

ENERGY FOR RURAL WOMEN'S ENTERPRISES

GHANA

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UNIFEM has supported the economic empowerment of women in Africa and other regions for many years. One of the major lessons drawn from its work is that lack of reliable, affordable and locally-available energy supplies limit women's productivity. For this reason, UNIFEM designed a project on "Energy for Sustainable Women's Livelihoods: Gender Responsive Renewable Energy Systems Development and Application" (GRESDA). The goal is to demonstrate selected marketable and appropriate renewable energy equipment and energy efficient appliances that can be used to create sustainable rural industries.

The project focuses on food-related activities since the majority of rural women in West Africa are involved in agriculture, small and medium scale food processing, and trade in such commodities as palm oil, shea butter, cassava, millet, smoked fish, vegetables and fruit juices. Its objective is to contribute to women's economic empowerment and food security by introducing energy technologies and equipment that improve agricultural processing enterprises and reduce post-harvest losses.

The strength of the UNIFEM approach lies in its emphasis on letting women speak for themselves. Consultations with women have provided important insights into the actual needs of rural women with regard to improving their occupational opportunities. Women have also been actively engaged in appraising equipment and adapting it to meet their needs.

Activities initiated by GRESDA in Ghana include development of an improved press for shea butter processing and of a more efficient fish smoker. Continuation of the GRESDA projects, however, will depend on attracting additional resources.



While gathering information about women and food security, UNIFEM funded a comprehensive research project to analyse existing renewable energy alternatives and assess their availability and feasibility for application in rural areas of West Africa. Experience in Ghana and Nigeria had already shown that one of the main impediments faced by rural women entrepreneurs in optimising the efficiency of their food processing activities was having to use wood for fuel. It is time consuming to gather wood and tend to wood fires, the smoke is harmful to women's health, and wood consumption contributes to deforestation.

Rural electrification is progressing but many areas remain without access to the electricity grid and are likely to remain so for a long time yet. The challenge that many African countries face is to strengthen national capacity to develop, operate and maintain alternative and renewable energy systems, and to ensure that women—who contribute to 70 per cent of the food security in Africa—control and benefit from these systems.

Most women either work individually near their homes or are organized into small business cooperatives. With the deepening of the economic crisis, more and more women are moving from subsistence-related activities to rural food processing enterprises to earn a living. Despite the growing importance of small-scale food processing for the economy, there is very little formal research or training available to support these activities. Moreover, there is little attention to women's energy needs. In most countries in the region, government energy policies do not take gender issues into account, and energy concerns have not been high priorities of women's organizations.

In the past there have been some successful attempts to support the output, efficiency and environmental sustainability of women's activities by introducing devices such as fuel-saving stoves, fish smokers and other equipment, but these have mostly focused on women's needs as household consumers rather than as producers or entrepreneurs. In addition, the technologies introduced were often designed without either a proper needs assessment or the participation and input of women end-users, and this led to problems in acceptance of the new equipment. This project emphasises participation by women, as well as the importance of increasing income so that women can afford to pay for improved processing equipment.

Stakeholder consultations

During phase one of the project, UNIFEM commissioned a baseline study on the energy use and technology needs of women in major economic sectors, with special reference to food processing. National consultations were held in Ghana in 1998 and in Nigeria in 1997. Participants in both workshops included policymakers, financial and research institutes, non-

governmental organizations, international development and cooperation agencies, UN representatives, the private sector, grassroots women's agricultural processing cooperatives and women entrepreneurs.

The national consultation in Ghana involved over 120 participants and stakeholders from the ten regions of Ghana. The consultation was unique in that it raised awareness about renewable energy technologies as well as the significance of gender responsive development.

Notwithstanding their traditional roles as mothers and wives, women in Ghana engage in a variety of productive activities to sustain their subsistence-level standard of living. These activities are generally carried out using labour-intensive techniques. Because rural women have so many responsibilities, they often cannot accomplish all their daily tasks. This results in a situation where a good proportion of farm produce is not processed for long-term storage and there are substantial post-harvest losses.

To provide a permanent solution to rural women's problems, it is necessary to look at the energy requirements of the day-to-day activities of women and begin to design an improved energy supply system.

Women's energy needs include the following:

- ▲ Sufficient power for grain threshing and milling, and tuber peeling for domestic consumption and marketing.
- ▲ Devices for pumping water from wells, bore holes and rivers.
- ▲ Energy systems for lighting, refrigeration and other electrical appliances.

A number of research and technological institutions in Ghana have developed proven energy-saving technologies aimed at reducing the drudgery of rural women. However, due to lack of proper interaction with the rural community, the transfer of these technologies has been very slow.

Through the national consultation in Ghana, UNIFEM and its partners gained valuable insights about project opportunities, and limitations. The country has already developed some expertise on bio-gas and solar photovoltaic technology, as well as solar thermal systems. Wind and micro hydro technologies and knowledge are limited. The discussions also showed that liquefied petroleum gas (LPG) has great potential for meeting women's energy needs, but it is often unavailable in rural areas.

During the national consultation, women engaged in productive enterprises identified the following needs:

- ▲ Training in businesses management and operations.
- ▲ Credit facilities to buy specialized equipment for improving operations.
- ▲ Training in the use of energy-saving devices.
- ▲ Support for exchange of information among groups through newsletters and networking.

Promoting income-generating activities for women

Following the national consultations, the GRATIS Foundation was selected to be the implementing agency for the GRESDA project in Ghana. The GRATIS Foundation evolved out of the Ghana Regional Appropriate Technology Industrial Service (GRATIS) Project, which was established by the Government of Ghana in 1987 to promote small-scale industrialization in Ghana. GRATIS has established Intermediate Technology Transfer Units in nine regions of Ghana to transfer appropriate technologies to small-scale industrialists through training and the manufacture and supply of machine tools, plant and equipment.

GRATIS also has a special Gender and Development Unit that provides technical and entrepreneurial skills through the implementation of development projects and extension programmes in rural communities. The activities of this unit include batik, tie and dye production, cotton spinning and broadloom weaving, bee keeping and honey extraction, soap and bead making, food processing (including shea butter and vegetable oil extraction) and citronella oil extraction. The unit has been successful in introducing technologies related to these activities through offices in the ten regions of Ghana.

In 1999, GRATIS organized a strategic planning meeting of GRESDA partners from both Ghana and Nigeria. The major challenge was to determine how to reduce reliance on fuel wood, for health as well as environmental reasons, and to reduce the time women spend in difficult and repetitive work. Discussions centred on ways of promoting the transfer of suitable energy technologies from research institutions to end users, especially by including women in the appraisal and adaptation of these appliances.

At the strategic planning meeting participants agreed to select a few demonstration sites, using information from existing sources and from the application of a rapid appraisal method, a tool for quickly obtaining demographic, economic and social data. The projects were meant to focus on rural areas where women were already engaged in some commercial activity related to food production or agricultural processing and needed a push in terms of technology to make their work more profitable and less difficult. After consulting with women's groups and gathering proposals, GRATIS discussed the suggested options in consultation with UNIFEM, other donor agencies and support organizations.

Although there was substantial interest in renewable energy technologies, the initial project designs involved more efficient processing equipment to reduce drudgery and demand for fuel wood, rather than new energy-producing technologies.

Examples of new energy efficient equipment include a cleaner fish smoker that uses LPG, and a shea butter extractor that dramatically decreases fuel wood consumption, water use and the amount of women's effort required for processing.

Shea Butter Extraction Project in northern Ghana

Traditional shea butter extraction is a major income-generating activity for women in the northern and upper regions of Ghana. Since 1998 over 32,000 metric tonnes of shea nuts have been exported from Ghana annually, generating about US\$7,000,000 revenue per year. There is high demand for shea butter in the international market both for cosmetics and chocolate production.

Shea nut harvesting and shea butter extraction are predominantly done by women. Marketing, however, is controlled primarily by businessmen who earn more than ten times the income of the primary producers. The women producers work in small groups but generally have private, individual holdings. Earnings are low, mainly due to the traditional technologies employed in shea butter processing.

The traditional shea butter production process, which gives an average extraction efficiency of 62 per cent, consists of seven steps: grinding, roasting, milling, kneading, washing, cream boiling and clarification. This process has a number of production and environmental drawbacks, including the arduousness of the seven different operations, the long processing time, low production capacity, excessive use of water and firewood, and the women's long periods of exposure to heat and smoke. Many attempts have been made to introduce improved technologies but these efforts have not created the needed impact on small-scale shea butter production. Traditional processing still accounts for about 80 per cent of total shea butter production in Ghana.

Women without working capital cannot run their own operations, and generally work for one of the six local companies that export shea butter. Poor women in need of income are hired by exporters to produce butter for them at very low cost and under very deplorable conditions. In Tamale, the northern regional capital of Ghana, hundreds of women queue daily for a chance to earn a daily wage producing butter for a company. Sometimes 200 women out of 600 women in the queue are



The improved bridge press reduces fuel and water use, as well as exposure to smoke and heat.

THE LEGENDARY SHEA BUTTER

Shea butter is treasured in West Africa for its many healing properties, and legend has it that it is used as an oil and food by the gods. It has been used there for thousands of years as an all-around remedy for skin problems, to ward off wrinkles and stretch marks, rejuvenate skin cells, protect against ultraviolet rays and strengthen weak hair. It also has anti-inflammatory properties that make it useful in the treatment of rheumatism, muscular pain and sunburn. These days, it is found in a variety of pharmaceutical products and high-end cosmetics and chocolates. A 200-millilitre container of rich shea body butter sells for more than \$25 in some New York Stores.

The butter is derived from the seed of the shea tree (*Butyrospermum parkii*) that grows wild in the savannas to a height of 55 to 60 feet. Once every year, the tree produces delicious fruits that are harvested during the rainy season. The seeds within are collected and usually sun dried.

At the end of the season when the nuts are well cured and dried, they are threshed. Because the shea nut seed is as hard as a pebble, the grinding process is arduous, especially without grinding machines. The powdered shea nuts are boiled in extra large clay pots for four to five days. The shea butter is skimmed off the top and stored in calabash containers.



selected and given the job of producing butter using the traditional processing method. Each woman is paid a daily wage of 3,000 Cedis, equivalent to \$0.50.

The GRESDA shea butter processing project was formulated after women's groups in northern Ghana that had participated in the national consultation organized themselves and appealed to UNIFEM for assistance. They were shea butter producers who wanted to find appropriate technologies that would allow them to increase output, reduce fuel use, and eliminate the middlemen.

The focus of the project is on introducing and testing an improved bridge press that reduces fuel and water use, as well as exposure to smoke and heat. To eliminate middlemen, the project promotes more effective marketing of the women's products and is making efforts to link the women processors directly with international markets through collaboration with shea butter processors and exporters in Burkina Faso.

In an attempt to improve on the traditional processing method, Ghana's Technology Consultancy Centre developed a simple process known as the Intermediate Moisture Content (IMC) method for shea butter extraction. In collaboration with community-based women's groups, the centre successfully field-tested the new processing method at Vitim and Savelegu in northern Ghana.

The IMC method involves grinding dry kernels into paste using a motorised plate mill. This eliminates the roasting, creaming and boiling steps in the traditional process, which consume large quantities of firewood and water and expose the women to a great deal of heat and smoke. Immediately after milling the paste has a moisture content of 12 per cent and is at a temperature of 70° Celsius—warm enough to allow pressing to be done effectively. After loading into empty cotton sacks the paste is placed directly into the bridge press.

Some advantages of the new improved method over traditional processing include:

- ▲ A five per cent increase in extraction efficiency and 200 per cent increase in daily production capacity.
- ▲ Decreased firewood consumption (e.g. eight kilograms of firewood for the IMC method versus 72 kilograms in the traditional process for the processing of 85 kilograms of kernels).
- ▲ Decreased water use (e.g. eight litres of water for the IMC method as against 160 litres in the traditional method for 85 kilograms of kernels processed).
- ▲ Higher consumer preference for butter produced using the new improved method owing to its milder shea smell.

There are over 1,000 women's groups involved in shea butter processing, with an average of 30 members per group. The pilot project is targeting four women's groups with a total of more than 200 members.

Fish Smoker Project in Accra communities

The fish smoker project grew out of persistent requests by women entrepreneurs and women's groups in four rural fish smoking communities in the Greater Accra Region who asked for assistance from GRATIS in improving the traditional smoking processes. The communities include Kpone, Prampram, Tema and neighbouring fishing communities in Accra. The project was designed to involve 70 women and to be completed within 14 months.

The project is introducing a new hygienic smoker that meets the requirements of both the Ghana Environmental Protection Agency (EPA) and the Ghana Standards Board (GSB), as well as international standards. Fish processed using traditional methods do not meet international standards and



Fish processed using the new hygienic smoker (left) can be marketed internationally at higher prices.

can only be marketed locally at low prices.

The target beneficiary group is women who currently use fuel wood for fish smoking and in so doing are subjected to long hours of smoke inhalation. The women are faced with dwindling wood supplies, low returns from the sale of low-quality smoked fish, and environmental as well as health hazards. They are therefore impatient to be assisted with an improved technology.

Fish provide an important source of animal protein for most people in Ghana. There is a fair-sized fishing industry comprised of both marine fishing and inland fishing. Marine fishing has been the most important sector, contributing about 80 per cent of the total domestic fish supply. Ghana's fishing industry has made tremendous strides during the past decades, developing from a predominantly traditional canoe fleet to a mixed traditional/modern fleet that includes factory trawlers. In the villages, however, canoe fishing is still of great importance and accounts for over half of the marine catch nationally.

In Ghana, canoe fishing is done only by men, and fish processing (smoking) is exclusively the domain of women. The main methods employed to reduce post-harvest losses in the fishing industry include solar drying, refrigeration, salting and smoking. Post-harvest losses are estimated at 45 per cent for fish products. In rural areas and less privileged communities, refrigeration facilities are either not available or too costly for most women to use. Solar drying, unfortunately, is only effective for a couple of fish species—the less bulky types. Preservation of fish through smoking represents the only option for most poor rural communities.

Fish smoking is traditionally done on an individual basis, or

by a family group composed of three or four members, which may include a mother and daughters or a group of sisters. Sometimes individuals will break off from these groups once they have acquired the capital to set up business on their own. The fish are purchased from fishermen who demand immediate cash payment for the day's catch. The smoked fish are later used for domestic consumption and sold in the local market for income generation.

For many decades, women fish smokers have depended on traditional wood-fired techniques that are very laborious. Trees are cut daily for fish smoking, which contributes to the depletion of the wood stock. The women, often with their babies on their backs, inhale volumes of smoke into their lungs. The vicinity where they operate is engulfed with thick smoke, affecting other people in the area as well as the environment.

The traditional fish smoker is made out of an empty metal barrel cut in half. The chorkor smoker, an improvement over the traditional smoker, reduces fuel wood consumption to some extent, but does not solve problems of smoke inhalation or fire wood scarcity.

At the GRATIS Foundation, engineers, technicians and a food scientist, in consultation with the women's fish smoking groups, developed an improved fish smoker which depends solely on gas (LPG) for fuel. The improved fish smoker offers an acceptable, clean, energy-efficient and environmentally friendly fish smoking technology. The LPG-fired fish smoking oven is constructed from aluminum sheets and equipped with smoke generators neatly embedded at the rear. Smoke is generated by burning crushed sugar cane, coconut husks or any approved agricultural wastes.

The fish-smoking village of Prampram, in the Ga Dangbe district of Greater Accra, was chosen for the initial pilot project. The men in this village go to sea and do the fishing while the women buy the catch from them and do the smoking and marketing. The main income source for these women is the sale of smoked fish, mainly herrings, tuna fish and the local favourite, "Keta school boys" (anchovies). The smoked fish is only sold locally and the women's earnings are extremely low.

In the pilot project, three LPG-fired fish-smoking ovens will be constructed and installed. The women have no direct access to commercial banks because they cannot provide collateral or other security. The project will provide the smoker and the women will pay for the equipment in instalments out of their



Trees are cut daily for traditional fish smoking, depleting the wood stock.

profits. Operating costs for the LPG smoker are slightly less than for the traditional smoker. According to the women, they use about 30,000 Cedis worth of fire wood to smoke 50 crates (one ton) of fish. The new smoker uses 28,000 Cedis worth of LPG gas to smoke the same quantity of fish.

The project will also provide the women with credit for fish so they can get started and be able to operate the new facility close to full capacity. Two cartons of fish (about 260,000 Cedis or \$40 per carton on the average) will be provided to each of the first 25 active women in the group out of a fund of about 10 million Cedis (\$1,500). As the women repay their loans, the money will be used as a revolving fund.

During the pilot phase, the women will also benefit from a comprehensive training scheme provided by GRATIS and Divine Sea Foods Ltd., which will cover:

- ▲ Proper operation of the technology, i.e. the smoke

generator, the heat generation apparatus and the temperature sensors.

- ▲ Minor repairs and maintenance of the equipment.
- ▲ LPG handling, purchase, valves and hoses.
- ▲ Simple bookkeeping and basic business management.
- ▲ Smoked fish packaging for national/international markets.
- ▲ Oven cleaning and wastewater disposal treatment.
- ▲ Credit utilisation and management.

At the end of a 12-month pilot phase, the project will be evaluated. If the women's collective group is found to have a strong management team, it will be given an opportunity to take over project operations entirely. Otherwise, an individual entrepreneur among the group, who is willing to operate and manage it to serve the others on a commercial basis, will be invited to make an offer for possible transfer.

LESSONS AND CHALLENGES

The GRESDA projects so far have tried to build on women's own knowledge and to engage them in the development and use of various technologies. It is not a simple matter, however, to get women involved in the design and use of equipment.

One of the difficulties in introducing new technologies is that they generally have to be accepted and approved by men in the community before the women can openly embrace them. Sometimes meetings with husbands, chiefs and elders at selected project sites are required to convince them that women are capable of using the technology.

In any event, getting illiterate rural women to operate and maintain equipment is a very great challenge in itself. Some of the women lack self confidence and are afraid to even touch the equipment, fearing that they might damage it. Therefore, comprehensive training and confidence building is required at the beginning of the project process.

In many cases, however, rural women do know what they need to make their work easier and more profitable, even

though they lack equipment, capital and skills training. Stakeholder consultations are an important method for providing local women with an opportunity to present their needs, discuss them with technology experts, and consider viable options. Cooperation and coordination between women's groups and equipment designers can result in more widespread adoption of new technologies, and more effective results in meeting the real needs of rural women for income-enhancing improvements.

Approaching project design through focusing on activities women are already engaged in, like food processing, and working with them to improve food security and current livelihoods, can promote acceptance of new techniques and technologies and lead to tangible results in rural communities. It also seems that energy efficiency in equipment and processing techniques may be more important in some cases, because of enhanced income-generating opportunities, than provision of energy technologies (e.g., for lighting and electricity) not directly related to production needs.



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