developing the capacity to use it, though on the American side this also leave a lot to be desired.

5. One source of additional frustration on the Egyptian side was th objection to seeing large fees go to American consultants and expertise whil their Eqgyptian counterparts were paid at much lower rates.

6. At the 75th anniversary celebration of Cairo University in December 1983, President Hosny Mubarak called for Egyptian universities to involv themselves more in the process of development, and to seek appropriate solutions to the social and economic problems of development. One can expect that Egyptian academics will be receptive to this call, insamuch as most of them already conceive of their role in this way. Such a program inevitably will involve Egyptian social scientists more in research and research-related action programs, and Egyptian practice and experience may evolve rapidly. However, it will be necessary to avoid the situation that exists in agriculture, where the experimental facilities in the faculties of Agriculture have no administrative link or substantive input into the extension programs of the Ministry of Agriculture.

In general, our level of social science knowledge of Egypt is such that we are still doing "first generation" research, in other words, simply trying to determine the basic facts of the case. Elaborate scientific methodology, hypothesizing, and theory building must await the accumulation of sufficient solid data. There is still a low level of information quality, and rapid change makes much of what exists go quickly out of date. We should be less concerned with who does the work, and more concerned that reliable data are gathered and are useful both for development projects and for continued theory building. On the other hand, social science should be allowed to retain its critical role and to evaluate projects in terms of their national and societal functions.

This paper has posed the problem of international cooperation through foreign aid as a cultural process involving diffusion and other forms of relationship between the two cultures or societies involved. The general argument is that this process will be a more rewarding one if the participants acquire some degree of self-consciousness about their respective roles, and that knowledge and understanding not only of the culture of the other but also of one's own culture is a necessary step to this self-consciousness. This consideration has naturally led us to consider the role of information (particularly social science information) in development. Provided they have the proper degree of perspective on their own roles, social scientists can make a valuable contribution to Egyptian development.

Whose Knowledge Counts: Discourse and Development In an Egyptian Rural Community*

by Cynthia Nelson

"All genuine knowledge originates in direct experience. But one cannot have direct experience of everything: as a matter of fact, most of our knowledge comes from past times and foreign lands...Moreover, what is indirect experience for me is direct experience for other people. Consequently, considered as a whole, knowledge of any kind is inseparable from direct experience. All knowledge originates in perception of the objective external world through Man's (and Woman's:C.N.) physical sense organs. Anyone who denies such perception, denies direct experience, or denies personal participation in the practice that changes reality, is not a materialist" (Mao Tse-Tung, 1937: 8)

I
Introduction

The above quotation immediately situates the problematic of this essay which can be rephrased in terms of three questions: (1) What is the relationship between theory and practice in the production of knowledge and the uses of such knowledge in the practice that changes reality? (2) What are the epistemological issues underlying the linkage of indigenous technology and equitable development? (3) What methodological stance provides a more adequate basis for research aimed at progressive social change? Therefore, we prefer to think about the issues posed by this symposium less in terms of technology per se and more in terms of the knowledge surrounding the control and use of technology in changing reality. Hence what knowledge, whose knowledge and how knowledge is used to change reality become the critical questions. This essay will address these questions by drawing upon direct experience participating in a project whose articulated objective is: exploring the relevance and potentialities of renewable energy technologies for the development of an Egyptian Village (hereafter referred to as the Basaisa Experience).[2]

II
The Context of the Debate: Energy, Technology and Development

There is a growing realization that the expected benefits of the capital investment growth models of development so popular in the 1960s have not "trickled down" to the rural poor as optimistically anticipated. This in turn has stimulated global interest in and concern about the nature of technologies

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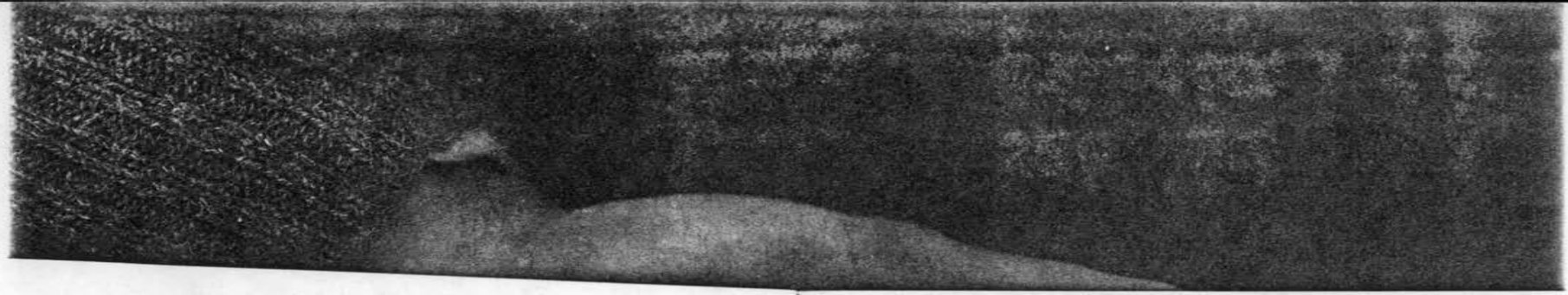
* This paper was originally prepared for presentation in a symposium on "Indigenous Technology in Equitable Development" to be held at the XI International Congress of Anthropological and Ethnological Sciences, Vancouver, August 20-24, 1983. The author's participation in this symposium has been made possible, in part by a Research and Conference Grant awarded her by the American University in Cairo, for which she is most grateful.



for rural development in the Third World and attracted widespread attention to the issues of rural energy resources for development (Elmendorf, 1980; Revelle, 1978; Dickson, 1974).

Accompanying this growing disenchantment with growth models of development, there has been an equally sobering accumulation of empirical evidence that the philosophy and process of "technology transfer" (consonant with capital intensive growth models) as it relates to rural people in the Third World is not working well. As Dickson cautions:

> Indeed, once the political nature of contemporary technology has been realized, it will be seen that a genuine alternative technology can only be developed--at least on any significant scale--within the framework of an alternative society (Dickson, 1974: 13).

Development throughout history has consisted of finding substitutes for human energy, yet the majority of people living in rural areas of the Third World (LDC) still must rely on human power to provide their subsistence. The interrelationships of the various energy needs are changing and being redefined within communities as they re-evaluate costs and benefits, both social and economic, of the various energy alternatives in a rapidly changing society. Sometimes there is a trade-off, often unstated, between different energy needs, household labor and reproduction. For instance, the number of children a family will want/have and the contributions of these children toward water carrying, milking and milk processing, and other labor for the household economy, are interrelated. As expectations rise and cash for consumer goods is added to subsistence needs, village families evaluate present labor contributions of the children in the sharing of energy needed for maintaining the household economy versus educating them so that their future contributions may be both more substantial and more lasting during old age when parents' physical energy is exhausted and no social security is provided. Energy needs and resources are very complex and interelated and therefore must be viewed in a holistic way within the environmental setting as well as within the socio-cultural context and the changing economic systems.

All people are users of energy. And different ecosystems pose different energy requirements both in terms of energy production and energy consumption. Energy production in a village ecosystem like Basaisa and similar small rural communities of Egypt, is highly dependent on agriculture. The village energy system tends to be a rather tight-knit subsistence economy, in which little material output is wasted and most energy is produced and used locally. Any change in this integrated and equilibrated system could upset the balanced subsistence village energy economy. A preliminary survey undertaken in the village of Basaisa revealed that nearly all the energy consumed comes from traditional sources that are used locally within the village without being bought or sold. These sources include crop residues, dried animal dung, draft animal power and human labor. Human labor, mostly women's and children's, is used for growing the crops, for grinding and pounding the grain, carrying the water for cooking and other food processing or preserving tasks.

In considering the human dimension of energy, therefore, it is crucial to be aware of the tremendously significant role that women and children play in village energy systems, particularly the heavy burden women shoulder in terms

of the energy consuming tasks they are required to perform. Food preparation, for example, consumes more energy than any other village task. It has been estimated that 60-80% of energy used in the villages of LDC's is for meeting food needs and that about 60% of that amount is required for cooking--a task that is almost universally performed by women (Revelle, 1978: 11-26). Concerning equitable development, any attempt to seek technological solutions to Egypt's rural poverty by necessity, must see the problem as an integrated one, including women.

Much has been said and written about the renewable energy resources as alternative technological solutions to the needs of the rural poor. The harnessing of solar energy, wind power, micro-hydro power, and the production of methane from biological wastes, and village woodlots are suggested possiblities. In general, this technological approach implies simple, decentralized, soft technology based squarely on local social organization and village energy systems. But the mere supply of the hardwares of alternative energy technologies itself rarely forms a sufficient condition for the reduction of poverty which is the central issue of rural development. It might not even be a necessary condition.

The acceptability of the rural people to any alternative technology and the viability of that technology are not simply the results of the excellent performance of the hardware, or the clever manipulation on the part of promoters. Rather it is because the technology corresponds to their very real needs, their social, economic, technological, cultural and environmental conditions. This also points out that energy development strategies directed towards meeting the needs of the poor majority are bound to fail, if no effort is made at the same time to develop the economic, social and technological capabilities of the rural poor, as well as the infrastructure at the community level.

In this context then, technology must be seen as embedded in modes of production, social structures and ideologies within specific social historical realities rather than as some mystical independent force. It involves the totality of ideas and tools employed to provide the means necessary for human subsistence and comfort. The measure of success of a people in harnessing science and technology to their ends is not to be found in the degree of complexity or sophistication or newness of what is employed, but in the degree to which it preserves and enhances (or changes and develops) those values and qualities of life that further human justice and liberation.

III
The Small Community in the Egyptian Context of Rural Development

Small communities, or villages, are perhaps the world's single most common form of human settlement, containing perhaps as much as 60% of the world population. Schumacher once commented: "the stark fact is that world poverty is primarily a problem of two million villages and thus a problem of two thousand million villagers" (1973: 178). In Egypt nearly 60% of the poulation live in villages, ranging from large polynucleated villages, to single villages to small hamlets (or ezab). The official definition of a village in Egypt tends to be a statistical one in which a population of between 1,000-15,000 could constitute a "village". It is estimated that there are nearly 5800 such main villages each with a population of more than 1000 inhabitants. On the other hand, there are nearly 25,000 small communities or hamlets (ezab) each with

populations of less than 1000 inhabitants. These small communities are often described as "satellite communities" in that they are dependent on a mother village for social and health services, market exchange, agricultural cooperatives, local councils, and most of the necessary goods and services not produced by the villages themselves for subsistence needs. They are usually without electricity, as well as any centrally supplied water system. Water resources are usually the canal system and a few handpumps. They are communities which are characterized by a preponderance of fragmented pygmy land holdings in which the peasant cultivator has less than 2 feddans, often less than one feddan. Incomes are low and families are large and a vicious circle of poverty and dependence dominates.

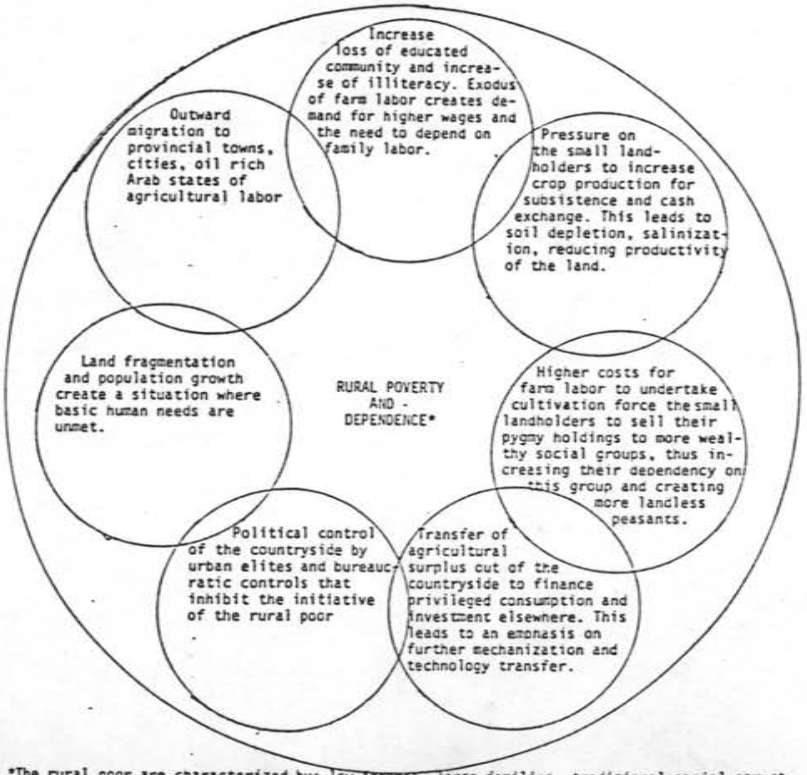
Before moving to a discussion of the Rasaisa experience itself, let me briefly sketch out some of the dominant historical forces/processes contributing to the present socio-economic conditions facing these small rural communities which act to constrain equitable development.

In the middle of the 19th century, laws were enacted that introduced the principles of private property and Muslim inheritance to the Egyptian countryside. Coupled with the population growth the effects of inheritance led to severe fragmentation of holdings among peasant cultivators. Throughout the twentieth century and even with the land reform measures enacted after 1952, there has been a constant process of peasant proprietors selling off their pygmy-holdings to wealthy owners and then regaining access to the land through tenancy or as hired laborers. The only other alternative has been migration to the cities. The fragmentation of land, the loss of agricultural labor to the city or oil-rich Arab states has deeply affected productivity creating what one scholar has described as "the modernization of poverty" (Amin, 1978). The present technology in peasant cultivation is labor intensive creating the pressure to have large extended families as labor for cultivation, particularly during peak seasons. The problem created is finding ways to support this labor throughout the year. Thus a contradictory situation is created in which there exists simultaneously a labor shortage in a labor intensive cultivation system and an over population of dependent labor (large extended families with many children) increasing the burdens on the peasant. Productivity is also lessened by the outward migration to the cities of village based labor that is both literate and educated. As a potential cadre for innovation and change, their departure may be a critical factor slowing down the development process in rural Egypt.

With the modernization of agricultural technologies geared to increasing the productivity of the land in a situation of declining labor supply and the preponderance of fragmented pygmy holdings, those who tend to benefit most from this mechanization process are "rich" and "middle" peasants who own 5-10 feddans or more (Abdel-Fadil, 1975). Thus, the potential benefits of mechanization to the majority of the rural peasantry owning one feddan or less in Egypt is minimized. Under these social and economic conditions the appropriateness of large-scale imported technology for the near landless becomes problematic.

As we explore the possiblities and potentialities of an alternative technology we confront two major challenges--the first is concerned with the nature of the small-scale energy technologies and industries, and how they could be linked to economic and educational support systems and integrated within the actual economic, social and cultural conditions of the rural

FIG. 1: THE VICIOUC CYCLE OF RURAL POVERTY AND DEPENDENCE



*The rural poor are characterized by: low incomes, large families, traditional social structures through which dominant social groups control conditions of life, basic human needs largely unmet, malnutrition, high infant mortality ratio, link to poor sanitation, and lack of clean water supply. These create conditions for material and mental dependence which constrain development in small communities.

community itself. The second is related to the issue of how to generate income at the community level to help support these marginally poor families in a situation of lessening crop productivity created by land fragmentation and outward labor migration.

To address these challenges, we now turn to a discussion of the Basaisa Experience to illustrate how a philosophy of equitable development can be translated into practice through a methodology of "participatory action research".

IV
The Basaisa Experience

The Setting

Basaisa is a small rural community consisting of some sixty three families living in forty-two households, with nearly 300 people living out their lives dominated by an agricultural mode of production in the heart of the Nile Delta--100 kilometers from Cairo and 15 kilometers from the provincial capital of Zagazig in the province of Sharkiah. It is an example of what is called an ezba or "satellite village" typical of thousands found throughout Egypt. Life is dependent and organized around the rhythmic cycle of agriculture in which men, women and children all have a vital role to play in the production and processing of crops that provide their livelihood.

Village land holdings consist of some eighty feddans (one feddan = 1.038 acres) all of which are cultivated and cared for by the village inhabitants. Most of these feddans are divided into very small parcels varying in size from 3-4 kirats (24 kirats = one feddan) up to 2-3 feddans. The average holding is less than 2 feddans. Although some villagers own as much as eight feddans, individually these are often scattered and broken up as a result of inheritance pattrens. The size of the holdings has very little effect on agricultural practices. There are approximately 40-50 villagers who tend the fields as a full time occupation. Nearly ten women, most of them widows, but others having sick husbands or husbands working outside the village, consider land cultivation as their main occupation and responsibility.

From a distance, one is fascinated by the pastoral beauty of rural Egypt--the open spaces, the green fields, the rhythmic cycle of the water buffaloes turning the traditional sakia (the traditional waterwheel) that brings the Nile water to the fertile land. The dark brown, rustic, adobe brick houses are roofed by dried cotton, rice and corn stalks which serve as fuel for later cooking and baking. The houses are clustered close together along narrow and dirt packed lanes that allow the easy flow of donkeys, camels and water buffalo moving to and from the fields. Pools of stagnant water accumulate around the troughs of the village water pumps creating active breeders for diseases such as malaria and eye infections. The irrigation canal on the eastern border of the village provides the main source of water for the village as well as the conduit of Bilharziasis and ancylostoma. In addition to providing the irrigation needs of the village, canal water is used for nearly all household needs: washing, bathing and cooking as well as the village swimmming hole in the hot summer months. Potable drinking water is supplied by hand operated water pumps scattered strategically throughout the village. A rudimentary system of sewerage disposal and internal sanitation exists in the majority of households. Nearly half the village households are without any "Raladi" toilets

and baths do not exist at all. The only public (communal) buildings in the village are the Mosque and the Mandara (village meeting room). Basaisa had no electricity at the start of the project and still has no tap water supply, it also had no direct contact with formal social, administrative or health services. The nearest primary school is five kilometers away and the nearest rural health unit is 3 kilometers away in Al-Tayiba, the mother village.

The Philosophy

The philosophy of equitable development guiding the Basaisa Project can best be described as "community-based innovation". Community-based innovation assumes that any change (social or technological) should grow out of the community--its needs, values, culture, aspirations, locale, ecology, unique assets and liabilities. Equitable development becomes an "innovative process" in which the innovation is not necessarily given. The innovative process is conceived and defined as including not only the work to spread an "innovation", but also (and more fundamentally) the identification and awareness of the underlying problem to be solved, as seen in the perspective of the periphery: and furthermore the organization and mobilization of those people who suffer from the problem in order to do something innovative about it. Here, innovation is the end rather than the beginning of the process. The innovation process is, thus, seen as involving both an increasing consciousness of grass roots problems and innovative action to solve those problems.

From Philosophy to Praxis: The Methodology in Action

It is one thing to talk about people's participation and another to translate this into practice. This poses entirely different challenges to the traditional role of the social scientist qua anthropologist.

We are engaged in what some social scientists have described as "participatory discourse-oriented action research" (Fals Borda, 1979: Moser, 1981, 1982). This is rather an inseparable combination of theory, research and practice characterized by a discourse between actors and researchers enlightening the actors as well as the researchers about the meaning of action intended, and eventually resulting in an increasing autonomy of actors in relationship to researchers, and to an emancipation from questionable and restraining beliefs in the inevitability of the given order of things. In participatory discourse-oriented action research, the intention of actions are not given in advance by researchers or outside sponsors, but by the actors themselves. The role of the researcher is to help clarify those intentions, and the relevant structural conditions and constraints in a kind of maieutic dialogue with the actors, that is through the discourse.

> And since discourse is the encounter in which the united reflection and action of the actors are addressed to the world which is to be transformed and humanized, the discourse cannot be reduced to the act of one person's "depositing" ideas in another, nor can it become a single exchange of ideas to be "consumed" by the participants in the discussion" (Freire, 1972: 61).

In participatory action research the researchers are actors in the social scene just as much as the "natives". From the outset our encounter with each

other in the various scenes that unfold through time reflect our being-actors-in-the world -- a world of nature and a world of culture...not as a private world but as an intersubjective one invloving intercommunication and language. Conversely, the praxis can also influence the formulation of another model of reality which is further put to test in the context of other social activities. This calls for an attitude of self-criticism (reflexivity) and the ability to learn from practice.

The main challenges facing participatory action researchers include: (1) How does one begin? What knowledge and skills are needed to open up a dialogue? (2) How do we become aware of the problems and urgent needs at the community level? (3) And once aware, what are the appropriate strategies for promoting community-based self reliant solutions? In other words, whose knowledge counts and how can knowledge be used to change reality toward more equity, justice and human freedom?

The beginning of the Basaisa Experience took root when a young Egyptian physicist returned to Egypt in 1973 from his sabbatical leave at the University of Uppsala, Sweden where he had been continually questioned by Swedish students about the problems of village life in Egypt. Uneasy that he did not really know the problems of the Egyptian rural countryside he began to visit different rural communities after his return. It was during this period (1974/75) that the OPEC countries initiated decisions that thrust the world into an awareness of an impending "energy crisis" and stimulated international dialogue dehate and research on renewable energy technologies. As a solid state physicist interested in solar energy, our young Egyptian decided that as good a starting point as any for initiating a dialogue between himself and rural villagers on their needs and his knowledge was the community of Basaisa where he had spent many months of his infancy living in his maternal grandmother's home.

An important strategic question was posed as the physicist contemplated his return to Basaisa after nearly 30 years--with whom should he begin and how should he open the dialogue? Should he seek out the village leaders and traditional power elite--i.e. the 'Omda' and 'Sheikh el Balad'? Should he concentrate on his own relatives? His decision was not only symbolically meaningful but strategically significant for it established a culturally appropriate locale and set the style for all future dialogues with the villagers. He went to the Mosque for Friday prayers and following the prayers sat with the men in the communal village meeting room (the mandara) getting to know more about them, what they wanted out of life, their hopes for a better future, their problems and how they might solve some of these problems. It was critical that the mandara became the place of meeting because it represented a "neutral territory" for villagers to meet and since it belonged to the community as a whole it symbolized the collective identity of the village rather than an individual family household. During these initial months, the physicist would travel each Friday to the village, gathering the young educated males mostly, listening, learning and demonstrating with simple examples what the sun's energy could do. It was during these encounters that villagers expressed a willingness to keep the dialogue going.

Following these initial contacts with the village, the physicist gave a public lecture (1976) at the university discussing his experiences and this stimulated a dialogue between the two of us-- a physicist and anthropologist--which finally resulted in a grant proposal to the National Science Foundation

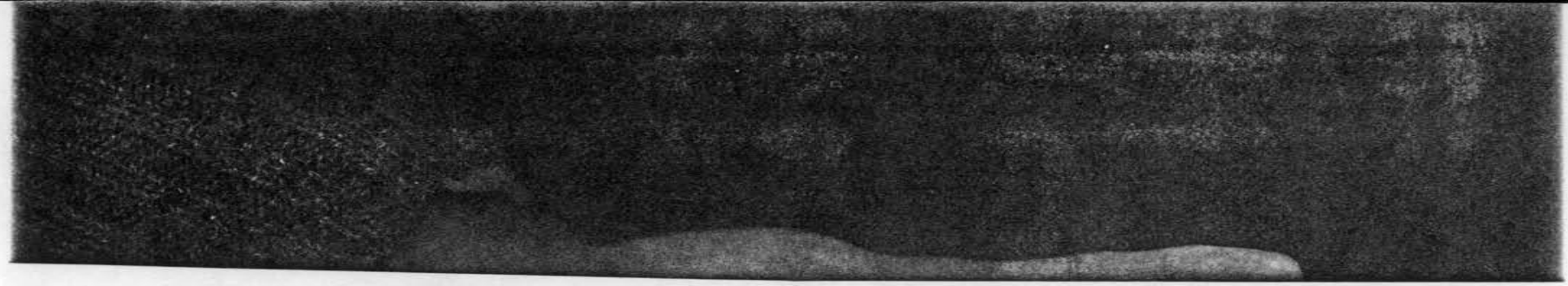
to support a project on "The Utilization of Solar Energy and the Development of an Egyptian Village". We did not wait for the grant to be awarded but with interested students from engineering and sociology-anthropology along with the villagers, we continued the dialogue. The first step was to learn from the villagers while embarking on an educational and training program in response to specific requests from the villagers--such as Arabic literacy, English lessons, carpentry skills, play activities for children. The volunteers developed simple educational programs incorporating village based situations and examples. Within these contexts, dialogues were initiated on the everyday life of the community in order to learn not only about energy consuming tasks and resources, the natural and social environment, but also about the major problems the villagers themselves confronted. We listened and tried to stimulate the villagers to raise their voices and express what they perceived as the problems to be overcome. We tried to encourage their criticism of the process itself. The aim of these discussions between actors and researchers was to clarify problems and intentions and for working out guidelines for social action. We wanted to arrive at enlightened consensus among ourselves about the nature of the situation and what to do. Let me describe one example of a community-based innovation, that not only illustrates how participatory action research works in practice, but also served as a micro-model demonstrating how indigenous technology could be linked to equitable development through a structure of cooperative-sharing. This experience along with others has led over the years to the innovation and institutionalization of a new community infrastructure (discussed later in this paper) which is aimed at helping facilitate the implementation of village initiated ideas for community development.

The Women Speak Out

During one of our Friday visits to the village early in March of 1979 one of the village women, the daughter of the Sheikh el Balad had come to the mandara meeting (held every Friday after the prayers) to tell us about the women's need to have a milk separating machine in the village. The women had been talking about this problem among themselves for several weeks and had approached one of the male villagers (one of the more active participants in the project) to ask the researchers for a financial contribution to buy a milk machine. He, in turn, encouraged her (he was her brother-in-law) to go to the mandara herself and raise the issue during one of the dialogues. This was particularly significant for traditionally women (especially married women) were not accustomed to enter the mandara as it was culturally perceived as exclusively male territory--a place for negotiating marriage contracts and expressing death condolences to male members of the village.

A voice had been raised and this, in turn, stimulated us to open a dialogue with the women of the village on their expressed need for a milk separating machine. The discussions that ensued facilitated information gathering in the context of action. We obtained from them a deeper understanding of the energy consuming tasks of women, the significance of animals in the domestic economy and the broader social structural and interpersonal sources of conflict that deter cooperative action. But also through discussion the villagers and researchers were able to arrive at a solution that served as a guide for further action.

We learned that nearly three-fourths of the forty-two households either owned or shared in the ownership of cows and buffaloes, creating a particular



set of tasks for women who are responsible for the feeding and milking of animals and for processing the animal products. Women of these households were walking daily to a larger nearby village to process their milk--a round trip of three kilometers-- and a labor effort of two and half hours. This trip was perceived as particularly burdensome to women, especially those with small infants who have to take them along if they cannot find someone to tend them during their absence. We also learned that several years ago, two women (the wives of the two largest landholders in the village) had purchased a milk machine but it was only used by kinsmen (particularly those directly related to the land owner). But conflict broke out between these two women over the share of the profits. Each user paid the owners between 15 and 40 piasters a month depending on the amount of milk processed, but many women resented these prices. Shortly thereafter, the machine broke down and neither of the women would (or could) take the responsibility to have it fixed and it stopped working altogether.

For several weeks the actors and researchers dialogued. Why didn't we just buy them the machine? The dialogue forced them to answer such questions as: (1) Why is the machine necessary? (2) Who shall benefit? (3) Are all the villagers aware of the idea? (4) Who is willing to share in buying one? (5) Who will take the responsibility for its operation? (6) Where will the machine be placed? (7) Will the responsible person take an incentive and if so how much? (8) How will it further community cooperation? The villagers and researchers began to formulate a plan of action that would become communally self sustaining. During these weeks, the women discussed among themselves, collected the names of those who would use it and came up with two suggestions for a responsible person. The final decision on who would take the responsibility posed the greatest difficulty for the women: for the two candidates represented opposing family factions in the village, and the women were reluctant to make the choice themselves and wanted the researchers to make it. We countered by saying that we would not make that choice and they had to find the solution. Another two weeks lapsed.

This problem was overcome by the women agreeing on a third woman who had access to a convenient locale for the machine that would not involve having people enter into her household quarters. This was the daughter of the Sheikh el Balad who had originally voiced the request. The next question was how to generate money to buy the machine which was estimated to cost 125 Egyptian pounds. The villagers suggested collecting shares from those households that would be using the machine and they decided on one Egyptian pound per share, with the profits from the use being distributed to each shareholder. They decided that the responsible person should receive an incentive of 20 percent of the total monthly income minus the costs of repair and maintenance. Ten villagers brought 12 shares and the researchers (through the project) bought the remaining 113.50 shares. However, the question was raised as to how the profits from these shares would be used. This stimulated dialogue around the formation of a community fund to be used to support communal service activities such as a health clinic and youth club which were other action projects being discussed in the village during this period. The villagers selected their own machine which was purchased from Zagazig and it finally went into operation nearly two months after the initial expression from the women.

What general insights can we derive from this micro-level example? First is the recognition that technology has both a material and symbolic dimension. In fact, it can be considered as a 'language' of social action. The essential

task is to discover how one particular role both relates to and reflects the "value" of the social milieu in which it has been defined, and of which the machine has come to form both an extension and an integral part. Although it may have originally been developed to perform a specific instrumental function, as the means to a particular end,its existence within a social environment-- whose importance to the individual goes far beyond the material properties of the objects of which it is made up, but provides her with the framework for her whole interpretation of reality--endow it with a range of further functions. Let me illustate:

On the most obvious level and perhaps the most significant for the women has been the saving in human energy and time, particularly at peak periods of the agricultural cycle. This, in turn, has opened more time and energy available to women for other activities--whether for domestic household tasks, or for milk processing for sale in local market or for training and production in the small scale handcraft industry which has also been initiated in the village. The important point is that the technology has not increased the burden on women, but rather has provided them the opportunity to choose from among other available options.

Second, the milk separating machine served as a model for shareholding and profit sharing. Third, it led to the development of managerial skills, as record keeping on use, technical operation and income is done by the villagers. Lastly and perhaps most significantly in terms of development concerns, the machine stimulated community cohesion and demonstrated the viability of 'self-help' strategies that do not rely on a centralized system of decision-making. It also brought women into the process of discourse and stimulated their further participation. In essence, the milk separating machine can be interpreted as a concretization of participatory action research.

V.
Conclusion
Learning from Praxis: Building Community Infrastructure

While participatory action research is a strategy through which awareness and attitudinal changes may occur, it is not adequate to maintain that change unless accompanied and reinforced by changes in the structure of social relations within the community in which new roles, new distribution of rewards and a new alignment of power can occur. As Moser has stated:

> If action research intends to guide the process of development of communities, it has to detect the underlying structure of social events in order to advance the common process of social change; and, as a means for the attempt to evaluate the chance a project has, participatory action research has to promote the self-articulation of the people (1980: 40).

Since we have stressed cooperation and participation as fundamental to something called equitable development, it seems appropriate to end our discussion with the critical question: what have we learned from our Rasaisa experience that informs our theoretical understanding of the structural aspects of cooperative processes at the village level? What is the role of social research in furthering social development? Action-research must seek to

identify those forces most favorable to desirable change and take them into account in the diagnosis of social situations. The critical lesson learned from our Basaisa experience is that projects provided without regard to the people's interest in having them, and the mechanisms necessary to insure that the systems would be operated and maintained, are doomed to failure. Our solution to this problem has been the working out together with the villagers of a community-based infrastructure which attempts to integrate the fundamental principles of: (1) utilizing natural, locally available resources to address the needs of low income pygmy landholders; (2) developing micro economic income generating projects within the context of a community cooperative for development; and (3) promoting extension services for education and training in small scale industries and collective self management. The new organizational infrastructure within the community is based on three main pillars: (1) A Community Cooperative for Development which is aimed at helping facilitate the implementation of village initiated ideas for community development such as: (a) increasing income and production activities such as the Knitting and Handicraft Industry, (b) providing consumption needs of the village such as communal grocery and loans for cattle raising, and (c) offering services such as the new health and first aid clinic support for the youth club and Mosque: (2) A Village Technical Training and Industrial Production Unit which is geared to training and developing skills in carpentry, metal working, electricity and solar energy technologies: and (3) A Community Club which is oriented toward encouraging activities reflecting interests of the villagers in such areas as sports, village newsletter, cultural and scientific education, and awareness discussion groups on action research projects in the village.

Within this new infrastructure lie the new roles, the new distribution of rewards and the possibilities of a new alignment of power based on collective management -- an innovation that neither the researchers nor the villagers had predicted as the outcome of our initial dialogues. The project is now at a stage where efforts are focused on strengthening what has been established and involving the surrounding villages and villagers. What seems to be emerging is a plan to construct a small regional training and small scale production center located in Basaisa aiming at serving the needs of the surrounding villages and providing them with some greater collective strength not only to cope with the conditions of rural poverty, but also, hopefully, to force changes in the wider society that now constrain equitable development.

To develop a methodology and ethic of participatory action research as well as sustain those activities necessitates a continuous process of collective self criticism among and between actors and researchers. To our mind this poses the greatest challenge to participatory action reasearch. Because within this process of collective criticism should lie the seeds for the process of researcher withdrawal and actor take-over. The participatory relationship in action research carries with it the inherent conditions for over-involvement and over-identification between actors and researchers. Neither we nor the project team will remain in Basaisa forever.Therefore, our effort, on practical and especially moral grounds, must be to avoid creating dependencies. Whatever process is generated in the village, our goal is that the villagers must become its masters.

End Notes

1. The title of this essay was inspired by a workshop sponsored by the Institute of Development Studies, University of Sussex on the concept of indigenous technical knowledge and its potential for rural development (Chambers, 1979). However, the particular line of argument put forth in the present essay reflects the author's own concern with the epistemological issues embedded in the notion of indigenous technology and equitable development and the necessity for developing methodologies more appropriate to the concerns of equitable development.

2. AUC-NSF Basaisa Project Grant No. NSF/INT 78-01127. Dr. Salah Arafa Project Director and Dr. Cynthia Nelson Co-Principal Investigator. The major objectives are: (1) to discover how to use natural available local resources in an appropriate way to improve the quality of life of rural peoples in ways that they themselves participate in deciding: (2) to promote community based innovations that would satisfy village energy demands, reduce drudge labor and stimulate income generating activities, especially among women: (3) to monitor and study the impact of such innovations on the live and life style of rural villagers: and (4) to provide interested others with a working system to be generalized or implemented in other areas of similar ecological, socio-economic and cultural conditions.