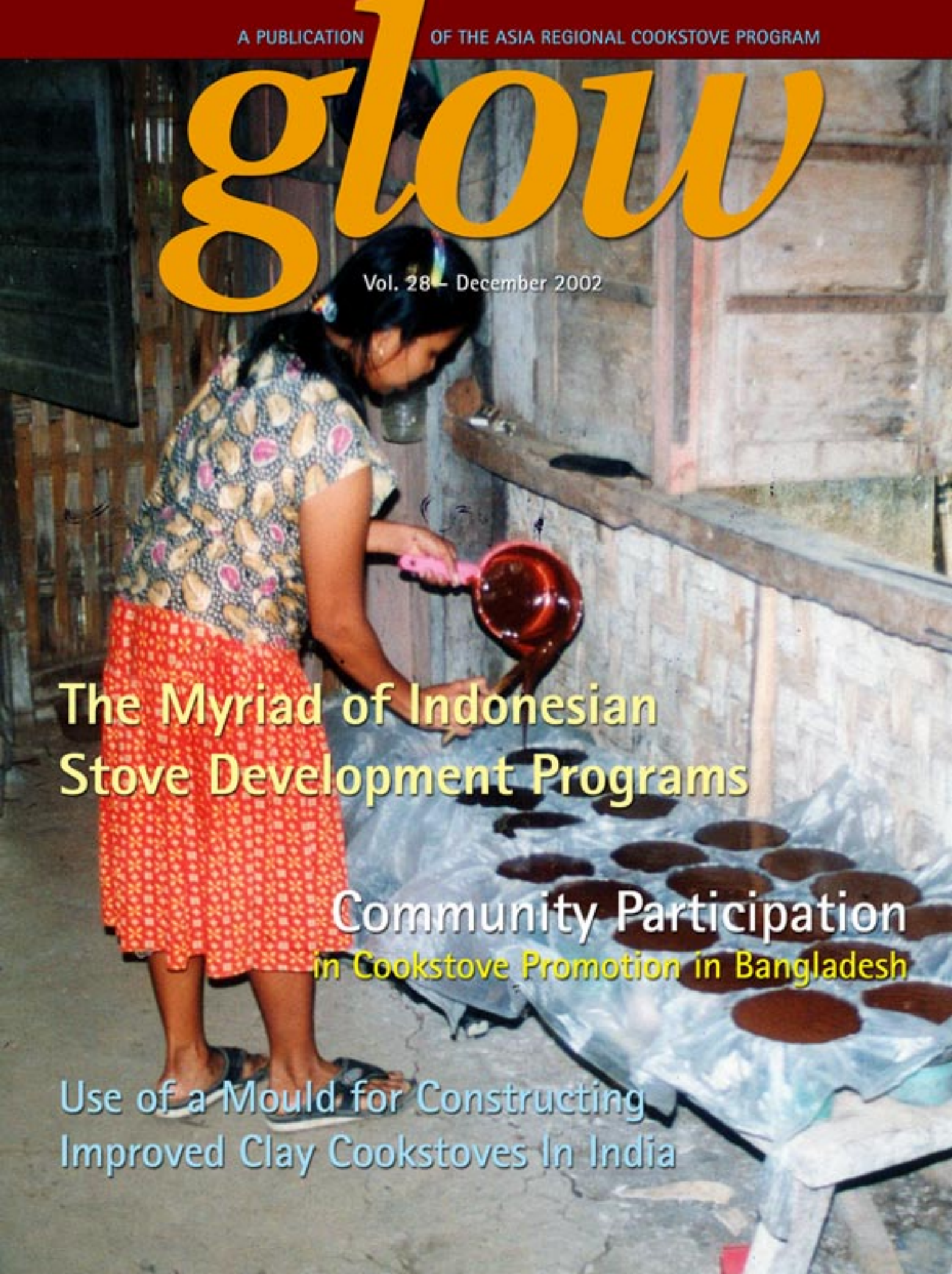
A PUBLICATION OF THE ASIA REGIONAL COOKSTOVE PROGRAM

glow

Vol. 28 – December 2002



The Myriad of Indonesian Stove Development Programs

Community Participation in Cookstove Promotion in Bangladesh

Use of a Mould for Constructing Improved Clay Cookstoves In India

glow

PUBLISHER
Asia Regional Cookstove Program

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SUBSCRIPTION:
For subscription, please contact ARECOP Secretariat. Back volumes of Glow are available upon request.

CONTRIBUTIONS:
Glow welcomes contributions from readers. Let us know about your work as well as your problems. Please contact ARECOP secretariat for contributions.

PRODUCTION:
Gaia Solutions, Yogyakarta

ISSN:
0853.4497

ARECOP

The Asia Regional Cookstove Program (ARECOP) is a forum for voicing the concerns of improved cookstove programs in the Asia Region. It influences and facilitates effective and efficient programs in improved cookstove issues.

DEAR READERS

In an effort to keep ARECOP members informed of activities and projects of other members, the ARECOP secretariat agreed that it would be a good idea to invite each CCP to write an article outlining the latest happenings in their country network. As each country in the ARECOP network has focussed on different parts of an improved cookstove program, differences were taken into account and each country was asked to write about something specific to their improved cookstove program.

The secretariat received articles from CCPs and members in India, Bangladesh, Nepal and Indonesia, highlighting the various activities recently undertaken in each country.

India's recent success in cookstove dissemation is largely due to the use of a stove mould in the stove production process. The mould simplifies the training process, enables centralized stove production, and expedites the entire in-household stove construction process by approximately one week. Furthermore, the mould can be used to make three different stove designs, and greatly improves the stove's finished look, which contributes to stove selling power.

Bangladesh is currently facing a land crisis, due to the fact that only 9 – 14% of land is under forest cover, which must sustain an ecological balance for a population of 133 million people. This reality means improved cookstove programs play a critical role in reducing biomass wood-fuel use by promoting more efficient cookstoves. Network organizations are also undertaking programs to encourage organic agriculture development to ensure sustainable livelihoods and empower poor people through technical trainings.

The Nepal CCP recently implemented an "Action Program for Strengthening Improved Cook Stove Networks in Nepal," in order to reduce identified gaps in the field of ICS through research and development. In collaboration with member organizations, R&D is being implemented in the following four sectors of ICS: A Healthy Kitchen for a Healthy Family, Stove Improvement for Agro-processing and Micro-Enterprise Development, Action Research Project for the Installation of ICS and Assessment of Health Effects from Women's Perspectives Specific to Tamang and Balami Communities in Rural Kathmandu, and Research and Product Development for Cooking and Space Heating Stoves.

Lastly, Indonesia's myriad of cookstove programs is progressing well, from reducing mangrove exploitation through charcoal production from coconut shells, to stove development construction and research at CCP headquarters in Yogyakarta, Java.

You will also find a brief update on CCP activities in Cambodia, Vietnam and the Philippines towards the end of this issue.

We hope this issue, featuring updates from ARECOP CCP's on the latest happenings in improved cookstove program development, research and programs, will encourage network members to take advantage of the wealth of information, expertise and knowledge that exists in this diverse network of improved cookstove programs.

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Community Participation in Cookstove Promotion in Bangladesh

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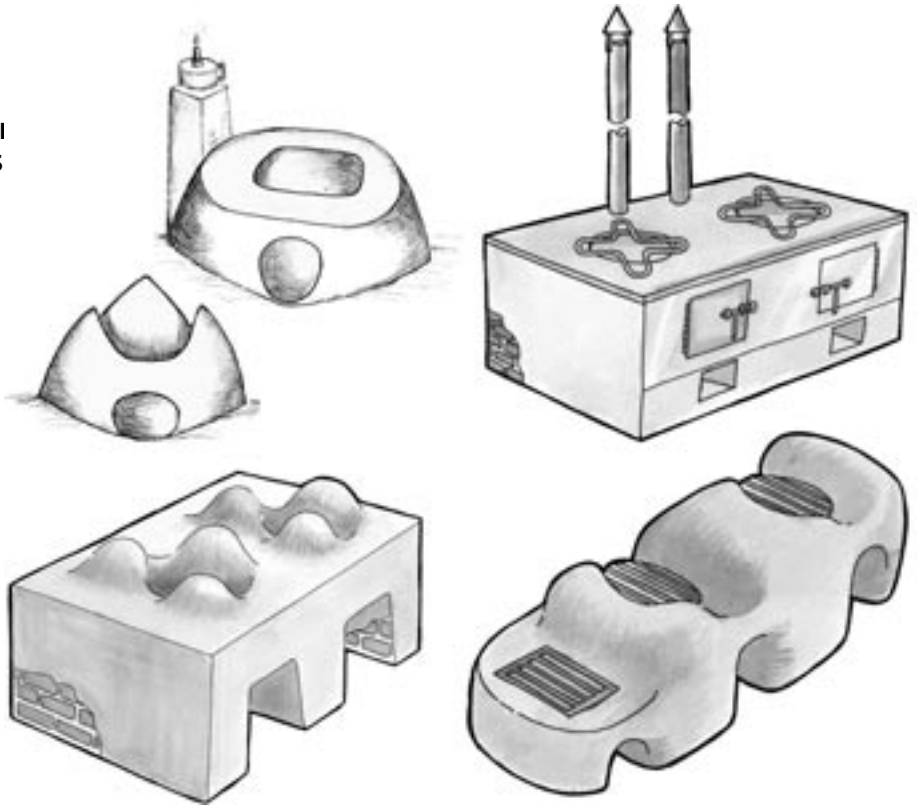

Introduction

Bangladesh is a predominantly agricultural country in Southeast Asia, with a population of 133 million, a growth rate of 1.47%, and a population density of 834 people per square mile. It is scientifically accepted that 25% of land in a country needs to be forest cover in order to sustain an ecological balance. While statistics suggest that Bangladesh has 14% of land under forest cover, other observations calculate only 9% (approximately). To sustain the 133 million people of Bangladesh, natural resources are utilized to their extreme.

More than 80% of the country's population resides in rural areas. Readily available fuels in the villages are fuelwood, cow dung, straw, leaves, rice husk, jute stick and others. The annual consumption of these fuels is about 39 million tons, which constitutes 83% of the total consumption of the economy. The natural gas supply network covers only 4% of the population. Even most of the semi-urban and urban populations use traditional fuels for cooking and other heating purposes. The use of traditional fuels is also increasing with rapid population growth. This is causing deforestation and consequently a change in the ecosystem, leading to soil erosion and climate changes.

Considering the serious environmental and ecological situation in Bangladesh, both GO's and NGO's have carried out activities to improve the situation and popularize and increase the user rate of ICS technology. Until now, the results are not too encouraging. Village Education Resource Center (VERC) is a national NGO engaged in developing livelihood technology for the purpose of bringing about sustainable change. ARECOP has also been supporting VERC to that effect.

Network Activities

An efficient and effective NGO network has been established with ARECOP support to improve the health of cookstove users and popularize ICS for the purpose of preventing ecological degradation. The main objectives of the network are to promote appropriate and user-friendly ICS technologies in rural and urban communities, and to improve technical and programmatic skills on ICS among development actors to enhance ICS promotion.

In line with the above, Unnayan Dhara (UD), a local NGO, came in contact with the network and sent a staff member for training on ICS technology to VERC. The staff level training has brought about a qualitative change in the technology promotion process of the organization and it is estimated that the new dimension is making a noteworthy contribution in the sector. The impact of the new initiative can be seen from the following success story.

Harishongkarpur is an intensive working area of UD—a remote village under the district of Jhenaidah in the western part of Bangladesh. About two hundred households maintain their livelihoods mostly on agriculture and small businesses on a very limited scale. Both Islam and Hinduism are practiced among village residents.

IMPROVED COOKSTOVE USED IN TEASTALL

Arable land in the country is facing a disastrous situation caused by a lack of appropriate foresightedness in the process of adaptation. Soil fertility in Harishongkarpur is also declining due to excessive use of chemical fertilizers, which are also causing an ecological imbalance. While biomass residues like wood-fuel; cow dung, straw, leaves, etc., are being used for cooking purposes, cow dung is not readily available due to the scarcity of cattle heads for cultivation due to poverty. Apart from this, the available cow dung is mostly used as cooking fuel rather than manure.

Considering the gravity of the above-mentioned situation, UD has undertaken fuel-efficient cookstove technology dissemination activities. The intervention will help reduce the present trend of ecological balance degradation to some extent. The intervention has been supported by the ARECOP network with training and communication materials.

UD started activities in 1992 with a mission to create a participatory sustainable process for socio-economic structural change through empowerment of the poor by providing need-based development support and services for holistic development. The sectoral attention so far given to achieve the mission has been organizing disadvantaged people and giving them skill-development training. Human rights and gender issues have been given priority. The improved cookstove program lays an emphasis on introducing organic agriculture development activities to ensure sustainable livelihoods and to save the environment through eco-friendly agriculture. ICS activities that are implemented in Harishongkarpur are part of the Conservation of Biodiversity Program of UD.

In rural areas women use cow dung as fuel for cooking in general. UD is trying to introduce compost manure as well as organic manure where cow dung is used as an activator in the preparation process. UD is implementing ICS activities to save firewood and ease the tasks of cooking for rural women. The ICS program in the area plays a significant role in daily life, and is gaining popularity due to the direct impact on fuel-wood consumption. This network partner NGO is working to play a broader role in the region with scanty forest resources to bring about sustainable change with other development interventions.

Scaling-Up of Technology

Activities carried out by GO's and NGO's to popularize the ICS technology could not address the needs adequately. The technology was not user-adaptable and did not meet cultural needs. Furthermore, during the process of developing models/designs, the users did not have any scope to participate or contribute.

VERC organized a workshop with the participation of grassroots-level staff members of network member organizations in March 2002 to improve the efficiency of traditional cookstoves in a very simple way. Before attending the workshop, participants addressed issues like how the heat of the cookstove is lost, and then generated ideas to improve the efficiency of the traditional cookstoves. In Bangladesh, most of the stoves used in poor/marginal families have a big gap between the cooking pot and the raised pot-rest. As a result, a significant amount of heat is lost. Most of the participants gave attention to this point and they have reduced the gap. Thus, they observed a tremendous increase in stove efficiency. After the workshop, the participants shared their knowledge with cookstove user women in their villages. The participants and users were happy with the innovation, as they were able to develop their existing stove model in a very simple way. Moreover, they found that the stoves do not create any health hazards from emitting excessive smoke, and there is no heat while cooking. By the end of the workshop 13 models were developed.

The workshop thus improved stove efficiency by making necessary adaptations to the traditional designs rather than struggling with unfamiliar complicated technical designs. They also shared ideas in improvement of traditional kitchen designs to reduce health hazards of kitchen users and children. The participants were found to be happy with the outcome of the workshop and they are promoting the designs in their respective areas simultaneously with other development activities.

Adamika Sarkar, a Field Organizer of UD, attended the above-mentioned workshop organized by VERC to get hands-on knowledge concerning the construction of improved cookstoves and the basics of increasing cookstove efficiency. She also attended the trainers' training workshop earlier.

Lessons Learnt

After attending the workshop, Anamika Sarkar encouraged the stove users to work together to develop the new stove models. User participation in developing training/workshop modules is important in the dissemination process. The participants in this process retained an interest in further promotion processes in communities. Sharing of experiences helps improve ICS technology design by identifying deficiencies and giving hands-on expertise to play a more creative role in disseminating new learnings to others in the community.

It is recognized that the technology which will be disseminated or developed should be user-friendly, culturally accepted, durable, easy to construct and easy to maintain. Materials should also be easily available and low-cost. The replication process should be maintained by women in the community.

Conclusion

To strengthen the information dissemination process, the following issues need to be taken into consideration:

- Participation of cookstove users in the model development process needs to be encouraged
- Information dissemination on: (1) Benefits of improved cookstoves, (2) Fuel-efficiency level, (3) Improved cookstove demonstrations for the purpose of awareness raising, (4) Health issues need to be highlighted through sharing with others in communities.
- Follow-up of activities ensures continuity of the process in program areas.

At this stage of the program, external support is needed to disseminate ICS technology on a massive scale. The network is providing support to the initiators only on a limited scale due to resource constraints. More attention should be given to explore avenues for required resources and mobilization support.

Rina Begum is Happy With Her Cookstove

Pictured below is a very happy woman, smiling with pleasure, using an improved cookstove below. We met her in Harishongkarpur village. At 37 years old, Rina Begum enjoys her family of three children and a husband. Her husband, Mr. Khalilur Rahman, does not have any arable land except a small piece of courtyard. He maintains his livelihood from the earnings of a small hotel in the nearby marketplace.

RINA BEGUM IS HAPPY WITH HER COOKSTOVE

When we reached Rina's house along with Anamika Sarkar of UD, she was extremely busy with cooking. Every day she has to supply prepared food for the hotel that is run by her husband. We found Rina's kitchen very clean, with a type of cookstove not similar to the traditional one. We started talking with her about the cookstove, and she informed us that previously she had a traditional stove. Anamika Sarkar told her about the possible development of her traditional stove with a minimal alteration of structure. Initially she had some hesitations, as her stove had been used for generations. 'How could she give up the traditional technology?' she thought to herself. But upon considering the various difficulties like fuel-consumption, excessive smoke emission and heat, she agreed to change her mind.

"Getting ideas and suggestions from Anamika on the development of the structural design of the cookstove helped me design the cookstove on my own," Rina informed us. When she started cooking, she found that the stove did not emit smoke, and as a result her eyes were no longer irritated. She also realized that the stove needed less fuel compared to the previous stove, and the cooking utensils were cleaner due to less soot.

"Before construction of the improved stove it was very difficult for me to supply large amounts of cooked food to the hotel for 30-40 people at a time. Now I feel relaxed. I am able to help my husband supply food to the hotel within the stipulated time in addition to providing my family with their daily food needs, which has a significant impact on financial benefits to my family," Rina told us. She also informed us that the direct benefits from the improved cookstove led her to destroy the previous stove. On the way back we also visited some households using improved cookstoves and were informed that they were encouraged to construct new stoves with ideas from Rina Begum. This provides an illustration of the sustainable replication process of the new technology in rural areas of the country.

WENETCAM
Wood Energy Network of Cambodia

REGIONAL TRAINING ON GENDER SENSITIVE PARTICIPATORY MONITORING AND EVALUATION WAS CONDUCTED BY WENETCAM

Arecop has country contact point (CCP) in 7 countries. In the beginning of the program, Cambodia was not one of the CCP's, but due to the political, social and environmental (related to the demand for ICS program) conditions of Cambodia, Arecop included Cambodia as a member of Arecop network.

History of Wenetcam

CFSP is a project which main target is to establish technical, social and economic references on the theme of reduction of fuel wood consumption in Cambodia, allowing them the diffusion of the acquired knowledge on Kompong Chhnang province towards the whole country. CFSP phase 1 is a three years long project started in December 1997. The CFSP phase 2 just started in mid year 2002 for four years project.

CEDAC is a local Non Governmental Organization, which was set-up in 1997. Its main action fields concern agriculture development. CEDAC has collaborated from the beginning with CFSP on improved cookstoves dissemination and set-up a Wood Energy Service in 2000.

A workshop organized in May 1999 by CFSP and CEDAC had gathered all the people formerly trained on improved cook stove dissemination in order to assess the different programs set up throughout Cambodia. The request of the attendants was to implement a network to synchronize and coordinate the work on improved cook stove in Cambodia.

FSP and CEDAC decide then to implement the Wood Energy Network of Cambodia by the beginning of the year 2000.

The WENETCAM will inherit all methods, tools, experiences and references made by CFSP.

The WENETCAM aims to initiate, sustain and promote any actions in order to reduce fuel wood consumption in Cambodia.

CFSP and CEDAC are founders of WENETCAM.

In accordance with the Seminar conducted in May 1999, the membership of the Network includes the Governmental institutions such as Ministry of Agriculture, Forestry and Fishery, Ministry of Rural Development, Ministry of Environment, Ministry of Education, Ministry of Women Affairs, Ministry of Industry, Mines and Energy and Ministry of Health.

The WENETCAM also includes as members the NGOs, concerned with wood energy actions. Therefore, the members of NGOs, who joined the seminars on improved cook stoves in 1997 and 1999, are included in the membership list of the WENETCAM.

However the WENETCAM is open to all organizations and individuals who are concerned in wood energy awareness action and improved cook stove dissemination.

SAMAKI STOVE IS USED BY HOUSE HOLDS IN KOMPONG CHHNANG

OBJECTIVES

1. Chose adapted legal status to make WENETCAM sustainable, autonomous and acknowledged in the Cambodian and international contexts.

2. Facilitate communication and information transfers among membership by: a. Edit and disseminate a Newsletter in English and Khmer, b. Open a library on improved cook stoves and wood-energy related matters, c. Facilitate Khmer translation of publications, d. Organize periodical meetings with different topics, e. Organize field visits to know the field activities of each member.

3. Target to develop new design of improved cook stoves, considering social-economical conditions, dissemination strategies, technology.

4. Initiate a stove laboratory to facilitate improved cook stoves development to any member.

5. Encourage and support any actions to disseminate improved cook-stoves throughout Cambodia.

6. Manage promotion actions to increase the utilization of improved cook stoves either in rural or in urban areas.

7. Look for funds to make network activities sustainable.

PRODUCTION OF NEW LAO BUCKET STOVE IN KOMPONG CHHNANG PROVINCE, ADOPTED FROM IMPROVED THAI BUCKET

STOCK OF TWIN STOVE, WAITING FOR QUALITY CONTROL

The Myriad of Indonesian Stove Development Programs

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CHARCOAL PRODUCTION TRAINING IN YDT, PONTIANAK, WEST KALIMANTAN

Indonesia is a large island nation consisting of five large islands and thousands of small islands. A stove dissemination program must therefore be concerned with large-scale human and material resources and empowerment.

Data collected by the FAO shows that as much as 60-70% of the total population of Indonesia utilizes biomass fuel. Furthermore, a survey done by The Director General of Electricity and New Energy and the Bogor Institute of Agriculture in 1981 in Java showed biomass consumption at a rate of 0.82 m^3 per capita per year, rising to 0.85 m^3 per capita per year in 1986.

Research and Implementation

Early in the reactivation of the Indonesia Cookstove Network (JKTI - Jaringan Kerja Tungku Indonesia) in the year 2000, there arose a dilemma. Should we begin with development research about stoves already in existence or rather directly with stove dissemination to target groups throughout the network? In the end we chose a middle road. Several research activities were organized among implementation programs for several network participants.

Network activities in Indonesia have already begun to show results. JKTI has conducted technical trainings on stove construction, arranged apprenticeships in charcoal and stove production, and supplied information to a number of organizations to encourage them to develop stove programs in their target areas.

These organizations want to develop stove programs for a variety of reasons. In their struggle to decrease mangrove deforestation in Bunaken Sea National Park in Manado, Northern Sulawesi, the Natural Resource Management Project has developed a program to produce charcoal from coconut shells to replace wood-fuel previously taken from mangrove forests. The Hamim Jember Foundation in East Java has tried to decrease exploitation of Meru Betiri National Park by developing improved stoves for household use and for the manufacture of palm sugar. The Bina Insani Foundation in Northern Sumatra has developed a stove to improve indoor air pollution in local kitchens. The Nusa Tenggara Project with GTZ in East Indonesia have begun a stove program to decrease women's workload from kitchenwork and collecting firewood. Sapa Persada Indonesia Foundation has begun a stove program continuing from a disaster management program in Central Java. The Environmental Conservation Foundation is trying to decrease exploitation of community forests by developing a 'fuel garden' and fuel-efficient stoves. And lastly, Dian Tama Foundation is developing innovative technology for charcoal production and disseminating improved stoves to raise the quality of life for women in West Kalimantan.

From these examples, one can see the diversity of stove programs in Indonesia, from the need for improved cookstove programs to the locations used, kinds of stoves being developed, and the research and implementation being conducted.

The Next Step

There are several things that need to be done to ensure the successful continuation of stove programs in

Indonesia:

- Continue researching stove technology that has been and is currently being developed.
- Information dissemination through magazines, books, leaflets, and a website.
- Conduct trainings, technical assistance, study tours and apprenticeships
- Organize and assist technical stove and fuel research, and prepare a stove dissemination approach.

Saving Bunaken Sea National Park through Fuel Substitution

In March 2002, a stove and charcoal production program in Bunaken Sea National Park joined a charcoal apprenticeship program operated by Yayasan Dian Tama in coordination with JKTI. Natural Resources Management (NRM) Manado sent two participants to the program, one from NRM of Manado and one from from Arakan Manado, a community-based organization. These participants applied their knowledge in both island and mainland settings.

The stove developed from the training is an energy-efficient mudstove fueled by charcoal made from coconut shells. According to Sinta Djuang of NRM, there has been no problem with the shift from wood-fuel to coconut shell charcoal, as coconut shells are available in abundance from Bunaken National Park's coconut crops. Previously, the local community used a three-stone stove that wasted fuel, and to collect enough wood-fuel the community was forced to cut down mangrove trees, which threatened the existence of coral reefs in Bunaken National Park.

Now there are 22 areas facilitated by NRM for the dissemination of cookstoves and the utilization of coconut shell charcoal. Several target groups have attained the necessary skills to facilitate trainings in areas that have never used improved cookstoves or fuel in the form of coconut shell charcoal.

At this moment, several stove models produced by the community have already been traded between neighborhoods. Aside from daily household use, coconut shell charcoal from household production has been offered by NRM to charcoal factories in Manado and this is still in the negotiation phase. Sample coconut shell charcoal made with a drum kiln has been tested and proven to have a high-carbon content.

Coconut shell waste that previously accumulated as garbage is now no longer seen. In fact, coconut shells have already become such a limited commodity that they were even stolen in one neighborhood. One funny story reports that a couple was fighting, and the first thing the wife did was to hide the stove under the bed, as she was afraid her husband would throw it in a fit of anger.

The charcoal production and energy efficient stove programs constitute some of the most practical programs NRM has ever used to solve community resource problems in the area of Bunaken Sea National Park.

POURING LIQUID PALM SUGAR INTO TINS WHERE THEY WILL HARDEN INTO SOLID BLOCKS

The Integrated Charcoal Center at Yayasan Dian Tama in Pontianak

A large percentage of Indonesian citizens depend on biomass fuel, both for daily cooking needs as well as small-scale industries. Unfortunately, biomass is often used inefficiently due to limited access to cooking and fuel-improvement technology. Wood-fuel availability is decreasing in many areas, forcing communities to use low-level biomass fuels like agricultural residues. Without appropriate technology, this wood-fuel biomass cannot be maximally utilized.

One way to increase biomass quality as a wood-fuel is through charcoal production, a technology developed hundreds of years ago. Charcoal as a fuel has many benefits, as it is very light, produces higher temperatures for cooking yet emits very little excess heat, is easy to transport, and cheap. These factors give charcoal a high selling power. Charcoal is generally used in urban areas for cooking, ironing, blacksmith work, drying food, etc. Until now charcoal production has always been done in a very simple, cheap and small-scale way, which has produced low-quality charcoal for local consumption.

Since 1990 Yayasan Dian Tama, an NGO in West Kalimantan, has been conducting integrated charcoal technology development and dissemination through cooperation with the International Charcoal Cooperative Association (ICCA) of Japan. The techniques used by the Center for Integrated Charcoal Technology Development originate from Toho Ilir Village in West Kalimantan, which first produced high-quality charcoal for farming, a technique that has also been used in Japan for hundreds of years.

WOOD CHARCOAL READY FOR HARVEST (LEFT) AND PALM TREE SAP IS BOILED FOR SEVERAL HOURS UNTIL THE TEXTURE THICKENS(RIGHT)

Several charcoal kitchen models that have been tested and developed are: 1. The open loose Residues Kiln/ Cerobong Kiln/ charcoal Kiln, 2. Ground pit kiln, 3. Drum kiln, 4. Coconut Charcoal drum kiln, 5. Yoshimura kiln, 6. Sugiura kiln, 7. Plate type kiln, 8. Iwate kiln, and, 9.Brazil Kiln

Charcoal research application at the Integrated Charcoal Center has been done for purposes of farming, livestock, construction and soil repair. Wood vinegar made from smoke that is collected in the charcoal production process can also be used for getting rid of bad smells, sterilization, and other uses.

The Integrated Charcoal Center conducts trainings concerning the production and utilization of charcoal, on both national and international scales. If you would like more information, please contact Yayasan Dian Tama. *)

Palm Sugar Stove Development East Java, Indonesia

Sarongan Village is located in the buffer zone near Meru Betiri National Park in East Java. The 5,981 villagers are sustained in a flat area of approximately 27,000 hectares, located 6 meters above sea level. This area collects as much as 2,000 mm of rainfall per year. The village is rurally located, 261 kilometers from Surabaya, the provincial capitol of East Java.

The residents of Sarongan Village make their living as farmers, palm sugar producers, civil cervants, merchants and other employment. Life is very dependent on the close proximity to forests in Meru Betiri National Park, mainly for those who look for wood in the park. One community of residents that uses the national park's forests are tree tappers, or palm sugar producers. The process to make palm sugar requires a large amount of wood-fuel for the evaporation process, and the wood is collected from the national park's forests.

After a technical training on stove production, Hamim foundation took the initiative to modify the existing stove used by the community. Stove development was needed to reduce the wood-fuel and time used to make palm sugar. The stove development process was not easy, as community members felt attached to their traditional stove after having used it for so long. However, there were several people who wanted to try the modified stove to economize and expedite the palm sugar-making process. These people encouraged the stove development process, and as of November, 2002, there are 72 palm sugar producers who use a modified stove out of 417 total palm sugar producers in Sarongan Village. Community members who first went through the stove modification process have begun to become training facilitators for several other communities.

Stove Forms Developed

Stove forms that were developed did not change the shape of the original stove. Changes lay more in stove production, namely the combustion chamber and the heat conductor were made more efficient.

In the old stove, the tunnel from the combustion chamber to the second and third holes did not have a baffle. The combustion chamber was not round, nor was there a chimney. The modified stove added a baffle and a smoke chimney and made the combustion chamber circular. However the smoke chimney depends on the producers, as some producers like it and some do not. If a smoke chimney is used it is only about half a meter tall, as it must be short enough to place wood on top for drying.

Stove-Making Materials

Stove-making local materials are used in the following proportions:

Clay	10
Sand	5
Rice husk	5
Ash	4

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Brick blocks	500 (or 400 without chimney)
Cement	as needed
Water	as needed

Cement is not used in the mixture but to strengthen the stove mouth to prevent against damage from collisions or friction from wood-fuel. Often distilled water and leaves from a silk-cotton or kapok tree are added to the stove mixture to make it stronger and stickier.

Stove Test Results

Stove tests were done in various conditions. The local stove test was done in the dry season and the modified stove test was done in the rainy season, so although the testing instruments used were the same, the nira (major ingredient of palm sugar that is obtained by tapping inflorescences of palms) had a different wieght.

Item	Local stove (dry season)	Modified stove (wet season)
Weight of nira	70 kg	105 kg
Wood used	45 kg	60 kg
Time needed averaged from 4 tests	5 hours, 46 minutes	3 hours, 20 minutes
Conclusion	More wood and time wasted	More efficient wood and time use

The test results showed a difference in the amount of fuel needed for each stove. Also, the above data shows that in the rainy season when the nira contained more water and was therefore heavier, the burning time was still much faster, which impacts total wood-fuel used. Until now there are no continuing measurements to compare the local stove used in the wet season to the modified stove used in the dry season. However, we can see that the modified stove took almost 2 ½ hours less to cook 35 more kg nira, which gives us the idea of how much more efficient the modified stove is.

Research and Development Activities of ICS Network in Nepal

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SUN DRIED 'LAPSI'

The Improved Cook Stove (ICS) program in Nepal dates back to the early 1950s with an introduction of the Indian models Hyderabad and Magan stoves. Since then, many organizations/institutions have implemented ICS programs. Since the early 80s, organizations like RECAST have been involved in modification of stove designs. In 1982, RECAST modified the prefabricated ceramic ICS and thus, Ceramic Insert stoves came into the picture.

In the early 90s, RECAST developed a new model of stove known as the "Improved Tamang Stove". The stove can be built using materials that are locally available. Since then, various INGOs, NGOs and other institutions have been promoting the stove. However, the stove models promoted are not sufficient to meet the demand and need of the people of Nepal, who have diverse cultures, traditions and eating habits. Therefore, there is room for further modification of the existing stove models. Moreover, there are other aspects of ICS such as kitchen management, health, stove models used in small-scale cottage industries of Nepal and stoves appropriate for high-hill areas that need to be further researched.

The Centre for Rural Technology, Nepal (CRT/N) has been coordinating the ICS Network in Nepal since 1995 with support from Asia Regional Cookstove Program (ARECOP). The Network at present is implementing an "Action Program for Strengthening Improved Cook Stove Networks in Nepal." The program took an initiative to reduce identified gaps in the field of ICS through research and development. The ICS Network has collaborated with its member organizations to implement R&D in four different sectors of ICS. The topics of the research are as follows: 1. A Healthy Kitchen for a Healthy Family; 2. Stove Improvement for Agro-processing and Micro-Enterprise Development; 3. Action Research Project for the Installation of ICS and Assessment of Health Effects

from Women's Perspectives Specific to Tamang and Balami Communities in Rural Kathmandu; 4. Research and Product Development for Cooking and Space Heating Stoves

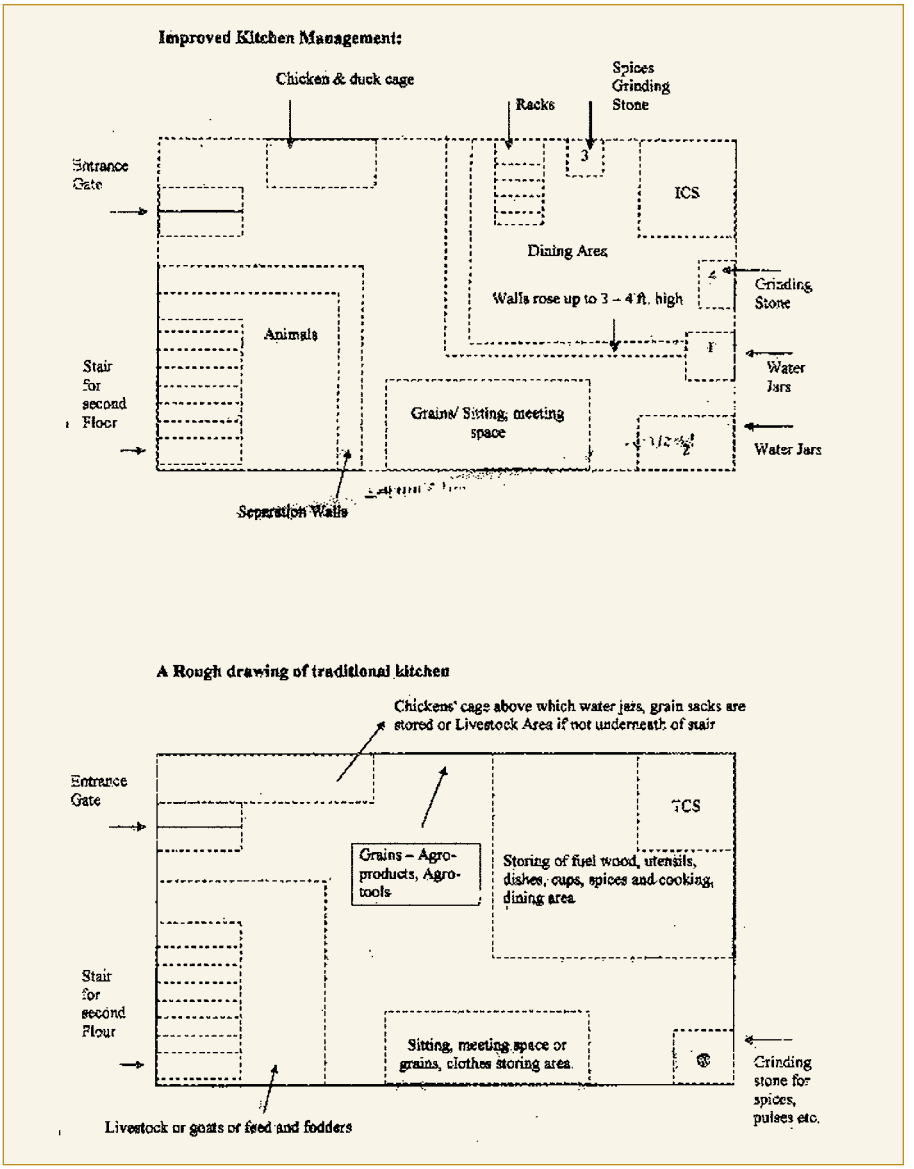
A Healthy Kitchen for a Healthy Family

The research on "A Healthy Kitchen for a Healthy Family" has been initiated in Baluwa VDC, Kavre district of Nepal by Rural Community Development Society (RUCODES) with support from the ICS Network in Nepal. The prime communities of the research site are Newar and Danuwar. Though living in the same village, kitchen layout of the two communities is completely different. In the Newar community, the kitchen is situated on the top floor of the house. The kitchen of the Danuwar community, on the other hand, is situated on the ground floor. The Danuwar communities share their kitchen with their cattle and livestock. Consequently, the kitchen environment is unhygienic as compared to the Newar kitchen. Given the above background of two different kitchen types in close proximity, the area proved to be appropriate for the study on kitchen management.

In rural communities, the kitchen is the most neglected part of the household and kitchen management is given least priority. The reasons for the reluctance to invest in kitchen management are varied but the following analysis by Malhotra (extracted from GLOW, vol. 26) is very appropriate in Nepal's context.

> *In rural areas it is typical to find all the monetary decisions being taken by the men. Thus, any decision with regards to purchase of cookstoves or improvement of kitchen, which involve some form of monetary investment, are taken by the men. Moreover, as cooking is "women's work," the men are not inclined to make any investment in efforts or improvements which will bring indirect non-monetary benefits for the women.*

Each individual has a different attitude and idea towards kitchen management. The important thing is to



KICTHEN IMPROVEMENT THROUGH ICP: A HEALTHY KITCHEN FOR A HEALTHY FAMILY

IMPROVED STOVE INTRODUCED IN NEPAL

TABLE 1: "KHUWA" PROCESSING STOVE

	Cost of the stove in US $	Efficiency	Fuelwood Consumption (to prepare 1kg of *Khuwa*)	Time Taken (to prepare 1kg of Khuwa)	Benefit / cost ratio	Pay Back Period
Traditional	-	15.9 %	3.7 kg	0.87 hr	-	-
Improved	10	26.4 %	2.7 kg	0.32 hr	27	14 days

TABLE 2: "LAPSI" PROCESSING STOVE

	Cost of the stove in US $	Efficiency	Fuelwood Consumption (to prepare 1kg of Khuwa)	Benefit / cost ratio	Pay Back Period
Traditional	-	19.9 %	2.9 kg	-	-
Improved	9.2	27.7 %	1.8 kg	3.1	48 days

TABLE 3: "ALLO" PROCESSING STOVE

	Cost of the stove in US $	Efficiency	Fuelwood Consumption (to prepare 1kg of *Allo*)	Time Spent	Benefit / cost ratio	Pay Back Time
Traditional	-	12.6 %	3.9 kg	72 minutes	-	-
Improved	5	26.3 %	3.1 kg	68 minutes	0.85	4 months

incorporate all the utilities of a kitchen such as cooking, preparation, washing of utensils, and storage of food, utensils and fuel while managing the kitchen. The kitchen should be properly ventilated. This research has been instrumental in bringing into focus the various aspects of kitchen management that have been overlooked or neglected.

A 5-day kitchen management training package was developed. The training package contains various concepts of management, operation and maintenance of ICS, waste management via vermi-compost and health implications of smoke and unmanaged kitchen. Health and waste management are integrated with kitchen management in this training package.

This integrated kitchen management concept has been promoted by other development agencies. A national ICS program has been implemented in Nepal since 1999 with support from ESAP/Dannida and AEPC. After this research, the program incorporated the kitchen management concept in its training package. In future training programs of the national ICS program, a session on kitchen management will be included. Similarly, the concept has been incorporated into other ICS training programs as well.

Stove Improvement for Agro-processing and Micro-Enterprise Development

Improving the design and increasing the combustion efficiency of the stoves used in small-scale industries of Nepal has received very little attention from the government, policy-makers, or development organizations. With the exception of a few organizations such as RECAST, very few organizations have done research in improving the designs of institutional stoves. RECAST is a purely research organization. Therefore, other development organizations such as CRT/N, which has a very good network at the grassroots level, has collaborated with RECAST on various occasions to transfer research results to the grassroots community.

One such collaboration is the initiation of research on "Stove Improvement for Agro-processing and Micro-Enterprise Development." RECAST did the research on stove testing and modification of the stoves used in agro-processing of Khuwa (a sweet dish made from milk), Allo (plant fiber) and Lapsi (a kind of fruit) with joint support from ICS Network in Nepal and ITDG Nepal. The main objective of this research is to modify the stoves used in the aforementioned agro-processing industries based on the existing design and requirements of the cook.

The modified stove is more efficient than the traditional stove and it saves time. The stoves are also modified in a user-friendly manner. The cost, efficiency, fuelwood consumption, time taken for the processing, benefit/cost ratios and pay back time of the modified stoves are given in table 1, 2, & 3.

There are other entrepreneurs with similar cottage industries who are eager to adopt the technology. The Nepal team participating in the PTA Meeting included an activity "Design and Testing of Appropriate Community Stove" in the Nepal Action Plan. The three stoves modified will be further tested in the field and information on the stoves will be disseminated in areas with similar enterprises.

Action Research Project for the Installation of ICS and Assessment of Health Effects from Women's Perspective Specific to Tamang and Balami Communities of Rural Kathmandu

In kitchens where traditional stoves are used, high levels of smoke and up to 8200m of total suspended particles can be found. There are ample studies relating indoor air pollution to various diseases. However, due to low literacy rates and lack of awareness campaigns, most of the users are not aware of the

health impacts from indoor air pollution.

This research has been initiated with the aim to find out the beliefs and behavior of the Balami and Tamang communities in kitchen management and subsequent health impacts of smoke from traditional stoves as perceived by the principal cook. The research also aims to create awareness on the impact of indoor air pollution through various educational materials.

Mrigendra Samjana Medical Trust (MSMT), an NGO with extensive experience in indoor air pollution, is conducting the research. The research site is Talku village, 20 km South of Kathmandu. The research is divided into 3 stages. In the first stage, 507 people were interviewed to analyze community beliefs concerning health impacts of indoor air pollution. During the survey, most of the interviewees identified smoky kitchens, minor and major accidents, burns and the problem of soot (mainly on their clothes) as prominent health effects.

In the second stage, women's groups were formed. Using the educational materials prepared, the groups were sensitized to the relation between indoor air pollution and health. After the education intervention and sensitization of the community on various health impacts, there was a demand for ICS in the village. To fulfill this demand, the ICS network in Nepal provided training to 2 local people. In the third stage, the trained technicians are installing ICS in the community. Besides analyzing the perspectives of users on the impact of indoor air pollution, this research is an attempt to integrate health issues with ICS.

Research and Product Development for Cooking and Space-Heating Stoves

Due to the extremely cold climate in mountain areas of Nepal, the cookstove is often used for room heating as well as cooking. Either a tri-pod stand or an open hearth is used. The metal stove is the improved stove used in high-hill areas of Nepal. The stoves are imported from China or other parts of Nepal, which makes the stove unaffordable for many poor people. Producing them at the local level using locally available materials could lower stove costs. Research and modification of the existing stove is required so as to maintain the efficiency of such locally produced stoves.

RECAST is involved in the "Research and Product Development for Cooking and Space Heating Stoves" with support from the ICS network in Nepal. The main objective of the research is to modify the existing metal stoves and train local blacksmiths to fabricate the modified stoves. The research is conducted in Rasuwa district of Nepal.

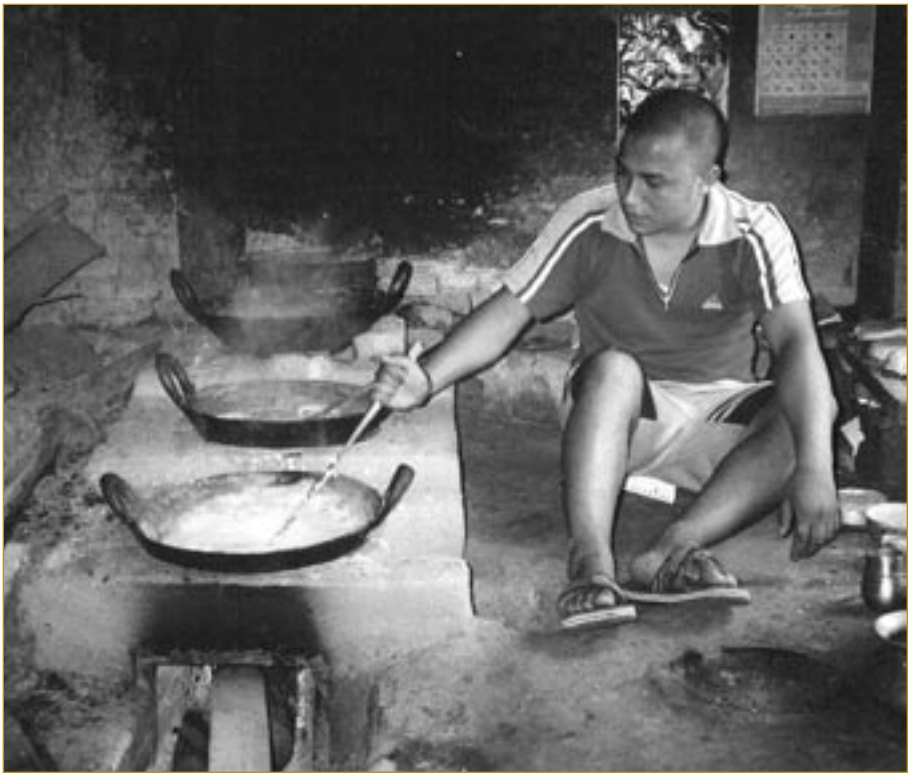
The research team has visited the areas and carried out a preliminary survey of the area. The team is at present doing lab testing of the modified models. After the model is finalized, local blacksmiths will be identified and trained to fabricate the metal stove. The indigenous knowledge of the blacksmith will be utilized during the process. After the training, the local blacksmiths will be able to build the improved metal stoves at cheaper prices.

The outcome of the research will be an efficient model of the metal stove, which can be fabricated by local blacksmiths.

Conclusion

The four studies conducted by ICS network members with support from the network is an effort to fill the gaps that were identified during the course of various ICS program implementations. Besides the aforementioned studies, National ICS Program has identified the need for research in subjects such as a) stoves used for cooking livestock feed, b) stoves suitable for semi-urban areas, c) stoves built on raised platforms for cooking while standing, d) stoves suitable for using agro-residue and cow dung, e) stoves with a proper chimney outlet, and f) improved kitchen and wood-fuel management.

The National ICS Program will carry out these studies in close cooperation with the implementing partners, in program areas with different implementation approaches and representing different ethnic groups as well as ecological zones. The outcomes of all the studies will be widely disseminated by the network.



THE IMPROVE COOKSTOVE IS USED

Use of a Mould for Constructing Improved Clay Cookstoves in India

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TRAINING ON MOULD -USE FOR STOVE CONSTRUCTION IN INDIA

ABSTRACT

One of the objectives of the National Programme on Improved Cookstoves (NPIC) of the Government of India was to promote rural self-employment in the country. The Technical Back up Unit of NPIC for Maharashtra and Goa States was successful in achieving this objective in certain pockets of these states. The credit of successful commercialisation of the improved cookstove technology can largely be given to the concept of using a mould to construct the clay stoves. Use of a mould not only ensures rapid serial production of the stoves but also eliminates batch-to-batch and product-to-product variations in the shape, size and dimensions of the cookstoves. The paper describes this important technical intervention and its positive impact.

INTRODUCTION

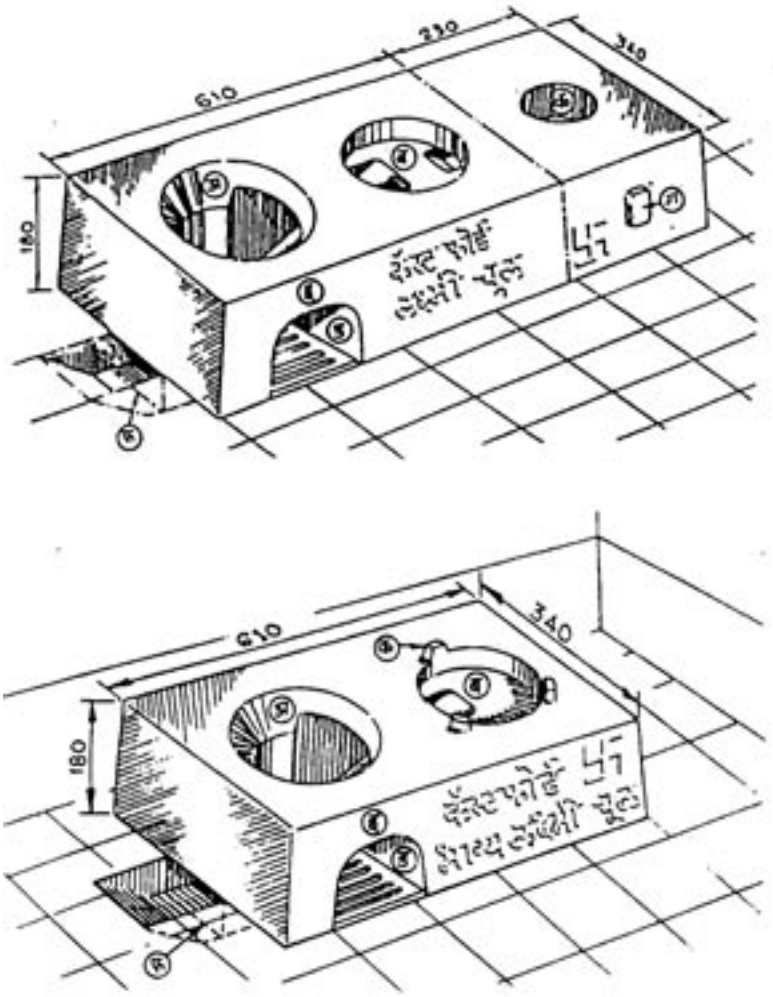
The Ministry of Non-conventional Energy Sources (MNES) of the Government of India initiated the National Programme on Improved Chulha (NPIC) in 1983-84. Under the programme, technical Back up Units (TBUs) were established in different states of the country. The mandate of a TBU was to develop designs of improved cookstoves suitable to the cooking and eating habits of the region, and to provide training in constructing and installing the cookstoves.

The responsibility of TBU for Maharashtra and Goa states was given to a project entitled the Centre for Application of Science and Technology for Rural Development (CASTFORD). The project came to an end in 1996, and the group of scientists and social workers that was operating the project formed a registered scientific society in the name of Appropriate Rural Technology Institute (ARTI). MNES shifted the TBU to ARTI to ensure continuation of the work by the same group of individuals.

An important contribution of the Maharashtra-Goa TBU group to NPIC is introduction of a successful model for commercialisation of improved cookstove technology. The two important aspects of the model were as follows.

1. Selection of hereditary potters as potential entrepreneurs in construction of improved clay cookstoves, followed by special entrepreneurship training.
2. Use of a mould to construct improved cookstoves.

The first intervention is related to the prevalent social structure in India. Because of the caste system, in each village there are families that have been exclusively in the pottery business for several generations. In many parts of Maharashtra and Goa states,



TECHNICAL DRAWING OF IMRPOVED COOKSTOVE

INTRODUCING AND DEMONSTRATING ICS MOULD TO THE COMMUNITY

there is a tradition of buying new clay cookstoves every year from these hereditary potters. This social reality was made use of for promotion of improved clay cookstoves in villages. The second intervention was technical in nature, and in this paper we describe it in detail.

BACKGROUND

In the early days of NPIC, although a variety of models of improved cookstoves were being promoted in different states, the methodology used for construction and installation of the stoves was the same everywhere. The clay was prepared using the traditional techniques used by the local potters. The improved stove was constructed on location, i.e., at the designated place in the user's kitchen. The construction was a two-step process.

Step 1: A block was constructed at the designated place using well-cured clay. The dimensions of the block had to match the required external dimensions of the stove to be constructed. The possible shrinkage of the block upon drying had to be taken into consideration while constructing it. The block was covered with a piece of wet canvas and allowed to set for a day.

Step 2: On the second day, after the clay had set but before it had dried completely, the firebox, the pot hole(s), the specifically shaped passage joining the pot holes, and the passage leading towards the inlet of the chimney were carved out of the block. This required the artisan to frequently consult the blueprint of the cookstove and use a measuring tape to mark the dimensions and portions to be carved out of the block, so as to ensure that the dimensions of all the openings and passages conformed to the recommended design.

Although the stove builder's job would be finished with this task, the user still had to wait for about a week before using the stove. This waiting period was required for the stove to dry out completely. While drying, the stove developed hairline cracks. The user was instructed to apply a thin layer of clay-dung mixture to fill the cracks. This process had several disadvantages.

1. The stove fabricator had to visit the user household on two consecutive days. Many times this meant excessive travel expenses for the fabricator. Also, the user lost two working days, as he/she had to remain in the house on two consecutive days, waiting for the stove fabricator to complete the job.

2. Field surveys showed that the proportion of installed stoves that deviated from the recommended design was unacceptably high. The faulty con-

struction of these stoves led to several complaints such as increase in cooking time, increase in fuel consumption, increase in smoke emission, etc.

3. While the stove completely dried out, the user had to make alternative arrangements for cooking. Surveys indicated that in a large number of cases the users got impatient and started using the stove before it was properly set. This led to reduction in the life of the stove.

The variety of inconveniences and problems faced by the users created a bad impression of the improved stove designs, and compounded the obstacles faced by the promoters of improved cookstoves.

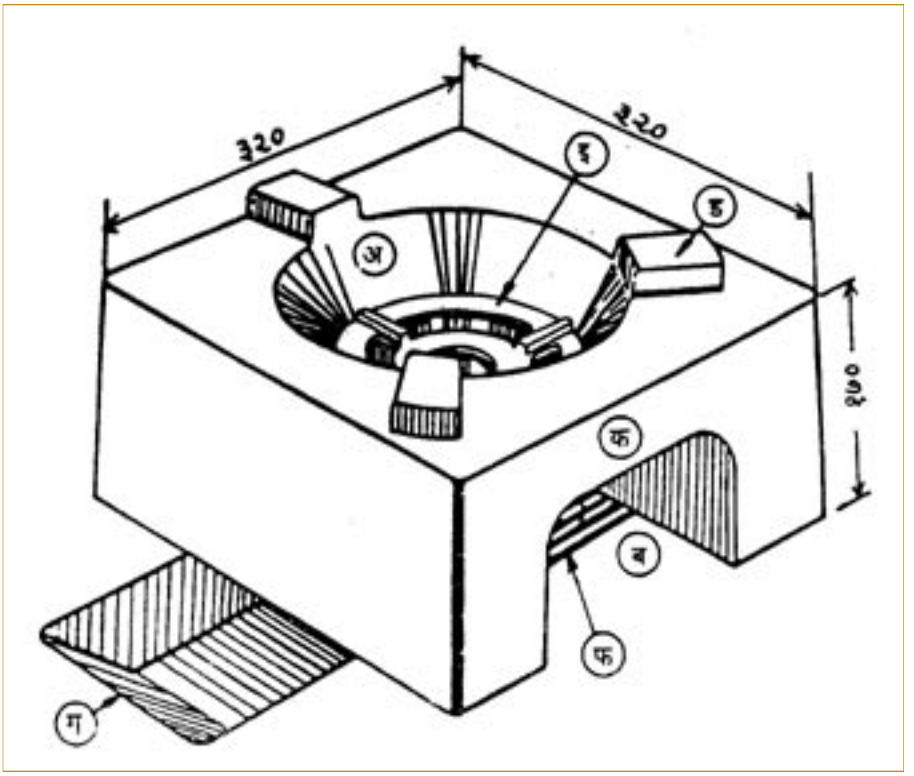
A technical intervention was therefore urgently required to overcome these problems. Several interventions such as use of ready-made pottery liners, ready-to-use baked clay stoves, etc., were tried out. However, these proved to be either impractical or too costly. The use of a mould to construct the stoves turned out to be the only techno-economically feasible intervention.

Design of the 'three in one' mould

The mould is called a 'three in one' mould as it can be used for constructing stoves of any of the three designs developed by our TBU. These designs are shown in Fig.1. The 'Laxmi stove' is a two-pot stove with a chimney. The 'Bhagyalaxmi stove' is a two-pot stove without a chimney. The 'Grihalaxmi stove' is a single-pot stove without a chimney.

The engineering drawing of the mould and the details of its components are shown in Fig.2. The mould is made using 16-guage mild steel sheets. 8 mm thick iron bars are used for joining the various components. The weight of the mould is 8.5 kg. The mould can be completely dismantled, and the components can be carried as a kit in a canvas bag. Various components of the mould are described below. The names in brackets refer to the local names that are used on the engineering drawings, which are made for the use of the local fabricators.

1. The moulding box: This is assembled by connecting the two side length covers and the left and right side covers with the help of the hinge bars as shown in the diagram (refer to the engineering drawing).



STOVE COMPONENT DETAIL,

2. The main pot-hole and firebox mould (Chula hole mould): This is a funnel shaped component. The upper tapered portion is the mould for the cavity of the pot hole whereas the lower cylindrical portion is the mould for the cavity of the fire box. In order to fit the component in its proper position in the box, two hooked bars are welded to the top of the funnel. These hooks fit in the holes in the edges of the sides of the moulding box, as shown in the diagram. In addition, a locking bar is inserted through the holes in the side covers of the box and the bottom of the component.

3. The second pot-hole mould (wail hole mould): This component is a flat cylinder. This too is fitted in the proper position with the help of two hooks that fit into holes in the sides of the moulding box, and a locking bar at the bottom.

4. Mould for tunnel between the two pot holes (passage core from chula to wail): As shown in the detailed design in Fig.2, this mould is made up of two components. This is to facilitate removal of this component through the first pot hole while dismantling the mould.

5. Mould for tunnel between the second pot hole and the chimney (passage core from wail to chimney): This is a single piece as shown in the diagram. This component is used for constructing the 'Laxmi stove', but is not used for the 'Bhagyalaxmi stove'.

6. A divider metal plate (not shown in the drawing): This plate can be fitted vertically at the center of the box along its width. This is used when constructing the 'Grihalaxmi stove'. The plate divides the box into two parts. The front part along with the main pot-hole and firebox mould is used for constructing the 'Grihalaxmi stove'.

Initially, one more component was included in the mould for constructing the firebox mouth. However, it was observed that the stove developed cracks while removing this component. It was therefore discarded, with the result that the firebox mouth needs to be carved into the moulded stove.

The position of the firebox mouth is marked on the stove, using a measuring tape. This is the only design feature that requires the use of a measuring tape in constructing the stoves using this mould.

The mould, being constructed out of mild steel, needs to be properly cleaned and dried after every use. Otherwise it gets rusted and damaged due to prolonged contact with wet clay. Also, steel being heavy, the weight of the mould is fairly high. An alternative is to construct the moulds using wood. This would reduce the weight. However, wood would get damaged even faster in continuous contact with wet clay. Another possible option is to use good quality plastic. Extensive field level experiments need to be conducted to test the durability and strength of a plastic mould under field conditions.

Advantages

There are several advantages of using a mould for construction of improved stoves.

1. It automatically ensures that proper dimensions are maintained for all the critical components of the stove.

2. The time as well as amount of clay required to construct a stove is reduced considerably, thereby improving the productivity of the stove builder.

3. The moulded stoves look attractive due to their smooth finish and sharp lines.

4. Using the mould, it is now possible to mass-produce the stoves in a centrally located workshop. These readymade stoves can then be transported to the user households and installed within an hour or so. The stove is then ready to use within a day or two. This has revolutionised the production of improved cook stoves, and has played a crucial role in the successful commercialisation of the improved stove technology.

Promoting the Concept

To start with, it was a difficult task to motivate traditional stove buiders to take up construction of improved stoves. To encourage them to discard the age -old practice of fabricating the stoves in user households and to establish 'stove producing factories' was an even more daunting task. However, NPIC created the possibility of earning money by taking up government contracts to install improved stoves for the stove manufactureres. This helped in promotion of the new concept. Under NPIC, the village-level government administrative units were asked to select a specified number of households for installation of improved cookstoves. This target of stove installation was assigned to the TBU-trained stove manufactuerers operating in the area.

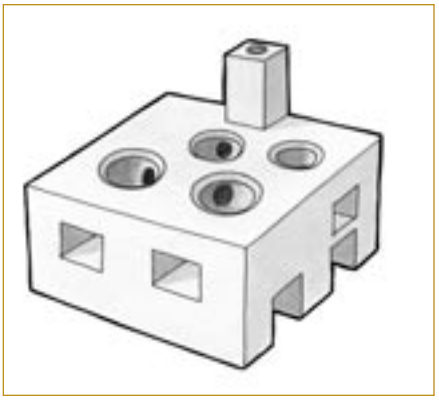
TRAINING ON MOULD-USE FOR STOVE CONSTRUCTION

Initially, these village administrative units purchased the moulds and lent these to the stove manufactuerers for completing the work assigned to them. While training the stove manufactuerers, the TBU focused on teaching them the proper use of the mould. Photographs 3 and 4 show trainees constructing a variety of stoves using moulds. The first hand experience soon convinced the stove manufactuerers of the advantages of using the mould. The manufacturers, whose performance was satisfactory in completing the stove installation targets under NPIC, were recalled by the TBU for entrepreneurship training. During this training, the trainees were encouraged to set up stove manufacturing factories, and to mass-produce the stoves using 4 or 5 moulds simultaneously. As a result of our promotion efforts over the last six years or so, today there are about 50 improved stove enterprises in Maharashtra and Goa states. The annual income of each unit is in the range of 1.5-2 hundred thousand Indian rupees (3 - 4,000 USD). Photograph 5 shows a typical improved stove production center.

During the last 2-3 years, on the recommendation of MNES, the improved stoves have been constructed out of cement instead of clay. This has increased the operating life of the stoves, as well as the durability of the stoves during transport. The concept of using a mould lends itself equally well to the cement cookstoves too. Some of the enterprises sell their products even in other neighbouring states, at locations about 350-400 km away from the production center.

Conclusion

Our TBU group has proved that use of a properly designed mould can give a tremendous boost to commercialisation of improved cookstoves. In this paper, we have described the design of a mould designed specifically for building three models of improved cookstoves. We believe that the same principle can be used for constructing moulds for any stove models. The mould as well as an instruction manual in English in the form of a VCD are available with us. The readers may contact us for more details.



A New Approach on Improved Cookstove Programs In Mountainous Areas of Nghe Anh Province, Viet Nam

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The Population, Environment and Development Centre (PED) is a Local Non-Governmental Organization (LNGO). Currently, PED is carrying out 4 projects in the Northwest of Nghe An province – a central province in Vietnam. The Improved Cookstove Program (ICSP) in mountainous areas of Nghe An province is a practical and useful activity, aiming to protect the environment as well as women's health. In the past, the ICS program consisted of the BLN cookstove dissemination (an improved cookstove), which did not have appropriate stove improvements. This stove is built with brick, iron and cement, and costs between $15 - $ 20 US. Having participated in 2 training courses held by ARECOP in Sri Lanka and Cambodia since 2001, our ICSP has obtained remarkable achievements.

Presently, our ICSP is to be developed as follows:

- Diversifying stove styles and types so as to increase community choices
- Creating chances for community members to choose which type of stove they prefer to use
- Diversifying sustainable stove materials such as soil and cruel brick
- Diversifying techniques so as to help communities to be able to build stoves themselves as needed
- Supplying materials, consulting and supporting necessary techniques for communities as needed
- Preparing for stove production on a large scale and commercialising simple stoves with low costs

In communities, we always carry out our activities using the following proccess:

STEP ONE: Organize a communication campaign addressing the improved cookstove program and the usefulness of protecting forests, women's health and kitchen sanitation towards family and community health.

STEP TWO: Organize training courses for a group of farmers (about 15 - 20 participants) on basic techniques used in building and making improved cookstoves. These farmers are to be key technicians, guiding and consulting other farmers in the community on stove-building techniques. Step by step, these farmers will become a "technical communication, consultancy and support" group on improved cookstoves and kitchen sanitation in the community. This group will be supported by the project so that they can carry out realistic activities in each family, village and community.

STEP THREE: Build stove models. In Vietnam, building stove models has until now usually been conducted in families. Therefore, the social marketing effectiveness of this activity is not very high. We have decided to conduct the building of stove models in public places where locals usually come (i.e commune people's committee, commune meeting hall). This attracts the participation of the local community in building cookstove models, and is a chance for the locals to learn by doing. Furthermore, locating stove models in puplic places helps local people to see the stoves carefully, try using the stoves, and then choose an appropriate stove for their family.

STEP FOUR: After families choose an appropriate stove for themselves, the "technical communication, consultancy and support" group will help them to define clearly what they need, what they don't have and what they can't do themselves. Based on this, the project will provide some necessary materials and the techical support group will help each family build the stove. Thus, we aim to support what the locals actually need. In this step, promoting local knowledge and experience is highly appreciated. Applying knowledge from the training course along with existing local knowledge and experience in building cookstoves is a new and successful method used in the projects that we are running.

Following the above steps, our ICSP is achieving remarkable results. Along with this experience we hope to have chances to share with ARECOP colleagues and to learn from you.

STOVE DESIGNED AFTER ATTENDING ARECOP TRAINING IN SRI LANKA

events

"Asia Industrial and Institutional Stove Compendium"
RWEDP & ARECOP, 2001.

The compendium is a collation of case studies and profiles of energy use and stoves, in over seventy industries and institution in 14 countries in Asia. Chapter one contains eight case studies of biomass-fueled industries. Each of the case studies describes in detail the industrial processes involved, the stove designs, the energy use patterns and the stoves performances. Chapter two presents brief profiles of over sixty industries and institutions that use biomass and coal fuels. Each of these profiles describes an overview of the industry/institution, illustrations and photos of the stove used, stove makers, stove materials, stove maintenance and stove durability. The Compendium is designed to give ideas or inspiration to field workers or stove practitioners

"The Improved Palm Sugar Stove Manual"
Syahri Ramadhan. CFSP, EC & ARECOP. 2001 (also available in VCD format)

Developed in Cambodia, the Improved Palm Sugar Stove is a low-cost twin size stove which can be self-built using local materials, which makes it more efficient, convenient, and adpatable to local needs. This manual provides a comprehensive step by step instruction guide on the construction of the improved palm sugar stove model, including information on how to prepare the mold, mixing material, carving and finishing.

"The Samaki Stove Manual"
Syahri Ramadhan. CFSP, EC & ARECOP. 2000. (also available in VCD format)

The Samaki Stove is a user built mud-stove developed and disseminated by the Cambodia Fuelwood Savings Project. It is a permanent stove and can be built with either single or double pot-holes and with or without a chimney. This manual is a comprehensive guide to stove construction. It first introduces a guide to assessment of social conditions prior to stove implementation, and further provides information on stove materials, methods of stove construction and stove maintenance.

internet

Center for Alternative Technology: http://www.cat.org.uk

CAT is an environmental charity aiming to 'inspire, inform, and enable' people to live more sustainably. A solutions driven organisation, offering practical solutions to environmental problems. Their key areas of work include renewable energy, environmental building, energy efficiency, organic growing and alternative sewage systems. This website includes a links page, downloadable articles and publications, course offerings, and many other resources.

events

Regional Workshop

Regional Workshop on ICS Commercialisation, venue: Cebu, Philippines, 15 -18 February 2003. Contact arecop secretariat for more information.

next GLOW

Coming soon, GLOW's next issues, a special thematic edition concerning Indoor Air Pollution, Biomass, and Improved Cookstoves. Featuring the following articles :

"Health Effects of Indoor Air Pollution¨ by Dr.Pandey, a comprehensive overview of the various
health effects caused by domestic smoke pollution from partial biomass combustion.

"A Case Study on the Exposure to Indoor Air Pollution from Biomass Pollutants in rural India,
specifially concerning the social and health benefits from improved cookstove programs

"Fuel usage and indoor air pollution in low-income urban areas of Delhi¨ a case study comparing the
overlap of indoor and outdoor air pollution in urban areas.