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Rural Ghanaian women and appropriate technology : maximizing the cultural benefit of Ghanaian women as partners in sustainable development

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RURAL GHANAIAN WOMEN AND APPROPRIATE TECHNOLOGY: MAXIMIZING THE CULTURAL BENEFIT OF GHANAIAN WOMEN AS PARTNERS IN SUSTAINABLE DEVELOPMENT

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ABSTRACT OF THESIS

RURAL GHANAIAN WOMEN AND APPROPRIATE TECHNOLOGY: MAXIMIZING THE CULTURAL BENEFIT OF GHANAIAN WOMEN AS PARTNERS IN SUSTAINABLE DEVELOPMENT

By Nehanda Imara

This thesis evaluates the effectiveness of constructing environmental models which include gender specific variables as critical factors in the application of appropriate technology. The impact of traditional Western development strategies upon rural African women in general and Ghanaian women in particular is briefly reviewed. The intent of this study is to reveal and document the favorable relationships and results of appropriate strategies for the inclusion of a gender partnership model within the field of appropriate technology. The goal of this study is to construct a critical framework for evaluating both policy statements of development agencies and the effectiveness of their projects in the field. This evaluation may provide an initial understanding of how cultural constraints and imperatives can limit both the acceptability and adaptability of appropriate technologies.

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INTRODUCTION

Background to the Study

In February 1989, the First African Women's Assembly on "Women and Sustainable Development" was held in Harare, Zimbabwe. Participants highlighted women's predominant role in aspects of resource management and agricultural production. They concluded that African women spend a significant portion of the day engaged in agro-forestry, animal husbandry, water supply, and energy management. In certain parts of Africa, women provide between 60 to 90% of the agricultural subsistence labor and constitute a substantial amount of paid labor in male-run commercial agricultural schemes (Loudiyi, Nagle, Ofosu-Amaah 1990).

The Assembly further concluded that many socioeconomic factors contribute to the restriction of women's participation in natural resource management. For example, the high rate of urbanization has led to dramatic increases in female-headed households in many rural areas. These socioeconomic factors are largely a result of the colonial legacy of exploitation and marginalization of African natural and human resources. Compounding this reality are; limited access to land title, low literacy and training rates among women (due in large part to cultural biases favoring male education), inadequate support systems to ease traditional loads, and the added workload created by some projects, [1] as well as limited access to

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[1]The Provisional National Defense Council (PNDC) sponsored, "December 31st Women's Movement" projects in Ghana provides one such example. They sponsored Palm Oil Extract Projects which required women to spend time on a weekly basis. While these were income-generating projects, these women continued to be responsible for their basic domestic duties, such as, tending family plots, fuelwood gathering, water supply, etc.

technology and tools necessary for successful agro-forestry endeavors (Loudiyi, Nagle, Ofosu-Amaah 1990).

Until the voices, knowledge, and experiences of African women are heard, sustainable development will remain only a theoretical goal. Ghana—where women have traditionally assumed the bulk of planting, weeding, harvesting, preparation and preservation of food products—serves as a case study. The Ghanaian "female farming system" has arisen as a particular area of interest for several reasons.

The cultural factors in some traditional Ghanaian societies are congruent with appropriate technology approaches related to women's role in resource management and rural development. Frequently, new technological innovations introduced into developing societies are not desired nor ultimately beneficial to the local populations. Critical input necessary for sustainable development to occur may mean readapting traditional, ecologically sound methods rather than the acquisition of shiny pieces of new machinery. An analysis of these traditional methods, especially in comparison to modern methods, has been the subject of many anthropological and cultural ecological studies. However, the proliferation of so many inappropriate technological innovations would suggest that the data has been largely ignored and/or improperly analyzed. For example, the solar cookers found in many rural African villages provide evidence of this failure[2] (Carr 1981).

Ghana

Modern Ghana is geographically located in Africa's western region. (See Figure 1). The population of 13 million enjoys a tropical to semiarid climate with an average temperature

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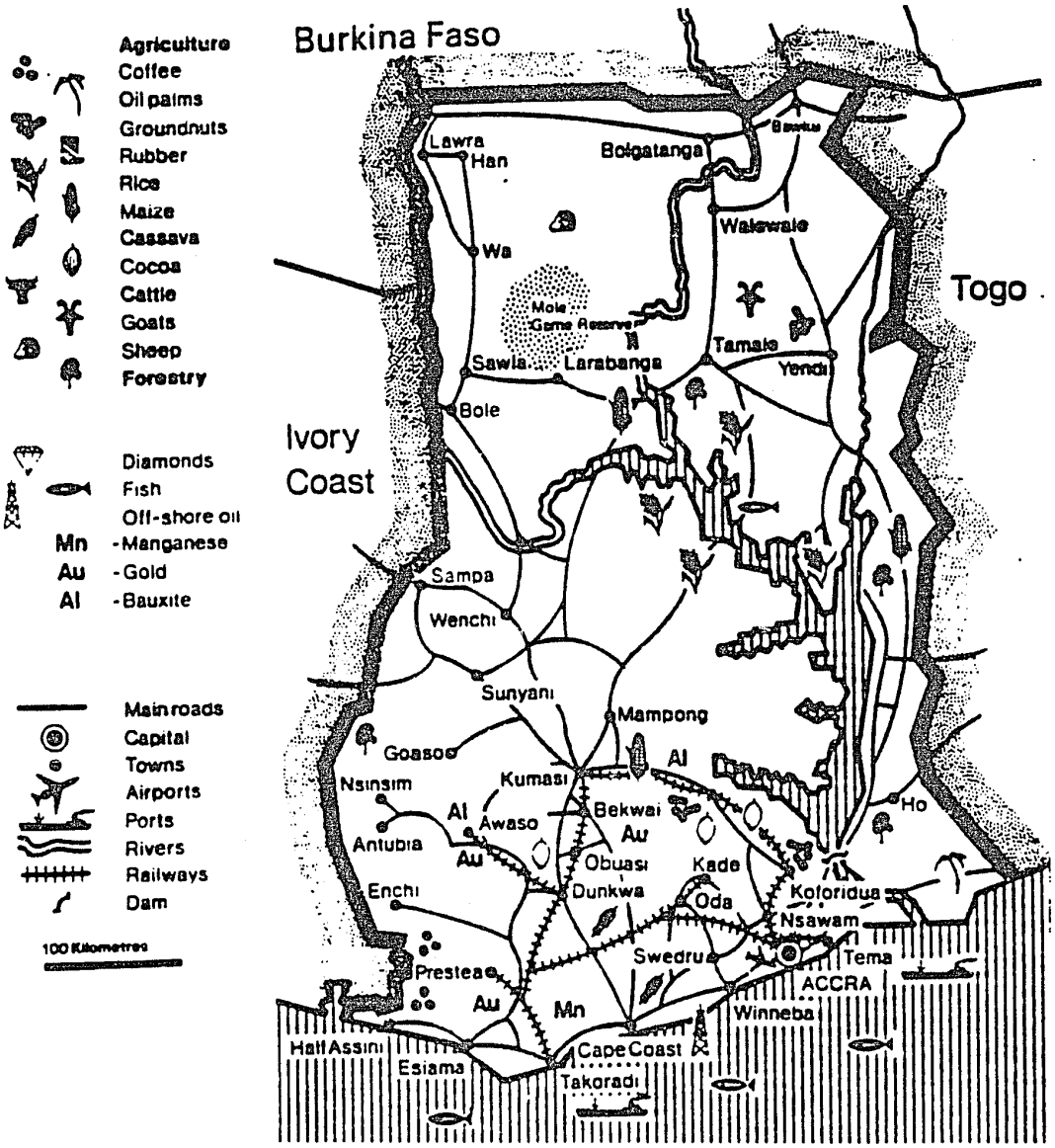
[2]Recent literature indicates the inappropriateness of foreign sponsored solar cookers in many regions of Africa. Solar cookers are most effective during the daylight hours, when the sun is most intense. However, this is not the most desirable time for women to prepare meals, dusk and after dark meal preparation times being common.

of 27 C. Ghanaians experience two distinct seasons—a short dry season with mild temperatures in December and January and a rainy season from April to September.

The four major ethnic groups are the Akan, (which includes Fante and Asante), the Ga, the Hausa, and other minor ones. English is the official language of this former British colony. All instruction, media and, communications are presented in English. The four Universities are located at Accra, Legon, Cape Coast, and Kumasi. There are also numerous poly-technical institutions and vocational training centers.

Ghana, historically known by European merchants as the "Gold Coast," is rich in gold and bauxite. Its primary staples are cocoa, palm oil, corn, cassava, and peanuts. Principal exports are bauxite, manganese, fish, timber, and agricultural products. The bustling cities of Accra, Kumasi, Cape Coast, and Takoradi have open markets with just about every imaginable product.

The market women of Ghana are typical of those found throughout West Africa. They literally control this portion of the economy. There are numerous cited incidents where these market women have organized boycotts that totally immobilized entire cities until demands were met (Kenneth Little 1973). While women obviously play a major role in the economy, they receive far less than the value of the labor they input. Given that rural Ghanaian women produce 80% of all processed, prepared, and preserved food produced and consumed by the general Ghanaian society, full integration of women into the development policies of Ghanaian society is critical for sustainability.



Map of Ghana

(Source: Africa YearBook, 1980)

Figure 1

Statement of Problem

Women in Africa are responsible for 60 to 80% of the work in the rural areas (Hafkin 1976). However, current literature points to gender-based inequalities, which suggest a failure to recognize the potential role African women could play in creating a model for a sustainable future. In many parts of Africa, the livelihoods of entire communities depend on biomass-based economies. Over thousands of years, women in these communities acquired and perfected a knowledge allowing them to enjoy a harmonious coexistence with their natural environments. These balances have been disturbed by population growth, urbanization, and capitalist cash economies.

The deleterious effect of historical changes in the African socioeconomic reality, coupled with the vital role women play in meeting the food and energy needs of a large section of the local population, make it imperative for policy and decision makers to incorporate women into planning and implementation designed to address the devastation of the biomass.

While 771,726 Ghanaian women are engaged in agricultural activities (1970 census), accounting for 54.5% of the total population; in areas of commerce, women completely outnumber men with 84.6% of women occupying this area primarily as self employed entrepreneurs (Date-Bah 1985). Yet, a significant percentage of the aid technology for rural development is managed, directed, and provided to male farmers and large plantation owners. The ratio of women as productive members of Ghanaian society to men represents an imbalance in relationship to their access to technology, education, employment, and political power. (See Figure 2).

Detailed occupation of employed person in agriculture by sex, 1970

Occupation	Male	% of male labour force	Female	% of female labour force	Total	% of total labour force
Staple foodstuffs and vegetable farmers	514,320	50.1	542,231	70.3	1,056,551	58.7
Cocoa farmers and farm managers	367,343	35.8	205,121	26.6	572,121	31.8
Tobacco farmers and workers	1,678	0.2	628	0.1	2,306	0.1
Rice farmers	8,120	0.8	3,816	0.5	11,936	0.7
Cotten farmers	75	t	123	t	198	t
Rubber planters and plantation workers	1,246	0.1	608	0.1	1,854	0.1
Sugercane	3,168	0.3	1,802	0.2	4,970	0.3
Coconut	5,924	0.6	1,677	0.2	7,601	0.4
Coffee farm managers	11,633	1.1	7,813	1.0	19,446	1.1
Oil palm farmers	2,881	0.3	1,046	0.1	3,927	0.2
Livestock and dairy farmers	5,262	0.5	720	0.1	5,982	0.3
Poultry farmers and farm managers	3,470	0.3	728	0.1	4,252	0.2
Other farmers	29,972	2.9	1,338	0.2	31,310	1.9
Horticultural farmers	4,604	0.4	277	t	4,831	0.3
Forestry wokers	6,940	0.7	1,655	0.2	8,595	0.5
Fishermen	58,648	5.7	800	0.1	59,448	0.1
Hunters	1,246	0.1	1,339	0.2	2,585	0.1
Total	1,026,530	99.9	771,726	100.0	1,798,256	100.0

Data from Ghanaian cencus, 1970

Figure 2

Detailed occupation of employed person in agriculture by sex, 1960

Occupation	Male	% of male labour force	Female	% of female labour force	Total	% of total labour force
Farmers and farm managers (food-stuffs)	462,730	46.9	385,499	66.8	548,229	54.3
Farmers and farm managers (cocoa)	313,922	31.8	143,234	24.8	457,156	29.2
Farmers and farm managers (other crops)	26,142	2.7	37,497	6.5	63,639	4.1
Farmers and farm managers (live-stock and poultry)	5,484	0.6	642	0.1	6,126	0.4
Farm equipment operators	1,292	0.1	6	t	1,298	0.1
Curators of grounds (grounds keepers)	145	t	5	t	150	t
Agricultural workers	103,555	10.5	6,687	1.2	110,242	7.1
Hunters and related workers	1,427	0.1	27	t	1,454	0.1
Fishermen and related workers	53,790	5.5	2,785	0.5	56,575	3.6
Loggers	7,876	0.8	55	t	7,931	0.5
Palmwine tappers	6,707	0.7	181	t	6,888	.04
Firewood cutters	285	t	244	t	529	t
Chewing stick cutters and gatherers of Other forestry products	10	t	60	t	70	t
Rubber tappers	181	t	4	t	185	t
Charcoal burners	1,527	0.2	405	0.1	1,932	0.1
Other forestry	1,070	0.1	8	t	1078	0.1
Farmers, fisher-men, hunters, loggers and related workers	986,143	100.0	577,339	100.0	1,563,482	100.0

Data from Ghanaian Cencus, 1970

Figure 2 (Cont.)

Ghanaian Women and Appropriate Technology

Central to the idea of the application of appropriate technology is the question, "Appropriate for whom?" (Carr 1981). The concept of appropriate technology has become so fashionable that this question is often overlooked. What needs to be identified here are those technologies that are appropriate for Ghanaian women of whatever ethnicity; Ga, Ewe, Ashanti, Fante, or Hausa.

The potential range of available technologies is limited by the inability to assess the specifics of women's circumstances as in the example of the solar cooker. Proponents of this technology may argue its appropriateness for rural consumption, but the error is the lack of consideration given to the life situations of rural people and practical factors related to its use (Carr 1976).

The late E. F. Schumacher recognized the necessity of exposing and creating a whole range of "intermediate technologies" that fill the technological gap between subsistence and high capital activities.

At the University of Kumasi, extension workers built solar dryers for a December 31st Women's Movement pepper farm project. The dryers were considered appropriate technology since they were able to dry larger quantities of pepper under more sanitary conditions. The traditional methods were simply to sun dry them on the ground. However, the technology was not readily accepted because the process bleached the peppers white. Project participants were not able to sell the discolored peppers nor did they desire to.

The Challenge to Modern Environmentalism

Western scholars, especially those within the field of Environmental Studies must begin to re-evaluate the values and perspectives underlying the tenets of their curricula.

These values inherently support present ideas and attitudes about women, development, and appropriate technology. Many of these values are gender and culture based (Wynter 1992). It is critical for those appreciative of traditional cultural approaches and "third world" issues as an aspect of environmental theory to research and develop curricular strategies that include non-Western scholars of both genders in more democratic partnership relationships. A concerted effort is necessary to achieve a truly multicultural, multidisciplinary field of study. All peoples of the world have created a variety of systems that approach resource management. In some societies these systems are often initiated by women (Wynter 1992).

Gender roles in non-Western cultures are often quite different from European ones. The inherent values and cognitive patterns of non-Western cultures can lend direction to strategies and tactics of global resource management issues. The limited Euro-Centric male-only perspective does not provide enough flexibility to encompass all relevant parameters, much less respond to the multi-cultural complexity of the world (Wynter 1992).

An analytical model that integrates the best of both modern and traditional worlds and which rests securely upon a humane world view, not merely an upgraded Euro-Centric, patriarchal world view, is sorely needed. All cultures and genders made valuable contributions to human development and resource management. The task of this thesis is to organize the diversity of approaches into a manageable and workable system for addressing cultural and gender diversity in resource management and appropriate technology. Current models of appropriate technology are not sufficient without a context of appropriate social organization and ecologically appropriate values.

Significance of the Study

Theoretical statements about women's roles in ecological and resource management patterns identify as well as manifest limitations in research and recording techniques. For

decades, Western models for creating a sustainable future have ignored the contributions of women—especially women within developing societies. A framework must evolve which focuses upon such societies, to support the necessity for including women as a major and significant factor in resource management and rural development policy.

An assumption exists that many traditional conservation practices by non-Western cultures, once documented, are instructive and thus valuable to modern-day resource managers. However, this is not widely visible in anthropological literature which is limited by a gender-biased orientation.

Similarly, a careful look at inclusion of third world gender issues within eurocentric environmental theory reveals that it has been largely tokenistic and the question of indigenous women's roles insufficiently developed. Only since the late 1960s has the emphasis in academic circles shifted to include discussion of marginalized groups, such as women and third world people. This shift, especially in the anthropological fields, has led to the development of several sub-fields, such as sociobiology and cultural ecology, to include a perspective of third world women in particular. This new emphasis in social science research has obvious social, political, and environmental implications regarding the categories of food, energy expenditure, and resource management and distribution (Dahlberg 1981).

One solution, which is based on resource management techniques in subsistence societies, has been defined as the "attempt to combine the best [conservation] elements of industrial civilization with the obviously superior components of primitive[3] cultures to establish a stable, more ideal society" (Klee 1980). Klee goes on to illustrate how this more sound management might be implemented within modern agricultural practices. It would

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[3]This term is anachronistic and its usage in contemporary environmental scholarship points to the necessity of identifying biases and distortions within the literature.

require "farm decentralization, self-sufficiency, the use of organic fertilizers, and the practice of biological control for insect pests" (Klee 1980). However, in addition to these practical solutions, a case needs to be made that includes a critical look at the gender roles and the values associated with supporting a social paradigm of patriarchal human relations. Failure to include women adequately within an evolving duel gender paradigm would affect programmatic efficiency and research effectiveness in moving towards sustainable development.

Assumptions/Research Questions

For technology to facilitate appropriate development, an optimal mixture of variables must be in place. What would be the optimal mix of social organization, cultural beliefs, and values for that technology to be accepted and adapted? A set of questions and assumptions that lend general guidance to the direction of this thesis are listed below.

1) The integration of women into the echelons of the scientific community as a means to affecting women's roles, technology, and development strategies must ask the question, "How can a society build upon its traditional democratic cultural practices in order to prepare its communities (including its women) to contribute significantly to sustainability?"
2) The introduction of appropriate technology must be accompanied by a sensitive examination of the social, geographic, and cultural realities of the "actors." The example of the solar cookers in Africa (described below) serves as a case in point. The critical question for those advocating this appropriate technology must be, "How is work collectively organized in a democratically based culture?"
3) The challenge to include women as partners in development and technological

innovation must not be construed to require an idealistic elevation of women's roles as superior to men's. Any society must ask the fundamental question, "What values protect its collective social, economic balance and stability?"

4) The women of Ghana, like those of any society, are a diverse group with a variety of interests, identities and needs. Some are Christian others are Muslim. Rural women in closer proximity to urban centers view their needs very differently from the women in some of the more isolated regions of Ghana. Perhaps the women influenced by Muslim or Christian vertical social organization may respond differently to indigenous religious practices of decentralized administrative structures still visible in some aspects of Ghanaian culture. Thus, there is a need for varied centralized and decentralized administrative approaches to disseminating technology and information. How should these differences be incorporated into policy and planning strategies for sustainable technology and development?

5) What are the best strategies for cultivating local leadership and grassroots participation in approaches to sustainable development and technology? Many grassroots "home grown" movements are sparked by pending ecological crisis or encroaching loggers and the like. Yet, successful movements have also grown as a result of well-trained local leaders mobilizing their communities.

These and other evolving assumptions and research questions are used to identify the necessary criteria for a human centered approach to sustainable development.

LITERATURE REVIEW

Ghanaian Women and Their Sociocultural Background: Traditional Roles in African Society

African women have participated actively and creatively in developing their societies. In communal African society, women were agriculturists; they wove and dyed cloth and gathered material to construct shelters. On the basis of both their economic productivity and their reproductive roles, women had the right and responsibility to participate in the political organization of society. In many African societies, women decided family disputes and village affairs, and they were in the council of elders (Aidoo 1981). African women's participation in production, reproduction, and politics extended naturally into aspects of cultural creativity, such as technology. Women, as children's first teachers, taught them skills and imbued them with the values, beliefs, and principles of their society.

Many traditional African societies operated under a communal construct in agricultural production and a matrilineal system of descent through the female line (Diop 1959). In these societies, lateral distribution of responsibility and privilege was promoted in the political and cultural life of the people. Women in both matrilineal and patrilineal systems of descent had varying degrees of power and influence in the political organization of society. In the patrilineal systems (such as the Lovedu, Ruanda, and Swazi) women performed the functions of rain-makers, members of the royal council, controllers of age classes, and distributors of land. Women were also dispensers of justice. Further, women held various positions of authority that were based on ownership and the distribution of wealth in the form of livestock and land. In communal, matrilineal societies with horizontally

organized centralized authority, women exert a greater amount of power and authority than their sisters in matrilineal states with vertically organized centralized authority. Women in general, within both patrilineal and matrilineal states and communities based largely on kinship, serve as the protectors and caretakers of natural elements (land, rain, the fruits of earth, etc.). These functions can be attributed to women's ability to reproduce and the inherent worth of that fecundity among human beings, plants, and animals (Finnegan 1970).

Pre-Colonial Roles

The vital position that African women occupied is illustrated in numerous anthropological works. In pre-colonial African societies, women held significant positions in the "domestic" and "public" spheres. This is a central theme throughout several of Dr. Sudarkasa's works. An examination of African women's position in these spheres and how the migration patterns of West Africans were both caused by and resulted in socioeconomic change, may illustrate how traditional roles have been impacted (Sudarkasa 1976).

With the transformation of these pre-colonial roles, especially due to migration patterns, numerous changes have occurred. In pre-colonial West Africa, women and men had complementary roles. Public duties were not generalized from their roles as husbands and wives, as mothers and fathers, as sisters and brothers, and as sons and daughters. While male and female roles were different from each other, they both made significant contributions to the "public" and "domestic" domains. Women and men shared both domestic responsibilities, such as raising the children, and decision making; as well as playing productive roles in the economy. These roles were inextricably linked for each gender. In traditional pre-colonial West Africa, men were primarily long-distance traders and women controlled the local markets. Additionally, there is no evidence that a different value was attached to the labor of women and men or that women and men were rewarded differently for the products of their labor (Sudarkasa 1987). The mobility of West African

populations, especially of women, created an environment of changing cultural and economic patterns. In general, rural women in Ghana were independent in their economic activities. They traded alone and were never expected to share their earnings with their husbands or their co-wives. In contrast, the new urban migrant reality found women and men engaging in joint trading activities (Sudarkasa 1977).

Conditions in urban Ghana were different from those in the rural homelands. Men who had been polygamous were now forced to live "de facto" monogamous lifestyles. No longer enjoying the comforts of the spacious rural compounds, husbands, wives and other relatives were forced into crowded urban quarters. Dr. Sudarkasa's conclusions are revealing: comparative data on Yoruba conjugal behavior in Nigeria indicates that the presence of decision making, consultation and cooperation in the use of conjugal resources within present day African marriages does not always derive from "Westernization" or elite status, as one might suppose. That is to say, there are traditional democratic characteristics that govern how decisions are made within a marriage, especially those concerning matters of resource use and distribution.

These characteristics also emerge among non western-educated, lower income, otherwise "traditional" marriage partners whose life styles have been altered by the demands of a new urban social environment. While this change in conjugal behavior had been influenced by both men and women, these same migratory trading (urban/rural) African women were responsible for the dissemination of significant innovations throughout West Africa. Primarily through their trading activities and interpersonal relations, female migrants have introduced new types of machinery and promoted new techniques for accomplishing tasks (Marshall 1970).

Self-reliance has been a common theme within traditional and modern African women's activities. This traditional feature is critical to understanding Ghana's modern

"female farming" system. The well-documented predominance of women's roles in hoe agriculture inspired Bores (1979) to refer to Africa as the continent of female farming par excellence.

The major contribution to the caloric intake of traditional societies has been attributed to women's work in gathering, sharing, and collective hunting (Dahlberg 1981). In most sub-Saharan tropical African societies, women held social and political power in determining the distribution of agricultural produce and foodstuffs. Women developed an ideology of self-reliance and can be said to have had "food power," in that they made certain decisions about food production, processing and distribution (Steady 1988). These examples of women's self-reliance and autonomy speak to the level of democracy enjoyed in pre-colonial West Africa.

Harrison (1987) also notes that women are the backbone of African agriculture. It has been estimated that women do 70% of the hoeing and weeding, 60% of the harvesting, 80% of the transportation and storage of crops, and 90% of the food processing (Harrison 1987). This fact holds true for most of rural Ghanaian society. The foundation of this modern female-farming system is rooted in what can be termed Ghana's traditional "democratic" social structure.

In southern Ghana, the Ga people were originally a community based on a farming and fishing economy. Land was owned communally before European colonial penetration. All individuals, male and female, had democratic access to the land (Mullings 1976). Mullings further describes a typical Ga pre-colonial social structure as "based on the principal of separation by sex: in general, men lived in male compounds with patrilineally related men, and women lived in female compounds with matrilineally related women." Social organization where sex separation is present cultivated important means for individual growth based on collective responsibility. This traditional institution facilitated the

development of self-reliant, democratic ideology and solidarity among women. However this solidarity was not based on gender antagonism. Steady (1988) elaborates on the solidarity among women where social organization is communal rather than composed of nuclear family units. This structure ensured a certain amount of socioeconomic security and cooperation across genders among the members of this traditional residence system.

Colonial and Post-Colonial Roles

Ghana's colonial and post-colonial socioeconomic structure—with its increase in unemployment, male absenteeism, and male migrant labor—fostered many negative effects that contrast with gender group democracy prevalent in pre-colonial Ghana. Single cash crops and a money based economy eroded family structures and left many Ghanaian communities suffering extreme conditions of poverty. Under these circumstances, "female self reliance becomes synonymous with male peripherality" (Steady 1988, 16). Women's contributions in pre-colonial roles were merely an aspect of a democratic process, where roles were different, but equally respected, and necessary for community sustenance. Under colonial and post-colonial conditions, these female roles have no mirror complementary male role. The men are mobilized away to serve the interests of a new social economic exigency. These self-reliant African women now carry the burden in meeting "subsistence needs under severely impoverished conditions" (Steady 1988, 16).

Modern conditions, resulting from the imposition of colonial rule and the spread of a capitalist money-based economy, critically changed the traditional roles of men and women in West African societies. Cash crops and migratory labor demands placed an emphasis on male wage-laborers. This pattern of changing the social roles of men and women additionally excluded women from many educational opportunities (Sudarkasa 1976).

One of the consequences of the disintegration of the Ghanaian agricultural economy

has been rapid urbanization. The urbanization process in Ghana contains all the features of asymmetrical development characteristic of Third World countries with a colonial history (Steady 1982). High rates of urban and rural migration, chronic unemployment, and overcrowded living conditions characterize many of Ghana's urban centers.

Ghanaian Women and Resource Management

Central to the theme of Ghanaian women as self-reliant female farmers, is the role they play as resource managers. Resource management can be defined as; cultural practices, checks and balances, policies, and regulations directed at conserving the earth's scarce resources. These practices are either "inadvertent" or "intentional" conservation practices (Klee 1980). Klee expands this definition of traditional resource management practices to:

> ...include discussing and analyzing magico-religious taboos, bans, seasons, wildlife, and marine preserves, land and lagoon tenure systems, social stratification, and such population control measures as overseas voyaging, suicidal voyages, celibacy, prevention of conception, abortion, and infanticide. All such practices, whether inspired by conservation or not, had and still have some effect on the availability and exploitation of local resources (Klee 1980, 245).

Ghana's traditional land tenure system is characteristically based upon lineage and ceremoniously lodged in the chief's stool/throne, this being symbolic of the community. In pre-colonial Ghana, this meant that absolute or allodial title was vested in the lineage group. In practice, any member of the lineage is entitled to occupy any unassigned communal land (Date-Bah 1985).

Presently, these traditional land tenure policies have created constraints for women farmers as managers. Communal land access is no longer available to women in the modern setting where urban and rural land is not contiguous or as available. For example, in the area of fuelwood management it is clear that women must have access to land if they are to meet their fuelwood needs, but pressure on land for industrial, residential, commercial and

agricultural purposes is depriving members of the lineage of access as chiefs distribute or lease the lands (University of Ghana Geography Dept. 1990). Again, these contemporary economic factors impeded the previous democratic structures of land access.

In general, Ghana's traditional management system can be described as sedentary cultivation that uses interplanting, composting, and fires as methods of agricultural management. Grains were stored in shallow pits and raised storage houses (Beyer 1980). These pre-colonial practices are often still present in modern Ghana. What is evident in both pre-colonial and present Ghanaian agricultural society is the primary nature of women's roles.

According to a 1981 study done by Atsu and Owusu for the Institute of Statistical, Social and Economic Resources at the University of Ghana at Legon, Ghana's farming technology has changed very little since pre-colonial times. Farming tools are a few single hand tools, notably the cutlass, the hoe, the mattocks and the felling axe.

Ghana's current economic and ecological crises present a situation that requires culturally appropriate strategies for development and resource management. That means incorporating women's role in agriculture as part of appropriate technology. After eight years of severe austerity measures imposed by the IMF, Ghana's current economic problems have not lessened. The March 1990 issue of African Business illustrates:

> When he seized power again at the end of 1981, Rawlings berated the ousted Liman government for allowing the price of chicken to rise as high as Ce70 ($25). After eight years of economic recovery though, Rawlings finds to his chagrin the price of chicken has risen even higher in real terms (Ce1,500) (Ankomah 1990, 11).

Compounding this economic crisis is the current ecological crisis manifested in the current rate of deforestation in Ghana. The situation is alarming and urgent. The stress on Ghana's forest derives from two primary sources; domestic consumption of trees for fuelwood energy use and lumber exports. In 1960 in both rural and urban areas, 80% of all

households used fuelwood for cooking. By the 1970s this pattern changed for the worse. Urban households turned to charcoal which was found to be more wasteful and polluting. (University of Ghana Unpublished Research 1990)

The pressures on the land for commercial and industrial purposes further exacerbate the crises with direct impact on rural Ghanaian women. Collection of fuelwood is "women's work." Women carry heavy loads on their backs for long distances. The burden of this task is a major factor in women's malnutrition. The task of fuelwood production can consume up to 500 calories per day. It also contributes to the overall shortage of time for farm labor, another woman's job (Harrison 1987).

In 1939, the area of forest available in Ghana for industrial use was 47,900 sq. km. By 1981, this area was reduced to a mere 17,000 sq. km (Asmah 1990). In 1974, in response to this growing crisis, Ghana established the Environmental Protection Council (EPC). The EPC functions as a liaison advisory body that conducts and promotes investigations, studies, and analysis of environmental issues. The EPC is headed by a Ghanaian woman, Christine Debrah, who is aware of the direct relationship between environmental issues and women's issues.

In 1984 the EPC in conjunction with the United Nations Development Programme (UNDP) and the National Council on Women and Development Ghana (NCWD), launched pilot projects in three villages designed to test potential innovations to address some aspects of the economic-ecological crisis. Similar projects had been undertaken through the International Labour Organization (ILO) of the United Nations (UN) as early as 1979; but only recently was serious attention given to the impact of the environmental crisis on women (Ahmed 1985). These projects are elaborated on in a later chapter. The critical point here is that Ghana's current economic crisis led to the recent emphasis on the "development of rural women" as a means to address critical environmental and household needs. Women's roles

in food production, processing, and other household responsibilities, traditionally and presently require more efficient means for households and the country (Date-Bah 1985). A complete assessment of women's methods, socio-cultural uses of time, labor, and tools is vital for developing strategies to create and disseminate improved technologies to rural women. Modern government, United States Agency for International Development (USAID), and development institutions are emphasizing the integration of rural women fully into all aspects of Ghanaian society. This often compounded her burden. Women in "development" often meant the underdevelopment of women. Patriarchally oriented governments and USAID organizations may introduce projects that solicit women's participation but actually benefit men financially. Men, designated as heads of households by these government and USAID agents, enjoy financial privileges restricted to males. Thus women who do the bulk of the work in such projects are often not eligible to get loans and credits now offered to male heads (Siedman 1981).

The following four areas of resource production illustrate the degree to which Ghanaian women are involved in resource management. The production categories of fuelwood, gari, palm oil, and fish preservation are key to basic Ghanaian needs.

Fuelwood Production

The current rate of deforestation in Ghana is due in large part to excessive domestic and commercial fuelwood consumption patterns. Women contribute 40-79% of the labor requirement in fuel provision for domestic and small-scale commercial use, (for example, charcoal making and foodstuff preparation and preservation) (University of Ghana at Legon Geography Dept. 1990). Many of these women have turned to charcoal making because of recent urban demands and as a means to generate income.

An average of 11 hours of a 16 hour day is spent in this activity alone. A typical day for a poor rural woman in the Aahale Botwe region is described:

> Afi starts her work day at about 5 A.M. to sort and pack charcoal for sale, She leaves her house at 6 A.M. and makes a 3 mile trek to the nearest market to sell only a small basket of charcoal. After selling the charcoal, she purchases groceries for the household meal. She then treks out to the savanna woodland where she collects fuelwood. As soon as she returns home she sorts and arranges the fuelwood for burning. She is sometimes assisted by her 2 daughters and a son. Once the charcoal-making is started, it needs constant attention to ensure that the fire does not burn with a flame and that a crack does not develop in the mound. By 6 P.M., the family meal is served and Afi goes back to the manufacturing site to check on the charcoal. She continues checking until she goes to bed after 8 P.M. Even then, she has to wake sometimes 3 times to check on the carbonization (The Energy Crisis in Ghana. 1990 University of Ghana, Legon. Unpublished Research, 44).

Gari Processing

Gari, the main Ghanaian staple, is prepared out of the root crop cassava. It is so popular because of its long storage life and the variety of meals for which it is used.

Traditional methods of making gari begin with peeling followed by a tiresome and long process of grating, pressing, fermentation, sieving, roasting, and sieving again. Peelings and residual roughage are used as animal feed (ILO/NCWD 1987).

Palm Oil Production

Palm oil is extracted from the palm nut to produce cooking oil. Rural women spend days using traditional methods that yield meager results. The oil extraction rate using traditional methods is only 10% (Date-Bah 1985). Women crack the nuts manually using stones followed by roasting, milling, and boiling the kernels until oil rises to the top of the water. The skimmed effluent is heated in large frying pans for further "clarification" of the oil.

Fish Preservation

As many as 12,784 Ghanaian women engage in fish preservation. They operate over 38,260 ovens and smoke approximately 80,000 tons of fish annually. The 1960 Ghanaian

census gave a larger figure: out of a total of 90,000 people in the canoe fishing industry, 47,000 were women who processed and sold fish (Date-Bah 1985).

Fish smoking is done in large mud ovens. Fish drying is done using solar energy and salting. The entire activity requires much manual labor; packing ovens and filling drying racks; storage, packaging and transportation to markets for selling.

The Ghanaian fishing industry has been described as a cooperative venture, where fishermen and women work together, sharing services and skills. The fishing community of Winneba still functions primarily on a traditional economic and social organizational pattern. The division of labor is based on gender and husband-wife cooperation. A significant implication (applicable to other areas as well) of this type of economic cooperation is that improved technologies should not be addressed exclusively to one gender since the changes in behavior needed for the successful operation of such technology can come from both sexes (Date-Bah 1985).

Improved Technologies

Carr (1981) has identified three reasons why rural women are not using many new "improved" technologies on a widespread basis. First, some improved technologies do not fit into the socio-cultural environment and behavior of the women. This seems to occur when proponents of a particular technology fail to factor in these issues prior to dissemination. For example, the proponents of the use of methane gas for cooking seem to have forgotten that production of the gas involves the use of large quantities of water and that in many areas where wood is scarce, water is even scarcer (such as the Sahel countries of Africa). Women are unlikely to see the value of adopting a cooking method which substitutes long walks to collect firewood with even longer walks to collect water and additionally involves collecting animal dung and mixing this with water (Carr 1981).

Next, technologies introduced are often not viewed as priority or as meeting an immediate need by the recipient. For example, for many African women the issues of fuelwood and water collection are priority—rather than sanitation, as viewed by USAID for a Swaziland rural development project (Carr 1981).

Finally, many institutional and financial obstacles exist that prevent easy access to improved technologies for rural women. Often the project workers are men or it is men who have the leisure time to attend meetings where information is presented. Additionally, long standing traditional land tenure rights, especially among the Ashanti, no longer allow women access to needed collateral, even if women learn of available resources (Carr 1981).

Current Representative Models: Women, Development and Technology

The following review of current representative models serves as a critique of the existing literature on African women, primarily in West and East Africa. Gender and class biases have distorted current representative models on women, development, and appropriate technology and have led to inappropriate technology and poorly planned rural development policies. The data reviewed indicates a strong case against technologies that ignore complex social, cultural, and gender issues and which require large capital investments and favor Western and native elites.

Critiques of impacts of development strategies and technological innovations on rural women that point out that rural women have often suffered from development have increased yet the field is still largely under researched. Many of the contributors to this inquiry have made judgments grounded in the context of single disciplines of anthropology, feminism, political science, or economics. As environmentalists, some of us want to address today's challenges by using a multi-disciplinary analysis that includes class, gender, and cultural constructs in research approaches. A critical question for us to address is, "What

are the socioeconomic and environmental implications of equal access to knowledge, resources, and appropriate technology by lay populations that would empower their specific cultural contributions towards a sustainable future?"

Development and technology are often believed to be value free social phenomena and are usually understood to be measurable in exclusively economic terms. For example, a particular country's development is thought to be calculated by its GNP or by its quantitatively measured technological achievements. Of course, any assessment of the impact of technology on development must consider economic factors. However, experience shows that development and technology must be evaluated using a range of quantitative and qualitative measures. Here, one would be concerned with factors of production such as, population, land, technology, capital, specialization and large scale-production. As Walter Rodney recounts in How Europe Underdeveloped Africa, bourgeois economists and scholars alike omit significant factors in their narrow analysis of the development process. A holistic definition of social development would include the history of exploitation of the indigenous majorities by the settler minorities. It would include an explanation of the social relations of production or of classes. Other indicators would address life expectancy, health care, education, social services. Finally, it would provide a description of how the factors and relations of production combine to form a distinctive system or mode of production. An equity oriented analysis of development and the role of technology must include the impacts on human subjects of imperialism as a phase of capitalism (Rodney 1977).

In an attempt to identify the strengths and weaknesses within the current existing models, we must look briefly at some of the alternative perspectives of women, development, and technology. Our goal is to glean from these approaches the ingredients that might be useful to shaping an evolving human centered development model. The following approaches are examined briefly: 1) gender integration, 2) appropriate technology, 3)

feminization of technology, 4) global economy, 5) eco-development, and 6) sustainable development.

Gender Integration Approach

This approach is directed to reforming current institutions by increasing the number of women within all echelons of the scientific community. Integrationists assert wider access and institutional change as solutions to gender inequality. They continue to argue that sexual hierarchy, and sexual divisions of labor are more than vestiges of prehistoric social relations and that these processes must be understood to reform educational and labor institutions (Warren and Bourque 1987).

An increase in the quantity of women entering into the scientific community has the potential for creating a climate for change, especially if the women come equipped with sound ideas and attitudes that challenge the status quo. The flaw here of course is that these same women would have been trained for their public domain roles by the professionals of the status quo. The integrationist approach assumes that an elitist, reformist strategy can influence entrenched power structures. In this way, policy decisions and development strategies can be administered from the top down. Yet, bureaucracies and power relations remain intact, unless mass disaffection imposes change.

Examples of this approach were evident from the field research collected in Ghana. The very mandate of the National Council of Ghanaian Women and the December 31st Women's Movements guaranteed women's representation in top key positions. The chair person of the Ghanaian Environmental Protection Council is a woman. Yet it was interesting to observe that at the December 31st Women's Movement, a male Ghanaian secretary was responsible for setting up the project site visits. The development implications of this issue are further developed in the data analysis chapter.

Appropriate Technology

The adherents of appropriate technology (AT) hold the philosophy that decentralized, small-scale development that uses low cost, intermediate, self-reliant, improved technologies will increase local development. This viewpoint can be described as an outgrowth of Schumacher's "small is beautiful" philosophy. Adherents of AT advocate "scientific rationality and technical efficiency as ways to increase productivity" (Warren and Bourque 1989), but they have left out one of Schumacher's (1973, 154) most vital ingredients in the AT equation—democracy. He concludes,

> One can call it self-help technology—a technology or democratic peoples' technology—a technology to which everybody can gain admittance and which is not reserved to those already rich and powerful.

While the proponents of AT have criticized top-down decision making within the development strategies, noting that they fail to consult end users, the AT strategists also fail in applying a horizontal approach to the introduction and dissemination of new technologies. For example, African women who experimented with solar cookers found serious drawbacks in this fuel-saving technology. Such cookers must be used during the heat of the day and moved continually to collect the sun's rays. Another objection to the cookers was that women were unable to fit large family group pots on the delicate stoves (Carr 1981).

The advocates of AT (and most scientists and engineers) may bring with them not only unconscious cultural and gender biases but also situational biases that influence the adaptability and acceptability of new technologies. The "appropriateness" of a technology can not be measured only by the form, amount, and type of energy required, but also by who "controls its development, dissemination, and products" (Leet 1981).

The Feminization of Technology

The social critique that argues for the feminization of technology suggests that technological innovation is determined by "distinctive masculinist values." These male

values are characterized by an orientation toward hierarchy, competition, immediate measurable results, material accumulation, depersonalization, and economic and political expansionism (Bergom-Larsson 1982).

The feminization of technology perspective holds that a "distinctive women's culture" must evolve to develop awareness in the public world of drawbacks of the "masculinist" values as it informs the public of the benefits of the "womanist" values of caring, nonviolent persuasion, and nurturance of future generations (Bergom-Larsson 1982). In its dichotomous context, the feminization of technology position tends to idealistically elevate "women's values," the family, and the nature of third world societies.

While there was no explicit awareness or verbalization of this approach in the project sites observed in Ghana, it was evident among the Environmental Protection Council chair, and the December 31st Women's Movement women trainers. These women often spoke of Ghanaian women's social positions and traditional roles as resource managers; and therefore, of the importance of mobilizing them to address Ghana's current environmental and economic crisis.

The Global Economy

The global economy approach uses a neo-Marxist framework in critiquing technology as the focus of development. This perspective argues that issues of an interdependent international market economy dominated by "developing" countries are central to the discussion of technology. The capitalist market forces of production and consumption shape gender and class relations in the public and private functions of women.

The Women in Development (WID) circles have found this perspective useful in criticizing the West. Beneria and Sen conclude:

> The problem for women is not only the lack of participation in this process [of development] with men; it is a system [of international capital accumulation] that generates and intensifies inequalities, making use of existing gender hierarchies to place women in subordinate positions at each level of

> interaction between class and gender. This is not to deny the possibility that capitalist development might break down certain social rigidities oppressive to women. But these liberating tendencies are accompanied by new forms of subordination (Beneria and Sen 1986, 150).

These institutionalized inequalities maintain and perpetuate the domestication of women, reinforcing a sexual division of labor, which places no monetary value upon the domestic work of women. In the West and the Third World, (Capitalist) development technology, whether in terms of an electric stove or solar oven, ultimately has come to perpetuate the persistence of social relations of production and consumption that engender man's control over women's reproductive capacity. In this way the capitalist economic interests of perpetuating unequal access to the means of production is maintained (Stolcke 1981).

Key to this analysis is the linkage which reveals the former colonial status of many third world national governments as former colonies, and thus their modern "dependent" relationship to first world international markets. This reality has had a major influence in shaping the planning, policy development, and the allocation of resources of such national governments (Afshar 1987).

The global economy also advances a perspective that women are in fact a multi-dimensional, diverse population with "competing identities." Their argument against the oversimplification of studying women as individuals, rather than part of an entire household unit that includes men and children who are all engaged in a variety of economic activities. Women are not necessarily a homogenous unit; their roles (reproductive and productive) vary by class and socio-political position in society (Ahmed 1985).

The December 31st Women's Movement probably has an interest in advancing this approach. As an internal organ of the Provisional National Democratic Council (PNDC), these women trainers engage with project participants in the political and economic issues affecting Ghana as part of the criteria for participation.

Eco-Development

The eco-development approach has roots in indigenous grassroots movements that have mobilized themselves to protect, restore, and develop the natural resources in their immediate environmental communities (Durning 1989). As early as the 1960s, indigenous projects were initiated in the West African Sahel region of Burkina Faso (Upper Volta). The Naam Movement was founded by Bernard Ledea Ouedraogo in 1967 and is noted as one of the most successful grassroots efforts (Harrison 1987).

Ouedraogo—a teacher whose task was to educate, mobilize, and organize rural peasants to participate in development activities—describes his basic approach to development as making the village members more responsible for their own development. He taught strategies on how to develop without destroying. He began with individual peasants; who they are and what they know. Then he developed what they know how to do, how they live, and what they want—Ouedraogo's work had positive results in one village community (Harrison 1987).

Almost ten years later in 1973 and many miles away in the Garhwal hills of Uttar Pradesh in India, the Chipko community forest movement began. Similar to the Naam, the Chipko are well-organized local volunteer groups who joined together to protect their natural resources. While many groups form to defend their resources in direct response to encroaching loggers, settlers, and cattle ranchers, others form in response to their own internal excessive environmental exploitation (During 1989). The Kenya Greenbelt Movement sparked in 1977 to save Kenya's shrinking forests was such a response (Maathi 1990).

The eco-development approach is a perspective largely shaped by non-wealthy communities that live and depend on biomass-based economies. Their goal is to develop appropriate strategies for ecological management and restoration. Instead of merely "hugging trees," these communities are planting trees (Durning 1989).

The December 31st Women's Movement of Ghana represents the most grassroots approach of the projects observed. The trainers are indigenous Ghanaian women who are concerned with empowering rural women to participate in development activities.

Sustainable Development

This model has relevance for assessing the impact of traditional Western development strategies on rural African women in general and Ghanaian women in particular. The World Bank and United States Agency for International Development (USAID) funneled billions of dollars into the Third World over the past fifty years. However, we see that the conventional wisdom that aid equals development becomes a myth as we assess "what has worked" and "what has not worked" in development assistance projects.

The sustainable development model has a primary emphasis on democratic, human oriented goals versus the goals of private capital investment emphasizing profit.

In general, conventional Western development strategies have not benefited rural African men or women. Instead, a handful of national elites and aid agency employees enjoyed the real economic benefits of aid and development programs. The cash flow that passed through the bureaucratic hierarchies of development schemes rarely touched the hands of the common rural African citizen. The question thus arises, "Has aid from multilateral banks and USAID agencies in the Third World, brought development or destruction?"

Sustainable development proponents must seek to synthesize current approaches towards evolving a human development democratic model. Such an approach is concerned with environmental, ecological, economic, social, cultural, psychological, and gender imperatives, towards a development strategy with a "human core."

Defining Development

"Development" is a multidimensional construct. Modern definitions of development have been largely shaped by some important historical political factors. World

War II, the creation of the IMF and the UN, the establishment of the Marshall Plan and the passing of Public Law 480 in 1954 comprised the ingredients necessary for the creation of a world order where aid and development programs became the new tools for maintaining the status quo. Thus development, defined as a process whereby societies are building the capacity to meet their needs and improve the quality of their own lives (Durning 1989), appears not to have been the intent nor result of traditional Western development strategies. Over a ten year period, the United States granted $50 billion in aid to ninety countries, but "only $5 billion was for non-military economic development" (Lappe 1977, 365).

France's Moore Lappe's Food First is instructive in outlining the role played in the aid hyperbole by foreign capital in general and UN organizations in particular. She states:

> The United Nations Food and Agriculture Organization (FAO) was founded to provide a pool of independent experts discovering and disseminating plant protection information, including the proper uses of chemical pesticides and alternatives. But more and more FAO technicians have come to see themselves as "brokers" linking up a multinational agribusiness firm and an underdeveloped country. Institutionalized within the FAO structure has been a direct collaboration with agribusiness corporations whose profits are directly threatened by any nonchemical alternatives. A key part of this Industry Cooperative Program, until recently within the FAO, has been the Pesticide Working Group, whose roster includes BASF, Bayer, Borden, British Petroleum, Ciba-Geigy, Cyanamid, FMC, Hoechst, Hoffman-La Roche, Imperial Chemical, Liquigas, Merck, Phillips, Sandoz, Shell, Stauffer, and something called the Wellcome Foundation (Lappe 1977, 415).

The economic interest of aid is further clarified when we expose the intent of the "Food Aid" Public Law (P.L. 480). It was passed in 1954 to for the primary purpose of creating a secondary foreign market that would then allow food-deficit countries to pay for American food imports in their own currencies instead of in dollars (Lappe 1977).

The majority of aid and development strategies have never been directed towards humanitarian goals. As professor Benham[4] in Economic Aid to Underdeveloped Countries remarks: "It is pleasant to feel that you are helping your neighbors, and at the same time

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[4]From Neo-colonialism, by Kwame Nkrumah (1965). No citation given in bibilography.

increasing your own profits" (Nkrumah 1965). Prior to W.W.II, 75% of the world lived in colonies. The impact continues to retard political and economic growth and stability in many former colonies. The legacy of single cash crop agriculture has left an antagonistic class structure of moneyed elites whose loyalty is more with the former colonial power than with their own country.

The small farmer and/or any rural elite who generally have access to land often became the target of aid programmers. These small entrepreneur farmers were typically male and represented those rural peasants who formed an "unofficial" alliance with USAID officials interested in transforming traditional rural economic relations into single cash crop monetary relationships. What this meant for rural communities is a cycle of marginalization. Many USAID policy makers came to equate the creation of a core of small entrepreneur farmers with success. Commercial farmers dependent upon foreign technology and technicians were portrayed as successful development examples (Lappe 1977).

The influence Multilateral Development Banks and USAID agencies have over the developing world is far reaching. In the 1986 Volume 10 (1) issue of Cultural Survival Quarterly, pg. 11-12, an article entitled, "Multilateral Banks and Indigenous Peoples, Development or Destruction?" stated that, "Developing countries often modify their development policies and priorities for entire sectors of the economy in response to the suggestions and requirements of the banks." The article continues:

> The current pattern of multilateral bank operations and lending bodes particularly ill for Sub-Saharan Africa. A recent study by the Office of Technology Assessment concluded that foreign assistance will result in major failures if it continues its "high technology, capital-intensive, profit maximizing orientation." The report, commissioned by the House Select Committee on Hunger, notes an emerging consensus that future development efforts in Sub-Saharan Africa should be small-scale, labor- rather than capital-intensive, resource-conserving and better adapted to traditional agricultural methods.

This critique of Western approaches to development is not new (Ahmed 1985)

(Dauber and Cain 1981). However, a new model for incorporating the results of that critique necessitates attention to the factors touched on above. A variety of theoretical and practical approaches have been described. The task at hand is to establish a human development model. However, the concern for using this sustainability critique as an intrinsic aspect of the creation of a more democratic human centered model is new.

The recent increase in interest for developing more effective models for third world resource management and appropriate technology demonstrates a shift from past ideas that Western modernization is the panacea for the problems of development. The "Green Revolution" which was expected to bring a great bounty of hybrid agricultural wonders to all the world was not so beneficial after all (Whitehead 1985). International conferences entitled, "Energy Use in Africa" and "Resource Management Strategies for a Sustainable Future" are examples of the hundreds of meetings occurring around the world on a more frequent basis in response to the current environmental crisis.

Contemporary resource management is often concerned with encouraging projects that can turnaround the ever increasing global environmental crisis. A small portion of these resource managers and researchers focus their attention specifically on women's social and economic roles in resource management. Since the first World Conference of the United Nation's Decade on Women in 1975 (Mexico), much concern has been directed towards the negative impact of Western technology on the working life of third world women (Cain 1981).

The role of technology in rural women's development presents a special focus within resource management and environmental theory building. Appropriate technology provides some practical options for resource management. Sim Van der Rym (1976, 5) defines some key elements of appropriate technology as: "smaller scale, more skillful, more understandable, diverse and non-violent." More recent literature challenges the advocates of

appropriate technology to extend the definition to include an approach that is sensitive to gender and culture specific issues as well (Karl 1984) (Carr 1985).

Schumacher (1973, 154) expounds on Van der Rym's appropriate technology definition:

> The technology of production by the masses, making use of the best modern knowledge and expertise is conducive to decentralization, compatible with the laws of ecology, gentle in its use of scarce resources, and designed to serve the human person instead of making them the servant of machines. I have named it intermediate technology to signify that it is vastly superior to the primitive technology of bygone ages at the same time much simpler, cheaper, and freer than the supertechnology of the rich.

Schumacher's description extends Van der Rym's by including a class and cultural analysis, especially suited to indigenous Indian cultural needs.

Carr, an economist for the Intermediate Technology Development Group in London, concurs with Schumacher in her description of a common occurrence throughout Africa:

> Undeniably a major cause of the most pressing problems of the Third World has been the transfer and use of technologies which are totally inappropriate to prevailing conditions. A famous case study from one African country illustrated this point perfectly. Two plastic-injection molding machines costing US$ 100,000 each were imported to produce plastic shoes and sandals. Working three shifts and with a total labor force of only 40 workers, the machines produced 1.5 million pair, they were better value and had a longer life than cheap leather footwear at the same price. As all the machinery and the material for the plastic footwear was based largely on non-indigenous materials and industries, the net was a decline in both employment and real income within the country (Carr 1978, 6).

It is an important and vital point that appropriate technologies be indigenous and economically stimulating to local rural developing economies. The ideal situation would have been to integrate the new technology into the social, cultural, and economic environment of the traditional leather shoe production. This would have required the inclusion of the primary producers and indigenous artisans, many of whom are women, in the planning and design of the new shoe factory from the onset. Such a planning policy would require a social context of sincere appreciation and understanding of the intricate

value systems of the host culture.

Some situations arise where the introduction of modern technology and expertise is necessary to prevent major deaths which result from epidemics, natural disease and pest infestation. For example, the use of vaccinations against numerous childhood diseases is an issue where modern medical preventive measures should be welcomed, especially by women, who benefit from these life saving technologies. Again, the challenge is to negotiate assistance which could encourage self-reliance, preventive health care and conservation of resources.

Western policy assumes a gender bias framed within its particular economic perspective.[5] This is buttressed by social organization associated with the exportation of advanced technology and supported by marginally altered colonial institutions. These aspects limit both access and utility of this exported technology to a narrow group of individuals, usually men. Rural women are left out of this range of power and influence due to their position outside the mainstream of the information flow about technologies. In addition, the selective perception and expectation of those controlling or choosing the technology may automatically preclude the inclusion of women and their social and cultural needs. According to Carr the introduction of improved technologies to developing countries reflects a gender bias:

> Many improved technologies that are appropriate for rural women are not being used by them because—in one way or another—they are denied access to them. In the great majority of cases, rural women are completely unaware of the existence of improved technologies which could help them. When information does filter down to the village level, it is usually the men who receive it, either because the extension workers are men, or because it is only the men who have time to sit around at organized meetings or demonstrations where such information might be given out (Carr 1981, 198).

Social organization in Africa in general and in Ghana in particular has several basic

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[5]See Ann Seidman, "Women and the Development of 'Underdevelopment': The African Experience," in Dauber and Cain's Women And Technological Change In Developing Countries, (1981).

characteristics that distinguish it from European (including Euro-American) social organization. In Africa, men, women, and children were and are cooperatively involved in production in a social, rather than individual, context. Economic activities such as farming, fishing, hunting, and gathering were geared toward subsistence so that use of the land was determined primarily, by rules of collective need and cooperative use, rather than by private property (Steady 1987). Social organization could vary from patrilineal or matrilineal descent or a combination of both, but the dominant ideology was group preservation and well-being ensured by institutionalized checks and controls to reduce tension, especially between the genders (Steady 1987).

While there have been benefits from modern technologies, where biases do exist, the literature goes on to conclude that the most fundamental error has been the distorted patterns for introducing improved technologies into the African setting. The colonial legacy in Africa is one of systematic exploitation of the resources (human and raw materials) to enhance the international marketing advantages of the "mother countries" (Siedman 1981) (Nkrumah 1965).

Many of these distorted patterns were facilitated by the work of the first anthropologists in Africa, whose descriptions of African cultures focused almost exclusively on men and ignored women and children (Smith 1988). In addition, they brought with them all their preconceived notions of that time about women's work, role, and status in society drawn from their European social milieu. Karl discusses this phenomenon in relationship to the management group:

> The colonialists brought with them their own beliefs that women should stay at home with the children. They primarily sought male labor to do the heavy work on their mines and farms. The preconceived European perceptions fit nicely with the emerging colonial pattern in which women stayed in the rural areas, using pre-existing technologies to grow the necessary food and raise the children. This provided a convenient rationale for paying the men wages barely adequate to support themselves alone (Karl 1984, 74).

Since many of the colonialists believed that women should stay at home with the children, but also feed them, institutional changes that were to exclude women from employment in modern wage jobs and from the limited colonial education emerged. Few women ever received the basics for mastering the new technologies introduced in the narrow, export-oriented sectors (Siedman 1981). This also eliminated native men from the adult provider category with respect to their biological extended families.

The inclusion of women in researching traditional resource management techniques is a phenomenon of recent years. The women's movement in general and Women Studies programs in particular have fueled this research innovation. Research of indigenous conservation practices in traditional systems has since been recognized as being less destructive than advanced technological practices, especially in terms of the damaging impact upon ecological, social and cultural systems (Klee 1980). Developing theories suggest that women were and are a critical element in the resource management equation (Dauber and Cain et al. 1981) (Ahmed et al. 1980).

Dahlberg, in her work Woman the Gatherer, suggests there existed in the Philippines a more cooperative, egalitarian system which included women and men as hunters and gatherers. She states:

> Among the Agta Negritos of northeastern Luzon, the Philippines, women are of special interest to anthropology because of their position in the organization of subsistence. They are substantial contributors to the daily subsistence of their families and have considerable authority in decision making in the family and residential groups. In addition, and in contradiction to one of the sacred canons of anthropology, women in one area frequently hunt game animals (Dahlberg 1981, 121).

The objective in recognizing women's importance in resource management in traditional and contemporary societies is to facilitate a balanced use of the productive social elements, thereby approaching a gender partnership model[6] in which both women and men

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[6]R. Eisler's concept of the partnership model is developed in Chapter III, Methodology and Research

play roles in development and no group is isolated or marginalized. It would be comparably biased to downplay the contribution of men in resource management; they too provide necessary input for conservation and survival. It is folly to address only one part of a complex and interdependent system. Communities are complex systems with diverse interactions and resource management must concern itself with this complexity to evolve management systems that lead to sustainablility. A synthesis of the positive aspects of the past traditional methods, values, and structures with modern features of the present would be optimal.

Government sponsored rural development projects which considered indigenous peoples as "ethnoscientists" have been effective; especially when this assumption has led to local control over the project. This form of "home-grown" democracy has surfaced in several communities in Kenya. For years, workshops and training courses were run exclusively by Western development officials, or by locals under the scrutiny of a Western agency (Horst 1988). The specific potential benefits of "home-grown" strategies is the sensitivity the locals possess towards "the problems of Africa, especially of its women" (Horst 1988). One such training project, The Tototo Home Industries program was designed to train students and field workers of the YWCA to set up income generating projects. This service benefits villages surrounding Kenya's second largest city, Mombassa in two ways, 1) Students and field workers initiate special agricultural and commercial income generating projects, and 2) They sell training and consulting services to outside communities and other countries thus generating additional income (Horst 1988). Kenya has a very strong Women's Bureau in national government that encourages women's groups in the villages to define needs and start income generation projects (Smith 1991).

Another "home-grown" project that was totally initiated by indigenous women

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Design.

without government assistance is the "Mraru Bus Service." The village women of a rural Kenyan town, called Mraru, were simply tired of inadequate transportation systems and services. So they created their own in 1971. These women had a traditional custom of meeting regularly to share ideas about home improvement skills, craftswork and other concerns. This type of social institution is a vestige of traditional women's groups and councils which had similar functions (Kheerim 1980). It was only natural that they discussed the problem of transportation from which they all suffered on a daily basis. The service progressed with such success that they were faced with the new challenge of where to invest surplus income (Kheerim 1980).

Government encouragement of such endeavors would have clear benefits. Organizations that are already in place and that have traditional social value may need fewer resources for initial program outreach and set-up in rural communities. Thus, start-up efforts of "home-grown" projects can be cost efficient with appropriate planning.

According to the Ghanaian Environmental Protection Council, such "home grown," appropriate technology projects work best when they are dependent upon a local resource base and are socially and culturally acceptable[7] (Ghanaian EPC 1990). Such projects have features which reflect a gender partnership model (Eisler 1987). Aligned with these key ingredients for successful rural development is the philosophy of self-reliance (Steady 1981). Ghanaian women in a pre-colonial context had definite social, political, and economic roles that induced them to achieve a measure of independence and autonomy and to develop their self-reliant capabilities through participation in production and reproduction (Steady 1981).

Ghanaian women continue to practice this self-reliance philosophy in colonial and

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[7]The author of this thesis was in Ghana in 1990 and had the opportunity to interview the director of the Ghanaian Environmental Protection Council. Christine Debrah explained the success of several projects due to these factors. Findings from this interview are developed in Chapter IV.

post-colonial society. In the economic spheres, Ghanaian women predominate in the areas of agricultural and marine production and processing (Abrokwa 1987). Fish and cassava are two of the main staple foods. These foods represent important areas of Ghanaian economic life, therefore women's roles in the production and preservation of these commodities is pivotal (Date-Bah 1985). It is therefore logical and natural that they become the innovators for improved technologies in food industries in particular.

Traditional sun-drying methods for preservation of locally caught fish and of cassava have been improved upon by local women. Many also preserve fish by smoking it, however this is a health hazard. Women and children who use smoking techniques suffer many respiratory illnesses due to inhaling large quantities of smoke (Date-Bah 1985).

The Ghana Rural Fishery Research and Development Project (RDP) has improved on these local innovations (for example, recent introduction of improved racks on a limited basis in the village of Elmina, in Ghana's coastal region). Government support for the dissemination of these racks into other villages and areas through local institutions and leadership will determine its ultimate success. Sun-drying racks are used for drying fish and kokonte (cassava) and have been well accepted by local women. The improved rack stands on poles and is much more sanitary and efficient than the traditional method since it takes only a few days for the fish to dry (Date-Bah 1985). The fact that this specific example of appropriate technology was introduced first by the initiative of local women and then improved upon by a local government body, contributed to both its acceptance as well as access to the technology by women. In Kenya, where there is a certain amount of competition and hostility between men and women, women are more likely to fund community projects while men do not feel that they have community responsibility and are more likely to spend income on personal consumption. In this case, aid donors may find Western sex role stereotypes reversed (Smith 1991).

Because social and cultural constraints create the greatest challenges to the adaptability and acceptability of appropriate technologies, the gender and age-group roles that guide the division of labor must be fully evaluated and understood. Compatibility with cultural and religious values is a critical factor in acceptance. When development schemes are based upon an appreciation of these traditional methods and variables, the results are encouraging. A culturally compatible non-hierarchical, democratic locus of control by the female workforce can evolve.

The Green Belt Movement in Kenya offers one illustration of how a socially and culturally palatable project can gain power and recognition. The project is concerned with re-foresting Kenya's indigenous forest which in the past century has been depleted by 90% (Vollers 1980). The project founder and director is a well known Kenyan woman who is a scientist. The project is also run and financed by local Kenyan women and indigenous organizations. The key to its success has been its ability to demonstrate through examples that are not alien or uncomfortable for women's participation. Women who have adapted and benefited from the tree planting project voluntarily initiated a campaign to recruit more women. A good indication of the acceptability of a given project is how fast the word spreads through informal communication systems.

These successful cases in Kenya and Ghana illustrate incorporation of traditional cultural values. What makes the technology appropriate is this incorporation of the locally relevant and multidimensional categories of social systems and physical environments. Carr concurs with this point:

> More socioeconomic research needs to be conducted alongside the purely technical research if technologies which are both useful and acceptable to rural women are to be developed. However clever, simple or cheap a new technology might be, it will stand little chance of gaining widespread acceptance if it does not meet priority need. Finally, not enough thought has been given to how new technologies are supposed to get into the hands of the people who need them. Much more positive action is required to ensure that information about improved technologies reaches the rural women (Carr 1981, 200).

Literature Review Summary

Women in development ideologies have evolved to a large extent from the international development programs of the major transnational development agencies, including the UN, the World Bank and national development agencies like USAID. Recent research models and theoretical approaches have come to critique these institutions as promoters of competition and exploitation, resulting in the further marginalization of rural women. Villages compete with villages for aid favors, access and leadership positions (Mbilinyi 1984).

In this context, Meena reminds us that under the banner of raising women's productivity and cash incomes, development agencies have focused attention on making the multiple roles of women more efficient. Increased efficiency has often meant, however, that women are now doubling their duties by engaging in income generating activities so that they can maintain their families as well as perform their biological roles of reproducing the future labour force without extra cost to employers (Meena 1984). Thus, the problem is to change agency policies, as well as develop new models.

The recent increase in research on women, technology, and development has led to a variety of theoretical models and approaches. An evaluation of these frameworks and findings will be useful in evolving a gender partnership model for development. Environmentalists and social scientists who seek to construct a comprehensive understanding of technology must include the study of gender, culture, and class construction and impacts. Social change, as a function of development strategies and technology transfer, can only be understood through the creation and use of a relevant set of comprehensive analytical instruments. The continued use of instruments which depend upon economic indicators and Western experiences as the measurement of development is

no longer sufficient in our age of expanded democratic aspirations and multi-cultural imperatives. New models must be self-reflecting in questioning the language of analysis to account for the limitations within them (Bourque and Warren 1989).

The data from Ghana and elsewhere in Africa indicate that government or aid-donor programs can be effective in partnership with local women. These local self-reliance programs are also extremely low cost. Development agencies need to be encouraged to abandon their inefficient large programs directed toward Third World elites and provide some resources for partnership building.

A basic set of guidelines can be gleaned from the literature:

1) Ghana has great gender and culture diversity
2) Appropriate technology requires encouragement of self reliance
3) Existing organizations like women's groups and credit associations need to be integrated into development from the grassroots up

The recent approach in building a new model for delineating and building support for women's roles in resource management and appropriate technology is avant-garde but plagued by many obstacles.

Gender and class biases inherent in Western technology and rural development policies continue to block progress in this field. As environmental theorists continue to evolve research in conservation and resource management, we must at the same time become aware of the cognitive and value patterns implicit in our work. The continued propensity to exclude 51% of the sustainability oriented talent of the world in that research will introduce the grave risk of intolerable delay in establishing a balanced and environmentally sustainable existence.

RESEARCH DESIGN

Methodological Approach

The approach used in this analysis is concerned with rethinking the very basic tenets of our Western cognitive patterns and cultural assumptions (Wynter 1992). It is therefore necessary to compare the Euro-Centric and Afro-Centric world view models. In Dixon's, "Modified Dixon Schema of Cultural Systems" (1976, 56) he presents a model which posits that different world views lead to different research methodologies. (See Figure 3). Dixon elaborates:

> There are certain philosophical characteristics in any given world view which determine the choice of assumptions in particular, and research methodology in general. Research methodology has world view specificity, which results from respective differences in axiology, epistemology, and logic. If the model is valid, then it will be possible to set forth different approaches to research, each consistent with its respective world view.

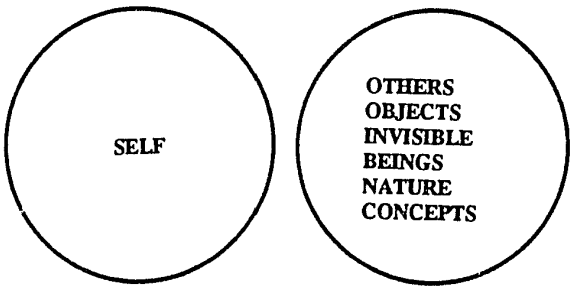
Modified Dixon Schema of Cultural Systems

Modern, Euro-American, Public

Traditional, Third World, Private

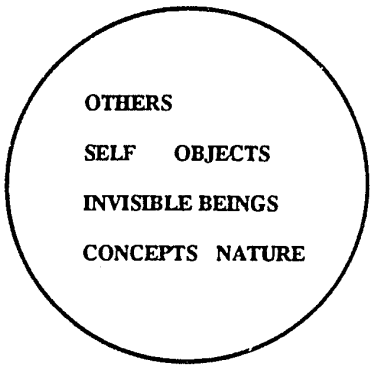
WORLD VIEW

Euro-American



"I" - "it"
(Objectified relationship)

Traditional African



"I" - "thou"
(Personified relationship)

AXIOLOGY

Relations:
- Human to Human
  - Mastery.....Harmony
  - Individualism.....Communalism
- Human to Nature
  - Mastery to the Natural World.....Harmony with Natural World

TIME
- Divisible, standardized (clocl).....Felt, relative
- Future oriented.....Present-past

ACTIVITY
- Doing.....Being

EPISTEMOLOGY

Object/Measurement/Cognition.....Affect/Imagery/Cognition
(I think..I know).....(I feel ..I know)

LOGIC

Either/Or.....Diunital
(dualism).....(wholism)

V.J.Dixon, (1978), "World Views and Research Methodology", In L.M.King, V.J.Dixon and W.W.Nobles. African Philosophy: Assumption and Paradigms for Research on Black Persons. Los Angeles: Charles R. Drew Postgraduate Medical School. (pp. 53-74)

Prepared by M. Smallwood

Figure 3

The author of this evaluation study, therefore, recognizes that the two philosophical characteristics of the Afro-centric and Euro-centric world views would lead toward two different research models. The former would be more circular and self-reflexive. The latter would imply a myopic and linear approach.

In addition, an examination of strategies for re-conceptualizing sustainable development and appropriate technologies in culturally congruent ways is applied. The strategies include a constructionist approach based upon system modeling (Bateson 1968) (Smith 1989). In his book, Steps to an Ecology of Mind, Bateson posits that cultures construct the conceptual boundaries they think are critical in terms of definition, language, values, and social organization. As co-founder of cybernetics, Bateson (1968) argues that, there is a fallacy in our consciousness that raises the question, whether information processed through consciousness is adequate and appropriate for the task of human adaptation. It may well be that consciousness contains systematic distortions of view which, when implemented by modern technology, become destructive of the balances between human populations, their societies and their ecosystems. If, for example, Western models of social organization, such as competition are introduced into a Ghanaian women's self help project, what does this do to existing deeply imbedded Ghanaian models of cooperation, especially among the women?[8]

Systems theory is useful in analyzing the relationships between technological development and the socio-cultural milieu in which it takes place. Instead of looking for some linear cause of technological development, the systems approach emphasizes the

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[8]In 1983, the Appropriate Technology Center in Papua New Guinea was not successful in designing small-scale technologies and promoting them in remote villages. It turned out that the village elders saw the competitive successes of community members who were gaining personal wealth and creating individualism. They believed that the successful individuals were threatening the common good and had them excuted (see "Cultures in Transition, What can the West Learn From Developing Countries" in The Futurist, March-April 1989).

circular and reciprocal relationships among technology, social organization, cultural beliefs and values. When social organization and cultural beliefs are ignored, technology projects can either be unsuccessful or they can devastate social organization or belief systems (Smith 1988).

Ghana's horizontal social structures, diverse cultural groups, and the significant roles women have historically played in all aspects of social development are elements a systems approach would consider. Such an approach would construct projects sensitive to these gender and ethnic nuances of Ghana's complex society. So the delicate balances between technology, social organization, and values are enhanced rather than destroyed.

A framework that considers the ethnic and gender characteristics of Ghanaian society is used in positing a human centered model for development. Fundamental to this approach is Eisler's (1987) gender partnership model. In her cultural transformation theory, Eisler seeks to present a new interpretation of our human past and our pending future. She outlines two basic models of society: the dominator model, which is preoccupied with gender "ranking" of one half of humanity over the other (power-over); and the partnership model, which is concerned with "linking" social and gender groups (power with), rather than "ranking" them.[9]

A gender partnership model generalized to international dimensions would consider the cultural differences between Ghanaian and Western concepts of economics. Prior to European colonization, Ghanaians had no concept of competitive trade; they merely gave with no measure of what might be returned but knew that the more they gave the more would be given to them (Ellis and Ellis 1989). The Western development model impacts

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[9]This gender inspired ranking becomes a paradign for vertically organized "power-over" relationships identified as domination derived ranking in contrast to horizontally organized "power-with" relationships, identified with partnership linking.

Ghanaian "economic" practice with notions of foreign-exchange receipts, soft loans, and economy recovery measures. A human centered model could seek a synthesis of the best of both models; and is therefore, an application of the gender partnership model.

A human centered model would further suggest that a consciously non-dominator model would facilitate cultural evolution toward equitable direction of the uses we make of greater technological and social complexity. The direction this evolution takes is radically different for both the partnership and dominator models (Eisler 1987). If appropriate technology is to continue directing our cultural evolution towards partnership relations in favor of dominator relations, a paradigm shift is necessary in the interpretation of both past and present human culture.

Ghanaian society represents one example of human culture. To make use of the opportunity for maximizing the social and ecological benefits to Ghanaian women as partners in development, we must find ways to escape the biases inherent in our current Western cultural paradigms and institutions. Studies of cultures using a partnership approach could open our eyes to the options for a more positive future which sustains culture, as well as economic development.

Relevant to this approach was data collection and analysis from Ghanaian institutions such as National Council of Ghanaian Women, United Nations Development Programme, December 31st Women's Movement, and Environmental Protection Council of Ghana, as well as individual experts. Aspects of this methodological design rely upon consultation with village women, agricultural specialists, as well as staff and designers of specific women's projects.

Observation and interviews were the primary techniques used. In all cases, whether visiting a village project sponsored by the Provisional National Defense Council's (PNDC), the December 31st Women's Movement, or interviewing the director of the EPC, the

guiding questions centered around, "What has worked and what has not worked in Ghana in terms of women, technology, and development?" More specific questions included, 1) Was the leadership self-initiated or appointed? 2) Did the projects receive initial outside funding? 3) What was the longevity of the project? 4) If its existence was short lived, why? () Were women involved in the project design? and 5) Why did some projects fail and others succeed and were there any cultural or social indicators for these failures and successes?

The research also includes a content analysis of written documents outlining policy guidelines for several of the agencies mentioned above. The responses are pertinent for determining where the deficiencies are in existing models for appropriate technology and sustainable development, as well as mapping out an outline for critical research on the role of rural women in development strategies and resource management. Finally, the methodology used to analyze the data will serve to point out the deficiencies in current existing approaches and the need to re-conceptualize future models. Therefore, to a large extent a part of the methodological approach is the creation of the research design.

Research Design Summary

A synthesis of the strengths within the current representative models include a diverse set of instruments for analyzing the data collected in the field research of this thesis. Especially significant are those aspects of each approach which encourage democratically-based gender cooperative society. The organization of the positive attributes of these approaches serve in the construction of a human centered model for resource management and appropriate technology.

Human centered development seeks to provide the foundation for validating the contributions of all human cultures and designing environmental research which draws on

the world view of the community being studied, utilizing tools of analysis specific to local experiences. The basic criteria for a human centered sustainable development model would include the following:

1) "Home grown" leadership and needs identification
2) Administrative structures based on local groups that have a detailed understanding of the conditions in a narrow sector of the economy, and could therefore, be either decentralized or centralized depending on the assessment of conditions
3) Cultural and social awareness of complex societies
4) Local, natural, and human resources
5) Integration of indigenous and appropriate modern technologies.

The application of these variables, within an African rural setting, requires step-by-step development over time. Possible stages include investigation of culture and gender resources, integration of indigenous wisdom, mobilization of local national and international resources, organization of human centered program and implementation of that program through flexible adaptation to local needs. The basic goal would be to determine collectively the most efficient development considering social, cultural, and ecological variables. This analysis of economic and social rural Ghanaian women and the impact of conventional Western development strategies is directed toward make a the construction of a sustainable gender inclusive partnership model for indigenous economic development.

The basic criteria provide the basis for assessment of project policies and a guide for evaluating effectiveness of policy documents in guiding project developments. An evaluation of how the language of these agency documents is or is not consistent with project objectives is systematized in the next phase of the ongoing study. The identified criteria also assist in making specific recommendations to the agencies and projects observed in Ghana.

The provision for the transfer of know-how and enhancement of the level of human well being and productivity must be sustainable on many levels. Any development project must be compatible with the country's level of social, cultural and technological development and it must be economically appropriate for the country's resource base and carrying capacity. Every development project should encourage local control and self reliance, so that income is generated for all sectors of the local society. The transfer of know-how as a teaching process must be consistent with the institutions and human capabilities of the society to absorb, maintain, and make use of it for the enhancement of their own conditions of life. This does not mean that the technical assistance should not extend the boundaries of existing technology. On the contrary, if it is to constitute technical assistance it must indeed enhance and extend the limits of present knowledge and techniques beyond what is currently practiced. But the plans for extension of technology must address; a) cultural milieu to insure the technology can be absorbed or integrated into the fabric of existing institutional structures without destroying them; b) acceptance and understanding by actor/ beneficiaries to make efficient use of the technology; and c) the ability of government or other agencies to meet costs of maintenance and replacement. Sustainability of development does not merely imply the introduction and maintenance of new levels of technology, but further implies the development of internal national capacity to propagate the new technology and to enhance it, so as to create a climate of continued increase in production which is the basis for improvement in the human condition and welfare (UNDP 1990).

Research Design Summary

Human Centered Model	Gender Integration (increase quantity of women	Appropriate Technology (small scale)	Feminization of Technology (women vs. men values)	Global Economy (internal mrkt forces)	Eco-Development (grass roots)	Sustainable Development (replenishing/regenerating)
Home grown leadership -designers -policy makers -duel gender roles	Does not advocate the development of local leadership	Does not necessarily promote local leadership; planners assume that recipients Euro-Centric view of the value of the new technology.	This approach is concerned female only leadership, and not necessarily "homegrown"	Its critique of international markets implies the need for more locally based models	Yes, fully appreciates the value of locally initiated group & leaders	Yes, but this approach is primarily based in the "Appropriate Technology" model
Democratized Administrative Structures -cooperative -gender balanced -self reflexive -partnership	More representation of women can reflect more gender balanced structure	Predominately dependent upon outside "Aid" donors for funding and project structure	Has the potential for more gender specific attributes to be included in planning	This approach tends to be Euro-centric and is not concerned with democratic social organization.	This approach fully develops local leadership based on traditional existing social organization patterns	This approach has the potential to include democratic structures yet it is not explicit in its criteria
Cultural and social awareness of complementary systems -women are not a homo geneous group	Does not appear to be concerned with complex social and cultural issues; this Euro-Centric view ignores the rest of the cultural world and is consequently unfamiliar with strong gender roles in Africa	The major flaw in this approach has been its lack of social, gender and cultural awareness; it assumes culture & gender similarity where it does not exist	This Euro-Centric view does not value male-female complementary roles	View women as multidimensional and not homogeneous	Yes, this approach consider and values the indigenous cultural social system & social organization	Not sufficiently culturally specific
Local resource dependent -self reliance -locally initiated -bottom up dep.	The top-down approach of this model does not encourage local resource base	The essencial feature of this approach is its low energy, local resource use	No indication	No indication	This approach is concerned with local resource dependant projects.	No indication
Integration of tradition and modern technology -simple -cheap -small scale -self-help -non-violent -diverse -build upon trad? -understandable -socially & culturally -income generating	No indication	This approach exceeds designs which integrate "old" and "new" technologies	No indication	Its "Marxist" view tends to assume cultural & gender similarity where it does not exist	Tends to romanticize the traditional cultural models and is therefore conservative in its approach	Yes, but preoccupied with integrating "appropriate technology" and therefore brings the flaws of this model as well

Figure 4

ANALYSIS OF THE DATA

Field Research

Decisive in determining the potential for technological improvements leading to intermediate technologies in rural women's traditional activities are several issues. The first is the sociocultural and environmental implication of equitable female access to knowledge, resources, skills, and appropriate means of improved production. The question of what kind of world women want, rather than how they could be integrated into the existing development paradigm, is important (Boulding 1981). The last issue is identifying explicit constraints to wider dissemination of improved technologies

In this chapter, the human centered model is used to analyze United Nations Development Programme, the Environmental Protection Council, the National Council on Women and Development, and the December 31st Women's Movement projects in Ghana. The core questions guiding observation and solicited responses from informants in activities of four key organizations are examined. An analysis of these four sponsoring agencies and their projects[10] is presented. Daily visits were planned and completed with offices, libraries and individuals of the University of Ghana at Legon and the agencies listed above.

United Nations Development Programme

In chronological terms, the oldest agency sponsoring rural development projects in Ghana is the United Nations Development Programme (UNDP). Ghana's efforts at creating rural development projects dates back as early as the mid 1940's (EPC 1990). The

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[10]From June to July 1990, the author went on a self-sponsored exploratory fact finding visit to Ghana.

Ministry for Rural development was created in 1969. In 1971, Ghana launched a project to rehabilitate her degraded natural forests. The project was quickly abandoned due to high costs. The UNDP revived the forest rehabilitation project in 1976 (Harrison 1987).

The United Nations General Assembly established the Voluntary Fund for the United Nation's Decade for Women in 1976 to ensure support for women's "productive activities" in developing countries. Renamed the United Nation's Development Fund for Women (UNIFEM) in 1985, the Fund has been active in Ghana's development primarily through Ghana's National Council on Women and Development (NCWD), the December 31st Women's Movement, and the Environmental Protection Council (EPC).

The UNDP falls short of this definition with their Rural Business Women's Income Generating Projects. Of the 23 sites, there are only a few success stories. The following is a summary of three site reports gathered from an interview with Ama Dapaah, UNDP project Assistant Director, on July 4, 1990. The sites include Odumasi-Kibi in the Ashanti region; Ado-Nkwanta in the Eastern region; and Aponapona in the Volta region.

The following description of the UNDP projects is built around a few performance focused questions:

1) What has been the program effectiveness for UNDP sponsored projects?
2) How are women's needs incorporated into the UNDP programmatic goals?
3) What have been the project successes and failures?

Odumasi-Kibi was established in 1984 and was abandoned in 1986. Initially administered through the NCWD, the women produced soap and palm oil. The short lived existence of this project was attributed to poor team spirit and a general lack of cooperation from local community members. It was also noted that local soap industry giants like Lever Brothers, Ghana Ltd. had intensified their public relations and initiated an aggressive sales campaign. As a result most of the small-scale producers folded.

Ado-Nkwanta is another abandoned palm oil project. The project was halted because it had become a one-man show and competition among some local personalities over control led to conflicts and finally closure of the project.

Aponapona was established in 1982 and in July 1990 it was still functioning with a membership of 114 and growing. This palm oil project is made up mostly of migrant farmers. Each member pays Ce100 (approximately 5 cedis to $1.00) per month into a local bank account. They purchased their own oil press, but the women complained that they could not operate the press and have abandoned it.

Major problems identified and stated by the UNDP project workers include:

1) There is a dependency upon UNDP capital
2) The UNDP depends only upon literate and skilled individuals as leaders
3) Local leadership lacks bookkeeping and record keeping skills
4) The projects are dominated by men
5) There were no criteria for selecting site locations
6) Educated, strong personalities tended to dominate
7) Low literacy among the women was prevalent
8) Technology introduced and left un-monitored by UNDP

(UNDP, Kumasi 1990)

The UNDP approach contains aspects of both the gender integration and appropriate technology models while gender integration was employed and the project was explicitly using appropriate technologies the project was not sufficiently for project effectiveness. Ghanaian women technicians are identified to work with rural projects, especially at the elite administrative levels of UNDP selection procedures. They find qualified candidates at the Universities and educated nationals trained abroad. Consistent with this top down approach, is the use of appropriate technology in these projects, like the

oil press, which were unsuccessful because the technology created a dependence upon UNPD funds for maintenance and operation. Following the human centered model the dimension identified by those in the field as contributing significantly to the failure of the project was the dependency of the technology on UNDP funds. There was no allowance for autonomous democratic use of these funds.

The Environmental Protection Council

The Environmental Protection Council (EPC) followed the UNDP in Ghanaian development. The EPC was established by the National Redemption Council[11] decree 239 on January 23, 1974. The EPC is charged with a broad range of duties, which include advising, investigating, researching, and setting standards—all aimed at protecting and improving the quality of the Ghanaian environment (EPC 1979).

The EPC is comprised of a wide range of bodies and organizations, public and private. The present 15 members are drawn from the Universities, Council for Scientific and Industrial Research, Foreign Affairs, Health, Industries, Agriculture, Works and Housing, Attorney-General's Department, Ghana Water and Sewerage Corporation, Tourist Control Board, Meteorological Services Department together with distinguished citizens of Ghana with special interest and experience in environmental matters (EPC 1979).

In December 1985 the first African Ministerial Conference on Environment was held in Cairo, Egypt. Their objective was to halt and reverse the environmental degradation of the African Continent as well as satisfy the energy and food needs of its people (WorldWIDE 1989). Consequently, the Ministers adopted a continental action plan, the Cairo Programme for African Co-operation under which institutions and measures were adopted to address the problems of the African environment.

Each government was requested to select three villages for the project and where the

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[11]The National Redemption Council took power after a 1972 coup.

country has semiarid areas a fourth one was to be included for a stock-raising project. The ultimate objective of the pilot project is to make the villages self-sufficient in food and energy (EPC 1990).

In November 1989, the Senior Women's Advisory Group (SWAG) of the United Nations Environment Programme organized a one day seminar in Ghana for Women to determine how much they knew about the environment. SWAG brought women together in their roles as managers of natural resources to discuss mechanisms for development within the framework of the Cairo Plan of Action. The women responded energetically. Noting this enthusiasm among the women and viewing themselves as partners in development, the EPC launched Village Pilot Projects with the goal that Ghanaian women would play an important role in the success of the projects.

The following is a brief summary of Ghana's implementation of this project administered by the EPC. The "Village Pilot Project in Food and Energy Self-Sufficiency" served as an example of the EPC's effort to address environmental issues in relationship to women, technology and development strategies.

The four pilot villages were selected based upon the following criteria:

1) Central location in relation to surrounding villages.
2) Easy access to roads.
3) Population of village and those within 5 km radius above 1000.
4) Village awareness of existing environmental problems.
5) Village preparedness to contribute to the solution.
6) Political and traditional administrative support.

The set of basic questions in the interview with Mrs. Christine Debrah, executive chair of the EPC, focused on how the project sites were selected; what the demographic and environmental conditions of the existing sites were; and how the local leadership was

mobilized to participate and what projects were most successful.

The initial selection of candidate villages was done through visits to all four ecological zones. After a series of screening exercises, five villages were proposed for the project in each of the four ecological zones of Ghana. To scale it down to one village per zone, the political and traditional administrative hierarchies, including youth and women's groups, NGO's and organs of the PNDC were consulted. After lengthy discussions, one village per zone was chosen:

1) Dawa in the coastal savanna
2) Jato-Zongo in the transitional zone
3) Nyanso-Nkran in the forest zone
4) Binduri in the Sudan savanna (simi-arid stock raising zone)

In order to take account of the development perceptions and aspirations of the local communities so that they can fully identify themselves as part of the project and eventually carry it forward on a sustainable basis, a Project Planning and Implementation Committee (PPIC) was set up by the EPC. The PPIC's are made up of village representatives, relevant line agencies at the local level, PNDC organs, Town Development Committees, Churches, NGO's, Chiefs and elders of the community and District Administration. The EPC has appointed Liaison Officers who work closely with the PPIC's, in order to monitor progress, facilitate back-up service, and project implementation.

Dawa has a population of 1,000. It is located in Dangbe District, Greater Accra Region, in the Coastal Savanna of the Accra plains. The village forms a focal point for more than 20 other villages.

Rainfall is low, averaging between 760 -890 mm. per annum. The major source of income is farming and livestock raising. The per capita income is estimated at Ce45,000 per annum in 1986. The principal crops grown are peppers, tomatoes, onions, okra, maize and

cassava.

The main problems of the village and its surroundings were the difficulty of obtaining good drinking water and fuel. Another major problem was dwindling crop yields due to deteriorating soil and drought conditions. Firewood and charcoal, though locally obtained, were scarce and their supply is further limited by over-exploitation of the few surviving trees.

The twin villages of Nyanso-Nkran are located in the Tarkwa District, Western Region, and were selected to represent the rain forest zone. With a combined population of about 1,500, the villagers are surrounded by about eight other villages. The average annual rainfall is between 1905-2020 mm.

The main occupation of the people is farming with supplementary activities like palm oil and pottery. The per capita income of the villagers is estimated at Ce19,000 per annum in 1986.

The major problem affecting the socioeconomic activities of the people was poor access to the market. Although the villages are located only about 2 km from the main road; farmers found it difficult to get their produce to market because road conditions are extremely poor.

The Jato Zongo village is located in the Atebubu District, Brong Afafo Region. The village is surrounded by 19 other villages and hamlets. Jato Zongo with an average annual rainfall of about 152 mm has a vegetation of the Guinea Savannah woodland type.

The village has a population of about 3,000 whose major occupation is livestock raising and farming. The per capita income was estimated at Ce20,000 per annum in 1986. Even though there is currently no apparent problems with fuelwood, a combination of factors such as charcoal burning and "slash and burn" agriculture, mechanized farming and perennial bushfires threatened the wood base of the village as the vegetation degenerated into more and more open woodland savanna.

The village of Binduri is located in the semiarid north eastern corner of the country in the Bawku District in the Upper East Region. Binduri, with an average annual rainfall between 760-1000 mm, has the Sudan Savanna type of vegetation with short grasses and scattered trees.

The major source of income is livestock raising and farming. While cotton, groundnuts, rice, tobacco, millet and guinea corn are grown during the normal cropping seasons, vegetables, particularly onions, are raised in the valleys during the dry season. Cattle, sheep and goats, donkeys, horses and poultry are some of the animals reared by the farmers. The per capita income of the Binduri inhabitants is estimated at Ce15,000 per annum in 1986.

The major problems of the area were health and scarcity of fuel. Millet and guinea corn stalks gathered from the fields after harvest are the main source of fuel for cooking. Firewood collected from afar is sold in the village at very high costs. These rural projects were primarily concerned with communities becoming self-sufficient in food and energy. The EPC implemented its projects through the infusion of technical assistance, educational activities, leadership opportunities, and access to financial assistance and additional resources through affiliated agencies, (for example, NCWD, UNDP, and December 31st Women's Movement).

The EPC evaluation of the projects indicated the early success of Dawa. Dawa stood out for several reasons. It is considered a model of decentralization. Local initiative, cooperation and increased productivity has kept motivation high. The other projects lacked the quality of leadership necessary for continued progress. Of the 70,000 seedlings planted in Dawa's reforestation efforts, only 32 had perished. The EPC's educational campaign, instituted prior to the project being launched, was instrumental in cementing the community cohesion necessary for project success.

The four Village Pilot Projects are on a five year schedule before the EPC will identify other villages to work with. The EPC's efforts to treat each pilot village as a small economic system with its own built-in potentials for growth seems effective at least for Dawa. While its approach is not to dominate and discount indigenous development, it emphasized the necessity for outside stimuli in the form of agricultural extension services, environmental education, social service facilities, incentives for production, and back-up technical services.

The EPC Village Pilot Projects illustrated many of the aspects necessary for the application of the human centered model, as identified by leaders in the field the most successful was the village of Dawa. The human centered model criteria noted as strongly present were home grown leadership and democratized structures. The leadership was homegrown, the project functioned on a decentralized administrative level, and technical assistance was integrated into the indigenous structure using local leadership, being sensitive not to ignore the existing social organization. They were gender balanced and working in partnership with local resources. There was no clear evidence that the fifth factor of integration of tradition and appropriate modern technology was significantly present.

The National Council on Women and Development

The National Council on Women and Development (NCWD) was established by the NRC decree in 1975. One function of the Council is to advise the Government on all issues affecting the full integration of women in national development. To perform this function effectively, the NCWD established a Research Unit at its Headquarters in Accra to collect and analyze data and research information on the present condition of women in the country. The United States Agency for International Development (USAID) provides additional funding for its research work allowing the Council to contract out some of its research officers from the three Universities in the country.

In September 1976, a project agreement was signed between the NCWD of Ghana and USAID, calling for research women's roles and participation as well as to design specific projects aimed at; 1) investigating the impact of urbanization on women and their employment patterns, 2) identification of appropriate simple technologies to help women, especially food producers and processors, 3) assessing the role of cooperatives in furthering women's small businesses, and 4) small scale research projects on specific areas of child care, education and women health issues (NCWD).

The following summary of NCWD project activities is based on data collected from unpublished research by Magdalen Akyeampong Abrokwa, entitled, "Participation of Women in Development, Both as Agents and Beneficiaries" (August 1987). Ms. Abrokwa was hired by the NCWD as a consultant to investigate the effectiveness of rural development projects through a survey and to provide guidance in clarifying women's roles in decentralized government/NCWD projects.

The results of the survey indicated that Ghanaian women are integrated into every institution of the country. There were three areas within the productive sector where the women feature prominently; food production, food processing and household item manufacturing.

While development workers, female chiefs and many others in the society prescribed improved education, nutrition, sanitation and child care as primary needs of women, the women themselves identify their own priority as the need to become economically self-sufficient. Their main problems are in the areas of resources for production (mainly land), access to credit, and appropriate technologies both to reduce drudgery associated with household work and to facilitate income-earning activities.

One specific NCWD and USAID joint activity is the Mafi Kumasi Gari Project. The high visibility of this agro-industrial project has increased the interest in large scale gari

production and resulted in the formation of the Gari Makers Co-operative in 1978. Yet high costs for technical and mechanical needs have impeded its success.

The survey made clear the need for selective but integrated intervention appropriate to women's particular situations. Such interventions should take cognizance of these available resources and ability of the women themselves to use available resources to their own advantage. Ms. Abrokwa made the following recommendations:

1) The need to develop an integrated rural development approach
2) Support for grassroots organization of women for community action
3) Dissemination of technologies to facilitate women's work and raise incomes

From this brief evaluation of the Mafi Kumasi Gari project, the NCWD and USAID coordinated efforts have not been successful in identifying appropriate technologies for rural Ghanaian women. Many of their projects, like the Mafi Kumasi, are dependent upon energy intensive and high cost machines and fertilizers (Ampratwum, 1990). In this case, the human centered model appears not to have been in place. There was no evidence of village indigenous women in leadership. The administrative structures were not democratic, exemplified by little cooperation between village women and project leaders. Project leaders did not demonstrate awareness of various systems factors in village communities.

December 31st Women's Movement

The December 31st Women's Movement (The Movement) is the final example of this data summary. Clearly a political wing of the Military Government's Provisional National Defense Council (PNDC), the December 31st Women's Movement takes its name from the date the PNDC installed itself in 1981. It was this organ which sponsored the author's four day tour of six of their rural women and development projects, spanning three of Ghana's four regions. They provided transportation and all accommodations for the site

visits, which took place July 5-6, and 10-12, 1990. The Movement projects observed included a child care center, palm oil extraction, gari processing, pepper farm and an appropriate technology food drying project.

While this is obviously a women's special interest organ of the PNDC, there were men employed as secretaries at the office headquarters in Accra. Yet, as the youngest of the institutions sampled, the December 31st Women's Movement projects appeared to have a broader base of support from local communities in general and women community members in particular. This may be in some part due to the strategy of recruiting teachers as project managers. Ghanaian women make up a significant proportion of the teaching profession. Additionally, their affiliation with local government structures gives the December 31st Movement a great deal of exposure, credibility, and resource base.

The UNDP has an equal amount of resources, if not more in some areas of expertise and financial assets. Yet the December 31st Movement is much more integrated into Ghanaian society, social organization and political life than the UNDP. The December 31st, it seems are in a more advantageous position to recruit women who themselves are suitably skilled, and who still have contact with rural women in communities based on family ties and teaching roles. They, therefore have a greater opportunity for grassroots organizing. They seem to have blended an authoritative approach orchestrated by all of the sample institutions, with a mixture of eco-development and feminization strategies inherent in the village cultural base described earlier.

The general guiding questions directed to the highly skilled trainers focused on how the Movement is organized to mobilize women and how the rural women accepted the opportunity to work with their projects. Additionally, questions were asked how the Movement identified local female leadership and did this produce any social or cultural resistance?

Project initiation can occur in one of two ways. The Movement can assess a district's needs and potential and begin mobilization of local women. They assist the women in forming collectives and encourage any individuals who approach singly to join the collective. The other method allows for individuals or groups of women to approach the Movement for financial support (loans) and technical assistance of projects they have initiated.

The Ashanti Region child care center was more a resource for working class Ghanaian women then it was a service for rural women. The child care centers in the more urbanized areas enroll children from the age of three months to the four years of age, the rural centers start at age 1-2 years. The rural women tended to be more reluctant to use the centers and consequently, this led to the failure of some rural centers.

Each region has a number of centers, depending on the financial success of other agricultural projects. These monies are used to purchase machinery, pay off loans and for general community development. The Ashanti region is one of the most productive and largest regions. They have a substantial entrepreneurial elite who make significant donations to Movement projects.

The Central Region palm oil extraction project depicted a village in transition from traditional technological methods to more appropriate technological use. The traditional labor intensive method of extraction existed next door to the newly purchased time saving manual press. While both methods were in use, the manual press was under the jurisdiction of the local chief's social organizational system and therefore access was administered through them (chiefs were both male and female). The manual press was purchased by funds raised through traditional palm oil production for Ce120,000 (approximately $300.00) so use of it was rented out to any local village member. In addition to saving time, the manual press produced more oil more efficiently. The traditional process was tedious and required large

quantities of fuelwood and excessive labor in comparison to the manual press, which one person could manage.

The purchase of the manual press was key in encouraging the general motivation of the village to produce more palm oil. Plans were developed and implemented to next purchase a generator so that the press could be run by electricity and improve the oil output. Most village women still maintained their own agricultural plots and also continued to do some palm oil production by hand. Access to the manual press was still limited to those women who could afford the rental fee. This limited access was an expansion over the previously narrow access women had to machinery purchased through aid dollars.

The palm oil project was a good example of improved technologies. The village women adapted both to the new appropriate technologies and continued to use the traditional manual process when necessary—thus increasing their repertoire.

The University of Kumasi pepper drying project was at a virtual standstill. The dryers were not useful during bumper crops because this would be the rainy season and there was little sun. Additionally, peppers dried this way were brittle and discolored which made them unsuitable for market. The assigned technician investigated and recommended the tray be shortened to allow for better ventilation. This modified version had not yet been tested. The pepper drying appropriate technology project illustrates the basic weakness of this approach. The extension workers and students who designed the pepper dryers were primarily Ghanaian men. They lacked significant input from indigenous local leadership in the original design and therefore there was no democratic link between the technicians and the cultural and social needs of the recipients. The first and third factors of the human centered model were not in place even though local resources (peppers) were used. The outcome was unforseeable.

The Central region gari processing project had been functioning successfully for

two years. Gari is a major staple and there is a wide market demand. The process is quite labor intensive because it is still basically hand operated. The women had experimented with a machine operated grater but rejected it because it altered the taste and consistency of the product., once again demonstrating the need for technology to achieve the same quality, and also meet the gender and cultural needs.

One major problem identified in all of the agricultural and food processing projects was the issue of transportation. It was noted by the Movement that at times the women would have barrels of palm oil or pounds of gari and no transportation to get to urban centers and local markets. Transportation as a factor of technology transfer and development presents a serious challenge to communities trying to develop with scarce resources.

The Movement demonstrates a number of the attributes of a human centered model. Local skilled leadership assisted in the design and policy development of the projects. Local resources, both natural and human make up the base of each project design. They are connected with the other agencies as well as with the government structure, so that women's issues in development and technology have an active voice at many important administrative levels. The Movement is consistent with four of the factors of the human centered model and its political orientation would bring about the fifth factor of integration of tradition and modern appropriate technology This would be consistent with its overall goals to empower Ghanaian women. However, since any Ghanaian, male for female, can apply for assistance from the Movement, the potential exists for men to take advantage of these resources, which may indirectly impact women's access to these same resources. For example, the pepper farm project was headed by a male PNDC leader. As a male leader of both the PNDC and of the pepper farm, there were many invisible privileges afforded to him that are otherwise assumed natural in a more patriarchal influenced system.

Integrated Systems and Strategies/Summary

It is evident from the preceding pages that Ghanaian women are critically involved in the vital aspects of Ghanaian social and economic life. Yet in general, women's access to appropriate training, credits, and technical assistance is still limited. This was illustrated by some of projects analyzed above. A particular case is the December 31st Movement pepper farm project.

In the brief review of four organizations in Ghanaian society where women were given increased access to knowledge, resources and skills, the projects were effective when some of the democratic criteria were present, despite other complex factors which serve to narrow dissemination of improved technologies. A human centered approach around a democratic practice has proven to be desirable, especially in the case of Dawa and some December 31st Movement projects.

CONCLUSION

Discussion

As an interpretive study, this thesis has demonstrated the need to re-conceptualize development and resource management approaches in culturally congruent ways. The potential effectiveness of appropriate technology is realizable, if the community receiving it can perceive it as an extension of what they already do.

The means for meeting gender partnership criteria in Ghana will be as complex as the criteria itself. For example, local leadership and vestiges of pre-colonial social structures still exist in many parts of Ghana. However, appropriate technology development is being cultivated with proper planning and grassroots organizing strategies. Skilled administrators, educators, students, and consultants can work in their own familiar communities with local leadership to identify and determine specific project needs. Cultural and social awareness must be derived from careful, sensitive, and non-biased inquires conducted by indigenous researchers. The human centered model also includes partnership between different levels of hierarchy, such as village and nation or village and international aid agency.

A Human Centered Development Model

The primary condition of a human centered approach for sustainable development could well be the cluster of humanist principles as identified by Nkrumah (1964), the first prime minister of the independent state of Ghana. The world view that men and women are inherently endowed with a certain inward dignity, integrity, and value must be the philosophical framework upon which such an approach rests. In this frame of reference,

there would be no problem in defining Appropriate Technology Projects as "home grown," dependent upon local resource bases, self-reliant and socially and culturally acceptable and adaptable.

Human centered development implies cooperative, non-coercive roles as opposed to competitive, coercive ones (Mullings 1976). The human centered model includes gender partnership, implicitly and historically congruent within the cultural matrix of many developing societies such as Ghana.

Recommendations

In general, there are three types of recommendations that can be suggested to each of the four agencies observed in Ghana. In every case, the projects had an interest in training, educating, and empowering women. Communication between the projects, especially where they overlap, needs emphasis. Perhaps an Annual Four Agency Ghanaian Women, Technology and Development Conference needs to occur, where rural women are solicited for input into planning and policy formations.

Secondly, special attention should be given to more efficient decentralization of project resources to allow for grassroots control and self reliance. All four of the agencies had more than their share of administrative bureaucracy. Often, a woman may only need a small loan of $100 or less to purchase simple farming instruments or may only need transportation once a month to transport gari to the local market. Such mini grassroots projects would require an in-depth survey of the women's needs. Small funds to be administered as part of village loan pools or credit club might be one such mini project.

Finally, it was not evident that the four agencies did much sharing with each other regarding the strengths and weaknesses of their respective projects. A task force needs to be established to research the existing projects that are self reliant. The dissemination of

information on those projects that are working through a positive action public relations campaign may serve to inspire duplication.

Suggestions for Future Research

The design of this thesis calls for a framework within which a human centered approach incorporates gender partnership. Project outcomes can then be identified, tracked, and linked more efficiently. In the research described above, the absence of critical analyses and field research of African women as partners in development and resource management was obvious.

Future research should be concerned with how to identify indigenous work norms and ethics. How are group decisions made about work? Why do women decide to work together in some areas of agricultural work? Does working in groups with other women provide for some specific social or cultural needs? How do women in rural areas in close proximity to each other perceive collective workplace practices? What keeps women going when the work they do is so hard?

Additional areas of research to be explored are cultural factors of technology innovation and use. What types of technology have women's collective work groups inspired? What factors influence types of technology that such groups are likely to use? How have Islam and Christianity influenced women's traditional indigenous work roles? Have these religious influences impacted the way such groups perceive collective work and technology?

Finally, in the area of leadership identification, emphasis needs to be placed on using formally trained agents to cultivate home grown indigenous leaders.

Typical instrumental questions should emerge about how organizations are guided in determining the success or failure of projects. For example how can objectives be

classified? Are they based on formal education or religious influences? What are the conscious expectations of organizations' female agents? Are women trainers concerned with moving culturally relevant elements into the pursuit of sustainability? What methods did the trainers use to promote high levels of local leadership participation? What methods did the trainers use to identify the more or less successful local leadership? How did the trainers deal with issues of traditional protocol and hospitality? How are trainers needs communicated to the traditional leadership; through formal and informal communication? What motivates trainers to enter and persist in sustainable eco-development?

This study has been confined to a small segment of Ghanaian women's environmentally oriented agricultural activities. However, to yield a complete environmental picture of the contemporary needs of rural Ghanaian women and appropriate technology, an investigation that includes the voice of Ghanaian women from the many isolated villages from which comes the majority of the population is essential.

The challenge to maximize the cultural benefit of the partnership of Ghanaian women in sustainable development exemplifies the standard that all environmental issues be viewed as cultural as well as natural issues. An examination of environmental issues form this context would reveal the capacity of human beings to evolve towards sustainability.

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