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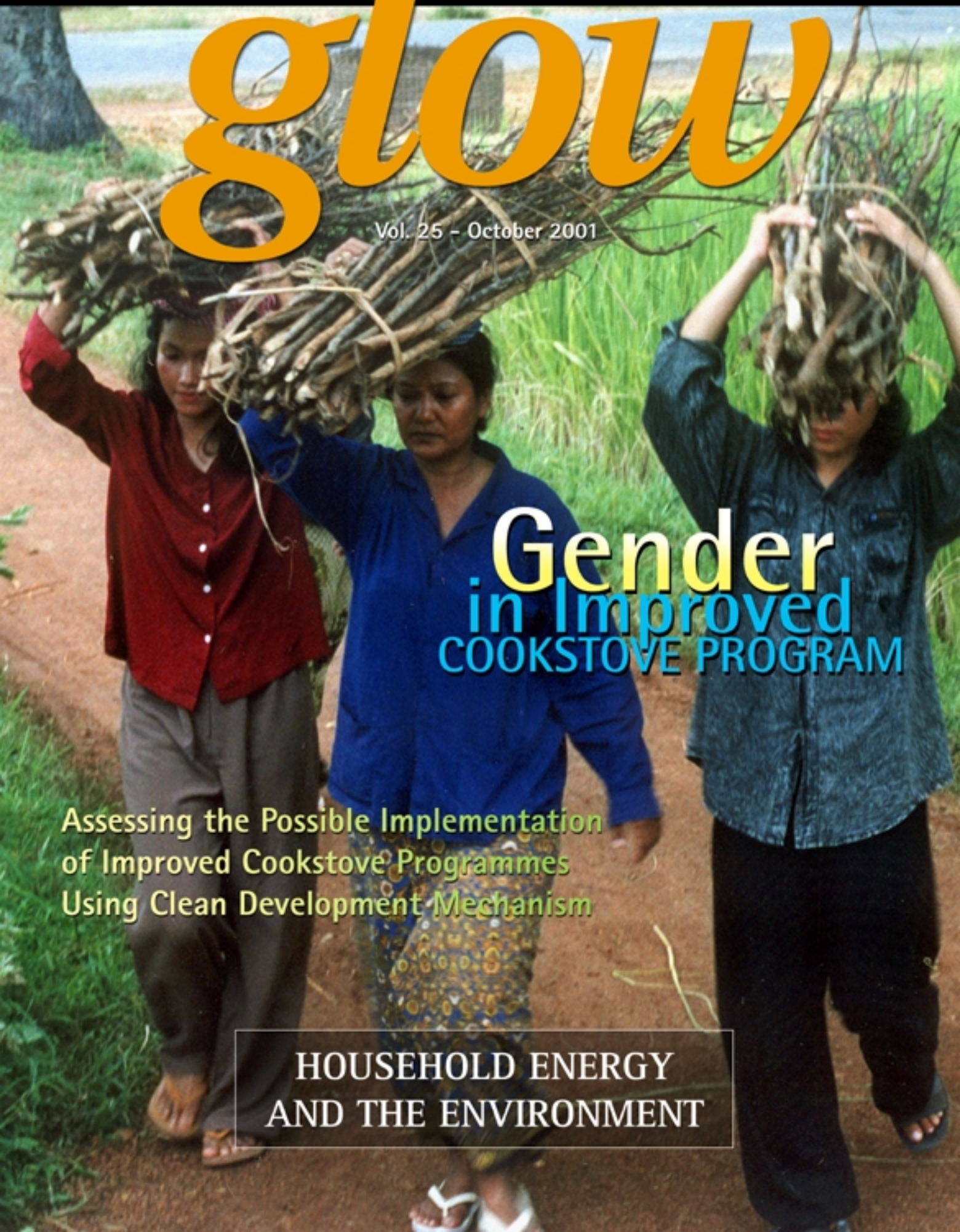

Gender in Improved COOKSTOVE PROGRAM

Assessing the Possible Implementation of Improved Cookstove Programmes Using Clean Development Mechanism

HOUSEHOLD ENERGY AND THE ENVIRONMENT

glow

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Front cover: Fuel transporation in rural Cambodia (Photograph by: Syahri Ramadhan)

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

Delivering the Benefits of Improved Cookstove Program

Women and Energy

Biomass fuels are still the main source of energy used in a number of Asian countries. The fuels are mainly applied in traditional stoves-posing various health hazards, primarily to women and children. Fuel collection, a task mostly burdened to women and girl children is an equally hazardous task. Studies in several Asian countries reveal health problems from effects of smoke and heat, and from wood fuel collection activities. Fuel collection is also known to cause other serious consequences such as physical abuse to female of any age and landmine accidents (specifically in Cambodia).

It is often said, that the real rural energy crisis, is rural women's time. Rural women as the main provider of household energy, often have to commit long hours to collect fuel. Women work longer than men, in providing human energy for survival activities such as fuel collection and transportation, cooking and food processing. Condition is worse whenever and wherever there is fuel scarcity, as women will have to work longer hours, walk longer distance, therefore women have to spend a lot more energy. The extent to which the crisis affects the population should also be considered; FAO estimates the proportions of rural women affected by fuel wood scarcity, range from 60% in Africa to nearly 80% in Asia, and nearly 40% in Latin America.

Economic opportunities for many rural women and survival of rural families are also dependent upon the sustained supply of biomass energy. Women are often involved in the informal sector such as small scale or cottage industries; these economic enterprises being often critical to many families economic survival.

Women and Improved Cookstove Program (ICP) - A Brief Overview

Benefits to women's development have been cited in favor of Improved Cookstove (ICS) since the late 1940's, when the *Magan Chulo* was promoted in India. Dr. Raju clearly indicated this, when he wrote, "You are working for the emancipation of women. Do not forget the millions of your sisters in the bondage of criminally unhygienic kitchens". Among the most often said benefits of ICS, are, reduced cooking and fuel collection time-which could mean that women and/or men, have more time available for other activities[1]; reduced health risks for women; and reduced risks associated with fuel collection. ICPs can also offer women the opportunity to become primary actors in a development project.

In the 70's and 80's, the number of ICP's has increased throughout the Asia Region-implemented by organizations, ranging from small community-based organizations to relatively big NGOs. Yet, it is ironic to witness the low adoption rates of ICS.

In the early 80's when ICS started to be addressed, it was looked into as pure technical issues and therefore studies have been concentrated on ICS efficiency and less on the users' priorities and needs. There was a shift in the late 80's and 90's when development agents in the energy and ICP sector began to recognise the importance of an approach that could respond directly to users' priorities and needs.

Priorities and Needs of Improved Cookstove Program Beneficiaries

Development projects in general fall into the domain of men simply because they are already in the positions of community leadership and have long been the default participants when new tech-

INSTITUTE OF ENERGY, VIETNAM

WOMEN TRANSPORT FUEL WOOD

nologies are introduced. This has had adverse consequences, in terms of projects not being able to deliver benefits to those who are actually in needs, women and the poor.

Improved cookstove project, however, have the potential to step away from the *status quo* because cookstoves are inherently linked to household energy management and food preparation, which are almost always the realm of women.

Accounts of stove project cases, reveal how needs and priorities of the beneficiaries could be easily overlooked.

Emma Crewe writes, "In the mountainous areas of Nepal.... Space heating is more important to women than fuel conservation, so well-insulated, fuel-efficient stoves are not popular". It may be cookstove designers ideas that the most efficient stove for cooking will be a very inefficient space heater. Nyoni adds on, " who determines that light and warmth should be traded for (cooking) efficiency"?

An area in Sri Lanka, where fuel wood was supplied subsistently by the households, revealed that while women were much more involved in wood harvesting, more men were actually involved in selling any excess wood[2]. Introduction of ICS which saves on fuel, could mean, that, while women's workload may not be reduced, men will likely to gain more by having more excess wood to sell.

There have also been misconceptions on the part of Indian stove designers, who run laboratory tests on stoves using exclusively fuel wood, and in turn produced stoves that are optimized for wood burning-when in fact a rural housewife hardly ever uses fuel wood and relies mostly on agricultural waste[3].

Despite frequently stated goals of ICP's, of raising the living standards through reduction in drudgery, improvement of health, *etc*.-why then have many of the priorities and needs been overlooked? Hence, it is important that cookstove projects give equal considerations to the priorities, needs and constraints of both women and men, in the project area.

What should be done?

Gender analysis and participatory approach[4] have been proposed, as program tools to identify constraints and opportunities of women and men in the project area. Constraints and opportunities of stakeholders concern with, the division of labour, access to resources and decision making. This information could guide us in the design of projects that could respond to priorities and needs of target beneficiaries. It is equally important to get community participation in the process, which would also encourage communities to explore problems by themselves and come out with their own solutions. Where communities have, by themselves, realised various structural barriers (e.g. structural inequalities with regards to access and division of labour)-this could often indirectly motivate communities to bring about structural changes that would make it easier for project to deliver its benefit to those in real needs.

While certain benefits of gender based participatory approach are quite obvious, its implementation could be a long process. Such approach also requires competent facilitators, so that the data collected are credible in terms of the required depth and scope; and analytical skills in order that the data obtained could be transformed into useful information that could guide a project's direction.

A challenge for those concerned with the application of the gender and participatory process would be to evolve tools that are 'user-friendly'. In response to this, ARECOP with the assistance experienced resource persons, have made attempts to develop guidelines and tools, in order that the application of gender and participatory approach could be more accessible to more stove practitioners. In this volume of Glow, you can read on ARECOP's progress thus far regarding the guideline and tools development.

1 Depending on specific social and cultural conditions, time saving cooking devices may not always be viewed positively by women. For example women in Kenya would rather spend longer time cooking and carrying out other work, than give their labour to their husband. Conversely, women in Sri Lanka, viewed time savings as the greatest benefit of improved cookstoves (Crewe, E. 1992, Social and Economic Aspects of Stove Promotion and Use, *Glow*, Vol. 6, p.5)

2 FAO-RWEDP. 1999. *Gender aspects of woodfuel flows in Sri Lanka: A case study in Kandy District*. Field Document No. 55.

3 Karve, P. 1999. Rural cookstoves and deforestation. *Regional Energy News*, Vol. 5, No. 1/2, June 1999, p. 3

4 Discussed in another article in this volume of Glow.

Erratum

In the footnote of the editorial column (***Glow***, Vol.25, June 2001) the calorific value of biomass should be 16,300 kj/kg.

Gender Sensitive Participatory Monitoring and Evaluation on Improved Cookstove Program

Profile of Guidelines & Tools developed by ARECOP

Various tools for participatory approach have been developed. Yet, thus far, there is no specific participatory monitoring and evaluation (M&E) tools that can be used for Improved Cookstove Program (ICP). Instead, M&E of ICP's is still limited to sets of questionnaires.

The Asia Regional Cookstove Program (ARECOP) Secretariat, has decided to initiate a development of guidelines and tools for participatory M&E- as part of ARECOP's commitment to participatory program approach.

The guidelines and tools are based and adapted from various existing M&E methodologies, such as "Measuring Successes and Setbacks - How to Monitor and Evaluate Household Energy Projects" and other existing ones; and also derived from MPA (Methodology for Participatory Assessment) .

The guidelines and tools consist of two main parts-the first part is on program monitoring for and by users; the second, is on project management, conducted for and by program management stakeholders (program staff, program partners, etc). These guidelines and tools are currently undergoing further development. ARECOP had conducted a workshop/training on GenderSensitive Participatory Monitoring & Evaluation (GSPME) on ICP, which provided us with feedback and early indications on their shortcomings. Down the development line, the guidelines and tools will be further field-tested and consulted with experts and ICP's implementers.

Development objectives of GSPME guidelines and tools

- ICS adoption rate is improved
- Women are involved and get chances to be involved in the decision making process related to improved cookstove program from the planning, to implementation, and to monitoring and evaluation stage.

Specific objective of the GSPME guidelines and tools are:

- Adoption of Gender Sensitive Participatory Monitoring and Evaluation Guidelines and Tools on ICP's by any individual, organizations and institutions in the ARECOP network, as well as anyone or any other organizations who wish to carry out the approach.

Why participatory and gender sensitive ?

A participatory process

Participatory is a process of communication that results in enhanced participation, in creative self-expression among participants, in encouraging one to be open with her/his views and in deriving new perspectives-in order to find possibilities for innovative solutions.

The process encourages the participation of individuals in a group process, regardless of their age, sex, class or educational background. They are especially useful for encouraging the participation of women (who in some cultures are reluctant to express their views or unable to read and/or write). In turn, the participation will build one's self-esteem and a sense of responsibility for one's decisions. The process of decision-making is made easy and fun, using numerous tools, which could be easily adapted to suit different social and cultural conditions.

Why Gender sensitive?

In different social and cultural settings, men and women are assigned different roles. "Gender Roles" differ from biological roles. Gender roles are socially structured and may overlap in different communities. These roles divide man and women, with regards to their responsibilities, social and economic activities, access to resources and decision making authori-

ty.

Gender analysis is needed to determine the relations, tasks and roles of men and women in household and society, to help us understand the differences between men's and women's roles, activities and access to resources and decision making. Through such an analysis, constraints and opportunities within communities will be revealed. Information based on gender analysis will be collected and communicated in order to influence decision making, roles and responsibilities-so that program benefits could be delivered in sustainably to all, based on equity.

GSPME on users

Basic Principles

Five basic principles are built into the tools, used in GSPME on users:

1. Principle on solving problems in a participatory group process

2. Principle on getting enough information through sharing experiences

3. Principles on learning: *(a)* Learning in a group context, to produce change in behaviour that will be socially accepted; *(b)* An appropriate learning environment can provide an opportunity for a group to make a review of existing experience collectively and to achieve a deeper level of understanding, which will then guide actions to be undertaken.

4. Principles on decision making: *(a)* Communities are close to problems and able to find solution; *(b)* Those who create decisions will commit follow ups for further action; *(c)* Communities understand their own situation better, and their involvement will result in a higher level of effectiveness and sustainability.

5. Principles on mechanism for information exchange and discovery: (a) Information and discovery raise individual and group self confidence; (b) When people know that they are responsible for finding solution, they start to demand information and such demand opens up opportunity for dialogue and information exchange; (c) Technical information is best provided in response to the needs identified by the communities.

GSPME Framework

GSPME framework analyses sustainability in connection to needs, gender and poverty. GSPME identifies and establishes:

- Factors which contribute to sustainability (technical, social, health & environment, institutional and financial);
- A variable for each of the above factor
- A series of specific in-

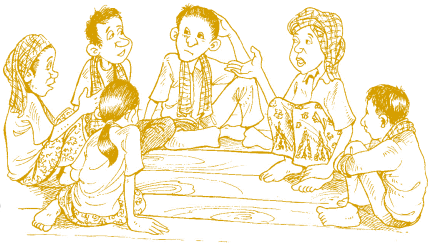
FRAMEWORK OF GSPME FOR USERS

Factors	Variables	Indicators	Sub-Indicators	Tools
Technical	Effective Sustained	Quality of work	• Design of ICS • Quality of ICS	
		Functioning	• Type and proportion of ICS in communities • User satisfaction of ICS • Voice and choice of ICS before and after	Transect walk with rating scale
Social	Division of burden and benefit	Gender considerations during establishment and operations	• Users perception on benefits and costs • Voice and choice of ICS • Division of functions	• Ladder 1 • Voice and choice in decision making • Ladder 2
Environmental Health	Effective use	Environmental health	• Proportion of population using ICP's • Improvement in the management as a result of ICP's • Safe working environment (healthy kitchen)	• Mapping and scoring • Observation and checklist
Institutional (management or organizational)	Responsive services to ICS users	Project responsive to user demand	• Control in construction • Responsibilities for maintenance	Indepth interview
Financial	Responsive participation	Participation during establishment and operations	• Cash and in-kind contributions • Gender	• Card scoring • 100 seeds

sustainability

TOOLS FOR GSPME ON USERS

WEALTH CLASSIFICATION



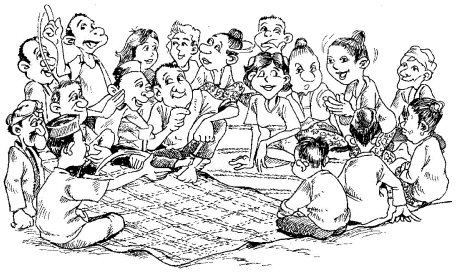
Purpose:

To classify the village population into three economics categories (Lower,Middle and Upper classes) on the basis of locally specific criteria and using culturally appropriate terms. These classifications will be used to identify groups with which to hold focus group discussions, for mapping the access of the the different economic classes to better living condition, work, improved health, improved kitchen, improved stove, fuel; and to identify their differential rates of participation in a program.

POCKET VOTING FOR PROGRAM SERVICES

Purpose:

To ascertain patterns and changes in behaviour, decision-making, choices, and so forth. This is very handy, particularly when the subject being assessed is sensitive and people are inhibited about stating their views publicly. It is used during the community assessment as well as in program stakeholders' Meeting.



COMMUNITY MAPPING

Purpose:

- To learn how the program has served the community; and how accessible are program services to the Lower, Middle and Upper classes.
- To depict which households (Lower, Middle or Upper classes) have paid or unpaid males or females working in program.

CARD SCORING

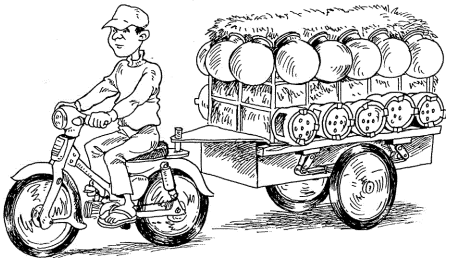
Purpose:

To assess who contributes what to the establishment of improved facilities (e.g. improved stoves or improved kitchen). The contribution is assessed in relation to the capacity to contribute.

LADDER - 1

Purpose:

To assess the extent to which program services meets the users' demand and how they consider the benefits of the service worth against the costs. The activity is done separately with women and men of the community.



100 SEEDS

Purpose:

To obtain an approximate percentage distribution of any concept, for example, sharing of earning and financial responsibilities within households.

LADDER - 2

Purpose:

To assess the impact of improved cookstove program on women's time and workload in relation to those of men.

dicators and sub-indicators for each of the variable

• Tools to assess the indicators and sub-indicators. The tools produce both qualitative data (through the scoring system) and the quantitative data collected from the participatory assessment.

The framework is represented in the diagram below.

GSPME on Improved Cookstove Program (ICP) management

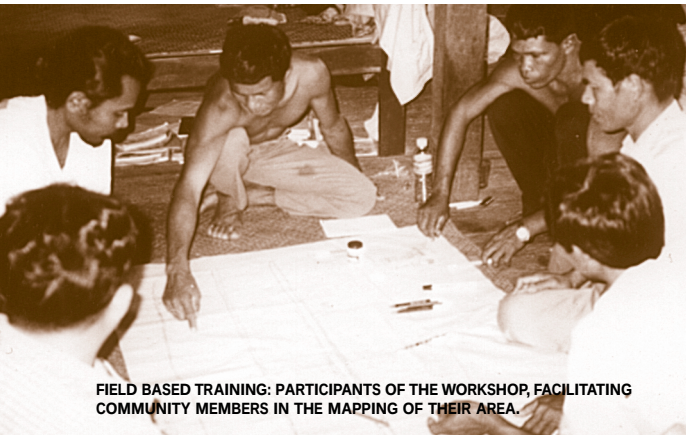
GSPME on ICP Management, is a series of tools used to monitor and evaluate project management. GSPME on project management is designed to be flexible, i.e. it could be used to monitor projects at varying stages of a project cycle and/or when certain components of a project are unclear or missing.

1 Developed jointly by HEP, ITDG, and FWD.
2 Developed by the Water and Sanitation Program of the World Bank and the IRC International Water and Sanitation Center.

Components of GSPME on Project management

ASSESSMENT ON	P U R P O S E	T O O L
PROJECT PROGRESS MONITORING	• Monitor financial progress of on-going projects • Monitor progress of activities • Identify problems • Preparation of a plan of action to remedy problems	Participatory Progress Monitoring (PPM)
MONITORING PROJECT MANAGEMENT	• Monitor the management capacity • Monitor the management sustainability • Monitor the management transparency • Monitor the participatory nature of the management	Participatory Assessment of Management Sustainability (PAMS)
MONITORING OF PERCEPTIONS OF PROJECT PARTNERS	• To update the knowledge of partners and remind them of their responsibilities • To take necessary remedial action	Participatory Cross Perceptional Assessment (PCPA)
SELF-MONITORIN-G OF TEAM WORK IN THE MANAGEMENT	• To identify level of team work in the management • To identity weak and strong areas of members of an organization • To monitor each person and his/her change • To identify remedies to improve team work	Participatory Confidential Self-Assessment (PCSA)
PROJECT PROGRESS EVALUATION	• Study the actual expenditure vs. planned expenditure, and if there are discrepancies and the reasons thereof. • Actual activities vs. planned activities, and if there are discrepancies and the reasons thereof. • Actual time duration vs. designed time duration, and if there are discrepancies and reasons thereof	Participatory Project Evaluation (PPE)
GENDER PARTICIPATION EVALUATION	• Study gender participation in the project • Study gender participation in various levels of the project • Identify areas where women's participation is poor • Make recommendations to strengthen women's participation	Participatory Evaluation of Gender Participation in Projects (PEGPP)

Workshop and Training on GSPME



FIELD BASED TRAINING: PARTICIPANTS OF THE WORKSHOP, FACILITATING COMMUNITY MEMBERS IN THE MAPPING OF THEIR AREA.

Since April 2001, ARECOP assisted by two resource persons, Mr. Tissa Athukorala from Sri Lanka, Ms. Ratna Indrawati and Mr. Amin Robiarto, from Indonesia, developed Guidelines and Tools on "Gender Sensitive Participatory Monitoring and Evaluation in Improved Cook Stove Program" (GSPME on ICSP). The first trial for the guidelines and tools developed was in Indonesia; followed by a workshop/training in Cambodia, organised by ARECOP and WeNetCam (Wood Energy Network of Cambodia).

A five-day Workshop and Training on GSPME on ICSP, starting from 8th August, 2001, took place at Seam Reap, Cambodia. Twenty participants from Indonesia, Philippines, Vietnam, Laos, Cambodia, Nepal, Bangladesh and Sri Lanka participated in the five-day training.

The objective of the workshop and training are: (1) To field test the GSPME in ICP guidelines and tools; (2) Some ARECOP members are trained to use the guidelines and apply the tools through a workshop and training; (3) Some ARECOP members conducted pilot projects by applying GSPME tools, (4) Improvement of the monitoring and evaluation tools based on participants' feedback and lessons gained from the field tests.

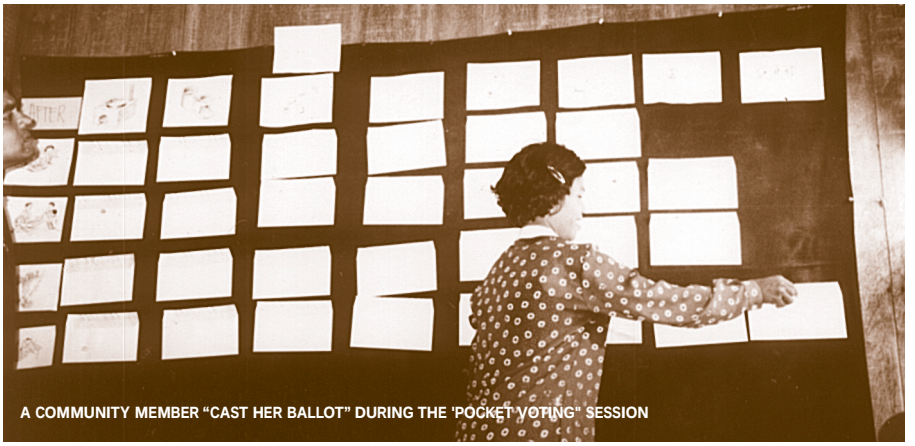
The five-day workshop and training were a combination of lectures, workshops and field practices. Training sessions conducted were described as in table below.

Field based components were conducted in three villages, where FAO and UNV (United Nations Volunteer) conducted stove programs three years ago. These programs were concerned with the introduction of improved stoves for household, institution (Buddhist monasteries) and cottage industry (palm sugar production).

Most participants found the method to be very promising in terms of its usefulness in stove programmes. Furthermore, participatory approach has also been implemented by some of the participants in their programmes. We have become aware of the shotcomings of the guidelines and tools, as pointed by participants; the needs to explain in detail facilitators' roles and tasks and the use of tools and the needs to explain more clearly some of the terminology used in GSPME. Despite the criticisms, in general all agreed with the value of a participatory program approach.

As of now, the secretariat is working closely with the resource persons to further improve the guidelines and tools, based on participants' feedback. Further development will be done through lessons gained from pilot projects to be organised soon, in Indonesia, Cambodia and the Philippines.

Day	Sessions
1	• Gender Sensitive Participatory Monitoring and Evaluation (GSPME) • basic principles approach, how does it differ from PRA, strength and weaknesses. • Conducting GSPME • how to be a good facilitator for GSPME • Wealth classification • Mapping • Gender (Hundred Seeds)
2	• Field practice
3	• Ladder 1 : division of benefit • Pocket Voting • Ladder 2 : division of work • Card sorting : contribution assessment • Decision matrix voting • Transect walk with rating scales • Semi structured systems with observation guide and form
4	• Field practice (Ladder 1, Pocket voting, Ladder 2, Card sorting, Decision matrix)
5	• Field practice (Transect Walk) • Combining results - reporting



A COMMUNITY MEMBER "CAST HER BALLOT" DURING THE 'POCKET VOTING" SESSION

Household Energy and The Environment

T.V.Ramachandra*

SUMMARY

Sectorwise, desegregated information of energy usage is developed for Uttara Kannada District, Karnataka State, India, to assist in regional energy planning exercise.

Cooking, water heating and space heating are the major end use activities. Traditional stoves were still widely used for cooking (97.92%) and water heating (98.3%). Average fuel consumption was higher in hilly than in coastal zones. Seasonal variation in fuel wood consumption is also evident for both coastal and hilly communities. Meanwhile kerosene consumption is also influenced by the availability of bioresources for fuel, besides the reliability of electricity supply.

INTRODUCTION

The integrated development of land, soil and water components is essential for environmentally sound development. Biomass energy extraction is also responsible in varying degrees for the ongoing deforestation, and loss of vegetation and topsoil. While energy availability is a determining factor for agricultural productivity, traditional use of agricultural residues for energy production leads to soil impoverishment. The current inefficient energy use in various sectors is certainly responsible for the detrimental impacts on the environment.

This paper provides comparative analyses of household energy consumption pattern - across coastal, interior, hilly and plain zones-considering regional and seasonal variations. Per Capita Fuel Consumption (PCFC) was computed based on a survey of 1304 households in 90 villages, in order to:

(i) determine fuel consumption pattern in various agro-climatic zones;

(ii) find out various parameters determining the variation and level of energy consumption;

(iii) estimate the daily per capita consumption of fuel wood in traditional and improved stoves for cooking and water heating.

PATTERN OF ENERGY CONSUMPTION

In order to see the role of culture and tradition in fuel wood consumption, data are grouped based on community. The data reveal distinct differences in diet and cooking habits. Consumption of fuel for cooking, ranges from 1.62 (Bhandari community) to 2.62 (*Achari* community) kgs/person/day. Fuel wood consumption for water heating, ranges from 0.89 (Madival community) to 1.59 (Havyak Brahmin) and 1.62 (Marathi community) kgs/person/day.

Energy Transition

It is seen that economically sound communities such as Havyak Brahmins and Gouda Saraswath Brahmins have switched over to biogas, kerosene and LPG stoves for cooking. The shift from traditional to improved cookstoves (in certain households kerosene stoves and/or biogas along with improved cookstoves) depends on educational background and economic soundness of the family. Economically and socially marginal communities, such as, Mukris and Kumbhi Marathis still prefer traditional stoves (fuel is collected at zero cost).

In order to see the role of economic background, number of persons per household and types of device in consumption pattern, further analyses were carried out.

The relation between Number of Persons per Household and Fuel Consumption

Fuel wood requirement per person per day for cooking ranges from 2.35 kgs (< 3 adults) to 1.42 kgs (> 12 adults). For water heating fuel wood requirement per day ranges from 1.99 (< 3 adults) to 0.73 (>12 adults) kgs/person/day. This shows reduced per capita fuel consumption with an increase in adult equivalents per household. The two variables are linearly correlated with a correlation coefficient of 0.36 and standard error of Y estimate = 0.923.

Therefore, proper stove design and size of vessels in relation to the number of persons in a household, are essential parameters in bringing down fuel wood consumption.

Table 1. The number of adults equivalent per household

Number Of Adults equivalent Per Household	< 3	3.10 - 6	6.05 - 9	9.05 - 12	> 12
Percentage	12.3	55.6	24.8	4.9	2.4

Effect of Educational Level on Energy Consumption

Qualitative data on educational level of those directly involved in domestic activity was quantified as: 0 (illiterate), 1 (primary education), 2 (up to 10th standard) and 3 (college education).

It is noticed that educated users are more receptive to adopting energy efficient devices and are efficient in utilising energy even in traditional devices. Fuel consumption (PCFC) and level of education of members (EDU) are linearly correlated, with a correlation co-efficient 0.845 and standard error of Y estimate = 0.506 ($p < 0.001$).

This is mainly due to awareness associated with level of education. The result clearly demonstrates that increase in literacy level among rural population would directly benefit in the form of less energy consumption.

Traditional versus improved stoves

End use efficiency experiment carried out in households located in Sirsimakki-Mundgesara catchment shows savings of about 42% fuel when improved cookstoves (ASTRA design) was used. Similarly, the use of improved bath stoves for water heating (ASTRA design) saves between 19-24% in fuel consumption.

FUEL CONSUMPTION

Domestic sector

About 60% (approx.) of fuel for water heating was met by agricultural residues. With this assumption, 1,202,615 tones of fuel wood and 367,861 tones (fuel wood equivalent) of agriculture residues was needed for domestic cooking and water heating. A total of about 1,570,477 tones of fuel wood equivalent was needed for domestic cooking and water heating.

During the monsoon season, only a minority of inland and coastal households used fuel for space heating, at a rate of 0.15 kg/person/day. In the same season, fuel for heating was used by 80% of households in the hilly areas, at a higher rate of 1.11 kgs/person/day. For the season, a total of 53,772.5 tones of fuel was required for all areas surveyed.

Boiled rice was used in most of the households in Kumta Taluk. 68% of the surveyed households used boiled rice regularly (mainly in coastal area). Fuel types used for this purpose ranged from rice husk, fuel wood to coconut residues. Specific Fuel Consumption (SFC) computed ranged from 0.70 - 0.89, which meant, for cooking 1 quintal of rice, about 0.7 to 0.89 quintals of fuel wood equivalent was needed. In all about 1,732 tones was required for rice boiling.

Kerosene demand of the district for lighting and cooking is about 12.73 and 3.32 million litres respectively. LPG required is about 226 tones (15613 cylinders) per year. Electricity demand in the domestic sector (lighting and All Electric homes) is about 32.65 million kWh per year.

Industrial Sector

• *Areca* Boiling (Red Variety Preparation) - *Areca* is one of the major horticultural crops in Uttara Kannada district. Boiling of *Areca* (to manufacture red variety for day to day use) is another fuel intensive operation carried out here.

Specific fuel consumption (SFC), computed based on data from 12 households, ranges from 1.97 to 2.03. This means fuel wood required for a quintal of areca processing is 1.97 to 2.03 quintals. In total, *Areca* processing requires about 1,399.88 tones of fuel wood per year.

• *Jaggery* Manufacture - Fuel wood required in traditional stoves to convert 300 litres of sugar-cane juice into about 40 litres of viscous *jaggery* is 195-220 kgs. Using ASTRA stove (jaggery stove designed by ASTRA), 25-30% reduction in fuel wood consumption could be achieved (based on SFC data from eight households).

Uttara Kannada district produced about 149,698 tones of sugarcane per year (1992-93 and 1993-94 production), out of which *jaggery* is prepared for domestic purposes. The fuel required for this, is about 41,316 tones.

Total Demand For Fuel In Uttara Kannada District

The total fuel wood required (cooking, water heating, space heating, *jaggery* making and *Areca* boiling) works out to 1,668,698 tones/year. Electricity demand excluding irrigation is about 32.65 million kWh/year. Meanwhile, the calculated demand for kerosene for cooking and water heating is about 15.86 million litres per year.

CONCLUSION

The results from the study reveal that the levels of energy use and mix of energy sources depend on the following factors:

1. Geographic and climatic factors (space heating, drying needs, altitude, and seasonal variation in cooking energy requirement),
2. Culture and traditions (diet, cooking habits, etc.),
3. Household income (urban),
4. Household ownership of assets such as land, cattle, etc. (rural),
5. Household size (number of persons per household),
6. Educational level of household members (educated women are found to be more receptive to alternatives such as fuel efficient stoves, biogas, etc.), and
7. The thermal efficiency of cooking and water heating devices.

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Assessing the Possible Implementation of Improved Cookstove Programmes Using Clean Development Mechanism*

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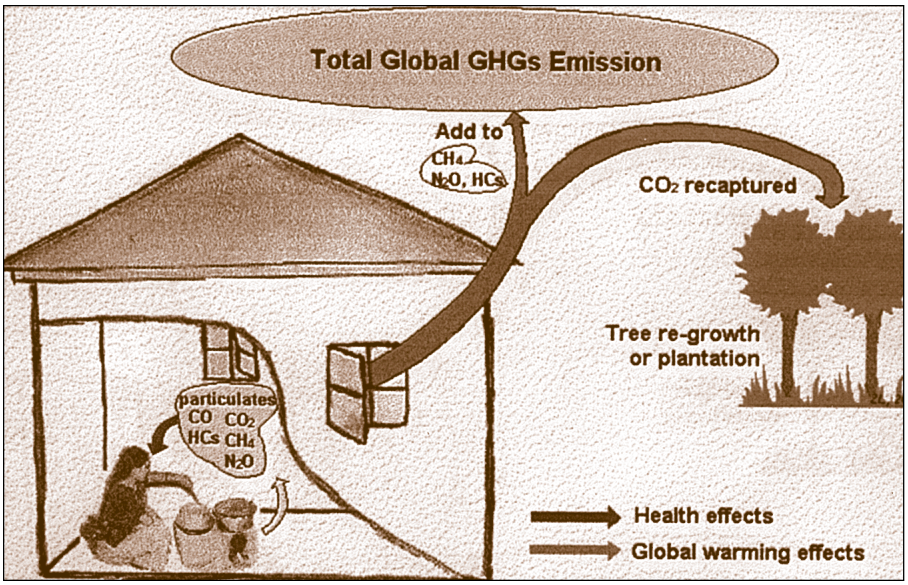


Background

The concept of the Clean Development Mechanism (CDM)

In 1997 an international agreement to reduce greenhouse gas (GHG) emissions, called the Kyoto Protocol, was signed to help combat dangerous climate change. This agreement followed on from the UN Framework Convention on Climate Change (UNFCCC) signed in 1992 at the Earth Summit. The Kyoto Protocol includes GHG emissions targets for Industrialised countries, and also a scheme called the Clean Development Mechanism (CDM).

The concept of the CDM is relatively simple in that an industrialised country with greenhouse gas emission reduction targets (known as a Donor), may choose to carry out emission reduction projects where the cost is lower, such as in a developing country (known as a Host). The donor receives credits (called certified emission reductions or CERs) for the emission reductions achieved and the host country receives investment, which is theoretically supposed to be in line with a sustainable path and with host country priorities.

Implementation of Clean Development Mechanism (CDM)

Though the concept of the CDM is simple, so far the practicalities, such as how to assess whether projects are in line with sustainable development, and how the emission reductions are to be calculated, have not yet been resolved.

Another point regarding the CDM implementation is one concerning the 'additionality' criterion. This, simply, requires a CDM project to result in GHG emission reduction 'additional' to that, which would have happened in the absence of the particular project. Another aspect of additionality (specified in the UN FCCC) is that funding shall be additional to the Official Development Assistance (ODA).

Concerns regarding the Clean Development Mechanism (CDM)

It is worth noting a number of concerns that have been raised regarding the concept of CDM. Developing countries (DCs), as well as Industrialised countries (ICs), recognise that most GHG emissions have up to now been released by the latter. Therefore it could be argued that the inclusion of the CDM may create further obstacles for the successful implementation of emissions reduction efforts as it might:

- undermine ICs domestic action in emissions reductions;
- limit host countries' (DCs) freedom in their own development path;
- replace some of the assistance currently given to DCs and transition countries under current UN FCCC commitments;
- encourage ICs to select the cheapest projects, so that, if and when DCs are required to reduce emissions reduction in the future, they will be left with higher cost reduction options;
- increase the transaction costs of achieving emissions reductions due to complex international regulating systems.

The scope of the study

Several Improved Cookstove (ICS) projects implemented in Sri Lanka and Kenya, in addition to other renewable

energy projects, were evaluated with the aim of contributing to the current debate on the methodological aspects of the Clean Development Mechanism (CDM), set under the Kyoto Protocol. The study was designed to produce several outputs:

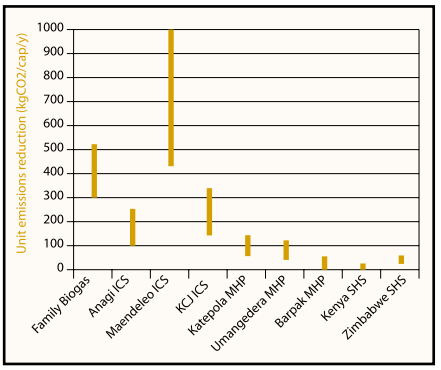
- Calculated ranges of greenhouse gas (GHG) emission reductions, for among others, improved cookstove projects
- Sustainability and development assessment of the projects taking into account issues such as technology transfer, poverty alleviation, capacity building, environmental effects, and country priority compatibility;
- Key features of technology transfer, poverty alleviation and capacity building;
- Comparisons of project types (ICS, biogas, micro-hydro, solar home system), over climate change and sustainability objectives;
- Suggestions for a new project types which maximise combined benefits, i.e. combining sustainably managed forests with fuel wood project such as an ICS project;
- Proposal for additionality implementation for small scale projects in developing countries;
- Methodology proposals for baselines and calculating emission reductions from small scale projects;
- Implementation proposal for the CDM from approval to monitoring and verification;
- Recommendations for future work.

GHG emission reductions of stove projects

Each case study project assessed in this study was a successful development project. The projects were assessed in a manner designed to yield useful information relevant to the functioning of the CDM, even though none of the projects themselves was actually a CDM project.

The results for unit emissions reduction (given in figure 1 in kg CO2/capita/year) clearly shows that ICS projects to be having large emissions reduction per capita (between 100-1000 kg CO2 / cap/y), compared with others, such as

FIGURE 1. UNIT EMISSIONS REDUCTION (IN KGCO2/CAPITA/Y) FOR CASE STUDY PROJECTS



solar home system projects (19-30kg CO2/cap/y).

Table 1. A list of Improved Cookstove projects studied

Stove project	Country	Organisation
Anagi	Sri Lanka	IDEA
Maendeleo	Kenya	Various
Kenyan Ceramic Jiko	Kenya	KENGO
National Institutions	Kenya	Bellerive

The total emissions reduction for different project types obviously depends on the unit emissions reduction, already discussed, and the size of the program. For example, in the cases of ICS programs in Sri Lanka and Kenya, between 0.25 million to 1 million households were involved; leading to emissions reduction of around 200 kilo tone of CO2 per year and 1000 kilo tone CO2/year in Kenya. These figures translate to approximately 3% and 15% of national CO2 emissions in Sri Lanka and Kenya respectively. Thus small-scale projects of this type, when gathered into a program, become equivalent to large projects. Sometimes known as 'umbrella projects', this could be administered in such a way that investors could receive CER credits from a collection of small projects.

Projects which focus mainly on cooking (e.g. biogas digester and ICSs) are likely to yield much larger greenhouse gas emission reductions than those which focus mainly on lighting (eg. Solar home system), since cooking makes up a greater proportion of household energy use.

PROFILES OF THE STOVE PROJECTS STUDIED

KCJ Improved Cooking Stove (Kenya)

The Kenyan Ceramic Jiko (KCJ) improved cookstove has similar roots to the Maendeleo stove. The fuel burnt by the KCJ, however is, charcoal. The stove is made up of metallic cladding with a wide base and a ceramic liner held on to the metal by a thin layer of cement and vermiculite. Air flow to the fire is controllable.

Large scale funding for the KCJ programme began in about 1988, and by the end of 1993, about 600,000 stoves had been disseminated, mainly in urban areas.

SOURCE: KENYAN CERAMIC JIKO (KENGO) LTD.

Institutional Improved Cooking Stove (Kenya)

There are about 5000 hospitals, schools, colleges, children centres, army barracks, prisons and dispen saries in Kenya. The larger institutions prepare meals for up to 1,100 people per day while smaller one prepare meals for only 30. Many of these institutions used a range of fuels including liquified petroleum gas (LPG), kerosene, electricity, charcoal and wood. However due to procurement difficulties and rising prices of some of the fuels, most institutions found themselves using wood fuel (charcoal and firewood) for cooking in inefficient traditional stoves, which are only marginally better than the three stones fires.

In early 1980's the Bellerive Foundation and UNEP started a programme aimed at reducing the use of fuel wood by introducing fuel efficient stoves in Kenyan institutions. The programme has progressed and is now in the hands of the private sector. About 3,500 stoves have been disseminated since the beginning of the programme.

Table 2. Comparisons on the sustainability performance of different project types implemented in a CDM scenario

Project type	GHG reduction kg/cap/y	Cost US$/t CO2	Technology transfer	Poverty alleviation	Environment	Overall development performance score	Overall performance order of preference
ICS	160 to 1000	-190 to -40	100	90	70	260	1 best on development and reduction potential and no regrets
Biogas	310 to 530	10 to 20	90	80	100	270	2 Also high on reductions, low cost and good development performance
MHP	20 to 130	-120 to -50	80	100 (if high service)	70	250	3 low GHG reduction, but no regrets** on cost and very good development performance
SHS	10 to 60	120 to 770	0	0	0	0	4 not strong on reductions, cost or on development

*Each of the sustainability aspects is assessed based on a relative scale of 0-100. See the main report for an explanation of the 'decision analysis' methodology used.
** 'No regrets' action - emission reduction action that would also result in financial saving.
MHP: Micro-hydro
SHS: Solar home system

Methodology proposals for baselines and calculating emission reductions

In order to estimate the GHG emissions reduction and cost for each of the case study projects, the project scenario must be compared with a baseline scenario of the GHG emissions and costs in the absence of project. However there is significant uncertainty associated with *baseline* construction. This necessitates the estimation of a range of baselines for each of the project.

Other major uncertainties in calculating emission are the crediting lifetime of the projects and uncertainties on input values for key parameters such as amount of fuel reduced.

Thus far, the results from the evaluation suggest high uncertainties in estimates of emission reduction between +25%-+50%, mainly due to baseline uncertainty. More important seems to be the level of poverty in the project area, i.e. high levels of poverty often means there are few alternatives to the pre-project situation, leading to lower uncertainty in the baseline.

For cooking projects, the pre-project situation (and hence the initial baseline situation) is generally unsustainably harvested fuel wood burnt in low efficiency stoves/open fires. Standardised baselines with other measures to limit uncertainty could be used in the cases of these projects. With this approach, the accounting of major determining factors relating to emission reductions would be simplified. From our experience thus far, the use of short crediting lifetimes, or regular revisions of baselines could be applied in CDM projects.

Consideration of uncertainties in the baseline suggests that poverty focussed projects have the least uncertainties as the range of energy options is severely limited. This could work in favour of the poorest if the CDM is found to be easier to apply to such projects.

Sustainability and development assessment

The study also explores how CDM based projects could be in line with a host country sustainable development path. The study investigated how the projects performed in relation to certain aspects of sustainable development relevant to the CDM context: *Technology transfer, Poverty alleviation, Capacity building, Environmental effects, Host Country priorities*.

Each aspect is evaluated using a set of criteria, which in combination try to define that aspect. For example, technology transfer was evaluated according to the criteria of initiation, imported technology, local technology, energy needs met, cultural needs met, quality control, participation of locals, subsidy, access to credit, stability of income.

Using the above sustainability aspects, the projects are then compared. Having made these comparisons, the project analyses were combined with the emission reduction and cost information for an overall assessment of project types for maximising climate and development objectives. Results of the assessment, as shown in table 2, indicates that stove projects had a strong overall performance in terms of preference, in comparisons with other projects.

Key features for sustainability aspects of projects

From the analysis, it was possible to identify key features for each aspect which are common to all project types studied, and which were important for project (and therefore CDM) success. Table 3 provides an overview of key features of technology transfer, poverty alleviation and capacity building.

New Project combinations

From the foregoing work, new project combinations, which would enhance the benefits from the project types studied can be suggested. For example combining sustainability managed forests with a fuel wood project

Table 3. Key features of technology transfer, poverty alleviation and capacity building

Technology transfer	Poverty alleviation	Capacity building
• Quality control and training for small scale project programmes are crucial for reductions over the longer term • Access to affordable credits to promote the uptake of the technology • All projects generated within country supplies of some or all components of the technology • Import tax and other fiscal structures need to be geared towards encouraging commercialisation of projects • Consultation is a major feature in household biogas, ICS and micro hydro proceeded to commercialise as quickly as possible • Subsidies have been important in many projects e.g. SHS, biogas, ICS, micro hydro to promote uptake by the market or to attract investors.	• For direct effects, projects should be small scale, affordable and accessible to the poor • Where possible the energy service introduced should reduce drudgery/ time expenditure on certain tasks • Energy projects yield local benefits in education and health • Indirect benefits, e.g. electricity for clinics and schools	• GO-NGO co-operations develop viable market systems. Investors could fund expansion of programs or create new ones • Education, training and public participation • Project additional activities, e.g. quality control systems, micro credit financing skills • Infrastructure gains • Networking with others strengthen capacity • Insufficient • Data gathered and experience shared on the projects • Community based projects create more community empowerment, compared to commercial ones.

Notes: All the approaches seemed to work and were characterised by a very fluid interaction between development and commercial ventures

such as an ICS project (wood or charcoal) would lead to even higher reductions for minimal investment or it could be a project on its own.

Proposal for the implementation of the CDM

Based on the findings of this study and taking into account previous work (Begg et al., 1999), a simplified implementation plan is suggested, which examines the following issues:

- Project approval
- Accounting for emissions reduction (including baseline methodology)
- Management of uncertainty
- Monitoring and verification
- Operationalisation of additionality
- Institutional aspects

For credible, certifiable, credits, a package of measures, for managing uncertainty is necessary. This would involve using standardised baselines where possible, monitored data where applicable, and limited crediting lifetimes as the simplest and easiest way of doing this. Baseline revision is an alternative to limiting the crediting lifetime.

Future work

There are many areas for future work on development and the CDM to confirm and build on the findings in this report. It should be emphasized that both emissions reduction accounting and sustainable development studies are required for a complete assessment.

- The work in this study could be taken further to include the following:
- Extension of project types to others such as transport, forestry, agriculture, levels and countries
- Extension to energy use and projects types in urban environments
- Extension of numbers of projects
- Surveys of households to improve baseline data quality
- Uncertainty analysis on a range of project types
- Production of guidelines for emission reduction calculations including baselines and additionality criteria
- Further refinement of the definition of financial additionality so that operation of ODA is not compromised by the CDM.

Much work has been carried out on the development aspects of projects but the particular combination of development and the CDM climate change concerns has not been studied. The CDM needs to have this input if it is not to be designed to meet the aims of the Kyoto Protocol. Development studies do not usually discuss fully the provision of energy services and the need to design these services to maximise the environmental and social benefits to the community. Therefore, there is a need to carry out studies in order to provide a more holistic view of the different aspects of development work related to the provision of energy and to relate that to the mitigation of climate change. The following are a list of suggested development work aspects, which could be studied:

- Development of simple energy and sustainability indicators for project approval and for auditing progress of CDM projects
- Studies on household energy use patterns and priorities to help to target energy services and maximise freed time
- Studies on cultural aspects of project types
- Studies on energy use and sustainable livelihoods
- Energy projects and gender issue impact studies

Reference

Begg, Jackson and Parkinson, *Accounting and Accreditation of Activities Implemented Jointly*. Final Report the European Commission DG XII.

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PROFILES OF THE STOVE PROJECTS STUDIED

Anagi Improved Cooking Stoves (Sri Lanka)

SOURCE: STOVE FOR SALE, ITDG, IDEA, GTZ, ARECOP

After several years of research and development involving the Sri Lankan government and a number of local organisations, a local development NGO, IDEA, started a program to train potters in Sri Lanka to manufacture a more fuel efficient cooking stove (called the Anagi) aimed at poor communities. The first stage of the programme ran from 1991-1996, the second stage running from 1997-1999. The program also included training potters in marketing skills, and public education workshops. During the first stage of the programme approximately 450,000 stoves were disseminated, some sold commercially, some sold at subsidised price by development NGOs.

The improved stoves are more efficient, reducing the fuel required to cook the average meal by a third, whilst also speeding up the cooking time and reducing smoke and other air pollutants.

Maendeleo Improved Cooking Stoves (Kenya)

Since 1981, a number of stove programmes have been run, ranging from small-scale grassroots initiatives by community based organisations to large scale national programs often supported by donor agencies.

A large scale program on the dissemination of the Maendeleo improved cookstove was started in 1991. In the following three years, the program had distributed about 150,000 stoves. The Maendeleo has been designed to increase combustion efficiency; reduce fuel use, decrease cooking time and reduce local air pollution.

Publications

Capturing Heat Two

Capturing Heat Two, is the second in a series of booklets on simple energy technologies. Simple but well designed cookstove, oven and water heater, are described clearly in simple language and with illustrations. Design principles are also explained, for each of the technology, making it possible for readers to develop/modify further the technologies based on needs.

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80574 Hazelton Rd., Cottage Grove,
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Proceedings of the International Conference on Biomass-based Fuels and Cooking Systems

The proceeding contains 27 of the 35 papers presented at the conference in Pune, India, in November 2000. The conference features the latest development in biomass technology from around the world.

To obtain copies, contact:

A.D. Karve
Email: adkarve@pn2.vsnl.net.in

Internet Resources

Energia - International Network on Women and Sustainable Energy

http://www.sms.utwente.nl/energia/home.html (verified 2nd September, 2001).

ENERGIA is an international network on women and sustainable energy which links individuals and groups concerned with energy, environment and women. ENERGIA aims to strengthen the role of women in sustainable energy development through information exchange, training, research, advocacy and action.

The web site provides access to Energia news, Energia quarterly publication; resource, which consists of papers on gender related energy issues and a list of links to related web sites. Relevant news is also posted on the page, such as information on gender related events and information on gender related energy program support, a directory of experts and resources.

Website for Environmentally Sound Biomass Stoves

http://www.cookstove.net (verified 15th September, 2001).

This website is dedicated to provide an overview of the work carried out by the Woodburning Stove Group (WSG) during the years 1980-1995. The website contains some of the results of their work, mainly on constructing a systematic methodology of developing designs acceptable to users and to provide supporting data - mostly technical - that will ease the burden of the design chore.