~~Food & Nutrition~~
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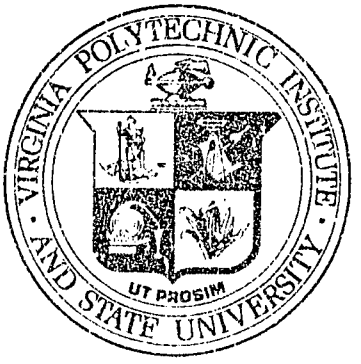
FOOD and FUEL:
CHANGES IN FAMILY BEHAVIOR

Proceedings from a
Title XII Conference
November 5, 1981
Virginia Polytechnic Institute and State University
Blacksburg, Virginia



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This project was sponsored by a TITLE XII UNIVERSITY STRENGTHENING GRANT through the Departments of Sociology and Human Nutrition and Foods.

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Reeser, Cynthia K. Nutrition Educator and Consultant in International Nutrition Programs. "Women's Energy Expenditure in Africa."

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Speer, Jean Haskell. Associate Professor of Communication Studies and Humanities, VPI&SU. "Observations of Adaptations to Energy Problems in Appalachia."

Tinker, Irene. Founder and Director, Equity Policy Center, Washington, D.C. "Energy for Survival: Scarcity and the Poor."

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I. Conference Overview and Acknowledgements

by

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CONFERENCE OVERVIEW AND ACKNOWLEDGEMENTS

Energy scarcity has had widespread implications for changes in all aspects of life. Family food behavior is one area in which change is a major concern, and it is an area for which alternate technologies are being developed.

Prior to implementing alternate technologies, scientists need to become aware of women's responses to energy scarcity or energy problems within their cultural and social setting. With this awareness, we can begin to assist in developing alternate technologies which can become appropriate for meeting the problems of energy scarcity and family food behavior.

With these goals in mind, this conference has been designed to explore the relationship of energy problems and family food behavior with an emphasis on developed and developing nations. The major portion of the conference will thus concentrate on the developing nations where poverty and energy scarcity go together. However, experts who work with middle and upper class Americans' adaptations to expensive energy have been invited to give another dimension of the problem. Since a local focus is important, observations of adaptations to expensive energy in Appalachia will be presented also.

With our main emphasis on developing nations, one point cannot be overemphasized. That is the realization that shortage of energy resources leads to a great dependence on human energy for survival. To cite one of the more glaring examples, increasing

deforestation implies walking much longer distances to collect firewood for cooking fuel, distances which are walked by humans, usually women and children.

What then is the relationship between energy problems (e.g., expensive energy in developed nations and the need for increased human energy in developing nations) and family food behavior? This is the question which this conference will attempt to answer.

The conference has been sponsored by a Title XII University Strengthening Grant. As such, the specific objectives are:

(1) To develop an awareness of the impact of energy problems on food habits; and

(2) To stimulate interest among Virginia Tech scholars in research and intervention strategies related to energy problems and food habits.

With these objectives in mind, we have invited faculty and staff with interests and/or expertise in food habits and related issues. In addition, we have invited graduate and undergraduate students with the same concerns. Thus, we are explicitly encouraging an interdisciplinary approach to any research stimulated by this conference.

Many people have contributed to the organization of this conference. First of all, I would like to thank the Title XII Committee for financially sponsoring the events with a special thank you to Peggy Hall for handling budget problems. Second, I would like to acknowledge the contributions of Dr. Ann A. Hertzler of

the Human Nutrition and Foods Department, Virginia Tech, in the earlier stages of planning. Also, background research was very efficiently provided by Dana Torisky, Wynn Baldock, and Elise Brown, graduate students at Virginia Tech.

Members of the Women in World Development Committee deserve a significant portion of the credit for brainstorming, exchanging ideas, and organizing this conference. The shortest, yet most productive, meetings of my career occurred with this group, which included Mary Rojas, Leena Kirjavainen, Marilyn Hoskins, and Larkin Dudley.

In the later stages of the project, the special support of the Environmental and Urban Systems staff is noteworthy. Essential editing assistance and trouble-shooting were provided by Dabney Weaver, graduate student, Environmental and Urban Systems. A special thank you is extended to the secretarial staff for their very professional skills, and the giving of their training and expertise in an unselfish manner. My thanks, then, to Amanda Shepherd for working the system; Terri Stover for interpreting tapes; Shirley Engelhardt for her editing abilities; Debbie Lindsay for taking on the overload; and Dawn Abatemarco for reading illegible scribbling. Also, thanks to Len Simutis, Assistant Dean, College of Architecture and Urban Studies, for not expressing any disapproval of the interruption of others' work.

Finally, a special note of appreciation to the speakers, who devoted their time and energy in sharing their expert knowledge with Virginia Tech scholars. In addition, Larkin Dudley and I appreciate their assistance and response to our call and recalls for papers for the proceedings.

II. Women's Energy Expenditure in Africa

by

Cynthia Reeser
Nutrition Educator and Consultant in
International Nutrition Programs

"Woman of Africa
Sweeper
Smearing floors and walls
With cow dung and black soil,
Washer of dishes,
Planting, weeding, havesting
Store-keeper, builder,
Runner of errands,
Cart, lorry, donkey...
Woman of Africa
What are you not?"

Thus writes Okot p'Bitek, Eastern Africa's foremost poet, in his "Song of Ocol," in which he paints a stark picture of the life of constant and unremitting toil which is the lot of the women in rural Africa today.

Women's Energy Expenditure in Africa

As we open this discussion of energy problems and their effect on food habits, let us expand our concept of energy to include human energy, and in particular, women's energy.

Women of the developing world are not yet freed from the most laborious aspects of domestic life from which American Women have won gradual emancipation during this century. So great and vital is the contribution of third world women to family and society that women have not been encouraged, and are often actively discouraged or prevented, from getting an education and pursuing non-traditional activities which would take them away from their work at home. Many women are burdened by the unremitting toil of daily tasks, many of which are centered around food production and preparation. These tasks include the following:

working the fields or garden;
threshing, winnowing and pounding grain;
gathering wild foods;
marketing;
preserving foods at home;
housekeeping chores--cleaning, laundry, etc.;
child care;
meal preparation;
obtaining and hauling fuel and water over long distances;
tending domestic animals;
traditional crafts or cottage industries during rest periods.

Add to these tasks the additional burden of frequent pregnancy, iron deficiency anemia, and carrying an infant on the back for its first year of life, often in addition to a heavy

head-load of water or firewood. All these tasks are performed, for the most part, without the benefits of mechanization, modern transportation, electricity, plumbing, animal traction, refrigeration, and other conveniences. In many situations, there are still few viable, affordable alternatives to tradition, which has often proved superior to foreign technology. However, many women may not regard their work as drudgery. They may accept it as the role for which they have been prepared gradually since childhood. They may not perceive any alternatives to this way of life, and if they do know about an easier way of life somewhere, their religious values and beliefs often tend to prevent them from wishing for more than they have, or from seeking ways and means for change. The same attitude may prevail toward food. For example, in a survey of food habits in Mauritania, women were asked if they were satisfied with their diets, or if they could improve their diets, what would they want. Although their diets were monotonous and nutritionally deficient, the most common response was, "Al-Hamd'llila!" (Praise God).

In the desperate poverty of third world life, many women struggle humbly and graciously each day for survival. While some women have the time to press for the acknowledgement of their equal rights, many of their sisters continue unaffected, even unaware of such issues. They live out their fate in dutiful resignation, with few alternatives, out of ignorance and lack of education, out of respect for their religion and tradition, and out of repression by men and other women.

How is it possible to alter favorably the balance between toil and leisure in the lives of third world women? This is a question which we Americans have not completely resolved for ourselves, let alone for others. We work hard too, and many of us still do not know how nor do we take the time to play. Our physical toil has been lightened, only to be replaced by emotional, mental, and social stresses. The question is: are we really happier for it?

A related question is how to correct the imbalance between human energy expenditure and consumption, a question which parallels the major question to be addressed by this conference: "How can a balance be achieved between fuel availability and fuel consumption?" Human energy, more precious than energy available from fossil fuels, wood, sun, or wind, seems to be our most precious resource.

Human energy is a renewable resource, and it lasts a lifetime. It is renewable by rest, water, nutritious food, and spiritual inspiration. Of course, energy can be neither created nor destroyed. But, with women's vital energy consumed day in and day out by repetitious acts of drudgery, what energy remains for the search of other horizons, the widening of interests, the pursuit of education, or fuller development of inherent potential as a dignified human being? "What are we talking about?" a woman may ask. "There is very little time for such things, for women " is one answer she has learned from experience. Another answer we

could work toward giving is that relief from some of the domestic drudgery of third world women, indeed everyone, would open at least one of the doors to self-actualization and to self-control over their own lives.

The question now arises, how well is women's energy being renewed? Where is the balance between women's energy expenditure and energy intake? As we examine this issue, it appears that women in many developing countries are performing incredible amounts of work on a net calorie deficit. The day's activities of a Zambian woman during planting season, (Table 1), illustrate what is probably more common than we wish to admit.

TABLE 1.

A Zambian Woman's Day
During the Planting Season

Activity	Time Spent (hours)
Waking up in the morning at 5 a.m.	
Walking 1-2 km to field with baby on back	0.50
Ploughing, planting, hoeing until 3 p.m.	9.50
Collecting firewood and carrying it home	1.00
Pounding or grinding grain or vegetables	1.50
Fetching water (1-2 km or more each way)	0.75
Lighting fire and cooking meal for family	1.00
Dishing out food, eating	1.00
Washing children, herself, clothes	0.75
Going to bed at about 9 p.m.	
Total	16.00

Summary:	Hours of work	15
	Hours of rest/eating	1
	Hours of sleep	8
	Total	24

Source: *The Role of Women in African Development*, prepared by the Economic UN IWY Conference, Background Paper E CONF. 66 BP 4 April 1975

This woman spends fifteen hours a day at physical labor and household activities, one hour resting/eating, and eight hours sleeping. Her energy expenditure level is considered to be "very active" according to FAO/WHO standards.* It is estimated that she expends between 2,400 and 2,700 calories a day (mean=2,600) at this level of activity, according to the FAO/WHO calculations for the reference woman, shown in Table 2 below.

TABLE 2

ILLUSTRATIONS OF HOW THE ENERGY EXPENDITURE OF THE 55-kg REFERENCE WOMAN MAY BE DISTRIBUTED OVER THE 24 HOURS AND THE EFFECT OF OCCUPATION

	Light activity		Moderately active		Very active		Exceptionally active	
	kcal	MJ	kcal	JM	kcal	MJ	kcal	MJ
In bed (8 hours)	420	1.8	420	1.8	420	1.8	420	1.8
At work (8 hours)	800	3.3	1 000	4.2	1 400	5.9	1 800	7.5
Non-occupational activities (8 hours)	580–980	2.4–4.1	580–980	2.4–4.1	580–980	2.4–4.1	580–980	2.4–4.1
Range of energy expenditure (24 hours)	1 800–2 200	7.5–9.2	2 000–2 400	8.4–10.1	2 400–2 700	10.1–11.8	2 800–3 200	11.7–13.4
Mean (24 hours)	2 000	8.4	2 200	9.2	2 600	10.9	3 000	12.5
Mean per kg body weight	36	0.15	40	0.17	47	0.20	55	0.23

Source: FAO/WHO

Energy and Protein Requirements

WHO Tech. Report Ser. No. 522, 1973.

An itemized evaluation of this same woman's energy expenditure is difficult, because not all tasks, such as pounding

*FAO/WHO, Energy and Protein Requirements, WHO Technical Report Series No. 522, 1973.

grain, have been studied. However, substitution of similar activities for unlisted ones produces the calculations shown in Table 3, Itemized Energy Expenditure of Zambian Woman During Planting Season.

TABLE 3.

Itemized Energy Expenditure of Zambian Woman During Planting Season

Activity (or similar activity substituted)	Time Spent (hours)	KCal/Min.	Energy Expenditure (calories)
Walking and carrying baby (= 3 mi/hr w/ 10 Kg. load)	0.50	3.4	102
Ploughing and hoeing	9.50*	4.8-6.8*	1,758-2,328*
Collecting firewood and carrying it home (= walking 3 mi/hr w/ 10 Kg. load)	1.00	3.4	204
Pounding grain (= chopping firewood)	1.50	3.5	315
Fetching water (= walking 3 mi/hr to site & walking home 3mi/hr w/ 10 Kg. load)	.37 .37	3.0 3.4	66 75
Cooking	1.00	1.7	102
Eating (= sitting)	1.00	1.15	69
Washing clothes & children (= light cleaning)	0.75	2.5	112
Sleeping	8.00	0.9	432
TOTAL	24 hrs.		3,235-3,805

Reference: FAO/WHO, op.cit., Annex 5, Table 35, Energy Expenditure in Specified Activities: Women.

* Actual time hoeing would not be 9.5 hours; let us assume that the total time spent actually hoeing is half this amount, with periods of rest, standing, in between.

The total daily energy expenditure, when determined on an itemized basis, is between 3,235 and 3,805 calories. However, this figure is an imprecise one, primarily because of uncertainty over the time spent actually hoeing. If the total energy expenditure seems unreasonably high, bear in mind that the calculation has been based on the assumption that perhaps only half the 9.5 hours spent hoeing, planting, and ploughing was spent in vigorous activity using 4.8-6.8 KCal per minute, with the other half of the time spent standing at rest.

Compare these levels of calorie expenditure with the FAO/WHO standard. The FAO/WHO calorie requirement for the reference woman, age 20-39, 55 Kg., "moderately active", is 2,200 calories a day. How does this calorie output compare with actual calorie intake? Food consumption data for Zambian women are not currently available. However, per capita calorie consumption data for many African nations suggest that women are not getting adequate nutrition, particularly those who are engaged in agricultural labor, and during certain seasons. Even where FAO standards appear to be met, women's intake is likely to be inferior to their needs, when the following important factors are considered. In addition to their high activity levels, it is important to acknowledge that a high percentage of women will be either pregnant or breastfeeding at any given time, which increases their calorie requirements by up to 500 calories a day. Note that a diet that supplies inadequate calories is probably

also low in many other nutrients including protein, which would be used effectively to provide energy. Other factors responsible for inadequate diets for women include inadequate food supply, low purchasing power, and various cultural attitudes and practices. For example, women often eat their meals after others in the family have been served, leaving little of the more nutritious foods remaining. Also, adherence to certain dietary restrictions and lack of knowledge contribute to poor diet during pregnancy and lactation.

The preceding discussion has attempted to increase awareness of the human energy problem in Africa and other developing regions of the world. What is the effect of the human energy problem on nutrition and food habits? Energy expenditure at the levels we now observe among active women in Africa appears to exceed their calorie intake, resulting in the hunger and malnutrition "habit." This problem must be addressed with greater commitment and effectiveness, both by reducing women's tedious labor and by improving their access to adequate food supplies. Moreover, as long as the situation exists wherein women's energies are expended in the performance of laborious tasks and nutrition is inadequate, additional/alternative pursuits of women shall be hindered. This would be to the loss not only of women but their families, for whom the central character in good family nutrition is a healthy, educated woman.

III. "Examination of the Professional Preparation of Land Grant Institutions' Home Economics Alumni from Developing Countries"

by

Penny L. Burge and Daisy L. Cunningham, Directors
TITLE XII UNIVERSITY
STRENGTHENING GRANT

Examination of the Professional Preparation of Land Grant Institutions' Home Economics Alumni from Developing Countries

The purpose of the project and study was to determine what factors of home economics programs affect the ability of these programs to meet professional needs of students from developing countries. The long range objective of the project was to provide the basis on which to strengthen the ability of home economics and home economics education programs to meet professional needs of the students. It is expected that the ability of international students to assume leadership roles upon returning to their home countries will be enhanced by better meeting their needs as students. Leadership abilities of particular concern included: (1) guiding the assessment and improvement of nutritional status and food use patterns, and (2) identifying and enhancing the roles of women in relation to family, work, the economy, and government.

The objectives of the study were accomplished by use of a mailed questionnaire to students from developing countries, both those who had returned to their home countries and those who remained in the United States. Names, addresses, and telephone numbers of international home economics graduates for the previous five years were requested from 65 land-grant institutions. Thirty five institutions responded, 21 of which were able to provide useful information. From this data a list of 111 graduates who had returned to their home countries and 80 who remained in the United States was compiled.[1]

A search and review of the literature was conducted to provide the foundation for developing the survey instrument. Upon completion of the initial framework of the instrument, the preliminary questionnaire was pilot tested using an interview procedure with five international students. Results of the interview pilot test were used to refine the final questionnaire for data collection.

Based on results of the pilot interviews, two instruments were developed and sent. One instrument was sent to graduates who had returned to their home countries; the other was sent to those students remaining in the United States. Six of the questionnaires sent to foreign addresses were returned as undeliverable; nineteen sent to domestic addresses were returned for the same reason. Twelve responses were received from students who had returned home and 19 were received from those who remained in the United States. No attempt was made to follow up non-respondents due to costs and time factors involved.

Findings of this project were grouped in three categories and included:

I. Educational

1. Respondents were concentrated in the upper three strata of the societies of their home countries;

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[1] The United Nations' definition of developing countries was used to determine inclusion or exclusion of international students in/from the study.

2. Eleven respondents who had returned home reported that they are encouraged to use their U.S. education in their work;

3. Most respondents who had returned home indicated increased respect from colleagues because of their U.S. education;

4. All respondents who had returned home indicated they were able to use their U.S. education;

5. a. The respondents' ratings of courses, professors, textbooks and materials, academic advising, and personal counseling as components of their U.S. education was generally quite high.

   b. Ratings by those respondents who had returned home tended to be higher than those of respondents remaining in the U.S.

6. Suggested changes recommended to aid future international students stressed:

   a. Need for advisors better informed and more concerned about foreign students and their particular problems.

   b. Need for advising about options to change majors and about opportunities in other branches of the department(s).

c. Personal counseling and advising during early phases of programs is needed.

d. Orientation periods of 1-2 weeks prior to classes are needed to ease adjustment(s) to society, institutions, customs and language of the U.S.

e. Need for counselors with personal knowledge about other cultures and understanding of needs of students from those cultures.

f. Increased emphasis on making courses relevant to conditions outside the U.S.

g. Need for more professors with interest and understanding about, as well as experience with, international students, their peculiar problems, and conditions existing in their home countries.

h. Increased consideration for problems of language proficiency.

i. Need to provide journals and textbooks from home countries so students can keep up with advancements at home during their absences.

II. Women's Roles in Developing Countries

1. Opportunities for women were perceived to be greater in urban than in rural areas.

2. Opportunities for women compared to men, were perceived as more likely to be equal, or nearly so, in urban than in rural areas.

3. Opportunities for women were perceived to be greater in the home and in education than in politics and/or government.

4. Political opportunities and roles for women, compared to men, were perceived as much less in both rural and urban areas.

5. Respondents were equally divided about whether their views of women's roles and status had changed as a result of their experiences in the U.S.

III. Food and Fuel

1. Fuels used for food preparation were reported to vary from urban to rural areas with wood being most frequently cited as a primary fuel for rural areas and gas most frequently cited for urban areas. Second and third most frequently cited fuels were oils and coal for rural areas and electricity and oil for urban areas.

2. Fuel was most frequently reported to be gathered in rural areas and bought in urban areas.

3. In all rural areas except one, fuel supplies were reported as adequate while in urban areas nearly one half of the respondents said fuel supplies were not adequate in urban areas.

4. Rural areas were reported less likely to experience changes in cooking patterns as a result of fuel shortages than were urban areas. Changes reported likely were:

   a. change fuels;

   b. less complicated meals; and

   c. reduce cooking frequency

5. Families in rural areas were more likely to produce a majority of their own food than were urban families.

6. Respondents reported that men were more likely to be involved in producing the family food in rural areas than in urban areas and that servants were more likely to be involved in urban areas. Women's involvement was reported as nearly the same in both cases.

7. Responsibility for food preparation was reported as a women's role in both rural and urban areas with the data indicating almost no responsibility on the part of men. Servants were more likely to be responsible for food preparation in urban than in rural areas.

IV. Food and Fuel: Issues and Observations

by

Laura J. Harper, Dean Emeritus
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FOOD AND FUEL: ISSUES AND OBSERVATIONS

You are to be congratulated on scheduling this conference on food and fuel. Since it is being sponsored as part of VPI's involvement in the Title XII program which deals in part with Women in Development, I am assuming that most of your deliberations will center around the implications and relationships of food and fuel in non-industrialized countries, and on ways to improve the conditions in regard to these two commodities, ways compatible with the culture and goals for development in those areas of the world.

In any culture and in almost all situations, if women are to achieve they must be ingenious as well as capable hard-working individuals. The need for woman's accomplishments through creative endeavors is magnified in those cultures where a large percentage of the population is still involved in subsistence agriculture or cash cropping on very limited acreage (especially so for landless farm families). Together these two classifications of farm families (the landless ones and those engaged in subsistence farming, even if the land is their own) constitute an overwhelming majority of the total population in most non-industrialized countries. The acquisition of family food and fuel in these cultures is usually considered to be women's work and both tasks are extremely laborious, time consuming, and a constant test of wits.

Estimates related to total food and fuel availability and consumption in non-industrialized countries, effects of not having enough of either or both combined, and amounts of time spent in collecting and preparing food and fuel vary due in large part to how and where the data have been collected, analyzed, and interpreted. There are three conclusions, however, with which all agencies involved in reporting the data related to domestic food and fuel in non-industrialized countries agree. They are:

1. In spite of increasing food production in the non-industrialized world (30 percent in the past 10 years)(1), diminishing family food supply and availability have reached crisis proportions and the situation worsens yearly.(2, 3, 4)
2. Conventional sources of fuel used in these countries for home consumption and acceptable alternative sources need to be increased rapidly if a large part of the world population is going to escape the consequences of future fuel shortage (5, 6, 7) of equal magnitude to the present shortage of food. In turn, such a condition would aggravate even further the increasing world-wide problems related to undernutrition since the causes and effects of these two shortages are linked together and compound each other exponentially.
3. The inordinate amount of time and extremely hard work spent by the world's poor women in fuel gathering and food preparation are increasing. Much of this time could ad-

vantageously be redirected to income generation projects, projects which would immeasurably benefit poor families in the non-industrialized world.

Diminishing Family Food Supply

Concerning the first statement that in spite of the fact that food production has increased by 30 percent in the past 10 years, family food supplies have diminished and undernutrition around the world has accelerated by approximately 40 percent in this same period of time (2, 3, 4) and continues to increase at an alarming rate:

There is a great difference in total food production and available family food supplies. (1, 4, 8) As farmers in non-industrialized countries move from subsistence farming to cash cropping, the extra income earned does not mean that sufficient money will be spent to replace the family food formerly grown on that acreage. Neither does it signify that food is available for purchase at the village level, nor that the families living there would know how to balance family meals and individual nutritional requirements from purchased food even if it were available. The inability of non-industrialized countries to increase and equitably distribute food supplies to the point that enough food is available where it is needed to prevent hunger of all the population is one of the saddest human conditions of our time. Equally tragic is the fact that undernutrition of those groups of the population who have traditionally been the most vulnerable continues to increase at a higher rate of incidence than is true for malnutrition generally.(4) These groups are of course:

Infants and young children of preschool age;

Pregnant and lactating women;

The sick, convalescent, handicapped, and elderly; and

Especially these groups among the rural landless poor.*

As for solutions, policy makers in FAO, WHO, UNICEF, UNESCO and many other international and national organizations are making an all-out effort to conquer in this century prevalent inadequate food production patterns around the world, inequitable distribution of the food produced, and resulting continuous escalation of undernutrition. All agencies agree that if these three goals are not met by the year 2,000, there is very little hope of such achievement later.

Fuel Shortage

Relating to the second statement that if the conventional sources of fuel used for home consumption in the non-industrialized world are not increased rapidly and acceptable alternative fuel sources effectively introduced, the food crisis already plaguing much of these areas will be aggravated still further:

In the second generalized statement you may wonder why I have referred to the term "conventional fuels" rather than speaking of new and sometimes controversial ways to cook

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* Referring to the deteriorating nutritional status of pregnant and lactating women in non-industrialized countries, this period in the life of a rural poor woman usually amounts to a significant portion of her adult child-bearing-ability years and not just 2-5 years, the average span of time devoted to pregnancy and lactation in the life of a women in the industrialized world.

foods. One reason is that firewood is by far the most commonly used source of fuel in most of the rural areas of non-industrialized countries, charcoal in the urban areas of these countries. Families in the Western World in the past century and a half of industrialization have shifted almost entirely to the use of gas (both natural and bottled), coal, oil (including kerosene), and electricity. However, almost all investigators in the area of fuel conservation, production, and consumption agree that in non-industrialized countries the transition to alternative domestic-food-production fuels will be slow. For the foreseeable future, firewood, or its charcoal derivative (where it is available), will continue as the fuel used by 90-95 percent of the poor. (5, 7)

Firewood scarcity is intimately linked in at least two ways to the current and continuing food crisis that faces many parts of the world:

1. When deforestation occurs (as in the case when there is a continuing firewood shortage), the land quickly erodes and the ability to produce abundant crops is drastically reduced;
2. When firewood is not available for home consumption, usually the only alternative left to families is to divert to fuel consumption the manures previously applied to the land as organic fertilizer.

Eckholm writing for Worldwatch (7) has posed this question:

> "Even if by some miracle, we somehow grow enough food for our people by the year 2,000, how in the

world will they cook it with the growing scarcity of firewood?"

Solving the fuel problem may be as difficult - or even more so - than the problem of undernutrition around the world. Both are inter-linked and in addition are intermeshed with population growth (of which this conference is not about). However, Food, Fuel, and Fewer Children is an appropriate topic for discussion and action. If population growth is not decelerated quickly, then the two other situations - food and fuel - appear hopeless.

In addition to family planning, prevention of undernutrition presupposes adequate food production, improved food distribution systems, universal food and nutrition education, and increased family incomes so that those who do not grow the foodstuffs needed for a balanced diet can and will purchase, prepare, serve, and eat wisely as well. Preparing, serving, and eating wisely and well presupposes appropriate and adequate storage and cooking methods and facilities.

Redirection of Projects

In regard to the third conclusion presented earlier that the inordinate amount of time and extremely hard work spent by the world's poor women on fuel gathering and food preparation could in large part advantageously be redirected to income generation projects which would immeasurably benefit the poor families of non-industrialized world:

The old adage that, "Men work from sun to sun but women's work is never done" describes perfectly the lives of the world's poor women. Although the amount and kinds of labor of poor rural women will vary slightly from country to country and even between various locations in a particular country, most labor surveys of household and women's labor in non-industrialized countries indicate that poor women in rural areas (which account for a large proportion of the women living in these countries) are engaged in hard physical work for approximately 60 to 75 hours each week or at least 9 hours daily. These hours are in addition to child care and other forms of family nurturance and support and are usually broken down as follows:

20-25 hours weekly in farming and marketing farm products;

24-30 hours in securing food, cooking it, and in other housework;

6-8 hours in securing the water needed for family use; and

8-12 hours in firewood collection and preparing it for use as fuel for cooking and heating.

Those rural women who are not so dreadfully poor may spend as many hours at work, but usually their labors are not as heavy and more of it is spent in income generation projects which assist their families greatly in many ways.

As I was getting ready for this presentation today, I asked myself several questions, such as:

Is this acquisition of food more limiting than lack of fuel to nutritional well-being of family members in developing countries or are they mutually dependent on each other?

What motivates the poor women of these countries to improve their lots in life and provide more adequately for their families?

Why do they even continue to try?

Why don't they just give up?

Why would a woman work the fields day after day and year after year and still see her children die from malnutrition before they are five years of age?

Why walk 10 miles a day to get a back-breaking load of fire-wood or a jug of water?

Some of the most creative combinations of food, some of the most ingenious cooking methods and uses of fuel I have ever seen have been improvised by these women. What is the secret of their continued creativity in the face of ever-present failure?

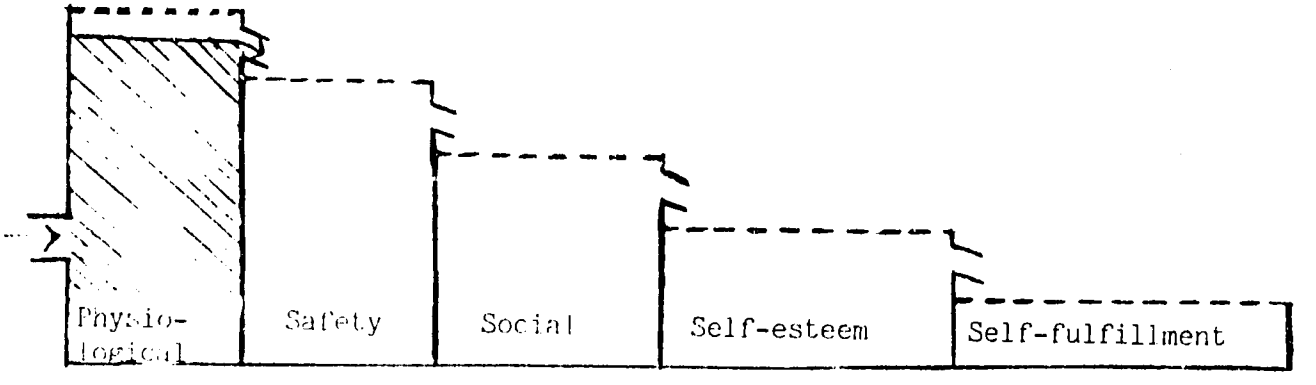
As I used this process to tidy up my thinking, I recalled a few concepts from Maslow's theory of human motivation, which he termed the hierarchy of basic human needs and the preconditions for basic-needs satisfaction. I took myself to the library to re-read this theory.(9) Briefly, these are the hierarchical stages of Maslow's theory of motivation and achievement:

1. The most basic and elemental component, meeting <u>physiological</u> and <u>physical</u> needs;
2. <u>Safety</u> and <u>security</u>

3. The sense of belonging and love and the need for social interaction;
4. The need for esteem and respect, both by self and from others; and
5. The opportunity for self-actualization or self-fulfillment.

The following graphic presentation of Maslow's hierarchy-of-human-needs theory shows the need categories and their fulfillment in sequential order:

NEED CATEGORIES IN SEQUENCE



A CONCEPTUAL MODEL OF MASLOW'S HIERARCHY-OF-NEEDS THEORY (10)

Need categories are filled sequentially and the most elemental one, meeting one's physiological needs, must be largely complete before the threshold of the next stage is apparent. The cycle of beginning, devoting one's energies to diligent and creative accomplishment, and subsequent satisfactory achievement must be fairly well completed before the next set of needs becomes evident, emerging as the new center of one's activities.

According to Maslow, in the primitive first stage of the hierarchy when an individual must do what he has to do to survive, if the tools, environment, and opportunities are available, he/she will move through the accomplishments of each state of the hierarchy to the place where he must be what he can be.

Physiological needs are the universal needs common to all humans regardless of culture, education, occupation, stage of national development, economic status, geographical location, etc. One's physical survival depends on being able to eat, breathe, sleep, be protected from the elements, and other physiological needs to a degree adequate to maintain normal body processes and energy. Physical needs are the most prepotent of all human needs and until satisfied all others become non-existent or pushed into the background. All one's energy, ingenuity and creativity are focused on filling this need. At this stage, little else matters. Using Maslow's hierarchy concepts, freedom from hunger is one of the components of this basic human need. Modern day nutritionists and international developers have added to the concept by stating that freedom from hunger is not only a basic human need; it is a basic human right.

All of the creative and management skills of families living in areas of the world where there is not enough available food to eat are directed toward getting it, conserving it, preparing it, and using it to meet basic needs. Thus, food preparation would take precedence over saving the forests for future use. But even the use of wood is very ingenious.

I have heard it said that the "poor are poor" because they lack energy, management skills, and creative approaches to problem solving. Nobody can stretch food further, prepare it as quickly and creatively to preserve available food content, and apply better management practices to the use of food and fuel than those who have little of both. If one really wants to study the art of management and creativity in an uncomplicated setting, one should study how the poor manage and improvise. Only the affluent can disregard cost and afford waste. Where we would, for example, prepare an elaborate oven meal or use a micro-wave to prepare for a well-balanced food pattern, a southeast Asian woman would serve her family fried rice. How simple and efficient!

When and if physiological needs are relatively well gratified, then there emerges the new set of needs categorized as safety and security. Sanitation and elemental cleanliness are included in this set of needs as is freedom from fear and anxiety. In category 1, as long as one's stomach is empty and the level of sugar or other nutrients in the blood and cells is below the minimum required for homeostatic equilibrium, one is not nearly as apprehensive about freshness or sanitation of food as when there is enough food to go around. Only when there is enough food is one able to think about order, plan for the future, and conserve the extra food and fuel for another time and need.

The use of food and fuel relate also to meeting:

Social needs;

Self esteem and the respect of others; and

Self-actualization;

but in more complex, sophisticated ways than is true for human survival.

We tend to think of creativity in terms of artistic pursuits and management in terms of economic outputs. Before people can direct their inventive abilities to self-actualization and money matters, they have developed the qualities of ingenuity and management on self-survival. Actually, some of the evolution of utensils, equipment, and use of fuel in family food production came to us from th creative inventions and discoveries of the women and families of cultures very different from our own.

Why then do we encourage these women and cultures to alter their styles of life?

1. Because under present conditions and continued population growth in the non-indusrialized world, there is and will not be enough food available to alleviate undernutrition nor the amount of traditional fuel necessary to make the food edible; and
2. Because some of the energies of the world's poor women could now be better used in other ways advantageous to their own self-fulfilment and their families' benefit.

When I was working at FAO Headquarters a little over a year ago I read reports of several research studies which showed that of all the factors influencing and controlling food intake, the most influential are:

The amount and variety of food produced;

Nutrition knowledge; and

Income levels.

As I later worked in four southeast Asian countries and in Egypt I observed experimental community projects aimed at:

increasing food production and potable water supply;

nutrition education;

improving family, maternity, and child development centers involved in basic education, feeding, health evaluation, and family planning; and

the introduction of income generation projects for women.

Not all of these experimental programs included all four of these components. However, without any doubt, those centers providing assistance in income generation for women were the most successful in all the areas involved, including

Amounts and varieties of food available and increased supply of potable water;

Knowledge and education related to nutrition, sanitation, food preparation, storage, etc.;

Better health and feeding practices, especially during pregnancy, lactation, infancy and early childhood, and during heavy work periods such as planting and harvesting time;

Acceptance of different ways to limited family resources in meeting family needs; and

Stabilizing population growth.

How I wish the designs of these experiments had been planned to look at the results from a statistical standpoint.

If countries of the non-industrialized world move forward to the place where they can feed their own in a healthy manner and meet fuel needs for doing so, women at local levels must be given the opportunities and assistance needed to become equal partners in this endeavor, not just women-of-burden. Local women, too, must be allowed the joys and benefits of self-actualization and fulfillment.

Even though I have observed how the rural poor (men, women, and children) live and work in several areas of the world, have read even more about the rural poor and their living conditions in many other regions, and have always sought the reasons behind their actions, in this paper I have attempted to re-evaluate my conceptions (or misconceptions as the case may be) in relation to the need for and use of food and fuel by the poor. As a result, some of my ideas regarding these relationships have changed.

In order for you to understand the basis from which the thoughts I have given here today have evolved, I must emphasize that I believe they are relative to the subject, but they are also tentative. Although I have truly struggled with the concepts and statements presented in the paper, I have an idea that reconsideration of the relationship between food and fuel will lead me to change them again from time to time.

Thank you for providing me the opportunity to test my knowledge and beliefs in this regard. I hope you will test yours also.

REFERENCES QUOTED

(1) FAO: 1979 Production Year Book, Vol. 33. Food and Agriculture Organization of the United Nations, Rome 1980.

(2) FAO: The Fourth World Food Survey. Food and Agriculture Organization of the United Nations, Rome, 1977.

(3) FAO: Food and Nutrition Paper 1/2: Review of the Food Consumption Surveys 1977, Vol. 2. Food and Agricultural Organization of the United Nations, Rome, 1979.

(4) FAO: The State of Nutrition and Agriculture, 1978. FAO Agriculture Series No 9, Food and Agriculture Organization of the United Nations, Rome, 1979.

(5) Fleuret, P. and Fleuret, A. K.: Fuelwood use in a peasant community: A Tanzanian case study. The Journal of Developing Areas, Vol. 12, April 1978.

(6) USAID: The Socio-Economic Context of Fuelwood Use in Small Rural Communities. A.I.D. Evaluation Special Study No. 1. U.S.A.I.D., Washington, D.C. August, 1980.

(7) Eckholm, E.: The Other Energy Crisis: Firewood. Worldwatch Paper 1, Washington, D.C. September, 1975.

(8) ADB: Key Indicators of Developing Members Countries of the Asian Development Bank. Vol. XI. No. 1, Economic Office, Asian Development Bank, April, 1980.

(9) Maslow, A. H.: Motivation and Personality, second edition. Harper and Row, New York, 1970.

(10) U.S. Department of Housing and Urban Development. Phase 1 - Volume 1 - User needs. In-cities Experimental Housing Research and Development Project. PB 184 121, Clearinghouse for Federal Scientific and Technical Information, HUD, Springfield, Virginia, March 1969.

V. Energy for Survival: Scarcity and the Poor

by

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An earlier version of this paper was prepared for the
U.N. Center for Social and Humanitarian Affairs,
December, 1981

"Energy for Survival: Scarcity and the Poor"

The primary energy shortage in subsistence economies is human energy. The poor, around the world, work very long hours for very little return. There has been a tendency for observers to assume that the rural poor are underemployed because they have focused only on one of the multifarious activities undertaken by poor women, and men, and children every day. (Myrdal, 1968). Only recently have there been careful village level time-use studies of the actual distribution of work in the household on such survival necessities as fetching water and fuelwood, processing and preparing food, and engaging in market activity. Casual surveys and anecdotal references to such activities have tended to create as much misinformation as did the previous practice of ignoring informal market and income-substituting activity.

In particular the recent explosion of interest in village use of firewood has produced exaggerated estimates both of consumption patterns and of collection time for many parts of the world. Further, land degradation and erosion were blamed on firewood collection practices. Now more refined studies suggest that forests are being cut for commercial timbering and for subsistence agriculture. Further, it appears that stemwood or logs are more often used for small industry than for domestic use which tends to utilize twigs, dead branches or agricultural refuse. The fuelwood shortages are real in many places, of course, but the most pronounced shortages are among the poor in urban areas of the developing world. The reality of shortages directly affects the time and energy of the poor, especially poor women, since they are the primary users and generally the major collectors of fuelwood.

For all the emphasis on collecting fuelwood, women generally spend much more time in the fetching of water than the collecting of fuelwood in most developing countires. Together these strenuous activities consume a woman's energies and help account for her undernourishment. Relieving such burdens could as readily redress her food deficit as the provision of greater amounts of food. Clearly, it is essential to have correct data on energy use before proposing alternative solutions.

This paper, then, will focus on household energy consumption patterns with particular emphasis on human energy expenditures. Changes in energy use associated with stages of development will be discussed in terms of the impact on the lives of women, particularly on how changes in energy have affected women's ability to maintain themselves and their families.

One of the first insights from the village time use studies mentioned above is the realization that the notion of the rural poor being underemployed is in most cases a myth. Rather than being underemployed, they are underproductive. For all their long hours of work, they barely meet survival needs; their energy goes into (1) powering the agricultural productions cycle and (2) feeding and watering both humans and animals that contribute to that cycle (Ashworth, 1980). Reddy has shown that 82 percent of the energy used in subsistence agriculture in South India is contributed by humans or animals, at about the level of 40 percent for humans and 60 percent for animals (A.K.N Reddy, et al., 1980). Makhijani emphasizes that if total energy is counted, that is , human and animal both are included, that

> ...farms in underdeveloped countries often use more energy per hectare than farms in the industrialized nations. It takes more energy to feed the bullocks and mules that work the fields of much of the Third World, than to farm with the heavily mechanized methods of U.S. Agriculture. Since farms in the U.S. are generally much more productive per unit of land, energy use per

> ton of food in the underdeveloped countries is much higher in comparison with mechanized farming, even when the heavy energy investments in irrigation and fertilizers are taken into account (Makhijani, 1975).

Another major insight that has recently emerged is that one of the major problems is the definition of work itelf. Most of the tasks which poor families must do to survive are outside the monetary economy and so are overlooked in official statistics. How easy it has been to underestimate the amount of work rural families do is illustrated in a recent survey of energy expenditures in six villages in southern India. The study of A.K.N. Reddy is an almost complete census of energy consumption in six villages; 560 of the 578 households in these villages were surveyed from September to December 1977 utilizing a careful pre-tested schedule. As is typical in India, there were slightly more males than females in the total study population of 3,452 persons. Average family size was 6.24 persons; nearly half (46 percent) of the population at the time was under fifteen years old. These villages are relatively homogeneous with 84 percent of the households engaged in farming on their own land; further, 78 percent of the households are of a single farmer caste. Nonetheless, there are inequities in land-holding patterns with about 12 percent of the households landless, 30 percent with less than 2.5 acres, 31 percent holding between 2.5 and 5 acres, 20 percent between 5 and 10 acres, and 8 percent over 10 acres. The large farmer category owns over one-quarter of the available land.

In his study, Reddy (1980) found that the average time spent per household per year on agriculture was less than four hours a day. If he had stopped there his figures could be used to bolster the underemployment argument. However, instead, he calculated the human energy utlilized for do-

mestic survival activities and found that the total energy used by the average family was 18.37 hours per day (see Table I). That figure still does not include the 16 to 52 days per household per year spent on work in village industries (A.K.N. Reddy, et al., 1980). Thus his findings, some of which are reported in Table 1, show support for the confusion in definition of work and the underproductivity of the poor, not underemployment.

Table I

Human Energy (in Hours/Household/Day) for Domestic Agricultural Activities: Average for Six Villages in Southern India*

Activity	Men	Women	Children	Total
Gathering firewood	0.57	0.66	0.46	1.69
Fetching water	0.04	1.24	0.25	1.53
Cooking	0.03	3.65	0.34	4.01
Carrying food to farm	-	1.82	-	1.82
Livestock grazing	2.85	0.75	1.95	5.55
Total domestic	3.49	8.12	3.00	14.61
Agriculture	2.19	1.57	-	3.76
Total	5.68	9.69	3.00	18.37

* A.K.N. Reddy, et al, 1980.

Among these rural poor, women, as many working women everywhere, work longer hours than men. Evidence from Table I above shows women working 9.69 hours/day against men's working 5.68 hours/day on agriculture and survival tasks alone.

However, household income level clearly affects which women have the greatest energy output. For example, while firewood is the primary fuel source, only 71 percent of the households in this village cluster depend upon gathering it themselves; another 8 percent procure wood from their own land while the other 21 percent of the households purchase their wood. Those households that gather wood spend about 2.16 hours per day per household picking up twigs and fallen branches as can be seen in Table II below. In contrast, households that purchase or fell trees tend to use logs. Dung is not typically burned in this area, nor is agricultural refuse a major alternative to firewood.

Table II

Human Energy Spent on Survival Activities in Southern India (in hr/household/day) and percent)*

Activity	Men	Women	Children	Total
Collecting firewood	.72 (33.5)	.84 (38.9)	.60 (27.7)	2.16
Cooking	.03 (.7)	3.68 (91.)	.32 (8.1)	4.03
Carrying meal to fields	-	1.82	-	1.82
Fetching water	.05 (2.9)	1.23 (80.7)	.25 (16.4)	1.53

*Figures only include the 71% of households which depend on this fuel source.
Source: A.K.N. Reddy, et al, 1980.

In those households which gather wood, the task is divided among all family members although the women still do the most gathering. Table III indicates the length of the trip taken to obtain firewood varied significantly among the villages, as did the proportion of households buying wood. Clearly, villagers weigh the time it takes to collect a "free good" against the cost of buying firewood. The poorer families do not have that choice. Average time spent by family members in those households which gather wood is

shown in Table II above. The number and length of trips taken to gather firewood shows that it is not a daily activity, according to data in Table III below. This intermittent nature of collection may help account for the inaccuracies reported in less detailed studies.

Table III*

Human Energy Spent in Fetching and Gathering in Southern India

	Average number trips/hr.		Average distance travelled/hr. in km.		
	per day	per year	round trip	per day	per year
Fuel	.39	142	5.4	2.1	766.8
Water	2.08	759	.38	.79	288.5

* Figures only include the 71% of households which depend on this fuel source.

Derived from A.K.N. Reddy, et al, 1980.

Women in the better-off households have very little responsibility for obtaining firewood. It is generally the men cutting their own wood who spend time felling trees. Neither men nor women are presumed to spend much time in obtaining firewood in those households constituting one-fifth of the villages that purchase firewood. The fact that poor households rely upon children to collect about two-fifths of the firewood restricts the ability of children to attend school. Other studies show that it is primarily the girls who do this work, and so girls are more likely to drop out of school than are their brothers (Acharya and Bennett, 1981).

While men from the poorer families assist in firewood gathering, and do most of the tree felling, they contribute very little energy to fetching water

or to the processing and cooking of food. Worldwide, these functions are considered a part of the woman's sphere, and are less variable across income lines.

In contrast to the importance of household level found by Reddy, Farouk, in another study of time-use of rural women, remarks that "there is little difference in the techniques of domestic work in the rural households, whether the family is rich or poor" (Farouk, 1980:54). A major reason for undertaking this study in Bangladesh, according to Farouk, was to investigate the hypothesis that rural women were a welfare burden being largely unemployed.

To do so, Farouk (1980) collected data in six predominantly Muslim villages, each in a different part of Bangladesh. Further, the sample population was divided into three income groups: landless, farmers, and large landholders. Though these groups are of quite different sizes, the women interviewed were drawn equally from each income group but their responses were weighted by actual population distribution in all village-wide tables. All females over five-years old in 600 families were interviewed during 1976-77; data was based on activities undertaken during a twenty-four hour period of the day before the interview. Data was also tabulated separately for the woman leader in the household, as opposed to the female children or elderly. Local women were trained as investigators. Farouk's findings of time-use by strata and comparing all females over five against the woman leader of the household are shown in Table IV.

Table IV

Time Use by Rural Women in Six Villages in Bangladesh for a 24-hour Day by Income Strata and Women's Positions

Use of Time	Stratum I landless		Stratum II farmers		Stratum III large landholders	
	(a)	(b)	(a)	(b)	(a)	(b)
Personal needs and recreation	3.10	2.55	3.25	2.84	3.31	2.99
Personal services to adult members	0.53	0.58	0.68	0.67	0.66	0.80
Child care	0.84	1.08	1.05	1.17	1.01	1.24
Farm work*	1.02	1.17	1.25	1.67	1.03	1.66
Processing and marketing farm produce*	0.75	0.80	1.06	1.20	0.93	1.05
Food preparation and kitchen	2.54	2.66	2.58	2.90	2.35	2.36
Collection of inputs for the household*	0.80	0.83	0.63	0.69	0.48	0.50
Care of the household	1.51	1.52	1.48	1.69	1.41	1.33
Education and training*	0.32	0.00	0.80	0.00	1.41	0.06
Prayer and religion	0.45	0.71	0.69	1.00	0.81	1.21
Socially necessary but unpaid work	0.04	0.03	0.03	0.04	0.08	0.17
Outdoor wage earning work *	1.06	1.23	0.25	0.26	0.12	0.12
Indoor handicraft* work	0.70	0.62	0.54	0.54	0.43	0.39
Unused time	0.74	0.48	0.58	0.73	0.69	0.80
Others	0.14	0.09	0.00	0.02	0.00	0.00
Sleep	9.30	9.17	9.17	8.97	9.19	8.93
	4.65	4.65	4.53	4.36	4.40	3.78

(a) = all females over five
(b) = women leaders of households

* Total time in paid/value occupations

Stratum I		Stratum II		Stratum III	
(a)	(b)	(a)	(b)	(a)	(b)
4.65	4.65	4.53	4.36	4.40	3.78

Source: A. Farouk, "Time Use of Rural Women: A Six Village Survey in Bangladesh." 1980. Dacca University: Bureau of Economic Research.

As can be shown in Table IV in the "Use of Time" column, Farouk adds together items which can be priced for creation of value or potential cash expenditure saving. His list includes farm work, processing and marketing of farm produce, collection of inputs, wage-earning, and handicrafts. It also includes education and training, but excludes cooking. His figures show that even with this narrow definition of work, women of Bangladesh spend more than half a day in gainful economic activity.*

Thus, Table IV shows that Bangladesh women do less work in agriculture than women of South India; this is especially true since carrying food to the fields is counted as farm work in this sample. Not surprisingly, women in farm families, as opposed to the landless or landlord families, do more farm work, while landless women do more wage-earning away from home and handicrafts. The collection of inputs for the household, which includes gathering dung, carrying water, and picking vegetables from the garden, goes down as income rises. The processing and cooking of food takes more time for the women in the middle stratum, perhaps because the poor have less food to fix and the rich have servants. The woman leader in most cases works harder, services both adults and children in the family, and has less time for education or personal needs than other women.

Both the Reddy and Farouk surveys were based upon survey techniques and recall. While such methodology is necessary for broad studies, the detail is necessarily less than in studies based on observation. McSweeney,

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*He used a broader definition in an earlier study where he found that poor women in Bangladesh were engaged in productive work between ten and thirteen hours a day compared to men whose productive worktime was more consistently around ten hours a day, but less than women in any particular location (Farouk, 1978).

doing research in Upper Volta, utilizing both the recall techniques and direct observation method, found that 44 percent of women's work was unaccounted for using recall (McSweeney, 1980). Further, most surveys, either listing activities or using interviewers, may not encourage the citing of unlisted activities. For both reasons, it is likely that the work of women at the subsistence levels is undercounted by surveys. Nor do one-time surveys allow for seasonal variation.

In order to remedy some of the limitations on survey technique, scholars have begun to collect data on time budgets derived from direct and repeated observation. These time budgets not only record a greater variety of activity but also detail survival activities with great accuracy. Three such studies were analyzed in a previous paper and are summarized in Table V (Tinker, 1981b) along with some of Reddy's findings already discussed above.

Table V

Time Allocations to Rural Activities Among Men and Women *

Country	Average hours of work/day in hours		Food for human consumption (hours & minutes)		Firewood (minutes)		Water (minutes)	
	Female	Male	Female	Male	Female	Male	Female	Male
JAVA	11.1	8.7	2.7	6.26	5.25	12.5	-	-
NEPAL	10.8	7.5	3.0 hours	27 minutes	22.8	14.4	40.2	4.2
UPPER VOLTA	9.8	7.55	2.2 hours	10.0 minutes	6.0	2.0	38.0	0
INDIA	9.69	5.68	3.65 hours	18 minutes	39	34	74	2.4

* Source: Java - White, 1976.
Nepal - Acharya and Bennett, 1981.
Upper Volta - McSweeney, 1980.
India - Reddy, et al, 1980.

In such a summary form, the results from the Reddy survey and these time budget studies do not diverge in most aspects. The major deviation is in the time spent collecting firewood. Indian women spend much more time gathering firewood and fetching water, nearly two hours per day, than the women in Nepal, Indonesia, or Upper Volta. A closer observation of these activities would be useful to verify this difference, since it is double the amount of time observed in the three countries where time budgets were done.

On the other hand, a recent survey of fuelwood in Tanzania, where men usually do not help at all with firewood, shows that women there average 12 hours a week collecting firewood at a distance. Also the gathered firewood is supplemented by twigs picked up by the women and their children to and from the farm fields. Thus, total collection time is about equal that in India (Fleuret and Fleuret, 1980).

In contrast, a lower figure than that reported in Tanzania is recorded in a Kenya study which indicates that women spend between 30 to 60 minutes a day collecting firewood. Three-fifths of these families also had charcoal burners and used the two types of fuels for different purposes. The wealthier farmers purchased the charcoal, but about one-quarter of the households--usually only the males--made charcoal for use and sale (Haugerud, 1981).

Fetching water in Kenya is a more onerous chore than is firewood collection with many households spending 5 to 6 hours a day of women's and girls' energy on this activity. The amount of time spent collecting water in Kenya further substantiates the fact that, in most countries, fetching water takes more time than gathering firewood. Further, as firewood becomes more scarce, men seem to begin to assist in the collection or to provide alternatives

to gathering. Seldom do men assist with water collection or food preparation, which are allocated to women's spheres.

The long workdays of these rural women contradict the widely held belief that they do not work. Even by narrow definitions of work, these women contribute at least half of their time to market activities with an assignable value. Time spent on household activities such as cooking and maintenance are frequently reduced by the poorest if economic opportunity is available (Jain, Singh and Chand, 1979) or during the harvesting and planting seasons (McSweeney, 1980; Tinker and Cho, 1981; DaVanzo, 1978). Since the woman's economic contribution is more important to the poorer family's survival, this reallocation of time and energy is quite logical (Stoler, 1977). Where the social fabric of society is already disintegrating so that there is not enough work for the poorest women, such as in Bangladesh, they may in fact have some unused time. But full-time, or even half-time jobs, may not be readily filled since they still must fulfill their subsistence activities (Farouk, 1980).

Thus, poor women are constantly balancing their personal time and energy against the demands of market work, subsistence activities, and household tasks. Given these pressures, poor women cannot easily alter their workday without risking survival (Tinker, 1981b).

However, these studies also show that as soon as a women's income is less essential to the family, there is a tendency for them to reduce market work and devote more time to household activities. There have been many attempts to assign a monetary value to these household activities: childcare, family health care, improved and more nutritious meals, cleaner, more attractive homes (Michel, 1978). Others argue that attaching a price tag to all human activity tends to minimize non-monetary values (Tinker, 1981a). Also, as

soon as the family can afford it, there is a tendency to substitute other fuels for fuelwood, and thus cut down on the time spent in gathering wood.

Thus, from these studies and surveys, we can summarize certain points concerning human energy at the subsistence level:

1. Women in subsistence economies work very long hours, longer than men;

2. The poorest women spend more time on market activity, both income-generating and income-substituting;

3. Women's work rapidly concentrates on women's sphere activities as income rises;

4. Changes in procuring fuelwood--but not water--are happening rapidly; the impact varies.

No matter how their activities are categorized, most rural women still carry out a variety of tasks which keep them occupied most of the day. Only the rich begin to have leisure for personal pursuits or education. However, the rapid change in female activity and the indistinct definition of work lead many surveyors to include many household activities as leisure. The inconsistency in the definition of work leads to generalized surveys which suggest that women and men in developing countries have more leisure than women or men in either the planned or market economies (Evenson).

Further, this misconception of leisure time has encouraged development planners to introduce projects at the village level which require active participation of women. However, only the better-off women have the flexibility of time and energy to allow them to respond, but status considerations often prevent them from participating (Abdulah and Zeidenstein, 1979). The poor women to whom the projects are often addressed have neither the time nor energy. Thus, while human energy constraints are the greatest obstacle to change in the rural areas, other factors should not be overlooked. One question, still unanswered, is why less attention has been placed on reducing

human energy used for totally women's sphere activities than has been accorded the firewood issue, a male and female activity? Or has the move of men into firewood/charcoal something to do with the value attached to the produce? or to ownership?

One answer may be that as long as a good or a service is considered free, little investment is made in reducing human energy inputs so that its provision is less arduous. Water is sold in urban centers, not only in the modern sector, but also by vendors in the squatter settlements. Urban dwellers increasingly buy food rather than cooking by household; street vendors, market women, indigenous food stalls, and eating houses all provide alternatives for subsistence food provision and for modern restaurants (Tinker, et al., forthcoming). How these two arduous activities, water fetching and food preparation and cooking, can be made less human energy-intensive at the village level is a major challenge to those interested in alleviating poverty among the world's poorest.

Some are now seriously addressing these problems. Energy technologies designed to make women's human energy more efficient at the village level are being conveniently classified by the type of activity for which it would be a substitute: fetching water, processing food, obtaining fuel for cooking and using it, and farming. The various programs initiated by the donor community, by non-governmental organizations, and by national governments to supply energy alternatives can then be reviewed within each category to show both the problems and the possibilities of the new technologies.

However, on the whole, there has been a tendency to focus on a single technological problem. This has often masked the interrelatedness of energy sources and the multiplicity of energy needs. Few areas of the world can function without both traditional and commercial fuels. It is not simply that

the over two billion of the world's population who use woodfuels, dung, and agricultural refuse are all clustered in the rural areas of the developing countries while the uses of commercial fuels lie in industrialized countries or in cities everywhere (IBRD, 1979). Not only are there large sections of modern towns where traditional lifestyles are the pattern, but even in the most remote corner of most countries commercial fuels may be found.

It is important to keep this multifold need in mind to avoid the danger of overly emphasizing small-scale new and renewable energy alternatives so that a sort of energy ghetto does not emerge. This fear of creating regions of countries condemned to permanent second-classness was frequently voiced at the U.N. Conference on New and Renewable Sources of Energy. On the other hand, unswerving dedication to energy-intensive high technology development has as many pitfalls. An energy mix throughout the economy is the most promising path for the future.

REFERENCES

Abdullah, Tahrunnessa and Sondra Zeidenstein. 1979. "Project Oriented Research on Aspects of Women's Knowledge and Experience" in Sondra Zeidenstein (ed.) Studies in Family Planning: Learning About Rural Women. New York City: Population Council.

Acharya, Meena and Lynn Bennett. 1981. "The Rural Women of Nepal: An Aggregate Analysis of Summary of Eight Village Studies." Vol. 9, Part 9 (CEDA/Status of Women Project).

Ashworth, John. 1980. "Technology Diffusion Through Foreign Assistance: Making Renewal Energy Sources Available to the Poor." Solar Energy Research Institute, Colorado. Unpublished paper.

DaVanzo, Julio and Donald Lye Poh Lee. 1978. "The Compatability of Child-Care with Labor Force Participation and Non-Market Activity: Preliminary Evidence from Malaysian Time Budget Data." Santa Monica, CA: Rand Corporation.

Evenson, Robert E. "The Time Allocation of Adult Women: An International Comparison." Behavior Science Research, State University of New York at Buffalo, forthcoming.

Farouk, A. 1978. "The Vagrants of Dacca City." Bureau of Economic Research. Bangladesh: University of Dacca.

Farouk, A. 1980. "Time Use of Rural Women: A Six-Village Survey in Bangladesh." Dacca University: Bureau of Economic Research.

Fleuret, Anne and Patrick. 1980. "Fuelwood Use in a Peasant Community," California State University.

Haugerud, Angeligue. 1981. "Household Energy Use in Rural Embu: Socioeconomic Aspects of Wood Use, Cooking and Lighting Fuels, and Water Collection. Mimeo. Report prepared for the Beijer Institute, Royal Swedish Academy of Sciences. June.

IBRD. 1979. "Prospects for Traditional and Non-Conventional Energy Sources in Developing Countries." World Bank Staff Working Paper No. 346, July 1979. Prepared by David Hughart, Energy Department, Central Projects Staff.

Jain, Davaki; Sing, Nalini H. and Chand, Malini. 1979. "Women's Work: Methodological Issues" in Women and Development: Perspectives for South and Southeast Asia, Jahan, Rounaq and

Hanna Papanek, (eds.) Dacca: Bangladesh Institute of Law and International Affairs.

Makhijani, A. 1975. Energy and Agriculture in the Third World. Cambridge, Mass: Baccinger.

Michel, Andre. 1978. Les Femmes Dans la Societe Marchande. Paris: Presses Universitaires de France.

McSweeney, Brenda Gail. 1980. "Collection and Analysis of Data on Rural Women's Time Use " in Studies in Family Planning: Learning about Rural Women. New York City: Population Council.

Myrdal, Gunnar. 1968. Asian Drama, Part V. New York: Pantheon.

Reddy, Amulya Kumar N. et al. 1980. "Rural Energy Consumption Patterns: A Field Study." Astra, Indian Institute of Science, Bangalore.

Stoler, Ann. 1977. "Class Struggle and Female Autonomy in Rural Java." Signs. 3 No. 1 (Autumn).

Taherunnessa, Abdullah and Sondra Zeidenstein. 1979. "Project Oriented Research on Aspects of Women's Knowledge and Experience " in Sondra Zeidenstein (ed.), Studies in Family Planning: Learning about Rural Women. New York City: Population Council.

Tinker, Irene. 1981(a). "Policy Strategies for Women in the 1980s." Africa Report. (March-April).

Tinker, Irene. 1981(b). "Energy for Essential Household Activities." Dames and Moore, Inc.

Tinker, Irene and Hyoung Cho. 1981. "Women: Participation in Community Development in Korea." Korea: Seoul National University, Institute of Saemaul Undong Studies.

Tinker, Irene et al. Forthcoming. "Food Vendors in the Informal Sector of Senegal." Equity Policy Center. Prepared for the Office of Women in Development. USAID.

White, Benjamin. 1976. "Population, Involution and Employment in Rural Java." Development and Change. Volume 7.

VI. Energy Scarcity and Food Habits: International Observations

by

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"Energy Scarcity and Food Habits: International Observations"

Recently we in the industrial countries have been faced with gas lines and rises in the price of fuels. We have suddenly focused more attention on the limited supply of energy both in our own countries and in countries abroad, but for people in non-industrialized areas, priorities have not suddenly shifted. For them, both food and fuel scarcity are continually growing problems. Developers often look at rises in the prices of fuel in urban areas of non-industrial countries but fail to observe also the substantial increases in the cost of staple foods. Thus, they attempt to measure the problem in economic terms in rural areas, where much of the food and fuel is still collected as free goods. These developers often suggest greenbelt projects and designs for planting fields in woodlots. Thus, as population numbers increase and as areas become more industrialized and urbanized, many rural residents are finding it a problem to produce adequate quantities of both food and fuel.

Until resources become limited, food and fuel are traditionally complementary for rural dwellers; they use fuel to make their foods more palatable. In times of scarcity, however, food and fuel compete for both human and physical resources. Often the quantity and/or quality of both decline together.

Local people go through a number of alterations in an effort to balance their ways of handling foods and fuel in order to have needed fuel with which to cook the food they habitually eat. For

the vast majority of rural families in non-industrial societies, fuel consists of wood, dung, or plant stems. The mix of fuels or their location may be the first thing to change as resources become more limited. Families may use more stems and dung and less wood or they may cut green wood or collect fuel further from home. If the distances needed to collect fuel increase, it becomes impossible to go far enough and still complete other tasks. Food habits appear to change next. We have little information about the specifics of these changes and their impacts. We are hoping some proposed studies will be funded to give us more precise background on what adaptive strategies rural people use and what nutritional and health implications these changes may have.

However, we do know some types of strategies people are using. The following are some brief examples to illustrate some ways to shorten cooking time or otherwise conserve fuel.

1. Chemical change of food. In Upper Volta, soybeans introduced in a farming project were not eaten in any large quantities because the beans took too much time to cook. However, later women started fermenting them and adding them to their sauces.
2. Physical change of food. In Kenya, local families that used to cook beans and corn together are now grinding the corn and eating more cornmeal mush.
3. Eating foods cooked less or not cooked at all. In Nepal and in Upper Volta, we have examples of people eating

more raw vegetables; in Senegal, more people are drinking raw millet flour in water instead of cooking millet mush.

4. Substituting foods. In Sahelian areas where hard dry grains such as millet have traditionally been the staple food, rice is becoming more popular, partly due to the shorter cooking time. In other areas, tubors are being substituted for rice. In more urban areas, purchased bakery breads are being substituted for home cooked cereals.

5. Change of amounts or times of meals. Some women claim they cook fewer meals and/or eat more left-overs in order to save fuel.

It is women who prepare the foodstuffs, and women who are usually responsible for the fuel collection. When they become overburdened in fulfilling these two tasks, food and fuel then compete for their time. When land becomes a more highly demanded item, then food and fuel compete for the same land areas. This competition has not been fully faced by agricultural and forestry planners. The issues are complex and area specific, but a few examples are as follows.

In Senegal, where a peanut raising project had encouraged the use of all available land for increased production, women now find wood fuel very difficult to secure. One woman described the change in her life from the time when she could pick up branches around the home until the time it took her and her children more

than a four hour walk to gather a two-day supply of fuel. She first cut green trees and finally turned to dung, although she knew some of the branches were from valued food producing trees and the dung would have increased production in her garden and fields. When she found fuel to purchase, she used cash with which she formerly purchased food items. Finally, she cut down on the cooking and served her family left-overs for some meals and a drink of millet flour mixed with water for others.

Limited cash must sometimes be used to try to provide the food/fuel balance. In Bengal, studies report fuel so scarce that factories pay women in fuel rather than in money or food. For instance, a jute factory started paying women a percentage of the left-over stalks they had cleaned.

Efforts of locals to plant trees frequently compete with the short planting season for fields and/or gardens. Solar scientists who suggest that women use parabolic solar cookers are often considered uninformed. Now some realize that the slow cooking dishes eaten by many groups would require the women to continually focus the mirror during the many daylight hours, hours which women need for raising crops and gardens, or collecting or processing food items with which to fill the pot. In Nepal, girls report having to give up going to school in order to free the mothers to collect fodder or produce food.

When a need for a balance between food and fuel for human and physical resources - namely time and land - is not recognized, project activities can actually increase the imbalance between

the two. When agricultural policies stress cash crops in areas where subsistence supplies of food and fuel are unsure, a "successful" project may bring with it serious hunger. When forestry policies stress harvesting beyond ecologically sustainable limits, as has happened in a number of areas including India and Nepal, the ability of the environment to sustain residents drops sharply. In areas of India (where young women fear they will be unable to provide their families subsistence needs), the young women sing songs asking their parents not to marry them to local young men. Here, many women are reported to have committed suicide rather than face their mothers-in-law when they have been unable to both raise the gardens and scavenge enough fodder and fuel. Other experiences indicate that projects which result in more development for plantations on land formerly used by local people for collecting food and fuel products do not adequately allow for local subsistence needs. Thus, great hardships can be created.

For the majority of rural families in non-industrial areas, women traditionally have gleaned, picked up fuel as a free good, and collected many nutritionally valuable leaves, roots, berries, and nuts from wild trees and plants. Partly because these activities are carried on by women, and partly because such items seldom reach the market economy, they have been either invisible or grossly underrated in development planning. Only now that resources are becoming more highly demanded and many of these foods and fuels are impossible to obtain as free goods are they

becoming visible economic goods. Only now is the competition of food and fuel for the same resources being recognized.

Before we can adequately plan for the food/fuel needs in resource management, we will have to focus more fully on not just the fuel -- or even just the food factors -- of the equation. Instead, we need more information on ways local people use both together and how they attempt to keep a balance. We will have to understand locally accepted adjustments in times of scarcity. We will have to identify trade-offs and the people who are currently becoming increasingly disadvantaged. If more food is eaten raw, are vitamins saved, are diseases spread, is the caloric value diminished? What integrated approaches will be effective to help increase needed food and fuel? Some trees or plants produce both food and fuel on limited space, but one cannot raise maximum fuel, food, and fodder on the same land at the same time. We will have to develop integrated plans with a focus on providing subsistence food and fuel and on involving the local rural women. Only women can provide the information needed about local practices and adaptive strategies in situations of scarce resources.

Finally, planners must realize the importance of integrated food/fuel planning and learn from local women about their needs and resources. Planners must develop new ways to meet the goal of increasing the complementary balance and easing the competition between two essential elements of life - food and fuel.

VII. Observations of Adaptations to Energy Problems In Appalachia: A Folk-Cultural View

by

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Observations of adaptations to energy problems in Appalachia: a folk-cultural view

My interest in food and fuels is from the perspective of a folklorist. Foodways interest me as they demonstrate how food choices, food preservation, food preparation and food consumption express cultural traditions. Thus, my observations on the impact of energy problems on family food behavior in Appalachia are biased by cultural interpretations. I propose no concrete solutions to the problems of food and fuel but simply another way of understanding such problems.

Although as a folklorist I have always been interested in observing foodways, I recently have had the opportunity to observe and participate in numerous food traditions in Appalachia through my work as staff folklorist on a large grant project in a rural Virginia county. At such activities as a "carry-in" (covered dish supper) and a senior citizens luncheon, I have been able to observe, photograph, and eat local foods and to discuss foodways with the county residents.

In this presentation, I would like to review some of the traditional relationships among food, energy, and culture in Appalachia and note some continuities and changes in that tradition in recent years. These observations are based on my own field work, reading the work of others, and my recent discussions with social workers, county extension agents, and public health nutritionists in Appalachia.

Traditional foodways in Appalachia derive from a frontier and rural economy based on hunting and gathering, subsistence farming, an emphasis

on food preservation and conservation, use of available energy sources (sun, water, wood, human energy), and the use of food for purposes other than eating. In the past, hunting and gathering were ways of living off the land, particularly important in the most mountainous sections of Appalachia where there was less land available for farming. Hunting for squirrel, bear, possum, turkey, deer, groundhog, rabbit and other game was combined with the gathering of wild plants, fruits, and nuts, including strawberries, raspberries, blackberries, persimmons, fox grapes, wild greens, and nuts of all types, especially chestnuts before the blight of the 1930's.

Hunting and gathering activities complemented the foods grown on small, subsistence farms. Common vegetables were potatoes, beans, onions, cabbage, squash, corn and turnips; chickens and hogs were more prevalent than cattle. Foods that could not be produced at home, such as corn meal, or coffee, frequently were obtained by trading hunted, gathered, or grown foods (e.g., chestnuts) for the needed items at stores or mills.

This general food self-sufficiency, typical of rural, frontier culture in Appalachia and elsewhere in the country in an earlier time, led to an emphasis on the preservation and conservation of food. As one person we interviewed in rural Virginia said: "And they -- another thing they done, way more than they do now, they tried to make something of everything and keep it, if they could, you know, keep it." In the process of preserving and conserving food in Appalachia, apples were transformed into apple butter, cider, vinegar, and apple brandy; cabbage

into kraut; green beans were strung into "leather britches." When hogs were butchered every part was used -- the meat was salted and stored, treated with borax for bugs, or made into sausage for canning; the intestines became "chittlings"; and the fat served as lard and the main ingredient in soap.

In traditional Appalachian culture, foods were preserved and prepared for eating by using readily available, natural energy sources which required little or no mediation for their use -- sun, water, wood, and human energy. Food preparation practices of the time highlight efforts at conserving energy. For example, several of our interviewees in rural Virginia recalled cooking several foods together in one skillet, such as cornbread and potatoes. Large cookstoves, with wood as their energy source, made it possible to cook many dishes at once for a meal and keep them all warm. The sun was used for drying fruits and vegetables; local water sources provided the energy for milling grain and for natural refrigeration in springhouses. In addition to canning, curing, and drying foods, some foods (e.g., cabbage) were buried underground to preserve them through the winter. Even human energy was maximized by organizing "workings," in which groups of people gathered to shuck corn, make sorghum molasses, or kill hogs. As one informant told us: "We always had help, it wasn't no one family killed hogs -- three or four families would kill hogs on the same day."

Exploiting the full potential of food, families in Appalachia made foods into cash crops, liquor, and remedies for home healing. Peggy Shifflett in her article, "Non-nutritional Uses of Food in Traditional Appalachian Culture, " describes two categories of food use in healing:

non-occult and occult.* Non-occult uses, or household remedies, include such practices as putting apple butter on burns or a hot cabbage leaf on a toothache. Occult uses of foods in healing, based on sympathetic magic and performed by persons with special healing powers, produced such rituals as breaking biscuits over a child's head to break the habit of bedwetting.

Life in Appalachia today is as complex as life in the rest of the nation and much of that complexity is tied to problems of energy production and consumption. These problems, in turn, affect food use behavior. Commenting on the changes in Appalchia, one informant remarked: "Uh -- times have really changed, in more ways than one. I heard someone say just this summer that they, uh, had breakfast in California, lunch in Texas, and supper back home in the county. So that gives you an idea."

But much about food and fuel use patterns in Appalachia remains the same, in part because of the force of tradition, in part because traditional foodways have proved to be satisfying, practical, and economical. Hunting and gathering activities persist, although now mostly to supplement the main sources of food supply. Some locally abundant animals such as possum and groundhog are still hunted and eaten by some in Appalachia (groundhog as a Christmas dinner delicacy), while such foods are not highly esteemed elsewhere in the country. Subsistence

*Shifflett, Peggy and Noel, Dorothy E. "Non-Nutritional Uses of Food in Traditional Appalachian Culture," Ecology of Food and Nutrition, 8 (1979): 259-264.

farming, if only a garden plot and a few odd chickens or hogs, is a mainstay for many in Appalachia, even those with jobs not tied to the land. Foods still are dried, canned in abundance, or otherwise preserved (freezing now is one of the most popular methods of food preservation); however, some attitudes about food conservation have changed. One woman told us how her mother used to use the head and feet of the hog for souse, which would be sliced and eaten with vinegar. She added: "It was awfully good, we thought, but now we're daresome to eat such a thing." Foods still play important roles in home healing, as well.

Although traditional energy sources and practices continue to be popular, such as woodstoves for heating and cooking, water for milling and cooling, there are some striking changes in traditional methods. Apples, formerly dried outside in the sun or in "dry-houses," now may be seen arrayed in the back windows of parked cars in an ingenious use of solar power. Workings (e.g., to kill hogs) still may be held, though their purposes now may be more traditional and social than essential. As one man told us, many families still get together for hog killing, but "aw, they wouldn't, uh, anybody wouldn't try to kill hogs now without they had a -- had a tractor on the job."

Public health nutritionists, county extension agents, and social workers I consulted agreed that traditional food and fuel practices continue in Appalachia, many are increasing, and that some people who had abandoned such practices are returning to them. Some younger people and people new to the region are turning to such practices for the first time out of economic necessity. A county extension agent,

citing reduced income and inflation as the cause of food and fuel problems, said evidence in his local area indicated more gardens were being cultivated, more freezers were being purchased, and cheaper foods, especially cheaper cuts of meat, were being bought in volume for freezing. He noted also that the rash of local controversies in Appalachia over the maintenance or operation of community canneries points to the high level of interest in home food preservation.

A public health nutritionist, who works in a coal-mining section of Appalachia, commented that the poorer people of the region had never benefited from energy conveniences but would continue to suffer from the loss of energy drained away by such conveniences. In her role as nutrition consultant, she finds many traditional Appalachian foodways provide nutritious, economical foods for the region's poor. However, she also consistently observes poor cooking and eating habits. For example, a pot of potatoes will be filled to the rim with water and heated with no lid to conserve energy; with little attention to pre-planning, all the food in a home may be consumed on a day-to-day basis necessitating daily trips to the grocery (money is lost to fuel rather than food); and food choices frequently are expensive, quickly consumable, non-nutritious foods such as cola drinks, potato chips, and cookies. Since such practices result in low-hemoglobin levels for the poor and in inefficient uses of energy, this public health nutritionist aims her education programs toward the improvement of food and fuel behavior which, as she correctly advises, must incorporate a culture's traditional foodways.

Finally, a county social worker expressed a belief that there was increased self-sufficiency in her area, especially among white-collar

workers who were imports to the rural setting. Many heat with wood-stoves, maintain a garden, are learning to can, and keep cows, cattle, chickens, rabbits and so on. As she said, an attitude growing in popularity in her area might be expressed as, "why give money to someone when I can do it myself."

All these professionals who work in the field in Appalachia lamented that the poor likely would continue as always -- relying on assistance for food and fuel, making do with what they have, or doing without; however, dwindling government assistance will necessitate the intervention of churches and the local community, a movement these workers already see in progress. Many rural people in Appalachia, mostly neither poor nor affluent, will return to or increase traditional food and fuel practices to balance the decreased use of high-cost energy; some, though not many, will try newer energy saving devices such as microwave ovens and solar collectors. The most visible changes these professionals have observed occur in the more affluent rural and urban populations in Appalachia -- gardens, even on the tiniest or most suburban plots of land, increased purchases of freezers and woodstoves, and numerous requests for information and instruction on canning or more efficient cooking and heating.

In conclusion, as a folklorist it is interesting and instructive to watch the mix of traditional and contemporary food and fuel practices, the continuities and changes in the cultural patterning of food and fuel use. While modern methods of applying energy to foods may be more efficient, the traditional methods are always more evocative, as the

following description, spoken to us by an eloquent Appalachian woman, attests:

> Springhouses had a smell all their own; there was the smell of buttermilk and the -- and the smell of the water. Uh, some of them had a minty smell, because a lot of them had mint growing around them, and the smell of rotting wood, and they always had the biggest, blackest, fuzziest spiders in them that you ever saw. And there was, uh, the light shown on our -- our springhouse was down under a hill, and it had, uh, rhododendron, mountain laurel bushes back of it, and it sort of leaned over the side, and the spring was in front. And you could go down the hill, and under that -- under the edge of the shade tree, there was a great big spider stayed most of the time, and as you went down there, you could see if that spider was there or not, by his eyes glittering in the reflected light.

Somehow I can't imagine her ever remembering her energy-efficient refrigerator-freezer in quite the same way.

VIII. Trends In Food Habits Related To Energy Use

by

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Trends in Food Habits Related to Energy Use

Total energy use in the United States is down. In the years 1950-1972, total energy consumption was rising at the rate of 3.6 percent annually. The demand for electricity, based on industry-wide figures, was increasing at an average of 8 percent per year. In the seven years between 1973-80, the total energy consumption had an average annual growth of only one-fifth of the 1950-1972 average. Electric industry sales have also fallen dramatically - to just under three percent (3%) per year. Increased public awareness of a need to conserve has had its effect, but much of the reduction has probably been the direct results of higher prices for energy.

Unfortunately, in developed countries the food cycle is very directly tied to energy use. We readily recognize the obvious energy use in running tractors and combines to till and harvest. These are essentially petroleum fueled. Let's also consider other energy consumed...in the factories that make farm machinery...the plants that produce agricultural chemicals...for irrigation of crops...for crop drying or refrigeration necessary after harvest.

Energy is consumed in cleaning, refining, milling, packaging, transporting, storing and cooking food. We have yet to mention the research laboratories, and factories that make ranges, refrigerators or pots and pans. All these consume energy. Actual-

ly, as much as 80 percent of the energy used in food production occurs after the food is harvested.

As the rising costs of energy are reflected in higher food costs, the American consumer has reacted in various ways. Surveys done by Better Homes and Gardens, Ladies Home Journal, Supermarket News, Women's Day, Benton and Bowles, and others have revealed similar trends. Shoppers are

-Giving less loyalty to a single brand,
-Purchasing more brands termed "acceptable,"
-Redeeming more coupons,
-Shopping for sales,
-Buying generic products,
-Using more leftovers,
-Using shopping lists more,
-Doing less "impulse buying,"
-And choosing alternatives to expensive beef cuts, such as poultry, hamburger, fish, cheese, and eggs.

These changes were "primarily due to inflation of food costs" according to explanations given by respondents. However, this inflation of food costs is directly related to energy costs. When the latest (1978) National Household Menu Census, conducted by the Market Research Corporation of America, is compared with the 1968 and 1972 National Household Menu censuses, interesting trends emerge:

-The quantity of food consumed at home is declining and the serving of meals of smaller size and less variety may also be a trend.

-Although "away from home eating" increased by 50 percent between 1963 and 1978 (a 15 year period), a recent report by NPD Research revealed that in both 1979 and 1980, restaurant traffic decreased.

This tendency toward a reversal of the previous trend of eating out may be because of rising fuel prices and general inflation. Thus, a return to eating at home may become a long term trend.

-When eating at home, there is a trend toward two distinct types of meals - an instant meal (e.g., "Heat before serving," "Add boiling water" or "Open a box" type) - or - a self-prepared meal consisting of "made from scratch" foods. Appliances and equipment indicating more home preparation of food, such as food processors and pasta makers, have sold well. However, some home preparation may be due to a social influence (e.g., "returning to crafts") rather than to an actual energy saving measure.

-Consumption of main dishes which combine protein foods and starches and/or vegetables is higher. This relates back to the type of shopping done to avoid the higher priced beef cuts.

Additionally, many Americans have responded to rising food costs with garden shovels and freezer bags. This trend is indicated through a comparison of the Nationwide Food Consumption Survey conducted in 1977 by USDA with a similar survey made in 1965. In 1977, one out of two surveyed households produced food at home compared to one out of three households in 1965. Most of the food production was related to vegetable gardens.

In the 12 years between surveys, home food production by various income levels shifted considerably. In the 1977 survey, the higher income households were more likely to produce food for home use. Higher food costs may have motivated the higher income households and their larger incomes would make garden costs (land, tools, fertilizer) more affordable. In the lowest income levels, there was actually an 8 percent decrease in home food

production. Availability of food stamps and other forms of help have made the lowest income family less dependent on home food production in recent years.

Additionally, a comparison of the two surveys indicates that the increasing number of households producing food was accompanied by a major portion of homes reporting home freezing of foods (from 24 percent in 1965 to 55 percent in 1977). The number of households where food was canned remained the same (at 35 percent) both years. In 1965, more middle income families were preserving food by freezing it. In 1977, the number of households reporting freezing of foods increased as income increased.

Additional support for an increase in owning freezers comes from two recent surveys. One survey in Merchandising magazine indicates that 33 percent of the households own a freezer. In this survey, the "typical" shopper interviewed was a woman representing the most affluent family. She lived in a city in an east North Central state, was a college graduate, was about 34 years old and had one child. She probably had a job and family income was between $20,000 and $25,000.

The second survey, drawn from a random sample of customers in the Appalachian Power Company territory in 1980, revealed that 40.1 percent of our customers own one freezer and 3.3 percent own two or more freezers (actually 47.2 freezers per 100 customers were reported). This high freezer ownership is probably related to the fact that this company serves a rather rural territory where home food production is a way of life.

In asking about other energy needs, our survey showed that food is still cooked in traditional ways with little change over several years: 75.3 percent of our customers own an electric range; 22.5 percent of our customers own a gas range; 1.5 percent of our customers cook with "other" methods; 10.2 percent own a microwave oven.

In comparison, the Merchandising magazine survey indicated that 24.9 percent of the households own a microwave oven.* Additionally, the survey by Merchandising reveals that ownership of small appliances, most often advertised as energy savers, has increased. Further, the responses indicate that 46.5 percent own a slowcooker, 54.3 percent own an electric skillet, 36.6 percent own a toaster oven, and 8.3 percent own a convection oven.

These four appliances listed above are the ones most often advertised as energy saving. According to the Merchanising survey, the majority were purchased in years when the trends to conservation have been greatest, in the years 1978-1979 and 1980.

So far we have discussed facts and figures. What conclusions are we to draw from them? It would appear that even the more affluent American family is reacting to the rising cost of food...which is tied to the rising cost of energy...in several ways: food purchasing habits are changing; the type of food served is changing; and efforts to preserve and cook the food are being modified as well.

*Although this appliance is often marketed as an energy saver, I believe it is bought as a human energy saver rather than a saver of electricity.

IX. How Appropriate Is Appropriate Technology at the Household Level: Slide Presentation Sources

by

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How Appropriate is Appropriate Technology at the Household Level?

A slide presentation (30 min.)
by
Leena M. Kirjavainen

Part I: Introduction to a Rural Village in Tanzania (housing, home interiors, facilities, cooking places, household utensils and equipment, overall living environment). Visuals from the village and town market, as a learning resource base on available ingenious appropriate village technologies (cooking stoves, utensils, etc.).

Part II: A slide set: "Village Technology" by UNICEF* illustrating the Karen Research Center on Village Technology, Nairobi, Kenya. The slide presentation demonstrates experiments of improved traditional technologies on:

A. Low-cost food production, storage and use of nutritious foods.

B. Availability of clean water.

C. Conservation of energy and the environment.

D. Improvement of home conditions.

Part III: Examples of the Training Programs and Facilities in Agricultural Home Economics, at the Uyole Agricultural Center, Mbeya, Tanzania. Development of a teaching curriculum with 40% in agricultural and 60% in home economics subjects (including food storage, processing and preservation). Construction of the "open-air" outdoor training kitchen and model rural home management house as more appropriate training facilities for the local environment.

Part IV: A Slide Set: Outdoor Institutional Kitchen, showing how charcoal is used as major fuel when preparing foods for students' catering services. Problems encountered in transport, storage and use of charcoal and in the maintenance of institutional kitchen equipment and facilities.

* "Village Technology" slide set and information kit is available from the U.S. Committee for UNICEF, 331 East 38th Street, New York 10016.

X. An Economist's Approach to Fuelwood Production and Use

by

Samuel A. Hale, President
Energy Development International, Washington, DC

An Economist's Approach to Fuelwood Production and Use

I appreciate having the opportunity to participate with you today. Exclusively, our company, Energy/Development International, does energy work in developing countries. In such places as the Sudan, Kenya, Somalia, Indonesia, West Africa, and the Caribbean, we have projects which started out as energy projects and have become cooking projects, local tree planting projects, and other kinds of projects. I think Marilyn Hoskins felt that as a male-dominated company, it was time that we received a little education. Thus, the primary reason I am here is to listen rather than to speak.

The title of the talk is supposed to be, "An Economist Looks at Fuelwood Production and Use." However, before addressing fuelwood production and use, I would like to make a few points about economics. My first thesis is that, in the kinds of areas which we've been discussing today, you cannot separate economics from the rest of the social sciences, particularly those that concern individual and social behavior. At too many times in project designs concerning fuelwood production and cook stoves, economists don't include adequate concern for how people actually behave. Donors and governments too often try to reduce everything to numbers that are inappropriate and misleading. They imply that somehow if you can achieve those numbers, you have achieved your goals, when in fact what is required is individual actions of a lot of people at the local level -- actions over

which donor or government have little influence. The other point, though, is that if you look at economic parameters, which I'll spend a few minutes doing, it may give you some clues as to what is likely to work or not work and why. In particular, when one looks at various participants' economic incentives, one finds a major difference between how the individual at the local level views things, and how donors, governments and the people designing big projects tend to think that local people are going to behave.

Before summarizing some overall fuelwood trends as we see them, I would add at the outset that there is very inadequate data on many of the factors that are needed to make decisions. For example, we may not have information about production of fuelwood, the consumption of energy, the ownership of land and who has rights to the land. In fact, despite the work of the FAO and others, there has been little work on even measuring rates of deforestation. From people who have been in Africa or Asia for years, there comes much anecdotal evidence and many impressions which lead us to believe that the problem is getting worse. However, when it comes to really being able to quantify what is happening, we are not very well off at all. Then, when you get to the operational aspects you need to know, such as land tenure, quantification is even more difficult.

As to the problem of fuelwood production and use, a particular thing that I would like to stress along with the other speakers, is that I believe that deforestation is not just, or even

primarily, a fuelwood problem, but a loss of Africa's and Asia's agricultural base. Yet, again, we're only beginning to have any kind of information that deals with the chain of cause and effect related to deforestation. That does not mean it's not a problem. I think it is very obvious for people who have been in Africa, or parts of Asia or Latin America, that the soil erosion problem is very serious. However, the information has not caught up with our perception of the problem. (Chart I)

One of the problems with the information we have is that the nature of the problem varies widely even within a relatively small region. For example, Dr. Tinker stated that the consensus at the U.N. Nairobi conference was that the major cause for deforestation is clearing land for agriculture because of the pressure from landless peasants to move on to ever more marginal lands. That is generally true. On the other hand, in Kenya we find many areas where that does not seem to be the problem. Rather, as soon as a rural road is put in, people come in to produce charcoal for sale in Nairobi and do not use the land for agriculture at all. In short, generalizations are risky.

A second problem, from an economic point of view, is that the individuals being asked to act often do not reap many of the benefits of such action. The classic case is the World Bank's major program in reforestation of the foothills of the Himalayas, the major purpose of which is to avoid long term flooding in the Ganges Delta. There, the major benefits of the program occur in regions far removed from the people that are being asked to plant

CHART I

FUELWOOD/BIOMASS:
SOME PLANNING CONSIDERATIONS

- Poor Data on Production, Consumption, Land Tenure, Etc.

- Lack of Information on Impacts of Deforestation or Diversion of Crop/Animal Wastes
  - o Soil Erosion
  - o Siltation -- Water, Power Impacts
  - o Wildlife, Tourism

- Local/Regional Nature of Problems and Solutions (Production, Processing, Use) -- Largely Individual Decisions, Limited Government Leverage

- Individual Cannot Capture Many Benefits of Afforestation or Efficiency Improvement

- Income/Employment Impacts of Many Policy Options
  - o Subsistence Agriculture/Shifting Cultivation
  - o Charcoal, Cookstove Employment

- Temptation to View as Less Immediate than Two Major Commercial Energy Problems:
  - o Oil Import Bill
  - o Reliability of Electricity Supply

the trees, to maintain the trees, and to give up time from other pursuits.

Third, policy options related to deforestation obviously have income and employment impacts. Governments' first instinct seems to be to protect government forests. Aside from the fact that this has not worked very well, it also has implications for subsistence agriculture and the landless peasants that put the pressure on so-called endangered forests in the first place. Another example: many government officials in Kenya want to move into large industrial scale charcoal production, despite the fact that traditional charcoal production -- which admittedly is very inefficient -- is the largest source of non-agricultural employment in most rural areas of Kenya where there is wood. These are but a few examples of obvious impacts.

Also, we find almost universally that the governments, unlike most donors and us, do not look at fuelwood and deforestation as being such a major problem. Although they think it is a serious problem, they tend to devote much more time to the commercial energy problems for a number of reasons. Commercial problems are where governments get political pressure. Doing something about fuelwood tends to be more postponable. Also, it is inherently more difficult to have an impact on deforestation because instead of reaching a few places in the system, you have to reach down virtually to every individual. Just from an organizational standpoint, many more people are involved in wood than are involved in other types of energy, and few governments in de-

veloping countries have been very successful at mobilizing great numbers of local people. So, for a lot of reasons we find that rhetoric and general concern about the problem notwithstanding, the president and the chief ministers tend to be concerned about commercial energy, not cooking energy or wood. Unfortunately, there seem to be few exceptions to this pattern.

Other trends also are evident. Prices of both fuelwood and charcoal appear to be going up dramatically in most areas, although price levels themselves vary widely from region to region. Distances involved in collecting firewood seem to be increasing in many areas; but again, as we discussed this morning, it is hard to generalize. In an increasing number of regions, firewood seems to be moving from a traditional free good to a marketable, sellable good. On the one hand, this trend is producing rural income; but, on the other hand, unlike before, it is costing money. In many areas, including rural areas, there is evidence of a quickening shift from wood to charcoal. At the same time we are also finding that the distance you can go before it pays to convert to charcoal rather than transport wood may be much greater than we thought it was. Finally, in a few areas, notably the Caribbean, there is some movement from charcoal to commercial fuel, though one would expect such shifting to be substantially less than it was before 1974. (Charts II & III)

Escalating rates of deforestation are things that all of us notice visibly in many areas. Although deforestation trends have not really been well documented, there are at least two particu-

CHART II

FIREWOOD TRENDS

(Caveat: Highly Site-Specific)

Increasing distance of firewood from consumers, decreasing ability to be selective

Trend in some areas to monetization

Where wood over 10-15 kilometers away, consumption decreases

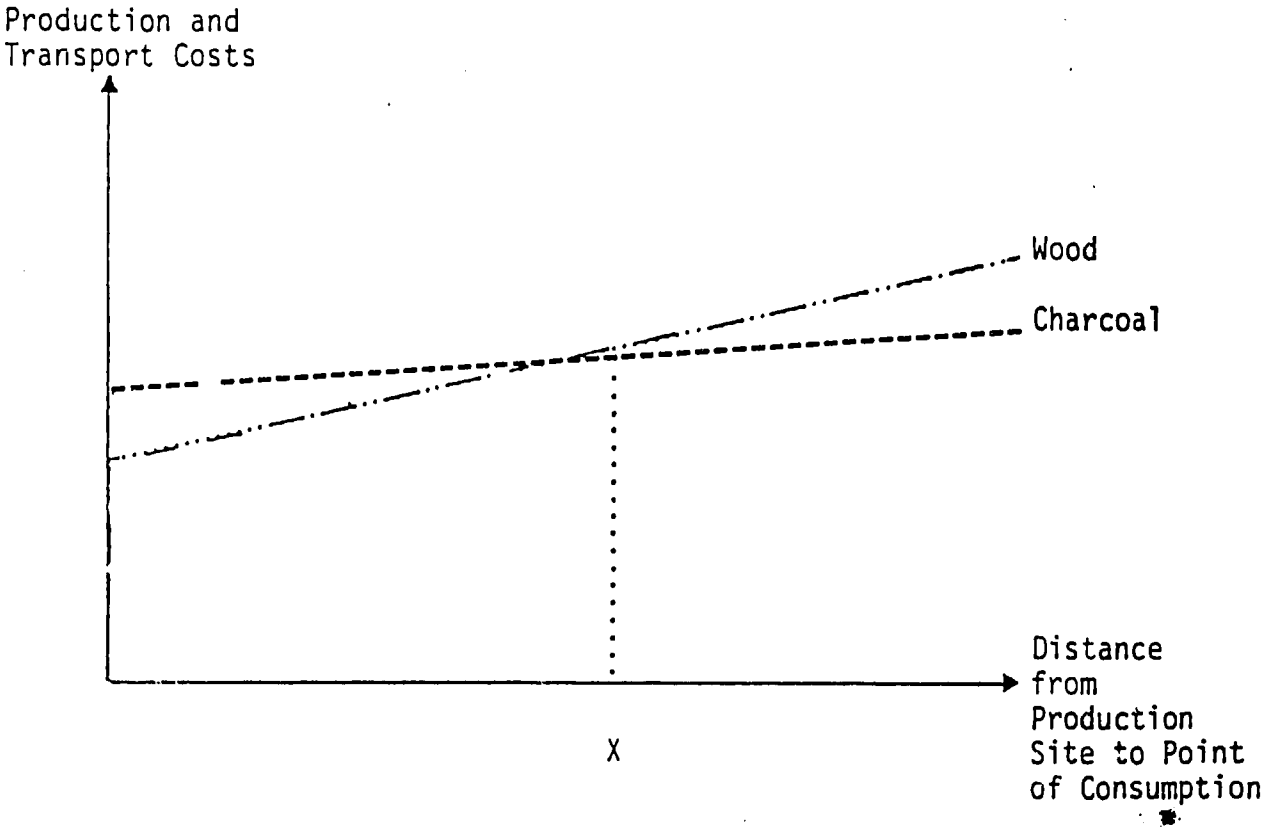
- Switch to crop residues, dung, etc. (households and industries)
- Fewer hot meals
- Switch to food requiring less cooking

Isolated efforts:

- Plant trees (not necessarily maintain them)
- Improve cooking efficiency in other than traditional ways

CHART III

FIREWOOD VS. CHARCOAL COSTS
AS FUNCTION OF TRANSPORT DISTANCE



lar areas where deforestation is very clear. One is the increasing sign of deforestation around cities, towns and villages. The second, which has been discussed less, is deforestation on marginal land, that is, the process where because of increased population on agriculture land, the poorer and less powerful rural groups are pushed to clear even more marginal lands. Examples include steep slopes and fragile semi-arid land which should not be used for agriculture because it is difficult to get anything to grow. The result of these movements will be more serious environmentally than if those lands were left in natural forest. In addition, the consequences may include accelerated watershed degradation, loss of agricultural production, accelerated siltation of waterways, and so forth. On the other hand, the political and social pressures to continue such land clearing are substantial. (Chart IV)

And finally we believe, although we cannot prove, that heightened competition for limited fuelwood sources is likely - not only competition from urban household purchases of wood and charcoal, but also from commercial and industrial fuelwood users -- tea and tobacco plantations, brick kilns, and the like -- which we have found to be increasing at a rapid rate. Although this is pure conjecture, our suspicion is that the money making users are likely to squeeze out the nonmoney making users. Thus, it appears that for a variety of reasons, there is going to be more pressure for what was previously free firewood collection. Because most of the money making users tend to be male and the

CHART IV

TYPICAL FUTURE "NO-ACTION" SCENARIOS

- Continued increase in:
  - o Charcoal prices
  - o Firewood collection distances

- Gradual shift from:
  - o "Free" to monetized f[illegible]
  - o Firewood to charcoal
  - o Charcoal to commercial fuels

- Escalating rates of deforestation:
  - o Around cities/towns/villages
  - o On marginal lands (slopes, arid lands, etc.)

- Accelerated watershed degradation, loss of agricultural production base

- Urban-rural competition for limited fuelwood sources

nonmoney making users are female, this has implications for the role of and the burden on women, especially poor rural women.

There is some evidence that industrial reaction to prospective fuelwood shortages may be more pronounced. The Beijer Institute, which has been doing a detailed fuelwood survey in Kenya, is finding that most so-called cottage industry, blacksmithing, tinsmithing, local brewing and a few others, use little or no inanimate energy. Thus, most so-called cottage industry is purely artisan and thus uses little or no fuelwood. At least in Kenya, most industrial fuelwood use is by larger-scale industry. Those industries may involve local small holders - for example, as much tea and tobacco production does in Kenya - but they still involve organizations which are large and sophisticated enough to both worry about and do something about problems of fuelwood supply. Thus, for example, a number of Kenyan tea and tobacco plantations or cooperatives are either growing their own fuelwood or fostering an active small farmer network from which they purchase wood. Some of the biggest plantation managers will now no longer take tea or tobacco from a small farmer unless that small farmer also brings the wood that is necessary to cure the product. This is a vast change from even two years ago. (Charts V & VI)

Another viewpoint can be gained from looking at household reactions to problems of higher fuelwood prices and lengthened collection distances. Reactions have included using dung or agricultural residues and having fewer hot meals and meals that require less cooking. There have been some efforts to either plant

CHART V

HOUSEHOLD VERSUS NON-HOUSEHOLD USES
AS PERCENTAGE OF TOTAL FUELWOOD CONSUMPTION

Country	Households	Cottage Industry	Industrial and Service Sectors
N. Nigeria	75		25
Gambia	85	7	8
rural	(85)	(9)	(6)
urban	(83)	(-)	(17)
Sudan	98		2
Tanzania	93		7
Thailand	84	7	9
rural	(89)	(7)	(4)
urban	(74)	(8)	(18)

Source: Openshaw, "Woodfuel -- A Time for Reassessment," Natural Resources Forum 3 (1978), p. 41

CHART VI

FIREWOOD PURCHASES
AS PERCENT OF TOTAL INCOME

	Up to:
Ouagadougou, Upper Volta	30%
Niamey, Niger	25%
Highlands of Korea	15%
Andean plateau	25%

trees or to improve cooking efficiency with the traditional three-stone stove. There also have been extensive efforts to introduce Lorena or other improved stoves, most of which require both learning a new stove construction/maintenance technology and changing cooking habits. Improvements to traditional cooking methods largely have been unexplored. We are seeing where the introduced stoves are doing poorly, that people are returning to and investigating other approaches. So far, AID and other donors have concentrated on high-mass owner-built mud or clay stoves, such as the Lorena stove. However, there is increasing attention to improvement in designs for low-mass charcoal stoves. Interestingly, the charcoal stoves now used in most of Africa originally came from Asia, and some of the stoves being investigated as possible replacements also come from Asia. Particularly, there has been a very active movement to take improved Thailand stoves and introduce them to Tanzania, Kenya, and elsewhere in East Africa, rather than trying to implement with a vast extension network and get people, one-by-one, to build their stoves.[1] These efforts to distribute improved charcoal stoves tend to concentrate on people who make stoves now, sell those stoves, and presumably have a stake in making and selling a stove which would achieve better acceptance in the market. (Charts VII & VIII)

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[1] This network requires not only getting them to change their cooking practices, but also requires them to learn a new artisan skill.

CHART VII

COOKSTOVE ISSUES

- INCENTIVES TO ADOPT IMPROVED COOKSTOVES

  - o Owner-Built Stove: 20-50 Hours to Construct
    Perceived Risks (Inconvenience vs. Time Savings, 100-300 HRS/YR)

  - o Purchased Stove: 50¢-$5 (More for Lorena)
    Payback Less than One Month

  - o Invest Money to Save Time?

- MALE-FEMALE ROLES

- INSTITUTIONAL ABILITY TO REACH COOKSTOVE USERS

  - o Marketed Stoves: Network Already Exists, at Least for Charcoal

  - o Owner-Built Stoves: Extension-Intensive (West Africa)

- EMPLOYMENT AND OTHER ASPECTS

CHART VIII

COOKSTOVES

TRADITIONAL STOVES (THREE-STONE, CHULA, JIKO, ETC.):

- o Wide Variation in Efficiency Estimates (3-5% vs. 18% in Lab)
- o Highly Dependent Upon Cooking Practices

BROAD ALTERNATIVES:

(1) MARKETED STOVES (LOW-MASS)

- o Improved Metal Charcoal Stoves (Kenya)
- o Pottery or Pottery-Metal Stoves (Asia, Tanzania)
- o Metal/Pottery Stoves for Firewood (Ethiopia)

(2) OWNER-BUILT STOVES (HIGH-MASS)

- o Lorena-Type Stoves (Central America, Africa)
- o Improved Chulas, Other Designs

(3) SIMPLE MODIFICATIONS

- o Sealing/Saving Charcoal
- o Sealing Pot Holes
- o Horseshoe Alcove
- o Dampers, Air Vents, Baffles (Chula)
- o Pre-Drying Wood

As I mentioned, the other option that has been given little consideration is simple modifications to existing stoves. Examples include saving partially burned charcoal in a sealed tin can, sealing up the pot holes, simple alcoves around a three-stone fire, dampers perhaps, pre-dried wood, and probably most important, processing the food first, whether it's soaking beans overnight, or simple grinding. Thus, rather than just concentrating on the stove, we are beginning to perceive that we should broaden our thinking to the whole area of cooking practices.

There is one other thing I would like to mention about stoves. When you go out to survey how people use stoves, you find that they use them for a lot of things. Sometimes they want a pot to boil fast, other times they want it to simmer slowly. They use three-stone stoves for heat, for light, for drying the thatch on the roof, for drying or curing food and for keeping insects away. In short, the traditional stove has a broad range of purposes, as well as some bad side effects, particularly smoke burning your eyes over time. Almost all the work on more efficient stoves is concentrated on only one of the first two parameters -- either to boil faster or to simmer more slowly and more efficiently -- and even those two tend to be mutually exclusive. If you do one, it is very difficult to do the other. Most "improved" stoves involve giving up at least some of the other benefits. From this point of view, it is fairly obvious why such stoves have not been adopted.

Another example of improved stoves not meeting user's basic design criteria is the very heavily insulated charcoal stove, a number of which were demonstrated at the U.N. Conference in Nairobi. Tests indicate that such a stove does consume less charcoal per meal. However, early designs were so heavy that they could barely be lifted. Also, costs of these designs were about ten times that of the traditional charcoal stove. Now gradually, with more design work and greater interaction between users and stovemakers, much more appropriate stoves are evolving.

Since the title is "An Economists Looks...," I feel obligated to again add something related to economics. So...what are the incentives to adopt and improve cookstoves? If you look at the owner-built Lorena-type stove from a purely economic point of view as a prospective user, it looks like a terrific thing. It does not take terribly long to learn how to build one, and projected time savings in the first year are much higher than construction time. Yet, despite substantial demonstration and extension effort, virtually nobody has picked them up. Similarly, one could pay more than ten times present prices for a charcoal stove and the charcoal cost savings would be so great that this investment could pay for itself in a few months. Again, however, there has hardly been a mad rush for improved artisan-made stoves. Consider, for instance, if in order to save time collecting fuelwood, are people willing to pay now for a stove that was free before? That is, at what rate are the rural poor willing to trade time for money or vice vesa? Nobody really

knows. Neither do they know enough about male/female roles. There has been little experience to indicate that a male household member is willing to build an improved stove so that the female (who collects the firewood) can save time.

Finally, a very important issue is the institutional ability to reach cookstove users. Even if we had an owner-built stove that we felt was terrific and knew people would use, fostering use for the owner-built stove is highly extension-intensive. In fact, it may take more hours of extension work per stove than it takes to build a stove. At a time when most people feel that the extension networks in most of Africa already are overburdened, could the extension network really manage under the kind of strain that it would take to get owner-built stoves adopted on a large scale? Where would the money for such an extension effort come from?

Now I'd like to turn to alternative fuelwood production systems. First of all, there are a lot of ways to approach the problem of imbalance of fuelwood production and consumption. Most plantations in Africa produce only saw timber or pulp wood and use perhaps only 25-30 percent of each harvested tree. More efficient management would arise if charcoal or fuelwood were produced with other products. Countries that have done this are able to use 75-85 percent of the tree. This can have an immediate impact with what appears to be minimal environmental costs, assuming some leaf litter and other biomass is left on the land. (Chart IX)

CHART IX

ALTERNATIVE FUELWOOD PRODUCTION SYSTEMS

- MULTIPLE-PRODUCT PLANTATION MANAGEMENT (MALAWI, KENYA)
- FUELWOOD PLANTATIONS (INDIA, PHILIPPINES)
- INTEGRATED WATERSHED MANAGEMENT PROJECTS (SRI LANKA; KANDI WATERSHED, INDIA; PANJABANGAN AND MAGAT WATERSHEDS, PHILIPPINES)
- VILLAGE/COMMUNAL WOODLOTS (SOUTH KOREA, CHINA, INDONESIA, ETHIOPIA)
- PRIVATE FUELWOOD PRODUCTION (ETHIOPIA)
- AGROFORESTRY APPROACHES
  - o Taungya Systems (Asia, E. Africa)
  - o Traditional Integration of Trees into Agriculture or Animal Husbandry
  - o Introduced Agroforestry:
    - -Tree-fodder crops (India)
    - -Mixed tree-fodder and field crops (IITA, Rwanda)

Fuelwood plantations are another option. The World Bank is investing in very large-scale integrated watershed management projects which produce major fuelwood components. Village wood lots have been tried with mixed success. In a few areas, fuelwood is grown by small farmers as a cash crop. In Ethiopia, for example, eucalyptus has long been a cash crop for sale to Addis Ababa urban fuelwood users. Trees have been grown on a sustained yield basis much the way an agriculture crop is. Finally, there are many agroforestry approaches. One example is the taungya system in East Africa, the so-called three-tier system where, for example, you have tall trees, like date palms, then perhaps small fruit trees or cocoa, and then group crops. The traditional use of fodder tree pods for livestock is another example.

The point I want to make is that most of these approaches require individual initiative at the local level. The government, the World Bank, or AID can propose and fund all of the projects they want. But, if somebody does not plant the tree and maintain the tree at the local level, development is not going to happen. That is obviously true with agroforestry, individual farmers' fuelwood production, village or communal woodlots, and also in virtually all of the World Bank watershed management projects. Even at government fuelwood plantations, experience around the world suggests that extra incentives get the people in the plantations to care for the trees. (Chart X)

CHART X

AFFORESTATION: NECESSARY CONDITIONS

- LAND AND WATER

- GERMPLASM OF APPROPRIATE SPECIES

- SEEDLINGS DELIVERED AT APPROPRIATE TIMES
  - o Nursery Network or Backyard Nurseries
  - o Delivery System

- TIMELY LAND PREPARATION, PLANTING

- POST-PLANTING MAINTENANCE
  - o Technical Information/Assistance

NCENTIVES

- o Who Benefits from Establishment and Maintenance
- o Time Distribution of Costs vs. Benefits
- o Where Monetized, Confidence in Marketing and Distribution System

AFFORESTATION CONSTRAINTS

- VILLAGE/FARMER INCENTIVES TO

- INSTITUTIONAL CAPABILITY
  - o Species Selection
  - o Nurseries/Direct Seeding
  - o Extension Services
  - o Marketing/Distribution

- CAPITAL AVAILABILITY

- LAND AVAILABILITY/SUITABILITY

The FAO and others (such as CILSS), who have conducted country-by-country surveys in Africa assume that, in order to get wood supply and demand in balance, you have to increase the planting rate by somewhere between 20 and 50 times the present level in most countries. Again, I would caution that since adequate data on neither production nor consumption exist, these numbers are a little suspect. Nonetheless, the point is that whatever the real number is, most countries are far below where they need to be. I would argue that it is not primarily because there's not enough money for forestry, although it is true that there's got to be more money. On the contrary, if you assume organizations will continue to use the dissemination models they are now using, many people feel that there is so much World Bank, AID, and other funding now going into forestry, that you simply could not move much faster.

So what is stopping it? First of all, villagers and farmers lack incentives to act. Most of the economic analysis that we've done -- and I am not going into numbers, because they are very site specific -- is concerned with very traditional economic measures, that is, what is the internal rate of return, how sensitive is the return to various assumptions, what are the scarce resources? We try to estimate these measures on the various levels of decision making to differentiate how an individual villager or farmer perceives the situation from how the government or donors perceive it. It becomes very obvious that these actors' perception and incentives are quite different.

Also, you really have to differentiate between actors at the local level, particularly if you are talking about village woodlots. For example, the village male elders typically make the decision about whether there is going to be a local woodlot, who's going to get the benefits, etc. The women in the village, who bear most of the burden of collecting firewood, may have no say whatsoever. You really need to get down to that kind of level.

Let me just take a couple of interesting cases, based on work that Asif Shaikh of our company did in Mali. AID had a number of small fuelwood projects and rural reforestation projects in Mali. They wanted to somehow jump from those to a major nationwide effort. There was a suspicion that the projects they had were not working very well. Nobody had looked in any detail at what they were costing per hectare or how much money or other scarce resources (such as forestry extension staff) would be required to apply the project model on a significant national scale. What we did was to go in, take various kinds of models -- particularly in village wood lots and agroforestry systems -- and we tried to analyze all of the inputs: the person's labor (peak or off-peak), the land and so forth. Examples of questions we asked were: if they spent their labor on something else, what were they displacing, and if they took land away from agriculture, how much would they have made if they had produced a cash crop. We assigned a value to the outputs. We did this from two or three different perspectives: the investors at the village

level (that is, a micro-social perspective), the national government's perspective, and, where significantly different, the donors' perspective. We also addressed issues of project efficiency, use of scarce resources, and other large-scale implementation issues.

Our findings are both obvious and important. First of all, from the local investor's point of view, virtually everything we examined did not pay each farmer. Lack of financial benefit was particularly true of village woodlots, even if you assume they worked (which, as Marilyn Hoskins has shown time and time again, is an issue itself). Even if you very clearly work out who is going to get the benefits and who is going to incur the costs and even if you assume there is only one person in that community who bears all the costs and reaps all the benefits, it does not pay him or her to do it. The benefits are less than what he or she gives up in terms of peak labor effort and other inputs.

Agroforestry potentially could pay for the individual farmer -- in fact, could have a nice return. The problem is that the cost is extremely certain and the benefits uncertain. You ask the farmer to give up 5 percent of his or her land, a certain amount of labor, and other inputs for benefits about which farmers are skeptical. That is, if you took 5 percent of the land and planted trees to stop soil erosion, would it really stop soil erosion? Is anything going to happen differently? What are going to be the outputs of these trees?

From our and others' surveys of farmers, it is clear that the thing on which they economize the most is peak season labor. Farmers generally are unwilling to take virtually any labor -- male, female, or child -- out of the agricultural cycle during the peak season. Since a tree requires nurturing at the same time as agricultural projects do, the farmers therefore are hesitant. Also, one must address the whole question about who the beneficiaries are and who bears the cost. For example, in most cases at the local level, if the problem is soil erosion on slopes, the farmers that are planting the trees are not going to get most of the benefits because a lot of the benefits are going to those farther down the slopes or in the valley. Within the village, the people that make decisions about land -- mostly male -- are not usually the ones to benefit from the fuelwood -- mostly female. Those are some of the issues at which you have to look in the future.

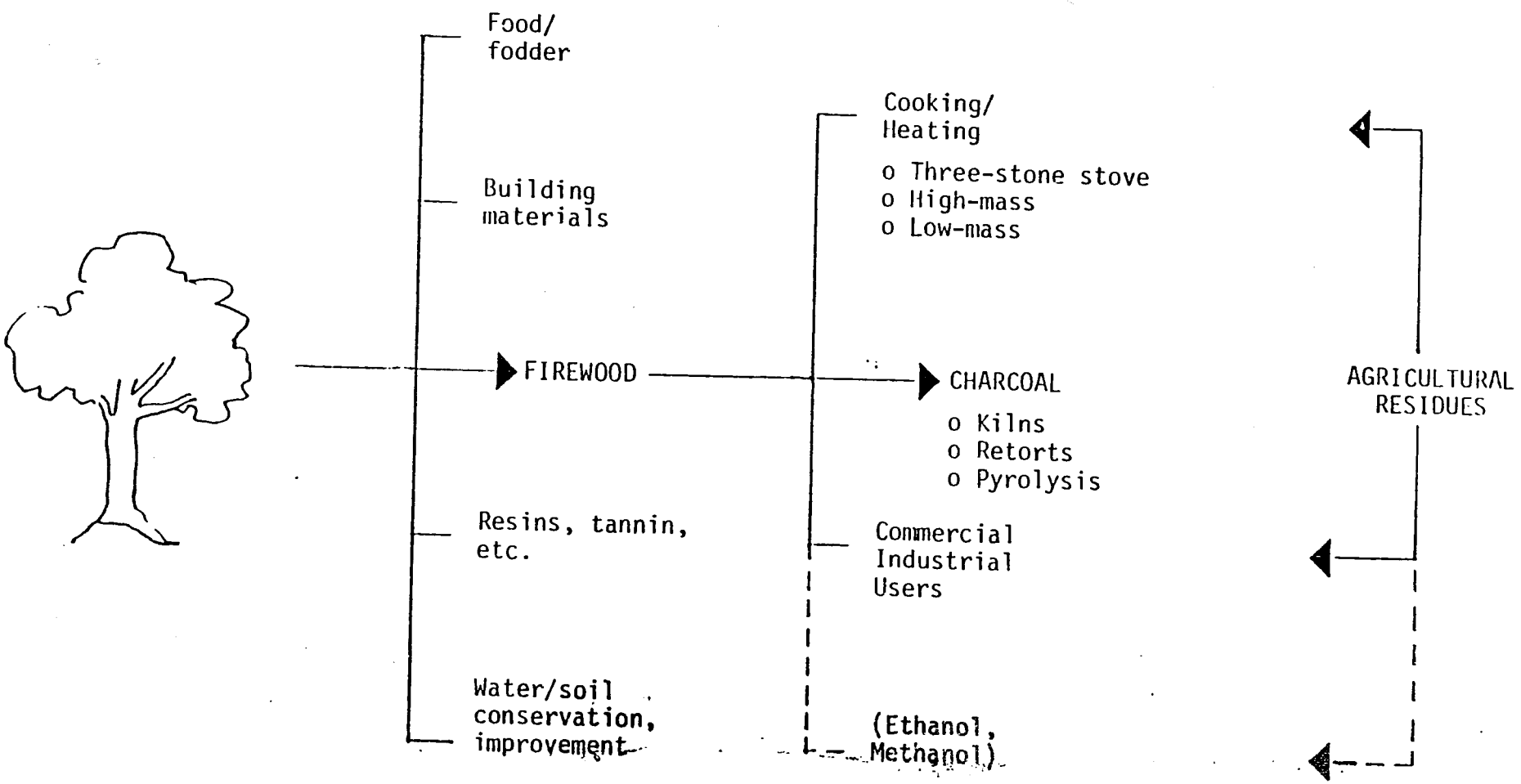
We in the West tend to think of a tree as producing fuelwood. However, this is only one product from the tree. The people in Africa or Asia tend to think of a tree as producing a whole range of outputs, of which firewood perhaps is the most important to the male, who in most cultures has the most influence over how land is to be used. Food and fodder from fruit trees, particularly as a potential cash crop, are much more highly valued by the males, at least in those cultures where the men are likely to get the income of whatever is sold. Building materials, firewood, rosins, tannin, medicinal herbs, leaves, and

so forth are also valued products. In Mali and elsewhere, a benefit that the country and our consultants may value highly, but which farmers were very skeptical about, is the water and soil conservation effect of planting trees. These kinds of findings lead us toward trees that can accomplish multiple purposes. If you look not at exotic (introduced) species, but at trees that are used locally, you find that most of them produce a number of outputs and that the tree itself is used very efficiently. Local people will use everything from the leaves to the bark, and in some cases even the roots. Certainly, the internal parts of the trees are used. Most such trees produce some kind of food or fodder in addition to other products. (Chart XI)

A notable thing about these indigenous species is that you seldom find them in government nurseries. For example, we went to one of the largest and best-run government nurseries in one African country and found basically highland plantation trees. Meanwhile, a prolific indigenous tree with big seed balls surrounded the nursery. The nursery staff complained about this tree because it drops its seeds all over the nursery. Well, it turns out that when you visit the farmers throughout the region, this tree is used by virtually all of them. It is very tall and straight with a crown that lets in a lot of light so that they can grow crops directly under it. It also produces fodder for their animals and other products used for cooking. Meanwhile, the nurseries were essentially clearing away the seeds and considering them a nuisance. This is perhaps an extreme example of ignoring local resources, but certainly not an isolated one.

CHART XI

MULTIPLE USES OF TREES



Now let me turn quickly to charcoal, as we talked some about charcoal this morning. I think it is clear that, in many developing countries, charcoal production and consumption are on the increase because wood around the major urban consuming areas has been stripped. People are continuing to come into the urban areas, yet have to go further for fuelwood. This begins to create essentially a cash crop opportunity. The distribution system varies widely by country, but a typical case is described below. Rural men or women, depending on the region, go in to harvest fuelwood from public forests, largely using hand tools, although the use of handtools could begin to change. They are, then, harvesting wood off land that they do not own, which is an important point to which I shall return. Most of the actual coking -- that is, charcoal production -- tends to be very small, dispersed, and low cost. People spend virtually no money making earthy or pit kilns. Thus, it is a heavily undercapitalized and very traditional production. On the other hand, what happens after the coking often is highly organized and, coincidentally, often well connected with high government officials. Often there are a few highly organized, generally politically powerful people or companies which control the distribution channels. Then after delivery to the main distribution points, the marketing system spreads out again. In some cases, as for example, in the Sudan, these distributors actually subcontract with the producers and provide them the capital and equipment to produce charcoal in slightly more efficient kilns. In most cases, however, there is

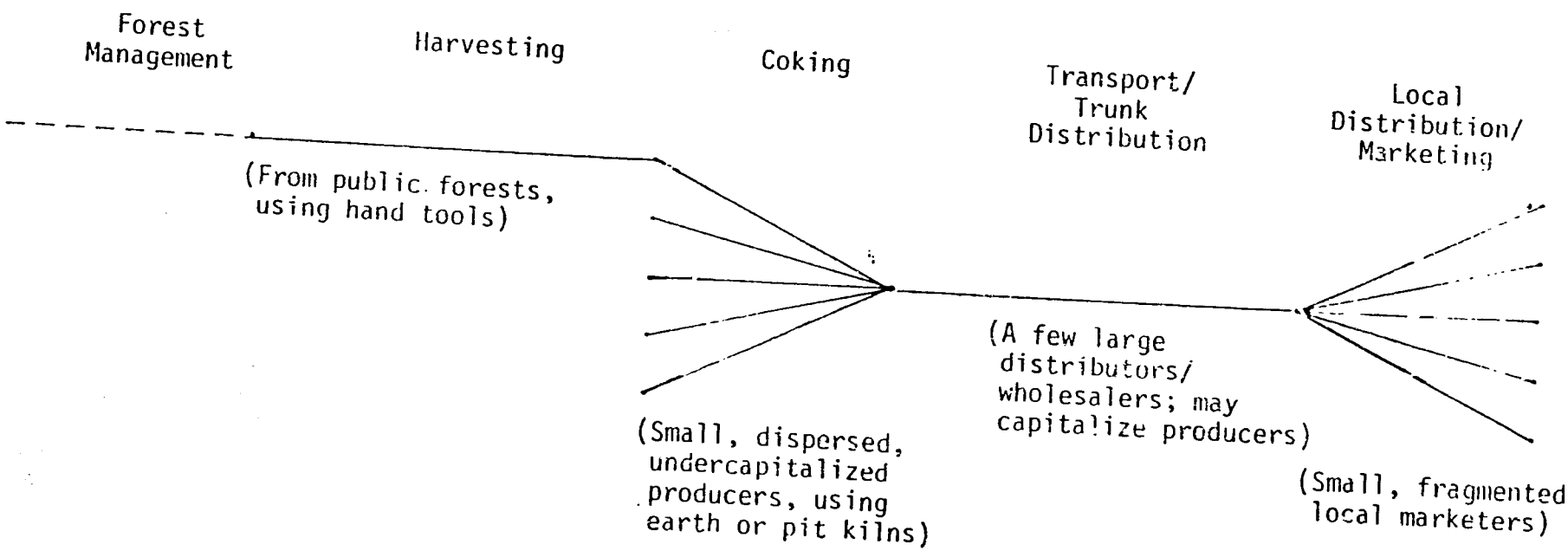
not such a formal link between producers and distributors. For example, in Kenya, producers typically go to the nearest road, sit out with their bags of charcoal (which they dare not leave) for two or three days until a truck comes by and purchases the charcoal. These producers are obviously in a very bad bargaining situation. (Chart XII)

The UN and others have projected very rapid growth in the demand for industrial charcoal, particularly in a number of developing countries. For example, in some countries the UNDP has projected that industrial demand for charcoal will exceed houshold demand by the end of this decade. We are finding in Kenya a similar phenomenon, where a lot of industries are becoming, if they have not already become, major industrial users of wood or charcoal. Part of the reason that statistics show this dramatic jump is not because demand is growing that fast, but because the demand that was always there has never been counted before. This trend, plus continued urbanization, suggest that charcoal demand will continue to increase dramatically. Also high-volume industrial users may begin to force nationalization of the charcoal industry.

Various things could be done to improve the efficiency of charcoal production. An attempt has been made by various donor projects which have spent a lot of money on metal kilns, starting at about $3,500 a piece. However, industrial charcoal producers in developing countries typically use much higher volume masonry or brick kilns. Also, there is some interest in very high-volume

CHART XII

TYPICAL CHARCOAL DISTRIBUTION SYSTEM



retorts or pyrolysis units to recover by-products as well as produce charcoal. Except for the Casamance kiln in Senegal, there has been virtually no donor effort to improve the traditional kiln, yet you will find, for example, a few foresters who have found very low cost ways of improving traditional kiln designs while working with the traditional makers. For example, in one region of Kenya, improvements in traditional earth kilns at a cost of under $10 per kiln appear to be achieving the same charcoal yields as a $3,500 portable metal kiln. (Chart XIII)

An economist can quickly demonstrate that, for those who have their own plantations, buying an expensive metal or brick kiln would pay if the plantations have sufficient volume to keep the kiln operating. What that says is that managing your own forests better with the assistance of your own kiln will pay for the higher cost of kiln operation. Even if producers had money (and most traditional producers do not), if he or she does not own the wood and does not capture the benefits of better management of the forest, there is absolutely no way to justify spending more than maybe $10 or $12 on a more efficient kiln. For someone in this position, the only benefits to more efficient charcoal production is the saving in labor and time and perhaps a slightly higher profit because the charcoal quality is improved. Neither of these benefits is significant compared to the benefit accruing to the plantation manager who can produce more charcoal per hectare on a sustainable basis. Virtually the only people, therefore, that you can find buying the other kinds of kilns are

CHART XIII

COMPARATIVE TABLE OF ILLUSTRATIVE KILNS AND RETORTS

TYPE	INVESTMENT COSTS	USEFUL LIFE	ANNUAL OUTPUT (TONS)	MAN-WEEKS PER TON	YIELD BY WEIGHT
Mark V Kiln (Portable Metal)[1]	$3,500	3 years	50-55	2	12-15
Small Lambiotte Continuous Retort[1]	$250,000	20 years	2,000	.15	23-25
Katugo (Missouri) Masonry Kiln[1]	$2,000	5 years	100-110	.5	21-23
Traditional Earth/Pit Kiln	0	1 charge	10-50[2]	3-5	8-12
Modified Traditional Kiln	$10	1/2 year	10-50[2]	3-5	12-15

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1 Adapted from E. Uhart, "ECA/FAO Forest Industries Advisory Group Data on Charcoal Kilns and Retorts," January 1976.

2 Assumes multiple kilns operating in sequence.

either donors who put them in to see how they work, or large plantations that have a continuing interest in managing a piece of land that they own.

Assuming that there is very little incentive to any other process than traditional charcoal production, the problem in trying to get people that are producing charcoal traditionally to make marginal improvements is very extension-intensive. In many countries, going out to give the producers assistance implies government recognition, a recognition some governments are not willing to bestow. In addition, most forestry extension officers come from forest services that traditionally view their role as protecting the forest from the charcoal producers, perhaps winking at the charcoal producers, perhaps being bribed by the charcoal producers, but not as assisting the producers. Also, and this gets a little further afield, our experience in many countries is that the way you move up in the forestry department is by making a mark on the government plantations. Thus, from the point of view of the extension agents themselves, they may have little incentive to help the people at the local level.

I realize that this has been a disjointed presentation, but I would like to end with a couple of even more disjointed points. The first is that we know very little about land tenure, yet it is clear that this could be a major obstacle to large-scale afforestation. Many of the projects that are being financed now do not even address the land tenure question. Second, a major

cause of the deforestation problem is that landless peasants are being forced into even more marginal land. How about the land ownership pattern in the first place that forced them onto that land? Third, and jumping back to a more narrowly forest-related issue, there is a real need to organize the selection and production of seeds of appropriate species. Virtually throughout Africa at least, you cannot obtain reliable seed of the right kind of species and selections. This is particularly true of the fast-growing, multi-purpose leguminous species used in agroforestry. Finally, the things the farmers need to do -- land preparation , planting, postplanting maintenance -- in most cases interfere with the agricultural cycles at the same time extension agents must have active participation. This means that they have to see the benefits of participation, and in too many cases they do not. Every profession looks at things from its own perspective. We would say that you are unlikely to have fuelwood production, improved cookstove and charcoal production, other measures or anything approaching the scale needed to turn around the critical problems of deforestation in developing countries until you really address the farmers' and the households' incentives -- the incentives of men and women both.

XI. Summary

by

Peggy A. Shifflett

The objectives for this conference were two-fold:

(1) To develop an awareness of the impact of energy problems on food habits; and

(2) To stimulate interest, among Virginia Tech scholars, in research and intervention strategies related to energy problems and food habits.

Objective 1 has been very effectively met. Cynthia Reeser's presentation has made us aware of two aspects of energy: fuel shortages and human energy and time spent to acquire decreasing supplies of fuel and water. Ms. Reeser pointed out that this extra expenditure of energy and time has resulted in less energy and time for preparation among rural people of Mauritania.

Dr. Daisy Cunningham and Dr. Penny Burge presented data from a recent research project which demonstrated levels of awareness of foreign students of food and fuel issues in their home countries. The students perceived fuel problems to be more acute in urban areas. Rural areas were reported less likely to experience changes in cooking patterns as a result of fuel shortages than were urban areas.

Dr. Laura Jane Harper discussed three issues relating food and fuel: the worsening food shortages, declining supply of conventional fuels, and the increasing amount of time and extremely hard work spent by the world's poor women in fuel gathering and food preparation.

Using Maslow's hierarchy of needs, Dr. Harper pointed out that all the creative and management skills of families living in areas of the world where there is not enough available food to eat are directed toward meeting the basic needs. This does not leave much time or energy for concern for safety and security, self-esteem and self-actualization.

Dr. Irene Tinker spoke on energy scarcity and the poor. She pointed out two types of energy scarcity: human energy and fuelwood. Theoretical

approaches supporting development efforts have been dominated by "take-off" theory of development. This approach to development assumes that aid implemented at higher levels of society will "trickle down" to the poor. In fact, this approach to development has widened the gap between the rich and the poor.

Theoretical approaches to development have also been conceptualized by developed nations' assumptions about the nature of problems or by observations from one setting which are generalized to all Third World countries. Dr. Tinker called for base-line research at micro-levels of society and exemplified the level of research needed by pointing out that "we need to know the ways of women."

The afternoon panel, entitled "Observation of Impact of Energy Problems on Family Food Behavior" was designed to emphasize the contrast between energy problems and family level food habit adaptations to energy problems in the United States and Third World countries. Ms. Marilyn Hoskins, whose work experience in Asia and Africa is quite extensive, pointed out that in many Third World countries cooking fuel consists of wood, dung, or plant stems. As these fuel sources decline, there have been major changes in the actual cooking process. These changes are designed to shorten cooking time, and they include: (1) physically changing the food by grinding; (2) eating foods less cooked; (3) substituting foods which cook faster (e.g., tubers for rice); and (4) changing amounts or times of meals. Ms. Hoskins stressed that planners must realize the importance of integrated food/fuel planning and learn from local women about their needs and resources.

Ms. Margie Cahill reported on changes in family food habits of the middle-class American. She cited several surveys which indicate changes in family food habits are primarily due to rising food costs; however, inflation of food costs is directly related to energy costs. Specific changes include food purchasing habits, types of food served, and efforts to preserve and

cook the food.

Dr. Jean Speer reported on her research in Appalachia. She indicated that Appalachian people are reacting to the high cost of energy by reviving traditional energy-saving ways of preparing food (e.g., using human energy in the work effort) and adapting the old and new in innovative energy-saving techniques (e.g., drying foods in rear windows of automobiles). Many people are returning to use of wood stoves, gardening, canning, and keeping animals for their products.

Ms. Leena Kirjavainen presented a slide show and discussion of the question, "how appropriate is appropriate technology?" The slides represented her work at the household level with appropriate technology.

The final speaker at the conference was Dr. Sandy Hale who presented "An economist's approach to fuelwood production and use." Dr. Hale began his speech stating the need for interdisciplinary approaches to fuelwood use and production. He stressed the need for interdisciplinary research. As a worker in energy development, he is constantly confronted with poor data on the many factors necessary for decision-making.

Many programs to increase fuelwood have failed because: (a) deforestation is not just a fuelwood problem; (2) individuals being asked to change do not benefit from their changes; (3) policy options related to deforestation obviously have income-employment implications; and (4) governments themselves do not look at fuelwood as a major problem. Other trends in fuelwood include higher prices, collection distances are increasing, and there is a trend toward use of charcoal.

Household reactions to these trends include eating fewer hot meals, planting trees, or cooking with three-stone stoves. Improvements of traditional cooking methods have been largely unexplored. Dr. Hale consistently emphasized the need for base-line research.

This brief summary does not reflect the extent of information presented by the speakers. Objective 1 which was "To develop an awareness of the impact of energy problems on food habits" has been effectively met.

Objective 2, which was "To stimulate interest in research and intervention strategies related to energy problems and food habits", cannot be measured at this point; however, the conference speakers have adequately demonstrated not only the need for base-line research but the level at which the research should be conducted. Research is needed at the micro-level (e.g., traditional cooking methods, the "ways of women"), and the research effort should be interdisciplinary. It has been aptly pointed out that researchers are frequently unable to comprehend many of the factors affecting the relationship between food and fuel because of their specialized training. An interdisciplinary effort would alleviate this problem and provide more comprehensive baseline data.

XII. CONFERENCE AGENDA

"Food and Fuel:

Issues in Family Behavior"

November 5, 1981

PROGRAM

November 5, 1981 - MARRIOTT INN, BLACKSBURG

9:00 - 9:30 Registration and Coffee

9:30 - 10:30 "Aspects of food preparation in West Africa: a slide show"

Cynthia K. Reeser, Nutrition Educator and Consultant in International Nutrition Programs

10:30 - 11:00 "Food and fuel in developing nations: perceptions of home economics graduates"

Daisy Cunningham and Penny Burge, Assistant Professors of Home Economics Education, Virginia Tech

11:00 - 11:45 "Food and fuel: issues and observations"

Laura J. Harper, Dean Emeritus, College of Home Economics, Virginia Tech

12:00 - 1:00 Luncheon (Smithfield Room)

1:00 - 2:00 "Energy for survival: scarcity and the poor"

Irene Tinker, Founder and Director, Equity Policy Center, Washington, D.C.

2:00 - 3:15 "Observations of Impact of Energy Problems on Family Food Behavior: A Panel"

A. "Energy scarcity and food habits: international observations"

Marilyn Hoskins, Title XII Chair, Arts and Sciences, Virginia Tech

B. "Observations of adaptations to energy problems in Appalachia"

Jean Haskell Speer, Associate Professor of Communication Studies and Humanities, Virginia Tech

C. "Trends in food habits related energy use"

Margie Cahill, Customer Services Associate, Appalachian Power Co., Roanoke, Virginia

3:15 - 3:30 Coffee

3:30 - 4:00 "How appropriate is appropriate technology at the household level?"

Leena Kirjavainen, International Consultant in Home Economics

4:00 - 4:45 "An economist's approach to fuelwood production and use"

Asif Shaikh, Chief Economist for Energy/Development International, Washington, D.C.

4:45 - 5:00 Summary - Peggy A. Shifflett, Assistant Professor of Sociology Virginia Tech