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By Marilyn W. Hoskins

Discussion Paper Prepared for Workshop
on Fuelwood and Other Renewable Fuels in Africa
Paris, November 29, 30, 1979

Overseas Development Council
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SUMMARY

All over the world people are becoming concerned over finding adequate supplies of energy. In Africa, where wood is the major source of fuel for cooking and heating in the vast majority of homes, this concern is complicated by a dwindling supply just at the time the demand is increasing. Example after example shows that the common top-down approach to forestry is not supplying this fuel. Not only is the demand too great and generalized for government agencies alone to fulfill, but successful efforts to produce local fuel in ways that protect or re-constitute a healthy environment require support from local people. This awareness and the new stress of many donors on local participation in defining and solving local problems has created a new interest in combining forestry technology with community development in a new field called "forestry for local community development" or FLCD. The basis of FLCD is community participation. In fuel production one could say, if residents do not participate in designing the project it risks being inappropriate to address local needs; if they do not participate in implementation, the trees probably will not survive; if they do not participate in receiving benefits, the project is meaningless. FLCD includes not only raising trees but processing and using tree products - in this case in all the processes between the seed to the cooked dinner.

Production

Including local people in the design, the implementation, and the benefit sharing aspects of fuelwood production and use raises a number of issues

which were not considered important in industrial forestry. It calls for reorienting goals and expectations, and re-designing training, technical packages, and managerial supports, as well as a new type of commitment on the part of donors, technical support agents, and local residents.

Unfortunately, some of the first projects designed to be FLCD projects have not succeeded. Local participants, host country technicians and donors alike look at these failures and express their separate frustrations - each from their different perspectives. When examined in detail, these perspectives give insights to a new set of problems and clues on how some of these may be resolved. Some complaints are common to all three groups, but each party feels that success or failure is beyond its own control because the other groups are at least partly responsible. For example, donors and foresters complain that villagers do not, or are not able to, effectively participate, especially in tree protection. Villagers counter with the complaint that programs are not designed around their real needs and using their expertise. Even when they feel firewood is a major problem, villagers are not given timely, adequate information and technical support and, therefore, have little assurance of the success of the project and even less assurance that they will receive benefits they will really value. Foresters, for their part, feel donors have self-defeating goals and funding regulations. They also feel that their own field technicians do not get appropriate and necessary logistic and materials support, nor the personal merit advances which should come while working with this new activity. Donors feel in turn, that foresters do not address themselves to appropriate technical packages and support for village participation. Additionally, they feel forestry services will need to refocus their goals, regulations, and efforts for this new approach to be

successful. Donors and foresters address the problem of motivation and incentives for villagers when land is limited and wood is still a "free good" while recognizing that after the wood is gone it is too late. All three groups recognize needs for integrated natural resources and energy planning at regional, national, and local levels.

The FLCD philosophy stresses that all groups involved have responsibilities and rights in this joint-effort programming. Because there is such a lack of communication and understanding of the problem between involved groups, there is an urgent need for more cooperative planning and clearer understandings of responsibilities and expectations from the beginning of projects. Most projects which eventually fail, do so because one or more of the following six elements were unclear when the project began: 1. identification of, and criteria for, participants; 2. clearly stated long and short range goals; 3. project land clearly identified, adjudicated, and dedicated for the duration of the project; 4. start-up and maintenance planning with a schedule of inputs, and with responsible parties identified; 5. specification of benefit distribution giving details of to whom, how, when, where, etc. benefits are to be distributed; and, 6. a plan for evaluation which provides for timely feed-back and flexibility in support of and, when necessary, redirection of the program. A written project management agreement to be developed by participants, thoroughly discussed, and agreed upon, could help clarify these project elements from the beginning of project design. The format and semantics would vary depending upon the circumstances, but even a family developing a personal woodlot should consider each of these elements. In recognition of the rights and obligations of each participating group or individual in an FLCD project.

this agreement should be signed by all those touched by the project in the form of a contractual agreement.

Transformation

Production of wood is only as effective as the quantity that arrives at the fireplace and the amount of cooking or heating it does. Transformation of wood from tree to fireplace fuel includes harvesting, charcoal making, transporting, and drying and storing the woodfuel. Studies show there is a great deal of waste at each of these steps. In order to diminish this waste, however, regional and national energy, fiscal, and transportation policies will have to be coordinated. This is especially true since available wood, including wasted wood that can be salvaged, and forests that could be managed to yield more fuelwood, is seldom where the fuel is needed. Any community or FLCD programs would have to start from felt needs and have as their goal to leave communities more in charge of their own futures. To do so, however, effective transformation projects would also have to be supported by government policies.

Utilization

Broad use of cookstoves is often cited as a great potential source of energy-saving over the traditional more open fires. To date emphasis has been on designing stoves in laboratories and developing a model that is technically a success because of its efficiency. These models fail to have any lasting impact in the field. This is due in great part to the confusion between the experiment and the demonstration - dissemination phases of projects.

Frequently, failure to disseminate stove models is blamed on traditional attitudes of women or ineffective extension services, when in fact the experiment phase has not been completed. Experiment designing should be done in areas where women are interested in stoves for saving fuel and where they use experimental stoves in their homes as paid members of experimental teams. The teams should also include technical personnel and extension agents as well as women from local women's groups and perhaps craftsmen. They should all be involved in suggesting modifications and added features to develop a useful stove design. The demonstration-dissemination phase would start only when the team members felt the model had been modified to satisfactorily meet the requirements of the local cooking and there was a local demand for the stoves.

Community participation in solving fuelwood problems in Africa is not easy or quick. Efforts to design these projects are still experimental and require new attitudes and support from all parties involved. It is difficult to approach problems in this way, but looking at the record, what other choice do we have? As a CILSS report stated, the goal of self-sufficiency in food production is meaningless unless one also has the fuel with which to cook.

Preface

My interest in problems of energy in Africa developed during five years I spent with the African Center for Research and Development (SAED) located in Ouagadougou, Upper Volta. As Chief of the Department of Culture, Tradition, and Environment, and as a senior research director in the Department of Social Issues, I worked with donor groups, governmental agencies, and local citizens on a variety of development issues. Watching women struggle daily to get fuel from land which was also needed to raise crops and feed animals, and watching donors and program implementors grapple with illusive solutions while developing appropriate local development projects, gave me respect for the complexity of these issues.

During the last several years I have worked in a number of community development, regional planning, program evaluation, and social impact studies in Africa. Among these studies was an FAO mission to Senegal in early 1979 where I worked with the Senegalese Forestry Service to assess the potential for forestry for local community development, and work in Rome with FAO foresters interested in community development. Throughout my travels in Africa, as in the United States, I have found foresters and program planners alike deeply interested in energy issues and ways to involve community members in more effective production, transformation and utilization of the wood energy needed daily by the base majority of African families.

This paper is written in response to a request by the Overseas Development Council and the Agency for International Development for a discussion paper about using a community development approach in fulfilling this energy need. It is not a state of the art paper, a case study, nor a research paper. It is a collection of thoughts formulated during my work in Africa, during discussions with others concerned with these issues and drawn from case studies. I wish to express a respect and appreciation to donors, foresters, local participants and others who cared enough to candidly discuss and write about projects "gone wrong". If they are quoted extensively it is with the awareness that there are many project failures but only those analyzed perceptively can help improve our project design and implementing skills.

I wish to thank some of the many people who have contributed to my understanding of these issues. I owe a special debt to David French, Frances Gulick and James Howe who were instrumental in my writing this paper, to Fred Weber and Leslie Temanson with whom I discussed forestry and technology issues, to Irene Tinker, Lawrence Ervin and Tony Proyor who gave encouragement, and to many others in the Senegalese Forestry Service, at FAO, SAED, AID, VITA, Peace Corps and the World Bank.

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COMMUNITY PARTICIPATION IN AFRICAN FUELWOOD PRODUCTION, TRANSFORMATION, AND UTILIZATION

I. INTRODUCTION

All over the world governments are showing an interest in developing a new approach to forestry. They are indicating an alarm over environmental degradation including the decreasing carrying capacity of land to feed growing populations, and also over the depletion of forestry products, by-products, and tertiary-products. This concern is augmented by the rising costs of energy that focus new interest on the dwindling supply of firewood.

The urgency to improve forestry production comes at a time when many donors, from small private voluntary organizations to multi-national organizations, are re-assessing their approaches to development, and deciding that development is not something one does TO SOMEONE, but something PEOPLE DO THEMSELVES. They are concluding that a developmental role is a supportive role; it is that which facilitates local people solving their problems in a way to gain control over their own futures.

FLCD

The "new approach" to forestry, then, is focused on ways to help local people identify and supply their local firewood and other forestry needs from the "bottom-up" rather than from the "top-down." It is an attempt to bring local residents into management decisions on integrated land and resource use, and to develop an "appropriate forestry" approach which FAO describes as follows:

> ...Rather than setting national goals, the priority is to enhance the lives of specific local communities.
>
> Forestry for local community development must reflect the needs, problems and aspirations of local people as seen through their eyes. To be truly appropriate its strategy will vary according to community and place. In underlining social, rather than strictly commercial needs, community forestry calls for new policies and attitudes. In particular, the division between agriculture and forestry which seems so clear as between industrial forestry and intensive agriculture must be abandoned. (FAO, 1978 pp8-9).
>
> Bringing forestry to the aid of rural communities is not so much a technical problem as a psychological, institutional, and political one. (FAO, 1978 p22).

This approach also includes transformation and utilization of forestry and related products as part of forestry for local community development projects.

Interest in developing this new type of programming has been widespread. FAO/SIDA has held several "expert consultations" where there was broad North-South participation discussing potential for this approach. From these discussions FAO published "Forestry for Local Community Development" and other papers elaborating problems and methodology. The Eighth World Forestry Congress held in Jakarta, Indonesia in October, 1978 received papers from numerous countries for the new discussion topic area, "Forestry for Rural Communities." Within six months after the World Bank published a forestry policy paper describing its change of focus from industry-oriented to people and environment oriented programs, requests for technical and financial assistance came in from about forty different countries. (Spears, 1978). A number of countries in Africa have sent representatives to

workshops and conferences to consider ways of solving local forestry problems and to share experiences with representatives from other countries. This new approach has frequently been called Forestry for Local Community Development or FLCD to emphasize the need to incorporate community development techniques with forestry and related technology.

TOP-DOWN FORESTRY

Why is there such interest in using this new approach based on community participation to supply African fuelwood needs? Because it is increasingly apparent that THE TOP-DOWN APPROACH IS NOT WORKING. That is not to say there is no further need for industrial plantations, for example, supplying urban centers with fuel. It is to say, however, that efforts to solve local fuel needs in ways that protect or re-constitute a healthy environment require support from local people.

Examples of failures of top-down forestry projects are everywhere. It is not difficult to pay workers to plant trees, but to keep them alive in Africa takes a positive committment. It takes energy and effort to weed around saplings when it is 120° F. in the shade. It takes diligent supervision of animals to protect young trees. It also takes self-discipline to protect locally planted saplings if the only other available forage and fuel is much further away. The total community must be involved for as one report stated, why should a farmer invest time in caring for a tree he knows a neighbor's goat will surely eat?

A major problem which illustrates the need for local support is the control of bush or forest fires. During a visit lasting only one week into the Casamance area of Senegal in early 1979, an FLCD team from FAO observed fires in four different national reserves. In only one case were neighboring people helping control the fire and they were paid workers from an endangered forestry nursery fighting the fire under the direction of their forestry supervisors. One of the fires had obviously spread from a certain village. Because there is a local law which requires villagers to help fight a fire spreading from their village, the angered foresters talked of enforcing a "work day" for all the male villagers as their punishment for not helping. Meanwhile, the women of the village continued washing their clothing and men stood by repairing farm tools and chatting among themselves as the foresters battled the nearby blaze.

The region in which all four fires took place had been the recipient of an intensive Canadian program on community involvement in fighting fires, and many residents had seen films, school children had heard lectures and drawn posters, and a number of villages had been given back-tanks for fighting fires. However, as anyone who has fought a bush fire can testify, fire-fighting is a hot, dirty, uncomfortable business. Successful control of fires can be obtained only when the residents see they have something personal at stake, and these fires were in what residents considered "foresters' lands." (Hoskins, 1979).

If various African nations are to solve their energy problems, then it is not going to be from top-down projects. Local energy problems cannot be isolated from localized basis needs and priorities and will require local input in the planning and broad local support. Fuelwood production, transformation, and efficient utilization approached from the bottom-up or FLCD philosophy raises many new issues. This paper explores some of these issues.

II. PRODUCTION

Simply deciding to include local participation in producing fuelwood does not solve the problem as it requires a new approach and new methodology. Unfortunately there is a lack of experience in FLCD, not only by host country foresters but also on the part of many expatriate forestry advisors as well. Generally, this has not been recognized. Other than Swiss, Austrian, and some Scandinavian community ownership of local woodlands, there is little European or American experience with locally planned, implemented, and managed forests. This is perhaps why the Swedes and Swiss are in the forefront of many FLCD efforts.

A demanding and rigorous education in forestry has given many upper-level European and African foresters a sense of elitism. This training stresses rule enforcement and includes military training but seldom includes courses in sociology, community development, or extension methods. Rural Africans may have more contact with foresters than with most other government officials but these foresters are usually in uniform, often armed, and frequently feared.

It is not surprising, then, that early attempts at community forestry have suffered from a lack of clarity regarding the philosophy of FLCD, a lack of effective techniques for carrying it out, and a difficulty in communication creating frustrations for the various actors involved. The donors, the host country services and technicians, and the local participants all see local fuelwood problems and attempts to solve them from different perspectives. The following is an examination of some problems in implementing FLCD programs from these three perspectives. It is important to look at these in turn and then draw out basic issues to see how they can be dealt with in an effective and rewarding manner.

DONORS

When donors and other planning agencies discuss the urgency of African firewood production and their difficulties in attempting to establish FLCD, their attention usually focuses on the following four issues: community participation, integrated resource planning, interagency cooperation, and commitment on the part of local forestry technicians to the FLCD approach. (See: CILSS, Winterbottom, FAO, World Bank, Spears, Peace Corps, Weber and Dulansey, AID, CESAO, and Kunkle and Dye).

Community Participation

The World Bank describes an early attempt to integrate forestry into a government planned "people-centered" program. It was a project designed to include village woodlots in a government implemented rural development scheme in Maridi, Niger:

> In Niger, a Bank financed rural development project, which included the establishment of 500 hectares of village woodlots, failed, because, as fast as the trees were planted, the people either pulled them out or allowed uncontrolled grazing to take place. The main reason for this, was because they themselves had not been involved in formulating the project and because they perceived the village woodlot area as a traditional grazing ground, access to which was now precluded because of the project. (Spears, 1978 p 4).

In Upper Volta an FAO project was designed to get local participation through the local village chiefs. An evaluation as to why villagers failed to maintain the woodlots they had planted concluded that villagers knew little of the project before being told by their chiefs when and where to plant the trees, had not been involved in any project decisions, and had little belief that the benefits would accrue to them. (CESAO, 1977).

In Senegal, foresters directed local residents to plant and maintain trees at the edge of a forest reserve. Residents were given the seedlings, forestry lands were made available for planting, and residents were told they would benefit from use of the matured trees. Foresters described the residents as uncooperative and recalcitrant when it became apparent that they were purposely destroying the trees. But one resident clarified the reason for the villager's actions when he remarked (out of hearing of the foresters) that he no longer had the problem of leaving his fields to tend the trees as no one could expect him to come this distance to care for dead trees. (Hoskins, 1979).

Several West African woodlot projects have failed even after they were planned with local village men who willingly planted the trees. These failed

because they were located in regions where women traditionally do all crop maintenance tasks. Since women were not involved in the project the trees died from lack of care.

Each of the examples above were planned to "benefit participants." One was implemented by government services, one by village chiefs, one by foresters, and one organized by a local group but requiring input from another. If participants feel their land, their labor, or their time is being improperly used, and if they do not recognize the "benefits" as being important to them, experience shows woodlot projects requiring continuing vigilance and care will probably fail.

To get residents involved in original project decisions is not always easy. Expatriate project designers in Upper Volta, in Chad, and in Niger tried to get local involvement in site selection without much success. Residents were reluctant to make land-use choices and many responded that their village chiefs should make those decisions. Several project designers have concluded that it is important to have an extension agent working with villagers during the design as well as the implementation stage of the project to help identify and incorporate community interests, and to help assure participants of receiving benefits. (Weber, 1979).

Integrated Resource Planning

In Africa, where there is a great deal of contrast in ecological niches, integrated resource planning is particularly important. This relates to all aspects of planning including regional, national, and local transportation as well as fiscal policy and land and water use.

The FAO team in Senegal (early 1979) found that even in that one country shortages of fuelwood were not only regional but almost village-specific. This type of uneven distribution requires careful evaluation of transportation systems and fiscal policy. One project manager in an area with a plentiful wood supply discussed the fact it was easier to export charcoal by boat to France than to send it by truck to regions in the same country which are in urgent need of fuel. (Hoskins, 1979). CILSS experts discuss the potential for salvaging wood which would otherwise be wasted. They point out that in the Ivory Coast 500,000 hectares of forests are cut for planting each year for an estimated yield six times the amount of wood used yearly by the total population of the Sahel. One planned dam project in Selegue, Mali alone will flood enough forest lands to have provided Bamako fuel needs for six years. Salvaging this wood and delivering it to areas in need of fuel would take regional cooperation and coordination and might require an upgrading of transportation systems. In some countries the lack of coordination of price controls, taxes, and subsidies combine to encourage environmentally disastrous practices such as exporting wood and charcoal while importing other fuel and denuding the countryside. (KiZerbo, 1979; Brokensha, 1978; Hoskins, 1979· Earl, 1975).

Where land is under great stress and farmers have a difficult time in both filling the pot and cooking from the same piece of land, there are other

types of regional and local resource management decisions. Donors insist that these hard moral choices be made and upheld by host country governments and by local residents. Donors cite examples where wavering support for these decisions by the government meant disaster for long term efforts. For example, in Morocco terraced hillsides developed over many years were destroyed almost overnight when the government quit controlling tree-cutting; in Matameye, Niger a formerly protected regenerated area was declassified with no management plan, the result was a quick reversion to its former unusable state. Donors also cite examples where government failure to act has resulted in completely stopping implementation of a project or in poor results. In one West African country a USAID team worked with government officials to plan a government requested forestry project. It has been twelve years since the project was implemented but in all that time the officials, who designated land to be planted, have never actually moved out the residents or incorporated them into the project. Because there was no clear land management plan, neither the farm crops nor the trees on this land are doing well. (Weber, 1979). A number of donors, especially FAO foresters, suggest that more African countries could allow residents to participate in selecting management options for park and reserve lands to facilitate the most advantageous use of limited land. Donors frequently insist that until detailed studies are made and integrated resource management plans are designed, it is useless to start large scale forestry programs. (Ulinski, 1978).

At the local level integrated resource management decisions also need to be made. This is especially true for forestry projects which require long term

commitment of land. Communities need to consider their current and future needs for food, for fuel, for animal feed, for income, and for other purposes and, giving consideration to their land and water resources, make wise decisions as to where their forestry projects should be located.

Several African governments have taken steps to give local residents more responsible roles in local land management. For instance, the government of Senegal is in the process of implementing a new land reform bill giving land ownership to the national government and control of land use and tax money with which to develop projects to local communities. Foresters and other technicians as well as national and local leaders speak optimistically about future community participation which they feel will be stimulated by the new legal structure. They report that other African governments have shown interest in observing the results of this approach as they discuss their own future land reforms. It appears to be more compatible with many African traditions than Western models. A village approach with strong national control has been used in Tanzania, but though forestry is designated an essential part of land use planning by the national government, local communities have not yet set aside much land for forestry activities. (Muzava, 1977).

CILSS has stressed the need for more emphasis on integrated planning at all levels and UNICEF and the World Bank have made provisions for supporting local efforts in integrated resource planning. (See Diallo, 1979).

Interagency Cooperation

Donors have pointed out a related problem, that of lack of cooperation between various agencies. As long as the forestry programs were based on commercial production there was little need for forestry services to seek ways to work closely with other services. This cooperation will be difficult to develop given the current systems in many countries. In Upper Volta the regional development organizations work independently of the ministries where forestry is represented. In Senegal and Benin the parastatal groups emphasizing agricultural production often have worked in competition with the local governmental organizations. In Tanzania some governmental ministries stress agricultural production at the expense of tree management. In the 1979 CILSS meeting in Niger, participants commented that it was the first time the chiefs of the forestry and of the livestock services had met together to talk about common problems. Agriculture and extension schools seldom teach forestry, and forestry schools include little if any agriculture and extension. One extension official watching a forest fire in Senegal remarked calmly that forest fires were not a problem of the people, only of God and the forest service. The World Bank and FAO have stressed interagency cooperation as being one of the most urgent problems to FLCD success.

Forester Commitment to FLCD

The very fact that foresters carry guns demonstrates to donors and participants alike that the current emphasis of forestry services is not community

development. They say project proposals are seldom community centered. There are also other examples donors give to illustrate forestry decisions are often not people-centered. For instance, in Burundi, in Mauritania, and elsewhere where there is tremendous land pressure and need for fuelwood, there remain protected stands of aging trees. These could be productively managed for the benefit of local residents. Foresters in Burundi discuss with donors their concern over protecting seedlings in government nurseries from theft by local farmers rather than seeing this local desire for trees as a potential for an extension program. (Weber, 1979).

Some donors also complain that expatriate and host country forestry officials alike are thinking in terms of high technology support which donors believe is inappropriate to FLCD. One related issue which is frequently raised is the forester's insistance on barbed wire for tree protection. This was not such an important issue when forestry was focused on limited numbers of large scale plantations. But now that the need for fuelwood is recognized as widespread and urgent a major approach is to plant many small plantations at the village level. The cost of surrounding all these individual and small groups of trees with barbed wire rather than fewer more contained units is staggering. It is apparent that if projects rely on barbed wire they will always be limited to the "model project" approach as donors will never be able to cover all of Africa with enough barbed wire. Donors feel foresters have not put enough stress on developing technical packages that are economically viable for FLCD.

Donors sometimes complain that foresters do not see the potential role of the villagers in the new forestry. Foresters in Senegal say repeatedly that women cannot be involved in forestry projects as they do not and cannot plant trees, when Senegalese women have traditionally raised crops as well as planted trees in the courtyards of these foresters' own homes. Several evaluations of FLCD programs in Upper Volta indicate forestry technicians did not inform or educate villagers about the projects or follow-up with technical support or information after the seedlings were delivered. Donors report further that foresters are yet to view trees as a long term crop or as an extension of the simple courtyard plantings to be used by local people to answer basic human needs. The forestry services and technicians, on the other hand, faced with these criticisms, have a different view of problems in implementing FLCD.

FORESTRY SERVICES AND TECHNICIANS

When host country forestry officials and technicians discuss their frustrations in implementing FLCD projects, their comments often fall into four main topics: funding from donors and government budgets, donor expectations, land-use issues, and community participation.

Funding

Foresters are quick to point out that while donors and others speak theoretically of FLCD, foresters expected to implement new programs are often handicapped by lack of funds, transportation, materials, and appropriately trained personnel. Forestry services are generally given much smaller budgets than agricultural

services and may be severely handicapped in joint projects with these and other services. They point out donors have made limited funds available for forestry especially in support of local firewood needs. They feel important projects are delayed by donor requests for extensive research proving there is a need, measuring extent of need, or calculating speed of desertification instead of starting to deal with obvious and urgent problems. (Ulinski, 1978).

Foresters who are criticized for not effectively informing villagers of projects may lack working vehicles. When seedlings arrive late it may be that the local forestry service had to share a truck with several services, had no gasoline, or had to service a large region during the short planting season. They may lack personnel to educate villagers or materials to implement new programs. Donors who willingly invest in large scale forestry programs may not offer funding for appropriate FLCD education or basic logistic or infrastructure support.

Foresters indicate expensive investments may be needed. They state that certain soils require deep plowing for adequate growth of trees. They point to project after project in which animal damage from non-local herds has discouraged local residents from tending their trees, or areas in which the chief owns the animals and will not cooperate in controlling them. They say there are regions in which there are no local shrubs to use as protection and they know of no substitute for fencing. (Hoskins, 1979).

Both top level forestry service officials and local foresters bemoan the fact that the European based forestry educational system and working structure does not allow merit rewards for lower level agents who work well in FLCD programs. Due to the permanent streaming into A, B, C, or D level forestry training and salary schedules it is difficult to reward para-foresters or those who have adequate technical training for village forestry or take specialized workshops but have not attended more advanced educational facilities. Top level forestry officials in several African countries say they would like to see an examination of the total forestry educational system with the possibility of basic reform. (Hoskins, 1978, 1979).

Donor Expectations

When foresters discuss donor's interests in FLCD they point out that most donor budgets are based on two-year projects and community development forestry actions are necessarily long-term projects. Donors who require results within the two-year period defeat the possibility of slowly building a lasting village level capability in forestry. Forestry officials also point out that though the FAO has shown interest in this approach it has little funding to implement projects, and that the World Bank can offer only soft loans but no grants to support its interest in building infrastructure and local capability. CILSS country officials comment that they have program proposals for FLCD type projects no donor has offered to fund.

Land Use Issues

Foresters, like donors, feel the need of national and local resource management decisions supported by national governments and local residents. They feel paralyzed by lack of lands dedicated to forestry projects. For example, in 1978 the USAID design team to Niger mentioned the desire to do community forestry. The foresters threw up their hands and just asked, "Where? Where!! Where??" (Weber, 1979). In Senegal when foresters tried to plan projects in the national forests they found residents unwilling to travel the required long distance from their fields though there was no closer land available. Foresters feel caught between donor requirements, and local residents' needs. As one report commented, there really is no humane way for a local forester to protect a sapling when it is the only available fuel for the evening meal.

Community Participation

Foresters, like donors, discuss the problem of getting local participation in forestry projects. A Tanzanian forester found that after twelve years of community approach to forestry, villagers are "still unable to understand tree planting" or "to make management decisions." (Muzava, 1977). In many projects foresters get local cooperation in planting trees but say villagers may believe that further tree care is "up to God." (Winterbottom, 1979). Foresters frequently say the fault is with the local people who cannot understand the need nor learn techniques for growing trees. Senegal foresters say they do

not even want to risk expensive seeds for backyard nurseries. Villagers, however, often see their problems with FLCD differently.

VILLAGERS

Villagers complaining of problems with forestry projects focus on four main issues: timely and adequate project support from forestry or extension services, limited local and personal resources for fulfilling all basic needs requirements, confidence in the potential success of tree planting programs, and assurance of gaining benefits from participation.

Seldom are villagers asked to describe forestry projects from their point of view. This was done, however, by CESAO in an effort to understand the poor survival rate of trees planted in an FLCD effort in ten villages of Upper Volta.

Interviews with residents showed they were quite aware of forestry issues. They described the loss of local vegetation and were concerned about growing shortages of fuelwood, building poles, and trees which gave food for man and animal. They believed that trees increased the rain, protected the soil, and gave needed shade and were therefore necessary for a good environment.

But the tree planting project in their village did not seem to relate to these issues. The project started with government officials telling certain village chiefs that their villages had been selected for woodlot projects. The chiefs were asked to select the land, organize the villagers, and manage the

tree planting. The trees came late, many were small, some were dead, and others died when there was little rain after the late planting. Neither were they the species villagers wanted. Villagers were promised food, materials, insecticide, and extra seedlings for personal use. Most of this did not come. Few of the trees originally planted lived. Villagers were disheartened.

In discussing basic needs in the community, people mentioned that there were things more urgently needed by them than forestry products. They stated that unless they could have water, health care, education for their children, jobs for their young adults, and enough food and income to keep their families together, it did not matter if they planted trees for the future.

About future projects, some villagers wanted to start nurseries so they could have fresh plants in time, and select species that interested them. Several residents suggested that given their bad luck perhaps they should leave it to "the good Lord." One suggestion was that since tree planting was new to them, small experimental plots and subsequent study of the results would be appropriate before investing large amounts of time and land

When asked who would benefit from trees that lived, residents gave various answers: the government, the forestry service, the village chief, or the foreign project designer; yet others were unsure or unwilling to hazard a guess. Few thought they would receive any wood after harvest. (CESAO). These answers were similar to those given to the FAO team in Senegal. (Hoskins, 1979). (Also see Brokensha, 1978; Digernes, 1977; Winterbottom, 1979).

These woodlots are not far enough along to examine actual benefit distribution. But some that are, support participant belief that participants may never receive promised benefits from projects. For instance, a ten-year old stand of trees in the Maggia Valley of Niger is ready to harvest. The forestry service wants to increase the number of woodlots throughout the country but has no funds with which to do this. It is, therefore, harvesting the trees from these first woodlots to sell the poles to earn enough money to start woodlots in other areas and is giving the branches to residents for fuelwood. The local people feel cheated as they only get the refuse when they had been promised it all. (Weber, 1979).

Problems of forestry product ownership have been the most difficult for local residents. The Hausa have even invented a term for "being taken by" development projects. To discuss community project lands they say, "land that has become dawan goma (i.e., governmentalized)". This carries the connotation that its use is now lost to local residents - they have been had.

SUCCESSFUL PROJECTS

Each group of actors in FLCD, donors, foresters, and village level participants, express frustrations over constraints to the success of woodlot projects which they consider beyond their control. However, despite all these problems there are projects that are reported to be going well. These range in size and approach.

In general the FLCD projects are modifications of one of two types of approaches to forestry programming; the integrated and the special project designs. In the integrated approach, the designer starts with a community and designs the various projects to fit the needs of that community. When properly run this can produce exceptional results. The second is to offer one or several forestry project packages, such as support for woodlot development, and find a community which could profit from this type of project and then mold it to fit the circumstances of the specific community. This can also be effective when flexibility is built into the design.

Integrated Approach

An example of what appears to be a successful integrated community development project is at Labgar, Senegal. This is a mixed community,

largely Peul, semi-sedentary pastoralists. In this community the pastoralists have participated on a voluntary basis to plan and carry out a forestry component of an integrated community development program. This example has the following elements:

1. An outside funding organization committed to integrated community development approach.

2. Senegalese project director experienced in extension and government agency functioning who lives in the region.

3. An indepth sociological study of the potential development of the region.

4. Self-selection of the village by positive response from residents of the area, many of whom live scattered around Labgar.

5. A woman extension agent and later a forester residing in community.

6. Open dialogue between the director, the agent, the forester, and the villagers.

7. Priorities chosen by area residents. Residents offered to provide labor and the donor organization and the government helped provide material and personnel. The projects were: a well with a pump, a dispensary with a nurse, a teacher for the school, and technical and material support for establishing a women's garden.

8. Identification by the villagers of problems that still existed for them, and made them dissatisfied with their current life-style

as compared to life before the drought. They reported they had less food, less income from gum arabic, and their small animals were not as healthy.

9. Selection of a project with the help of field trips to see possibilities of tree planting and with the assurance they would own the trees and could not be punished by the forestry service for accidental animal damage to the trees. They selected the species from information provided by the forester and from past experience. They selected species to provide fodder, shade, income, building poles, and firewood for future needs of this growning community.

10. Time and lab or scheduling with the forester. Villagers prepared soil ahead and at the appointed time, the first rain, herders came from many miles around. Men planted the trees while women carried water. They planted the area and chose to increase the area planted the following year.

11. Many neighboring villages have requested similar projects.

This project had elements in which local community residents defined their own goals and priorities and the extension agent and forester acted as facilitators. The woman extension agent took the interests of the women as well as men into account and both participated in the project design and expect benefits. There was follow-through and flexibility especially with the facilitators living in the community.

Project Package Approach

A second type of project, also in Senegal, is much more common. A parastatal group (SODEVA) designed to increase peanut production, discovered that the carrying capacity of the soil was decreasing and that planting trees was necessary for soil fertility and for local fuel use. There was, however, a serious shortage of seedlings. SODEVA officials decided to support individually owned backyard nurseries to provide needed seedlings. A female extension agent and a male forester contacted various groups, including women's groups in several villages, informing them of the possibility of operating nurseries and presenting the technical and labor requirements and potential risks and benefits. Women in Ngodiba, Senegal chose to take this as a project, planting small nurseries and selling the seedlings locally. Women found it profitable and plan to continue in the following years. Both individual and communal woodlots have been started in the region and both women and men participate.

The key to this type of project is an appropriate technical package being presented with appropriate extension methods and forestry being a felt need in the community. This project also has the advantage of a female extension agent interested in both men's and women's roles, of a forester giving technical support, and of the necessary material support.

Both model projects were based on the participants selecting the program, setting up the work plan, retaining the benefits, and on continuing

support or follow-through. These elements can be part of any project by building them into the original design in the form of a project management plan or agreement. (Descriptions taken from Hoskins, 1979b).

III. TRANSFORMATION

The next step after wood is produced is transforming it from a tree to usable fuel with as little waste as possible. Not much attention has been paid to examining this step, yet fuelwood production is only as effective as the amount of fuel that arrives at the hearth and the amount of food it cooks. Several issues involved in more efficient harvesting, charcoal making, transportation, and drying and storage, relate to potential programs involving community participation and to protection of community interests.

HARVESTING

Traditionally, most fuelwood harvesting is collected for the family by women breaking dead branches from trees. Men help in some areas where larger logs are used for fires, and where women have used all locally available branches and wood must be brought from greater distances. When dead wood is no longer available, trees may be killed by girdling, by chemicals, or by fire made selectively by piling branches around the base of a selected tree or less selectively by burning larger forested areas. As pressures increase women substitute millet stalks, peanut hulls, dung or other agricultural products which have important alternative uses, or they may even use saplings or fresh branches from fruit or nut bearing trees. (See Ernst, 1978; Brokensha, 1978; Digernes, 1977; Fleuret, 1978).

Even the traditional collection of dead branches wastes potential fuel as the logs are frequently left to rot before they can be hacked into usable size

pieces with locally made hatchets. The burning and use of saplings or green wood further reduces the potential energy supply. Donors have suggested that commercial harvesting should be encouraged to salvage trees from projected dam sites or other land clearing. These could be extended to salvage wood from less inhabited areas where dead trees from the drought are still visable in large quantities. Reports from Nigeria, Sudan, Kenya, and Upper Volta discuss various commercial enterprises which collect and transport wood. These vary from the Voltaic example of women collecting wood and selling it to truckers, to the Sudanese example of armed landless gangs stealing trees and leaving large regions denuded. (Morgan, 1978; Digernes, 1977; Brokensha, 1978; SAED, 1976; Powell, 1978). Some of these examples illustrate the need for care in introducing more high powered tools for harvesting or organizing cooperative or other commercial ventures without adequate protection of people living in areas to be salvaged. However, waste in current harvesting practices due to lack of effective tools, commercial organization, marketing supports, and transportation is clearly a field which deserves more thought.

CHARCOAL

Charcoal making is a subject on which there is much emotional controversy. Opponents say it is very wasteful to turn wood into charcoal, proponents say charcoal is used more efficiently than wood since it is used in stoves, etc. Moderates point out that there is an energy cost in transportation and that, depending upon the area, there is a breaking point of about 75 miles from the

source where transportation energy costs of the heavy and bulky wood balance the energy loss in making charcoal. Part of this is technical and will not be treated here. However, a number of reports have stressed that in areas where charcoal is made improved techniques in charcoal production can reduce waste. (See Brokensha, 1978; CILSS, 1979; Earl, 1975; Morgan, 1978; Hugart, 1979). This can be done not only by more complete use of trees, including using odd shaped pieces of wood and sawdust, but by more efficient techniques of charring the wood and lessening the number of accidents caused by kiln cave-ins and explosions. If making charcoal more productively is to be an FLCD project, it has to follow the rules for community development by starting with local participation from the beginning. In many parts of Africa, charcoal is made only by a specific caste working within long standing organizational structures. These structures must be understood thoroughly before changes can be productively introduced. In many areas where charcoal is made, the need to conserve wood is not recognized by charcoal makers and conservation techniques may appear to them to be simply restrictions on their economic freedom unless improved marketing or other incentives also can be introduced.

In one African country a charcoal project which was designed to change local behavior has aroused a great deal of antagonism and has failed to gain local support. It was designed as a two step experimental program. The first step was to develop a less wasteful charcoal technology. The second step was

to form cooperatives of charcoal makers eliminating middlemen and making sure the cooperatives would employ conservation-wise techniques. The project designer began his program with the support of the forestry service by: 1. issuing licenses to limit the number of charcoal middlemen who hire charcoal makers and who control the transport and sale of charcoal, 2. limiting the number of charcoal makers who can work under each middleman and, 3. restricting the area in which wood can be collected. This cuts down on the wood being used to make charcoal, but it also threw several hundred local people out of work. The project director then re-hired a few of the charcoal makers to help experiment with old and new techniques of charcoal making given by the middlemen. The charcoal produced in these experiments is sold on the market at a subsidized price and thereby undersells the traditional vendors.

During the experiments, a technician designed a kiln which is not as expensive as many kilns, and which accommodates various sized pieces of wood and makes charcoal more efficiently. The project director has written an evaluation which reports the technical stage of the project has been successfully completed and they will now start the second stage that of disseminating the technology.

However, before the project goals were designed there was no thorough study to understand the social realities; the positive as well as negative role of the middlemen or their relationship with charcoal makers, or the traditional organization of charcoal makers themselves, or the perceived need for a new technology. Charcoal makers had felt no pressure of a limited wood supply until new prohibitions were introduced in connection with the project. Even if the new kiln design is cheaper than many others, the traditional way of making charcoal under a mound of clay involves no investment. It calls for no fixed equipment thereby allowing one to make charcoal wherever wood is gathered. Local residents discussing this project report that many middlemen and charcoal makers who were put out of work by the project's licensing procedure are very angry at the project and several have started forest fires in the protected areas. Even those who have licenses are angered at having to compete against project-subsidized charcoal. Although the technical aspects of the project may have been successful, the community participation and the use of the new technology aspect of the project was not well designed in terms of social reality and the results seem doubtful. (Hoskins).

TRANSPORTATION

Transportation is part of the total resource planning at the regional and national levels, discussed elsewhere. At the local levels one type of project is to introduce carts for village women to use in collecting wood. This can be done as part of an effort to lighten the work load of women so they may have more time to participate in such projects as woodlots or nurseries. It may also relieve pressure on closer overused lands, on areas where there is an attempt at management or protection, or encourage use of more distant deadwood instead of closer less suitable fuels such as live branches, saplings or dung, etc. In some areas in Upper Volta where carts have been given to women partially for fuel collecting purposes, women who have not traditionally used carts have lost control of them to their husbands. Where the husbands have used the carts to collect wood, the purpose has not been defeated, but where the men use the carts for other purposes leaving women to find fuel as before, it has. Where carts are introduced in these projects it must be with knowledge of the local wood collecting patterns and potentials.

DRYING AND STORING

Another issue to be more thoroughly examined is wood drying and the protection of wood and charcoal from water in the rainy season. Wet wood is reported to be up to 20% less energy efficient than dry wood and residents in many areas remark they know wet wood is not good to burn and only use it when they have no choice. Charcoal, which attracts moisture even more than wood, is also less efficient when wet. Solar driers and enclosed storage

areas have been suggested. However, in many areas where villagers lack sufficient grain storage and have no solar driers for drying grain or other foods, drying and storing wood and charcoal may receive a lower priority. The gravity of this problem varies in differing regions according to humidity and availability of suitable wood.

The encouragement of new harvesting techniques or organizing wood collecting businesses, making charcoal, transportation of wood and charcoal, and any projects relating to storage would all be very area specific but fall within a national energy plan.

IV. UTILIZATION

Planting trees is important for future wood supplies, but the introduction of fuel saving stoves could have an immediate impact on available fuel. To date there has been relatively little donor interest in wood stove improvement in Africa and stoves that have been tried have had negligible success. Perhaps the lack of interest is due to the lack of glamor of a mud stove compared to more complicated but probably less appropriate or more technologically advanced innovations. (AID, 1978).

OUTSIDE-IN APPROACH

There have, however, been several projects of stoves having been introduced into various African countries sometimes with raving success notices, but without major long-lasting impact. (Draper, 1977; AID, 1978). This is because the OUTSIDE-IN APPROACH IS NOT WORKING. There are examples of large scale government programs to introduce new stoves being declared successful in saving half or more of the fuel in laboratory tests. For example, in Ghana a model of a "smokeless stove" recommended by the Canadian Hunger Foundation and Brace Research Institute and presented in an FAO manual was introduced by the Department of Social Welfare and Community Development in the late 1960's. The stoves "had been adapted for African cooking" and were made of locally available scrap metal and hard-baked clay tile, brick, or masonry. Stoves were built in women's training centers and in the homes of women involved in women's groups and women were told they would save 50% of the fuel. By the

mid 1970's, interest had completely waned when it became apparent that women were no longer using many of the stoves. Women complained the stoves required larger pieces of wood than those found locally, the stove surface was too high for stirring the large pots for their traditional dish and the holes in the stove were too small for large pots and too large for small pots. When the women did not tightly cover the unused holes in the multi-holed stove surface, or when the pot did not fit the hole, there was smoke in the room, the pots became dirty, and the stoves used more, not less, wood. The researcher evaluating this project remarked that dialogue with the women on the stove design prior to construction might have prevented many of these problems. (Martin, 1979). This was evidently not done although the Canadian Hunger Foundation stresses the need for local participation in its handbook. (Canadian Hunger Foundation, 1976).

FLCD APPROACH

In order to apply the FLCD approach to the introduction of stoves it is important to isolate some of the problems which have handicapped the adoption of fuel saving stoves. Many reports simply say that new technology must be taught, that extension services have been ineffective in selling the new ideas, and that traditions die hard. But all these criticisms may have focused on the second stage, the dissemination stage, before the experimental process has been completed. Many projects appear to be weak in four fundamental elements in the original stove

designing process: failure to identify actors and their roles in developing stove designs, failure to establish criteria for introduction, failure to identify physical and social reality and the trade-offs and risks presented by each change, and failure to establish effective criteria for evaluating "success".

Actors and Roles in Stove Design

If stoves were being designed for researchers in laboratories then there would already be many stoves which successfully fulfill all artistic and technical requirements. However, the scientists sometimes forget that the primary actor, the audience which ultimately approves or disapproves the design, is the person with the greatest expertise - the woman who cooks every day. It is a major failing of scientists not to recognize the cook as an essential part of the cast of research experts. The second group of individuals who will evaluate and participate in the successful adoption of a stove design are the women leaders, the extension agents, and sometimes local officials. These are the essential salesmen who need to be brought in as part of the research team. They are also judges of a successful model. A third group who may be involved are the local artisans. If a stove design requires metal work, masonry or changes in sizes or shapes of utensils it may be up to the local craftsmen to help design these changes within local capabilities and be ready to make repairs and alterations. They are also experts and in that role can have valuable information which is frequently missing in developing stove models.

In one African country there is a "demonstration" of solar cookers which is being publicized as a grand success in which the women were not given experimental roles - only demonstration roles. In demonstration sites women dutifully put on demonstrations of cooking on these stoves when teams arrange to come by. When an unannounced team came to one site, they found the stoves locked in the warehouse. Had the project been designed so that there was a method for the women to freely present their ideas, they would not now be becoming increasingly frustrated in their role of posing for pictures in front of a badly adapted bit of technology and the donor would not risk embarrassment and anger when it discovers the highly publicized stoves are useless.

Criteria for Stoves

When stoves which fit laboratory or "Western" standards of improvement are brought to Africa, they frequently lack the bare minimum of usefulness in the African setting. Before a design leaves the laboratory it should be tested for its basic utility for specific areas. If it cannot hold the heavy pots, cook hard grains into mush for lengthy cooking periods, or perform the basic requirements for a certain locality it should not even be introduced. This sounds like a self-evident requirement, however, it is frequently not done. Solar cooker specialists have been even less socially aware than wood stove technicians in their requests for women to stand over pots stirring their slow cooking foods on stoves which are uncomfortably hot to even approach in the African sun, or which take 1 1/2 hours to cook a soft boiled egg. They frequently suggest that

women can easily cook in the daytime instead of the evening without noticing that during the day the women are working in the fields and need that time to grow the grain to fill the pot. However, wood energy specialists, too, would save a great deal of grief if they looked at the purposes for which the three -stone stove is used. If they had tried cooking in 1 1/2 ft. tall kettles, constantly stirring mush for ten people with a large wooden paddle, they would not suggest waist-high wood stoves (unless they also added step-stools), flat bottomed pans (which burn around the edges) and lids (for foods requiring constant stirring). One report chided a woman for using a stove in a wrong and wasteful manner because she left the front open for heat in the room while she cooked on the top. Since the need in that community was for heat as well as cooking, then the stove was not being wrongly used, it was simply the wrong stove.

Identify Physical and Social Elements and Trade Offs

The realities of the physical elements, the type of wood (size, shape), the size of the pot or pots (not just how many people are in the family because the situation may require extra for unexpected guests or left-overs for breakfast), the stove or stoves used now, the food to be cooked, the process used, the place and time cooking is done, etc., are all elements of the situation which should be known at least at a general level. A 1979 CILSS report gives a useful outline of physical elements involved in cooking in the Sahel. (Lepeleire, 1979). Each of the physical elements relates to social realities. Someone gets the wood

and breaks or chops it into pieces as part of a routine task. Each time a physical element is changed, one or more social elements may be affected. For example, in the illustration of the stove evaluation in Ghana, the stove required larger pieces of wood. The woman who collected the wood was not willing to walk the extra distance for this type of wood when there were adequate pieces of wood for a traditional fire nearby. This then, is a trade-off; a trade-off which this woman was not willing to make. When introducing a potential stove design the scientists should explore with other actors in the experimental group all the elements that can change and the resulting trade-offs and risks. Will the woman want to use the stove when the local supply of wood is gone and all fuel is the same distance? An excellent description of some of the social requirements for stoves and the attitudes women in the Sahel have toward the advantages and disadvantages of the traditional three-stone stove is given in a 1979 CILSS report by a Voltaic woman sociologist who discussed these issues with Voltaic and Nigerien women. (KiZerbo, 1979). These studies give basic information which can help clarify the real trade-offs in changes in stove design.

One frequently hears questions like, "If you had a stove that used only one-half the fuel you currently use, would you cook on it?" This is not the real question. The question might more accurately be "If you had a stove that used less fuel would you be willing to chop your wood into 8-inch lengths, control the damper, and clean the flue?" Technicians are not in a position to evaluate these types of trade-offs. Only if the woman is given the necessary information

will she be able to make an accurate evaluation of a new stove's potential for being adopted. Any time a new technology is introduced questions such as who benefits, how, who pays, who maintains, and who introduces, should be considered. (Tinker, 1979, p 27).

If the scientist wishes to evaluate the trade-offs, he should be realistic about the possible benefits and risks. Women have been using the three-stone stove with various innovations in many areas of the world for a long time. In Africa there are local modifications of stoves already in existence for purposes of brewing beer, roasting meat, drying salt, frying cakes, etc. It is especially the long slow cooking of large quantities of grains or roots for which the three-stone stoves (sometimes with minor modifications) have proven so satisfactory to African women. The fact that Africans are estimated to use only .6 M^3 of wood a person a year shows they are already using wood more economically than it is being used in many areas of the world. Recently, some scientists and experimentors are beginning to doubt the wastefulness of the three-stone stove. Yet other reports suggest that fuel usage could be out to .3 M^3 or even .2 M^3 if a certain stove is adopted. Until this is well established in the field, it would be dangerous and misleading to present it as a proven fact.

Criteria For Success of Experiment

One of the issues connected with all projects is that of what (and when) is something successful. In FLCD terms success relates to local people solving

their problems in a way that makes them more in control of their environment. It has nothing to do with BTU's produced in a laboratory. The test for a cookstove is not made until it is established in a community cooking one or more types of locally consumed food. If it solves a felt need in a way that is economically and socially affordable it will be adopted and its use will expand.

Throughout a large part of Africa one sees stoves used for charcoal. How is it that charcoal stoves have caught on where wood ones have not? One might guess that since charcoal is more expensive the women using it could afford a stove, or would want to make it go farther by using a stove. However, when cooking large pots of traditional slow cooking foods the same women who use charcoal stoves for smaller more quickly cooked dishes will often still turn to the three-stone fires. The charcoal stove fulfills some but not all needs.

The same can be said for the bottled gas stove subsidized in Senegal by the government to relieve pressure on wood in the urban areas. This has not been successful, and officials frequently say women are too fixed in their ways to try new technology. One conversation with the wife of a forester, however, brought out the fact that the stove, similar to an apartment gas stove in Europe or the United States, was useful for coffee water or even rice. However, it would not work for the large pots of millet mush cooked locally, mainly because the four small burners did not hold the huge kettles well and heated the mush in the center of the pan too hot and heated the rest of the large quantity too slowly.

This woman suggested a large burner in the center of the stove which could be used for middle sized kettles. For the largest size kettle used for celebrations, all five burners could be lit. She felt that if the stove were not so high this new burner design would be accepted by women. The smaller bottled gas stoves were simply too unstable for the large kettles, but could also have been modified easily had designers consulted the women.

Although the three-stone stove is used as a symbol of a united family, this emotional factor has not stopped women from using alternative fireplaces for specific purposes. They also alter the three-stone fireplace by putting rocks or earth between two of the stones when there is wind, etc. Women are willing to experiment with new stoves. If a stove really saves up to half the daily fuel or more and does not require undesirable trade-offs, what woman would choose the extra hours of hauling wood?

An experiment is successful when it solves local needs, and at this point women will want to use it. Now it is ready for the demonstration and dissemination stage. However, the experimental process should still continue as an impetus for further improvement and for flexibility in introducing the new stove in differing environments. It becomes a support for effective demonstration and dissemination. Any attempt to introduce stoves without first completing proper experimentation in the village milieu is premature. When the stove is genuinely useful it will quickly be adopted. If, however, a stove design is found to be completely unsuitable, the experiment is still successful as an experiment if the reasons are documented and if the design is not forced on the unwilling women.

V. ISSUES AND RECOMMENDATIONS

A recent CILSS report stressed that the basic goal of CILSS countries to become self-sufficient in food production is meaningless without sufficient fuelwood. A woman in the peanut area of Senegal echoed the same sentiments somewhat more dramatically when she said, "One can starve with a full grainery if one has no fuel." Since the top-down approach to forestry has not succeeded in supplying the fuel needs to the cities and rural areas of Africa it is time to make a serious effort identifying issues and make recommendations for techniques to overcome some of the problems FLCD has faced up to now. In the area of fuelwood production, transformation, and use, the main problem is how to insure local participation from the beginning to the end of the project, and how to provide appropriate technical and managerial support to assure programs will be successful and will benefit those who participate.

PRODUCTION

Including local people in the design, the implementation, and the benefit sharing aspects of fuelwood production projects raises a number of issues which were not considered important in industrial forestry. It calls for reorienting goals and expectations, and re-designing training, technical packages, and managerial supports, as well as a new type of commitment on the part of donors, technical support agents, and local residents. Currently there is a great deal of frustration within each group, with each stating that success or failure of projects is out of their control.

There is a need to underscore what this new approach offers to each of these three participating groups and what they must contribute in return. There is also a need to examine ways in which these rewards and responsibilities can be made clear from the beginning of the project.

Community Level

The basis of FLCD is community participation. If residents do not participate in designing the project, it risks being inappropriate to address local needs. If they do not participate in implementation, the trees probably will not survive. If they do not participate in receiving benefits, the project is meaningless.

If residents participate in an FLCD program they have the right to help design a program which complements their other essential activities. After learning about required inputs, risks and potential benefits, they may select the best options and expect appropriate technical and managerial support. They have the right to receive benefits they value in return for their work.

The subject of benefits and incentives is probably the most difficult to address but it is the heart of motivating participation. While wood is available as a "free good" it will be difficult if not impossible to interest villagers in projects which are strictly firewood oriented. Technicians will have to develop program options including various species valued in the community, such as fruit or income producing trees, along with trees which supply fuelwood, and perhaps varieties which have multiple uses.

In no community is fuelwood the only need. Forestry programs will interest participants only insofar as they also address other perceived needs such as improved crop production, added food or forage, a source of income, environmental improvement, etc. Programs must also be tailored to the appropriate people depending on local interests, property ownership, land availability, social structure, and work patterns. Sometimes whole villages, sometimes families or individuals, sometimes schools or special men's or women's groups will respond to forestry projects and there should be technical support available to fit their special needs. In any type of program the potential benefits and their eventual distribution should be clearly understood before work begins.

In many countries there are individual or village requests for more seedlings and technical support than the forestry service can currently provide. However, in other areas, the forest service or donors see the need for forestry projects but local residents do not. Foresters may wish to start programs for erosion control to benefit distant areas or fuelwood for urban centers or for future use. If the project cannot be designed so that local residents see benefits they value coming to them, they will have to be offered other incentives. One experienced project designer reports that in harsh environments requiring lengthy growing periods for trees, residents will opt for other uses of time and land unless they are paid for tree planting. (Weber and Dulansey, 1978). However, payment for planting trees may have negative results for a project and for future or neighboring

projects. Participants paid to plant trees may assume that the project manager or government owns the tree and will fail to maintain it; residents after hearing of a project paying participants in a neighboring village may refuse to participate in a community project unless they are also paid.

In Senegal one project paid farmers a small amount each year for three years for each living tree. They found that the survival rate was almost 100% compared to about 20% in another project in which they paid farmers only to plant the trees. In the FLCD concept if residents needed money while trees were growing a payment for living trees could be considered an advance toward the future products. The tree still belongs to the farmer but he has sold a portion of the product (firewood, etc.) in advance such as is commonly done with grain.

In India, a forestry project gave land to unemployed and landless people and paid them to plant trees. Every year the project gave each person who had maintained his trees more land to plant. When the trees were grown the participants received a percentage of the harvest and retained the land. (Eckholm, 1979). Seedlings for individual plantings may be used as an incentive to participants for communal projects.

Food is sometimes used as an incentive. When it is used as a lunch or dinner for workers, it falls within a well recognized African pattern of the host serving a work party. It frees women to participate instead of preparing meals at home, it gives workers added energy and lets them stay longer instead of taking time for the trip home to eat. It can be a unifying celebration for people working together on a common project. But buying a worker lunch is not the same as paying him and may not be a sufficient incentive for long term projects unless the worker is otherwise motivated. When food is used as a payment for labor it is especially valuable to the worker if there is a local food shortage. Otherwise

food should not be seen as anything other than a money substitute for the worker although it may be politically or economically expedient for the donor.

Several countries have volunteer programs which are useful especially for consciousness raising. In Dakar, Senegal, during the Day of the Woman, women planted trees around a new social center. Many countries have tree planting days which work with varying degrees of success. In The Gambia trees were planted along the roads duringa tree planting day. As frequently happens trees near the houses were cared for and lived, the others died. In Kenya there is a program in which city dwellers pay for a tree to be planted in a village and hire a handicapped person to care for it. In Senegal Boy Scouts and some school groups help with forestry projects every summer. Some countries such as Tanzania have minimum community participation requirements which may be used for forestry programs. Efforts to publicize these projects help educate the populace to the importance of trees and environment. However, volunteer programs are only as good as the technical and management supports permit. Results can only be disheartening unless they are planned and organized with care and receive appropriate follow through to ensure their success. The forest service should have the wherewithal to encourage such efforts.

When community members participate in FLCD programs they should consider not only the benefits and supports due to them but they should be aware of their responsibilities in making the project successful. Necessary inputs for both

beginning and maintaining the project required of the participants should be clear and agreed to before the project begins.

Technical Support Personnel

Just as villagers have rights and obligations in FLCD projects, technical support personnel should have the same. Technicians in the field need to find FLCD work successful and rewarding. They have the right to have their position and responsibilities clear and realistic. Donors should appraise the time and funding required to carry out each project so that the forester or extension agent is not left with a program for which there is not adequate personnel, material, or logistic support. A liberal amount, perhaps 20% of each project budget, should be dedicated to education of personnel and development of appropriate materials. Donors should work with national level services to improve communication and cooperation between various support services so field technicians can have needed input for integrated projects.

Forestry service goals and rewards must change. Goals, such as straight rows of tall exotic trees must give way to emphasis on community participation even if the rows are not quite so straight nor the trees so beautifully planted. Technicians have a right to expect personal benefits from successfully implementing this new type of forestry. They have the right to have their formal and academic training and rigid pay structure re-examined in light of this new type of forestry. Agents taking specialized training in community forestry, and working in the field to implement successful projects, should receive merit pay raises.

On the other hand, donors and villagers have the right to expect a new focus by foresters on developing appropriate technical packages employing low cost and simple technology. Donors and villagers have a right to expect needed management skills and supports from foresters, extension personnel, or project managers. If extension personnel are used they may need training in the two way communication expected in FLCD as many extension services in Africa concentrate on teaching rather than faciliting roles and might tend to present programs to villagers rather than develop programs with villagers.

Donors

Donors also have new expectations and obligations when they participate in this type of approach to forestry. They may expect more active participation from both villagers and technicians. They may expect more and better designed project proposals, and more successfully completed forestry projects.

On the other hand they will have to be willing to fund the less glamorous support and institution building required by this new approach. They will have to re-assess realistic goals for their projects and be willing to support more small experimental size projects before embarking on large scale showcase demonstrations. They will have to accept flexibility built into project design and designs which differ village by village and are therefore more difficult to administer.

Project Management Agreement

It is clear that there is a lack of communication, a great deal of frustration, and much confusion about responsibilities by all parties involved in forestry projects. In line with FLCD philosophy, responsibilities and duties of citizens and support agencies should be clear from the beginning of any project. One way of approaching this problem is through a management plan discussed, agreed upon, and signed by all those involved. This agreement, written as part of the project design, will involve local participation and lead to better communication and better planning. Most of the projects which fail do so because one or more of the following six elements were unclear when the project began: 1. identification of participants; 2. long and short range goals; 3. site selection; 4. start-up and maintenance plan; 5. benefit distribution plan; and 6. evaluation plan with feed-back and flexibility potential for altering the program. A written project management agreement could help clarify these project elements at the design stage. The importance of this type of document would increase with the size and complexity of the program but these six items should be considered even if the project is carried on by individuals on their own land. The format and semantics will vary depending upon the country, the agencies involved, the local adminsitrative structure and on the desires of the participants.

Several types of contracts have been used in community development or production projects. One which has been used in Latin America is in the form of an application for a community service award. In this, applicants outline elements of their proposed project in a few sentences, listing all participants, and if the application is approved the award is given at completion of the project.

(Leet, 1977). A second type is used in Senegal by the parastatal production-marketing organization SAED. This is a contract between a group of farmers and SAED in which farmers agree to grow certain irrigated crops according to directives of SAED, maintain the irrigation ditches, and sell all their surplus produce to SAED. SAED on the other hand agrees to give them technical advice, sell them needed fertilizer or other inputs, and lend them an irrigation pump. All members of the group are responsible for debts of any member, and if the farmers default in any way SAED will remove the pump. Although this is clearly an "employer" biased contract it does make requirements of participants clear. One observer found the contract stimulated discussion among community members and acted as a medium for community awareness and participation. (Personal communication with David French, 1979).

A agreement or contract more applicable to FLCD projects is used in the Uttar Pradesh Social Forestry project in India. Called "Proforma Agreement for Village Forests", it is written in formats for either forestry service plantations or village plantations. It gives a seven page description of the purpose of the project requiring only several blanks to be filled in with such information as number of days of voluntary labor villagers agree to provide and the amounts of land donated by the government and by the village. Villagers agree to pay for forestry service inputs but are guaranteed firewood and any profits beyond these costs. This contract requires a mutually acceptable operational and financial

plan to be attached. The agreement is specifically designed for one type of forestry project and has proved to be successful as it is tailored for this specific area where there is strong community organization with a long-standing plan of voluntary community service.

The following is a suggested format for a project management agreement. It is designed to help clarify all obligations and benefit distributions similar to the Indian agreement cited above, as well as to help organize the program. It is designed to be written with local participation. The fact that the large majority of participants may not be able to read does not negate its importance.

Suggested Format for a

PROJECT MANAGEMENT AGREEMENT

1. PARTICIPANTS

This would list all participating members; not, for example, just family heads if women and young people were expected to have input. It might include or limit the possibility of adding others wishing to become participants later because they see the potential benefits more clearly, because they have moved into the area, or because they are young people of the village who have married and established new households. It might establish criteria for participants so that there is a clear understanding of responsibilities and a method of reclassifying those who fail to continue fulfilling their responsibilities.

2. LONG AND IMMEDIATE TERM GOALS

This would not stop as many projects do with the number of trees planted, or even the number of trees living, but would consider the desired impact. For instance, the goals could be to make the community, or a defined group of participants, self-sufficient in home cooking fuel wood in X number of years by planting and maintaining X hectares of X (species) trees each year for X years. This way if the goal of self-sufficiency for fuel wood appeared to be in risk of failure because of increased requirements, etc. steps could be taken to increase the area planted or the species might be changed, etc. If, on the other hand, the introduction of modified cooking stoves reduced the demand for fuel, the species which produce fruit could be substituted, charcoal making could be introduced, extra wood could be sold, or the project modified in other ways. If different groups or agencies have different goals these should be expressed here.

3. DESCRIPTION OF PROJECT

This will include an elaboration of step 2 telling how it is to be carried out and establishing a timeframe.

4. PROJECT SITE

This would be a description of the site chosen, how it is to be used, and any time or other limitations on its use. It is to be signed by anyone who is giving up rights to the land, those responsible for distributing land, and those who will participate in its use.

5. START-UP AND MAINTENANCE

This section would describe needed inputs, identify who is responsible, and establish a time schedule identifying inputs required at a specific time and those that are continuing responsibilities. For example, repair of a water pump may be under the direction of the government water service or a local repair man. If a working pump is necessary for project success then the party who is responsible for its upkeep and repair should be part of the discussion of participant expectations and acknowledge their role if they take on this responsibility.

This part of the plan might be written in a schedule format and copied in a large well displayed schedule to remind participants of steps to be followed. If responsibilities are by group, such as all male participants are to prepare the soil in April, a representative of the male group could sign that part and be responsible for reminding others when it is time to start. This would be signed by any party or representatives of any agency or group with labor, money or material input expected during the life of the project such as the forestry service agreeing to supervise planting or to deliver X number of seedlings at a specific time.

Time	Input	Responsible Party

6. BENEFIT DISTRIBUTION

A. Range of potential benefits (considering possible risks).
B. Formula for benefit division including the time framework (who, when, what, how).

This will be signed by participants and others responsible for the development of the project and for benefit distribution. It will often be important that the forestry service, chiefs, or others who participants fear might want to intervene or appropriate some of the benefits sign, though they themselves are not supposed to be involved in the benefit sharing. This may strengthen participant confidence as well as their actual ability to retain ultimate control over benefits.

7. EVALUATION FORMULA

A. Identification of an evaluation committee.
B. Description of when evaluations are to be made.
C. Description of how the report is to be made, and by and to wl om.
D. Formula for how the goals are judged to be reached, an evaluation as to whether all parties are up-to-date on their inputs, and an evaluation as to whether benefits are being distributed as planned.
E. Prescribed procedure if there are complaints by participants or others, if the evaluation committee feels the program is missing its goals, or for any reason needs to be changed, or if agencies or participants, etc. are not fulfilling their part of the contract.

TRANSFORMATION

The major issue in fuelwood transformation is simple. It is how to limit waste while getting wood from where it is to where it is needed in a way that benefits participants and community residents now and in the future. Dealing with this issue, however, is not simple. It requires regional and national planning of resources, fiscal policy, and marketing systems, and developing local projects within these plans.

Although Ivory Coast officials may be willing to allow residents from neighboring wood hungry regions to salvage trees from newly cleared agricultural land, they may at the same time need to address the issue of their disappearing forest reserves. Although Kenyan officials may want to subsidize imported fuel while they control the price of wood and charcoal, they will want to control wood smuggling into neighboring countries before large areas of their country are denuded. The idea of organizing harvesting cooperatives to salvage unused wood is excellent as is the introduction of more efficient charcoal making. However, new technology and organizational structures for marketing wood in large quantities must be done not only with the good of the workers and consumers of wood in mind but also with respect to local custom in order not to put residents of the area where the wood is salvaged at risk.

But basic to all these considerations is transportation. Much of the wood which is currently going to waste is in areas where transportation expenses are quite high or where no adequate system exists to remove the wood. Governments

should seriously weigh the cost of subsidizing transportation of wood especially as a temporary measure to take the pressure off newly planted woodlots or overly exploited lands. Energy considerations should be basic to any transportation planning, not only in evaluating energy use in water, rail or road transportation systems, but also as to means to transport available wood, charcoal, or other energy producing materials. Funding improved transport systems may be of more long term benefit than subsidizing imported oil based fuel, and temporarily subsidizing transportation costs of fuelwood may be essential to many reforestation efforts.

Local projects enabling residents to make the most of available wood resources by improved harvesting, charcoal making, transportation or drying and storing should also be considered in any FLCD project.

UTILIZATION

It is evident that to date African women have found the three-stone stove or other modivications of the open fireplace to be the most appropriate technology for cooking their daily meals. If "appropriate" technology means technology which best satisfies the need in a way that is economically and socially affordable, other stove designs have thus far fallen short. It is therefore distressing to hear promises by technicians that women can save half to two-thirds of their fuel consumption by utilizing other stove designs. Most generally the women or the extension services are held to blame for this lack of change. However, it

is time to realize the outside-in approach has not worked and develop new stove research design methods using local women themselves. Once this new approach is accepted in theory, the next step is to design a manner in which this can be done. The following is a possible approach.

EXPERIMENTAL PHASE:

(1) A country is selected in which the government shows an interest in improved wood stoves, in which there is a local scientific institute able to assign a technician to this effort, and in which an extension service is willing to support such a project.

(2) A region is chosen in which there is a deficiency of fuelwood, but wood is still being used for cooking, there's a female extension agent who speaks the vernacular and has already conducted some successful programs, and in which there is a regional or local women's group interested in such efforts.

(3) A program manager is chosen who will live in the region, who has technical and preferably also extension background. The manager may be brought in by the project or be found among private voluntary groups or requested from various volunteer groups such as Peace Corps.

(4) A team is formed of the manager, the technician, the female extension agent, a representative of the woman's group to set up women's meetings in a number of villages in the region during the agricultural off-season. The extension agent and woman's organization member should help decide if husbands, chiefs or other residents should be consulted or represented at the meeting.

(5) At these meetings fuel problems and the possibility of experimenting with fuel-saving stoves are discussed. A suggested model is shown along with a presentation of instructions for use, risks, trade-offs and options. Women are asked to comment and to help set up criteria for judging successful stoves.

(6) After each of these meetings the team will discuss the women's ideas and any modifications that might need to be made at this point.

(7) Publicity in the form of newspaper articles and radio discussions could be useful to get people thinking of the problem and its potential solution.

(8) Localities are chosen from those in which women show interest in becoming experimentors and from those accessible to the other members of the team.

(9) Women volunteer or are selected from volunteers by the woman's organization to become experimentors. They agree to participate in stove evaluations as long as they use the stoves.

stoves, and the evaluation team feels the design satisfactorily meets its criteria.

At this point the evaluation team may wish to have a celebration. Neighboring villagers could be invited and the project could provide food which could be prepared using the newly designed stoves with the woman who helped develop the stove demonstrating its use. Now is the time for photographers and radio discussions. Now is the time to train extension agents to help advise more women on building and use of these stoves. The women who cooked on the stoves during the experimental phase might become paid para-extension agents for neighboring villages.

One interesting approach to dissemination of stoves which might be useful was described as taking place in Swaziland. Women were brought into a training center to learn to make several appropriate technology items including clay cook-stoves. At the end of their training when they had the models made, village chiefs were asked to come to a ceremony and judge which of the items the women made would be most useful in their villages. The chiefs in this case chose the stove as one of the most useful and agreed to help support its introduction into the villages.

Unless the government decides on a fiscal policy in which metal stove burners or other parts will be subsidized, the donor would not ordinarily continue paying for materials for stove building. The stoves are worth the investment

to the local family, or they are not. However, during this second phase the donor should do whatever is necessary to support publicity, educational materials, needed transportation or training, or even salaries to help get technical information to local women. Schools, women's groups, private voluntary organizations and volunteers could all help spread information about the new stoves.

If there is a decision to subsidize the building of more stoves, one idea would be to tie the subsidy to fuelwood production. When women plant X number of trees which they keep alive for a year they could be given a grill for a stove as a prize.

Another entire approach to stove development that has been mentioned is for donors to offer African institutions or scientists a worthwhile amount of prize money to develop practical stove designs. This might be the first step after which the modifying could take place as described above.

The emphasis of this paper on improving wood stoves does not suggest that other approaches should not also be tried to conserve wood. There is a need to explore the use of alternate foods or processes which require less energy. In some communities group cooking might be tried to conserve fuel. Foods pre-processed in a village level industry might be investigated. For example, in Upper Volta a traditional practice is to soak and then pre-cook rice before husking it. This not only cuts down on the time for final cooking but improves the nutrition of the rice. (KiZerbo, 1979). However none of these ideas should be explored only in an isolated laboratory when the true evaluation of the acceptability and success of any such idea must be made by the consumers themselves.

VI. CONCLUSIONS

This paper has been an exploration of issues raised when residents are included in the effort to solve local fuelwood needs through forestry for local community development programs. It is not an attempt to say this is an easy approach but it is based on the premise that since top-down forestry is not working FLCD may be the only viable option. It has looked at various problems which donors, implementors, and participants raise and at possible approaches to program design which mitigate some of these problems.

However, as is mentioned in the paper, it is always important to keep in mind the distinction between experimentation and dissemination-demonstration. Methodology for implementing FLCD is new and, judging from problems which are raised at all levels, it is still in the experimental stage. Ideas in this paper are not offered as proven solutions but are offered to stimulate discussion while searching for better techniques in a field which is controversial, urgent, and exciting. It is written in the belief that only as one shares experiences, tries out new ideas, and documents failure and success, can one hope to deal more effectively with the issues and to eventually reach the demonstration-dissemination stage.

Forestry has been one of the last fields to use the community development approach. However, since sound environment and availability of forest products are vital to agriculture, industry, and life itself, FLCD is potentially of great interest to community residents. By improving FLCD impact in the communities

of Africa, forestry may become the basis for revitalizing rural communities and a tool with which residents can direct and control their own futures.

Howe, James, 1977. "Energy for Villages of Africa; Recommendations for African Governments and Outside Donors." Overseas Development Council. Washington, D.C.

Hughart, David, 1979. "Prospects for Traditional and Non-Conventional Energy Sources in Developing Countries." World Bank Staff Working Paper #346. World Bank: Washington, D.C.

KiZerbo, Jacqueline and Guido de Lepeleire, 1979. "L'Amelioration des foyers pour l'utilisation domestique du bois de feu." CILSS. Niamey. May, 1979.

K unkle, S.H. and A.J. Dye, 1979. "The Effects of Forest Clearing on Soils and Sedimentation." Paper for the Conference on Agricultural Hydrology and Watershed Management in the Tropics, International Institute of Tropical Agriculture, Ibadon, Nigeria, November, 1979.

Lepeleire, G. de. Text of a presentation. "Seminare sur l'economie du bois et les foyers amelores. CILSS/FAO. Ouagadougou, April, 1979.

Martin, Luann Habegger, 1977. The Ecology and Economics of Cooking Fuels in Ghana." Thesis for M.A. in International Development. The American University, Washington, D.C.

Morgan, W.B., 1978. "Development and the Fuelwood Situation in Nigeria." Article for GeoJournal: Special Issue on Africa. University of London, King's College, 15 February.

Muzava, E.M., 1977. "Village Afforestation in Doama District." (Tanzania). FAO Second Expert Consultation on Forestry for Community Development, June, 1977.

National Academy of Sciences, 1979. "Tropical Legumes: Resources for the Future." NAS; Washington, D.C.

Peace Corps, 1979. "Notes of the 1978 Peace Corps Forestry Conference, Niamey, Niger." Office of Programming and Training Coordination Information Collection and Exchange, Peace Corps: Niamey, Niger.

Paulsen, G., 1979. "Wood Stoves." Sylva Africana Forestry Research in Africa No. 4., March. International Development Research: Nairobi, Kenya.

Poulsen, G. "Man and Tree in Tropical Africa." 1978. Paper IDRC No. 10le. Ottawa, Canada: International Development Research Centre.

Powell, John W., 1978. "Wood Waste as an Energy Source in Ghana." In Norman L. Brown, Ed. Renewable Energy Resources and Rural Applications in the Developing World. AAAS Selected Symposium 6. Boulder, Colorado: Westview Press.

S.A.E.D. "Le Deboisement en Haute Volta." Le Developpement Voltaique. No. 40 du 1er an 8/31/76.

Spears, John S., 1978. "The Changing Emphasis in World Bank Lending. A Summary of Recent Experiences and Problem Areas of Relevance to the Eighth World Forestry Congress Sessions Concerned with 'Forestry for Rural Communities.'" Paper for the Eighth World Forestry Congress. Jakarta, Indonesia. October, 1978.

Tinker, Irene, 1979. "New Technologies for Food Chair Activities." In Impact of Technology Change on Women. AAAS Symposium Vol.; Boulder, Colorado; Westview Press.

Ulinski, Carol, and John Earhart. Peace Corps Forestry Policy Paper. Forthcoming.

Ulinski, Carol A., 1978. "U.S. Forestry and Ecology Program in the Sahel." AID/SDPD. October 31.

Weber, Fred, 1979. Personal communication.

_____. 1977. "Reforestation in Arid Lands." VITA Publications Manual 37E. VITA: Washington, D.C.

_____. and Maryanne Dulansey, 1978. "Midpoint Evaluation Chad Reforestation Project." Washington, D.C.: CARE, Inc.

Winterbottom, Robert, 1979. "Upper Volta, Kondongon Agricultural Development Project". CILSS Ecology and Forestry Team. Ouagadougou, Upper Volta.

World Bank, 1979. Review of Bank Financed Forestry Activity in FY79.
1978. "Forestry Sector Policy Paper." Washington, D.C.: World Bank.

Bibliography

AID, 1978. "The Firewood Problem in Africa". Report on the AFR Firewood Conference, AID, 8/29/78.

_____. 1979. Airgram. "Village Firewood Production and Other Cooking Fuels", 3/3/79.

Brokensha, David and Bernard Riley, 1978. "Forest, Foraging, Fences and Fuel in a Marginal Area of Kenya." Paper for USAID Africa Bureau Firewood Workshop, Washington, D.C., June, 1978.

Canadian Hunger Foundation and Brace Research Institute, 1976. A Handbook on Appropriate Technology. Ottowa: CHF, April.

Carr, Marilyn, 1978. "Appropriate Technology for African Women." ITDG/UNICEF.

Cecelski, Elizabeth. "Cultural and Equity Constraints Conditioning Energy Usage." Paper for discussion at the Food Energy/LDC meeting. Resources for the Future, Washington, D.C., 2/2/79.

C.E.S.A.O., 1977. "Projet-Test de Plantations Villageoises d'Arbres dans la Sous-Prefecture de Kombissiri. Bobo Dioulasso, Upper Volta: CESAO."

C.I.L.S.S., 1979. "Grandes lignes de la Strategie du Programme revise de satisfaction des besoins de la population en produits forestiere et de lutte contre la desertification." Reunion de l'equipe Ecologie et Forets. Niamey, Niger, June, 1979.

_____. 1978. "L'Energie dans la Strategie de Developpement In Sahel. Extruit In Chapitre 4."

Diallo, M.I., 1979. "Les Amanagements Sylvo-Pastoraux." Strategy for Sahel Range Management. CILSS. Niamey, Niger, May, 1979.

Digernes, Turi Hammer, 1977. "Wood for Fuel--Energy Crisis Implying Desertification, the Case of Bara, the Sudan." Thesis Cond. Politl, University of Bergen, Norway.

Draper, S.A., 1977. "Wood Processing and Utilization at the Village Level." Third FAO/SIDA consultation on Forestry for Local Community Development. Dec.

Dulansey, Maryanne, 1979. "Can Technology Help Women Feed their Families?" Paper for the AAAS Workshop on Women and Development, Washington, D.C. March, 1979.

Earl, Derek E., 1975. Forest Energy and Economic Development. Oxford: Clarendon Press.

Eckholm, Erik, 1979. "Planting for the Future: Forestry for Human Needs." Worldwatch Paper 26. Washington, D.C.: Worldwatch Institute.

_____. 1975. "The Other Energy Crisis: Firewood." Worldwatch Paper 1. Worldwatch Institute: Washington, D.C.

Ernst, Elizabeth, 1978. "Fuel Consumption Among Rural Families in Upper Volta, West Africa." Paper for Eighth World Forestry Congress, Jakarta, Indonesia, October, 1978.

F.A.O., 1977. "Report on the Third FAO/SIDA Expert Consultation on Forestry for Local Community Development." Semarang, Indonesia. December, 1977.

_____. 1978. "Forestry for Local Community Development." FAO Forestry Paper No. 7. Rome: Food and Agriculture Organization of the United Nations.

Fleuret, Patrick C. and Anne Fleuret, 1978. "Fuelwood Use in a Peasant Community in Tanzanian Case Study." The Journal of Developing Areas 12, April. pp 315-322.

Freeman, Peter, 1979. "Deforestation and the Use and Conservation of Forests and Woody Vegetation; Policy and Program Considerations." Draft Report, USAID. July.

French, David, 1978. "Firewood in Africa." Discussion Paper for the Africa Bureau Firewood Workshop. 6/12-14/78. Washington, D.C.

_____. 1977. "Appropriate Technology in Social Context: An Annotated Bibliography. Mt. Rainier, Maryland: VITA.

Hoskins, Marilyn, 1979. Personal interviews and notes from an FAO study in Senegal to study the potential for Forestry for local community development.

_____. 1979 a. "Women in Forestry for Local Community Development; A Programming Guide." WID/AID. Washington, D.C.

_____. 1974-1978. Personal field notes from work in the Sahel.