burundi, gave the briquettes a clean initial burn, as well as a long burning period. Cassava and resin binders proved impractical or expensive due to the seasonal or irregular nature of the supply.

EIA staff will continue to provide technical input to USAID's Peat II project and ONATOUR (Office National de la Tourbe). This activity includes followup peat trials and project development. EIA staff have also conducted similar trials in Uganda with the Busoga Cooperative Union.

b. Charcoal Export

In March 1986, an EIA consultant conducted a six-week mission to investigate the potential for charcoal export to European and African markets from Liberia and the Ivory Coast.

He traveled to importing countries in Europe (England, France, Belgium, Holland, and Germany) to assess the markets and conditions that would have to be met in order to penetrate the market effectively. The same type of investigation was carried out in Senegal and Mauritania. On the supply side, the consultant visited manufacturers, exporters and shippers in Ivory Coast and Liberia to determine supply potential and identify logistical constraints.

The consultant's findings demonstrated that, for the most part, charcoal exports from Liberia and Ivory Coast to other West African countries and Europe are not financially feasible. Price controls, strict quality standards, and transport costs make West African charcoal noncompetitive in most markets. Both the English and French versions of the report are available for distribution.

c. The Gambia: Computer Training for Forest Service Technicians

In June 1986, EIA conducted a training session for forest service technicians in The Gambia on the use of the Forest Resources Assessment and Planning model (FRAP). The model, originally commissioned by CILSS to examine fuelwood and natural resource issues, was based on data from The Gambia. FRAP has proven to be a useful tool for energy and natural resource planners in projecting supply as well as demand for forest resources. The model has been used in AID-funded energy planning projects in Sudan and Morocco.

The two-week workshop was attended by five Forest Service employees and three professional foresters, including Byemass Taal, the Director of the Forest Service. Emphasis was placed on training in the use of computers for the everyday planning and scheduling of forest management activities.

In addition to acquiring basic functional skills, the more advanced trainees learned enough about operating system theory and chip architecture to manage various studies in forestry planning on their own. The theoretical background provided by the trainers encourages an independent transfer of skills to new but similar environments. A final report from the EIA consultant and computer trainer is available.

d. Guinea: Photovoltaic Refrigeration Study

EIA supplied two consultants to carry out a prefeasibility study of photovoltaic systems for the basic electrification of four rural health clinics. The assessment, conducted for the Ministries of Energy and Health, recommended systems based on cost-effectiveness and reliability of fuel supply.

In May 1986, after significant modification due to changes in terms of reference, EIA presented the final report to the Minister of Health and the Guinean coordinator of the study. The Minister, an expert in solar energy, was particularly interested in the findings, and plans to pursue recommendations to seek funds from other donors. EIA/Abidjan anticipates a formal request to assist in preparing financial dossiers to obtain funding for a feasibility study.

e. Kenya

(1) Peri-Urban Forestry Study

EIA/Nairobi staff participated with the World Bank and USAID/Nairobi in drawing up the terms of reference for a peri-urban forestry study. The team examined alternative energy sources to satisfy Kenya's urban energy requirements. Keith Openshaw played a key role in shaping the design of this World Bank project, and continues to serve on the advisory board.

In 1986, EIA staff participated in a study to review options for improving the efficiency of charcoal production. At this time, the Project was redesigned to improve planning components of the activities. Recommendations made in the study defined part of the World Bank's forestry/energy/natural resource project.

(2) Improved Institutional Stoves for Schools and Hospitals

In the first quarter of 1986, EIA assisted Appropriate Technology International, the Intermediate Technology Development Group, and the Bellerive Foundation in preparing a proposal to fund improved institutional stoves in Kenyan schools and hospitals. Institutional participation in energy conservation measures, such as improved stoves, facilitates the dissemination of the principles and technology on an individual level. EIA advised on budgeting and general presentation.

f. Kenya and Rwanda: Energy in Rural Enterprises

EIA staff designed screening criteria for a survey to identify those rural enterprises which comprise significant energy consumption and employment prospects. The dual objectives of the study are:

- To develop options to alleviate energy constraints in small labor-intensive enterprises via conservation and fuel substitution.
- To identify development opportunities and constraints in such enterprises.

Results describe the rural enterprise in terms of energy cost, fuel use, and energy intensity.

The subcontractor, along with E/DI staff, surveyed about 200 small-scale enterprises in Kenya and almost 100 in Rwanda. In June and July of 1986, E/DI staff targeted specific rural industries where there exists the greatest need for energy management plans, such as brickmaking, charcoal manufacture, pottery, repair workshops, and lime burning. The subcontractor will submit the edited draft document for review by E/DI staff in late November of 1986.

g. Malawi: Introduction of Fuel-Efficient Charcoal Cookstoves

The World Bank is planning a major wood energy project for Malawi to further their ongoing work in the forestry sector. EIA provided the Bank with an expert to design a private sector charcoal stove component for this project. The activity included arranging for the training of Malawian Energy Studies Unit participants in an improved stoves program in Kenya. Further project design assistance will be provided by EIA staff as needed.

h. Rwanda: Charcoal Production

EIA staff traveled to Rwanda at Mission request to work with a World Bank charcoal consultant who was assigned to train local charcoal producers in more efficient production methods, based on use of the Casamance kiln. (The consultant had been trained in Senegal by EIA's Abidjan Deputy Director.) EIA advised on charcoal production and training techniques.

i. Madagascar: Energy Planning

For a combined AID/World Bank energy mission to Madagascar, EIA provided staff time to design the upcoming World Bank Energy I project. EIA focused on the design of an energy planning unit and a household energy program. EIA staff will

continue to provide assistance to the World Bank during this design phase. The assistance includes organization of a visit to Kenya by four officials of the Ministry of Energy and Mines. The officials visited several energy projects in Kenya, and interviewed key managerial and technical experts in this field. These visits, similar to the trips to Kenya by the Malawians, provide the means through which EIA as well as E/DI staff can transfer information about energy planning on a regional basis.

j. Malawi: Technical and Business Advisory Services

USAID and READI project personnel requested EIA staff to design scopes of work, related especially to energy use, for small- and medium-scale enterprises and the financial institutions that service them. These scopes of work aimed toward the development of technical and business advisory services. EIA staff drew up sample questionnaires, formats, and cost delivery estimates. EIA staff will provide further assistance on an as-needed basis.

k. Sudan: Forestry Assessment

EIA participated with AID, the World Bank, and other donor agencies in performing the original Sudan forestry sector assessment in 1984. EIA, in particular, played a major role in writing up the final report and recommendations, especially concerning fuelwood and energy issues. In February 1986, the report was formally presented to, and accepted by, the Government of Sudan. A followup team has drawn up a profile of prospective forestry development projects valued at more than U.S. $35 million to be accomplished within a five-year program.

1. Biomass As Energy

EIA staff have been participating with the Commonwealth Science Council (CSC) and the United Nations Statistical Division to develop standardized methodologies and measurements for biomass resources. The CSC's ongoing Biomass Resource Assessment Project is holding two workshops on finalizing field activities for resource assessment: one in Rome, in collaboration with the U.N.; and the other in Mauritius.

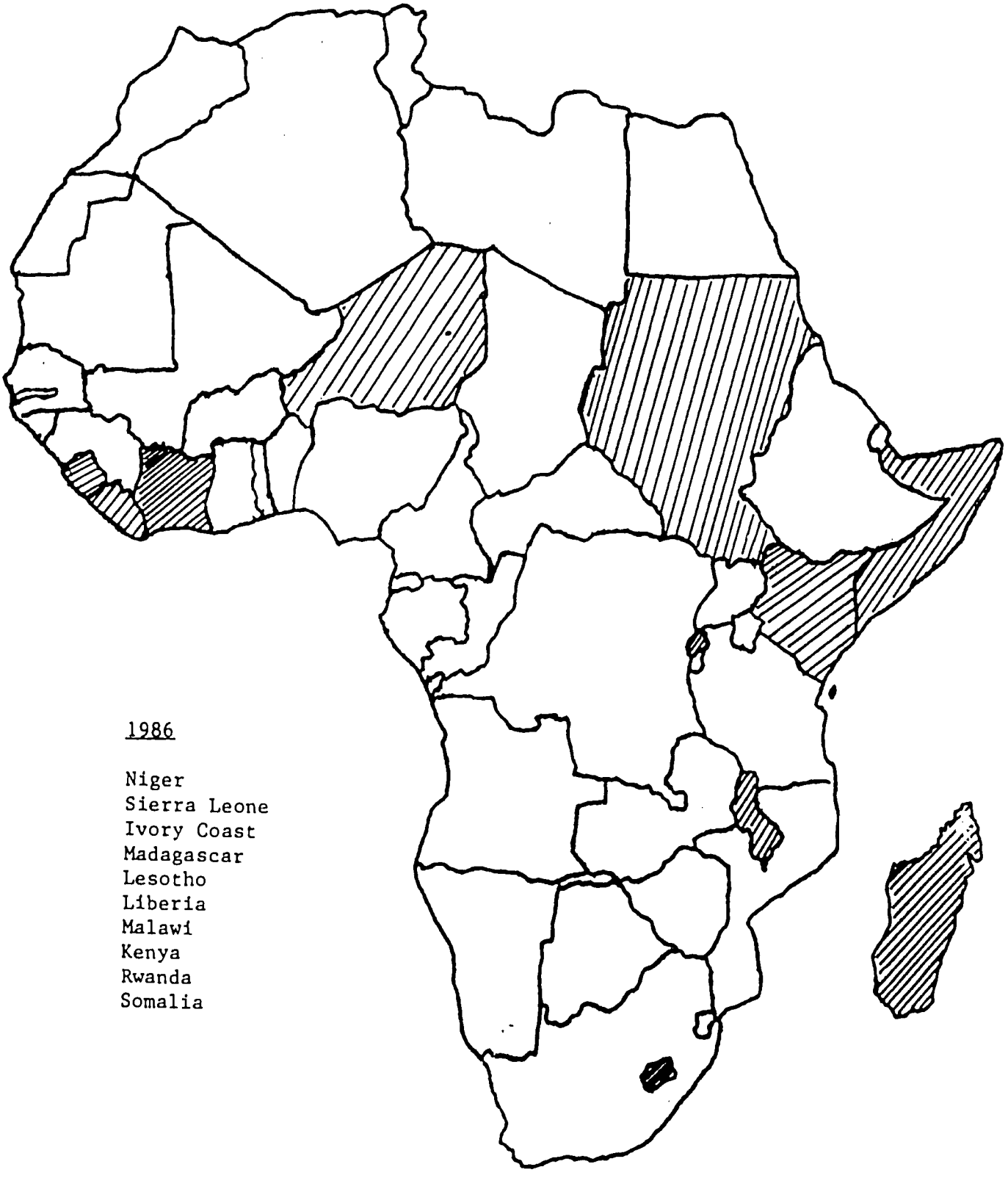
In September 1986, EIA staff presented a report on "Concepts and Methods for Collecting and Compiling Statistics on Biomass Used as Energy." The report is intended to serve as the U.N. Statistical office's springboard for increased statistical coverage of new and renewable sources of energy. EIA staff concluded the paper with a recommendation to integrate this data into prevailing overall energy balance formats. This effort is aimed at leading to a much better understanding of biomass as an important energy form.

C. Subprojects

- ECOWAS Energy Audits in Electric Utilities
- Ivory Coast National Energy Conservation Planning
- Madagascar Small Hydropower Project
- Lesotho Energy Technology Marketing
- Liberia Energy Planning Advisor Final Evaluation
- Malawi INDEFUND
- Regional Cookstove Production and Marketing Subproject
- Rwanda On-Farm Tree Planting
- Somalia Energy Planning Advisor

COUNTRIES PARTICIPATING

IN SUBPROJECT ACTIVITIES



Energy Conservation Audits in Electric Utilities

WEST AFRICA

Subproject Grant
Proposer/Grantee: Economic Community of West African States (ECOWAS)
Duration - 14 months
Funds Obligated - 28 June 1984

AID Funds: $250,000

The ECOWAS representative notified the winning contractor of its selection in late 1985, approximately one year behind schedule. Because of the delays, the Project completion date was extended to December 31, 1986; but even with this extension, it will be impossible to complete the original scope of work. Therefore, the work plan has been scaled back to include only one round of audits in two countries -- Niger and Sierra Leone.

In June 1986, EIA and contractor staff traveled to Niger to identify trainees and make logistical arrangements for the energy audits. These audits, which recommend short- and medium-term steps to improve energy efficiency, took place at Sonitextile in Niamey. Trainees were drawn from the electric utility, government ministries, and local industry.

The energy audit training session in Niger was completed in July 1986. The six students who attended were very pleased with the courses, as were the affected ministries and AID. Trainees in Sierra Leone were selected for the energy audit training program which commenced in Sierra Leone, late in September 1986.

Ivory Coast Energy Conservation

IVORY COAST

Subproject Grant

Proposer/Grantee: Ministry of Industry,
Bureau d'Economies d'Energie

Duration - 24 months

Funds Obligated - July 1985

AID Contribution:	$ 200,000
Host Country:	1,500,000
TOTAL:	$1,700,000

This Subproject was formally inaugurated in March of 1986 when the conservation master plan, which had been developed in 1985 by E/DI and the Ministry of Industry, was officially transmitted to the Ivorian Government. The occasion included speeches from U.S. Ambassador Miller and the Minister of Industry.

In following the EIA national energy conservation assessment, this subproject focuses on three major activities:

- Assistance to the newly-created Bureau d'Economies d'Energie within the Ministry of Industry.
- Preparation of financial dossiers to seek external financing for energy conservation measures.
- Support for continued energy audits and conservation publicity measures.

The first two quarterly reports for this subproject have been submitted and accepted by REDSO. Among other issues, these reports discuss a change in the approach to training.

The Energy Conservation Bureau successfully used the $9 million training budget to attract $150 million from other funding sources such as the Ministry of Information within the Ivorian Government.

In addition to this 15-fold expansion of training activities, a contract to design and implement an intensive advertising/public information campaign on energy conservation has been signed. The Ministry of Industry, REDSO, and Interpret Advertising Agency will use local television and radio stations, as well as brochures and pamphlets, to educate and encourage the public to pursue energy conservation measures. Energy audit courses in the Ivory Coast are scheduled to begin in October 1986.

Small Hydropower for Increased Agricultural Productivity

MADAGASCAR

Subproject Grant

Propcser/Grantee: Ministry of Industry, Energy and Mines

AID Funds:	$150,000
Host Country Contribution:	407,000
TOTAL:	$557,000

A regional AID team identified this prototype subproject while preparing the FY 86 CDSS for Madagascar. This subproject addresses a priority concern in the CDSS -- power for agriculture and the improvement of agricultural infrastructure. The purpose of the Subproject is to demonstrate the economic and technical feasibility of harnessing Madagascar's abundant water resources for stimulating local growth through providing cheap, decentralized hydromechanical (shaft) power. Virtually all equipment, including the turbines and all physical works were built locally. Other donors, including the World Bank, FAO, and the African Development Bank, have already expressed interest in funding a country-wide program pending the outcome of the Ampefy experiment.

A combined AID/EIA team selected the site for a mini-hydro facility. The turbines will generate 60 kW (30 kW in hydroelectric power and 30 kW in hydromechanical power) for agro-processing and local power supply. The area of Ampefy, on the River Lilly near Antananarivo, was chosen because the local farmers produce an abundance of rice, but cannot mill it nearby due to the lack of an affordable power source such as diesel fuel.

EIA staff developed the specifications for the distribution system. Local firms participated in turbine redesign, manufacture, and installation. The National Utility and the Ampefy community have established a program of tariffs and charges for utilizing the site's resources. The plant, scheduled for commission in mid-November 1986, with the President of the Republic presiding over the opening ceremonies, will be managed by the townspeople and the national utility.

A three-day national workshop on hydromechanical power for development will be held in Antananarivo and the village of Ampefy immediately after site inauguration. Representatives from various national, bilateral, and multilateral agencies will participate in this conference. The key issue to be addressed is the Subproject's replicability and relevance in other parts of the nation.

To supplement this effort, EIA assisted in preparing and organizing the visit of four officials from the Madagascar Ministry of Industry, Energy and Mines to Kenya. The Ministry team toured energy projects and interviewed the managers of private energy-related manufacturers, as well as government officials involved in energy planning in Kenya.

Increased Agricultural Productivity in the Rural Sector Through the Marketing of Energy Technologies

LESOTHO

Subproject Grant
Proposer/Grantee: Ministry of Cooperativ and Rural Development
Duration - 24 months
Funds Obligated - September 1984

AID Funds [illegible]

This Subproject aims at increasing agricultural productivity in the rural sector through the marketing and dissemination of energy technologies. These technologies include multi-fuel metal stoves, stone paolas (stone stoves), retained heat cookers, growholes (for tree and other seedling production), and food dryers. Dissemination involves the active participation of existing agencies and PVOs. GOL capabilities for continuing outreach, training, and extension after the Subproject's completion has also been strengthened. Five GOL Ministries and their extension networks, several national parastatals, and international PVOs participate in the dissemination effort.

With assistance from REDSO/ESA and EIA, the USAID completed the mid-term evaluation of the Subproject. EIA staff assisted in the preparation of the second annual operations plan, as well as in the budget and staff training plans. The evaluation team recommended extending the PACD beyond September 1986 on the condition that the management and staff support from the Government side be improved.

A visit by EIA staff in June - July 1986 confirmed that the Government has made considerable efforts towards filling key staff positions in the Appropriate Technology Section (AIS), and in providing logistical support to AIS staff. However, the Ministry of Cooperatives and Rural Development was formally abolished on September 27, 1986, and several key staff were retired from public service. This reorganization reportedly addressed the specific staffing and performance issues that led USAID to consider terminating the Subproject.

In this light, USAID/Lesotho and the GOL agreed that the Ministry would be given until December 15, 1986 to come up with a realistic operational plan to deal with USAID's key concerns. If the Ministry is unable to tackle these issues to USAID's satisfaction, the Subproject will terminate January 31, 1987. EIA developed the budget and implementation options. Subproject funds, for a lesser amount, were left to continue the activities. The Subproject should be evaluated again in December 1986.

Long-Term Energy Advisor

LIBERIA

Energy Planning Advisor

Proposer/Grantee: National Energy Committee
Government of Liberia

Duration - 2 years

Funds Obligated - 29 July 1983

AID Funds:	$250,000
Local Contributions:	83,500
TOTAL:	$333,500

A joint Government of Liberia and USAID/Monrovia energy assessment was performed by Oak Ridge National Laboratory and issued in June 1983. The assessment produced basic data on energy in Liberia and identified the most promising areas for conservation and exploitation of domestic resources. USAID/Monrovia felt that an advisor was necessary to assist in developing national energy policy aimed at building up the country's foreign exchange reserves. Mission priorities focused on promoting energy conservation, substituting local resources for oil imports, managing more efficiently, and creating a larger role for private business.

In April 1986, EIA staff performed a final evaluation of this subproject, which provided for assistance to the National Energy Committee (NEC). EIA staff gave technical advice to the USAID, and GOL personnel involved about matters such as the development of an energy data base to form an Integrated Energy Plan, as well as the identification of economic alternatives for petroleum. The evaluation revealed widespread institutional problems. The staff recommended that the most efficient and effective means of following through with energy

planning in Liberia is for those professionals who are directly involved in the Subproject to receive further training in statistics and energy economics. The development of these technical skills by the NEC staff will increase their awareness of the importance of economics in energy planning.

Energy for Small and Medium Enterprises

MALAWI

Subproject Grant

Proposer/Grantee: Investment and Development Fund of Malawi (INDEFUND)

Duration - 24 months

Funds Obligated - August 1985

AID Funds:	$ 150,000
Host Country Contribution:	1,153,500
TOTAL:	$1,303,500

This Subproject, using INDEFUND as a financial intermediary, has established the capability to identify, develop, monitor, and appraise energy-related activities in small- and medium-scale enterprises. INDEFUND, an offshoot of the parent INDEBANK, was created to provide concessionary financing to the small business sector. Its funding comes from the Malawian, Dutch, West German, and U.S. Governments.

The Subproject got off to a slow start due to INDEFUND's difficulties in locating a suitable candidate for the Energy Advisor position. A qualified engineer, who coordinates training programs as well as provides technical assistance, is now on INDEFUND's staff.

During a May 1986 visit to Malawi, EIA staff discussed with INDEFUND and the Intermediate Technology Development Group the financing of two feasibility studies for improved energy efficiency in lime kilning and food drying. Presently, an in-country training program, a revised work plan, and feasibility studies in six relevant fields are underway.

Aware of the financial constraints on the EIA project, the Mission offered to finance EIA per diem expenses out of Subproject funds. The Subproject should be evaluated in January or February of 1987.

Regional and Improved Cookstove Development and Dissemination Program

SUB-SAHARAN AFRICA

Subproject Grant

Proposer/Grantee: Kenyan Energy Non-Governmental Organizations (KENGO)

Duration - 24 months

Funds Obligated - August 1985

AID Contribution:	$200,000
Local Contribution:	110,000
TOTAL:	$310,000

This Subproject promises to offer replicability and follow-on activities throughout the eastern and southern African (ESA) regions. KENGO staff have made technical visits to four countries and conducted a Regional Planning Workshop in October 1986. Representatives of ten countries and five international organizations participated in the Workshop. Additionally, at least ten donor agencies' representatives sat in on various sessions at the Workshop. Training and technical assistance for the remainder of the Subproject was programmed during the Workshop.

EIA staff assisted the Subproject Grantee, KENGO, in the selection of the project coordinator and preparation of the first annual plan, as well as the initial project implementation. In-country training commenced mid-year. The coordinator contacted Sudan, Somalia, Lesotho, Malawi, Rwanda, and Madagascar about participation in the regional stove program. Sudan and Madagascar sent candidates for Kenya-based training in April.

EIA staff continue to assist KENGO in developing country stove strategies, focusing on energy economics at the household level. In June 1986, KENGO staged an informal donor workshop to provide information on the Subproject and available services. KENGO also coordinates donor stove programs in the priority countries above, and provides technical assistance to design, produce, and market stoves.

Farm Tree Planting in the Sub-Prefecture of Buberuka, Ruhengeri Prefecture

RWANDA

Subproject Grant

Proposer/Grantee: The Director of Water and Forests, Ministry of Agriculture, Kigali

Duration - 4 years

Funds Obligated - 31 August 1983

AID Funds:	$500,000
Local Contribution:	335,800
TOTAL:	$835,800

Under the supervision of the Director of Water and Forests, the proposed Subproject has established a forestry extension service in the communes of Cyeru, Butaro, and Nyamugali, in the sub-prefecture of Buberuka. It is training 37 extension workers, planting 400 hectares of communal forests, as well as improving the management of existing forests, woodlots, and tree nurseries. Farmers are encouraged to plant more farm trees to increase their agricultural yields, and to manage existing and new trees properly. The Subproject provides instruction in the more efficient use of wood, especially as fuel, as well as organizing extension courses and demonstrations for farmers.

In January, April, and June of 1986, EIA staff carried out subproject monitoring trips for this Project, which were designed to increase fuelwood output and enhance agricultural productivity. The first demonstration farm was established with alley cropping of Sesbania sesban, a leguminous species. The June quarterly review reported that due to unforeseen labor and building requirements, Subproject finances had been

overextended. Consequently, EIA staff sought alternative financing; then the Mission announced its intentions to support this project through to its completion.

Earlier in the third quarter, EIA had arranged a study tour for the Peace Corps Volunteer who was working on the Subproject while he was in Kenya for other purposes. The tour included visits to agroforestry sites and programs in Kenya.

Presently, the Subproject promotes on-farm tree planting in all three of the communes originally identified in the Project Agreement. The evaluation of the Subproject will take place in the first quarter of FY 1987.

Long-Term Energy Advisor

SOMALIA

Energy Planning Advisor

Proposer/Grantee: Ministry of National Planning
Government of Somalia

Duration - 2 years

Funds Obligated - 29 June 1983

AID Funds:	$205,000
Local Contribution:	waived
Subproject Amendment:	34,000
Subproject Amendment:	46,425
SUBPROJECT TOTAL:	$285,425

The Government of Somalia, through the AID Missio requested an energy advisor for the Ministry of Nation Planning in a move to execute major recommendations of t recent World Bank national energy assessment. The respons bilities of the advisor include developing national planni and management capability, coordinating donor activities the energy area, identifying alternative funding, as well determining information requirements, institutional needs, a priorities for immediate action.

The Somalia Energy Advisor Subproject's PACD has bee extended to September 1987. An interim subproject bridgir program has been designed to continue some subproject activi ties until the World Bank's Power Sector Project commences probably in September 1986. EIA staff have worked wit USAID/Somalia, the GSDR, and the World Bank to design th World Bank's three-year Energy Planning component of its Powe Sector Project.

During his almost two years in-country, the EIA Energy Advisor helped to establish the Energy Planning Unit within the Ministry of National Planning. He prepared the energy section for the next five-year plan, wrote and reviewed numerous proposals to request funding for energy activities, and developed an energy library. He designed energy surveys for the household, industrial and agricultural sectors, and conducted a survey program. Under his supervision, technical assistance was recruited to assist the power sector, and training exercises were arranged for counterpart personnel.

The evaluation of this subproject was completed in May 1986. In August 1986, EIA staff met with World Bank officials in Washington, D.C. Findings showed that due to a lack of institutional support to provide interim services, it was necessary to extend the PACD (now September 1987) until the startup of the World Bank energy planning project. Subproject funds are being used to furnish this additional short-term technical assistance throughout the intervening year. S&T/EY will match EIA funds with their own to support consultancies. EIA and REDSO/ESA input has been critical to the design of the World Bank follow-on project.

IV. PROJECT MANAGEMENT

A. Budget/Planning

EIA held its Annual Planning session this year to coincide with FAO meetings on the joint Wood Economics activity. Because the planning session was held in Rome, in addition to E/DI and EIA staff from Washington, D.C., Nairobi, and Abidjan, the energy advisors from REDSO/ESA and AFR/TR/SDP were also able to attend.

The purpose of the planning session was to discuss the programmatic implications of the projected budget cuts, and to plan activities such as the workshops which will conclude each of the three priority areas. Once a common understanding of the budget cuts was established, the participants were able to develop a flexible program strategy to deal with a reduced, but still uncertain, level of funding.

Based on the program outlined at the Rome planning session, EIA staff performed a detailed budget analysis to determine how monies would be allocated through to the end of the Project. In spite of cuts amounting to $428,000 ($50,000 more than anticipated), EIA will be able to implement its program as well as to maintain its overseas offices through June 1987, instead of only through March 1987 as had originally been planned. Sahel funds released to FAO for the Wood Economics Workshop, accompanied by a reduction both in monitoring visits and in responses to unanticipated Mission requests, will enable the Project to complete its planned activities.

This budget exercise provided a clear picture of the discretionary funds to be applied to program line items. As soon as this reallocation is approved by USAID, a contract

amendment will be sought to accommodate changes in the funding ceiling and in the level of effort.

B. Program Strategy

The first step in developing a program strategy was to determine what the current commitments of the Project were. Once these commitments were identified, a matrix was set up which included level of effort, travel time, the influence of the activity outside of EIA, the repercussions of canceling the activity, and its importance among EIA priorities. These last three categories were ranked and tallied to gain an understanding of which activities were the most critical to the EIA program. Activities that did not measure up to these evaluation criteria were eliminated.

With this information in hand, AFR/RA asked the Project contractor to draw up budget and level of effort figures on what it would take to complete the new program. E/DI met in closed session to discuss with project staff their recommendations for carrying out the list of activities despite the economic cutbacks.

What emerged was a set of alternatives that could be tailored to the amount of funding AFR/RA could raise from deobligations and other sources. Flexibility was attained not at the expense of the program, but by adjusting staff strength and location to what would be optimal for program support at a given level of funding.

C. Workshop and Activity Planning

The Wood Economics Workshop, co-sponsored by FAO and AID (through EIA), will proceed as planned in April 1987. EIA

staff took charge of setting up the national teams for Senegal, Burkina Faso, and Mali. EIA/Abidjan staff, in cooperation with the FAO consultant, are presently training the three national teams. EIA was originally slated to underwrite the entire supporting costs of this training program. However, in view of the budget cuts, the Project obtained outside FAO funding for this purpose.

A Stoves Workshop was staged in October (FY 1987) by EIA/Nairobi in conjunction with the regional stoves Subproject managed by KENGO. A small amount of funding built into the Subproject allows that staff to sponsor separate workshops. EIA has used the Subproject as a vehicle to introduce concerns broader than training and funding. Such issues as marketing and commercialization will serve to expand the last subproject workshop, to take place in Spring 1987. Better planning of these stages of stove development and dissemination will enhance future spending on stove activities.

A Post-EIA follow-on workshop is being planned by EIA/Washington, D.C. for the purpose of examining the long-term implications of AID and E/DI's efforts in energy development through the EIA Project. Participants will include EIA staff, E/DI, REDSOs, USAID and the Missions, as well as the World Bank and other donor organizations. The Workshop will make recommendations on project design of follow-on activities. Specific attention will be focused on: 1) the technical and managerial achievements of EIA; 2) the lessons learned in project design and implementation; and 3) the potential institutional channels through which to sustain and expand EIA's efforts.

Through the creation of some kind of communications infrastructure, participants will be able to follow-on to various EIA projects.

D. Staffing

EIA field staff remained intact in FY 1986. In the fourth quarter, Adriane Wodey was replaced by Julia Demichelis as Project Consultant in Washington, D.C. Adriane had held this position since December 1982. In late July, she left Washington to study Finance at the Wharton School of Business Administration/University of Pennsylvania.

Ms. Demichelis served as a Peace Corps volunteer in Ghana in conjunction with the World Bank's Upper Region Agricultural Development Programme. Her worked there included the dissemination of cookstoves through the Women's Extension Unit. Since her return to the U.S., she has organized two conferences on international development. Until recently, she was employed by the Rural Electrification Administration/U.S. Department of Agriculture as a loan analyst. She is a graduate of Georgetown University, with a degree in Finance/International Management.

E. EIA Travel

Travel for FY 86 is presented below.

Nairobi

Keith Openshaw:

- Rwanda (January 10-17) to review and monitor progress of Subproject, and prepare budget.

- Rome (February 2-8) for the EIA Annual Planning meeting.

- Sudan (February 16-20) to review Forestry Sector Assessment, present report, and assist World Bank in formulating new projects.

- United Kingdom (April 12-21) to review the biomass resource assessment project and to attend the Commonwealth Science Council (CSC) workshop.

- Swaziland and Zimbabwe (May) to follow up on natural resources assessment workshop.

- Zimbabwe and Swaziland (July) to follow up on the EIA Remote Sensing workshops.

- Rwanda (July 4-11) to make the quarterly monitoring visit to the EIA On-Farm Trees subproject.

- Rome (September 27-30) U.N. and CSC workshops.

D. Michael Bess:

- Lesotho (December 1985) to review the progress of the Energy Marketing subproject.

- Malawi (December 1985) to assist with the startup of the INDEFUND subproject.

- Somalia (January 15-22) to review and monitor Subproject, and approve Annual Plan.

- Rome (February 2-8) for the EIA Annual Planning meeting.

- Madagascar (February 9-20) to review Subproject progress and participate in joint AID-World Bank Energy Planning Project preparation.

- Malawi (March 1-12) to assist the READI Project in design of technical advisory services for small- to medium-scale IFIs and to review progress of EIA Subproject.

- Lesotho (March 13-21) to monitor the EIA Subproject and assist in the mid-term evaluation.

- Somalia (May 7-14) to complete the mid-term evaluation of the EIA Subproject and to design a PACD extension.

- Lesotho (June 29 - July 4) EIA Energy Technology Marketing Subproject monitoring.

- Malawi (July 12-19) to work with the new INDEFUND Energy Advisor, as well as to revise quarterly and annual work plans.

- Washington, D.C. (July 11-15) EIA consultations.

- Somalia (September 14-21) EIA Energy Advisor Subproject monitoring and World Bank pre-appraisal mission.

Josh Mabonga-Mwisaka:

- Burundi (February 7-14) to prepare test samples of peat, coffee husks, charcoal, and binders.

- Rwanda (April 22-29) to monitor the EIA Subproject.

- Kenya (May 2-28) to provide technical assistance as well as ongoing guidance for the World Bank Peri-Urban Charcoal/Fuelwood Study program.

- Uganda (May 29 - June 3) to assist the Busoga Cooperative Union in carbonization and briquetting.

- Uganda (August 28 - September 11) USAID/Burundi Peat II peat carbonization and briquetting trials.

Abidjan

Kjell Christophersen

- Mali (October 1985) to set up pre-implementation assessments for the Mali Forestry Project, to discuss the cookstoves project, and to review the Solar Energy Lab evaluation.

- Nigeria (October 1985) to plan for Subproject implementation with ECOWAS.
- Burkina Faso (November 1985) to assist CILSS in purchasing computers for The Gambia.
- Rome (November 1985) to negotiate with FAO on the terms of their involvement in the Sahel Wood Economics workshop.
- Rome (December 1985) to continue discussions with FAO on the workshop approach.
- Mali (January 19-23) to coordinate the FSDP priority studies with AID and the Malian Forest Service.
- Rome (February 2-8) for the EIA Annual Planning meeting.
- Senegal (February 17-21) to recruit the national teams for the wood economics activity.
- Burkina Faso (March 5-7) to recruit the national teams for the wood economics activity.
- Niger (April 24-25) to negotiate the energy audit training program (ECOWAS).
- Guinea (May 15-17) to present the report prepared by EIA consultants on photovoltaic refrigeration for health installations.
- The Gambia (June 15-28) to demonstrate the FRAP model developed for CILSS by EIA and to train Forest Service technicians in its use.
- Niger (June 23-27) to make arrangements for the ECOWAS subproject.
- U.S.A. (July - August 10) home leave.
- Mali (August) to conduct the initial field visit for the wood economics activity.
- Senegal (August) to conduct the initial field visit for the wood economics activity.
- Burkina Faso (September) to conduct the initial field visit for the wood economics activity.

G. Edward Karch

- Mali (January) to work with EIA consultants on the forestry project policy studies.
- Rome (February 2-8) for the EIA Annual Planning meeting.
- Liberia (March) to coordinate with consultant on the charcoal export study.
- Madagascar (April) as the carbonization specialist on a joint AID/World Bank energy mission.
- The Gambia (June 15-28) to demonstrate the FRAP model developed for CILSS by EIA and to train Forest Service technicians in its use.
- Sierra Leone (July) to identify trainees for the ECOWAS subproject.
- U.S.A. (August - September) home leave.

Agnissan Kouassi

- Guinea [illegible]-17) to present the report prepared by EIA consultants on photovoltaic refrigeration for health installations.

Washington, D.C.

Cathryn Goddard

- Rome (November 1985) to negotiate the terms of FAO involvement in the Wood Economics workshop.
- Rome (February 2-8) to attend the EIA planning meeting.

Adriane Wodey

- Nairobi (October 1985) to discuss plans for wood economics and stoves workshops, staged by the Nairobi office.
- Rome (February 2-8) to attend the EIA Annual Planning meeting.

Appendix A
SELECTED EIA MANUAL ABSTRACTS

Among the most requested EIA publications available to the public through the Washington, D.C. office are the following:

1. The Casamance Kiln, by Ed Karch, Michael Boutette and Kjell Christopherson, will be published by the University of Idaho with a Title XII strengthening grant (completed September 1986)

The Casamance Kiln was developed to meet the specific requirements of a UNDP/FAO project in the Casamance region of southern Senegal. The overall objective of the Project, was to place the Casamance forests under management, and to provide income from the sale of forest products to finance timber stand improvement and planting costs. After several years of research, the resulting kiln showed dramatic improvement in both production efficiency and economic returns over the traditional method. In addition to this technical success, the kiln was well accepted by the local charcoal makers.

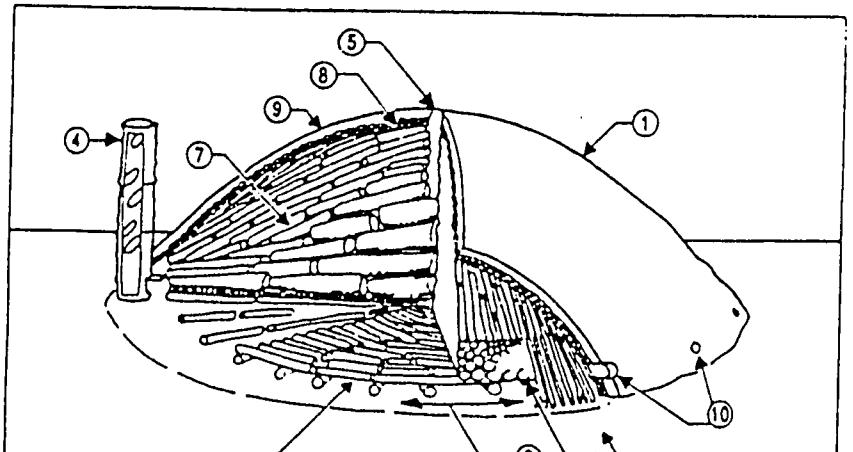
After recalling the history of the kiln design, the authors provide explicit instructions on its construction and operation. Diagrams clearly illustrate the design details, while graphs highlight the economic analysis that follows.

A glossary distinguishes over fifty technical items, from baffles to pyroligeneous liqueurs. In its conclusion, the manual describes other kiln types (e.g., Missouri Kiln, and the Argentine Half Orange Kiln) to emphasize that even the magnificent Casamance Kiln isn't universally appropriate.

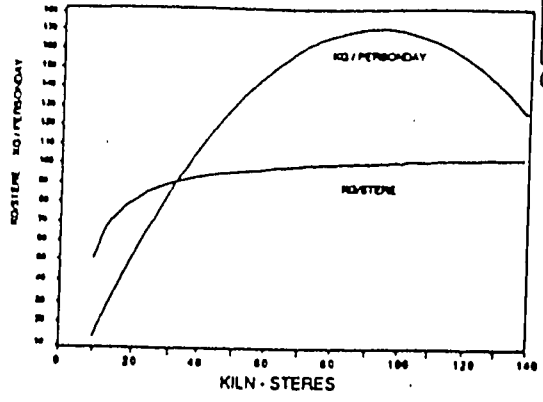
Figures From: The Casamance Kiln

1. **Low Domed Shape**
   - Places thick pieces of wood at the center of the kiln for complete carbonization
   - Gentle slope of kiln sides allows easy sealing with earth
2. **Platform**
   - Allows air to get in and out of any part of the kiln
3. **Air Chamber**
   - Mixing of exhaust and intake air preheats input air and cools exhaust air, dilutes oxygen and increases carbon dioxide content. This makes the kiln easy to control.
4. **Baffled Chimney**
   - Provides draft to promote quick carbonization
   - Allows the collection of condensable volatiles
5. **Top Central Lighting**
   - Promotes even carbonization by allowing no favored air path
   - Minimizes collapsing during the run
6. **Radial Layering**
   - Promotes even carbonization by allowing no favored air path
7. **Tight Packing of the Charge**
   - Minimizes collapsing
   - Lengthens gas path
8. **Vegetation**
   - Keeps earth out of charge
9. **Earth**
   - Serves as a barrier to air
10. **Inlets**
    - Allows air into the air chamber
11. **Size**
    - Between 90 and 130 steres for maximum efficiency

The Characteristics of a Casamance Kiln



Casamance Kiln



This graph is a composite of thermal efficiency and labor efficiency. At 40 steres, the major gains in thermal efficiency have been made and the curve slowly increases from here on. Significant gains remain for labor efficiency between 40 and 90 steres.

From the above analysis, it is seen that size is one of the most important criteria in the Casamance Kiln design. Optimum size is between 60 and 120 steres. Below 60 steres, the kiln is not thermally efficient. Above 120 steres, the kiln is not labor efficient.

2. Regional Charcoal Market Study: Europe, United Kingdom and West Africa, by Nicolas Engalichev, (May 1986)

As a private sector activity, charcoal making is a major contributor to the West African rural economy. Traditional production methods in Liberia and the Ivory Coast successfully meet domestic and regional market requirements. This report analyzes the substantial adjustments of current industry practices that must be made to develop export opportunities.

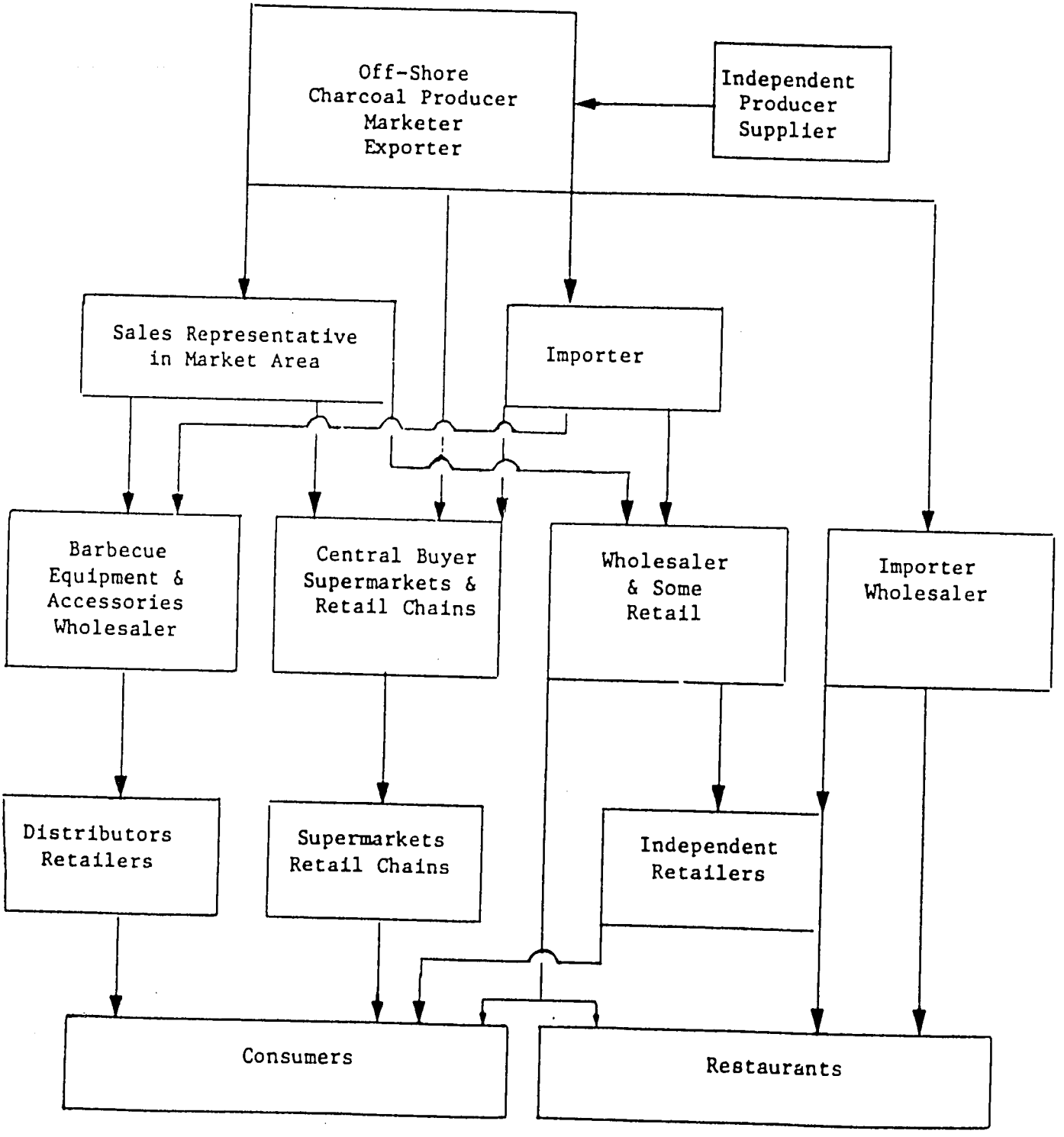
3. Will Wood Work? The Future of Wood Energy in the West African Sahel, by Asif Shaikh and Ed Karch, (July 1985)

Though fuelwood use probably represents the greatest factor of forest depletion in the Sahel, fuelwood shortage does not pose the most critical threat that results from deforestation. The author creates a fictitious country to present a systematic framework for assessing the potential for increasing wood supply or improving demand efficiency as a means of stabilizing the environment. Using FRAP projections, the author illustrates the long-run consequences of several reforestation and conservation options.

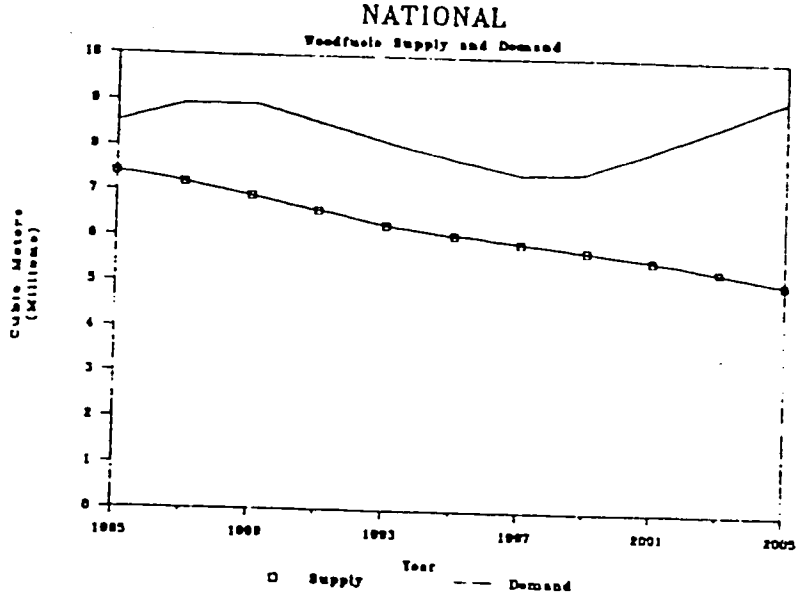
4. An Approach to Analyzing the Feasibility of Irrigation Pumping Systems in Africa, by Asif Shaikh and Gregoire Genot, (January 1986)

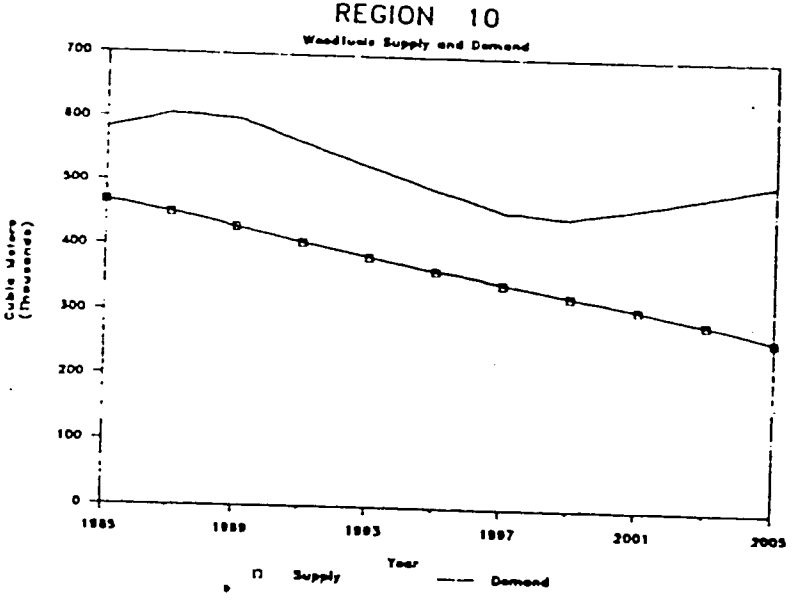
This manual introduces a simple, yet flexible, framework for economic analysis of water pumping/lifting projects to the informed user. Emphasizing the need for accurate site and technology specific data, the authors utilize a computer model to systematize the methodology. This concept paper suggests

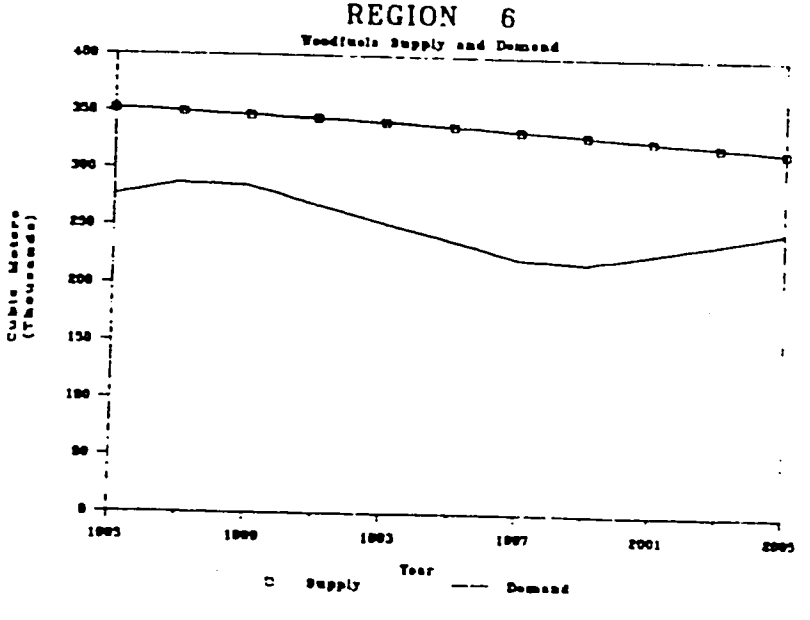
Figures From: Regional Charcoal Market Study: Europe, United Kingdom, and West Africa



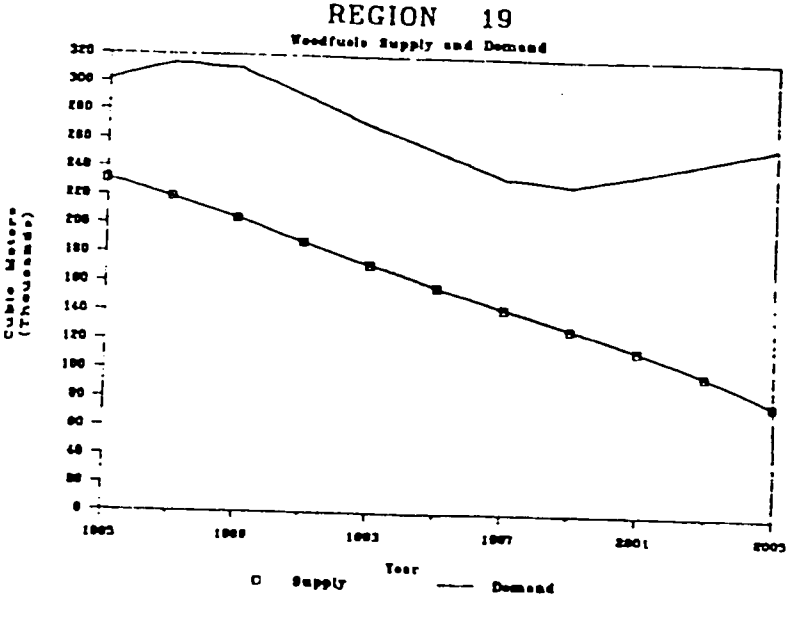
MARKET CHANNELS FOR CHARCOAL PRODUCTS







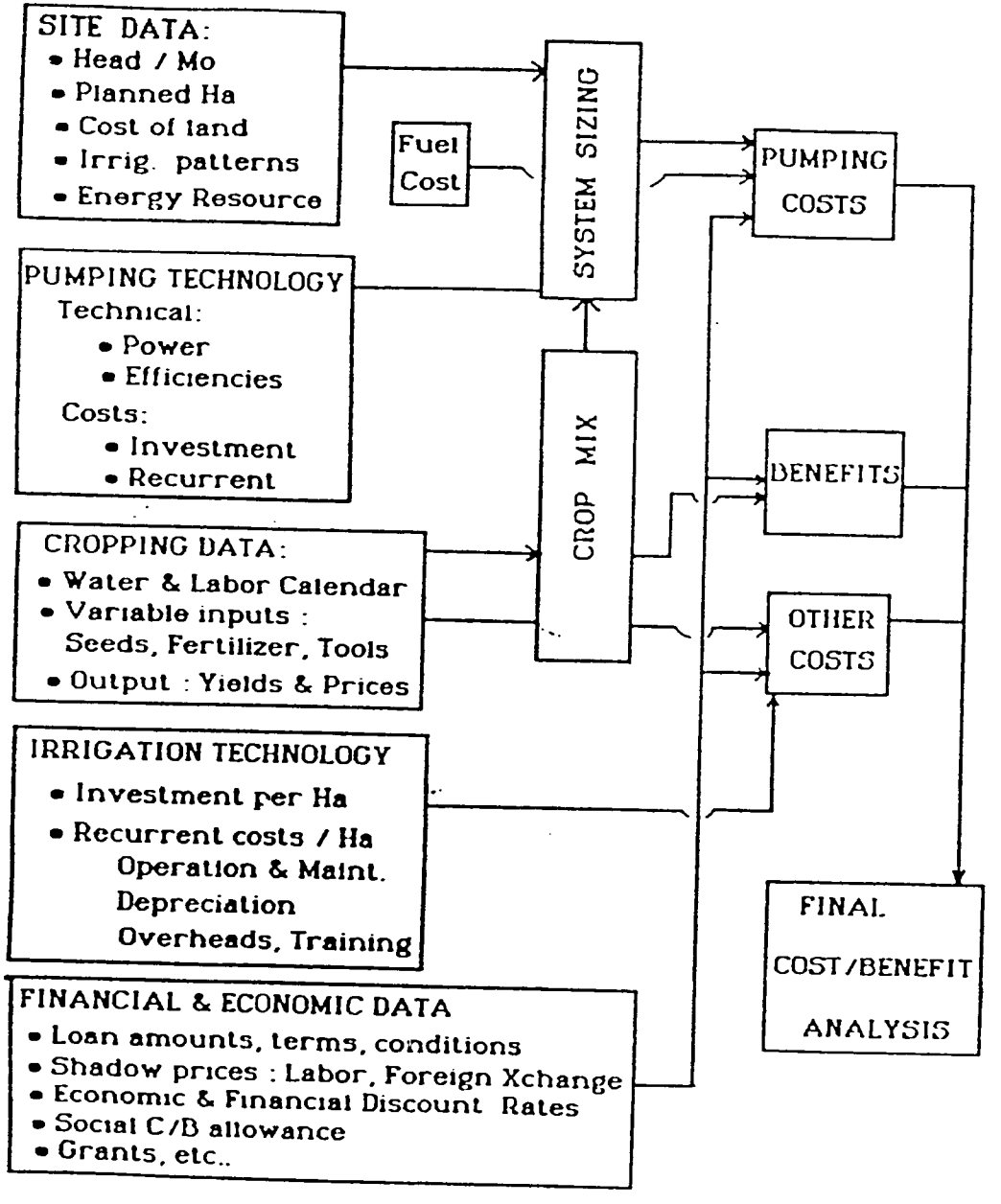
IMPROVED STOVES CASE

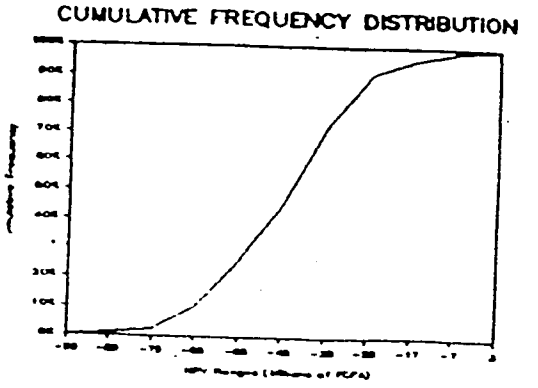


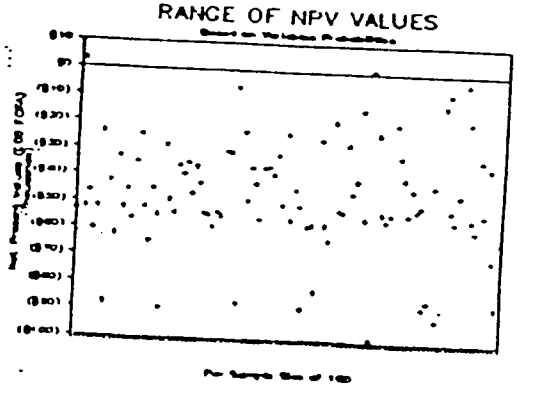
IMPROVED STOVES CASE

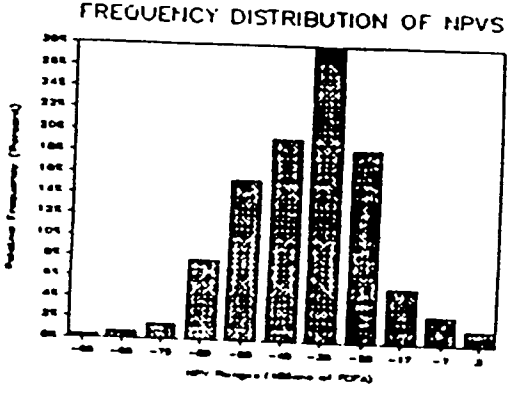
Figures From: Will Wood Work? The Future of Wood Energy in the West African Sahel

Figures From: An Approach to Analyzing the Feasability of Irrigation Pumping Systems in Africa









that the economic and financial cost-benefit analyses described serve to validate the independent technical and institutional analyses of pumping systems. Input tables, graphs, and charts that analyze a project in Senegal are included.

5. Agroforestry in African Farming Systems, by Willem Beets, (1985)

This well-illustrated handbook was written for both practitioners and policy makers. This guide describes how to plan for and achieve increased yield potentials through various crop/tree combinations. Agroforestry is examined through financial analysis as well as social and economic analysis. Diagrams and photographs help to explain the variety of land layouts. The author concludes by drawing attention to the need to consider an institutional framework through which to increase the extension of agroforestry practices.

6. Mali Forestry Sector Reports

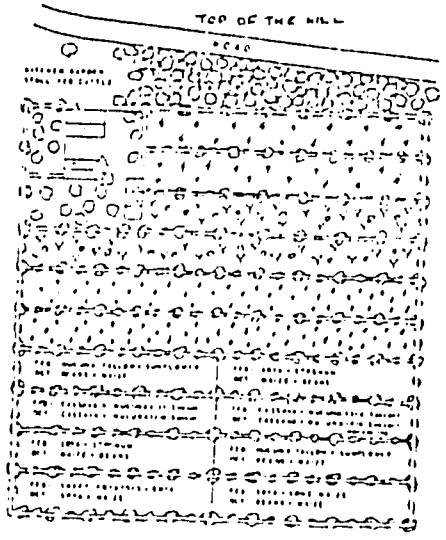
A series of four reports on various aspects of the forestry sector in Mali are available:

a. Forestry Development Options in the Fifth Region of Mali, by Asif Shaikh, (April 1985)

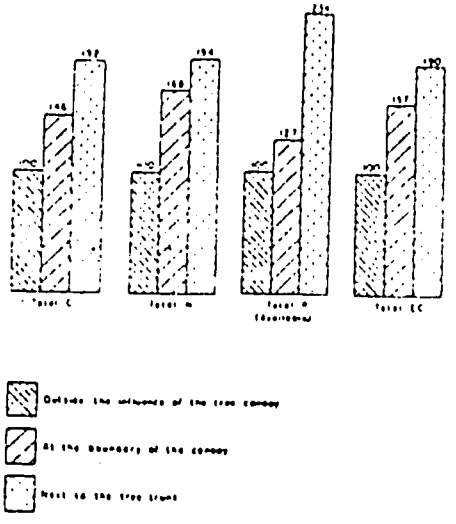
b. Recurrent Costs in the Mali Forestry Sector*, by Fred Weber and Amadou Maiga, (May 1986)
*Report also available in French

c. A Preliminary Investigation of Forest Products Pricing and Marketing in Mali: Legislative Aspects*, by Roy Hagen and Hamadi Konandji, (May 1986)
*Report also available in French

Figures From: Agroforestry in African Farming Systems



AN EXAMPLE OF A MODEL FARM LAYOUT



NOTE: In each case, the soil outside the influence of the tree canopy has been taken as 100.

EFFECT OF ACACIA ALBIDA ON SOIL

Explanation:

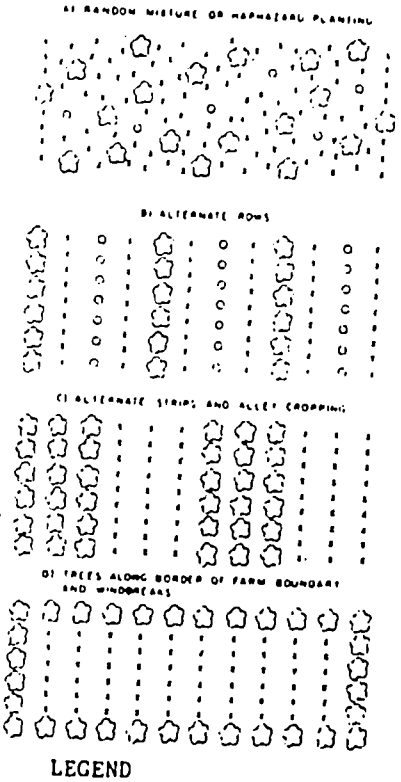
A) A random mixture has no specific pattern and is often the arrangement used by shifting cultivators when the trees are the result of random natural regeneration (seedlings and sprouts) rather than systematic planting.

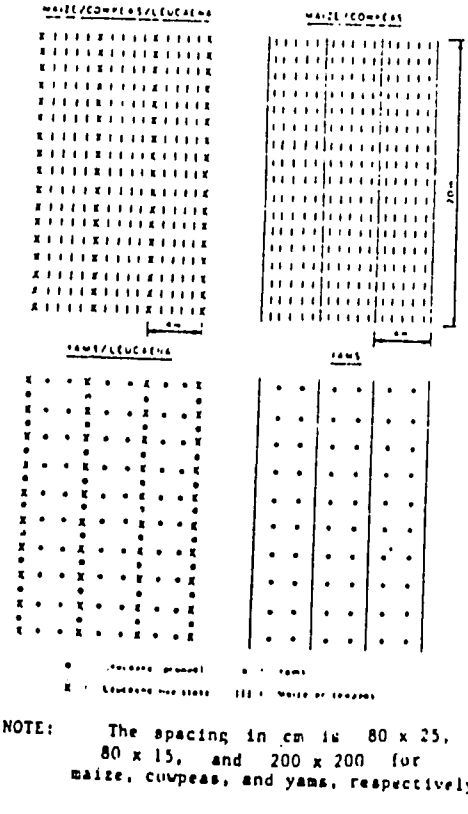
B) Alternate row arrangements allow only narrow gaps between rows of trees and may be used when food crops require or are tolerant of partial shading. Crops also obtain more organic fertilizers or green manure from litterfall.

C) Alternate-strip or zonal arrangements allow wider gaps between tree strips for food crops that require more light.

D) Border planting is used when the short-statured crops cannot stand shading and where these crops are of prime importance. The trees serve here as boundary markers, live fences, and fire or windbreaks. In addition, they can produce wood, fodder, fruits, and green manure. Windbreaks are a form of border planting that has great potential in the Sahel.

NOTE: There is a decreasing level of intimacy from A to D





NOTE: The spacing in cm is 80 x 25, 80 x 15, and 200 x 200 for maize, cowpeas, and yams, respectively.

AN EXAMPLE OF ARRANGEMENT OF FOOD CROPS AND LEUCAENA IN AN ALLEY CROPPING TRIAL

SPATIAL ARRANGEMENTS OF CROPS AND TREES IN AGROFORESTRY

d. Traditional Donor Financial Support for Forestry Sector Reforms in Mali, by Asif Shaikh, (August 1984)

The first report, Forestry Development Options in the Fifth Region of Mali, examines available options to reverse the trend of declining forest cover, wood products scarcity, and degradation of agricultural land in this region of Mali. The paper presents economic and financial analyses of alternative approaches designed to meet this goal, including in-field tree planting, windbreaks and hedgerows, commercial urban cookstoves, natural forest management, and village woodlots.

Recurrent Costs in the Mali Forestry Sector addresses the current and future issues involved in financing the recurrent costs of forestry operations in Mali. The paper defines the concept of recurrent costs, examines the present efforts to finance these costs, and outlines options for financing these recurrent costs after external funding has ended.

In A Preliminary Investigation of Forest Products Pricing and Marketing in Mali: Legislative Aspects, the authors examine current legislation pertaining to wood product harvesting and marketing. The study found that retail prices of wood products do not reflect the cost of growing wood or replacing natural stands, and that much of the current legislation designed to correct the problem is not enforced. The report recommends policy changes to revise legislation or enforce current laws.

Traditional Donor Financial Support for Forestry Sector Reforms in Mali explores the idea of a "forestry wedge" in donor financing; that is, that donor financing of forest development in Mali would decrease annually over a defined period until it is gradually phased out. However, the report concludes that reforestation efforts must constantly expand

and will require ever-increasing financing. To maximize the effectiveness of this donor support, the role of the forestry agent, management of the forestry fund, and options for woodfuels pricing are examined.

7. Computer Models and Manuals

Four energy planning models and manuals, produced by several members of E/DI staff, are available, including:

a. Forest Resource Analysis and Planning (FRAP) Model and Manual

b. Breakeven Model and User Manual

c. Charcoal Production Model (CHAR IIA) and User Manual

d. Woodfuels Road Transportation Model (TACOW) and Manual

The FRAP model provides planners and analysts with a tool to assess the supply and demand for wood, develop projects and investment programs to decrease wood demand, increase wood supply or substitute alternative fuels for wood, and design and evaluate wood-related surveys. FRAP has been applied in Mail, Gambia, Morocco and Sudan, and has been used as an instructional tool in Senegal and the U.S. The user manual provides a step-by-step guide to using FRAP.

The Breakeven model is designed to calculate production levels required to breakeven on ventures with cyclical patterns of recurrent costs and revenues. A case study of silviculture management is presented. Using the energy plantation as an example, the model allows the user to select various management options, e.g., pruning, fertilizing and pest control, and to analyze the production yields necessary for the

net present value of the costs to equal the net present value of the revenues.

The CHAR IIA model analyzes the economics of small-scale charcoal production for a variety of charcoal kilns, taking into account all of the factors of production. The model calculates, for the local entrepreneur, the economic returns from operating various types of kilns. This model is linked to the TACOW transportation model, which calculates the economic breakeven, or crossover, point between transporting wood and charcoal. Based on inputs such as transport costs, wood and charcoal costs in production areas, and the quality and moisture content of wood and charcoal, TACOW calculates the distance in which it becomes more economical to produce and haul charcoal, in place of wood, to the demand center.

8. Alternative Fertilizing Methods for Increasing Agricultural Production in Developing Countries: Economic and Energy Considerations

This analysis compares the costs and benefits of various natural and artificial fertilizers. Two regions in Kenya, the Kakamega and Embu districts, are presented as case studies. The report concludes that the least-cost options for both districts are organic fertilizers, and recommends increased research to improve and disseminate various methods of natural fertilization.

Appendix B

EIA MANUALS REQUESTED AS OF OCTOBER 1986

TITLE	REQUESTED BY
Abidjan Charcoal Market	USAID/Somalia
Agroforestry for African Farming Systems	USAID/Gambia and Matthew Shields, graduate student, Univ. of Idaho
Alternative Fertilizing Methods for Increasing Agricultural Production in Developing Countries	USAID/Gambia, USAID/Mauritania, USAID/Togo and USAID Mali
Annotated Bibliography of Factors Affecting Pumping & Irrigation in Africa	USAID/Gambia, USAID/Somali, USAID/Mauritania and USAID/Togo
Approach to Analyzing the Feasibility of Irrigation Pumping for Africa	USAID/Chad, USAID/Gambia and USAID/Mauritania Paul Meissner, E/DI consultant
Appropriate Technology for Forestry & Forest Industries	Matthew Shields, Univ. of Idaho
Biomass Supply	
The Bobo Kiln	USAID/Togo
Breakeven Model User Manual & Model	
Charbon: Production et utilisation a petite echelle	USAID/Mali and USAID/Togo
Charcoal Production Technology	USAID/Somalia and USAID/Togo

Appendix B: EIA MANUALS REQUESTED AS OF OCTOBER 1986 (continued)

TITLE	REQUESTED BY
Charcoal Production User Manual & Model (CHAR Version IIA)	
Dinderesso Forest Charcoal Production Analysis: A Natural Forest Management Production Possibilities Model & Manual	USAID/Mali
Economics d'energie en Cote d'Ivoire -- Vol. 1&2	USAID/Togo, EIA Abidjan
Economic Methodology for Feat II Project	USAID/Mauritania & Matthew Shields, Univ. of Idaho
Energy Conservation Workbook -- Commercial Buildings	USAID/India, USAID/Somali Energy Information Center and USAID Egypt
Energy Conservation Workbook -- Industry	USAID/Somalia, USAID/India and USAID/Egypt
Energy Conservation Workbook -- Transportation	USAID/Somalia, USAID/India and USAID/Egypt Bob Lapradde, consultant
Energy Conservation Workbook -- Utilities	USAID/Somalia, USAID/India and USAID/Egypt
Energy Profile of Small & Medium Rural Enterprises in Africa	USAID/Togo
Etude de marche regionale sur le charbon de bois: Europe, Royaume Uni, Afrique de l'Oest	
Etude sur les charges recurrentes du secteur forestier au Mali	
Forest Energy/Natural Resources Assessment Workshop/Project	USAID/Mali and Clay Finley, Univ. of California

Appendix B: EIA MANUALS REQUESTED AS OF OCTOBER 1986 (continued)

TITLE	REQUESTED BY
Forest Resources Analysis & Planning Model & User Manual	USAID/Mali, USAID/Somalia, Clay Finley, Univ. of California and Matthew Shields, Univ. of Idaho Paul Meissner, E/DI consultant Paul Cough, E/DI consultant x 8 Gregoire Genot, E/DI consultant
Forestry/Development Options in the Fifth Region of Mali	USAID/Somalia, Clay Finley and Matthew Shields, Univ. of Idaho
Fuel From Papyrus Study	
Initiating Forestry Reforms in Sahel	USAID/Mauritania
Intermediate Financial Institutions	USAID/Somalia, USAID/Mali and Clay Finley, Univ. of California Calev Ndiega, Univ. of California
Les possibilities pour les economies d'energie et pour l'augmentation d'energie et pour l'augmentation de la production dans le secteur des energies traditionnelles	USAID/Mali and USAID/Togo
Le role de l'energie et des ressources naturelles dans la production et le developpement agricoles et dans les secteurs domestiques urbains et ruraux	USAID/Mali and USAID/Togo
Lesotho Household Energy Survey	USAID/Somalia and Karen Kainer, Peace Corps Lilian Constantino, Philippines Statistics Department
Market Study: Forest Products From Dinderesso Classified	USAID/Somalia, USAID/Mali and Matthew Shields, Univ. of Idaho

Appendix B: EIA MANUALS REQUESTED AS OF OCTOBER 1986 (continued)

TITLE	REQUESTED BY
Overview of the Energy Situation in ECOWAS Countries	Karen Kainer, Peace Corps
A Preliminary Investigation of Forest Products Pricing and Marketing in Mali: Legislative Aspects	Matthew Shields, Univ. of Idaho
A Preliminary Profile of Rice Processing in Madagascar	
Priorities for & Types of Forestry Research in Kenya	USAID/Mali, Clay Finley, Univ. of California and Matthew Shields, Univ. of Idaho
Production & Consumption of Wood Energy in Kenya with Particular Reference to Agroforestry	USAID/Somalia, USAID/India, USAID/Mali and Matthew Shields Mr. Swartzendruber, ATI
Production & Marketing Strategy for the ATS Metal Stove	USAID/Somalia, USAID/Togo and USAID/Mali Mr. Swartzendruber, ATI
Recurrent Costs in the Mali Forestry Sector	
Regional Charcoal Market Study: Europe, United Kingdom, and West Africa	USAID/Liberia Peter Reiling, SaLUT Ron Yamamoto, FDA Timothy Resch, Forestry Service Davis Helberg, Seaway Port Authority
The Role of Indigenous Vegetation in Energy Production for the Rural Household	USAID/Mali and USAID/Egypt
Rwanda Forestry II Project	USAID/Mali

Appendix B: EIA MANUALS REQUESTED AS OF OCTOBER 1986 (continued)

TITLE	REQUESTED BY
Senegal River Irrigation Pumping Study	USAID/Chad and USAID/Gambia
Small-Scale Pumping for Agriculture in Developing Countries	USAID/Mauritania, USAID/India and USAID/Egypt
Sudan Forestry Sector Review	USAID/Mali and Clay Finley, Univ. of California
Surveying the Marketing/Production Capabilities of Certain Renewable Energy Technologies by Basuto Small/ Medium-Scale Enterprises	USAID/Somali Energy Information Center and Clay Finley, Univ. of California
Timber & Fuel Needs in African Nations & How They Can Be Met	USAID/Mauritania, USAID/Mali and Clay Finley, Univ. of California
Transitional Donor Financial Support for Forestry Sector Reforms in Mali	USAID/Somali Energy Information Center
Une investigation preliminaire de la fration de prix	
Use & Management of Indigenous Woody Plant Species for Energy	USAID/India, USAID/Mali and Clay Finley, Univ. of California
Will Wood Work?	USAID/Chad, USAID/Mauritania, USAID/Mali and Matthew Shields, Univ. of Idaho Gidiyon Gonga, Nigeria Ron Yamamoto, FDA
Woodfuels Road Transportation Model and Manual (TACOW)	Mr. Swartzendruber, ATI Tom Luche, AID
Woodfuels and Their Importance to Development	USAID/Mauritania & Matthew Shields, Univ. of Idaho
1983 Energy Sector Profiles	55 requests

Appendix B: EIA MANUALS REQUESTED AS OF OCTOBER 1986 (continued)

TITLE	REQUESTED BY
The Casamance Kiln	Being published by Univ. of Idaho and will be available FY 1987.

In addition to these requests, full sets of EIA reports have been requested by, and/or may be sent to:

National Energy Committee of Liberia
REDSO/ESA and REDSO/WCA
U.S. Peace Corps/ICE
CDIE/AID
Oak Ridge Technical Information Center
National Technical Information Service

NOTE: Some of these publications have not been requested because they were omitted from the original cable.