Energy and rural women's work: Crisis, response and policy alternatives

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1. The crisis

More than a decade ago the world entered an era of higher energy costs. In 1983 the World Bank estimated that developing countries needed to invest about 4 per cent of their GDP in energy annually, or altogether US$130,000 million, in order to meet projected needs over the next ten years (IBRD, 1983, pp. xviii-xix). Even with the lower oil costs of late, such an investment still poses a very difficult problem for most developing economies, weighed down as they are by the world recession, deteriorating terms of trade for their raw materials exports, massive debts and recently, in much of Africa, drought and famine. And all developing countries, including many oil exporters, will need ever larger amounts of energy in the future owing to increasing population growth, urbanisation and industrialisation.

Up to now the impact of higher energy costs has been cushioned by large reserves of "free" wood and other biomass fuels (animal dung, crop wastes) from the fields and forests of rural areas, though at the cost of deteriorating living and working conditions in the rural subsistence sector. By the year 2000, however, more than 2,000 million people in developing countries will be suffering from an acute scarcity of fuelwood (FAO, 1981). The distinction between "free" traditional woodfuels and expensive "modern" fuels is already becoming meaningless in many Third World cities: woodfuels for cooking today are no cheaper, and sometimes even dearer, than kerosene or gas. There is already a huge "overhang" of household demand for these modern fuels, and higher woodfuel prices and rising incomes will obviously lead either to increased fossil fuel imports (or increased use of indigenous resources) or to rationing. Many governments are looking to biomass and wood cultivation and to crop residues as new sources of energy for modern industry, transport and household use, such as fuel alcohol and producer gas.

In most developing countries the household sector is still the largest single energy consumer — and the poorer the country, the truer this is. As

* International Labour Office.
table 1 shows, in lower-income countries such as Burkina Faso, Ethiopia and Nepal the household sector accounts for more than 90 per cent of total energy consumption. The share of biomass fuels in the household sector is similarly related to the level of economic development but remains at over 80 or 90 per cent in most countries.

Deforestation and even desertification are the most serious consequences of this unseen reliance on “free” biomass fuels. But agricultural productivity begins to fall well before these “natural” disasters strike. The growing use of tree, crop and animal residues for fuel deprives the soil of recycled nutrients and thus reduces crop yields and also agriculture’s capacity to support livestock, thus diminishing the draught power available to farmers. Men are forced to leave the land in search of seasonal work or work in the towns in order to supplement rural incomes, further reducing the labour inputs available for agriculture. These “environmental refugees” swell urban populations and intensify the pressure on rural food and biomass resources, while food production declines.

Hardest hit by this crisis are rural women. Women are largely responsible for subsistence food production and must increase their own labour inputs as productivity decreases, while often forfeiting the help they need to receive from their menfolk, in such tasks as land clearing and ploughing, as a result of migration (an avenue often closed to women for social reasons). As the quality and quantity of forest and water resources decline, the time and effort that must be devoted to fuel and water collection, two of women’s traditional tasks, also increase. The possibility of obtaining “minor” wild forest and field products to supplement family nutrition and incomes, e.g. through food processing for sale, is excluded. Women have little choice but to work more (and to use child labour to help them), cut down on family living standards and try to squeeze more output and income out of the land, thereby often contributing to the destruction of the ecological base – a vicious circle.

These are among the major findings of an ILO research project (supported by the Netherlands Government) on energy and rural women’s work in several countries in Asia, Africa and Latin America. The ILO’s interest in rural energy arises from its concern that sufficient energy supplies should be available both for meeting minimum basic needs and for promoting economic development and rural employment (ILO, 1982). Since 1982 comparative country studies have been made on the effects of the rural energy crisis on rural women and households in Peru, Ghana, Mozambique, India and Indonesia.1 Multidisciplinary national teams carried out action research in several villages representing different ecological regions in each country. Information on the time use of family members, fuel search and use, and food consumption was collected through household sample surveys during the rainy and dry seasons and through detailed observation of individual women in each village. Group discussions and interviews were used to obtain more qualitative information and opinions as
Table 1. Household energy consumption and biomass\(^1\) fuels in national energy balances, selected countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Household energy consumption as % of total energy consumption</th>
<th>Biomass fuels as % of household consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>1978</td>
<td>...</td>
<td>84.0</td>
</tr>
<tr>
<td>Nepal</td>
<td>1980/81</td>
<td>94.0</td>
<td>98.7</td>
</tr>
<tr>
<td>Thailand</td>
<td>1983</td>
<td>29.3</td>
<td>84.8</td>
</tr>
<tr>
<td>Burkina Faso</td>
<td>1983</td>
<td>92.7</td>
<td>97.7</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>1982</td>
<td>92.8</td>
<td>99.5</td>
</tr>
<tr>
<td>Ghana</td>
<td>1985</td>
<td>72.0</td>
<td>94.0</td>
</tr>
<tr>
<td>Mozambique</td>
<td>1980</td>
<td>76.4</td>
<td>98.7</td>
</tr>
<tr>
<td>Senegal</td>
<td>1981</td>
<td>67.4</td>
<td>93.2</td>
</tr>
<tr>
<td>Tanzania (United Rep.)</td>
<td>1981</td>
<td>85.0</td>
<td>98.8</td>
</tr>
<tr>
<td>Zambia</td>
<td>1980/81</td>
<td>45.6</td>
<td>91.8</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>1980</td>
<td>30.0</td>
<td>85.4</td>
</tr>
<tr>
<td>Ecuador</td>
<td>1984</td>
<td>32.8</td>
<td>30.5</td>
</tr>
<tr>
<td>Peru</td>
<td>1981</td>
<td>38.6</td>
<td>62.4</td>
</tr>
</tbody>
</table>

\(^1\) For purposes of this table "biomass" means traditional, non-commercial fuels.

Source: UNDP/World Bank Energy Sector Assessment Program reports with the exception of the figures for Mozambique which are taken from P. O'Keefe and B. Muslow (eds.): *Energy and development in southern Africa*, SADCC country studies, Part II (Stockholm and Uppsala, Beijer Institute and Scandinavian Institute of African Studies, 1984).

well as to catalyse group reflection on the fuel problem and possible solutions.

II. The household response: Survival strategies

These country studies show that, confronted with changes in fuel and biomass availabilities, rural households are being forced to make various adjustments that adversely affect their living standards, work and consumption. The adjustments produce negative effects on working patterns; on family nutrition and health; and on the environment, agricultural productivity and incomes. Some aspects of the urban fuel crisis and rural-urban linkages are also relevant here.

Working patterns

Although the division of agricultural and other tasks between men and women varies considerably from one region to another, in general men tend to have greater access to the cash economy and public life and to perform work that generates cash income (wage labour, crafts, cash cropping) as their
primary activity. Women’s activities revolve more around the subsistence economy, family food production and household maintenance. These activities, while essential to family survival and welfare, are typically unpaid — although women’s “secondary” activities (such as food processing) may make a substantial contribution to family incomes. The ILO country studies confirm this general pattern.

The double — or rather triple — burden on women of household, family agricultural and income-earning work is shown in table 2. In these examples women’s work in agriculture ranges from a low of 1.3 hours daily (owing to the drought) in a savannah village in Ghana to a high of four hours in the Peruvian sierra, where the women work on family plots and as wage labourers in co-operatives or on state or private farms. Non-agricultural income-earning work, such as crafts, trade and food processing, ranges from a low of 0.1 hours in Mozambique, where few opportunities for such work exist, to a high of 6.3 hours in a Ghanaian village, where women’s main occupation is fish smoking. Household maintenance — cooking, fuel and water collection, cleaning and child care — takes up the largest proportion of women’s time in virtually all the villages studied. On average women work about the same number of hours as men in agriculture, while men work only slightly more hours than women in non-agricultural activities. Almost all the household tasks are performed by women alone. This triple burden means that women work considerably longer hours than do men, between 11 and 14 hours daily in the countries studied as compared with between eight and ten hours for men.

Two of the most time-consuming activities for women in these villages are fuel collection and cooking. The total time spent on them ranges from 1.5 hours daily in an irrigated village in West Java, where new agricultural wage opportunities for women seem to have replaced their household activities, to five hours in a savannah village in Ghana. These energy-related activities take up between 13 and 36 per cent of women’s total work time. A major activity for women in most of the villages in fact is cooking — up to 34 per cent of women’s daily workload; an exception is Mozambique where, because of the severe food shortage at the time of the study, only one meal per day was prepared.

Men, women and children have distinct roles in fuel supply and use. Interestingly, the division of labour in fuel collection activities varies little by region. Men usually cut down trees to be used for household fuel. The collection of “minor” fuels such as branches, bushes, dung and crop residues, on the other hand, is frequently done by women in conjunction with other activities such as medicinal herb gathering, or on their way back from work in the fields. Partly for this reason, women in these villages typically spend less time on fuel collection alone than on cooking, in most cases no more than an hour or two. More important, perhaps, is the change in women’s work patterns when fuel gathering can no longer be combined with other work but must be the object of a separate trip.
Table 2. A rural woman’s work is never done... (hours per day)

<table>
<thead>
<tr>
<th>Country</th>
<th>Agricultural work¹</th>
<th>Non-agricultural work²</th>
<th>Fuel collection and cooking</th>
<th>Other ³</th>
<th>Total hours worked</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indonesia</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irrigated village</td>
<td>2.9</td>
<td>0.2</td>
<td>1.5</td>
<td>6.9</td>
<td>11.5</td>
</tr>
<tr>
<td>Upland village</td>
<td>3.1</td>
<td>0.5</td>
<td>2.4</td>
<td>6.0</td>
<td>12.0</td>
</tr>
<tr>
<td><strong>India</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average of five villages</td>
<td>3.9</td>
<td>4.0</td>
<td>4.8</td>
<td>0.9</td>
<td>13.6</td>
</tr>
<tr>
<td><strong>Ghana</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Savannah village</td>
<td>1.3</td>
<td>2.7</td>
<td>5.0</td>
<td>5.0</td>
<td>14.0</td>
</tr>
<tr>
<td>Fishing village</td>
<td>2.0</td>
<td>6.3</td>
<td>3.6</td>
<td>2.1</td>
<td>14.0</td>
</tr>
<tr>
<td>Forest village</td>
<td>3.8</td>
<td>0.3</td>
<td>4.1</td>
<td>5.8</td>
<td>14.0</td>
</tr>
<tr>
<td><strong>Mozambique</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average of four villages</td>
<td>3.1</td>
<td>0.1</td>
<td>1.8</td>
<td>9.0</td>
<td>14.0</td>
</tr>
<tr>
<td><strong>Peru</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coastal desert</td>
<td>1.4</td>
<td>2.0</td>
<td>2.2</td>
<td>5.6</td>
<td>11.2</td>
</tr>
<tr>
<td>Sierra</td>
<td>4.0</td>
<td>1.0</td>
<td>3.8</td>
<td>2.4</td>
<td>11.2</td>
</tr>
<tr>
<td>High sierra</td>
<td>4.0</td>
<td>2.0</td>
<td>2.9</td>
<td>2.8</td>
<td>11.7</td>
</tr>
</tbody>
</table>

¹ Family subsistence, wage employment and livestock raising. ² Crafts, food processing and trade. ³ Cleaning, child care, social, community and religious activities; for Ghana, travel time is also included here.

Source: See note 1 at the end of the article.

Since women and children are responsible for collecting residue fuels, their workload is increased when these fuels have to replace others that are becoming scarce. Residue fuels include twigs and branches, bushes, thorns and weeds, crop stalks, pods and roots, animal dung, and even paper and plastic trash. Many residue fuels not only take more time to gather in sufficient quantities (the relative calorific value being lower) but also require more time and attention when they are used since they burn quickly and the fire must be constantly tended. When women and children regularly collect residue fuels, one may conclude that fuel scarcity has reached a level that is probably severely affecting the environment as well as family welfare. On the other hand, commercialisation of household fuels, whether woodfuels or “modern” fuels, is a sign of both fuel scarcity and the availability of cash incomes.

Nutrition and health

When families are really hard pressed, food production and cash earning take precedence over women’s household tasks such as cooking and fuel and water collection, even though these are also essential for family welfare. The
traditional "hungry season" before the harvest is a crucial period: food deprivation is acute at the very time when all the adults have to work the hardest. When more time has to be spent on particular tasks, whether in farming or in fuel collection, women's other work suffers. The case studies suggest that the total time spent on food preparation, including fuel gathering for cooking, may be limited simply because other subsistence activities demand more time. In villages where women had to spend more time on fuel collection, they spent less time on cooking. This, however, can result in a lower nutritional level.

To spend less time cooking is an extreme reaction to a fuel shortage. Generally, less fuel per head is used in those villages that experience fuel supply difficulties, although the amount also varies according to diet and other factors. Staple foods such as beans and whole grains have to cook a long time before they are edible (or even safe to eat, in the case of legumes). Cooking fewer meals, eating cold or reheated leftovers, eating more snacks or processed foods and even changing diets have been reported as fuel-saving devices in areas suffering from an acute shortage of fuel, such as the Sahel, Haiti, Mexico and Nepal.

In most of the countries studied (especially in drought-stricken Africa) the lack of food was so great that fuel shortages played only a minor role in determining diets. Many households had only two meals a day or sometimes only one. The quantities and types of foods cooked play an important part in determining fuel use per head. Coastal villages in Peru and Ghana where fish consumption is high use much less cooking fuel than inland villages relying on hard staples such as maize, cereals, potatoes and cassava. This suggests that studies on fuel-saving methods should take a hard look at foods requiring high energy inputs.

Family welfare can also suffer from the loss of products gathered from forests. In subsistence economies uncultivated areas provide food, medicines, building materials, tools and utensils. Foods gathered from these areas, mainly by women, are often an important nutritional supplement. Even arid and semi-arid savannas and deserts can provide a variety of wild produce, which are especially important as a fallback during drought.

Wood and charcoal, let alone fossil fuels, are rarely purchased by these rural households for cooking, except for income-generating uses. Most poor households have had to switch increasingly to cooking with residue fuels since they cannot afford either wood or fossil fuels. This is not to say that they do not value and need "modern" energy sources such as kerosene and gas; in fact they often spend a considerable amount of time in searching for supplies of scarce kerosene. In the many countries which have found it necessary to limit imports and ration supplies even in the cities, very little kerosene finds its way to the countryside. Not only kerosene and other petroleum products but the equipment needed to use them (stoves, gas bottles) are expensive and difficult to find in rural areas because of high transport costs and small dispersed markets. However, where life styles are
changing and incomes are rising rural households also wish to adopt more convenient cooking fuels, and indeed may need to do so in order to provide nutritious meals in keeping with new work and school patterns. Kerosene was used only for lighting in most of the villages studied, but even so that use absorbed an appreciable proportion of rural household budgets. Table 3 shows that between 5 and 20 per cent of household expenditures went on fuel (mainly kerosene), while the food budget varied between 50 and 91 per cent. Because of the households’ small cash incomes even this minor use of a commercial fuel has already affected food and other expenditures; and further commercialisation of household fuels is bound to make matters worse unless rural incomes increase.

Water and heating are also “luxury” uses of fuel that are frequently curtailed when fuel is scarce. However, washing is essential for health and heating is often essential for survival. In cold mountainous regions such as the Andes, Himalayas and Ethiopian highlands as much fuel is used for heating as for cooking, which may be one of the reasons why these regions suffer so much from fuel scarcities.

Besides taking more time to gather and use, residue fuels are also smoky and inefficient. Storing the large quantities needed in a dry place is practically impossible, especially in the rainy season. Even poisonous weeds are used for cooking by the poor in some of the villages studied (retama in Peru, basothi in India). Rooms were quickly filled with smoke by the inadequate combustion of damp, low-quality fuels. The WHO has begun to document the serious health effects (especially eye and respiratory diseases) of lengthy exposure to emissions from biomass fuels in smoky kitchens (WHO, 1984).

The heavy workload of manual tasks imposed on women also affects their health. A study carried out in Karnataka State in India calculated that women’s calorie expenditures were higher than those of men and that energy expenditures on domestic tasks were higher than on agricultural work (Batiwala, 1982). Many of these tasks (gathering firewood, fetching water, cooking, etc.) could be done mechanically or made more efficient through the use of alternative technologies and energy resources.

Little attention has been paid so far to the “working conditions” of female fuelwood collectors. Forest workers are provided with special equipment for harvesting trees, yet women collecting fuel for subsistence do the job with their bare hands and primitive tools. Loads weighing 25 to 35 kilograms on average (some were said to weigh as much as 80) are carried for miles on end and very often exceed the maximum weights allowed by the country’s labour legislation (most legislation prohibits the carrying by women of loads weighing over 20 kilograms) (ILO, 1966).

The environment, agricultural productivity and income

A typical Peruvian valley in the Andes is graced by eucalyptus trees destined for poles and pit props for mines while the women from the villages
Table 3. Distribution of household expenditures among food, fuel\(^1\) and other items in four countries (%)

<table>
<thead>
<tr>
<th>Village</th>
<th>Food</th>
<th>Fuel</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indonesia</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irrigated village</td>
<td>50</td>
<td>10</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>Upland village</td>
<td>63</td>
<td>5</td>
<td>32</td>
<td>100</td>
</tr>
<tr>
<td><strong>India</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average of five villages</td>
<td>87</td>
<td>9</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td><strong>Ghana</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Savannah village</td>
<td>85</td>
<td>5</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>Fishing village</td>
<td>81</td>
<td>8</td>
<td>11</td>
<td>100</td>
</tr>
<tr>
<td>Forest village</td>
<td>91</td>
<td>7</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td><strong>Peru</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coastal desert</td>
<td>69</td>
<td>20</td>
<td>11</td>
<td>100</td>
</tr>
<tr>
<td>Sierra</td>
<td>71</td>
<td>5</td>
<td>24</td>
<td>100</td>
</tr>
<tr>
<td>High sierra</td>
<td>68</td>
<td>8</td>
<td>24</td>
<td>100</td>
</tr>
<tr>
<td>Average of 13 villages</td>
<td>78</td>
<td>9</td>
<td>13</td>
<td>100</td>
</tr>
</tbody>
</table>

\(^1\) Fuel expenditures almost exclusively kerosene (for lighting), except in the coastal desert village in Peru.

Source: As for table 2.

scour the hillsides for bushes and roots for fuel. The Green Revolution in Malari (India) has left the landless and semi-landless without communal forests and with few fuel-producing resources of their own, so they use animal dung for cooking fuel instead of fertiliser for their meagre lands. Women in drought-stricken rural Ghana “mine” their fallow land for charcoal making. Are these women destroying the environment and creating a fuel scarcity? The principal causes of deforestation and fuel scarcity in the villages studied were population growth and the clearing of forests for agriculture. Ironically, deforestation often results in lower agricultural productivity and hence makes it necessary to expand cultivation still further. Present policies have failed on the whole either to increase agricultural productivity on existing cleared land or to generate enough off-farm or urban employment to absorb surplus agricultural labour. Land settlement schemes involving massive clearing of forest areas have often been the response of governments seeking an outlet for growing populations. Because they need to export raw materials in order to earn foreign exchange, many developing countries have also been forced to sell their tropical forests cheaply.

The breakdown of traditional systems of common property management of pasture lands has led to overstocking of animals and overgrazing in many
marginal agricultural areas, for example much of the Sahel and Baluchistan (Pakistan). Fast-growing cities and towns and expanding rural industries have also depleted surrounding forests, where the trees have been felled for high-quality wood and logs rather than for the deadwood and minor fuels that rural households use for cooking. Refugee camps and new communal villages, in turn, cast smaller versions of the "urban shadow" on nearby forests.

The damage caused to the environment by rural women in gathering a few twigs and residues for cooking is insignificant by comparison. It is hardly surprising that women in the villages studied saw little relation between their own actions and environmental deterioration. People usually feel that the encroachments being made on the environment are the work of external forces, which they and their communities have no power to control, any more than they can control fuel scarcity. Nor is any need felt for specific action to protect the supply of biomass, since fuel has always been considered a "free" good. In some of the Indian villages studied the women said that their fuel problems had been caused by the outside contractors who had come to cut down the trees and by the government restrictions placed on their use of the forest – things they could do nothing about. At the same time the pressures on the environment have had consequences for people’s lives of far greater scope than the decline in fuel supplies. In Ghana, for example, the introduction of new cash crops such as cocoa has increased population pressures in settled areas and more land has been privatised. This in turn has restricted women’s access to land and their ability to produce food as well as fuel in many cases. Moreover, the struggle of the poor simply to stay alive is so desperate in some countries that long-term fuel supply is often immaterial to them. In most of the countries studied food consumption at the time was below the minimum considered necessary for human survival. Poor women will therefore only feel they have a stake in efforts to tackle energy problems if they lead to an improvement in nutrition and income as well.

Women are hit the hardest by the negative effects of environmental deterioration on incomes and welfare. The most important effect is the long-term decline in agricultural productivity and hence in food production. This means that more land must be brought under cultivation and, since the soil is often unsuitable for farming, leads to still further deterioration. In the western Sudan, for example, the traditional practice of crop rotation has been abandoned on account of the growing population and low rainfall, causing soil erosion and lower land productivity. To compensate for the declining yields, women are forced to cultivate their millet or sorghum over larger areas and to work harder to achieve the same output. Such expansion further accelerates the process of soil erosion and prevents natural regeneration (Berar-Awad, 1985, and Ibrahim, 1982).

While more attention has recently been paid to the relationship between such "natural" disasters and human actions (Wijkman and Timberlake, 1984), the logical connection between the food-fuel-water crisis and
women’s central concerns and activities is only beginning to be made (see, for example, Sen and Grown, 1985). The links between the two are illustrated in the figure showing the effects of the biomass crisis on rural women’s work and basic needs. Given the sexual division of labour in the energy use and supply system as well as in agriculture, women’s activities are affected more than men’s work by environmental deterioration. As we have seen, not only is family farming – which is done mainly by women – becoming more difficult and less productive but women’s household tasks – fuelwood collection, water fetching and cooking – are also becoming more burdensome. Furthermore, migration of male labour in search of jobs was an important phenomenon in all the villages studied. In many of them more than half the households were, in practice, headed by women for a good part of the year. If food production depends primarily on women’s work, it is bound to fall sharply in areas suffering from ecological decline, and especially drought, unless more help is provided to improve their productivity.

In their search for cash income as the biomass system becomes less able to support a subsistence economy, many women in these villages are taking up low-productivity and low-wage crafts, agricultural wage employment when it can be found (at wages often half those of men) and at times even migration. In the countries studied women’s contribution to household cash income ranged from one-third in some Indian villages to nearly 80 per cent during the dry season in Ghana. In relatively commercialised rural economies like Ghana and Peru women often have several sources of income, alternating between them seasonally and as opportunities arise. In Mozambique and Indonesia, on the other hand, women have fewer off-farm employment opportunities than men – being mainly restricted to agricultural wage employment – since at least seasonal migration is necessary to take advantage of most. These women make a larger contribution therefore in the form of subsistence production. In all these countries women’s contribution to food production is high.

Many of women’s key income-generating activities such as food processing and snacks (Indonesia), beer brewing (Peru) and fish smoking (Ghana) are fuel-intensive and the difficulty of procuring adequate low-cost fuel supplies has in many cases made production problematic. In some villages a division of labour among women in the processing of time- and energy-intensive foods has spontaneously developed. In a coastal village in Peru nearly every woman produces chicha beer both for sale and for home consumption at least once a week, but at other times she buys the beer from other women producers. In Ghana a variety of processed and semi-processed foods are prepared and marketed by different women, so that one woman may make and sell fufu (a cassava dish) while buying soup or smoked fish from other women to make up a complete meal. Partly for this reason (and because of the drought), expenditures on food in Ghana are extremely high (80-90 per cent of total spending). In cities such practices are often carried further by commercial bakeries or, as in Lima, the communal cooking of
meals in poor neighbourhoods. If they were promoted on a bigger scale significant savings in both women's time and their fuel use could be made. But it would be necessary to ensure that poor women themselves earn cash from the commercialisation of processed foods for otherwise they might be unable to afford to make or buy these foods at all. This seems to have happened to some extent in West Java where, although numerous snack and processed foods (e.g. tofu) are marketed on a larger scale, they are made available to poor families usually only as payment in kind or meals provided by employers.

Woodfuels and other "minor" forest products such as honey, flowers, seeds, leaves and wild fruits are critical to survival when agriculture fails or supplementary income is needed. Wood itself is the basis of much small industry and other forest products can also be sold directly or processed to increase their value, thus providing employment and income. Some 30 million people in India alone are estimated to derive part of their livelihood from forests (Kulkarni, 1983). In the rural areas studied wood collection and charcoal making, transport and marketing are an important source of income for many rural women and men, especially in Africa where rationing and shortages of fossil fuels have kept the cities reliant on woodfuels. The profitability of this market makes plantations for woodfuel processing near cities and towns a promising rural income-earning activity, provided it can be so organised as not to damage the environment and to ensure regeneration. Lessons learned from past experience with other cash crops should be heeded, however, so as to avoid mistakes that harm the poor's welfare, such as displacement of food crops, concentration of land and transfer of resources from women to men. Food production has been adversely affected mainly by "energy crops" such as sugar-cane for alcohol production, though similar harm has been caused by eucalyptus plantations for woodfuel in India.

Here it may be worth adding that the urban poor are probably suffering even more than the rural poor from the effects of fuel scarcity since their incomes have not kept pace with rising prices and they cannot fall back on subsistence production or their own labour in residue fuel gathering. A recent survey found that in Addis Ababa more than two-thirds of the cash income of the lowest income group was spent on cooking fuel (ILO, 1986b). Many of the fuel-saving practices that had been adopted by the poor in this survey had adverse effects on nutrition and health, and these were far more evident than in rural areas - cooking less, reheating, and eating cold food. Some poor households were even using residue fuels dangerous to their health. Because they cannot afford the kind of stoves needed to burn more efficient fuels the poor continue to rely on woodfuels even though their cost (per unit of delivered energy) in most Third World cities today is higher than that of kerosene, gas or electricity. Yet it is the latter fuels that official subsidies often favour. Measures are urgently needed to enable urban poor households to meet their minimum basic energy needs.
III. Policy and project approaches

The findings of the ILO country studies reviewed here raise questions about the effectiveness of many current energy policies and projects and point to some possible alternative approaches. In this section we first discuss how energy can serve as a starting-point for addressing poor people's priority concerns and then describe a participatory approach to project design and implementation in line with these priorities. Strategies combining energy and rural development objectives are then suggested in three areas: managing energy demand and improving family welfare through better household fuel planning; increasing energy supplies while improving rural biomass resources and agricultural productivity; and using energy to increase women's productivity and their incomes.

Energy as a starting-point for rural development

In highlighting the interdependent nature of basic human needs, including energy, the ILO country studies show that the pressure on women's time has greatly increased because of the growing scarcity of accessible woodfuel, together with the loss of food production and income sources resulting indirectly from deforestation.

Yet in most of the villages studied women did not regard woodfuel and cooking efficiency as top priorities. Their immediate preoccupation is the need for quick solutions to desperate food and income deficits. First of all, then, it is essential to help poor women understand the causes of these problems and to gain more control over resources that can provide their families with secure and higher levels of food and income. The need for locally conceived solutions and approaches is borne out by the great diversity of the ecological and other circumstances of the villages, even within the same country.

This does not mean of course that energy supplies are not important to these women. Energy is a very effective starting-point for addressing rural women's priority concerns with food, income and time saving. A schema of three different stages of environmental and socio-economic degradation can be used to put the women's priorities in these villages into perspective (table 4). Stage I is characterised by a biomass-rich subsistence economy; stage II by a natural resource system under pressure; and stage III by an advanced degree of ecological deterioration. Each stage corresponds to a particular priority for energy-related interventions. While conceptually these stages are separate, in practice more than one strategy may be needed simultaneously since many of the villages have characteristics of more than one stage.

In stage I signs of degradation are absent. Tree cover provides nitrogen fixation and mineral retention to the soil, while natural springs and rain provide water; agriculture is based on long fallow periods or even shifting cultivation. Access to many types of high-quality woodfuel is free, on
<table>
<thead>
<tr>
<th>Stage</th>
<th>Fuel access/types</th>
<th>Labour time</th>
<th>Income</th>
<th>Agricultural productivity and nutrition</th>
<th>Migration</th>
<th>Policy priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Free access to high-quality wood</td>
<td>Minimal</td>
<td>Forest-based industries and trade, food processing still viable</td>
<td>Little erosion. Nutrition based on a variety of locally cultivated and gathered products</td>
<td>Minimal</td>
<td><em>Energy for labour and time saving</em> to increase efficiency and productivity in specific tasks, e.g. improved animal traction for water lifting, hydro grain milling, better drying for fish and herbs, more efficient beer brewing</td>
</tr>
<tr>
<td>II</td>
<td>Access limited and increasingly privatised. Type of fuel used corresponds to income level; the poor mostly use residue fuels being unable to afford more convenient ones</td>
<td>More time spent on fuel gathering, cooking, water collection and agriculture</td>
<td>Forest-based industries and incomes declining</td>
<td>Falls as a result of erosion, diversion of organic matter to fuel. The rich take control of best lands and other resources. Diets depend increasingly on purchased foods</td>
<td>Male migration becomes an economic necessity for poor households</td>
<td><em>Energy for cooking and rural employment</em> to save time and raise incomes, e.g. through energy and resource-based income activities</td>
</tr>
<tr>
<td>III</td>
<td>All high-quality fuels commercialised and severe penalties imposed for encroachment on private resources</td>
<td>Satisfaction of basic needs alone requires all household time, with negative effects especially on women’s health</td>
<td>No natural resource-based or fuel-intensive industries or employment</td>
<td>Yields of staple crops fall dramatically. Food from relief or purchase. Nutrition and health poor</td>
<td>Out-migration of “ecological refugees” to cities</td>
<td><em>Energy for reclaiming waste lands and generating incomes,</em> e.g. through public forestry and infrastructure works</td>
</tr>
</tbody>
</table>

1 Concept based on a schema in Newcombe, 1984.
common land or individual plots. Gathered foods and forest products are important in artisanal production and are sold and traded for income. Forest products are also available for housing construction and other uses and forests are a source of food, as well as fodder, especially useful during droughts and the “hungry season”. Medicinal plants are widely used and there is sufficient fuel for heating and water boiling. Nutrition and health are sustained by a variety of locally produced items. Male migration is minimal since agriculture and small industries based on local resources provide adequate subsistence.

Energy for labour and time saving is nevertheless needed even in this relatively biomass-plentiful system. More food, easily accessible water and some cash income are frequently needs that could be met through a locally appropriate energy source. Improved animal traction for water lifting, small hydro grain milling, better drying methods for fish or other foods, and more efficient beer brewing are some possibilities. The proper choice depends on a clear analysis of women’s existing activities and time use and of locally available non-human energy sources that could increase the efficiency of these activities.

Ecological disequilibria and resource limitations are inherent in stage II as loss of tree cover and use of animal dung and crop residues for fuel decrease soil fertility. Finding fodder for animals becomes a problem. As the amount of arable land becomes insufficient for year-round subsistence, permanent or seasonal male labour migration begins, adding to women’s work burden. Living trees are felled for fuel by the well-off, but branches and twigs, bushes and residues become the major cooking fuels for the poor. Access to private, state and communal lands is controlled. Fuel entitlements may be tied to employment contracts or depend on kin or other social relationships. Households with enough cash switch to more convenient charcoal or fossil fuels. The amount of time that women devote to the preparation and use of low-quality fuels increases. Sale of fuelwood and charcoal making become important income-earning activities. But other small industries are curtailed on account of the shortage and high cost of raw materials and fuel. Diets become increasingly dependent on purchased foods. Nutrition and health may suffer from lack of wild foods and fuel.

Energy for cooking and for rural employment is needed in this stage to generate cash for the many new items that have to be purchased and to replace jobs lost owing to the deterioration of the biomass base. Basic activities such as cooking and fuel collection take up a large amount of women’s time, so that labour-saving cooking technologies may be necessary to release women for income-earning activities. As more activities are commercialised and families are less able to support themselves through their own production, there are also more potential opportunities for women to specialise in income-earning production and processing, e.g. in energy-related and resource-based activities such as making building materials (bricks and tiles), appliances (ceramics), clothing (knitting and weaving) and
food processing (drying, baking, brewing), and in petty trade in these products.

In stage III ecological decline is patent and biomass and cooking fuels are very scarce. Agriculture is in retreat. Top soil is depleted, ground cover disappears and there are few crop residues for fodder so that livestock raising becomes less viable. Dung, roots and sweepings are the only fuels available and most households must purchase all or most of the fuel they need. Droughts may become increasingly frequent and populations increasingly dependent on food relief. Nutrition and health are poor. The final resort for entire families is out-migration as "ecological refugees" to cities or relief camps.

Energy for reclaiming wastelands and generating incomes on fragile lands is a priority in this extreme situation. Gradual rehabilitation through progressive planting of grasses, bushes and trees and labour-intensive infrastructure works, e.g. terracing and irrigation, could provide the "energy boost" from outside that these degraded areas need, while also employing people displaced from agriculture.

While this rough outline makes it possible to conceptualise the type of energy intervention that may best respond to the priorities of the poor (and especially of poor women) and the local physical and socio-economic circumstances, in order to translate those priorities into effective action a participatory approach to project design and implementation is essential.

Energy for the poor: A participatory approach to project design and implementation

Attempts to remedy the situation should start from an assessment of existing activities, needs and problems made both by external and national experts and by the people themselves. The assessment should be based on participatory methods – which can include both quantitative surveys and qualitative interviews and group discussions. Implicit here is the idea that needs can be effectively identified and solutions acted on only if the individuals and groups concerned have themselves analysed their problems and found the answers. Action research can help the target populations to understand how their immediate poverty problems relate to broader environmental and social issues and to identify technological and other alternatives for making improvements. This approach usually requires a sensitive outsider able to establish close links with key members of the community and provide continuing support to fledgling women's and peasants' groups.

An organisational framework is necessary for helping the people to analyse their needs and to overcome the many obstacles to effective action. The groups set up for the purpose can include both men and women. However, experience has shown that working with women separately, or taking specific measures to make sure that women are able to voice their
concerns, is often necessary to ensure that they benefit. If they do not, the project is likely to fail in its other goals as well.

Projects that start from the preconceived notion that improved stoves or village woodlots are the solution to the problems facing women will probably not respond to their most pressing needs. However, renewable energy and forestry projects, where they avail themselves of proven energy sources (such as wind-powered irrigation of vegetable or other ‘home’ gardens or hydropowered grain grinding) and more efficient end-use devices (such as fish smokers and food processing stoves), can help women to meet their priorities of increased income and family welfare while at the same time economising on woodfuels or complying with other energy policy objectives.

Another essential step in this approach is to facilitate access to land, technical expertise and credit. Secure legal land rights are fundamental for any forest- or agriculture-based activity. The lack of access to appropriate technical expertise is a major obstacle for women in improving their productivity. Special mechanisms such as group credit, as well as group access to marketing and raw materials, are also needed to enable the poor to undertake new activities.

Let us now see how this approach can be applied in trying to achieve two common energy policy goals – managing energy demand and increasing energy supply – by combining them with rural development objectives.

Managing energy demand and increasing family welfare through improved household fuel planning and cooking efficiency

Managing energy demand obviously implies dealing with the needs and preferences of energy consumers, and in households these are primarily women. Many attempts to popularise new, more efficient stoves have foundered on the discovery that women cooks are not chiefly concerned about saving fuel. Even where fuel is commercialised, as in urban areas, fuel savings are often considered less important than time saving and other user conveniences. Partly for this reason, the results of efforts to save fuel have often been disappointing (Manibog, 1984; Foley and Moss, 1983).

Moreover, given the decline in fuel use and living standards that many poor families are experiencing as a result of higher costs and growing scarcity, it would hardly be surprising if more efficient stoves and fuels were being used not to save fuel but rather to restore family welfare (e.g. use of heating, more cooking) to pre-scarcity levels. This is why it may be unrealistic to launch programmes to improve cooking efficiency with the sole aim of saving fuel. It is also why nutrition and health planners and extension services, as well as energy policy-makers, should be involved in planning and carrying out such programmes. If they are to be successful, such programmes must be implemented by interdisciplinary teams and based on a systematic assessment of needs. The characteristics valued by women in cooking should be determined before the programme is launched, and the stove design should
provide for local variations in cooking habits, fuels, seasonal and alternative uses of the stove, and so on. The nutritional and health aspects of women’s cooking are also extremely important.

Stoves should be properly designed and tested by both technicians and cooks to ensure that they do deliver promised benefits in fuel saving and other respects. The collaboration of stove technicians with consumers’ (women’s) groups can be an effective way of choosing stoves to satisfy individual needs, as was confirmed in a recent project in Ethiopia (ILO, 1986b). Adequate production capacity and marketing networks must also be ensured.

The urban areas should receive special attention, partly because of the often desperate need of the urban poor for cooking fuel and partly because these areas tend to siphon off rural woodfuel resources. A variety of alternative fuels, stoves and other means of achieving fuel economies should be considered. Improved stoves are in fact more likely to catch on in urban or highly commercialised rural areas, where the cash costs of inefficient fuel use are high. Co-ordinated approaches to cooking practices, pot materials and types, diet, and fuel preparation and storage may be as effective in saving fuel as are improved stoves, and merit more attention.

Stoves projects in rural areas, however, come up against great obstacles. The low cash cost of biomass fuels in most areas tends to make the purchase of artisan-made stoves financially unattractive despite the potential saving of women’s time in fuel collection. On the other hand the fuel efficiency and ease of construction of low-cost owner-built “mud” stoves have been increasingly questioned: smokelessness, prestige and other factors may be more important than fuel savings for some rural users. Improved stoves certainly have a part to play in reforestation programmes and in the general efforts of extension agents to improve nutrition and health.

Biogas technology has not lived up to its expected potential for providing rural cooking fuel either; successful household or community projects are rare. However, biogas experiments may have failed because it was mainly men, without much interest in household energy, who organised them and set the objectives. Pilot projects for biogas plants run by women, for example a cattle-owning group, might therefore be tried.

While some changes in food use patterns in response to fuel scarcities have been identified (reducing the number of meals, cooking less, eating processed foods), the links between fuel savings and nutrition need to be investigated more thoroughly in the light of other factors; nutritionists should, at the very least, establish what potential effects such dietary changes may have on nutrition. The apparent inverse ratio between time spent on cooking and that spent on fuel collection also has nutritional implications which should be looked into more closely.

Nutritionists could also help to identify fuel savings that could be made in food preparation. Basic information on the quantities of fuel needed to cook different foods, or at least on cooking times and methods, is needed to
show how foods can be cooked with less fuel. Other cooking methods and the use of retained heat, or hayboxes, might also be systematically investigated and the findings disseminated by nutritionists and home economists. The availability of processed foods also changes food habits, and their consumption often has a detrimental effect on nutrition. On the other hand, the availability of ready-to-eat "street foods" reduces the fuel demand of many households.

Increasing energy supply and promoting agricultural productivity: Forests and land for food, fuel and fodder

Like demand management, energy supply development must take into account users' priorities, especially those arising from the shortfalls in food and income that households have experienced as a result of the general rural biomass crisis and the decline of agricultural productivity. Fuelwood is the lowest-value wood product of forests and therefore is unlikely to be the most important product for rural households (unless profitable external markets such as cities are nearby and natural forest resources are depleted to the extent that cash cropping of trees for sale becomes worth while). Yet it is also clear that it is far beyond the capacity of forestry services to plant enough trees to meet future wood and fuel needs. This can be done only by decentralising tree planting and therefore fuel production.

It has been explained above why, with the biomass crisis, rural women urgently need alternative sources of food and income. These needs could be met by combining tree and other biomass planting. Increasing food production was the top priority identified in Ghana and Mozambique, yet fuel is scarcer than food in some areas of Kenya, fodder for livestock is an important need in much of Asia, and in the relatively monetised rural economy of Peru earning cash income from natural resources is essential. The nature of the agrosilvicultural farming system that ought to be introduced will depend partly on households' and women's access to land: agroforestry can be practised on small farms, and food/fodder/fuel production can be combined in home gardens, on wastelands or on communal holdings. The legal and sociological obstacles to women gaining control over land deserve special attention.

Where the priority needs are to stabilise soil production, to generate income and to grow other products, the solution may be to combine trees and field crops on women's own holdings or on family land. This approach need not be limited to tree planting but can include bushes and other plants; or there may simply be a need for better management of fallow and shifting cultivation, e.g. by leaving some of the more valuable species when clearing. Scattered farm trees, improved fallows, alley cropping, mulching, buffer strips, terracing, windbreaks, live fencing and "interstitial" planting between crop fields are agroforestry techniques that can be practised on farms to
improve agriculture and also produce wood, fodder, fruits and so on, either for immediate sale, for further processing or for home consumption.

Even in areas where land is scarce or where women do not control extensive farmland, the land immediately surrounding the homestead is often used by women to grow vegetables and other foods for family consumption. The productivity of these home gardens can often be greatly increased by combining tree and bush cultivation with agriculture. Like more extensive agroforestry, home gardens can provide food, fodder and fuel (not to mention cash income); and the time previously spent on walking to gather such resources can be put into cultivating the gardens. The diversity of crops and products in these agroforestry systems can also help to avert the problem of seasonality and timing of production, so that some food crops are available when supplies are otherwise low.

Near cities or industrial markets, other potential income-generating activities lie in the production on wood lots or orchards of fuelwood, charcoal, poles, fruit or other items for sale or further processing. Women already have experience with food and raw material processing, charcoal making and wood preparation, and with trade and commerce in these products. These wood lots and orchards could also serve to provide wood and other products for home consumption.

The above proposals for making good the existing food and income shortfalls are all based on the assumption that women can add trees to land they already control. However, many women head, or belong to, families that have no land, especially in certain parts of Asia and Latin America. Yet these women have an even more urgent need for biomass products and income. Enormous expanses of uncultivated wastelands (overgrazed pasture lands, communal property, roadside ditches, etc.) exist on every continent. Some governments have already launched experimental schemes to give the poor access to such land. While the most notable example is India, such schemes are not limited to Asia. In Lesotho, for instance, it has been proposed that deep gullies caused by erosion should be reclaimed by leasing them to cooperatives of the landless in return for a labour commitment to maintain the reclamation infrastructures. The potential for land regeneration in the Sahelian region, for example as part of labour-intensive public works, is obvious.

Because of their need to secure quick returns of food and income, women and the poor in general will have to start gradually with quick-growing grasses, food crops and medicinal herbs, for example, before they can invest in bushes and trees that take longer to grow. This sequence could also help to restore degraded lands. External assistance will often be required to enable poor groups or individuals to secure rights to these lands. Even where property rights as such are not acquired, right of access to what is grown on the land would give women a guarantee that the fruits of their labour are not lost to others. While individual control over land may be a necessary incentive in some situations, in others groups may be able to carry
out activities jointly. Organisations of women and the rural poor will also require external assistance in obtaining the expertise, credit and marketing facilities they need.

Using energy to improve women's productivity and incomes

In all of their income-generating activities women are handicapped by their restricted access to land, raw materials, technology, skills, credit, extension services and so on. Transport and marketing (apart from what they can carry on their heads) are often major problems because of the constraints on their mobility and social contacts and because they seldom own means of transport, whether donkeys or trucks. To produce sound results any income-generating project must solve the problem of access to these essential inputs.

Energy is only one of the inputs needed for successful productive activities but it is crucial in determining the labour requirements and productivity of any small industry. So far, however, direct energy use in women's productive activities has received little attention.

More efficient energy supplies could improve the productivity of women's small-scale industrial work, especially work that is fuel-intensive such as food processing and ceramics. The scarcity of both fuel for process heat and labour for cutting, grinding, stirring, etc., often puts limitations on women's non-agricultural activities. Fish smoking ovens, rice parboiling units, oil purifiers, palm fruit sterilisers, crop driers and roasting units are examples of fuel-saving equipment that could increase the profitability of women's post-harvest and food processing activities. They should be viewed, however, as part of a package of inputs needed for income generation, together with raw materials, credit and marketing.

Perhaps the most important constraint that women face, however, is their lack of time: this is the "real energy crisis" for them (Tinker, n.d.). The availability of alternative energy sources could release women from repetitive, unproductive household tasks and thus give them more time for productive work. The improved household fuel supplies and technologies discussed above are one such strategy. Time- and labour-saving technologies are crucial for improving women's productivity, income and health, but, ironically, in order to purchase such technologies women must first earn income or have access to credit.

The differentiation made between "household" and "productive" work and the low value placed on women's work generally are obstacles to improving the productivity of their household work. Although time-use studies have highlighted the long working hours of women, the opportunity cost of women's time is usually considered to be zero. Alternative methods of evaluating women's time are needed. One possible approach is cost-benefit analysis to quantify the cost of fetching and preparing woodfuel (as well as other household tasks), based on local minimum wage or current agricultural
wage rates, in order to arrive at a realistic idea of women’s economic contribution. Such assessments could then be compared with similar analyses of the cost of providing subsidies for alternative fuels and/or credit systems for the purchase of alternative stoves.

Conclusion

Rural women are shouldering the major burden of environmental degradation and economic distress in many developing countries: working longer hours to produce enough food and income to support their families while having at the same time to collect fuel and water, with less family labour available because of male migration. In times of crisis, such as drought and famine, women’s contribution to family income and survival is even more crucial. Yet the access of many women to resources, including energy, is actually declining, while their workload is increasing. Fuel for cooking and heating, wild foods, fodder, and biomass raw materials (including energy) for small industry are becoming increasingly scarce in many regions and the shortages, which can have serious repercussions on family nutrition and health as well as on incomes, are likely to get worse.

Neither energy policies nor rural development policies have so far come to grips with the links between rural women’s work, energy and the environment. Poor women have often failed to see the links themselves because of their overriding, immediate preoccupations with food and income. Energy can nevertheless serve as an extremely useful starting-point for meeting women’s priorities through participatory projects. Grass-roots organisations have a vital role to play in identifying group needs, in obtaining access for the poor to such essential inputs as land, credit and technical expertise and in overcoming other obstacles.

It is possible both to manage energy demand and to increase family welfare through improved household fuel planning and cooking efficiency. Woodfuel supplies can be increased and agricultural productivity promoted through agroforestry and other more efficient ways of using land to produce food, fuel and fodder. Decentralised energy supplies can improve the productivity of women’s income-generating and household activities. And by combining rural development and energy goals in a participatory approach, it is possible to meet both objectives more effectively.

Notes

1 Examples cited in this article are mainly drawn from the following ILO country studies: E. Alcántara et al.: Crisis de energía rural y trabajo femenino en tres áreas ecológicas del Perú (Geneva, ILO, 1986; mimeographed World Employment Programme research working paper; restricted); E. Ardayfio: The rural energy crisis in Ghana: Its implications for women’s work
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2 Plastic wastes reported to be eating away metal roofs and chat twigs said to transmit tuberculosis.

3 I am indebted to Ben Wisner for many of the ideas, and indeed for key phrases, in this section (Wisner, 1986).


5 This section and the following one are based on the findings and conclusions of a Preparatory Meeting on Energy and Rural Women’s Work held in Geneva in October 1985 (ILO, 1986a).

6 Some useful guides to stove project assessment and monitoring have recently been published. See, for example, Joseph et al., 1985, and Intermediate Technology Consultants, 1985.

7 In one of the villages studied in West Java improved stoves were introduced under a rural development programme to raise the inhabitants’ consciousness of women’s work and the technology they use in the household, to stimulate interest and experimentation in technologies with forward and backward linkages to rural industry and marketing, and to provide a fledgling co-operative with the challenge of managing a technology and small industry development problem, in addition to saving fuel (Poerbo et al., 1985).

8 The following section is based partly on French, 1986.

9 Personal communication to the author from Ben Wisner.

10 A useful manual on these and other ways of easing rural women’s work is ILO, 1984.

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IBRD. 1983. The energy transition in developing countries. Washington, DC.


International Labour Review


