Upper Volta

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BASE-LINE STUDY FOR SOCIO-ECONOMIC EVALUATION

OF

TANGAYE SOLAR INSTALLATION

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by

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In 1978 I conducted a baseline socio-economic study in the village of Tangaye, Upper Volta. The study preceeded the installation of a solar unit, the first of its kind in Upper Volta. Research was focused on the three issues affected by the installation of the solar unit in the village. These were: 1. the need for alternative, inexpensive, sources of energy; 2. the need for labour saving devices, particularly for women; 3. most significantly, the means of integrating a highly-complex technology into village society. In regards to the third issue, my purpose was to discover, and perhaps activate, the structures within the village that could potentially administer the solar unit. This is to say distributing the services equitably and permanently, as well as providing adequate maintenance.

Description of the solar unit.

The solar unit consists of two components: a solar cell array designed to transform solar energy into electricity, and a battery designed to store electricity. This photovoltaic system, as it is so named, supplies the electric energy necessary to power a food grinding mill and a water pump. The mill has a maximum food grinding capacity of 92 kilograms of sorghum per hour. Millet and maize may also be ground though at a reduced hourly capacity. The pump is capable of pumping 1,457 liters of water per hour. One of the most significant

attributes of the solar unit is that it has a battery that stores energy. Although there are other solar energy units in Upper Volta, this system is unique in the country.

Description of Tangaye

The village of Tangaye was chosen as the site for this pilot project for many reasons; among them the village's accessibility. It is located on a major road linking Ouagadougou, the capital of Upper Volta, to Fada N'Gourma a semi-urban administrative center. Since most of the technical monitoring of the unit originates from Ouagadougou, ease of access was an important consideration in the selection of a site.

Tangaye is a large village with a population of approximately 2,000 inhabitants. It is located in a high population density rural zone. There are at least 40 inhabitants per kilometer square. Residents reffer to themselves as the Zaose and are genealogically linked to the Mossi. According to their accounts they are sedentarized pastoralists. Most of the villagers combine subsistence agriculture with animal husbandry.

The village is located in the eastern region of Upper Volta within the sudanic zone. Roughly speaking there are two distinct seasons characteristic of this zone. These are: the dry season from November to May, and the rainy season from June to October.

During the rainy season farming is practised to the

exclusion of all other activities. Farmers cultivate the staples, millet and sorghum. Small quantities of corn, rice, and peanuts are grown in addition to a variety of other products.

Activities during the dry season vary. High population density and poor soil conditions contribute to inadequte food supplies. Since the villagers do not produce the necessary quantity of food to sustain themselves for the entire year, dry season activities are crucial. Villagers must earn money,during this season, to supplement their meager food supply. They do this by engaging in all forms of small scale business ventures. These include migrant labour, production and sale of crafts, and marketting processed foods. Thus food processing and water consumption are at their height in the dry season. It became quite clear that this was the season in which labour saving devices of reduced energy costs, such as promised by the solar unit, would be most usefull.

Labour saving devices and the cost of fuel

Everyone agrees on the importance of solar energy systems, especially in countries such as Upper Volta, where there are few natural energy resources. Wood is the main fuel utilized by the majority of the population. Suffice it to say that defforestation , in this drought ridden land, is a growing problem.

When one considers the energy supplies required for powering food grinding mills, the fuel problem in Upper Volta acquires greater significance. Mills are powered by diesel oil which must be imported at rising costs to the millers. In the past the population has seen the cost of milling services increase with the rise in fuel cost. The increase in rate means fewer people can afford to use the mills. A vivid example of this is provided by the case of a milling establishment in the vicinity of Tangaye. When the cost of fuel rose 33% three year ago, the miller raised his fees 25 percent. This raise was equal to two american cents. (5 francs CFA). As a result of this he lost so many customers that he was forced to open the mill twice a week , on market days, rather than every day as he had done in the past. Few people in the area could afford the 25 percent increase in milling rates. Expenditures for fuel comprise 50-60 percent of the monthly cost of running the mill.

Clearly an inexpensive source of energy is essential if the residents of the area are to have access to labour saving devices. The limited monetary resources of the people places major constraints on the degree to which they may utilize local labour saving devices, particularly in light of rising fuel costs.

Use of commercial mills in the area

As forementioned , the villagers have had experience with labour saving devices in the form of commercial mills. Interviews and observations at these mills revealed the degree

to which the population in the village and elsewhere relied on the services of the mill.

There were two such mills in the vicinity of Tangaye. In a village wide survey it was reported, that though infrequently, almost all families had used commercial mills at one time or another. Approximately 61 percent of the visits were made after 1975. This was so despite the fact that mills had been in the vicinity since 1968. The majority of these visits (55 percent) were made during the rainy season. Large quantities of millet, more than eight liters, were usually ground on these visits.

Most of the villagers did not visit the mills regularly. Those who used the mills regularly were generally vendors who sold regularly in the market. where the mill was housed. The majority of the residents of Tangaye availed themselves of th services of the mill only on special occassion.

Daily observations at mill sites revealed that more than 90 percent of the customers utilizing the mill were women. They were, for the most part, residents of the village in which the mill was housed. They came to grind small quantities of grain for the evening meal. This shows that the services of the mill are still in great demand even for women who do not market as regularly as vendors.

Solar mill and pump: labour saving devices for women and herders

The two segments of the population most directly

affected by the services provided by the solar unit are women and herders. Women are primarily responsible for furnishing the drinking and cooking water used in their homes.They are also responsible for processing grain for the preparation of all the food.consumed in the.village.

One of the questions that I set out to ascertain was the degree to which the pump and grinder would be a labour saving device. Exactly how much labour and how much time was involved.? To do this it was necessary to measure as accurately as possible the time consumed in food processing and water procuring activities. This segment of the study was divided in two sections: 1. food processing activities among women and;2.water procuring activities among men and women . In addition,an estimate of daily food and water consumption was made, thus establishing the extent to which the services of the solar unit would meet demands in the village.

Food

It was established that diet,food preparation , and level of consumption varied significantly from dry to farming season. Time constraints and available food resources showed marked seasonal variations.

The dry season is the social season. A larger variety of food is available in greater quantities. This is because it is the season immeadiately following the harvest. Food

preparation for feasts,and more commonly for marketing , takes on added importance. Grain is usually ground for the purposes of brewing beer and baking cakes commonly sold on the market. During the dry season it was shown that women spend at least 60 percent of their work day processing food and fetching water.

In the rainy season, however, women had to devote the greater part of their work day to farming. Marketing diminishes. The frequency of consumption of food increases with the expenditure of energy required for farm labour. During this season food is prepared twice a day. Sometimes large cultivation parties organized for bride service require large scale preparation of food. The burden of labour increases twofold for women at this time. They must cultivate as well as prepare meals twice as often.

Yet the women employ many labour saving devices. These, coupled with the greater availability of water due to the rainy season, cut down on the time women devote to processing food and obtaining water. Thus women spend only 30 percent of their working day processing food and obtaining water. It must be stated that their working day was considerably longer in the rainy season. In absolute terms women dimished their cooking time by one hour,and the time spent in search of water by one hour and ten minutes.

They dimished their cooking time by altering various aspects of their customary food processing methods. This

included occasionally cooking whole grains rather than making flour, and grinding a coarser grind rather than a finer flour. A kilo of red sorghum may take anywhere from 20 minutes to one and a half hours to grind depending on the quality of flour desired. Thus women may save up to an hour of grinding time if they are willing to eat coarsely ground flour.

It was established, therefore, that the mill would be a great help to women in the dry season when the volume of food processing was at its height . Women had already found ways to diminish the time spent in food processing during the rainy season. Therefore, the presence of a mill might affect the quality of the food consumed rather than contribute to any great degree to the time saved in processing. Especially when one considers the time taken to travel to the mill, waiting to be served etc.

Water

Villagers use of wells showed dramatic seasonal variations. People depended entirely on wells for their water supply during the dry season. During the rainy season, however, the wells are almost never used. The population relies on seasonal sources of water provided by the often torrential rains. The earth in this area is not very absorbent. Water slides off the soil and settles in depressions in the earth, thus forming pools. These pools are often more conveniently located than the wells. In addition the people preffer certain types of water

laden with calcium -like soil deposits. They label this type of water white water. It is considered tobe healthier and more palatable than well water. Hence the water pump will have added importance in the dry season when water is scarce and people must drink,bathe,cook, wash their clothes, and water cattle from diminishing sources of water.

Many wells dry out at this time of the year,rendering the population dependent on a few sources, and forcing women to travel long distances in search of water. This is a time of numerous conflicts over the use of water sites, particularly between women and herders.Herders, often the proprietors of the wells, forbid women the use of the wells at certain times of the day when they must water their cattle. Women often have to wake up very early in the morning, before sunrise, in order to obtain enough water to meet their daily needs. Women averaged ten trips per day to the water sites during the dry season. They covered a distance of approximately seven kilometers per day. This distance was covered while transporting heavy containers of water. Herders had to lead animals to the wells and supply them with large quantities of water.

The solar unit provides one pump,located on one of the major wells of the villages. As a labour saving device, it is quite limited. The pump relieves the effort of drawing water from the well. Clearly, the pump will be much more attractive

to herders than it will be to women. The main burden in this case is the necessity to draw large quantities of water. Women, however, must transport water over long distances. Thus the main effort is in the transportation. I would venture to say that, given a choice, women will utilize the nearest source of water rather than the pump. Herders, however, will simply walk their animals a greater distance in order to utilize the pump which will save them the effort of drawing water. This arrangement may still be advantageous to women. Women may find that the wells closest to them have been liberated, once the herders are drawn to the pump.

Management of the solar unit.

Technical aspects of the functioning of the mill are by no means the most important considerations. Most important is the integration of such a system in the recipient society. There are numerous examples of useful technology either being abandoned by the local population or giving rise to social abuses.

It seems to me to be out of the question to expect government agencies in Upper Volta, a country poor in administrative resources, to be solely responsible for the management of the mill and pump. Indeed, if the project is to be extended to other areas it is imperative that the management of the mill be local. My purpose in designing the management plan was threefold: 1. to stimulate personal interest on the part of the villagers in the management of the mill; 2. to make the

make the services of the mill accessible and profitable to all segments of the population; 3. to minimize the possible social abuses in the distribution of the services.

We are dealing with a complex and delicate issue requiring sensitive handling and striking at the very foundations of common proceedure at the inception of development projects. Since it was my opinion that the solar unit would be best run by the villagers, I began by investigating traditional means of management of public works within the village. The traditional political system was the first branch investigated. In the past, the chief of the village had the authority to invest certain individuals with the power to administer public resources. However, since the advent of colonialism, the village chief has been divested of the power to administer. In addition he can no longer tax the villagers and use the revenue, as he once did, for managing public works. In fact all of his present resources are personal. If he were to manage the mill it would have to be managed as his personal property and thus run the risk of using the mill to enrich a minor segment of the population.

The other solution was to open the possibility of management to all segments of the village population. Villagers show great talent as business managers. I investigated the management of water resources and milling enterprises specifically. There are also, however, numerous examples of entrepreneurship in the village. All of these, whether water resources or milling enterprises, were priva-

tely owned despite the fact that use of the services was open to the community at large.

If the villagers are to apply their management skills to the solar unit, the delicate issue of private management of public property is raised.I devised a system in which the villagers would be able to invest in the mill and share in the profits from the services provided.

The idea of not charging for the services of the mill was dismissed because of potential conflict and monopolization of resources by a certain segment of the population. In addition, if the services were free, it would be impossible to equalize access to the mill without excessive policing. Hence a reasonable price for the services was be charged.

Those willing to invest in the mill by providing services and the money for the operating costs would have a part of the monthly profit. Part of the monthly profit has to be put aside for future investments in development projects within the village that the villagers themselves would decide upon. In this way private investors and the entire community will benefit from the profits gained from the milling enterprise.

In order for this system to work, it is absolutely necessary to have input from the population. This requires an intensive information program permitting villagers to criticize the system, detect possible flaws, suggest improvements,

or even propose other management plans better suited to their needs.

Even before the mill is installed, it would be necessary to inform the villagers of the implications of huousing such a system in the village. They should then be asked if, given the risks, they would want it to be installed. The villagers would then decide, knowing the full implications of housing such a unit.

Although investment in the mill should be open to all villagers, no one should be coerced to invest. Only those who want to participate should do so. Those who have doubts should have the option to see if the system works before commiting themselves to an investment.

The villagers should make all the decisions relating to the organization of labour, the repartition of profits etc. Last but not least, provisions have to be made for maintenance and repairs of the mill. Permanent members of the village, particularly those most concerned by the services offered,(women and herders), should be trained in the proper maintenance and reparation of the mill and pump.

Alienation, resulting from the inability to understand the technology on which they are depending, and from the lack of personal investment in the project, must be avoided at all costs.

Too often development efforts of this nature fail becase of insensitivity to crucial elements of societal structures available for the integration of new technology in village society. Project designs fail to take into consideration

the needs of the population, their resources, and their often excellent suggestions. The knowledge that the recipients are more conscious of their needs, more capable of suggesting adequate solutions than most expatriates or government officials generally divorced from the setting for which they are expected to design development projects, is crucial to the success of any project design.