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Roberto Caceres et al

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Status of improved woodstove dissemination in Sri Lanka

R. M. AMARASEKERA

Introduction

Sri Lanka is a small island situated close to the southern tip of India. The total population is around 16 million in an area 65,610 km², the majority of whom are engaged in agriculture. Nearly 80% of the population lives in rural areas.

The three major sources of energy in Sri Lanka are fuelwood (72%), hydro-electricity (10%) and imported fossil fuels (18%). Sri Lanka does not have any fossil fuel resources and therefore the entire requirement has to be imported. In 1984, oil imports cost 52% of the foreign exchange earnings of the country.

Fuelwood is by far the largest source of energy in Sri Lanka. Contributions to the fuelwood supply come mainly from agricultural and crop residues, home gardens, shrubs and forests. The natural forest cover of Sri Lanka, which was 44% of the land area in 1956, had decreased to 24% in 1982. At present the average rate of deforestation is 1% per year. The factors which have contributed to the dramatic depletion of forest cover are: forest clearings for government development activities, encroachment due to population growth, legal and illegal extraction of commercial timber, and shifting cultivation.

Despite the fact that it is increasingly becoming a scarce commodity, in rural areas firewood is still gathered. However, in urban areas where firewood is generally traded, the price has escalated by about 600% during the last three decades.

Being aware of this situation, a number of policy initiatives are contemplated by the government of Sri Lanka. These are generally directed towards expansion of the biomass resource base, adoption of better management and conservation practices of existing resources, improvement of utilization efficiency by disseminating improved woodstoves, utilization of agro-residues instead of firewood, and development of new and renewable sources of energy.

Fuelwood supply and conservation strategy

The National Fuelwood Conservation Programme

(NFCP) was launched by the Ministry of Power and Energy in 1984 with the objective of reducing the consumption of firewood. The major activity under this programme is dissemination of improved woodstoves.

Although the Forest Department has plans to meet the entire fuelwood demand up to the year 2000, the wood stove project is viewed as a back-up project in the event of a shortfall in supply.

Half a million stoves are to be installed in rural areas by the year 1995. The average annual consumption of firewood per household is estimated to be 2.5 tons. Assuming a saving of 20%, each stove could save 1.5 tons per year. Hence 500,000 stoves could save 250,000 tons which is almost 2.5% of the total annual energy consumption.

NFPCP receives inputs from several organizations, since the requirements of such a programme cannot be met by a single organization.

In 1984 the stove team consisted of a part-time Engineer and two field assistants with technical support from the Sarvodaya Movement. However at present, the stove team consists of a project manager, eight district co-ordinating officers, two training officers, three drivers and about forty field assistants, all working full time on the project. The number of staff is likely to expand in the future, depending on the area of operation. Field assistants are selected from the most efficient stove builders with secondary level education, whose services are obtained on a daily wage basis.

Stove design, rural and urban

Cooking habits differ by locality and social class and vary seasonally in rural areas. However, rice is generally eaten twice a day with vegetables, fish or meat. For breakfast bread or 'rotty' (wheat flour pancakes) are eaten. Tea is prepared three to five times a day; the kettle is kept simmering most of the time. Duration of the cooking period is generally longer in rural areas than in urban ones.

Traditional 'U'-shaped mud stoves and three-stone open hearths are mostly used in rural areas. In

almost every house two stoves are built to enable two pots to be used simultaneously. Cooking is generally done in an outer kitchen that may or may not be attached to the main house. Among low income urban dwellers cooking is done in the living room.

Despite shortages, fuelwood is still gathered by the rural dweller. The urban dweller spends 10% or more of his salary to meet his fuelwood requirements. The price of a ton of firewood in the city is almost Rs800 (US\$ 25).

In view of these circumstances, the NFPC has identified different programmes for rural and urban areas. Several single and two pot stove designs have been developed for the urban area by various organizations during the last decade (Figures 1-6). All the work done so far is based on the concept of the portable pottery stove. The most promising among them are the designs by CISIR, IDB and CEB. Several laboratory and field tests and surveys have been carried out to assess the performance of these stoves at various locations in Colombo city.

Urban programme

Most of the preliminary work such as designing, testing, and field evaluation is now complete, what is required now is to focus on final design requirements and to develop production and marketing strategies for large scale dissemination in urban areas. The urban programme will require a commercially oriented dissemination strategy and large-scale centralized production.

Since the urban dweller has to pay for his firewood, he can benefit financially from an improved stove even if it is purchased at an unsubsidized price. This makes a commercially oriented strategy possible in urban areas. The production system has to be geared to cater for a large centralized market, which requires mass production of good quality. These facilities exist in the private sector infrastructure, such as in the brick and tile industry.

The programme, which spans a period of one and a half years, is directed towards:

- o Identifying suitable designs;
- o Establishing a production unit making use of an existing government or non-government tile factory situated close to the city;
- o Establishing a suitable market mechanism;
- o Dissemination of 100,000 stoves.

Rural programme

The target of the rural programme is to install 500,000 stoves by the year 1995. The cost of installation is to be borne by the user. Of the total target



Figure 1: CISIR stove (urban)

of 500,000 stoves, 140,000 stoves are to be built by the year 1990 under the Dutch Assisted Programme.

At the time the NFPC was launched, only the Sarvodaya stove had a well-documented history of development and social acceptance. Its efficiency is reported to be 23% with fuel savings ranging from 20-50%. Its life span is two to four years, and its estimated price is Rs 65, which includes a 55% subsidy.

Extension officers are expected to stimulate demand and indicate their requirements to the Assistant Government Agent (AGA), who will supply the pottery liners. An installation fee of Rs 15 is charged for the service. The AGA is paid Rs 5 per stove installed to cover transport and administration costs and the extension officer is paid Rs 3 per stove for his efforts.

Production

Decentralized production of stove liners is preferred for several reasons.

- o Since demand is spread over a large area, transportation costs from the production centres have to be kept low.
- o Unlike centralized production systems, the production costs are low since no overheads are involved.
- o To revive the dying pottery industry and to provide a source of income to the potters who are among the poorest of the society.



Figure 2: CEB 2-pot stove (urban)

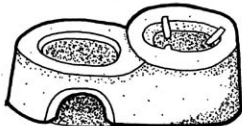


Figure 3: *Sarvodaya insulated mud stove (rural)*

Over one hundred potter families have been trained so far and about seventy are in production. The production process consists of clay preparation, forming, drying and firing. An average family with only the husband and wife working can produce about one hundred stoves a month, which gives an income of Rs1500 against Rs300 spent on clay and firewood. Standard purchase price of a stove liner is Rs15.

Production constraints are technical as well as social. Traditional pottery and stoves differ in characteristics and require different production techniques, which some potters fail to realize. When too much control is exercised potters tend to drop out of production.

In most cases, firing is done in a pit which cannot be raised to desired temperatures. Under this scheme, a simple testing facility is being established at the Rural Energy Centre, Pattiyapola. This could help the project staff to advise the potters on the proper clay composition. Social and other organizational problems are more difficult to overcome. Another major problem is the need to make payments to potters in cash since they do not have facilities to handle cheques, money orders, etc.

Review and future directions

Dissemination

The experience gained so far pinpoints two major drawbacks in the strategy which may retard large scale dissemination. The first weakness is the need to depend on AGA and their subordinates in activities other than publicity, namely for distribution of pottery liners, marketing and installation, and co-ordination. The second drawback is the need to have a trained person for installation.

It now appears that considerable motivating force and intensive monitoring are required to push AGA's and their subordinates to their targets. Nevertheless, a number of AGA's have gone beyond their targets, which indicates that commitment plays an important role in success. In the new strategy, the

AGA network is being replaced by co-operative, welfare and credit societies, women's organizations, etc. These organizations are now transporting pottery liners, marketing, and co-ordinating installation; the stove project pays them Rs 8 per stove for these services.

Subsidy

The commercial value of the stove is around Rs 50. This includes Rs15 for the liner, Rs 20 for installation, Rs10 for transport and Rs 5 for the vendor.

Since firewood is still not paid for in rural areas, it is unlikely that an average rural dweller would be prepared to pay Rs 50 for a stove. With the availability of Dutch aid and the need for rapid dissemination, the price was brought down to Rs 15 throughout the programme areas. However, the experience so far shows that the majority of the poorest are still isolated from the benefits of the stoves programme. Reasons are that they have other priorities to worry about, do not have permanent houses or kitchens, do not have sufficient education to identify their priorities and to realise the benefits afforded by an improved stove, and do not see the logic of investing Rs 15 on a stove when firewood is free.

For whatever reason, it is clear that the subsidy is not being utilized by the majority of the most needy. At present, the Government subsidy amounts to Rs 45 (US\$ 1.50) per stove. In other words, this would mean providing financial assistance of US\$ 1 to save 1 tonne of firewood (one stove saves 1.5 tonnes within three years).

Design

The new design gives users the choice of using the stoves as they are sold, of insulating the stoves themselves, or of paying a skilled person to insulate it for them. In the author's opinion, this is the most suitable approach and should be given priority. Attempts have already been made in this direction. A single piece two-pot pottery stove has been developed by Sarvodaya and CEB, which is promising.

Recent field studies, comparing the new stove and



Figure 4: *CEB stove*



Figure 5: IDB stove



Figure 6: CISIR stove (rural)

the open fire, carried out by the CEB in Ratnapura and Kandy districts reveal fuelwood savings ranging from 16–39% and 20–48%. Laboratory tests done at the CISIR indicate 21% efficiency compared to 23% of the Sarvodaya stove. Fuelwood consumptions between the insulated and non-insulated stoves do not show any significant difference. However, insulation would improve the life span of the stove. The main constraint of the new stove is the difficulty in training potters.

Evaluation

Evaluations were carried out in Hambantota and Ratnapura districts by the IRDP authorities, to assess the impact of the programme. In Hambantota district it is revealed that, at least 81% of the users save 25% of the firewood formerly used. The users indicate the time saving in cooking as the most favourable aspect of the stove. 59% of households used only the new stove, while 26% used the new stove often and an open fire occasionally.