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(DRAFT)

WOMEN IN DEVELOPMENT (WID)
AND THE
ENERGY SECTOR

A REVIEW FOR THE
U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT (AID)

BY

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EXECUTIVE SUMMARY

This study was part of an overview of the experience of the U.S. Agency for International Development (AID) in Women in Development (WID) during the United Nations Decade of Women (1975 - 1985). The energy sector was one of five chosen for closer examination by sector specialists. The study was divided into three phases: 1) the application of a data collection instrument to a sample of project documents; 2) sector analyses, based on findings from phase one and further research; and 3) field visits to selected projects. This report completes phase two of the energy sector analysis.

Lessons Learned from the Sample Energy Projects (Phase One):

Although the sample of project documents was a small one, a few lessons emerge:

1) Women are most likely to receive project benefits if projects or project components are targeted to household energy technologies.

2) It is more difficult to successfully implement project components which involve women's directly productive economic roles (for example, hiring women for wage labor on project activities).

3) Information on project activities and energy technologies are most likely to reach women where female extension agents are in place.

4) Baseline studies which give serious attention to the many roles of women are associated with high levels of awareness of WID issues and the involvement of women in the project.

5) High levels of awareness and concern for WID issues on the part of project planners, project staff or Missions increase the chances that project activities will address women's real needs and that WID goals will remain important throughout the project cycle.

6) Energy institution-building projects require more start-up time than do other types of projects. Successfully including women in all levels of project activities may take even longer because women generally have less access to the technical training necessary for professional work in such institutions.

7) Other important project factors -- inappropriate technology, unforseen weather conditions, or funding delays, for example -- may severely curtail a project's

effectiveness. In such cases, even the presence of positive factors like "WID aware" personnel is unlikely to make much difference to overall project success until other critical project implementation problems have been solved.

Conclusions, WID and the Energy Sector (Phase Two):

The broader energy sector analysis (phase two) was based on findings from the sample as well as further research. Several themes emerged from this analysis of WID and the energy sector:

1) Women as Energy Consumers -- Women benefit most from energy projects which provide technologies they need at prices they can afford. Energy technology projects should identify potential markets and the best dissemination strategies at the front end.

2) Women as Energy Experts -- Women in developing countries have many traditional strategies for energy use and conservation. It is important to recognize the advantages of traditional technologies before designing new ones. Women may also perceive different benefits (or a wider range of benefits) in a single energy technology than project planners.

3) Women's Special Needs in Energy Projects -- Women often find it difficult to learn about energy technologies for reasons ranging from time constraints due to child care responsibilities, to cultural constraints on associating with male extension agents. Women frequently find it harder to obtain cash or credit to invest in energy technologies. Female heads of households have particular difficulties in acquiring new energy technologies. Women have special health needs associated with their use of energy. One of the most important health hazards for women may be high levels of smoke inhalation from traditional cooking fires or stoves. Women often come to institution-building and energy training projects with lower levels of technical training and experience than men. This must be addressed before women can participate fully in such projects.

4) Women and Energy Planning -- Women's organizations can play an important role in national and regional energy planning. Planners should be made aware of energy projects which have been helpful to women, and recognize those technologies which are likely to help only one class of women (e.g. urban women, wealthier women). Planners should understand the broad range of women's roles and responsibilities. Energy projects are needed which will address the whole range of women's activities -- their directly productive economic roles as well as their household roles.

INTRODUCTION

There is a clear link between modernization and the use of inanimate forms of mechanical energy -- especially those using the so-called "commercial" energy sources like coal, petroleum and hydroelectricity. It was once assumed that as countries became more developed, their energy consumption patterns would switch from traditional energy to modern commercial energy sources. However, rapidly rising oil prices in the 1970's, and a sluggish world economy in the 1980's has led to a situation in which consumers in developing countries are not following the developed countries' energy use patterns. Instead of moving "up" the energy ladder into the commercial fuels, consumers in developing countries are continuing to use traditional biomass resources.

In developing countries, traditional biomass fuels like fuelwood, crop residues and dung account for over half of the total energy consumed -- in some of the poorest countries the proportion can reach as high as 90%. These energy sources are usually catagcrized as "non-commercial" because they have traditionally been considered a "free good" obtainable by family labor. However, this distinction has become blurred in many places as some traditional energy sources -- especially fuel-wood -- are increasingly bought and sold on the market. The causes for this are complex, but it is clear that commercialization of energy has produced hardship for many of the world's poor. The urban poor must spend more scarce cash in order to meet basic energy needs. The rural poor tend to move down the energy ladder as more desirable traditional biomass fuels like fuelwood become scarce and expensive, switching to agricultural residues or dung which may previously have been used as fertilizer.

Women and energy

Women farmers, artisans or entrepreneurs in developing countries can be expected to share directly in the economic benefits of cheap and readily available commercial fuel supplies to the extent that they have access to other development inputs like credit or farm machinery, and access to the rewards of increased production.

In addition to such directly productive economic roles, however, women have additional responsibilities for household tasks and child rearing. If one includes traditional as well as commercial fuels in the calculation,

household energy use in developing countries can be a very high proportion of the total national energy balance. Estimates range from around 50% to almost 100% in the poorest countries. (The most important household fuel use is for cooking.) Because traditional fuel use is not easy to measure and has no clear relationship to national economic indicators like the GDP, many governments fail to include these fuels in national energy planning.

A Note on the Women and Energy Study

This study was part of an overview of the experience of the U.S. Agency for International Development (AID) in Women in Development (WID) during the United Nations Decade of Women (1975 - 1985). The energy sector was one of five chosen for a closer examination by sector specialists. The study was divided into three phases: 1) the application of a data collection instrument to a sample of project documents; 2) a sector analysis based on findings from phase one, further research, interviews, and the specialist's own professional knowledge of the sector; and 3) field visits to selected projects. This report completes phase two of the energy sector analysis.

THE SAMPLE PROJECTS

In the first phase of the energy sector analysis, a survey instrument (a questionnaire) was applied to documents from a random sample of ten energy projects. This section of the report briefly describes these projects and draws a number of conclusions based on AID's experience as outlined in the project documents. (See Appendix A for profiles of selected projects and Appendix B for a more detailed description of the methodology.)

The ten projects in the energy sector were were all classified as WID-integrated projects. One Latin American, four Asian and five African countries were represented. Seven projects focused exclusively on forestry/fuelwood issues, and forestry/fuelwood issues figured prominently in the remaining three projects. Five projects included cookstoves components which were seen as especially benefiting women. Seven projects saw improved fuelwood supplies as a result of project activities to be of special benefit to women.

All of the projects were relatively new (since FY 1979). Six projects are still on-going and four projects should have been completed (although project completion dates may have been optimistic and documentation did not always make project status clear.) AID loans or grants varied from $.66 million to $25 million.

Documentation varied considerably among projects. For three projects (Burundi, Pakistan, and the Philippines) only planning documents were available. For two others (Upper Volta and Thailand) only planning documents were comprehensive enough to be of any use. It should be noted that the documents that were collected were the result of searches in several data banks by AID personnel as well as a number of telephone calls by the contractor to country desks, and other AID sources of documents.

Four sets of project documents discussed women at length and generally indicated a high level of awareness of WID issues and concerns (Burundi, India, Lesotho, and Thailand). Three of these projects have either shown themselves to be successful in WID terms or are judged likely to succeed. (In the case of Thailand, the results are not known.)

Five sets of project documents mentioned women in only a scanty, boilerplate way, or limited the discussion of

SUMMARY PROJECT DESCRIPTIONS

COUNTRY	REGION	PROJECT TITLE	ENERGY SUBSECTORS	COMPONENTS DIRECTED TO/ INCLUDING WOMEN	SUCCESS IN WID TERMS
Burundi	Africa	Bururi Forest	Forestry, Fuelwood	Improved fuelwood supplies, Improved cookstoves	Likely
Honduras	Latin America	Natural Resources Management	Agro-forestry, Forestry, Fuelwood	1. Improved cookstoves 2. Improved fuelwood supplies 3. Utilizing women's labor in agro-forestry and reforestation work	1. Yes, Positive 2. and 3. Unknown
India	Asia	Madhya Pradesh Social Forestry	Forestry (institution-building) Fuelwood	Women to be integrated into all levels of project activities -- staff, nursery workers, village women	Positive, but below intent
Lesotho	Africa	Renewable Energy Technology	Solar, Fuelwood, Energy Conservation	1. Improved cookstoves 2. Growhole greenhouses	1. Yes, Positive 2. Positive, but below intent
Mali	Africa	Village Reforestation	Forestry, Fuelwood	Increased available fuelwood, Improved cookstoves	Unlikely
Pakistan	Asia	Forestry Planning and Development	Forestry, Fuelwood	Improved fuelwood supplies, Female staffed/operated nurseries	Unknown
Philippines	Asia	Rural Energy Development	Dendro-thermal (wood-fired power plants), Gasifiers for irrigation, charcoal production	More available energy will help women entrepreneurs, increased fuelwood supplies, most charcoal will be used in home by the women	Likely
Senegal	Africa	Fuelwood Production	Forestry, Fuelwood	Increased available fuelwood, Women employed as nursery workers	Poor
Thailand	Asia	Renewable Non-Conventional Energy	Energy Planning, Renewable energy technology, Conservation technology	Improved woodstoves, Recruiting and retention of women staff for project activities	Unknown
Upper Volta	Africa	Forestry Education and Development	Forestry, Fuelwood	Improved fuelwood supplies	Unlikely

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COMPARISON OF PROJECTS

* Life of project (LOP) funding
** Fiscal Years

PROJECT	FUNDING* (MILLIONS)	PROJECT** DATES	IMPLEMENTING AGENCIES				STAFFING			IMPLEMENTING MECHANISMS						INPUTS				
			Natl/local Government	PVO	Private Contractor	Peace Corps	Professionals	Para-Professionals	Volunteers	co-ops	Extension Agent	Media	Community Organizations	Local Government	Others	Commodities	Technical Assistance	Training	Research + Development	Credit
Burundi	$ 1.14	81-85	x		x		x	x				x	x	x		x	x	x		
Honduras	$14.99	80-88	x			x	x	x	x	x	x	x	x	x		x	x	x		x
India	$25.00	81-87	x		x		x	x			x	x	x	x	research unit	x	x	x	x	
Lesotho	$ 1.60	79-84	x		x	x	x	x	x		x	x	x	x	private entrepren.	x	x	x		
Mali	$ .66	80-86	x			x	x	x	x		x	x	x	x		x	x	x		
Pakistan	$25.00	83-91	x		x		x	x			x	x	x	x		x	x	x	x	
Philippines	$25.00	82-90	x		x		x	x		x	x		x	x		x	x	x	x	x
Senegal	$ 3.43	79-84	x			x	x	x	x	x			x	x	village employment	x	x	x		
Thailand	$ 5.00	79-84	x		x	x	x	x	x		x	x	x	x	local univer-sities	x	x	x	x	
Upper Volta	$ 5.90	79-83	x				x	x			x				training center	x	x	x	x	

women to their roles in minor project components (Hondura, Mali, the Philippines, Senegal, Upper Volta). The Mali, Senegal and Upper Volta projects were evaluated as generally unsuccessful in WID terms, but the Honduras project was considered partially successful in its small cookstoves component. The Philippines project is considered likely to succeed in WID terms (with some reservations) because two project components -- a power plant and a charcoal manufacturing plant -- will be providing low cost energy for household use.

The projects used a variety of implementing mechanisms, but it is notable that none in the sample used private voluntary organizations. The only volunteers were Peace Corps Volunteers. All projects involved national or local government bodies as prime implementing agencies, and utilized professional and paraprofessional staff. All projects provided inputs of technical assistance, commodities and training. Other inputs, like credit, varied among the projects.

Three projects were considered unsuccessful in WID terms. Five projects were considered successful or likely to succeed (although some of the successful projects were below intent and one of the projects was "likely to succeed with reservations"). Two projects' outcomes were unkown.

Conclusions, Sample Projects

In spite of data limitations and the small size of the sample, there are a few general conclusions which can be suggested.

1) Women are most likely to receive project benefits if projects or project components are targeted to household energy technologies.

Examples: To the extent that they are well-designed and properly disseminated, cookstove technologies will directly benefit women (Burundi, Honduras, Lesotho). Projects which supply energy widely used in the household like electricity or charcoal will also benefit women (the Philippines).

2) It is more difficult to successfully implement project components which involve women's directly productive economic roles (for example, hiring women for wage labor on project activities).

Examples: Because women traditionally plant and care for seedlings, it cannot be assumed that women will be

successfully integrated into paid project nursery work. In Senegal, men took over the work once it entered the cash economy.

In Lesotho, planners erroneously assumed that because women were the users and experts on cookstoves, they would move easily into roles as entrepreneurs constructing and selling cookstoves as Village Energy Technicians.

Women were employed as laborers (planting and watering trees and nursery work) in the Indian project. But plans to increase the number of women in the predominately male forestry staff were more difficult to implement.

3) Information about project activities and energy technologies are most likely to reach women where female extension agents are active.

Examples: In Honduras and India, it proved more difficult than anticipated to field female extension agents, and this curtailed project effectiveness. In Honduras, the presence of female extension agents encouraged the dissemination of cookstoves technology. In areas where there were no female agents, introduction of cookstoves was very slow. In Indian villages where female extension agents were in place, women villagers were more active in project activities and more aware of project issues. In areas where there were no female agents, levels of awareness and support among women were found to be lower.

In Lesotho, although extension work was carried out primarily by contracting staff and Peace Corps Volunteers, women were well-represented on the staff and were believed to have increased village women's participation in project activities.

The forestry extension school in Upper Volta trained only males and this may have a detrimental effect on implementing conservation activities involving village women.

4) Baseline studies which give serious attention to the many roles of women are associated with high levels of awareness of WID issues and the involvement of women in the project.

Examples: The Lesotho and India projects are examples of such projects. In Honduras, where otherwise thorough baseline studies did not collect much information on gender differences, women were only marginally involved in project activities.

5) A high level of awareness and concern for WID issues on the part of project planners, project staff or Missions may increase the chances that project activities will address women's real needs and that WID goals will remain important project goals even in the face of funding delays or institutional obstruction.

Examples: High "WID awareness" on the part of the Lesotho contracting staff probably contributed to their efforts to get feedback from local women on what they really wanted from cookstove technologies. In India, similar efforts ensured that the idea of integrating women into the forestry staff remained an important project goal.

6) Energy institution-building projects require more start-up time than do other types of projects. Successfully including women in all levels of project activities may take even more time because women generally have less access to the technical training necessary for professional work in such institutions. (Honduras, India)

7) Other important project factors -- inappropriate technology, unforseen weather conditions, or funding delays, for example -- may severely curtail a project's effectiveness. In such cases, the presence of positive factors like "WID-aware" personnel is unlikely to make much difference to overall project success until other critical project implementation problems have been solved (Senegal, Honduras, India).

THE ANALYSIS

WID and the Energy Sector

Introduction

Because the energy project sample was small and so heavily concentrated in one energy sub-sector (fuelwood/cookstoves), this section will review other experience in the fuelwood/cookstove sector and will expand the analysis to include other energy sources (charcoal, peat, dung, biogas, solar) and other types of energy programs (rural electrification, energy training).

The discussion in Part Two is based upon AID experience in energy projects not included in the sample, interviews with AID and project contractor personnel, interviews and correspondence with other energy experts (from multi-lateral organizations and from other countries) who are knowledgeable about and interested in the relatively new field of women and energy. Research also involved a review of the literature (see Bibliography).

BIOMASS ENERGY

(Fuelwood, Crop Residues, Peat, Dung, Charcoal)

World-wide, women play an important role in rural energy systems (which are primarily biomass energy systems). In some parts of the world women and their children are the primary collectors of biomass fuels, although the gender division of labor is much less stereotyped than in other "women's work" like fetching water or cooking. The household is the basic user of biomass fuels in rural areas, and whether or not men participate in collecting fuel, the basic responsibility for fuel use is women's. Households use biomass fuels primarily for cooking, heating, boiling water, and hot water for washing and bathing.

Fuelwood Shortages

The pattern of biomass use varies widely, depending on local conditions, but wood is generally the preferred

biomass fuel in rural areas because of its superior burning qualities. The supply of fuelwood varies greatly with the region. In areas of high rainfall and in rural areas of semi-arid lands, fuelwood supplies appear to be adequate. Projects aimed at alleviating energy shortages in such areas are likely to run into difficulties.

For example, in one area of Honduras, so much wood was freely available, that it was difficult to convince villagers that a fuel-saving stove was important. Adoption of such stoves was very slow. In Malawi, rural residents did not share the Forestry Department's sense of a fuelwood crisis. Because the area residents saw no need to become self-sufficient in fuelwood production, project nurseries found few markets for seedlings and operated at only 10 - 20% capacity.

Although supplies of fuelwood may remain adequate in such areas, it is clear that arid and urban semi-arid environments are more likely to experience fuel shortages. Space heating requirements in cold, high altitude areas may be as high as the fuel requirements for cooking. Such areas (e.g. the Himalayas, Andes, and the highlands of Mexico, Ethiopia or Lesotho) are among the world's most environmentally stressed areas. In such areas, fuel shortages are undoubtedly a serious problem. It has been estimated that over 112 million people -- most living in Africa -- are experiencing severe fuel scarcity. The number may double by the year 2000.

In such areas, negative health effects may be associated with fuel shortages. In Mali, where women are primary fuel suppliers, women who made the arduous trip to a fuelwood source 15 kilometers away were exhausted for two or three days afterwards. They had difficulty lactating and performing strenuous household tasks like drawing water or pounding millet.

Fuelwood shortages have also been linked with negative changes in nutrition, though this is difficult to prove and such changes may also be related to lack of time or lack of food. However, fuel shortages have been associated with incompletely cooked, less nutritious foods, and increased danger of toxicity and disease from leftovers when cooking is done less frequently.

Conservation Strategies

Because women are the primary users of fuelwood in rural areas, they are the ones most concerned with resource

conservation. Traditional wood-saving practices -- protecting the cooking fire from wind or slightly wetting overly-dry firewood -- can cut down on fuel used. Different ways of managing the fire, even a three-stone fire, can also save fuel (for example, ensuring that only wood directly under the cooking pot is burning, or putting out the fire as soon as the food is cooked). Properly practiced, traditional cooking methods frequently minimize fuel use and cooking time while ensuring palatable, digestible food. For example, a careful cook will not make overly-thin sauces which would require lengthy cooking to thicken them.

Many of these fuel saving strategies, however, require women's time. There are some indications that fuel use may be lower when women have leisure to carefully tend the fire. Conversely, fuel use may be higher when demands on women's time are greater and where other tasks and responsibilities vie with fire-tending for attention.

One fuel saving strategy which may also save time, has been to transfer household food processing activities like baking, grain grinding, or beer brewing to commercial or community-owned plants. Economies of scale can contribute to increased efficiency as well as lower costs.

Fuelwood Prices

The costs of fuelwood to the household have steadily increased in developing countries. In rural areas, where most fuelwood is still considered a "free good" the increased costs of fuel to the household may be reflected by increased time spend fuel gathering. This may not be the best indicator of costs to rural families, however, since several time studies have shown that even in areas of serious fuelwood shortages (Nepal or Upper Volta) surprisingly <u>little</u> time is spent on fuel collection. (In Upper Volta, for example, men spent two minutes and women spent six minutes, as a daily average on fuel collection.)

It is likely that many households adjust to fuelwood shortages by moving down the energy ladder to less desirable, but more easily obtainable fuels -- twigs, agricultural wastes etc. -- instead of spending more time obtaining higher quality fuelwood. Other common strategies for the rural poor are poaching on government or private forest lands, or entering new and often exploitative labor or barter relationships with private owners of fuel sources.

In urban areas (and in some rural areas where fuelwood has become a commercial fuel) market prices have increased.

In some cases, increased fuelwood prices may have a beneficial effect on fuel supplies. Once wood prices reach a certain level, wood becomes an attractive cash crop. When wood prices in Gujarat and the Punjab increased, Indian farmers converted irrigated fields into irrigated fuelwood plantation. If fuelwood production costs are too high, however, even high consumer demand will not make wood plantations profitable. For example in arid, high altitude regions farmed wood is extremely expensive and would require very high consumer prices to be profitable.

Increasing commercialization of fuelwood in rural as well as urban areas, has caused special problems for women. In some areas, particularly in Africa, even if family incomes have increased, securing fuel supplies remains the sole responsibility women, (who have fewer opportunities than men for earning income). Female-headed households will suffer especially as wood ceases to be a "free good".

Health and Safety Problems

Because women are the major users of fuelwood in cooking, women are most likely to be affected by health risks associated with fuelwood use. Traditional three-stone fires, for example, can cause dangerous burns. But a more widespread and serious health risk associated with traditional cooking technologies is smoke inhalation.

If wood is allowed to burn completely, it emits relatively few pollutants. But in traditional open fires or in small stoves, it is difficult to maintain the good combustion needed to completely burn the wood, and a wide range of complicated organic compounds are emitted in the process. In small stoves, wood may emit more harmful pollutants than coal, which has a reputation for being a "dirty fuel". This is less of a problem where cooking fires are situated outside, but in much of the world, particularly in cold climates, cooking often takes place in ill-ventilated, chimney-less houses where the smoke escapes as it can through the roof. Traditional fires and stoves are very prone to smokiness, but some of the major changes in stove design, intended to increase efficiency, have also increased emissions.

In some rural households with traditional stoves, researchers have found ten, twenty and even one hundred times the pollution levels of the world's dirtiest cities. Few medical studies have yet been carried out on the health

hazards of cooking on open fires or traditional stoves. But one study found that cooks (usually women) were inhaling as much benzo(a)pyrene as if they smoked twenty packs of cigarettes a day.

Bronchitis and other respiratory diseases, eye infections and lung cancer may be caused or aggravated by working in smoke. Pregnant women are particularly at risk, for they may expose the fetus to the risk of birth defects.

Besides these health hazards, smoke from traditional fires and stoves is a serious nuisance. Soot coats household walls, furniture, ceilings and clothes. Smoke may have a beneficial effect in discouraging insects, drying and strengthening thatch roofs, or preserving food, but studies suggest that levels of smoke needed for these functions are substantially less than those found in many village houses.

Attempts have been made to alleviate the smoke problem, but with mixed success. Venting the smoke through chimneys lets in cold air; enclosing the fire in a stove and venting through a flue may not let in cold air, but many designs do not provide much warmth either.

Because the widespread and serious nature of woodsmoke pollutants has only recently been recognized, its implication for women is not yet clear. Proposals have been made to recognize and address the health problems that are caused by the use of traditional fuels through rural energy programs, as well as health programs. Improvements in combustion characteristics of traditional fuels and improvements in end-use technologies could reduce exposure to pollutants. In some countries, exposure to domestic smoke may be so high and the health risks so great, that more benefit would be gained from improvements in household energy use technologies than from the installation of emission controls on fossil fuel power plants.

Fuelwood Use and Deforestation

In the past few years, there has been a growing understanding that fuelwood gathering plays only a minor role in deforestation. The major causes of deforestation are large-scale lumbering, agricultural expansion, overuse of existing agricultural land (not allowing it to lie fallow long enough), burning forests to encourage fodder growth, and overgrazing. Rapid urban growth also contributes to localized pressure on the land. Urban fuel demands contribute to widespread forest destruction close to

population centers. But here, too, increased fuel needs are accompanied by increased urban needs for construction timber and for food.

In some rural areas, local industry and agricultural processing facilities may put pressure on fuelwood supplies. Tobacco curing, lime and cement manufacturing, and brick making all put pressures on rural fuelwood supplies. Such rural industries are often very inefficient in their use of wood. A few measures to improve their efficiency may have more impact on fuelwood supplies than conservation programs addressed at the household level. Because household fuel gathering is not a major cause of deforestation in most areas, projects which attempt to address the problem of deforestation only through women's activities as fuel gatherers and cooks are unlikely to have much impact on the problem.

Social Forestry

Social forestry is a new approach to forest resource management. Foresters have traditionally been concerned with managing forestry reserves and plantations for industrial or commercial use. If the local community was considered at all it was to ensure that the forest was protected from their poaching. In social forestry programs, however, the forester's role is that of extension agent, rather than policeman. Social forestry projects aim at providing a mix of small timber, fodder, oil seed, and fruit trees near villages so that villagers can become self-sufficient. Social forestry concentrates on fast-growing species which meet immediate needs rather than longer growing (though potentially valuable) timber species like teak.

Social forestry projects frequently include agro-forestry components. Agro-forestry integrates food, fodder and wood production either intensively on small private plots, or more extensively on communal lands. Agro-forestry projects are of particular interest to women because they attempt to meet rural women's needs for food for her family and livestock as well as her fuelwood needs.

When properly designed and implemented, social forestry projects have been very successful in involving women in project activities. Women, in turn, have contributed to project success through their efforts in planting and watering trees and protecting the seedlings against children and animals. The involvement of women's organizations and the presence of female foresters and extension agents has been found to increase the participation of women.

To succeed, projects must recognize women's particular needs. In some areas, where women have lost traditional rights to land, projects must take measures to assure that women will receive the benefits from any trees they plant. In other areas, the products which women want from forests may differ from men. For example, women may be more concerned with assured supplies of fuelwood and forest products used for food or medicine. Men are more likely to be interested in timber as a cash crop for construction, etc. Projects must be designed to meet women's as well as men's needs in order to assure women's active participation.

Social forestry, however, is not the perfect development solution to deforestation problems. Social forestry projects are unlikely to succeed where local residents do not identify deforestation as a serious problem (as in Malawi), or they feel that other problems (low agricultural productivity or shortage of fodder) are far more pressing, as happened in Nepal.

It may also be difficult to ensure participation in community forestry projects. There is a widespread feeling that community (as opposed to state- or individually-owned) forests require more time and effort from everybody with no clear return to the individual. "Everybody's property is nobody's property." In theory, the benefits of social forestry projects are supposed to be distributed in a way that reaches every community member. In practice, ideas of "fair distribution" vary widely, and in some cases forest products grown under the project are not available to the poor at all. Sometimes only a new cash crop for landowners is provided, with the poor receiving only short-term employment. Indian projects in Uttar Pradesh and Madhya Pradesh ran into these problems.

Cookstoves

Improved cookstoves projects have often been implemented along with social forestry projects in addressing the deforestation problem. In many cases, cookstoves have not lived up to expectations of fuel-saving. Sometimes, stove designs which performed efficiently in laboratories proved to be very inefficient under field conditions -- occasionally less efficient than a properly-managed three-stone fire.

Traditional stoves and three-stone fires, it turns out, are not as inefficient as once thought. Further improvements in their efficiency may detract from their

other advantages -- low cost, adaptability to pots of many sizes and shapes, and portability. Traditional stoves have an additional advantage in that they are not as sensitive to construction errors as improved models. Open fires provide other functions for households. Enclosing a fire in a stove will remove a source of heat and light.

The cost of improved stoves is another major factor hindering their widespread adoption. In rural areas where wood is still considered a free good, people will have little incentive to invest scarce cash in a fuel saving device. In urban areas, where fuel is purchased, there may be more incentive to invest in stoves. However, the poorest households will still find the initial capital costs too high, and simple credit schemes may be necessary.

Improved cookstove programs have proved very popular in certain places, and users have sometimes reported great fuel savings. However, fuelwood conservation is not always the most important reason for adoption and use of the stoves. Women cite many other reasons for preferring a new cookstove: it vents smoke away from the cooking area; it is less mess than an open fire; larger stoves make cooking more convenient by providing a place to put pots and utensils away from children and animals; enclosed fires greatly reduce the danger of burns for cooks and children. Some cooks also find that food tastes better and that cookstoves require less time and attention to fire-tending.

Well designed and implemented cookstove projects can meet a real need, even in areas where fuelwood conservation is not of paramount importance to women. Some specific suggestions for successful cookstoves projects include:

1) Market research. Do local cooks (usually women) feel a need for new stoves? What cooking needs must a stove meet -- boiling, baking etc. What sized pots will be used? What other needs should a stove meet (venting smoke, providing space heating and lighting)?

2) Involve women in the design process. A frequent criticism of cookstove design is that it is done by male technicians who have no feel for women's real needs. Get women's opinions on a limited number of promising models and test the selected models on a pilot basis. Compare the efficiency and benefits of traditional stoves with the new models. Stoves which require only small changes in cooking habits, fuel collection and use will likely be the most successful.

3) Dissemination and marketing considerations should be taken into account throughout the design and testing process. Subsidies may be needed initially, but should not be large and should not be continued. The technology should be designed so that there is a market for it. Dissemination techniques will differ depending on stove design. In some cased, where individual users will build the stoves, clear training in construction techniques must be given. Where artisans will build and sell the stoves, they must be trained and consumers must be educated in the stove's utility and value. Credit schemes may be necessary. Many cookstove projects have been aimed at rural women, when, in fact there may be a greater market in urban areas where fuel is purchased and even marginal fuel savings will be valued.

Properly designed cookstoves projects, with an understanding of the market for improved cookstoves technologies, will be most likely to design a product that women want at prices they can afford. Cookstoves have been well-received in many locations, although they have not lived up to their original intent of widespread fuel savings. Planners should begin looking at the whole range of benefits from cookstoves, focusing on more than just fuel savings.

Charcoal

Women are important consumers of charcoal, although its relatively high price is a deterrent to its use in rural areas where wood is still considered a free good. In urban areas however, where more fuelwood must be purchased, charcoal is more likely to be an attractive option.

In some places, charcoal is the fuel of choice, even when heavily subsidized substitutes like butane are actually cheaper than charcoal. Charcoal is often considered safer than gas and many people prefer the taste of food cooked over charcoal. Sometimes urban charcoal prices are themselves maintained at low levels for political reasons. Since the raw material, wood, is considered free, this may be easier for governments to justify than subsidies of refined petroleum products.

Although as cooks women play a large role in household use of charcoal, they have little part in its production. Charcoal making is usually done by men, though women may sometimes engage in its sale. Traditional methods of making charcoal are relatively inefficient (e.g. five kilograms of wood to make one of charcoal). Introducing technology to

improve this ratio is likely to benefit more urban than rural women because of differences in fuel use patterns.

Peat

In some areas of the developing world, such as Burundi, peat has been seen as a potential substitute for fuelwood. Tests have shown that peat burns hotter and longer than equivalent amounts of wood. Furthermore, it is not difficult to prepare peat for use, although machine-maceration is superior to hand-maceration and this may add to production costs.

However, there are a number of important drawbacks to its household use. Peat emits a heavy, acrid smoke. Woodburning stoves can be adapted to use peat, but this may be too expensive for the poor, who may, in fact, possess no stove at all. The acrid smoke caused additional problems for housewives by wrecking the cheap aluminum pots used extensively in some areas. In these cases, successful household use of peat would require the introduction (or re-introduction) of terra-cotta cookware. In addition to smoke problems, peat is more expensive than wood in terms of kilocalorie equivalents.

Peat is more likely to be valued by institutional rather than household users. Commercial enterprises or schools, for example, would be more likely to be able to afford special stove modifications to vent the acrid smoke, and at the same time would place a high value on the burning qualities and convenience of peat.

Dung and Crop Residues

Using dung and crop residues as fuel is generally considered less desirable than using wood, in part because of wood's superior burning qualities, but also because dung and crop wastes can make an important contribution to agricultural productivity when used as fertilizer. It is generally agreed that twigs, straw and other crop residues are inferior fuels because they burn quickly without giving off much heat or creating coals. The ashes of some wastes (millet stalks) contain high quality potash, but generally ash is viewed as a nuisance.

Dung's value as a fuel depends on the animal it comes from -- cattle, llama, and sheep dung, for example, all have different burning characteristics. In addition, the animal's diet and the dryness of the environment can affect

the burning qualities. In some places, observers have reported that dung is a smoky fuel which requires constant tending. Observers in Lesotho and Transkei report cattle dung produces a thick smoke. However, in other areas, dung cakes are considered an attractive fuel because they are convenient, cheap and burn with a slow, even heat which provides heat for homes as well as for cooking. Reports from the Peruvian altiplano, where dung has been the traditional fuel for centuries, have found that the cattle dung burns with little smoke. Dung is also valued as a starter fuel for wood and coal.

In many areas the amount of dung used for household fuel varies seasonally, with more used in the winter when there is less available wood or agricultural residues. Use also varies by region. In India, for example, a large percentage of the manure output is used for fuel in the flat, fertile alluvial plains where there is little available firewood. In hilly upland regions with poorer soil but more locally available fuelwood, dung is used primarily as fertilizer. In alluvial areas of Iraq, buffalo populations are maintained primarily for cooking dung production.

In areas where dung is often used as a fuel, such as India, women have the major responsibility for preparing dung cakes. Dung and agricultural residues are infrequently traded and have remained much more firmly in the "non-commercial" fuel catagory than has fuelwood. Where dung has been traditionally used for fuel on a large-scale basis, efforts have been made to minimize the time costs to the household -- by controlling cattle movement for easier dung collection, by combining dung with other fuels, etc.

Energy project planners usually assume that dung and agricultural wastes are best used as fertilizer and that development efforts should assist people to move away from such fuels. (Dung, especially, is one traditional fuel which has inspired very little research.) In some areas like the Peruvian altiplano or India's alluvial plains, there may be very few substitutes for dung. Projects which improve combustion efficiencies, reduced smokiness, etc. might have important benefits for women, who are the primary users of such fuels in rural areas.

ALTERNATIVE RENEWABLE ENERGY TECHNOLOGIES

Biogas

Biogas plants (which produce methane gas from animal waste) have been used successfully in the developing world, but this technology has a number of serious drawbacks for widespread use. Installation of the digester and gas piping system are relatively expensive. Installation costs may be easier to meet if the digester is community-operated, but community ownership produces problems of waste collection and fair distribution of the methane gas. In some countries the cost of methane substitutes like butane is kept artificially low and discourages investment in biogas facilities.

Human wastes may be used to run the digester -- one estimate concluded that a family of five could efficiently make use of a digester for meeting its household cooking needs. But more usually a digester uses the wastes of adult animals, which requires animal ownership and precludes the poorest households from benefits.

Other disadvantages to biogas plants are that they are generally less efficient in winter, when there is a higher demand for fuel because of increased lighting and heating needs. Also, as more economic value is assigned to dung, animal owners may collect more dung and the poor may be denied access to a very important fuel source.

For all their disadvantages, there have been a number of biogas projects which have brought substantial benefits to women. The methane produced from biogas plants is a clean, convenient fuel which produces few irritants when burned. In Egypt, women cared for animals in a much cleaner, more healthful environment because manure was regularly flushed off the barn floor into the digester. The women also found that their farmhouses were more free from odors and flies, since the effluvient produced by the biogas plant for use as fertilizer was relatively clean and odor free.

Biogas plants can be of real benefit to women. However, beneficiaries will probably continue to be the relatively well-off unless means can be found to make community biogas facilities a more attractive option. Areas with a strong concern for community hygiene and health are most likely to make successful use of a biogas plant. China provides one of the world's primary role models in community biogas

facilities, but the degree of social control necessary for efficient and equitable operation may not be attractive to all countries.

Solar and Other Renewable Energy Technologies

Passive solar energy has traditionally been used by women in developing countries for such tasks as food drying. Improved solar food drying technologies have also been useful to women, but even the simplest -- which may require the purchase of screens or black plastic to line a box -- may be too expensive for poor women.

Solar cookers are another technology with great potential value: the energy source is free, there are no pollutants, the appliance is easy to care for. But the initial capital investment is prohibitively high for poor households and there are certain limitations to their usefulness. Solar cookers are less useful on cloudy or rainy days -- in some monsoon areas this can limit their effectiveness for an entire season. Using solar cookers, which require direct sunlight, may be very inconvenient for women who spend daylight hours working in the fields. In hot areas where cooking is done in the coolness of the evening or the early morning, solar cookers will be of little use.

Additional problems are that the the reflector and support framework for some solar cookers are too large for easy storage in already small living quarters. Women have also found other drawbacks: the sun's rays in the reflector hurts the eyes, solar cookers are not stable enough for certain types of cooking pots, the cookers require metal rather than traditional terracotta pots, and the cooking process itself is very slow.

Because of the high capital investment and other problems associated with use, solar technologies may have the broadest impact when used for community, rather than household purposes. For example, AID's photovoltaic technology project has installed a number of solar-powered medical refrigerators and other clinic systems. Solar-powered grain mills and water pumps have also been installed. However, care must be taken to assure women's access to the benefits. The introduction of mechanical grain grinding may remove a means of livelihood from women who previously had hand-ground the grain. The introduction of a solar-powered water pump may make a well more attractive to herders, and women may have to find alternative water supplies, as happened in Upper Volta.

Other renewable energy technologies -- windmill irrigation systems, small decentralized hydropower plants, or water-powered grain mills -- are likely to benefit women to the extent that the whole community benefits , as long as the introduction of such technologies does not take away traditional resources from women without giving women something of value in return.

RURAL ELECTRIFICATION

Until the late 1970's, rural electrification was often viewed as an all-purpose catalyst for a wide range of development goals -- from economic goals like stimulating rural industry to social goals like improving literacy rates. Recent studies have indicated that electricity is a necessary though not sufficient condition for the development of local commerce and industry. However, when linked with such other factors as access to markets, credit, or a trained labor force, electricity can make a very important contribution to raising production. Rural electrification projects have been widely implemented in Asia and Latin America and less widely implemented in Africa. In most projects, although rural electrification was not targeted to women, it was assumed that women would benefit as members of a larger electrified community.

Commerce and Industry:

It is not entirely clear how women fare in cases of such commercial or industrial development. There has been at least one report of significant positive correlations between electrification and off-farm, non-family employment for women, but the more general conclusion seems to be a pattern of declining female employment (possibly due to the mechanization of tasks previously done by hand), or a pattern in which benefits from increased wages or new employment opportunities accrue disproportionately to men.

The story is somewhat different for household industry, however. Electrification seems to have a positive effect on such industry, though more by providing improved work lighting than through the use of new appliances or tools. In areas where cottage industry exists, electrification is associated with a larger number of home-manufactured goods, greater numbers of family members employed, and longer working hours, accompanied by increases in family income.

Since women are heavily involved in such businesses, they can be expected to benefit accordingly. However, electrification does not, by itself, bring about these improvements in household industry. In areas where no handicraft industry exists, or where markets are too far away, electrification has had little effect on household industry development.

Household use of Electricity:

With some notable exceptions like India and China, most national rural electrification programs have emphasized household lighting over electricity for industry or agriculture. In most developing countries the single most important use of rural electrification is for household lighting. But appliance use is also widespread and electric irons, fans, refrigerators and washing machines have made a profound difference to women by easing the burden of household chores. Radios and televisions are also popular and women benefit, along with other family members, in greater access to entertainment and information.

Electricity is not a substitute for other widely-used household fuels. There has been very little substitution of electricity for wood, agricultural wastes or kerosene used for cooking or heating, so provision of electricity is unlikely to reduce women's biomass fuel needs for household energy use.

The Equity Issue:

There is a body of evidence which suggests that, at least in the short run, rural household electrification increases rural inequities. In most countries the poor adopt electricity at a lower rate than better-off households. (Although it should be noted that official hook-up rates may not reflect those households which have avoided initial costs by "unofficially" hooking themselves up to the line.)

Over the longer term, however, rural electrification appears to <u>decrease</u> rural inequities as more and more households adopt electricity and as villagers receive such public benefits as improved security gained from street lighting. Because in many areas cultural and security concerns keep women from moving about freely after dark, the availability of street lighting may have greater benefits for women than for men.

Women and Rural Electrification:

Because electricity is used primarily in the home, women and children are the main beneficiaries of this energy technology. This makes rural electrification unusual if not unique among high technology projects not specifically directed to women. In many developing countries, in fact, rural electrification is viewed as a social welfare, not an economic development, program. This has undoubtedly helped ensure that women receive a large share of its benefits.

Development planners have struggled for years with the "social benefits" versus "economic benefits" approach to rural electrification. The projects are relatively expensive and require substantial capital investment. It is much easier to justify such projects on economic, rather than social welfare grounds. Planners have often been too optimistic about economic benefits, and one of the major criticisms leveled at rural electrification projects has been that they do not live up to these economic development claims.

Women are directly affected by this reasoning because it does not take into account electricity's contribution to women's indirectly productive household work, which is seldom included in assessments of economic development. The economic value of household tasks like ironing, clothes washing or food preparation is very hard to measure, but increased efficiency or productivity in these areas could have great impact on women's lives. Greater productivity in household tasks may free women's time for more directly productive, income-earning activities, and will certainly contribute to an improved "quality of life".

Measuring improvements in the "quality of life" is very difficult, perhaps even more difficult than assigning an economic value to household work. It is difficult to quantify the changes which superior household lighting or greater access to information and entertainment may bring. But one major benefit frequently perceived by rural residents is this sense that "life is better now".

Rural electrification has been of great benefit to women, but it is not the perfect technology for meeting women's development needs. Rural electrification's relatively high capital costs and initial adoption only by wealthier households may make it inappropriate where other development needs are pressing and development funds are scarce. In areas where rural electrification is appropriate, women may benefit even more if WID issues are considered in

design of technical, financial or adminstrative project components (e.g. tariff schedules, load capacity or representation on cooperative boards). Very little research has been done on such issues and it may be that women are affected in different ways than men.

TRAINING PROGRAMS

AID has sponsored a number of energy training projects, including conventional energy training, energy conservation, and alternative energy technologies. Participants have been trained in U.S. universities and other technical training centers. Direct beneficiaries of these training projects tend to be the educated elite of developing countries. Furthermore, most participants are male, since energy is a relatively new field for women and few women in developing countries have the necessary technical background or experience to take full advantage of the courses.

Even though the overall number of direct beneficiaries is small and these beneficiaries have been primarily male, there may be opportunities to introduce WID concerns into the process. Most trainees return to responsible policy-making positions in the energy sectors of their countries; finding opportunities to sensitize them to WID concerns could be of long-term benefit to women in their home countries. For example, recognition of the critical role biomass energy plays in rural women's work can contribute to more realistic, inclusive national energy planning.

Women's participation in these training projects has been limited by their lower levels of technical training and experience compared with men. But even if a woman does possess the necessary qualifications, there may be cultural constraints which restrict her from participating. Parents may be unwilling for unmarried daughters to attend distant schools without family protection and supervision. Wives may not feel their husbands or children can spare them (husbands are much less likely than wives to accompany their spouses to the U.S. for training).

AID has made very strong efforts to ensure that qualified female students are able to participate in the courses, but much less attention has been given to assisting the women who accompany their trainee husbands to the U.S. There may be a missed opportunity here for training these women in skills which could assist the development process in their home countries. Some wives are highly educated

professionals in their own right and may benefit from further coursework in medicine, demography, etc. Other women could benefit from courses ranging from secretarial or foreign language training to nutrition or health care courses.

CONCLUSIONS: WID AND THE ENERGY SECTOR

Several themes emerge from the above discussion of women and the energy sector: the importance of women as energy consumers; women as energy experts; women's special needs in relation to energy projects; and women's important role in energy planning.

Women as Energy Consumers:

Women benefit most from energy projects which provide technologies designed to meet their needs at prices they can afford. Energy technology projects should identify potential markets and the best dissemination strategies at the front end. Regularly consulting the consumer during the design process and making use of proved strategies for dissemination (e.g. using female extension agents) should produce affordable technology that women will adopt enthusiastically.

Women as Energy Experts:

Women in developing countries have many traditional strategies for energy use and conservation. It is important to recognize the advantages of traditional technologies before designing new ones. Properly managed three-stone fires or traditional stoves are more efficient than some "improved" cookstoves, for example. Traditional fuel choices, such as dung, may be a reasonable energy source in some areas where there are few alternatives. In such cases, helping women make the most efficient use of available fuel may be more helpful than encouraging them to adopt new, often more expensive energy sources.

Women may also perceive a wide range of benefits in a single energy technology and may rank these benefits in a different order of importance than project planners. For example, women may value improved cookstoves for convenience and safety factors more than fuel savings.

Women's Special Needs in Energy Projects:

Women have special needs in relation to energy technology. It is frequently difficult for women to learn about new technologies. For example, women may be constrained from participating in general village meetings, or it may be considered inappropriate for male extension agents to deal directly with women. Women also have special responsibilities which will affect the ways they can learn about or use energy technologies. For example, child care responsibilities will limit the times and places where women can receive energy training.

Improved food processing and household technologies are more important to women's work than to men's. At the same time, women may have more difficulty in obtaining funds to invest in the technology they need. Women have fewer income earning opportunities than men, and in those areas where women do have income earning opportunities, they tend to receive lower cash benefits than men. Where non-household energy technologies are introduced (e.g. grain grinding mills or water pumps) women often do not have the skills necessary to use or maintain them. In extreme cases, women have lost control over a traditional economic activity when the work was mechanized and men took over the technology.

Female heads of household have particular difficulties in acquiring new energy technologies. Because they have often taken over men's agricultural and other economic responsibilities in addition to their own traditional tasks, these women have extremely limited time to learn about new energy technologies. In addition, because they will likely have fewer opportunities for earning income than men, they may find it difficult to make the necessary capital investment.

Women also have special health needs which are associated with their use of energy. For example, women in their role as cooks are most exposed to the danger of burns and smoke inhalation from traditional stoves.

Women have special needs in institution-building and energy training projects. Women often have lower levels of technical training and experience than men and this must be addressed before women can participate fully in such projects. Women's special needs for childcare facilities or separate living quarters must also be considered in planning such projects. In some cases, institutional resistance to including qualified women may require the use of

administrative measures such as quotas before the project can successfully integrate women into project activities.

Women and Energy Planning:

Women's organizations can play an important role in national or regional energy planning. The 1984 Conference on Women and Energy in Oslo recommended that women's organizations, energy organizations, and forestry organizations work together in energy planning. (See Appendix C.) Such an arrangement would help ensure that women are considered in all their roles (directly productive economic roles as well as household roles) in plans for energy pricing and subsidies, energy distribution, technology acquisition, etc.

Giving women's organizations an active role in energy planning should also help identify instances where women should not be the target beneficiaries for energy programs. For example, because household fuel gathering is not the major cause of deforestation in most areas, projects which attempt to address the problem only through women's activities as fuel gatherers and cooks are unlikely to have much impact on the problem.

Energy planners should also be aware of energy technologies which only help one class of women. Improved charcoal making technology is more likely to benefit urban than rural women, because more urban households use charcoal. Other technologies which require high initial investments -- biogas facilities, solar cookers, and even, in some areas, rural electrification -- may not be accessible to poor women at all. Relatively expensive technologies may be of more use to poor women when installed in community facilities where they can benefit as part of the community.

Women must be assured access to energy technologies which will help them in their directly productive work as farmers, artisans or entrepreneurs. But women have additional needs for improved household and food processing technologies. The economic value of such indirectly productive work is seldom included in energy planning. The value of household tasks like ironing, clothes washing, or food preparation is very hard to measure, but increased efficiency or productivity in these areas could have a great impact on women's lives. Greater productivity in household tasks may free women's time for more directly productive, income-earning activities. But even in areas where few economic activities are available to women (because of lack

of raw materials, little access to markets, etc.) improvements in household and food processing technologies can substantially improve the quality of women's lives. Energy projects are needed which will address the whole range of women's activities -- both directly productive economic roles and indirectly productive household roles.

APPENDIX A

PROJECT PROFILES

Country: **Burundi**

Project Name: **Bururi Forest**

Project Number: 695 0105

Life of Project Funding: $1.14 million

Length of Project: FY 1981 - 84

Type of Project: WID integrated

This project was designed to preserve Bururi Forest, one of the last remaining natural high altitude forests in Burundi. It was felt the most important factor endangering the forest was the pressure of local fuelwood needs. To reduce this pressure, the project proposed to establish plantations around the forest, set up seedling nurseries, and encourage private and community woodlots. A subcomponent of the project was the introduction of inexpensive, energy-saving stoves which was expected to decrease the fuel use for each household.

The project paper was one of the more "aware" documents in WID terms. Although women were primarily expected to benefit from project activities in their household roles (e.g. more readily available household fuelwood supplies, the cookstoves project), there was careful attention paid to other roles as well (e.g. women as primary food producers). The design team made an effort to contact project area women in order to get their opinions on proposed project activities. An excellent social analysis annex was written by a woman. This annex included data on women and much of this information was incorporated into the body of the main paper.

The planning document anticipated that the workers employed on the project would be predominantly male, while women continued their own traditional work as food producers. One serious attempt was made to look into the possibility of hiring women for paid project work (making baskets for seedlings), but this did not turn out to be feasible. (Plastic bags are much better for protecting seedlings against insects.)

This is a relatively new project and the word is not yet in on project success. The cookstove project was well-planned in the design stages (village women's opinions were solicited, for example). If the implementation efforts

continue to involve women in the testing process, and if effective methods can be found to disseminate the technology, the cookstoves will likely find an appreciative market among village women.

One potential problem with this project is that planners' justification for the cookstoves component rests almost exclusively on the assumptions: 1) that the cookstoves will save fuelwood; and 2) that these fuelwood savings will markedly relieve the pressures on Bururi Forest resources. Experiences with other cookstove projects in other areas have shown the difficulty of designing stoves that show substantial fuel savings under field conditions. More important, however, is the fact that fuelwood collection is often a relatively minor pressure on forest resources -- other project experience suggests that lumbering, agriculture, or grazing cause far more damage. Although the design team found area women eager to receive new cookstove technology, the project documents did not explore the reasons for this besides possible fuel savings. Other project experience shows that women value improved cookstoves for many reasons -- convenience, time-savings, safety, and appeal of more modern technology -- in addition to fuel savings.

Country: **Honduras**

Project Name: **Natural Resources Management**

Project Number: 522 0168

Life of Project Funding: $14.99 million

Length of Project: FY 1980 - 85
(Project evaluation recommends extension to 1988)

Type of Project: WID integrated

This projects' purpose was "1) to strengthen the institutional mechanisms through which the Government of Honduras manages the country's natural resources; 2) to undertake an action program in selected watershed areas to increase farmers' incomes; and 3) to conserve the natural resources of soil and water through the introduction of modified agricultural and forestry activities."

At the time of the project evaluation, work on the project was seriously delayed and the evaluation recommended extension of the project to FY 1988. There were apparently many reasons for the delays in implementation, but the most serious one was the lack of necessary host country government support. By the time of the evaluation, however, the political climate had changed, the project had gotten back on track, and in some areas was moving well.

Project benefits for women were primarily seen to be the introduction of fuel-saving Lorena stoves, and the planting of fruit trees around some houses. (Women in the project area were traditionally responsible for tree crops on family farms.)

The project paper paid only minimal attention to females as a catagory of beneficiaries although there is a statement that "the project's educational campaign will build on the current division of labor to encourage use of female labor in new agro-forestry and reforestation activities." This rather vague commitment seems to have been dropped from the project, as there is no mention of it in the evaluation document.

One strength of the planning document was its thorough and well-considered discussion of general classes of beneficiaries (e.g. cattlemen, small or medium farmers, sharecroppers). There was a serious attempt to consider the

differing needs of these groups and to discover different implementation approaches which could reach each one. The information and data presented in this discussion seemed to have been based on careful research. An opportunity was missed either to collect gender-disaggregated information during surveys, or, if such information was collected, to include it as part of the background material and discussion of the project paper.

Implementation of project components meant for women was been seriously handicapped by the lack of enough female extension agents. The evaluation team found that the cookstoves component was seriously affected. In areas where no female agents were in place, introduction of the cookstoves was very slow; in the few areas that did have female agents, dissemination of cookstove technology was much more widespread. In one project area, an enthusiastic woman extension agent, who had the willing help and support of her male co-workers (for cookstove demonstrations), had apparently been markedly successful in introducing the new technologies to area women.

This project may benefit women in its cookstoves component, although this may have little effect on total area needs for forest resources (see Burundi project profile). However, women should not be limited to participation in this one project component. Little effort has been made to ensure that women benefit from the broader range of project activities. The mid-term evaluation reported that the local Watershed Management Units (the critical unit for implementation of conservation measures) was originally to consist of an agronomist, a forestry specialist, a male social promoter, a cooperative extention specialist, and an accountant. The revised plan called for a woman social promoter "to work with the wives and children of the committee members," and dropped the accountant and the extension specialist. Although this structure may, in fact, bring some information and benefits to women, it is clear that effective control of project activities is still in male hands. Subsidies for soil conservation projects are limited to those with title to the land. Because ownership of land seems to be primarily male, women as a group are automatically excluded from direct benefits (although they may benefit as members of a household unit).

Country: **India**

Project Name: **Madhya Pradesh Social Forestry**

Project Number: 386 0475

Life of Project Funding: $25 million

Length of Project: FY 1981 - 87

Type of Project: WID integrated

This was an institution-building project which aimed to create the capability among villagers to manage communal and private forest lands and to increase production of forest products. The project would establish a forestry extension organization, institutionalize communal plantations on common land and government wasteland, and would produce and distribute seedlings for reforestation of private land.

The project was exceptionally well-planned in terms of WID issues. Although at the time of the mid-term evaluations, many activities had been unsuccessful in including women, the "WID issue" never disappeared from sight during the project cycle, as it has in other projects. There has been a strong and continued recognition of the need to include women in all levels of project activity, and time and effort were given to ensuring that this come about.

Major problems which hampered efforts to integrate women into project activities included lower levels of technical education among female candidates for forestry staff positions, and difficulties in finding appropriate forums for disseminating information to female villagers on conservation, fuelwood, fodder, etc. Project implementors found it difficult to find qualified female candidates for forester positions and to field enough women extension agents.

However, where female extension agents were in place, there were encouraging signs of women's support for the project: many village women were aware of the general issues being addressed by the project (e.g. fuel conservation); in a few areas, women's groups had been formed to plant and care for trees in common areas near wells; many women were growing trees on family plots. In addition, though this is not explicitly linked with the presence of female agents in the documents, poor women had

been significantly involved in planting and watering trees and in nursery work.

As stated above, there was a continued awareness of WID throughout the project. In 1983 the AID Mission included a specific provision for a review of women's participation in the project. An experienced female professional was recruited to carry out the study, her recommendations were reviewed by the Mission and by the state government, and plans were made to incorporate the recommendations into future project activities. These recommendations included the following:

1) Establishing recruitment quotas for women at all levels of the Social Forestry Department;

2) Introducing village training courses which stressed the participation of women;

3) Wider use of female labor on the project (including nursery work);

4) Special attention to recruiting and training women extension agents. Childcare facilities may be needed so that women with small children can come to classes. The report also pointed out that the requirement that female extension students wear men's uniforms (including men's shoes) acts as a deterrent to recruitment. A woman's version of the same uniform was recommended.

Country: **Lesotho**

Project Name: **Renewable Energy Technology**

Project Number: 632 0206

Life of Project Funding: $1.6 million

Length of Project: FY 1979 - 84

Type of Project: WID integrated

The purpose of this project was "to disseminate a set of renewable energy technologies in pilot areas of Lesotho and establish an institutional basis for their dissemination nationwide." The project was primarily concerned with domestic or household-use technologies which would aid women's work (e.g. growhole greenhouses, improved cookstoves). Primary beneficiaries from this project were expected to be women, although it was considered a mainstream project. This was, in effect, part one of the project, since efforts were concentrated in pilot areas. In late 1984 efforts began to disseminate the technologies on a wider basis.

Recognition of the gender factor was apparent throughout the project cycle. The project paper recognized the unusual demographics of Lesotho. Male migration to South Africa for employment, as well as high male death rates, have led to a situation where most inhabitants of rural villages are women and children. As a result, many women have been forced to take over traditionally male work like agricultural management in addition to their household responsibilities.

During implementation, the project staff frequently consulted with village women on the relative merits and demerits of the various household cooking, heating, and insulating technologies which were being tested. Project technicians then made modifications based on the women's comments. The technologies were disseminated in pilot areas by foreign specialists and by trained host country personnel from the Ministry of Rural Development. Many of these workers were female and were apparently very successful in disseminating the technologies -- especially cooking and heating technologies.

It should be noted, however, that the original plan assumed that technology dissemination would take place

through trained Village Energy Technicians selected by the village. Because household technologies were involved, planners assumed that women would be likely to be chosen as Technicians. This project was never implemented because the Technicians needed considerable technical and business training and extremely varied skills (from welding to glass-fitting). Villages could not easily provide such persons, male or female. (Trained male technicians would likely be using their skills on jobs in South Africa.) Project emphasis shifted from using the Technicians to training existing entrepreneurs (or their potential employers) who would have some technical and business skills already. These persons would then repair and maintain commercially available renewable energy technologies in their communities. There was a hope that some of these entrepreneurs would be women, but no active plans were made to ensure women's inclusion in this cadre of workers.

The project was more successful in dealing with household energy technologies, and less successful with general community or agricultural energy technologies -- for example, a community greenhouse demonstration was never implemented. The household focus may have missed opportunities to help women in their directly productive agricultural work.

However, the project did bring some real benefits to individual women by making their arduous household work safer, more convenient and more efficient. The well-planned stove design apparently did cut fuel use to some extent and so should reduce the time and labor needed for fuel-gathering.

Country: **Mali**

Project Name: **Village Reforestation**

Project Number: 625 0937.09

Life of Project Funding: $.66 million

Length of Project: FY 1980 - 86

Type of Project: WID integrated

This project sought to address the problem of deforestation in Mali's Fifth Region by: 1) improving the extension capability of local Water and Forestry Service officials to promote and support social forestry activities; and 2) increasing village and regional fuelwood production while reducing fuelwood consumption.

Women were expected to benefit from this project through an increased availability of fuelwood and from the introduction of fuel-efficient cookstoves. In this part of Mali, women have traditionally been responsible for fuelwood collection and this has now become a serious burden to them. In some areas, women's health is seriously affected by the strain of finding and procuring increasingly distant fuelwood supplies. Fuel shortages have caused fuelwood to move more and more into the "commercial fuel" sector, and has affected traditional male-female roles. Distances to fuelwood supplies are now so great that some men either gather wood themselves or pay to have it gathered. Young males have also gone into the wood gathering and selling business. Because of the severity of the fuelwood shortage in the Fifth Region, this may be one instance where even marginal fuel savings on improved cookstoves may be of great value to women.

Project implementation was substantially delayed. Although the project agreement was signed in 1980, funding was not available until 1981. Additional delays were caused by limited experience of project personnel with the necessary range of forestry intervention techniques, and by difficulties in quantifying experimental results.

WID issues were not well integrated into the project process. A cable to Mission after an A-PID review specifically suggested that the "role of women" be stressed as an important project focus (e.g. in tree selection, location of woodlots), and that a sociologist be a part of

the team in order to examine these roles. This was not brought "up front" in project documentation to the degree which would probably have been necessary for serious implementation of the idea. The cable remains buried in the appendix. This may have affected the success of project components meant to help women. At the time of the mid-term evaluation, the cookstoves component was faltering badly. The implementation team lacked a cookstoves specialist and was having difficulties designing an efficient woodstove which would be acceptable to the target population.

Other project components ran into difficulties, too. The woodlot project, which was intended to increase the availability of fuelwood suffered from two years of poor rainfall. Villager support of the woodlot project was said to be high, though women's participation in project activities was not specified. Woodlots have drawbacks in that the wood they provide is relatively expensive, so this project component may be dropped entirely.

Country: **Senegal**

Project Name: **Fuelwood Production**

Project Number: 685 0219

Life of Project Funding: $3.09 million
(increased to $4 million)

Length of Project: FY 1979 - 84

Type of Project: WID integrated

The purpose of this project was to improve the efficiency of fuelwood production for the cities of Dakar and Thies. The stated intent was to provide employment and improve the general environment for villagers in the Thies region, but the project was essentially a technical forestry project with very few social forestry activities.

The linchpin of the WID component in the project planning documents was to be an extensive use of local female labor on this forestry project -- specifically in the nurseries. Women would be paid the same wages as men. The project paper noted that this would be the first time area women would be employed on such a wide scale. In addition, there was a general idea that more easily available fuelwood supplies resulting from project activities would ease the burden of fuel collection for area women.

The ambitious plans for hiring female nursery workers disappeared between the planning and implementation phases, and women had, in fact, only a very minor role in paid project activities (one small seed-extracting activity). Project documents do not make it clear, but it is likely that men took over the nursery work because it was <u>not</u> seen strictly as "women's work" and, more importantly, because nursery work offered regular cash wages in a very poor area. With no special efforts to hire and retain women, seedling nurseries became a male domain.

However, it should be noted again that this was a project defined and evaluated primarily in technical terms. Whether or not efforts were made to hire women as nursery workers, it would probably have made little difference to the rather marginal success reported in the evaluation paper. Severe organizational, labor, and financial management problems beset the project and there is no evidence that an increased "WID awareness" would have solved

these problems. Project success was curtailed primarily by technical factors -- rainfall was much less than expected topographic maps were very poorly designed, severly underweight (and therefore ineffective) ground tilling and clearing equipment was delivered. Another major problem was that the planning paper was not translated into French until three years into the project. Senegalese project personnel therefore, did not have access to basic project information.

The following projects were not included in the sample. Project profiles are included here because they represent another type of AID energy project -- participant training.

Conventional Energy Training Program

Project Number: 939 9997
LOP Funding: $14.65 million
Length: FY 1980 - 84

The purpose of this program was to provide candidate participants from developing countries with M.S. degrees, and in-service and industry fellowships in science and engineering fields related to conventional energy. Participating countries had to meet several criteria, which included: potential for conventional energy development (coal, gas, oil); a degree of financial and development strain resulting from energy import dependence; plans to acquire technology to complement the training received under the project, etc.

Candidates were required to have a Bachelor's Degree and relevant work experience. Direct beneficiaries, therefore, tended to be the elite of developing countries. The selection process was composed of several steps: 1) host country governments proposed the candidates; 2) AID Missions reviewed the applications; 3) Selection Committee reviewed candidates and forwarded applications to appropriate universities; 4) final selection was made at the university level.

Project documents specify that during the selection process "AID Missions and Governments and the Contractor will actively recruit qualified women candidates. The selection committee, similarly, will give special consideration to applications of women candidates. While no quota for women will be set, the Advisory Committee, Contractor, and AID may decide on formal measures to recruit women if natural selection proves that significant barriers exist to women applying."

Energy Management Training

Project Number: 939 1160
LOP Funding: $3.492 million
Length: FY 1981 - 84

The project provided a series of intensive courses on energy planning and management, primarily directed to those in middle and upper levels of management in energy planning institutions, oil companies, electric utilities and other energy institutions. Participants were chosen in the same fashion as above.

Training in Alternative Energy Technologies

Project Number: 936 5716
LOP Funding: $3.9 million
Length: FY 1982 - 84

The project was established at the University of Florida to help developing countries explore the potential for using renewable sources of energy. The six month training course covered such technologies as thermal gasification, anaerobic digesters for biogas, alcohol fuel production, hydropower, wind energy and geothermal energy. Candidate selection was the same as above.

One of the more unusual requirements of this program was that all participants had to be able to cook. This requirement was primarily due to the type of lodging provided (access to kitchens, but no prepared meals), but also to the custom of having all participants prepare at least one native dish for an international dinner. At least one male mid-level government official had to ask his cook to give him lessons as preparation for the energy course!

WID and Participant Energy Training:

The Office of Energy, which ran these training programs, encouraged the Missions to identify women candidates. But the number of female candidates remained low throughout the program because the first step, host country identification of candidates, tended to favor men. (The pool of women with appropriate technical training would in any case be smaller than the pool of men.) The AID selection committee tried to compensate for this by

accepting essentially all women nominated for the program who met the minimum qualifications. On the whole, the qualifications of women candidates were lower than those of men, but male candidates tended to be overqualified (already possessing an advanced degree, in upper rather than middle levels of management), so many female candidates were actually well-qualified for the training.

Twenty four women were trained in the Energy Management Training Program (8% of the total trained). All ranked in the top half of the program. Women also comprised 8% of the total participants in the Alternative Energy training program. Because energy is such a new field for women, this 8% participation figure can be considered quite good. Most women trainees came from Egypt, Sudan, Thailand and the Philippines. Many women (especially from the Philippines) were academics who would return to teach at universities. The Egyptian and Sudanese women were mostly from utility companies. The women students proved highly motivated and did very well in all of the energy training programs. Women also adjusted well to life in the United States. There is no tracking mechanism in place to determine what roles trainees play in their home countries upon their return, but anecdotal evidence suggests that their skills are being used.

APPENDIX B

METHODOLOGY

METHODOLOGY

This study was part of an overview of AID's experience in Women and Development over the past decade. The energy sector was one of five chosen for a closer examination by sector specialists. The study is divided into three phases: 1) the application of a data collection instrument to a sample of project documents; 2) sector analysis based on findings from phase one, further research, interviews, and the specialist's own professional knowledge of the sector; and 3) field visits to selected projects. This report completes phase two of the energy sector analysis.

Phase One: The Sample Projects

In this phase, each sector specialist applied a uniform survey instrument (a questionnaire) to a random sample of projects. Ten projects were selected for the energy sector. There were a number of serious problems with the methodology in this phase:

A) The sample was not representative of AID experience in the energy sector over the past decade. All of the projects in the sample had fuelwood and/or cookstove components. Although other project activities included a greater range of energy technologies (from solar energy to gasification), the "women's component" in all projects was strongly identified with the provision of fuelwood for household use and with improved cookstoves to save fuelwood.

This leaves out of the sample a number of important energy sub-sectors where AID has been active over the past decade, which include: rural electrification; conventional and non-conventional energy training programs; assistance in energy planning and pricing; assistance in developing national petroleum, coal and gas resources.

B) The random sample was chosen from a universe of projects suggested by the Missions as having some special women's component or interest for women. The choice of projects may have reflected the close identification of women with household energy use (fuelwood, cookstoves), and to that extent the energy cases included in the universe may reflect a bias. It is true that AID has been very active in the fuelwood/cookstove area over the past several years and that, through their sheer number, fuelwood/cookstove projects would be likely to be well-represented in a sample.

But it seems unlikely that a completely random sample would have produced cases in which 100% of them included fuelwood/cookstoves components as the major "WID component" of the project.

C) The survey instrument (a questionnaire developed for this study) was very difficult to apply to the sample for several reasons. First, the questionnaire focused on a level of detail on women's roles and activities which could not be answered by project documents, which sometimes barely mentioned women. Second, project documentation was incomplete in many cases. A good deal of the consultant's time was spent tracking down project documents from country desks or other sources within AID which were not available through the Evaluation Office. This effort did not always yield useful information. Limited documentation was available on many projects; sometimes only a planning document was available.

Phase Two: The Analysis

Because of the limitations of the sample as a tool for looking at the relationship between Women in Development and AID energy projects over the past ten years, the analysis was based on a wider range of energy development experience as reflected in:

1) other AID energy projects which did not appear on the sample, but which were identified by AID personnel, energy sector specialists in other organizations, and a computer search through AID library documents;

2) other energy sectors in which AID has been involved over the last decade (e.g. rural electrification) but which did not appear in the sample projects;

3) interviews with energy and WID experts outside of AID (e.g. private contractors, the World Bank, the ILO);

4) a review of the literature.

Phase Three: Field Visits

This last phase will be an extremely important one for the analysts involved in this project. Several energy projects which appeared in the sample would be good candidates for field visits: Madhya Pradesh Social Forestry (India); Renewable Energy Technology (Lesotho); and

Renewable Non-conventional Energy (Thailand). Profiles of the first two appear in Appendix A of this study.

Thailand's Renewable Non-conventional Energy Project (#493 0304) is another possible candidate from the sample. Project components included: 1) institution-building for government energy policy planning capability; 2) introduction and testing of renewable energy technologies in rural areas; and 3) developing and testing techniques for disseminating these technologies. Women were expected to benefit from the project through the introduction of wood-saving stoves. In addition, the Royal Thai Government, as a Condition to the Project Agreement, agreed to "emphasize the recruitment and retention of women staff for project activities."

A fourth candidate for a field visit is Nepal's Resource Conservation and Utilization Project (#367 0132). This project should : 1) increase the number of persons in natural resource management in Nepal; 2) establish watershed and forest management programs; 3) establish fodder and fuelwood plantations; 4) increase crop yields; and 5) increase livestock production. The project emphasized the energy needs of women and made efforts to incorporate women into the Ministry of Forestry and to train village women as extension agents. Ten percent of program funds were reserved for women. A mid-term evaluation reported that this project had encountered many of the same difficulties in including women in project activities as had India's Madhya Pradesh project. It also found it very difficult to incorporate women into professional training programs. Although women had been trained as extension agents, the overall number was lower than hoped.

APPENDIX C

MAJOR RECOMMENDATIONS FROM THE CONFERENCE ON WOMEN AND ENERGY

(Oslo, Norway June 1984)

Major Recommendations From the Conference on Women and Energy

(Oslo, Norway June 1984)

An international Conference on Women and Energy was held in Oslo during June, 1984. Hosting the conference was the Norwegian Development Group for Women and Energy, which is composed of the Norwegian Housewives Association, the Royal Norwegian Ministry of Agriculture and Forestry Development, and the Norwegian Water Resources and Electricity Board's Directorate of Energy. Following is a summary of major recommendations which came out of the conference.

1) National and international agencies responsible for energy development should adopt the "troika" model: women's organizations/ energy organizations/ forestry organizations. There is a clear mutual interdependence among these organizations in planning and executing energy projects.

2) International women's organizations should mobilize political opinion and educate governments on the important role which women play in energy development. International women's organizations should also identify appropriate national women's organizations to participate in planning, designing and implementing energy programs.

3) Implementation of energy projects should be done through existing institutions, not newly-created institutions.

4) National planners should be aware that large-scale users of forest lands, spreading agricultural and logging operations, and animal herders are the principal causes of fuelwood shortages (not women fuel gatherers). This should be taken into account when designing energy projects.

5) Governments and energy planning bodies should be made aware of the mobilization potential which women's organizations have throughout most of the world and how this resource might be tapped for implementing projects at grass-roots level.

6) New and more imaginative methods of loan financing should be implemented. Greater use should be made of "front end" financing (in which different interest rates are applied in accordance with the project's ability to repay). Grants should be concentrated in non-commercial projects

with a high social impact among the poor, since such projects are difficult to finance through conventional financing mechanisms.

7) A project should be develcped in the field to incorporate the findings, principles and recommendations of the Workshop.

8) Copies of the Workshop Report shoudl be disseminated at international meetings and conferences.

(Source: Norwegian Development Group for Women and Energy, "Women and Energy: Report from an International Workshop held in Oslo, June, 1984," Oslo: Norwegian Development Group for Women and Energy, 1984.)

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