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FUELWOOD AND OTHER RENEWABLE ENERGIES IN AFRICA
(Revised)

A Brief Summary of
.S.-Supported Programs

by

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November 16, 1979

(Prepared as background material for members of
the Workshop on Fuelwood and Other Renewable
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TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION	1
SECTION I: The Legislative and Policy Setting	3
SECTION II: Forestry and Fuelwood	5
Project Summaries	6
Studies	14
Other Related Activities	16
SECTION III: Other Renewable Fuels	18
Project Summaries	19
Project Proposals	27
Studies	30
Other Related Activities	32
SECTION IV: Peace Corps	34
P.C. Forestry Initiative	34
P.C. Renewable Energy Program	36
ANNEXES	
Annex 1 - AID-Supported Fuelwood and Other Renewable Energy Projects in Africa	37
Annex 2 - U.S. Commitments to the Club of the Sahel/CILSS Ecology and Forestry Program (in \$000)	40
Annex 3 - AID-Supported Energy Development, by Technology and Country: Current and Proposed	42
BIBLIOGRAPHY	43

INTRODUCTION

Support for fuelwood and other renewable fuels is a fairly new feature of U.S. development assistance programs, and is expanding quite rapidly. This paper provides brief narrative descriptions of projects and other activities currently supported (or proposed) in Africa by the Agency for International Development, the primary government agency responsible for administering the U.S. foreign assistance program. Some of these projects are being implemented with assistance from the Peace Corps and/or private voluntary organizations (PVOs).

The Peace Corps is in the process of expanding and strengthening its programs in the areas of forestry and renewable energy, and these are briefly described in this paper. The author attempted to develop a comprehensive list of U.S. PVO activities: between 400 and 500 organizations provide development assistance to third world countries, and administer a substantial portion of AID funds as well as private membership contributions. However, little or no documentation was available in Washington on PVO forestry and renewable energy activities, with the exception of the AID-financed projects included in this summary.

The information summarized here was obtained primarily from AID project documentation and office files kindly provided by the Division of Selected Development Problems of the Bureau for Africa, which also reviewed the draft of this paper for its accuracy and completeness. This documentation contains a wealth of economic, social, ecological, and technical information which was not possible to reproduce here in full, but would be useful to anyone involved in programming, project design, implementation, and evaluation.

This paper is purely descriptive and does not attempt to critically analyze the projects or programs summarized herein. Many AID projects are just getting underway and in many cases it is still too early to evaluate these efforts. In fact, the author was able to locate only one completed evaluation during a review of all U.S. forestry projects in Africa. Evaluations of all AID-supported forestry and renewable energy projects are planned. However, Peace Corps has programmed forestry volunteers since 1961 and PVOs have supported small-scale forestry activities in Sahel West Africa since the early 1970s, but no evaluation of these efforts has been conducted.

*See Fred Weber and Maryanne Dulansey, Midpoint Evaluation: Chad Reforestation Project.

A brief explanation of AID's project documentation process is noted here to assist the reader. All major AID projects pass through two steps: (1) A "Project Identification Document" (PID) is presented by the AID country mission to Washington. It includes a brief description of the proposed project and sufficient information to demonstrate that it is feasible and consistent with AID priorities; (2) Upon approval of the PID, a "Project Paper" (PP) is approved, often with the help of consultants. The PP provides a full description of the project, an analysis of the project's feasibility (social, technical, economic and environmental), and a plan for implementation. The PP is reviewed, and once approved, a project agreement is signed with the host country government and the funds are obligated.

Several energy and forestry activities have been funded under a regional, umbrella program called Accelerated Impact Projects (or AIPs). These are small-scale (\$500,000 or less), two-year pilot or experimental projects which can be quickly processed, and meet certain conditions, specifically: (1) introduction of a new technology; (2) participation by local institutes and beneficiaries; and (3) transfer of productive skills and knowledge to beneficiaries. Small-scale renewable energy projects (under \$50,000) will also be funded under the Africa-wide Improved Rural Technology Project which supports technology innovation by local organizations in such areas as agriculture, food processing, village water supplies, energy, construction, and health.

The AID fiscal year (FY) begins October 1st and runs through September 30th.

The following sections describe (I) the legislative mandate which underlies AID's current activities in this area; (II) forestry and fuelwood projects supported by AID; (III) AID-financed projects in other renewable energy technologies; and (IV) Peace Corp's forestry and renewable energy programs. AID projects and funding amounts are listed in Annex 1. AID-supported energy development, by technology and country, is summarized in Annex 3.

Additional information can be obtained from the Division of Selected Development Problems, Bureau for Africa, Room 2480, Agency for International Development, Department of State, Washington, D.C. 20523.

SECTION I

THE LEGISLATIVE AND POLICY SETTING

The U.S. Congress has given AID a clear mandate to assist developing countries in meeting their energy needs through increased energy production and conservation.¹ Emphasis is on renewable and nonconventional energy sources which are:

- Responsive to rural needs,
- Environmentally sound,
- Inexpensive,
- Simple to use and maintain,
- Replicable.

Wherever appropriate, these activities are integrated into rural development projects. The Department of Energy, as well as other public and private sector specialized institutions, provide technical support to AID for designing and implementing this program.

Meanwhile, the problems of deforestation and desertification were given world visibility during the drought and famine which ravaged the sub-Saharan belt of eight countries in the Sahel, beginning in 1968. The multilateral effort which has been launched to attempt to halt and reverse this process was matched by growing concern on a global basis.

¹The most explicit authorization involving renewable fuels is found in the provisions of Section 119, Renewable and Unconventional Energy Technologies, included in the Foreign Assistance Act of 1977, as amended, which states: "The President is authorized to furnish assistance. . .for cooperative programs with developing countries in energy production and conservation, with particular emphasis on programs in research, development, and use of small-scale, decentralized, renewable energy sources for rural areas carried out as integral parts of rural development efforts . . .These programs shall be directed toward the earliest practicable development and use of energy technologies which are environmentally acceptable, require minimum capital investment, are most acceptable to and affordable by the people using them, are simple and inexpensive to maintain, and are transferable from one region of the world to another."

In the U.S., a June 1978 Strategy Conference on Tropical Deforestation, sponsored jointly by the State Department and AID,² and the simultaneous Workshop on Firewood in Africa, sponsored by the Africa Bureau, clearly identified both traditional fuels and tropical deforestation as issues of considerable U.S. concern. In follow-up to the Strategy Conference, AID has joined with other U.S. government agencies in establishing an interagency task force to define a U.S. policy position on tropical deforestation.³ The U.S. public, through a number of interested nongovernmental organizations (NGOs), is closely monitoring and contributing to this process. The U.S. Congress has also expressed particular concern about this area, and recently amended the Foreign Assistance Act authorizing AID to support forestry activities.⁴

And finally, in August 1979, the President personally instructed the Administrator of AID and the Director of Peace Corps to give high priority to forestry programs, including projects for increased production and conservation of firewood. Thus it appears that AID is embarking on a new facet of development assistance: community forestry, traditional fuels and renewable sources of energy.

In the following sections, AID's current and proposed forestry and renewable energy programs in Africa are described.

²Proceedings of the U.S. Strategy Conference on Tropical Deforestation can be obtained from Bill Long, Office of Environmental Affairs, Room 7820, Department of State, Washington, D.C. 20520.

³Recommendations of the interagency task force are scheduled to be released in early 1980. See the U.S. Interagency Task Force on Tropical Deforestation, "The World's Tropical Forests: A U.S. Policy, Strategy and Program," Report to the President, forthcoming.

⁴Section 103(b) of the International Development Cooperation Act of 1979 states the following: "The Congress recognizes that the accelerating loss of forests and tree cover in developing countries undermines and offsets efforts to improve agricultural production and nutrition and otherwise to meet the basic human needs of the poor. Deforestation results in increased flooding, reduction in water supply for agricultural capacity, loss of firewood and needed wood products, and loss of valuable plants and animals. In order to maintain and increase forest resources, the President is authorized to provide assistance. . .for forestry projects . . .Emphasis shall be given to community woodlots, agroforestry, reforestation, protection of watershed forests, and more effective forest management."

SECTION II

FORESTRY AND FUELWOOD

AID support for forestry in Africa first came about as part of U.S. participation in the Club of the Sahel. This is an informal, international consortium created in 1976 under the aegis of the Organization for Economic Cooperation and Development (OECD), to coordinate long-term development planning and programming for Sahel West Africa. The eight countries most severely affected by the 1968-73 drought are represented by the CILSS, the African regional coordinating organization based in Ouagadougou, Upper Volta.^{5/} The CILSS has played a key role in representing the development needs of its members and in mobilizing donor financial and technical support through the Club. In 1977, the Ecology and Forestry Technical Unit of the CILSS developed a first generation, regional program which begins to address the problems of deforestation in the Sahel. This program was later presented to, and approved by, the donor community, and has subsequently received considerable support from the U.S. (U.S. commitments to the CILSS/Club Forestry Program are summarized in Annex 2).

In June 1978 the Africa Bureau sponsored a "Workshop on Firewood in Africa." There was general consensus among participants that shortages of fuelwood pose an immediate threat to the well-being of both the rural and urban poor. However, lack of specific information about the nature and extent of the problem, villagers' perceptions about potential solutions, and local institutions for managing projects, has inhibited planning and programming. The workshop participants endorsed the recommendation that AID support a study in several African countries to obtain this information and identify project opportunities. A methodology for undertaking such a study has recently been prepared in draft.^{6/}

^{5/}The eight members of the CILSS are: Mauritania; Senegal; Mali; Niger; Chad; Upper Volta; the Gambia; and the Republic of Cape Verde.

^{6/}The proposed methodology is described in a paper by James Thompson entitled "Firewood Survey." See section on studies.

The remainder of this section summarizes AID's forestry portfolio, and includes both current and proposed projects as well as related studies and other activities. Some of these activities are principally concerned with planting and managing trees for fuelwood production. Others are broader in scope and include support for a range of interventions: institution building, training, land-use and natural resources planning, and resource conservation pilot projects (e.g. dune stabilization, planting Acacia albida in farm fields, living fences).

Project Summaries

Africare Forestry (Project No. 685-0243)

Africare, a private voluntary organization, has submitted to AID a project proposal to establish nurseries and woodlots in five villages (for a total of 100 ha.) in Thies and Sine-Saloum, Senegal, to meet firewood needs.

Project Status: Partial funding has recently been obtained from The al Dirr'Iyyah Institute, based in Geneva, Switzerland. The proposal is under consideration by USAID/Senegal.

Burundi Agricultural Land Protection (Project No. 695-0105)

This proposed soil conservation project includes a component for reforesting 1,000 hectares.

Project Status: The PID is being rewritten. Implementation could begin during FY 1980, if the project is approved and funds are available.

Chad Reforestation (Project No. afr-A-1251)

The purpose of one of the earliest forestry activities supported by AID in the Sahel was to "establish the Acacia albida tree as a recognized low-cost technology which will produce increased food supply for subsistence farmers, and to establish the concept of cultivating firewood as a domestic crop with concomitant protection of the environment." It was implemented by CARE, with Peace Corps participation. Twelve Chadian forestry agents worked full-time on the project. All project-related work undertaken by local farmers was paid for with food rations.

A midpoint evaluation conducted in 1978 generally concluded that the project was very successful in meeting projected goals:

- seven nurseries had been established;
- planting targets were on schedule, with one exception;
- farmer participation was high;
- acceptance of the Acacia was high.

The evaluation strongly urged that more attention be directed to ensuring the survival of the seedlings that had already been planted. The report included additional recommendations for improving project performance and impact.

Based upon their experiences in Chad, CARE technicians prepared a field manual which contains detailed information on planting Acacia albida in farm fields; planting trees for shade; establishing woodlots; and planting live fencing. The manual will be translated into French.

Project Status: The project is nearing completion. Field operations have been temporarily suspended for security reasons.

Gambia Forestry (Project No. 635-0205)

This project supports reforestation efforts at the plantation and village level, and strengthens the Government's capacity to develop and manage its forest resources. More specifically, it will:

- Establish 1,300 ha. of Gmelina arborea on government-owned land, to supply fuelwood to the nearby metropolis of Banjul-Kombos-St. Mary. These plantations will be prepared and weeded by local farmers in exchange for the privilege of growing their crops between the trees during the first year.
- Establish community woodlots in ten villages for a total of 50 ha. This is a pilot effort, as there is no previous experience in the Gambia with village woodlots. Villagers will provide the labor for planting and maintaining the trees, and the Government will furnish fencing materials and seeds.
- Support a feasibility study of harvesting 8,700 ha. of mangroves which would otherwise be destroyed by the proposed antisalinity barrier at Yelitenda.

Other supporting activities include: the preparation of a media campaign for the rural extension program; training of 14 employees of the Forestry Department; and the acquisition of some logging and milling equipment.

This project was designed in close coordination with the Federal Republic of Germany, which plans to finance complementary forestry activities beginning in 1980. AID will provide the aerial photography to be used by German technicians in completing a forest inventory.^{7/}

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Project Status: The project agreement has been signed and implementation has commenced.

Guinea Woodlots

At the request of the Guinea Service des Eaux et Forets, the U.S. will consider support for a village woodlot project.

Project Status: A two-person design team is scheduled to write a PID in late 1979, and the project may be considered for FY 80 funding.

Mali Firewood Conservation and Production AIP (Project No. 698-0410)

This project consists of four major elements:

- Studies, including an analysis of known conservation techniques; an inventory of traditional fuel uses and their efficiencies in Mali; and an examination of the economics of fuelwood, to determine the minimum level of efficiency required to persuade villagers to adopt new techniques or invest in new devices.
- Applied R&D. The most promising technologies will be tested both in the laboratory and the field.
- Introduction of proven technologies/techniques to rural areas through the functional literacy program, a national extension service. Villagers will also be trained in how to construct the new devices.

^{7/}The aerial photos will be undertaken as part of the AID-financed Mixed Farming Systems Project.

- Development of a model for managing village woodlots.

The project would be implemented by the Institute Polytechnique Rural (IPR), location of the largest forestry school in the Sahel. Some work is already underway here to test improved woodburning stoves, and IPR students will also assist in conducting some of the studies. The Departement des Eaux et Forets, and the Institute d'Economie Purale would assist in project implementation.

Project Status: The PID is being redrafted in Bamako, and will be resubmitted to Washington during FY 1980.

Mauritania Renewable Resources Management (Project No. 682-0205)

Begun in 1978, this five-year project assists the Government of Mauritania to develop an integrated program for the management and conservation of its renewable resources.

It is being implemented by the Directorate for Agro-Pastoral Protection and Management within the Protection of Nature Service, and consists of the following elements:

- (1) Inventory of Mauritania's natural resources. Baseline data will be collected through a combination of satellite imagery, aerial photography and field observation and will provide the basis for a long-term resource management plan.
- (2) Pilot interventions to test specific approaches for undertaking resource conservation and rehabilitation:
 - Dune stabilization in Boutilimit and Mederdra, primarily through revegetation.
 - Surveys of two forest reserves near Mederdra (Tine Yera and Perimetre de Reboisement), and the development of a forest management plan.
 - Establishment of two grazing reserves, to include revegetation, establishment of grazing controls, and sensitization of the local population to the need for these controls.
- (3) Short- and long-term training of Mauritanian personnel. Approximately 40 Mauritanians will be trained in extension methods for resource conservation and management. Nine will be trained in Landsat photo-interpretation, and two will undergo long-term training in resource management.

Project Status: A contract with a U.S. organization is being negotiated, and implementation is scheduled to begin in early 1980.

Mauritania Firewood/Reforestation AIP (Project No. 625-0937)

This project was jointly conceived by the U.S. National Academy of Science and the Government of Mauritania. It will lay the groundwork for a larger, long-term reforestation project being considered for AID financing in FY 1981 (Mauritania Reforestation). Its purpose is twofold: to determine the most appropriate tree species for Mauritania and to develop the human and institutional base for implementing a larger effort.

Exotic and local species will be tested under both riverine and dryland conditions on 140 hectares along the Senegal river, with the first planting occurring at the beginning of the 1980 rainy season. All exotic seeds, to be provided by the National Academy of Science, will be directly planted and allowed to grow with as little interference as possible. Seeds of indigenous species will be obtained from both the local forest service and the National Center for Forestry Research (CNRF) in Dakar, Senegal. In some instances they will be planted directly, while in others they will be cultivated under nursery conditions and transplanted. Fences will be built and guardians hired to protect the seedlings from livestock and people. Given the unpredictability and unreliability of rainfall in this region, a backup water supply system will be installed as part of this project. Comparisons will be made after 2-4 years and hopefully adaptive species will be identified.

Support will be provided to the Kaedi Agricultural School for the purpose of strengthening and expanding the school's forestry extension service. Students will work on and monitor some of the species trials and will work with nearby villages to establish up to four community nurseries.

The project will be under the Ministry of Rural Development. The Water and Forest Station will monitor the experimental plots at Boghe, and the Kaedi Agricultural School will assume responsibility for the trial species undertaken on school grounds. Two agricultural extension Peace Corps volunteers to be assigned to the Societe Nationale de Developpement Rural (SONADER) in Kaedi will work part-time on this project.

Project Status: The PID is being revised by USAID/Mauritania and will be resubmitted to Washington during FY 1980.

Mauritania Reforestation (Project No. 682-0220)

A proposed FY 1981 project will support reforestation of 25,000 ha. for fuelwood, dune stabilization and forage. This would replace the anticipated loss of an equivalent area of gonakie, which will be destroyed when two dams on the Senegal River are completed. Government technicians and local people will receive training in land-use management and forestry techniques.

Project Status: A PID will be submitted in FY 1981.

Niamey Department Development (Project No. 683-0205)

This integrated rural development project includes support for soil conservation, reforestation and land-use activities in 115 villages in the arrondissements of Oualam, Filingue, and Niamey. Soil conservation plans will be developed for each community, and training programs for sensitizing villagers will be initiated. Nurseries will be established in cantons where water is available. A large nursery to be managed by the arrondissement will supply seedlings to areas having insufficient water to support a nursery.

Project Status: The project is being implemented.

Niger Forestry and Land-Use Planning (Project No. 683-0230)

This four-year project will assist the Government of Niger (GON) to: (1) slow down and reverse the existing trends of resource deterioration and (2) to better manage the country's renewable resources (soil, water and natural vegetation). A major purpose is to strengthen GON's national planning capabilities. To this end, a planning unit will be established within the Water and Forestry Ministry and will have responsibility for coordinating all efforts aimed at the rehabilitation and protection of the country's natural resources. The Unit will collect data and prepare resource inventories which will provide the basis for developing a long-term, comprehensive conservation and rehabilitation plan.

The project will also support a variety of small-scale field activities for the purposes of:

- field-testing potential solutions on a small scale before giving them wider application;
- verifying and demonstrating how specific interventions can help achieve the overall objectives of resource rehabilitation and conservation;
- providing practical demonstration and full-scale models for extension education efforts;
- providing sites for in-service training of government personnel.

Project Status: The PP is under review in Washington.

Seguenega Integrated Rural Development, Upper Volta (Project No. 686-0231)

Forestry and conservation activities are part of this larger project to strengthen the social and supportive services and production opportunities within the Seguenega sector of the Yatenga Regional Development Organization (ORD). Soil and water conservation will be accomplished through tree planting, conservation education, development of marginal areas for forest plantations and increasing the potential of forest products. A 50,000 seedling nursery will be established and 30 ha. will be reforested each year for five years. The ORD will provide seedlings, some tools and technical support while the villagers will be responsible for planting and maintaining the trees.

Africare is managing the project.

Project Status: The project is being implemented.

Senegal Fuelwood Production (Project No. 685-0219)

Dakar accounts for 89% and 36% of nationally marketed charcoal and firewood respectively. All fuelwood is imported from outlying areas, and 32% of current supply is "deadwood" from drought-stricken areas. The purpose of the project will be to provide a future source of fuelwood for Dakar through the establishment and management of 3,000 ha. of exotic forest plantations in the Bandia Classified Forest. Projected yearly production will represent 5% of official annual demand.

Preliminary research for this project has been underway for three years by the National Center for Forestry Research (CNRF), which has conducted species trials on 30 hectares in the Bandia Reserve. The CNRF estimates that eucalyptus, under intense management, will yield 10-15 m³/ha/year, which is 20 times greater than the average production of natural forests.

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The Bandia Forest Administration (BFA) will be created to manage the nursery and plantations. Although under the supervision of the Departement des Eaux et Forets, it will be financially autonomous. The BFA will issue licensing permits to timbercutters and timber cooperatives for harvesting the wood in the reserve, and this income will cover recurrent costs after the project has terminated.

If successful, AID will finance a second four-year phase for the establishment of an additional 3,000 ha.

Project Status: The project agreement has been signed with the Government of Senegal and workplans for implementation have been drawn up.

SODESP Livestock Production, Senegal (Project No. 685-0224)

The objective of this project is to develop a more productive system for raising livestock in the Sylvo-Pastoral Zone which is consistent with the rehabilitation and sound use of range resources.

Overgrazing and overcutting have contributed to the deterioration of resources within a ten-kilometer radius of wellpoints. The consequence has been an increase in wind and water erosion and a decrease in forage supplies. One element of this project is to provide equipment and operating funds for reforestation around selected wellpoints. Trees will be planted on 300 hectares surrounding each of four wellpoints for a total of 1,200 hectares. Local people will also be encouraged to plant trees near their homes. Senegalese field technicians will be trained in forestry management.

Managerial responsibility for this project will rest with SODESP, but the reforestation component will be implemented by the Departement des Eaux et Forets.

Project Status: The project is in the process of being implemented.

Upper Volta Forestry Education and Development (Project No. 686-0235)

The initial design of this project was undertaken in the context of a multi-donor forestry mission in Upper Volta, organized by the CILSS. Considered a high priority by the Government of Upper Volta (GOUV), this project will address a major constraint to the ultimate success of forestry programs: the lack of trained forestry agents. This project will provide support for the improvement and expansion of the current training facility at Dinderesso. When completed, the school will be able to accommodate 30 D-level agents per year, as compared to the current enrollment of ten students per year. In addition, 10 C-level agents will be trained annually and periodic refresher courses will be offered to in-service forestry agents.

The forestry management activity in the neighboring national reserve of Dinderesso is an integral part of the AID project, and has two major objectives. First, it will provide a valuable "outdoor classroom" for the forestry students. And secondly, it will provide a national model for the rational development and exploitation of the country's forestry resources. It is anticipated that the management model developed at Dinderesso could be transferred to other Sahelian countries.

Project Status: The project agreement has been signed, and implementation is commencing.

Studies

The first study summarized below by Hoskins was prepared specifically for the Workshop on Fuelwood and Other Renewable Fuels in Africa. In his report, Thompson presents a methodology for undertaking a firewood survey in African countries. And the last two studies, although global in scope, include information about and relevant to Africa.

"Community Participation in Africa Fuelwood Production, Transformation and Utilization," by Marilyn Hoskins, draft. Projects are considered from the varying perspectives of donors, forestry services and villagers, with proposals on how to reconcile them. A "management agreement plan" is described, whereby a written agreement to be negotiated and signed by all participating parties would provide the basis for project implementation. This contract would clearly identify the responsibilities and rights of all participants.

"Firewood Survey" by James Thompson, draft. The survey package consisting of questionnaires directed to four distinct groups has been designed to reveal producers' and consumers' perception of the firewood crisis. Also included is an overview of the firewood problem with particular attention to the institutional constraints, as well as recommendations for adapting and administering the survey.

"Deforestation and Development". With AID funding, the U.S. Forest Service is compiling baseline data on forestry problems and interventions in developing countries. An inventory of all donor-supported forestry-related projects is being compiled as part of this effort. The final report will be available in early 1980.^{8/}

"Community Level Socio-Economic Context of Fuelwood Use"^{9/}. AID has recently commissioned a study on fuelwood consumption in small rural communities worldwide. It will examine the socio-economic, ecological and political factors which:

- determine access to fuelwood-producing land;
- affect fuelwood harvest and distribution; and
- influence fuelwood consumption, including cooking, heating, and community-level manufacturing.

Community responses to fuelwood shortages, such as efforts to impose controls on usage and/or increase fuelwood supplies, will be given particular attention. Based upon the study's findings, guidelines will be developed to assist AID in formulating policy, and designing and implementing community firewood programs and projects.

The final report will be available in early 1980.

8/Deforestation and Development, AID PASA No. AG/TAB 1080-10-78.

9/The study is being conducted by Devres, a private U.S. consulting firm with international experience in agriculture, rural development and policy planning.

Other Related Activities

The U.S. is supporting the establishment of regional remote sensing centers in East and West Africa. Because satellite imagery is a valuable planning and management tool for natural resource programs (including forestry) these projects are briefly summarized here.

Regional Remote Sensing Center, Ouagadougou, Upper Volta (Project No. 625-0913)

The U.S., Canada, France, and the Government of Upper Volta are supporting the establishment of a regional remote sensing center in Ouagadougou to serve 30 African countries. The goal is to establish a functioning center staffed by African professionals and technicians and supported by participating African governments. Project elements include the following:

- Train African professionals in data analysis and application;
- Provide user assistance services to African governments;
- Create an information/reference service;
- Inform African officials about the uses of remote sensing data; and
- Establish a satellite reception center capable of receiving and recording data from NASA's LANDSAT as well as other satellites.

Regional Remote Sensing Center, Nairobi (Project No. 698-0414)

AID is sponsoring the establishment of a regional remote sensing facility in Nairobi, which will provide a variety of services to countries in eastern and southern Africa. These include:

- Training remote sensing specialists and resource managers to use the data;
- Assistance to governments in data interpretation and analysis; and
- Data distribution.

The facility is located at the headquarters of the Regional Center for Surveying and Mapping, established in 1975 by the U.N. Economic Commission for Africa to provide mapping and surveying services. A quarterly newsletter, entitled "Earth Resources Mapping in Africa" is published jointly by the two centers, and provides information on matters of interest including current activities and projects, coming events (e.g. workshops, meetings), and new developments in space technology.

SECTION III

OTHER RENEWABLE FUELS

In mid-1976, with a grant from the Africa Bureau, the Overseas Development Council undertook a study on the role of renewable energy in the development of rural areas in Africa. The final report, entitled "Energy for the Villages of Africa", played a major role in raising the Bureau's perceptions of Africa's energy problems, and in formulating an initial policy and program.

In August 1979 the Bureau further refined its policy, which is described in an airgram circulated to all field missions. Emphasis will be to meet energy needs in the areas of:

- cooking and heating
- water supply, grain grinding, irrigation, handicrafts, and other basic life functions.

These activities represent approximately 80% of all energy consumed in Africa for all purposes, and 90-100% of all energy used by the poor. This approach is consistent with AID's mandate to address problems which affect the lives of the majority of people in developing countries.

In some instances, energy components are being incorporated into existing projects in the areas of health, agriculture, education, and rural development. In others, new undertakings are being supported. The current and proposed program includes the following activities:

- Institution Building (training; expansion of laboratory facilities; acquisition of equipment and supplies)
- Data collection (national energy assessments, village-level surveys).
- Applied R&D on small-scale, renewable energy technologies (improved wood burning stoves, solar crop and fish dryers, wind systems, photovoltaic and rankine cycle pumps, solar stills, peat exploitation, pyrolytic converters, improved charcoal-making techniques, mini-hydro generators, biogas digestors).

Because the village-level approach is relatively new and untested, special measures are being taken to ensure that the various approaches are "appropriate" from a technical, social, economic, and environmental standpoint. A number of studies have been commissioned to assist project designers and managers, and procedures for evaluating the impact of AID-financed energy technologies on the people to whom they are provided are also being developed.

Project Summaries

Burundi Alternative Energy - Peat (Project No. 698-0410)

Burundi has an estimated two billion cubic meters of peat reserves. The government has placed a high priority on the development of this natural resource to meet energy needs. Peat is a possible substitute for wood which is becoming increasingly scarce: it has been estimated that Burundi's wood reserves will be depleted in ten years at the current rate of use.

This pilot project provides assistance to the Office National de la Tourbe (ONATOUR) in the Ministry of Mines and Geology, to develop peat reserves for non-industrial purposes and to encourage its use by rural peasants. Activities include:

- strengthening ONATOUR's management capabilities;
- exploiting peat on a small-scale;
- establishing marketing and distribution systems.

Funds generated by sales of peat during this pilot phase will be rechannelled to ONATOUR. It is not intended that ONATOUR become a marketing and distribution outfit, however, and the ultimate goal is to encourage exploitation by rural peasants.

This project is being implemented by the Catholic Relief Service, a private non-profit organization.

Project Status: Project evaluation to be undertaken during the fall of 1979.

Burundi Peat II (Project No. 695-0103)

This will be the second phase of AID support for developing Burundi's peat reserves. Design of this project will commence after the completion of a country-wide survey of peat reserves now being conducted by the Government of Ireland. Discussions are also underway regarding possible collaboration between the U.S. and Ireland in the design and implementation of this project.

Cape Verde Renewable Energy (Project No. 655-0009)

This project is a small-scale, two-year effort, which, if successful, would become the first phase of a larger program. It will provide assistance to the Ministry of Rural Development, Bureau of Conservation and Natural Resources, to strengthen its capacity to design, develop, test, maintain and evaluate alternative energy technologies. More specifically, the project will provide assistance for the following:

- Establishment of an applied R&D workshop;
- Short-term training for workshop personnel;
- Applied R&D (this will include the acquisition and installation of local and imported wind systems for pumping water and generating electricity; and construction and testing of prototypes of solar cookers, wood burning stoves, solar fish dryers, solar stills, solar air heaters for processing gypsum, and a small biogas digester;
- Feasibility study to assess the potential of a combined wind electric/hydro system in Tarrafal, the site of an ongoing AID-supported project to develop ground and surface water.

A Dutch wind expert on loan to the Bureau for Conservation and Natural Resources will assist in managing this project. A request will also be submitted to the United Nations for one volunteer experienced in renewable energy technologies to assist in project implementation.

Project Status: The PID was approved in June 1979 and the PP is now being written.

Ghana Pyrolytic Converter Demonstration (Project No. 698-0135)

A feasibility study conducted by the Georgia Institute of Technology in 1976 concluded that the conversion of Ghana's forestry and agricultural wastes into solid and liquid fuels would enable the country to meet a significant portion of future energy needs. According to the study, about 2,735,100 tons of annual waste is currently unused and considered a nuisance.¹⁰ Through pyrolysis, this could be transformed into charcoal (342,000 tons) and pyrolytic oil (273,000 tons). Projected output exceeds Ghana's annual domestic charcoal consumption which was 250,000 tons in 1975.

Shortly thereafter, AID commissioned the Georgia Institute of Technology to design, construct and evaluate the performance of a portable pyrolytic conversion system in collaboration with the Technology Consultancy Center of the University of Science and Technology (Kumasi) and the Building and Road Research Institute (also in Kumasi). Design criteria were (1) use of labor intensive methods whenever possible (2) maximum use of components available in Ghana and (3) a system which could be fabricated with local skills.

A prototype of a 6 ton/day pyrolytic converter will soon be tested at the BRRI brickworks kiln in Fumesua, Ashanti. Sawdust will be supplied by nearby lumber mills and wood product plants, and the char and oil will be used to fire the brick kilns. The system's daily output is expected to be 3,000 pounds of char and 2,200 pounds of oil. Three additional units are nearing completion. A social, economic and technical evaluation of the system will be conducted in the near future.

¹⁰Wastes considered as potential raw materials for pyrolytic conversion include: sawdust; rice straw and husks; logging; coconut; oil palm; and reforestation--bushes and non-commercial species being cleared for reforestation of more desirable species. Other wastes, such as maize stalks, peanut hulls, and cocoa pods were not considered because of their importance as domestic fuels and problems with collection.

Project Status: Project is nearing completion. The pyrolytic converter is not yet operational.

Lesotho Renewable Energy Technology (Project No. 632-0206)

The purpose of this project is to introduce renewable energy technologies in rural areas on an experimental basis and to develop Lesotho's institutional capacity for disseminating these technologies nationwide.

Applied R&D will be carried out at the lab in Maseru and the three regional training centers (to be established as part of this project). The following technologies will be tested and evaluated: mud stoves; pedal-powered grain grinders; community greenhouses; hand-woven insulation; an experimental feedlot-based biogas system; and a mini hydro unit (3-5 kW).

Seventy-five percent of all project activities will be implemented at the village level. Through the traditional village meetings, villagers will be actively involved in decisions regarding participation in the project, identification of energy needs, and preferred solutions. Each participating community will appoint one person to be trained at one of three regional training centers in the construction, operation and maintenance of devices to be introduced at a later date. Upon completion, these people (to be called village energy technicians, or VETS) will return to their respective villages, construct devices for personal use to serve as demonstration models, and offer to assist others (for a fee) interested in constructing their own.

A major emphasis of this project is training: staff at the Ministry of Rural Development; the village energy technicians, and the villagers. Training materials, such as "how-to-build-it" brochures, films, booklets and slide shows will also be produced and distributed.

Continuous evaluation of the social, economic, and technical aspects of the project will be carried out by a group consisting of representatives from the Ministry of Rural Development, other concerned ministries, the village energy technicians, village residents and outsiders. The project will be implemented by the Appropriate Technology Unit within the Ministry of Rural Development, with assistance from expatriate experts.

Project Status: The project has been approved and a project agreement signed with the government.

Mali Renewable Energy (Project No. 688-0217)

The purpose of this five-year project is to identify, adapt and introduce renewable energy technologies responsive to local needs. It will also attempt to increase understanding of the social and economic implications of introducing alternative energy technologies in rural Africa.

To accomplish these objectives, a coordinated program will be undertaken which includes the following elements:

- institutional support to Mali's Solar Energy Lab (expansion of laboratory facilities; develop program for applied R&D; short-term training; technical assistance; financing a portion of operating costs);
- socioeconomic and meteorological surveys of 25 villages;
- applied R&D (solar water heaters; crop/fish dryers; wood burning stoves; photovoltaic battery chargers);
- field demonstrations (selected devices to be introduced into 20 villages; special training will be provided to villagers who will be responsible for their operation and maintenance);
- Evaluation.

Four photovoltaic pumps will also be installed during the first year of the project at the following sites:

- Kamodibo and Demba Diawara--domestic water supply;
- Mopti--irrigation for a market gardening cooperative
- Samanko--leper rehabilitation center.

An interagency committee will coordinate the activities of eight Malian agencies involved in project implementation. The primary recipient is the Solar Energy Lab, which falls under the Direction Generale de l'Hydraulique et de l'Energie, Ministry of Industrial Development and Tourism. The village level surveys will be under the direction of the Evaluation Unit of the Rural Economy Institute, and four Peace Corps volunteers will be assigned to assist with the surveys.

Project Status: U.S. technical personnel are being recruited; laboratory equipment has been ordered; the contract for the design of the new laboratory buildings has been let; the Peace Corps volunteers have been trained; and the survey program is being organized.

Mali Operation Mils Mopti (Project No. 688-0202)

This agricultural production project was amended in FY 1979 to authorize the acquisition of two photovoltaic pumping systems to be installed in the villages of Bankass and Koro. They will replace nonfunctioning gasoline engine generator sets.

Mali Action Ble (Project No. 688-0213)

This agricultural production project was amended in FY 1979 to authorize the acquisition of two photovoltaic pumping systems to be installed in a village and a small town in the 6th region.

Niger Solar Energy (Project No. 683-0039)

This two-year project will provide material and technical support to Niger's Solar Energy Laboratory, ONERSOL. The U.S. will finance the expansion of laboratory facilities; the acquisition of new instruments and equipment; training for two staff persons; and short-term visits to Niamey by 10 U.S. experts. Experiments combining ONERSOL collectors or concentrators with American thermal pumps and photovoltaic cells will be conducted and two pumping systems will be installed at locations along the Niger River to provide irrigation water to farmers.

Project Status: Project is being implemented. Equipment has been ordered, an ONERSOL technician has started training, and a contract for the design of expanded ONERSOL facilities has been let.

Rwanda Renewable and Improved Traditional Energy (Project No. 698-0410)

This project will provide support to the Centre d'Etudes et d'Applications de l'Energie au Rwanda (CEAER), located at the National University. Its purpose is to design, develop and field test energy technologies which meet rural energy needs based on selected village-level surveys. The U.S. will finance short-term training; technical assistance; the acquisition of equipment; and the creation of a small energy fund to finance the construction of small-scale technologies by schools, missionary groups, the University, and Peace Corps volunteers. Evaluations, including social and economic analyses, will be conducted prior to introduction of the devices, and again upon completion of the project. Recommendations for a national energy strategy will be forwarded to the government.

Project Status: Project agreement was signed in September 1978.

Senegal Bakel Irrigated Perimeter (Project No. 685-0208)

The U.S. and France are jointly financing the installation of a 30-kW thermodynamic pump in Bakel, Senegal to irrigate up to 200 hectares and produce 20 kWh/daily of electrical power. The pump is being jointly constructed by a U.S. (Thermo Electron) and a French (SOFRETES) firm. SINAES, a local Senegalese firm, is providing supporting services.

The solar pump is being installed at the site of an on-going U.S.-financed crop production project to irrigate 1,800 hectares with small diesel pumps. This effort is being closely coordinated with SAED, the Senegalese governmental agency responsible for agricultural planning and preparation of the irrigated perimeters in the Senegal River Basin.

Project Status: Fabrication of the hardware is almost completed and the solar collectors have been shipped to Bakel. Installation of the hardware has been delayed due to difficulties in contracting for the civil works.

Senegal Renewable Energy (Project No. 625-0937)

This two-year project will support the development and testing of three technologies: solar fish dryers; wood burning stoves; and more efficient charcoal making.

- Solar fish dryers. Support will be provided to the Institute Technologie Alimentaire (ITA) to continue applied R&D on solar tent dryers and storage units for fish. These devices can dry up to 100 kilos of fresh fish and store 250 kilos of the dried product. They are constructed with wood and plastic and are relatively inexpensive, costing about 12,000 CFA. Efforts will be made to increase the durability of both devices.
- Wood burning stoves. A Peace Corps Volunteer will construct and test prototypes of wood burning stoves at the Center for Study and Research on Renewable Energy (CEPER). Village demonstration and diffusion of successful models will be undertaken by the Maisons Familiales Rurales.
- Improved charcoal making techniques. A method for making charcoal which increases yields from 20 to 30% has been developed as part of an FAO-UNDP forestry project in Ziguinchor. Under this project, charcoal makers in four regions--Casamance, Thies, Sine-Saloum and Senegal Oriental--will be trained in the new techniques. About 30 people will participate in each training session, to run about six weeks. During the life of the project, as many as nine courses will be given. This activity will be managed by the Departement des Eaux et Forets.

Project Status: The PP has been submitted to Washington for review.

Upper Volta Solar Cell Power System Demonstration (Project No. 698-0410)

With AID funding, the Lewis Research Center of the U.S. National Aeronautics and Space Administration (NASA) designed, fabricated and installed a 1.8 kW (peak) photovoltaic system in the village of Tangaye in February 1979.

It generates power for grinding 320 kg. of cereal grain and pumping 5,000 litres of water daily. The purposes are to: (1) test the system's technical performance under harsh Sahelian conditions, and (2) determine the socio-economic impact of reducing the time required by women in Tangaye to draw water and grind grain. Baseline data on food preparation, water procurement and distribution systems existing in the villages was compiled prior to the installation of the solar energy unit.

Project Status: The system was installed, and operation commenced, in the spring of 1979. NASA is monitoring and providing technical support to the project. A socio-economic study of the project has been initiated.

Project Proposals

In response to government requests, the Africa Bureau has recently commissioned several studies in the Cameroon, Mauritius, Swaziland, and the Republic of Cape Verde, and follow-on project support is being considered. A feasibility study on methane production has been carried out at the request of the Rwanda government. A regional energy project is also under consideration.

Cameroon

A report prepared by an AID consultant covers the state-of-the-art of renewable energy development in the Cameroon; provides a preliminary assessment of the potential of selected technologies (wood burning stoves, wind systems, photovoltaics, biodigestion, and solar fish and crop dryers); and offers specific recommendations for project activities.

Mauritius

A review of renewable and conventional energy possibilities in Mauritius by an AID consultant found that the country has many of the technical resources for developing its energy base. Some small-scale activities are already underway. Solar hot water heaters have been successfully installed in several hotels and private homes and there is potential for manufacturing the panels locally. Local sugar factories are energy self-sufficient, generating all their own electricity from bagasse.

However, Mauritius lacks both a national energy policy and the institutional capacity for undertaking a substantial applied R&D effort. Project recommendations include:

- Creation of an Alternative Energy Research Institute, located at the University of Mauritius, to undertake applied energy research and testing.
- Establishment of a National Energy Board to undertake an energy needs/resources study, develop a national energy policy, and coordinate energy development efforts.
- Dissemination of information and devices through the existing agricultural extension service, or through a proposed energy extension service.
- Provision of incentives, such as tax credits, to encourage energy conservation and adoption of new energy technologies.
- Establishment of a solar loan bank to extend low-interest credit for construction of active and passive renewable energy systems.

Swaziland

This proposal recommends support for a survey of alternative energy in Swaziland, as well as the construction and demonstration of prototypes. One potential pilot effort to be carried out under this project could be the construction of a mini-hydro facility to determine the technical, social and economic feasibility of this technology as a source of electricity for pumping water.

Cape Verde

Drafted as part of a design effort for the Cape Verde Renewable Energy Project described earlier, this proposal recommends and provides a preliminary outline for undertaking a national energy assessment covering renewable and non-renewable energy sources used in both the modern and traditional sectors. It would be implemented by expatriates and Cape Verdean counterparts.

Rwanda

A feasibility study was conducted to determine if and how the development of methane reserves from Lake Kivu could benefit the people of Rwanda. The report covers the physical, chemical and biological aspects of Lake Kivu; the economics of methane exploitation and implications for the national economy; different options for exploiting the gas; and recommendations for an intermediate-phase development program.

In brief, the study concludes that the development of this energy resource could substantially reduce the country's present total reliance on imported petroleum products. Methanol, the most versatile and clean-burning of fuels that could be derived from Lake Kivu, is a substitute for fuel oil and kerosene, and could be distributed by existing trucking facilities. The study predicts that methanol production would be cost-competitive with importing petroleum, and could save the government \$17 million in annual foreign exchange costs by 1985.

Recommendations include the establishment of a test facility to exploit the gas on a pilot basis. At the same time, more precise information on the extent of the gas reserves, the renewal rate, and the effect of gas exploitation on the lake's environment would be compiled. Gas sharing arrangements between Rwanda and Zaire would be explored. The feasibility of full-scale gas removal would also be assessed.

AID has requested cost estimates for building and operating a test plant, but has no plans for financing such an effort at this time.

Energy Initiatives for Africa

A proposal for a four-year regional project to support energy activities is under consideration. It would finance new undertakings, or energy components for incorporation into on-going projects. Illustrative activities would be:

- Information gathering (e.g., national fuelwood or rural energy surveys);
- Pilot activities (e.g., testing renewable energy devices);
- Training (e.g., workshops, short-term courses, seminars);
- Evaluation (e.g., comparative evaluation of African woodlot projects);
- Special activities (e.g., addressing conventional energy problems where other donor support is either unavailable or delayed).

Studies

In addition to the five studies outlined below, the Africa Bureau plans to commission a catalogue on low-cost energy devices, for completion in early 1980. The first two studies have been prepared specifically for the Workshop on Fuelwood and Other Renewable Fuels in Africa.

"Selected Issues in Rural Africa Energy Assessments", by Thomas Graham, draft. Major issues in carrying out rural energy surveys are described, with particular attention to:

- ways to acquire useful data on attitudes of villagers, and objective measures of energy use;
- analytical procedures for evaluating social, economic and technical information to determine which systems are most appropriate for each area surveyed.

This paper is an extension of an earlier study entitled African Energy Survey Methodology, prepared by Donovan, Hamester and Rattien (described below). The consultant spent time in Swaziland, the country used here as a case study.

"The Role of Evaluation for Renewable Energy Projects in Africa," by George Burrill, draft. The report covers the substantive issues which monitoring and evaluation systems should observe. Emphasis is on creating an interactive observation process which allows projects to be refined. The questions to be asked are defined, as well as how to ask them. This process is designed to elicit technical, social, economic and institutional information which will be used to modify and improve the project during actual implementation.

"African Energy Survey Methodology," by Donovan, Hamester and Rattien, Washington, D.C., 1979. A comprehensive methodology is presented for carrying out national energy surveys in both the rural and urban sectors in Africa. Its purpose is to assist planners to assess energy resources, uses and suitable conversion technologies. A case study of a maritime artisanal fishing village in Senegal is used for illustration. A survey document for village-level surveys has also been prepared.

" 'Spontaneous' Socio-Cultural Change--A Model of Low Friction Technology Adoption in Africa," by Cecil Cook , draft. Using case studies and theoretical material, this study identifies the attributes of technology which has been adopted by Africans in the absence of interventions by donors.

"Energy and Development: Issues and Questions for Africa's Future," by Martha Novick, draft. The case is presented for an integrated, intersectoral approach to the study of energy flows (rural and urban, non-renewable and renewable) within African countries. The author attempts to analyze the total energy system of an economy from rural subsistence farming to modern urban and industrial energy uses.

Other Related Activities

In May 1979 an African Solar Energy Workshop was convened in Atlanta, Georgia to review the current status of renewable energy programs, solicit African views on priorities for future activities, and encourage greater collaboration on a regional and continental level. The workshop was sponsored by AID, UNDP, UNEP, the Solar Energy Research Institute (of the U.S. Department of Energy) and The al Dirr'Iyyah Institute, and organized by Atlanta University and the Georgia Institute of Technology. Representatives from 20 African countries participated in the conference. Although invitations were extended to both technologists and social scientists from each country, few social scientists in fact attended the conference, and the discussions focussed primarily on the technical aspects of renewable energy research.

The African participants emphasized that a dual approach is needed to solve Africa's energy problems: expanded applications of renewable energy technologies and massive reforestation and fuelwood conservation programs. Other major conclusions are summarized below:

- Energy for cooking was identified as the most pressing need. Solar cookers were not viewed as a viable alternative because they are considered contrary to the deeply held cultural value, particularly in Moslem countries, of the sanctity of the hearth. However, there was a general consensus that the introduction of more efficient clay and mud stoves holds promise, because this device is consistent with local values and would simultaneously conserve fuelwood.
- A second priority is energy for pumping water. The small 1 and 5 kW SOFRETES rankine cycle solar pumps were generally considered unsuitable for rural use. Photovoltaic systems were favorably viewed, provided that financing was available from donors. Mention was made of a cheaper (\$1,000), low maintenance solar pump which has been developed and successfully field-tested in Botswana.
- Solar water heaters have been constructed in Mali, Niger, Senegal and Tanzania. The market for this technology is still small, however, being mostly limited to urban areas.

- National and regional capabilities to adapt, test, manufacture, install and service renewable energy devices need strengthening.
- The lack of an information network in Africa was noted, as was the irony that Africans had to travel to Atlanta to exchange information and ideas.

An "ad hoc" committee, with representatives from Sudan, Mauritius, Guinea, Tanzania and Mali was formed at the conference to explore the possibility of forming an African Solar Energy Society and to formulate an "African position" for the 1981 U.N. Conference on New and Renewable Energy. Both UNEP and UNESCO have indicated a willingness to support this effort, but the committee has not as yet met. UNESCO is completing a feasibility study for a CEAO-sponsored regional solar energy R&D Center in Bamako, Mali. A directory of African individuals and institutions working in renewable energy, and a list of available reports, is being compiled by UNEP. The full proceedings of the African Solar Energy Workshop are being published by Atlanta University and should be available shortly.

SECTION IV

PEACE CORPS

Since 1961, the U.S. Peace Corps (P.C.) has been involved in forestry projects such as village woodlots, reforestation, agroforestry, land rehabilitation, arid zone vegetation management, and forestry resource management. A few enterprising volunteers have initiated small-scale renewable energy activities, including biogas digestors in Nepal and Ecuador, windmills in Senegal, and forestry for firewood in a number of countries. However, for the most part, these activities have been "ad hoc", and volunteer effectiveness has been somewhat limited by the lack of technical and material project support.

During the past several years, the P.C. has been strengthening its capacity to address problems of deforestation and traditional energy shortages. A major forestry initiative is now underway, and a global renewable energy program has already been launched. These efforts are briefly described below.

P.C. Forestry Initiative

P.C. plans to recruit, train and assign substantially greater numbers of forestry volunteers during the next few years. They are also exploring opportunities for collaborating with other donors (e.g. AID, private voluntary organizations, World Bank, FAO, International Council for Research on Agroforestry, among others) similarly committed to addressing deforestation and related problems in developing countries.^{11/}

In October 1979, approximately 46 volunteers were assigned to forestry projects in Africa.^{12/} (See Table 1.)

^{11/}For more detailed information on potential P.C. projects and their respective resource requirements, as well as preliminary identification of potential joint efforts with other donors, see "Peace Corps Forestry Initiative Paper," Office of Programming and Training Coordination, Peace Corps, Washington, D.C., November 1979.

^{12/}Experiences and insights of PCVs working on projects in Chad, Ivory Coast, Upper Volta and Niger have been documented in "Notes of the 1978 Peace Corps Forestry Conference, Niamey, Niger, October 25-30, 1978", compiled by Steve Seefeldt, Peace Corps/Niger, June 1979. A limited number of reprints are available through the Office of Programming and Training Coordination, Peace Corps, Washington, D.C.

Other activities of interest supported by Peace Corps include:

- the publication of a manual entitled Reforestation in Arid Lands, which contains useful information for designing and implementing projects in arid and semi-arid regions, and specific information on sub-Saharan West Africa.
- an evaluation of ten completed village-level forestry and natural resource projects sponsored by the donor community. This assessment will attempt to identify factors contributing to project success or failure, and will be used to develop guidelines for project identification and design.

Table 1

Ongoing P.C. Forestry and Soil Conservation Projects, October 1979

Country	Project Title	No. of Volunteers
Tanzania	Afforestation	8
Upper Volta	Village Reforestation	12
Senegal	Forestry Survey	1
	Improved Charcoal-Making Techniques	1
Niger	Forestry	12
Lesotho	Soil Conservation	10
Liberia	Forestry Development	2
Ghana	UN/FAO Charcoal	2
	Forestry Products	5
The Gambia	Forestry	1
Total	10 Projects	54

Source: Office of Programming and Training Coordination, Peace Corps.

P.C. Renewable Energy Program

Peace Corps, in collaboration with AID and the Overseas Development Council, has developed a three-year survey, programming and training project. Key elements of the rural energy project are to:

- Design, test and conduct energy surveys to identify local needs and resources in villages;
- Identify, design and implement renewable energy projects.

The survey is intended to raise the consciousness of participants, while providing decision makers (host governments, international donors, P.C. volunteers) with data necessary for planning programs and projects. The survey is designed to elicit information on:

- Energy needs (descriptions of tasks requiring energy at the family, farm and small industry level, and current sources used);
- Energy sources (identification and measurement of potential energy sources; e.g. wind speed, stream flow, biomass).

Seven countries are participating in the first phase of the program: Micronesia, Philippines, Dominican Republic, Senegal, Paraguay, Ecuador, and Mali. Workshops are being held during the summer and fall of 1979 in these countries to train data collectors (P.C. volunteers and host country counterparts) on how to use the survey document, observation and interviewing techniques, and measurement procedures. In Ecuador, the survey is being conducted by host country groups, and an energy survey of 25 villages is already underway in Mali as part of an AID-financed project. (See Mali Renewable Energy Project.)

Peace Corps also plans to send programmers to each of the participating countries to assist volunteers in identifying and designing renewable energy projects. As many as 75 volunteer assignments could be approved and implemented in FY 1980.

Concurrently, Peace Corps has developed a training module in renewable energy/appropriate technology. During FY 1980 50 volunteers will be trained and sent to the field to implement renewable energy projects. Additional modules are also being developed in technologies such as fuel distillation and wind and water systems with at least one training cycle for 25 volunteers planned during FY 1980.

Annex 1

AID-Supported Fuelwood and Other
Renewable Energy Projects in Africa (\$000)A. Bilateral Projects

Project Title		1978	1979	1980 ^{1/}	Proposed 1981 ^{1/}
683-0039	Niger Solar Energy	500			
683-0230	Niger Forestry & Land Use Planning			880	892
686-0235	Upper Volta Forestry Education & Develop.		700	2,000	1,500
632-0206	Lesotho Renewable Energy Technology		1,600		
633-0209	Botswana Alternative Energy				1,039
682-0205	Mauritania Renewable Resources Mgmt.	250	1,300	1,500	1,300
682-0220	Mauritania Reforest- ation				400
688-0202	Mali Operation Mil		220 ^{2/}		
688-0217	Mali Renewable Energy	2,174		500	1,420
685-0219	Senegal Fuelwood Production		1,404	700	1,030
685-0224	Senegal SODESP Live- stock Production		831 ^{3/}		
685-0243	Senegal Africare Forestry			125	
685-0208	Bakel Irrigated Perimeter		700 ^{2/}		
655-0009	Cape Verde Renewable Energy			460	
688-0213	Mali Action Ble		220 ^{2/}		

1/These figures are subject to change.

2/Represents energy component only.

3/Represents forestry component only.

Project Title	1978	1979	1980 ^{1/}	Proposed 1981 ^{1/}
695-0103 Burundi Alternative Energy-Peat II			1,800	700
645-0207 Swaziland Alternative Energy Research			NA	NA
635-0205 Gambia Reforestation		1,575	1,150	
afr-G-1251 Chad Reforestation ^{4/}	444	291		
686-0231 Upper Volta Seguenega Integrated Rural Development		20 ^{3/}	30 ^{3/}	20 ^{3/}
683-0205 Niger Niamey Dept. Development	670.7 ^{3/}			
695-0105 Burundi Agricultural Land Protection			750	NA
682-99 ⁵ Mauritania Renewable Energy				250
677-0040 CARE Firewood			400	

B. Regional Projects (Small Grants for Renewable Energy)

698-0937 Mali Firewood Conservation & Production AIP			200	
698-0410 Upper Volta Solar Cell Power System Demo	80			
698-0410 Rwanda Renewable Energy and Improved Trad. Technology AIP		487		
698-0410 Burundi Alternative Energy Peat AIP	480			
698-0410 Burundi Forest Preservation AIP			490	

^{1/}These figures are subject to change.

^{2/}Represents energy component only.

^{3/}Represents forestry component only

^{4/}Initial funds totaling \$75,000 were obligated in FY 1976.

Project Title	1978	1979	1980 ^{1/}	Proposed 1981 ^{1/}
698-0937 Mauritania Firewood/ Reforestation			300	
698-0937 Senegal Renewable Energy			300	
698-0410 Guinea Fuelwood			500	
698-0424 Energy Initiatives (Africa-wide)			275	1,000
698-0135 Ghana Pyrolytic Convertor Demon- stration	83	25		
698-0135 Firewood Study (Africa-wide)			400	
698-0135 Project Design Services (Africa- wide)	357	453	500	500
TOTAL	5,738.7	9,126	13,260	10,051

Annex 2

U.S. Commitments to the Club of the Sahel/CILSS
Ecology and Forestry Program (in \$000)

AID Project	Corresponding CILSS Project	Project Duration	LOP Funding
Mauritania Renewable Resource Mgmt.	Mau B 301 Mau B 302 Mau B 304	1978-1982	4,677.7
Senegal Fuelwood Production	Sen A 302	1979	3,200
SODESP Livestock Production			
-Wellpoint Rehabilitation through Reforestation	Sen B 301	1979-1983	831
Dune Fixation and Protection of the Niayes	Sen B 302	1980	3,500
Planting <u>Acacia albida</u> in farm fields	Sen B 304	Undetermined	Undetermined
Upper Volta Forestry Education & Mgmt.	UV A 304 UV D 301	1979-1983	5,980
Gambia Reforestation	A 301 portions	1979-1984	1,575

Annex 2, continued

AID Project	Corresponding CILSS Project	Project Duration	LOP Funding
Cape Verde Watershed Mgmt.	CVI B 303 CVI B 305 CVI B 306	1979	6,100
Niger Forestry and Land-Use Planning	Proposal pre-dates CILSS Program	1980-1983	3,585
REGIONAL ACTIVITIES			
Sahel Regional Aid and Coordination			
-Provision of Full-time Ecologist to CILSS Forestry and Ecology Unit	RAF 304 portion	1977	85+
-Two Months of Consulting Services in 1978	RAF 304 portion	1978	Contract with OECD
Soil Conservation Training Program	D 301	1979-1981	280

Annex 3

AID-Supported Energy Development, By Technology
and Country: Current and Proposed

Technology	Country
1. Village woodlots	Guinea, Mali, Rwanda, Senegal, Gambia
2. Fuelwood production	Senegal, Gambia, Burundi, Mauritania, Niger, Upper Volta
3. Wood and dung burning stoves	Cape Verde, Senegal, Niger, Rwanda, Lesotho
4. Improved charcoal pro- duction	Senegal, Rwanda
5. Solar water heaters	Niger, Mali
6. Solar thermal pump	Senegal
7. Photovoltaic pumps	Niger, Mali, Upper Volta, Rwanda
8. Wind systems	Cape Verde, Rwanda
9. Pyrolytic conversion	Ghana
10. Pedal power grain grinding	Lesotho
11. Photovoltaic battery charger	Mali
12. Solar grain dryer	Mali, Rwanda, Niger
13. Solar stills	Niger, Cape Verde
14. Peat production	Burundi
15. Solar fish dryers	Mali, Cape Verde, Senegal
16. Solar cookers	Cape Verde
17. Solar greenhouse	Lesotho
18. Solar thermal refrig- eration	Niger
19. Biogas refrigeration	Rwanda
20. Biogas digestors	Lesotho, Cape Verde
21. Mini hydro	Lesotho, Rwanda, Swaziland

Source: Office of Selected Development Problems, Bureau for Africa, September 1979.

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