



Women, Energy and Water in the Himalayas

Project Learning



Bikash Sharma
Kamal Banskota

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Women, Energy and Water in the Himalayas

**Incorporating the Needs and Roles of Women
in Water and Energy Management
Project Learning**

**Bikash Sharma
Kamal Banskota**

**United Nations Environment Programme (UNEP)
Nairobi, Kenya
and
International Centre for Integrated Mountain Development
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Foreword

Increasing numbers of gender awareness and development interventions are helping to increase opportunities and improve the lives and well-being of women and rural communities across the Himalayan region. Nevertheless, in many areas women continue to bear a disproportionate burden in meeting their household water and energy needs. Increasing chemical pollution and ecosystem degradation often exacerbates their daily plight.

Fortunately, there are an increasing number of technical solutions available. A number of good practices in energy and water management are able to reduce the need for fuel, provide alternative energy sources, and increase water availability close to the home. However, such technologies and approaches are only accepted and used in practice if women are directly involved, and their special concerns taken into account in the decision-making and implementation processes. Unfortunately, the failure to recognise this has meant that many water and energy initiatives have been much less effective in the long-term than originally hoped.

ICIMOD, with its long experience in diverse mountain communities, recognises that any new interventions for improving the well-being of mountain women need to focus on ways to free women from the long hours and drudgery of work to enable them to engage in income-generating and other activities. This is accomplished by bringing them into the technology choice and decision-making process from the outset. This approach has the added benefit of contributing to women's overall empowerment and status.

In 2002, UNEP and ICIMOD initiated a project on 'Incorporating the Needs and Roles of Women in Water and Energy Management in Rural Areas in South Asia – Capacity Building of Women in Rural Areas of the Himalaya' with financial support from the Swedish International Development Co-operation Agency (SIDA). The project focused on enabling women to participate fully and effectively in the planning and implementation of household water and energy initiatives by building their capability to organise themselves and to identify and prioritise their own needs. The project was carried out in partnership with the Royal Society for Protection of Nature (RSPN) in Bhutan, The Energy and Resources Institute (TERI) in India, and the Centre for Rural Technology (CRT/N) in Nepal.

In less than two years, the project made a marked difference in the lives of the women, their families, and their communities. Women developed their own solutions to their water and energy needs, and many were able to use the time saved to generate income. Women have operated a technology demonstration centre from the technologies they adopted for the benefit of other women. Some have emerged as energy entrepreneurs, for example, as liquid petroleum gas depot managers, and producers and sellers of solar dryers and improved cook stoves. The impact was further broadened by coordinating with different development partners to provide additional inputs and training to the women, providing the basis for mainstreaming good practices at district and national levels.

The project has demonstrated that the issue is not merely which technologies best serve the needs of women, but also how to enable them to choose the options that meet their needs

and improve their livelihoods. The major challenge now is to translate such experiences into gender sensitive policies that can extend the impact across the Himalayan region.

The experiences and lessons learned from the project have been encapsulated in three publications and a film: a Policy Guidelines publication, a Training Manual, and this report with details of the overall project experience.

Policy makers and rural development practitioners can pick from these experiences those that are useful or suitable to their particular needs for replication and upscaling.

I hope that the Guidelines will be of use to policy makers, planners, and development specialists in national institutions, NGOs, and donor agencies engaged in engendering development and empowering women, especially in mountain areas. I would like to extend my sincere gratitude to UNEP-Nairobi and SIDA for the financial support, without which this important work would not have been possible.

Dr. J. Gabriel Campbell
Director General
ICIMOD

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Executive Summary

Water and energy are two essential resources for human survival and well-being. Once believed to be abundant and relatively free, these resources are becoming increasingly scarce in the Himalayas as a result of poverty, increasing population, and inappropriate development interventions. Women are finding it more and more difficult to meet their daily water and energy needs in a sustainable manner. With increasing water- and fuel-related work burdens, women are often forced to keep their children, especially daughters, out of school to assist with household chores – perpetuating intergenerational poverty, drudgery, lack of education, gender discrimination, and ill-health. Both water and energy uses are intrinsically linked with the degradation of the environment in the Himalayas and the poverty that goes with it. Women must play an important role in the management of energy and water in the rural Himalayas if the problems are to be addressed successfully, for it is they who are responsible for, and affected by, these two critical resources.

If one is concerned about the well-being of women in the Himalayas and about reducing poverty and environmental degradation here, it seems natural to focus on interventions that empower women to meet their water and energy needs in a way that frees them from excessive, time-consuming drudgery and allows them to increase their income and improve their status in society. However, conventional development interventions in energy and water with their focus on investment into large capital-intensive infrastructure have largely overlooked projects and activities which women can take charge of themselves. The development process has traditionally selected projects which by their nature further strengthen the entrenched dominance of men and take resources away from alternative interventions that could empower women. The numerous smaller-scale technologies which women can take control of and manage themselves to meet their needs continue to remain largely overlooked in government planning and donor investments. The few examples of approaches that have stressed the central role of women in water and energy management remain fragmented and the learning from them has yet to be assembled coherently.

The project, 'Capacity Building of Women for Energy and Water Management in the Rural Areas of the Himalayas', supported by UNEP and SIDA and executed by ICIMOD from January 1992 to December 1994, tackled the question of how women can be empowered to meet their water and energy needs. The project was carried out in three Himalayan countries – India, Nepal, and Bhutan. The learning from the pilot projects is being consolidated into a Policy Guidelines publication and a Training Manual, together with this publication which sets the project in context and describes the overall implementation, response, impact, and lessons learned in more detail. Policy makers and rural development practitioners active in the Himalayan region can immediately take these experiences, adapt them to their needs, replicate them, and scale them up. The major findings of the project are as follows.

First, the project concludes that the pertinent question is not merely which technologies best serve the needs of women, but more importantly, how to enable women to choose which options meet their needs and improve their livelihoods. The project distinguished

between the practical, productive, and strategic needs of women in the context of energy and water. Practical needs might be met by technologies that reduce drudgery, save time, and improve health through improved access to energy and water. Productive needs would be met by technologies that provide an income to women, utilising the time saved by improved access to water and energy. Strategic needs would be fulfilled by processes and technologies that empower women to choose their own technologies and improve their standing in society. The project demonstrates how women can be enabled to access improved energy and water services through empowerment and enhancement of their entrepreneurial and technical skills. Focusing on women's needs and roles in water and energy management can contribute significantly to meeting a number of Millennium Development Goal (MDG) targets.

Clearly, technology is not neutral. The choice of technology determines who benefits from a particular intervention. This project demonstrates how women can choose technologies that specifically benefit them through a participatory process. Within the project period, participating women's groups selected technologies that met their particular needs. In addition, pilot interventions strengthened their roles in water and energy management through the mobilisation of self-help groups made up of local women. Women have been careful to select technologies that do not increase their financial burden or increase their workload. What is striking is that a few simple technologies in the water and energy sectors had a substantial impact on the lives of the women even within the short time frame of the project. These technologies are decidedly different from those normally seen in conventional government-supplied water and energy projects.

A second interesting feature of the project is that the time saved after adopting the technologies was used for income generation at most sites. Since women in the rural Himalayas are so heavily burdened under current gender relations and resource conditions, reducing their heavy burden of work is an essential first step towards making it possible for them to participate in any new livelihood opportunities. Time saving and reduction of drudgery are valuable impacts in their own right. Women can use the saved time to spend with their children, to rest, for leisure, or for other pending tasks. When the use of simple technologies can save time which can be used to enhance income it becomes additionally attractive for the women participating.

A third important feature of this project, and a departure from the norm, is that women themselves participated as entrepreneurs and leaders, particularly in the supply of energy and in establishing and operating technology demonstration centres. This allowed the women to take ownership of the technologies and to expand their application as opportunities arose. The formation of women-only groups clearly helped this process. In such groups women felt comfortable enough to take charge of the technology instead of handing over control to men and being relegated to passive 'beneficiaries'. Once their level of confidence has been adequately enhanced through the initial women-only initiatives, these leaders and entrepreneurs will, it is believed, continue to provide leadership in their communities in mixed groups as well.

A final feature of the project is that the beginnings of the mainstreaming of good practices at the district or national level could already be seen even with the project's limited duration. The immediate benefits of the technologies, the clear potential for their replication, and the enthusiasm of the women participating has led to significant interest

from local government to expand their coverage by incorporating these technologies into their own programmes. This is a positive sign as it shows the way to scale up the positive outcomes of this project. A major limitation of the time-bound nature of the project was the lack of sufficient time for further deepening and expanding the project activities to make an impact at the policy level. A second phase would allow further testing of the Policy Guidelines, the establishment of demonstration models highlighting entrepreneurship, technology options, credit, and women-centric institutional mechanisms, structured advocacy and outreach activities, and the scaling up of the models through collaboration with local and central government.

Acronyms and Abbreviations

AEPC	Alternate Energy Promotion Centre
CRT/N	Centre for Rural Technology, Nepal
CSID	Cottage and Small Industry Development
DASP	Diversified Agriculture Support Project
DDC	district development committee
DEEP	Society for Development & Environment Protection
DOC	dimensions of organisational capacity
DPO	district partner organisations
GAD	gender and development
HKH	Hindu Kush-Himalayas
HOPE	Himalayan Organisation for Protecting Environment
ICIMOD	International Centre for Integrated Mountain Development
IDE	Integrated Development Enterprise-Nepal
IGG	income generating group
ITDG	Intermediate Technology Development Group
LPG	liquefied petroleum gas
LSU	livestock standard unit
MANUSHI	MANUSHI (Energetic Women of Nepal) for Sustainable Development
masl	metres above (mean) sea level
M&E	monitoring & evaluation
MDGs	millennium development goals
NADEP	Naryan Devrao Pandri Pandey
NGO	non-government organisation
NRCS	Nepal Red Cross Society
NRs	Nepalese rupees
NWAB	National Women's Association of Bhutan
O&M	operation and maintenance
PCAP	Phobjikha Conservation Area Project
PDDP	Participatory District Development Programme
PRA	participatory rural appraisal
REDA	Rural Economic Development Association
RSPN	Royal Society for Protection of Nature
SHG	self-help group
SIDA	Swedish International Development Cooperation Agency
SOLVE	Society of Local Volunteers Effort

TDV	technology demonstration village
TERI	The Energy and Resources Institute
TOT	training of trainers
TU	Tribhuvan University
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
VDC	village development committee
WDD	Women's Development Department
WEAN	Women's Entrepreneur Association of Nepal
WECS	The Water and Energy Commission Secretariat
WHO	World Health Organization
WID	women in development

Approximate rates of exchange in 2004

Bhutan

Nu. 46.50 = \$US 1

India

IRs. 46.50 = \$US 1

Nepal

NRs. 71.00 = \$US 1

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Chapter 1

Introduction

Background

Why women in water and energy management?

Water and energy are essential resources for human survival and well-being. Today, some 1.1 billion people lack access to improved water, with Asia having the highest number of people unserved by a clean water supply (65% – WHO/UNICEF 2002). Projections show that by 2025 as many as four billion people, or one half of the world's population, could live in conditions of severe water scarcity, especially in Africa, the Middle East, and South Asia (WICEE 2004). At the same time, more than 2 billion people in developing countries, particularly in rural areas, still continue to use traditional fuels such as wood, charcoal, and dung for cooking, and lack basic modern energy services.

Over the years, poverty, increasing population, and inappropriate development interventions in the Himalayas have led to adverse effects on the environment, including the degradation of forests and water resources, a decrease in soil fertility, and land and air pollution. Adverse socioeconomic effects are also visible, most importantly migration and its consequent social dislocation. Mountain women in the Himalayas are finding it increasingly difficult to meet their daily water and energy needs in a sustainable manner as a result of deforestation, a scarcity of freshwater resources, and increasing population pressure. With increasing water- and fuel-related work burdens, women are even forced to keep their children, especially their daughters, out of school to assist with household activities including fuel and water collection – thereby perpetuating intergenerational poverty (Figure 1.1).

Besides lost opportunities, women are also faced with a variety of health hazards from fetching heavy loads to cooking for long hours in a smoky environment (Dutta 2003; UNDP 2001). The annual number of deaths attributable to biomass indoor air pollution is over 1.6 million people worldwide and the casualties are predominantly women and children (WHO 2002). Environmental health and hygiene problems related to a shortage of clean water is another hazard, again especially for women. Water-related diseases are among the most common causes of illness and death, affecting mainly the poor in developing countries. Worldwide, over 2 billion people are infected with water-related diseases (WHO/UNICEF 2002). Despite the significant positive effects on rural livelihoods of improved access to water and energy services, women's time and effort saving (drudgery reduction) as well as women's health issues have not received the attention they deserve (Denton 2002; Clancy et al. 2002).

Greater attention to the needs and concerns of women in these areas could help governments promote overall development goals such as poverty alleviation, employment, health, and education through improved water and energy policies (UNDP 2004a; Dutta 2003). However, most energy- and water-related institutional and technological interventions in the past have not only ignored the special circumstances and needs of women, but have also failed to consider women as active partners in water and energy programmes, despite women's prime responsibility for managing the household's water and energy needs (ICIMOD 2002). Not



Figure 1.1: Collecting water in Bhutan

only do the needs identified by male and female groups differ significantly (men focus on physical infrastructure including roads, and electricity; while women identify social infrastructure including health, education, and drudgery-reducing technologies as important), but also the benefits of renewable energy technologies are inequitably distributed between men and women. The EnpoGen study clearly showed, for example, how men and women perceive the benefits of electricity differently. Women and men have different perceptions about the benefits of energy: for example, men see the benefits of electricity in terms of leisure, quality of life, and education for their children; while women see electricity as providing the means for reducing their workload, improving health, and reducing expenditure (Clancy and Skutsch 2003; Cecelski 2002)

Despite the differential impacts of energy policies between men and women, policy makers continue to treat energy policy as gender-neutral (Clancy et al. 2004). The focus of most energy policies in the past has been mainly on centralised (supply-driven) power plants and other commercial fuels with little attention paid to conventional energy (biomass fuels), which still accounts for 80% of all household fuel consumption in developing countries, most of it used for cooking done primarily by women (Figure 1.2). Meeting the energy needs of women generally calls for a shift in focus to the demand side of the energy sector, well-integrated with water and other rural development activities.

As with energy, focusing on women's domestic water needs has a multiplier effect leading to benefits that go beyond good water project performance. For example, better access to water reduces time spent collecting water and the drudgery involved in this, giving women more time for income-generating activities, meeting the needs of family members, and allowing children – especially girls – to attend school, resulting in intergenerational impacts.



Figure 1.2: Carrying wood for cooking and heating

Although water and energy are inseparably connected to enhancing livelihood options, they are generally not treated in a combined/integrated way to address the problems women face in the daily collection and use of these resources. A lack of energy often restricts the availability of fresh water and vice versa. While conventional energy production is dependent on the availability of water, water delivery relies on energy for pumping (WICEE 2004). Similarly, women's time and contributions are often undervalued, and the invisibility of women's labour perpetuates policies that reinforce subordinate roles for women. The lack of value placed on women's time and work tends to make it difficult to implement policies designed to reduce the drudgery they face.

Past failure to recognise the special needs and roles of women has not only worsened environmental degradation due to the continued, unsustainable exploitation of biomass and water resources, but has also limited the participation of women in most development interventions. Although women play a key role as collectors, transporters, users, and managers of domestic water and traditional fuels, they have been excluded from participation in policy formulation and decision-making processes due to their low political and economic status. This has led to a situation where women are bound up with the conditions of disempowerment, as they are unable to voice their concerns and make strategic choices (Sharma and Banskota 2004). By reducing their heavy work burden and drudgery it becomes possible for women to participate in development activities, thereby addressing their productive and strategic need – empowerment. Focusing on women's needs and roles in water and energy management can make significant differences in meeting development challenges, including the Millennium Development Goals (MDGs). Women throughout the world continue to have fewer options and opportunities than men, and in many countries women face overt inequalities, marginalisation, and discriminatory practices. Of the 1.3 billion people who live in poverty, 70% are women. Women perform two-thirds of the world's work but earn

one-tenth of the world's income (Clancy et al. 2004). This marked gender inequality clearly underscores the importance of focusing on women's needs and roles for gender mainstreaming.

Lessons learned from the region

The limited benefits of the many past energy- and water-related interventions are the result of a poor focus on women. Women's participation has remained marginal, and despite capacity building efforts, their self-esteem and confidence has remained low. However, women continue to utilise biomass and water resources judiciously despite their increasing scarcity. Experience suggests that in the absence of opportunities to earn a cash income, women have little incentive to adopt the water and renewable energy technologies that help save the time and effort they expend in collecting these resources (quoted in Clancy and Skutsch 2003). The improved cooking stove (ICS) programme initiated during the early 1980s in India and Nepal failed completely because the technologies were designed without consulting women and did not address their actual needs, including the need for capacity building (ICIMOD 2002). In the past, most programmes were biased towards fulfilling the needs of the male members of the family without adequately addressing the needs of the women. Male members preferred physical infrastructure (roads and electricity) and income-generating activities, while female members emphasised the importance of social infrastructure (health and education) and drudgery-reducing technologies. For instance, solar home systems fit well with meeting men's need for entertainment but not with women's cooking needs. Biogas systems meet the need for cooking energy but in some cases they have increased women's workload, as dung and water have to be added daily to the pits, increasing the women's work burden. Likewise, the provision of electricity does not address the cooking energy crisis in rural areas since many of the activities performed by women require process heat for which electricity is neither the most appropriate nor the cheapest option (Clancy and Skutsch 2003). Experience shows further gender differences in the perception of the benefits of renewable energy technologies. In an assessment of biogas plants in India, women saw time saving in terms of reduced fuel collection and food preparation, whereas men saw time saving in terms of faster cooking and more timely availability of meals. Women valued smoke reduction both for the health benefits and the decreased drudgery of cleaning smoky pots. Men placed a higher value on savings in fuel and money (Dutta et al. 1997). Understanding how the priorities of women might differ from those of men thus becomes critically important for devising gender-sensitive water and energy policy strategies.

The manuals currently available are unable to address the special roles and needs of women and largely focus on the needs and priorities of men. In addition, most training programmes have also been geared towards building men's capabilities. The approach and/or methodology used in these training programmes is not effective in training women, given their different roles and needs. It is therefore not uncommon to see a high participation of women in the social mobilisation phase of a programme with this participation gradually tailing off during the implementation phase. As a result, males generally tend to take over from females, even in water- and energy-related training activities.

In short, an important lesson learned from past experience is the genuine need for women-centric water and energy projects that cater to the practical needs of women and help them to

meet their productive and strategic needs. This would help women gain increased control over their lives and enhance their access to water and energy resources and appropriate services. A project with women as the primary stakeholders in the planning, implementation, and monitoring of the activities would therefore be the best model.

The Women, Water and Energy Project

Project rationale

From January 2002 to December 2004, the International Centre for Integrated Mountain Development (ICIMOD) supported by the United Nations Environment Programme (UNEP) and Swedish International Development Assistance (SIDA) implemented a project 'Capacity Building of Women for Energy and Water Management in Rural Areas of the Himalayas' which was designed to test a new approach to water and energy development that addressed the issues raised by the experience of earlier interventions, as outlined above.

The project was designed to promote the integration of women in the decision making, implementation, and management of household energy and water initiatives by building their capability to organise themselves, identify their needs and roles, and implement energy- and water-related technologies. The project distinguished between the practical, productive, and strategic needs of women in the context of energy and water. Practical needs might be met by technologies that reduce drudgery, save time, and improve health through improved access to energy and water. Productive needs would be met by technologies that provide an income to women, utilising the time saved by improved access to water and energy. Strategic needs would be fulfilled by processes and technologies that empower women to choose their own technologies and improve their standing in society. The project was based on the underlying principle that any new interventions for women in the Himalayas should aim to reduce hours of work and drudgery, minimise hazards and risks to health and life, increase productivity, enhance equity in the sharing of work and benefits, and widen the options for productive work through the saving of time and energy in other areas. The underlying assumption is that reduced drudgery for women and girls through increased access to energy, and to better sources of energy for lighting, cooking, and productive activities can have a dramatic effect on women's education, literacy, nutrition, health, economic opportunities, and involvement in community affairs, with significant benefits for their families and communities as well.

In order to focus on the needs, perceptions, and aspirations of women, it is essential that they be at the forefront of the dissemination of technological options that are pro-environment and pro-poor in the rural hill and mountain context. Emphasis should be given to forming groups made up exclusively of women. The project was envisaged as primarily focusing on women's needs and identifying technological options that not only catered to their needs and empowered them, but which would also enhance environmental sustainability. Applying a participatory approach, the project followed the process of 'learning by doing'.

Two hill and mountain settlements were selected from each of three countries (Bhutan, India, and Nepal) for the participatory action research.

Since the participatory process in itself is resource-intensive, the project stressed the need to document the methodologies employed and the experiences gained in order to prepare

training manuals, policy guidelines, and video films to suit the needs and aspirations of women living in mountain areas. This is crucial for the replication of the process in similar areas, and to ensure that the results can be used by different extension agencies and grassroots NGOs to train women's groups in the management of pro-environment, pro-poor, and pro-women water and energy technologies.

Major objectives

The main objective of the project was to promote the integration of women in decision making, and in the implementation and management of household energy and water initiatives that better reflect their roles and needs and are environmentally sound. This was achieved by building the capabilities of women to organise themselves in order to identify their needs and to implement energy- and water-related technologies that help them in reducing drudgery, improving productivity, and widening their options for more productive and useful time allocation.

The specific objectives were as follow.

- Ensuring self-sufficiency in meeting needs at the community level through the enhancement of traditional water and energy technologies, and the development and adoption of new technologies. The new technologies would contribute to sustainable development and protection of the environment, for example, water harvesting for household irrigation, fuel-efficient stoves, solar energy, biogas, and briquettes from biomass waste.
- Creating awareness and an enabling environment for women in areas relating to water and energy management through training and institutional strengthening.
- Preparing policy guidelines, including an institutional framework for the replication of appropriate and innovative water and energy resource management practices that are pro-women, pro-environment, and pro-poor that can be carried out in similar environments in the region and in other regions.
- Creating awareness about the activities of the pilot project through video shows in participating communities that can also serve as a training tool to enhance the replication of the programme by extension agencies operating in the mountain areas of Nepal, Bhutan, and India.

Project implementation

The expected results, planned activities and outputs, and details of the implementation framework, evaluation, and financing mechanism of the project as given in the project document are summarised in Annex 1.

The project was implemented in two hill or mountain settlements each in Bhutan, India, and Nepal. The national collaborating partner NGOs were the Royal Society for Protection of Nature (RSPN) in Bhutan; The Energy and Resources Institute (TERI) in India; and the Centre for Rural Technology (CRT/N) in Nepal. RSPN implemented the pilot itself in Bhutan, whereas TERI and CRT/N selected local NGO partners in India and Nepal to implement the project activities. The basic project approach and implementation framework are summarised in Figure 1.3.

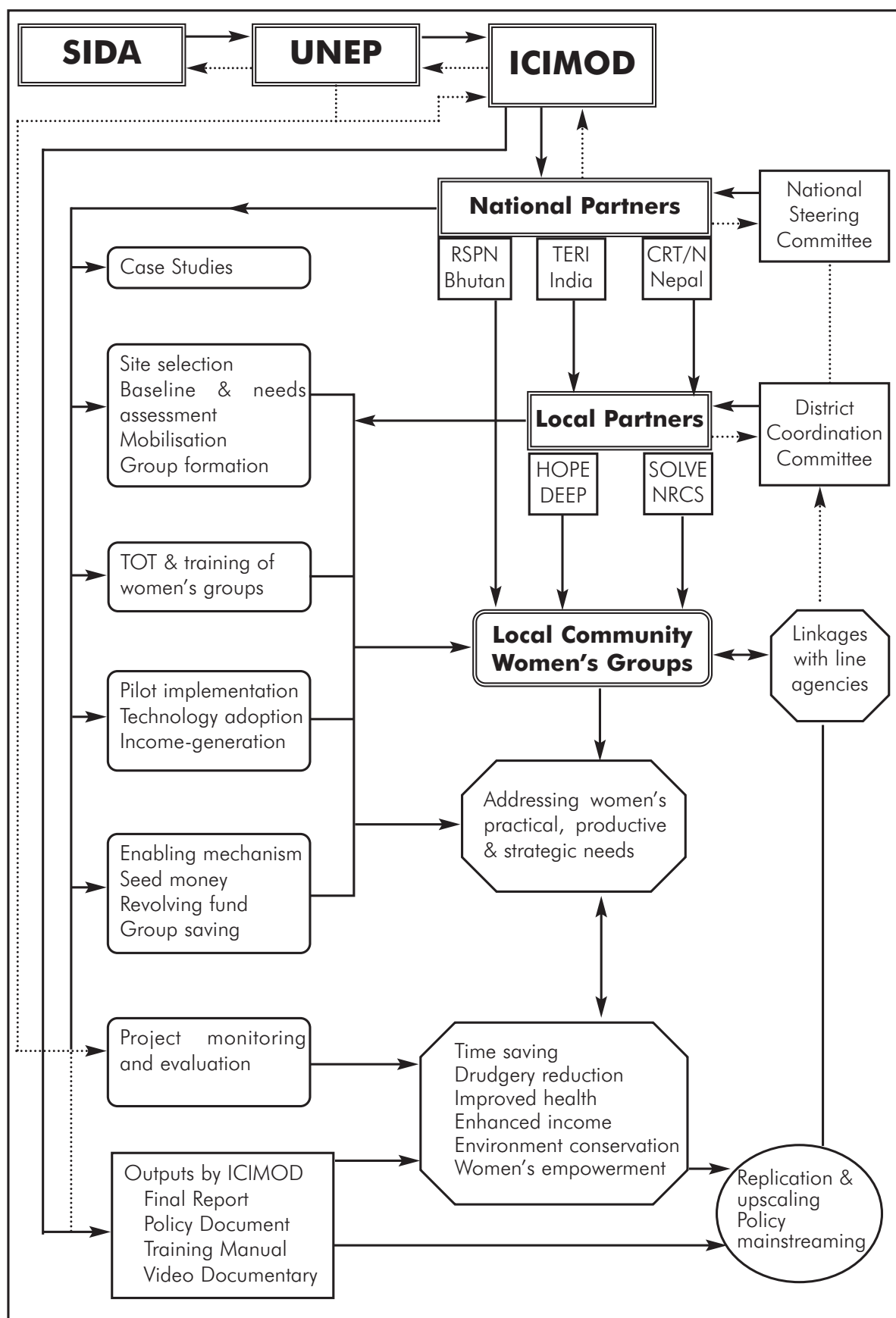


Figure 1.3: Project approach and implementation framework

Case studies were carried out to understand how women's roles and needs could be incorporated into the use and management of energy and water resources. Gender sensitisation and gender analysis were conducted to raise awareness and to increase the confidence of project participants and women beneficiaries through training, group meetings, and social mobilisation for institutional capacity building. Technology manuals were prepared in national languages to train selected women as trainers in a TOT workshop. Observation/exposure visits and exhibitions on various technologies were also organised. Various fuel-efficient and drudgery-reducing technologies were promoted according to women's prioritised needs.

Women face considerable constraints in obtaining loans as they do not own collateral or have legal rights to land. Thus the project established revolving funds to facilitate access to credit and promote income-generating activities. The project also encouraged women to set up group savings schemes. Seed money was provided for demonstrations and to create the revolving funds. The implementation process was documented in training manuals, a video documentary, policy guidelines, and this detailed report for the future design, scaling up, and replication of similar projects in the region.

Organisation of the Report

This publication provides a detailed account of the project learning. It is divided into six chapters, the first of which is this Introduction. The process involved in the implementation of the project, the preparatory activities, the project sites selected for programme implementation, and the major issues emerging from the case studies conducted in each country are described in Chapter Two. Chapter Three is devoted to a discussion on the implementation of the pilot project, focusing mainly on the training component. Chapter Four highlights the various water- and energy-related technologies adopted by the women along with the types of income-generating activities taken up. Chapter Five looks at the impacts of the project in major areas of concern such as workload and drudgery reduction, capacity building through training and social mobilisation, and productive use of saved time for income-generating activities. Finally, the major experiences and lessons learned and their implications for the future design and implementation of similar projects are highlighted and major conclusions and recommendations made.

Chapter 2

The Implementation Process

Introduction

Various activities were carried out at both the central and the project level to prepare for the actual project activities. The central-level activities included the formation of a project steering committee, selection of the project sites, performance of case studies, selection of district partners, preparation of training manuals and policy guidelines, as well as monitoring and evaluation. Project-level preparatory activities included needs assessment, group formation, social mobilisation and capacity building, training of trainers, and exposure visits. These preparatory activities are described in more detail in the following.

The Project Steering Committees

Steering committees were formed in each country to supervise the activities implemented by the collaborating national partners. The members included representatives of line ministries, NGOs, and private academic institutions. The steering committees have also been instrumental in advocating for women's roles in the planning, design, and implementing of water and renewable energy technology interventions based on the lessons learned and the experiences gathered during the implementation of the project.

Case Studies

Case studies were prepared by the partner institutions in each country using secondary data, literature reviews, and interaction with various individuals and organisations related to women, water, and energy. The objectives were:

- to analyse the sources of energy and water used at present for cooking, drinking (by humans and livestock) and cleaning; as well as for household-level water harvesting and small-scale irrigation, and the associated constraints;
- to examine legal frameworks and regulations on access to water and energy for household use and their effectiveness, and in relation to sustainable use and protection/conservation of related natural resources;
- to make recommendations on legal, institutional, and capacity enhancement to improve access to and improve skills relating to the management and self-sufficiency of women in the area of household energy and water needs; and
- to identify potential sites for project implementation in each of the three participating countries, taking into account the potential for impact and replication.

The studies covered three districts in Bhutan (Wangdi, Punakha, and Ha); two districts in India (Solan in Himachal Pradesh (HP) and Almora in Uttarakhand) and two districts in Nepal (Dhankuta and Palpa). They provided an understanding of the local water and energy needs and helped identify the local, district, and national level inter-linkages. Some of the major findings are summarised below.

Bhutan

Almost no research has been carried out up to now in Bhutan on the needs and burdens of rural women and the resources that they represent in their communities. A multi-sectoral approach is needed in order to improve energy and water management practices among the rural communities, particularly for women and children. At the household level, a division of labour and domestic roles is needed to motivate both rural women and men to recognise their individual roles and rights. This could be accomplished by introducing energy-efficient technologies and educational programmes on the environment. The study suggested that project implementation in Bhutan should focus primarily on the institutional aspect of how to encourage an equitable distribution of work between women and men, on how to make the best use of the energy and water resources available, and on how to integrate women into the country's development mainstream (RSPN 2003).

India

There is a lack of institutional mechanisms in India for involving women in rural infrastructure development. There are few if any capacity enhancement programmes at the village level that are particularly in tune with women. Even where such programmes exist, they are primarily suited to men. Women do not have access to credit as they do not have property rights. Innovative approaches are required, and the formation of women's self-help groups (SHGs) may be suitable. Policies and programmes need to be designed to improve access to cleaner fuels and technologies with the main emphasis on women. There is also a need to emphasise an organised, institutional approach (such as the formation and involvement of SHGs). An enterprise-based approach to water and energy management with the active participation of women in decision making, access, and control over programmes for capability enhancement is a must. There is a need to mainstream issues related to the livelihood enhancement of women and to the proper utilisation of the natural resources that are available locally (TERI 2003).

Nepal

In Nepal women rarely participate to any great extent in community water- and energy-related activities because drudgery, poverty, and the prevalent social and cultural values restrict women taking part in many outdoor activities. Women have very little say in decision making at the community level, at the village level, at the district level, and at the national level. There is a lack of gender-balanced, local-level planning in the water and energy sector because of the low level of involvement of women in the selection of drinking water and irrigation projects. Women lack property rights and control over resources. Few women take up new water- and energy-related technologies. They have poor access to credit, partly because financial intermediaries are only located at the district headquarters. There is also limited access to credit through group lending to women without collateral. There is a need for women-friendly technologies, and for information dissemination with a special focus on women. It is also necessary to focus on disadvantaged groups in the implementation of water- and energy-related programmes (CRT/N 2003).

Regional Consultative Workshop

After the case studies were completed, a four-day regional stakeholders workshop was organised by ICIMOD and UNEP in September 2002 in Kathmandu, to share experiences and

lessons learned during the preparation of the case studies, to identify water and energy needs and constraints at the household/community level, to identify priority sites for the implementation of the programme, and to set up and agree on modalities for implementation. There were 43 participants: 9 from Bhutan, 7 from India, 16 from Nepal, 5 from outside the region, and 6 from ICIMOD (Figure 2.1).



Figure 2.1: Participants at the regional consultative workshop, September 2002

The workshop was instrumental in clarifying the role of small-scale energy and water schemes in reducing drudgery, reducing health problems, and providing the necessary linkage between energy and income generation. Several suggestions were made on how to improve and reflect women's needs and roles so that gender bias could be minimised while implementing energy and water projects in rural areas of the Himalayas. The workshop was also instrumental in charting a road map for the implementation of project activities in each country, with the main focus on enhancing the capability of women in planning and implementing energy and water schemes at the selected project sites. Some of the guiding principles agreed upon by all the participants were as follows.

- It is necessary to first identify needs, and then promote the energy- and water-related technology options selected by the women's group.
- It is up to the women's group to name their preferences (whether they see the benefits of renewable options or conventional options like grid connection, LPG, diesel).
- All interventions should aim at sustainability, both financial (the establishment of a revolving fund should be given priority), institutional, and environmental.
- 'Smart' subsidies may be provided for pump priming.
- The ultimate objective of the project is capacity building of the women's group but the implementation of selected technologies should also have a meaningful impact on livelihoods and help increase income.
- Project activities need to be integrated into existing programmes and plans.
- Indicators for impact assessment need to be developed at all levels (i.e., implementation, technology, institution, and policy) and properly monitored.

- Financial sustainability is key to the success of the project. It is a prerequisite for the integration of the private sector during the project implementation phase.
- There is a plenty of scope for the development of women’s entrepreneurship in the energy and water sector of the Himalayas. There is a need to bring advocacy to this process.

Selection of District Partner Organisations

In contrast to Bhutan, where ICIMOD’s national collaborating partner RSPN was directly involved in the implementation of the pilot project, the national partners in India and Nepal selected their own local NGO partners to implement the project activities. The village-level activities were conducted with the help of field-level motivators who were mainly responsible for motivation, social mobilisation, training, and the implementation of technologies at all the selected sites. The implementation framework of the national partners differed somewhat in the three countries, reflecting the different needs identified. These approaches are shown schematically in Figures 2.2 to 2.4.

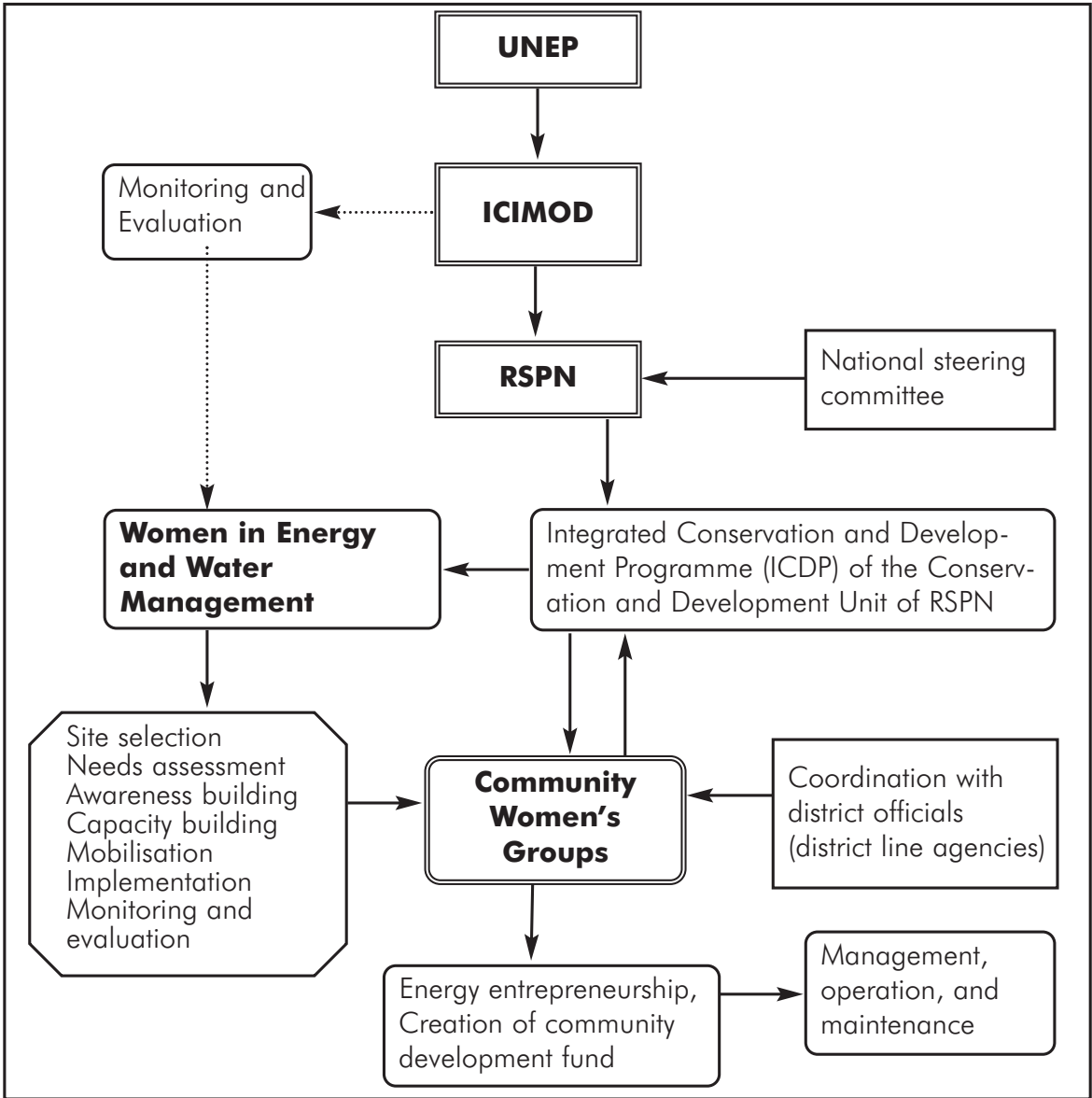


Figure 2.2: Project implementation framework in Bhutan

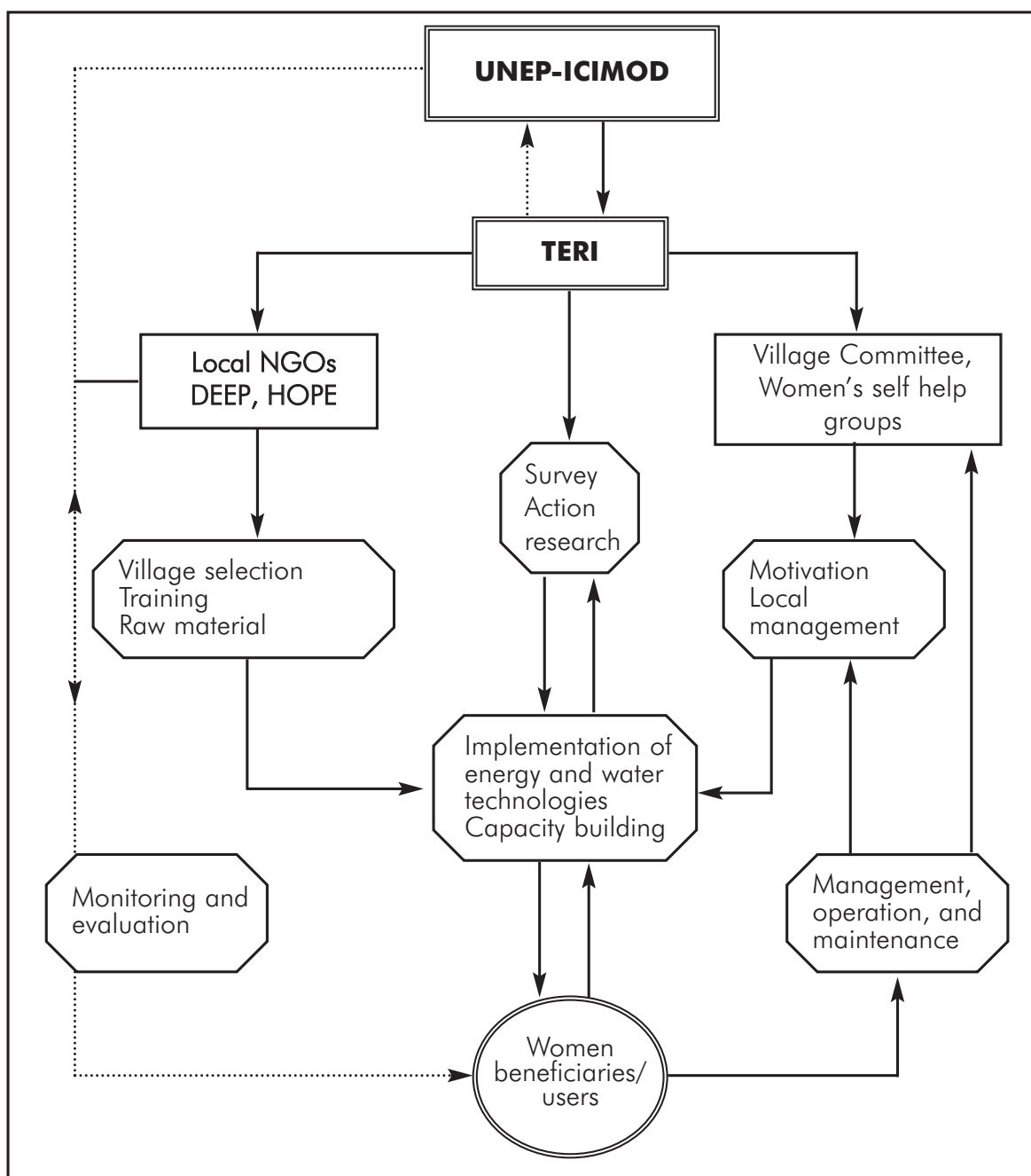
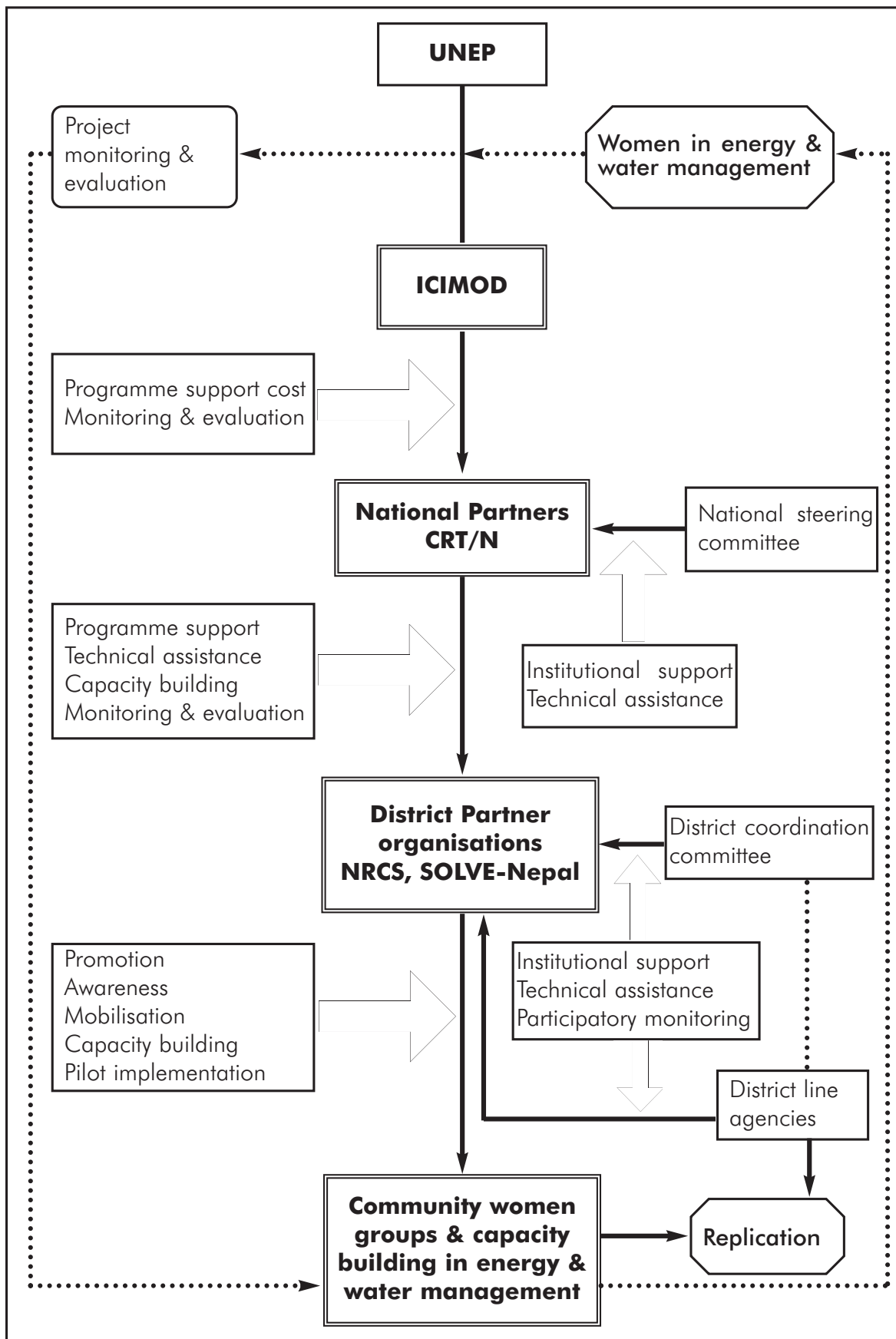


Figure 2.3: Project implementation framework in India

In Bhutan the project was implemented by RSPN by linking with its ongoing Integrated Conservation and Development Programme (ICDP), followed by coordination and linking with district line agencies. The project coordinator of RSPN was responsible for carrying out the village-level activities.

In India two local NGOs, the Himalayan Organisation for Protecting Environment (HOPE) and the Society for Development and Environment Protection (DEEP), implemented the activities in the Almora and Solan districts of Uttaranchal and HP respectively, based on their past experience with community mobilisation for pilot interventions in these areas. Detailed project briefings and field-level activities were discussed with these NGOs. The field-level



coordinators and motivators were selected among the NGO staff and local people at the project sites who had had past experience working in related activities. The national partner TERI thus acted as an interface between ICIMOD, the local NGO, and the village committee during the implementation phase. The management committee had the full responsibility of providing local support and motivating men and women to adopt the technologies during implementation. The local NGO procured the raw materials, organised the working team, and provided technical know-how.

In Nepal, the Society of Local Volunteers Effort (SOLVE-Nepal) in Dhankuta, and the Nepal Red Cross Society (NRCS) in Palpa, were chosen as the district partner organisations (DPOs) based on their coverage and work experience with energy, water, and women in the project districts, as well as their good rapport with the district community. Following agreement with these partners, a series of discussions were held to implement the pilot project activities in collaboration with the district agencies and village and community-based organisations.

The Project Sites

Bhutan

Initially three project areas were selected in Bhutan through field visits made to a number of potential sites and in consultation with the steering committee (Table 2.1). The third project site, Ha, was dropped as this site had been selected by the government and was provided with grid electricity and a water supply scheme.

Table 2.1: Project sites in Bhutan		
District	Blocks	Villages
Wangdu-Phodrang	Phobjikha, Gangte, Bjena	Haal, Kumbu, Yusa
Punakha	Limukha	Limukha, Nabchen, Omtékha, Gungkami, Yusakha
Ha		Yomto, Gyensa, Talung, Jamtey

Phobjikha

RSPN had already introduced the Integrated Conservation and Development Programme (ICDP) in Wangdue-Phodrang district (dzongkhag), with development interventions in Phobji and Gangte. It was considered important to capitalise on the ongoing conservation effort by incorporating activities that would address women’s roles and needs in energy and water management practices.

The project sites of Haal, Kumbu, and Yusa are located in the Phobjikha Valley, they have 10, 15, and 11 households, respectively. The settlements are widely scattered and thinly populated with both rugged and gentle slopes. The main source of livelihood is subsistence agriculture. Potatoes, vegetables, and rice are the main crops. Irrigation facilities are limited. The average size of a landholding is about 1.4 ha with 8 head of livestock. The majority of households belong to the moderate-income bracket (Nu 30,000 to 50,000 per annum). The literacy rate is low with marked gender disparities. Female-headed households predominate as this is a matrilineal community. Fuelwood is the main source of energy for cooking and space heating and its consumption is high due to space heating. During the summer months

villages endure water shortages (Figure 2.5). Women have the main burden of collecting water and firewood. The ICDP is being implemented in the Phobjikha valley to protect the winter habitat of the black-necked crane and to develop the valley into a model village for biodiversity conservation. A Phobjikha Conservation Area Project (PCAP) committee has been formed to promote social and economic development and to ensure environmental conservation. The valley is relatively undeveloped and lacks modern facilities such as electricity, water, and sanitation, as well as transport and communication facilities. Being the winter habitat of the protected black-necked crane, the valley has been unable to obtain grid electricity since high voltage wires may hinder the flight of this rare and endangered species.



Figure 2.5: Water supply before project activities at Phobjikha, Bhutan

Limukha

The Lingmotechhu watershed area was selected because it adjoins Wangdhue-Phodrang district and has the representative characteristics of a lower altitude watershed, as well as having ongoing activities on watershed management by the Government of Bhutan. Limukha block (geog), was selected because of the inadequate electricity supply within the watershed.

The block has 6 villages with a total of 188 households. The project sites encompassed the scattered settlements of 5 villages: Limukha, Nabchen, Omtexha, Gungkami, and Yusakha. Limukha is located about 2000 metres above sea level (masl) on a hilltop. Livelihoods are based on subsistence agriculture with paddy and wheat the main crops. The fields are surrounded by forests and crop damage by wild animals is a regular occurrence. Although the village is accessible by road, the condition of the road is poor and it cannot be used during the rainy season. People use mules to transport goods to and from market. Punakha, the nearest market centre, is four hours away and getting goods to and from the market is a problem. This village was not electrified at the time of selection, nor did it have piped water

services. The government undertook these development activities after the project was launched. Fuelwood was the main source of energy for cooking and space heating, although some households used LPG. People in general were unaware of water and energy-related technologies that could improve their livelihoods and conserve the environment. Generally, women are involved in kitchen and overall household chores as well as weeding and harvesting of crops. Livestock rearing is the job of both women and men, but women usually take care of the cattle.

India

A list of possible villages was first prepared with the help of local NGOs already working in the different villages of the watersheds. After visiting all the potential sites, the final sites for implementation were selected based on the following criteria: a) villages should lie within one micro-watershed; b) the presence of an active women’s group; c) persistent energy and water problems; and d) physical accessibility of the site. The selected sites are shown in Table 2.2

Table 2.2: Project sites in India			
State	District	Block	Villages
Himachal Pradesh (HP)	Solan	Kunihar	Nager, Kotla, Bhatuin
Uttaranchal	Almora	Tarikheth	Bajeena, Naila-Marwa

Kotla and Nager: Himachal Pradesh

The project sites of Kotla and Nager are located about 40 kms north of Solan. Kotla has 14 households with a total population of 83; and Nagar 25 households with a total population of 142. In both villages the majority of the households belong to under-privileged castes (92%). The female literacy rate is about 68% in Kotla and 56% in Nager. Agriculture is the main source of livelihood. The majority of the households (86% in Kotla and 88% in Nager) are marginal farmers owning 1 to 2 hectares of land. The average number of livestock per household is two to three. Almost all households possess electronic gadgets such as TVs and radios as all have electricity. Open well springs are the most common source of drinking water in both villages. Although every household is connected to a tap, the water supply is inadequate and meets only about 25% of demand. As the discharge of water from the spring diminishes, women have to travel further to collect water and spend three to four hours every day in this activity. Fuelwood, the major source of energy for cooking, is becoming scarce with the gradual degradation of forest resources in the vicinity of the village. Fuel requirements for domestic use are also being met through the purchase of wood, kerosene, LPG, and electricity. Fuelwood is mostly collected from the forest each day and women spend about 4 hours daily engaged in this task. Households use traditional mud ‘chulha’ without a chimney for cooking. Although the majority of the households in Nager and Kotla have LPG, biomass fuels meet over 90% of their energy needs. Due to the out-migration of males for employment, women have to take the overall responsibility for household affairs, spending over 68% of their available time in outdoor work such as gathering fuel, fodder, and water as well as caring for animals and agricultural work.

Naila and Bajeena: Uttaranchal

The village of Naila lies in the Kumaon hills. It is a small village located at an altitude of 1500 masl, about 1 km from the road and 15 km from the town of Ranikhet. The village falls within

Panchayat Mawra of Tarikhet block in Almora district. Naila has 24 households with a total population of 122 mainly Brahmin and Rajput families. The primary occupation of the villagers is agriculture, which is entirely rainfed. Due to the acute shortage of water there are no irrigation facilities in the village and agricultural productivity is very low. Migration is common. The village is fully electrified. Being close to Ranikhet, infrastructure facilities such as health and education are readily available. Underground springs called 'naulas' are the only source of water. The gradual decline of water discharge from the naulas has resulted in a severe scarcity forcing women to spend 4 to 5 hours a day collecting water. The situation has become worse with time and is especially bad during the summer when women have to spend their nights waiting in line to fill their vessels with water.

Bajeena is a typical hill village, situated on both sides of the main road, 14 km from Ranikhet. The village has 70 households with a population of 528, with both upper caste (65%) and scheduled caste communities. The primary occupation of the villagers is rainfed agriculture. Due to the absence of irrigation facilities agricultural productivity is very low. As in Naila, migration for employment is common. The village is fully electrified. Sixty-five per cent of women are literate, but very few women (8%) are involved in the government or in private service. The average number of livestock per household is 3.5. Ninety-five per cent of houses are made of mud and locally available material, and only 5% with cement. Naulas are the most prominent source of drinking water. Gradual deforestation and the drying up of the spring, means that villagers face acute firewood and water shortages, especially during the dry season. The supply of tap water in the village is irregular and is not enough to meet the village's water requirements. Women have to wait long hours to fill their pots from the trickle of water that comes from the spring (Figure 2.6) and have to travel long distances to fetch firewood.



Figure 2.6: Waiting for water at Bajeena, before the project

Nepal

Potential micro-watersheds in Dhankuta and Palpa district were first identified based on the following criteria: micro-watershed area with an altitude ranging from 1000 to 3000 masl, approximately 100 to 200 households, perceived need of technical and institutional intervention, avoidance of duplication, presence of proactive and supportive community, presence of functional groups, and relative accessibility and security in the prevailing conflict situation. Two watershed areas, Tankhuwa in Dhankuta and Aangakhola in Palpa, were chosen (see Table 2.3).

Table 2.3: Project sites in Nepal		
District	VDC	Project sites/Ward
Dhankuta	Tankhuwa	Ward 3 and 4
Palpa	Pipaldanda	Ward 2 and 4
	Humin	Ward 1, 8 and 9

Tankhuwa

Tankhuwa VDC is located in Dhankuta, a hill district in eastern Nepal with a total population of 168,781 in 27,445 households. Tankhuwa VDC lies in the Tankhuwa micro-watershed, which is located east of the district headquarters at an altitude of 450 to 2100 masl. It has 845 households with a population of 4665. The main ethnic group is Limbu. People depend heavily on subsistence agriculture and animal husbandry for their livelihoods. Rice, maize, and wheat are the main crops. Women are mainly responsible for almost all activities apart from land preparation. The district headquarters of Dhankuta is the nearest significant market and is almost 3 hours walking distance from the project area. There is severe scarcity of water due to the degradation of natural resources and the drying up of freshwater sources. Water for both drinking and irrigation is insufficient. The only source of water is the Tankhuwa stream. Most people use traditional cooking stoves with wood. However, fuelwood is becoming insufficient. Women often spend almost the whole day collecting fuelwood. Improved cooking stoves (ICS) had been introduced earlier by various organisations but not accepted by the community. About 45 households had installed biogas plants but were not satisfied with how they functioned.

Pipaldanda and Humin

Pipaldanda and Humin VDCs lie in Palpa, another hill district lying at an altitude of 200 to 2000 masl in western Nepal. The total population of Pipaldanda VDC is 7274 with 1074 households, and of Humin VDC 4232 with 455 households. In both VDCs, the major ethnic group is Magar (Tibeto- Burman). A drinking water supply system has been installed by the Nepal Red Cross Society, but drinking water is scarce during the summer and women have to spend much time collecting water from streams and rivers. Most cooking stoves use biomass fuel, mainly fuelwood. There is no electricity except in Wards 1 and 2 of Pipaldanda VDC. Solar power based electricity is present in some of the households from private companies and some households have biogas plants. The main source of income is from agriculture and livestock, but agriculture barely supports the daily needs of the population as production is low. The area has a very high potential for ginger production.

Preliminary Steps

Baseline survey and needs assessment

In any project, it is important to establish baseline data against which to assess the impacts of the interventions in key areas of project concern, in this case workload and drudgery reduction, utilisation of saved time for productive income generation, improved health, and other dimensions of livelihoods. It was also important for project design to have an understanding of the sociodemographic and economic conditions; the prevailing patterns of household water and energy use by sex; seasonal patterns of workload and drudgery of women; existing technological options and practices; and others. A detailed baseline survey was conducted at the project sites in India. The district partner NGO in Palpa (NRCS) conducted a baseline survey using various PRA tools such as household surveys, seasonal calendars, social mapping, wealth ranking, and participatory discussions. Similarly, the local partner in Dhankuta (SOLVE, Nepal) conducted a baseline survey using questionnaires and checklists covering the water and energy situation of the project area. Baseline studies and needs assessment reports were published in Nepali covering such aspects as the sociodemographic and economic conditions of the site, the water and energy situation, the status of health and sanitation, the present situation of women, and women's needs in the project area.

The information gathered complemented the findings of the case study reports and was useful in ascertaining the needs of women with regard to household energy and water. It was useful both for mapping the current situation and identifying the needs of the specific technologies, and also for the preparation of the training manual, for the training of trainers within women's groups, and in the implementation of various pilot project activities.

Introductory workshop

A workshop was organised by the national partners at each site to introduce the project and familiarise the local community with the objectives, approach, and intervention modalities. The workshop helped the project to understand local perceptions about the water and energy situation, existing programmes, and the different line agencies working in the area. Participants from the project sites included representatives of local leaders, community groups, and extension agents. A second meeting was organised with all the men and women who had taken part in the discussion. Suggestions from the villagers were noted down and discussed in detail for future action. Box 2.1 shows an example of the participatory mechanisms used to prepare action plans.

District coordination

The project management approach and project implementation varied somewhat among the national partners. In Bhutan and India coordination was established with district level line agencies and NGOs without forming a coordination committee; in Nepal CRT/N formed district project coordination and management committees in Palpa and Dhankuta (project-level advisory committee) to supervise, support, and coordinate project implementation activities at the district level. These committees were made up of representatives from local organisations, the District Development Committee (DDC), and other district line agencies related to energy, water, and women, and were instrumental in supporting the project in various ways.

Box 2.1: Preparation of an action plan by needs identification in India

Group discussions and structured questions were asked about the condition of natural resources to try to discover the availability of energy and water and to ascertain the perception of women about addressing the water and energy situation. Several possible measures for improving the livelihoods of women through drudgery-reducing technologies and capacity building were discussed. A detailed needs assessment was made to understand the costs and benefits of various appropriate technology options and to identify and prioritise the needs and choices of women, as well as to identify possible areas of intervention for energy, water, and income-generating activities. All the key persons, village elders, and women were contacted. The following options were suggested.

- **Energy:** improved cooking stoves, solar systems, pressure cookers, energy plantation
- **Water:** rainwater harvesting, renovation of traditional tanks, check dams, recharging ponds
- **Income-generating activities:** composting, forest and grassland development, group formation

Community mobilisation process

The ongoing process of community mobilisation adopted by local partners consisted of a series of participatory action processes involving motivation, sensitisation, and creation of awareness among local leaders, community groups, and local people. Motivators and mobilisers (all women) were selected from among the NGO staff and local people at the project sites in India and Nepal. Each household in a village was contacted through door-to-door visits and formal and informal meetings held from time to time. These meetings sensitised and built the awareness of the women on water- and energy-related problems. Box 2.2 shows the overall community participation process in Bhutan.

Box 2.2: Community participation mechanisms in Bhutan

RSPN developed a participation strategy for women and men during project implementation and M & E that avoided overly high expectations of women's participation and developed a practical schedule, as women often have both time and financial constraints. The strategies incorporated were as follows.

- **Organisational set up:** Women's representatives established in all the project villages and women's representation promoted in executive committees (e.g., chairperson, secretary, treasurer). Considered stipulating mandatory women's committees to ensure representation.
- **Group rules:** Clearly defined rules and responsibilities of members. Established grievance mechanisms and water- and energy sharing rules to avoid competition between men and women over user rights (e.g., regarding water requirements for home gardens and livestock). Documented the agreements in bylaws.
- **Construction:** Ensured work conditions that are conducive to women's participation (e.g. gender equal contributions and construction season).
- **Operation and maintenance:** Once the committee was formed it was mandatory for the committees to be the operators, caretakers, and water and energy source and technology monitors.
- **M & E:** Developed a feedback mechanism in which both male and female beneficiaries had a voice.
- **Informal village institutions:** Identified other village based communities that could facilitate women's participation during implementation and M & E.

Formation of women's groups

Formation of women's self-help groups (SHGs) is an important prerequisite for the provision of credit and other support services to women beneficiaries. The project implementing partners in each country attached great importance to enhancing the organisational capacity building of women and to women's empowerment. The formation of women's groups at each project site provided an institutional platform for women to undertake initiatives related to the

development of their community as well as their individual living standards. These groups hold monthly meetings and discussions, and take decisions based on transparency and consensus through the articulation of their concerns, vision, and commitments (Figures 2.7, 2.8). Details of the groups are given in Annex 2.

Two women's groups were formed in Bhutan, one in Phobjikha (initially nine members from the three villages of Haal, Kumbu, and Yusa, which later rose to 13) and another in Limukha. The women's group in Limukha started with 17 members from the 5 villages, was later reduced to 8 members as 9 women who lived far away did not participate, and then rose again to 12 members. After the group management training, these women formed a Women's Welfare Association and drafted a constitution and bylaws (see Chapter 3).

Two separate women's groups were formed in Kotla and Nager villages in HP with 20 members each and two in Uttaranchal – one in Bajeeana with 20 members, and one in Naila with 24 members.

In Nepal, the partner organisations linked and coordinated newly-formed and existing women's groups with the project. In Dhankuta there were five groups with a total of 112 members. In Palpa, two newly-formed groups joined with four existing groups to make six groups with 179 members (Annex 2). Each group set their own rules and norms regarding such things as the date of the regular meetings, the membership fee, the size of the monthly savings, lending rules, and overall management of the groups.

Separate sub-committees, for water, energy, and income-generating activities were formed from among the members of the SHGs at each project site to create awareness among the women and also to help with planning, implementation, supervision, operation, and maintenance, keeping the records, accountancy, and recording information about the project. Training was provided to all committee members in project-related programmes.

Initial Training

Preparation of the technology manual

A Technology Manual was prepared for the training of trainers (TOT) sessions based on the needs assessment reports and baseline surveys prepared by the DPOs. The manual incorporated appropriate rural energy- and water-related technologies that are pro-environment, pro-poor, and pro-women. The information for each technology consisted of a general introduction, construction of benefits, and operational and management aspects, and included costs and a relevant organisation which could be contacted for further details. The manual was produced in appropriate quantities in the national languages and was provided to the local partner organisations for use during the TOT. The manuals were refined during the course of implementation on the basis of the feedback received from trainers and users on the practical usefulness of the manual and the use and operation of water- and energy-related technologies.

Training of trainers (TOT) workshops

The plan was to train a group of women at each selected site as trainers; this core group would then be in a position to train other women members in their communities to manage and



Figure 2.7: Meeting of a women's group in Bhutan



Figure 2.8: Meeting of women's group at Kotla, HP

handle the selected water and energy technologies. In all the project areas, the trainees were selected by the women's groups themselves. The main objective of the training was to build the capacity of local women in appropriate rural energy- and water-related technologies in such a way that the women could transfer the acquired skills and knowledge to their respective districts for the effective management of energy and water resources at the household and community level. The training consisted of both theoretical and practical sessions. The actual package differed slightly in the three countries.

Bhutan

CRT/Nepal, provided technical assistance to RSPN by sending a technical support team to the project site to conduct orientation training-cum-exhibition on selected energy- and water-related technologies. The CRT/Nepal team assisted RSPN in identifying potential technologies, preparing an action plan for the implementation of activities, and preparing a technology manual. They helped RSPN to exhibit the technologies and carry out the TOT Programme. Altogether 13 women – 5 from Phobjikha and 4 each from Limukha and Haa – participated in the training. The participants experienced and learned about the benefits of various energy and water technologies such as the mud cooking stove with back boiler, improved metal cooking stoves, the improved one pot hole mud stove for cooking livestock feed, plastic water tanks, water harvesting tanks, sprinkler irrigation systems, peltric sets for hydropower generation, and solar greenhouses using plastic sheeting.

India

The TOT programme in India was organised at the DEEP complex in Solan, HP, to sensitise the women about the emerging scarcity of energy and water resources and to provide training on water- and energy-efficient technologies (especially improved cooking stoves [CS] and rainwater harvesting). There were 21 participants (14 women) from the villages of Bhatuin and Kotla in HP, and two from Uttaranchal. Training started with an introductory session, followed by a sensitisation and problem analysis session (using the PRA techniques of historic transect walk and tree analogy) focussing on water and energy and the role of technology. In the third session, the NGOs shared their experiences with different activities they had carried out. The fourth session was devoted to training in ICS. The local NGO partner, DEEP, highlighted the usefulness of the newly-designed multifunctional ICS with water heating facilities. Women were trained in the construction, use, and management of the ICS. Both ICS and rainwater harvesting technology were demonstrated and discussed in Kotla village with the help of a master trainer during the fifth session. This was followed by an exposure visit to the YS Parmar University of Horticulture and Forestry, Nauni, Solan, to introduce the women to the potential of different income-generating activities (forestry, animal husbandry, horticulture, forest products, and food processing) being carried out in different parts of the state. Finally, the outcome of the TOT programme was assessed; all the women trained as trainers expressed their confidence in being able to disseminate their acquired knowledge to other members of their community (Figure 2.9).

Nepal

A week-long TOT workshop was organised in Kathmandu for eight women and two social mobilisers selected by their communities on the basis of ethnic and geographic representation. The first two days of the training were conducted in Kathmandu and the remainder in Budol, Banepa, in a rural setting about 25 km east of Kathmandu. The training team consisted of four



Figure 2.9: Training of trainers session in HP, India

staff members from CRT/N and six resource persons. Participatory training methodology was used with the main emphasis on practical orientation through ex-situ field visits rather than closed session exercises. The training sessions were as follows.

- Interactive learning on theoretical aspects of water- and energy-related technologies relevant to women. Various promotional materials such as leaflets, posters, flip charts, and photographs were displayed.
- Exposure visits to ICIMOD's demonstration and training centre site at Godavari, and to technologies on CRT/N's premises and at ITDG and LOTUS Energy Nepal, to familiarise the trainees with different water- and energy-related technologies and to underline their relevance and usefulness in the rural context. Specific aspects considered were cost effectiveness, how environmentally friendly they are, their ability to reduce the drudgery of rural women, and the ease with which loans can be paid back through the wide scope of new income-generating prospects.
- An informal session held every evening before and after dinner to review the day's session with the help of a recorded video and also by showing documentary film slides related to the different rural technologies such as ICS and the improved water mill.
- An entertainment/interactive session with the help of different games on some practical training theme in order to establish closer and more friendly relations between participants.
- Action plan preparation and presentation followed by the subjective evaluation of the whole session by a trainee on the concluding day.

Exposure visits

Exposure visits were organised for selected participants from the project sites to familiarise the women with further relevant water and energy-technologies, and technologies relevant to income generation activities, and to facilitate exchange of experiences. The activities in the three countries are summarised below.

Bhutan

A three-day study tour was arranged for seven women from Phobjikha, eight from Limukha, seven from Bji block (geog) in Ha, and two steering committee members with a view to encouraging the women to exchange their experiences and to enhance mutual learning in water- and energy- related technologies.

The first day of the visit focussed on facilities in Thimpu such as the briquette manufacturing factory, fabrication units, and the solar showrooms. The women were exposed to the usefulness of briquette technologies, of various solar technologies including solar lanterns, solar water heaters, solar fans, and solar parabolic cookers, and the 'bhukhari' stove (a hollow metallic block with a chimney and grate) for room heating. The second day's visit to the Agriculture Machinery Centre and the National Post Harvest Centre in Paro enabled the women to find out about the procurement of agricultural machinery such as power tillers, post harvest machines, and small-scale driers for fruit and vegetables. The third day's visit was to a micro-hydro project where the women were exposed to a way of using locally available water from the existing irrigation canal and use of electricity to run simple machinery such as flour mills, rice hullers, and oil expellers for use in agro-processing operations, as well as for household lighting purposes. The study tour proved to be an eye-opening opportunity for most of the participants, who felt that many of the things they learned, could be replicated in their villages, especially in terms of solar technologies, the farming machinery, and the agro-processing.

India

Exposure visit of HP women to Uttarakhand

A group of nine members from the HP project site accompanied by two members of TERI visited the Uttarakhand project site for one week. The group first visited a number of organisations including the following.

- Diversified Agriculture Support Project (DASP) – The NGO Shri Jagdamba Samiti Dehradun helped the self-help groups to learn about different income-generating activities such as packing, grading, and labelling of agro-products and their efficient marketing through women's cooperatives.
- Alternative Energy Centre for demonstrations of various energy technologies such as the gasifier and its use for cooking, and the use of weeds/biomass in energy production such as for briquettes, as well as for coal, lighting and fuel.
- Uttam Urja in Rishikesh to see solar energy products such as solar lanterns, domestic lighting systems, solar torches, and 'mathani' (runner for improved water mill)
- HOPE (an NGO) to find out about the greenhouse techniques used in agriculture and about various medicinal plants.

The women's group then visited both project sites (Bajeena and Naila) in Uttaranchal where the NGO worker shared the whole process of organising the women and the activities undertaken to overcome the water- and energy-related burdens they faced including their successful efforts to recharge water springs through innovative conservation methods on the hill slopes and the usefulness of infiltration well technology.

Exposure visit of Uttaranchal women to HP

Nine members from Uttaranchal (six women and three men) visited the HP project site. The main purpose of the visit was to obtain information on energy, water, and income-generating activities and their benefits by visiting the different project sites in HP; to improve cross-learning within the groups by organising inter-group interactions; and awareness creation of different energy- and water-related technologies which can help them in daily life. The visits included the following.

- A visit to Shri Jagdamba Samiti, an organisation implementing the DASP in Dehradun, where women were exposed to various activities concerning self-help groups, marketing the production from the groups, and gaining better prices for their produce.
- A visit to Mathurawala village to learn about the management aspect of SHGs and the micro-finance activities being carried out under the project, including vermicomposting, mushroom cultivation, and greenhouse techniques.
- A visit to the site in Lachiwala to show women how a local entrepreneur was working to upgrade traditional water mills to generate electricity for various income-generating activities.
- A visit to Vaikalpic Urja Centre (Alternative Energy Centre) to learn how lantana weeds are harvested to produce briquettes.
- A visit to Uttam Urja in Rishikesh to see solar energy products such as solar lanterns, domestic lighting systems, solar torches, and solar mathani.
- A visit to YS Parmar University of Horticulture and Forestry, Solan, HP, to see techniques of seed production for major vegetables, plant propagation, nursery management, and the commercial production of fruit and flowers for income generation.
- A visit to the DEEP office, the NGO involved with the project in HP to learn about the construction techniques of improved efficient chulhas; rainwater harvesting; the different uses for conserved rainwater in irrigation, potable water, and animal husbandry; capacity building of SHGs for smooth execution of SHG records and bookkeeping; and coordination for development activities.

Nepal

Two successive study exchange and exposure visits were organised for the participants from Palpa and Dhankuta Districts to provide them with a unique opportunity to observe, share, and gain practical knowledge about water, energy, and income-generating technologies so that they would be able to identify and select the technology and organisational interventions best suited to their needs and environment (Figure 2.10).

An exposure visit of eight women members from the project site in Palpa was organised first. The women first visited several organisations in Kathmandu, including CRT/N, ITDG, ICIMOD, Solar Electronics, and the WEAN Cooperative to observe and learn about various aspects of drudgery reducing water- and energy-related technologies, including income generation, micro-financing, and institutional development mechanisms. Then they visited the

project site in Dhankuta where they exchanged their experiences, shared success stories, interacted directly with the women's groups about problems encountered, and observed the progress status of the pilot project in Dhankuta.

A similar exchange visit was organised for the participants from Dhankuta. A team comprising nine members (the district coordinator, mobiliser, administrative head, and women members from the women's groups) first visited several technological centres and organisations such as the WEAN Cooperative, MANUSHI (Energetic Women of Nepal) for Sustainable Development, and the Department of Food Processing. They later visited the pilot project site in Palpa where they observed the technologies adopted and shared their experiences.



Figure 2.10: Exposure visit in Nepal

Chapter 3

Training of Women's Groups

Introduction

Training of women's groups was one of the main components of the project, which envisaged providing training to as many women as possible through women's groups using the Training of Trainers (TOT) concept. Following the TOT workshop in each country, as described in the preceding chapter, a series of training sessions was provided to members of the women's groups based on their prioritised needs. The training aimed to enhance their capacity to organise themselves in the planning, implementation, and management of water- and energy-related technologies at the household and community level. In most cases, the main trainers were the women who had been trained in the TOT training, especially for the training on group building and the use and management of the water- and energy-related technologies that were covered in the TOT sessions. Skill development training on income-generating activities including micro-finance (savings/credit schemes) was organised from other sources. A conventionally structured training approach was not suitable, since the women had to find time out of their regular chores to attend the training sessions. Flexible strategies were adopted in recognition of the constraints faced by the women with regard to time, mobility, and educational level. The training courses were made shorter, with sessions provided to a series of small groups at different times and/or where appropriate divided into sessions of short units. Follow-up training was also provided. Training was provided locally so that the women did not need to travel. A set of eligibility criteria for selecting trainees based on their training needs was also put in place. This chapter documents the various types of training provided to the women's groups to build their capacity in energy and water management, and their coverage in each country. The outcome of the training is described in subsequent chapters on the adoption of technologies and their impact.

The training provided to the women's group members can be broadly divided into three areas:

- a) basic training considered necessary for all group members to enhance group cohesiveness and empowerment through gender orientation and group management training on saving credit and revolving fund;
- b) specialised skills training on use and management of water-related technologies; and
- c) skills development training on income-generating activities.

In Bhutan, all members of the women's groups took part in the basic and group management training. Ten women in Limukha were trained in making solar driers, and ten in Phobjikha in improved mud/metal cooking stoves. In India and Nepal, orientation and group formation training was provided to most members of the women's groups; some men also joined the gender orientation training sessions. Specific training was provided to different groups in water and energy technologies and various income-generating activities. The number of participants in the different types of training is summarised in Tables 3.1 and 3.2.

Training Component	Uttaranchal	Himachal Pradesh
Gender orientation	45	30
Group empowerment training	40	40
Tree planting orientation	40	
Account keeping /micro -finance	4	2
Improved cooking stove		25
Household electrical appliances		30
Rainwater harvesting pond/tank	20	24
Infiltration well	4	
Composting / vermicomposting	22	20
Food processing (pickle making etc)	16	
Off-season vegetable farming	4	
Tailoring and sewing	32	20
Loan management		20

Training	Palpa	Dhankuta
Training of trainer sessions	4	4
Group empowerment / Paralegal training	142	46
Gender training	36 (+5 men)	24 (+20 men)
ICS promotion	6	14
Kitchen management	16	18
Low-cost solar drier		7
Drip irrigation	21	15
Drip irrigation follow up	15	
Off-season vegetables	21	15
Beekeeping	16 (+2 men)	9 (+8 men)
Ginger production	26 (+11 men)	
Vermicomposting	12	
Food processing	4	5
Grass production	36	
Loan management		32
Tailoring & sewing	16	11
Non-formal education	48	
Marketing & quality control	3	3

Basic Training on Gender Orientation and Group Empowerment

Bhutan

A week-long group empowerment and management training programme was provided to the women's groups of Phobjikha and Limukha with technical support from the Ministry of Agriculture of the Royal Government of Bhutan. The objective of the training was to build the managerial and organisational capacities of women to initiate savings and credit schemes in the communities to ensure the long-term sustainability of the scheme. Thirty-three participants attended the training, ten women from the Phobjikha and eight from the Limukha project sites, and the remainder from the Phobjikha Conservation Area Project (PCAP). The training covered topics on understanding existing rural savings and credit mechanisms in Phobjikha and Limukha, the concept of small farmer associations and village banks, the group formation process, maintaining group cohesiveness, managing conflict-consensus building, record keeping and reporting, loan management procedures, and the drafting of a self-help group constitution, bylaws, and action planning. One major outcome of this training was the formation at both project sites of a women's welfare association with an executive committee comprising the chairman, secretary, treasurer, and member representative, together with the drafting of a constitution and bylaws. The constitution contained 17 articles covering the duties and responsibilities of members, the powers and functions of the general assembly and board of committee, the scope of business, share capital, eligibility criteria for membership, savings and credit mobilisation, lending terms and loan sanctioning procedure, record keeping and reporting, termination of membership, amendment of constitution and bylaws, and auditing and fines.

India

A one-day gender orientation and group empowerment training session was organised for women in Uttaranchal (Bajeena and Naila) to sensitise them on their roles and motivate them to form groups with a set of rules and regulations. A similar training programme was organised with the help of the local partner NGO at the project sites in HP (Kunihar, Kotla, and Bhatuin) to train women on the role of gender in energy and water management, the formation of groups and their rules, record keeping and savings, and credit mobilisation. Group empowerment training was provided to group members every month with the help of NGO partners and field motivators using tools such as group discussions, question-and-answer sessions, and presentations. All the women's groups have formed their own rules and regulations, they have regular monthly meetings to discuss progress, and each member is required to deposit a monthly saving of IRs 20.

Nepal

Group empowerment training was provided separately to all five women's groups in Palpa (142 members at the time of training) to generate awareness about group solidarity and collective action, and to develop skills and transfer technologies to help empower and strengthen the capacity of the women's group members. The training methods adopted were mainly group discussions, role-plays, question-and-answer sessions, and the presentation of posters. Group members defined their roles and responsibilities, prepared the rules and regulations, and enforced them properly.

Gender orientation-cum-training sessions were provided to women and men in Palpa and Dhankuta to raise awareness on the key gender concepts. The focus was on socially constructed gender inequalities in society, especially in relation to the efficient management of water and energy resources. The training covered such topics as gender concepts, socialisation, the role of gender, access to and control over resources, the need for gender development, equity and equality, positive discrimination, the legal rights of women, and the provision of women's participation in users committees.

In addition, two days of paralegal training were provided to 46 women in Dhankuta to increase understanding of women's issues such as double marriage, divorce, citizenship, women's rights to parental assets, and legal provisions regarding these. The main objective of these training sessions was to make women aware of the various issues. This training also linked legal aspects and the provision of water in the rural communities.

Non-formal education classes

In Palpa, six-month-long informal education classes were also conducted as requested by the women's group. Forty-eight members of the women's groups from the two VDCs benefited from the programme. In Bhutan, all the women's group members at the project sites have access to the non-formal education provided by the Department of Education.

Training in Energy-related Technologies

Improved cooking stoves (ICS)

In Bhutan, a stove specialist was hired to impart training to all the nine women in Phobjikha on the improved mud cooking stove with metal plate, metal chimney, and back boiler. Refresher training on two other types of improved cooking stoves (metal stove and back boiler and improved one pot hole stove) was provided to eight of the women from Phobjikha with the help of two stove technicians from the Ministry of Trade and Industry. The training was conducted at the house of one of the women's group members where both types of stove were installed.

In HP, improved cooking stove (ICS) promoters provided 'on-the-doorstep' training to 25 women users in the construction of ICS and their repair and maintenance.

In Nepal, a two-day-long 'ICS Promotion Training' programme on making ICS was provided to six women participants in Palpa with the help of CRT/N technicians. Similar training was provided later to 14 women in Dhankuta with the help of a local NGO. The techniques of building an ICS were demonstrated and the participants learned how to construct ICS for both domestic use and to cook livestock feed. This promoter training has provided a new source of income to these women who have begun to sell their services to construct the ICS – they have become 'energy entrepreneurs'. The direct achievement of this training has been that women who previously were not ready to install the ICS have been motivated to construct these stoves in their homes. Promoters have also been able to convince women who do not belong to the group to install them. ICS refresher training was also provided to some women in Dhankuta. 'Kitchen Management Training' was also an integral part of the ICS training in Nepal. A one-day orientation-cum-training session on kitchen management was provided to 16 members of the women's group in Palpa on the importance of proper kitchen layout with ICS

and kitchen management linked with health and sanitation aspects and time management. A three-day kitchen management training programme was provided to 18 members of the women's group in Dhankuta.

Solar driers

In Bhutan, two local carpenters and eight women in Limukha received training on making solar driers with the help of a skilled carpenter hired for eight days. In Dhankuta, Nepal, a week-long training programme on low-cost solar driers was conducted with the technical and resource support of the Cottage and Small Industry Development (CSID) Office for five women from five sub-groups of Sibuya Banchare Women's Group. The major focus of the training was on delivering practical skills to the women on the construction of low-cost, plastic-covered solar driers. After training, the women were able to construct the low-cost plastic driers on their own. All the women now have these driers in their homes to dry vegetables and other food products quickly and hygienically.

Household electrics

In India, a one-day training session was provided to 30 women in Uttaranchal and to 15 women in HP on household wiring and simple electrical appliances. A toolkit was also provided to each of the participants to help them start repair work.

Training in Water-related Technologies

Bhutan

Some women in Bhutan received training on rainwater harvesting and drip irrigation during the TOT. Women in Phobjikha were then trained in the operation and maintenance (O&M) of the drinking water scheme constructed by the project in their village. The women have formed a committee of three members for the O&M of the water supply scheme.

India

In Uttaranchal, a one-day water management and water harvesting training-cum-orientation programme was organised for the women members of Bajena and Naila villages on rainwater storage methods and the good use of this water. Practical training was given in Bajena village on the construction of rainwater storage ponds, plantation, and social fencing for recharging the traditional water spring. Women in HP and Uttaranchal were trained in rainwater harvesting from rooftops.

Nepal

A one-day drip irrigation technology training session was provided to 21 women in Palpa focusing on drip irrigation, vegetable cultivation, and seeds and seedling plantation. The training also discussed the importance of organic manure, and how to make compost with natural green manure and its uses. A follow-up training on drip irrigation was held for 15 women in order to provide practical skills for preparing a seasonal and off-season vegetable nursery and to transfer seedlings from nurseries to fields as well as on the importance of green manuring, to strengthen women farmers' technical skills in vegetable farming. Similar training on drip irrigation and related issues was provided to 15 women in Dhankuta.

Training in Income-generating Activities

Based on the needs and priorities of women in the project areas, some specialised skilled training on tailoring, beekeeping, agro-processing and marketing were also provided to help enhance the income of women and address their productive needs.

Sewing

In Uttaranchal, 32 women from the Bajeena and Naila sites received training in sewing with the help of a qualified trainer hired from the village itself (Figure 3.1). In HP, 20 women received the same training spread over a six-month period provided by a qualified woman from the village.

In Nepal, 16 women in Palpa received a three-month-long training course in sewing with support from the CSID Office. Eleven members of the women's group from Dhankuta received hosiery training lasting three months, with support from the same office. The training has helped the women generate an income.



Figure 3.1: Sewing training in Bajeena, Uttaranchal

Organic composting and vermicomposting

In Uttaranchal, 22 women were trained in the NADEP composting technology (developed by Naryan Devrao Pandri Pandey). In HP, 20 women were trained in vermicomposting. The compost produced from these technologies has helped women increase the vegetable yields in their kitchen gardens.

In Dhankuta, 12 women were trained in vermicomposting and organic farming. The main purpose of the training was to orient and motivate the participants towards sustainable agricultural methods using various types of composting, organic pesticides, and natural farming practices. Women were made aware of various types of beneficial and harmful pests and their role in improving and suppressing production. The women also learned different methods of preparation and use of organic manure and organic pesticides through the use of effective micro-organisms, organic waste, cattle dung, livestock urine, and several locally available medicinal herbs and shrubs. The participants from each group were provided with a bottle of effective micro-organisms and 200 live earthworms in order to motivate them to transfer their acquired knowledge to their respective groups.

Training in off-season vegetable farming

Three days of training in off-season vegetable farming was provided to 21 women in Palpa and 15 in Dhankuta. The training focused mainly on growing vegetables, the types of diseases seen in vegetables, and pest problems in vegetables and their control. The importance of organic compost manure was stressed. There was also training in vegetable drying and the marketing of produce.

Training in beekeeping

A week-long course in beekeeping was provided to 18 participants (16 women and 2 men) in Palpa with the cooperation of the CSID Office, Palpa, and ICIMOD (Figure 3.2). The objective of the training was to provide knowledge and skills on developing beekeeping enterprises, concentrating on practical know-how including honey extraction and marketing activities (see Box 3.1). Similar training was provided to 17 participants (9 women and 8 men) in Dhankuta jointly by ICIMOD, CRT/N, and SOLVE-Nepal. Another two-day, follow-up training was provided to the entire group in Palpa.

Food processing

A five-day training programme on food processing was conducted in Dhankuta for nine women from the Dhankuta and Palpa project sites. The main objective was to improve knowledge about the preservation of food and how to add value to products in order to earn more income. The training covered a variety of subjects related to the importance of food preservation and processing, hygiene and sanitation, quality control, safe handling, packaging, solar drying, labelling, marketing, and others. Several food items prepared from ginger, 'amala', 'lapsi', and apples were demonstrated during a practical session (Figure 3.3).

Ginger production

A one-day training session in the production of ginger was provided to 37 people (26 women and 11 men) in Palpa, with support from the District Agricultural Development Office. Participants gained practical knowledge and skills on the selection of ginger seed, diseases seen in ginger and their control, and related issues.

Grass production orientation

A one-day training session was also provided to 36 women in Palpa on fodder grass production to make them aware of the different types of fodder grasses available, their



Figure 3.2: Beekeeping training in Palpa



Figure 3.3: Training in food processing

Box 3.1: Beekeeping training concept

The rearing of honeybees in a hive, usually for honey and wax production, is called beekeeping. Traditionally in Nepal, bees are kept in fixed comb log and wall hives. These hives are easy to make and are cheap, but they do not allow for colony inspection and manipulation. Beekeeping does not require day-to-day care, heavy work and huge investment. However, to maintain healthy bee colonies, to produce clean and hygienic honey, and to multiply colonies, the bee colonies need to be managed. The ICIMOD indigenous honeybee project has been encouraging farmers to keep their bees in moveable frame hives. These hives have the following advantages.

- They allow the beekeepers to manage the bees by dividing strong colonies that would otherwise swarm; uniting weak colonies that would otherwise die; strengthening colonies by feeding sugar syrup and providing extra combs of brood or honey; inspecting colonies to find out the condition of the queen, and her egg laying and brood pattern; and detecting disease and providing medication if necessary.
- They facilitate non-destructive honey harvesting and reuse of the honeycomb.
- The volume of nesting and honey-storing cavities can be expanded or contracted as necessary for the comfort of the bees. A dummy board is used to reduce the volume of the nesting cavity and a honey chamber can be added to increase the space for honey storage.
- They are easy to transport and suitable for migratory beekeeping.

The bee project provides training on different aspects of beekeeping, including colony management, queen rearing, and value addition of bee products. The training provided in Dhankuta and Palpa districts focused on colony management techniques, such as the need to manage honeybee colonies in moveable hives; the observation of bee colonies (when and why); winter and summer management; the prevention, hiving, and management of swarms; uniting and dividing colonies; methods of honey and wax harvesting and processing; identification, prevention, and control of diseases; and so on. Some basic beekeeping tools such as the honey extractor machine were also introduced and participants were taught how to use them.

importance, their uses, and plantation methods. The training was provided with support from the District Livestock Office in Palpa.

Loan and savings management

Training in various aspects of loan management was provided to 32 women members in Dhankuta. The participants themselves selected the contents of the training: loans and their usefulness, terms and conditions for obtaining a loan, the proper utilisation of a loan, risk management, fund management for sinking loans, selection of good enterprises, and others. The five-day programme ended with a full commitment from the participants to utilise their savings and the revolving fund properly.

Training in marketing and quality control

With the support of the research organisation MANUSHI, a week-long training programme on marketing and quality control was organised in Kathmandu for six women (three each from Palpa and Dhankuta) to enhance their entrepreneurial skills. The training incorporated various introductory topics of business management – types of business, risk analysis and management, awareness and self realisation, the selection of a business, markets and marketing, target identification, quality and quality control, making a business plan, and others. A field visit to a pickle manufacturing site was organised on the seventh day of the training.

Chapter 4

Adoption of Technologies

Introduction

Following the training sessions conducted for members of the women's group to increase their awareness, positive attitude, self-belief, and skills, the women selected and adopted a variety of technologies to address their water and energy needs and utilised the time saved for productive income-generating activities. The technologies selected in the first phase differed in the different countries and project sites reflecting the different needs and situation of the women. The technologies implemented at the project sites can be grouped broadly into those related to energy, those related to water, and those related to income-generating activities. Details of the technologies adopted and the enabling mechanisms (revolving fund, group savings, and credit micro-finance schemes) used to support adoption are described in the following sections. Approximate conversion tables for local currency costs are given at the end of the 'Abbreviations and Acronyms' list at the front of the book.

Bhutan

In Bhutan the construction of a drinking water supply scheme in Phobjikha (Kumbu and Haal) fulfilled the water needs of 17 households. To address their energy needs, training was provided on a variety of energy technologies, including solar driers, solar lanterns, improved cooking stoves (ICS) with metallic chimney and back boiler, and the development and management of an LPG depot (see Chapter 3). In both Phobjikha and Limukha, the women selected the improved one hole stoves for livestock feed and water harvesting plastic tanks for implementation. Women in Phobjikha also selected improved mud/metal stoves, and those in Limukha, solar driers and sprinklers.

India

In Uttaranchal the major water and energy technologies implemented to address the needs of women were an infiltration well, water recharging on mountain slopes through the plantation of saplings and the construction of micro-reservoirs/ponds, and the distribution of pressure cookers and solar lanterns. The main energy- and water-related technologies adopted by women in HP to address their needs were rainwater harvesting, the renovation of traditional water harvesting structures and drinking water tanks, ICS, pressure cookers, and solar lanterns (see Table 4.1).

Nepal

The major energy- and water-related technologies implemented in the Palpa and Dhankuta project sites included the installation of ICS with an improved kitchen environment, solar driers, drip and sprinkler irrigation systems, vegetable nurseries for fresh vegetable farming, and the renovation of traditional water wells (see Table 4.2).

Technology /Activity	Himachal Pradesh	Uttaranchal
Improved cook stove	25	
Rainwater harvesting tank	22	25
Water tank repair (community system)	1	
Solar lantern	8	11
NADEP composting pit	2	16
Vermicomposting (and NADEP pits)	16	
Pressure cooker	30	100
Plantation (trees)		2500
Micro-reservoirs		14
Pit digging for plantation		5000
Grass sowing		0.4ha
Seed sowing (pits)		2 ha
Rambans plantation		1000
Infiltration well		2
Check dam		3

	Dhankuta	Palpa	Overall
Improved cook stove (ICS)	72	108	180
Solar drier	7	1	8
Low cost solar drier	5		5
Solar lantern	8	1	2
Biogas		1	1
Rainwater harvesting tank	1	1	2
Irrigation tank	1		1
Plastic pond		1	1
Well rehabilitation	2	2	4
Maize opening machine		1	1
Packaging machine		1	1
Honey extractor		1	1
Drip irrigation	11	73	84
Sprinkler irrigation	10		10
Waste water management	10		8
Group nursery	1	6	7
Plastic green house	1	1	2
Beekeeping	23	29	52
Modern toilet		48	48
Total	152	275	418

Energy-related Technologies

Improved cooking stoves (ICS)

Bhutan

The most common type of stove used at the project sites in Bhutan is a modified version of the traditional cooking stove (the 'bhukhari' type, Figure 4.1), which was promoted by the National Women's Association of Bhutan (NWAB). In this type of stove, all the components are constructed out of metal; the stove can be used for both cooking and space heating. While the stove is good from the point of view of being smokeless, it is inefficient in terms of saving fuelwood. Livestock feed is still cooked on a traditional stove with three stones, which requires large quantities of fuelwood. The project introduced two different forms of ICS: a) an improved mud cooking stove with a back boiler to heat water (the top part of the stove body, the GI pipe for the back boiler system, and the chimney pipe are made of metal, while the combustion chamber and side walls are made of mud and mulch block); and b) a one pothole mud stove for preparing livestock feed (Figure 4.2). These were installed in a household in Kumbu for demonstration purposes. The ICS for cooking livestock feed was adopted by most women, but not the ICS for cooking meals. The latter was less popular both because of its high cost and because of its incompatibility with the local housing structures. The cost of the stove (Nu 4300, with the backboiler being Nu 2500) was many times higher than the cost of the previously used bhukhari improved stove (Nu 700). In addition, the mud stoves are not suited for installation inside homes in this area because the kitchen is generally located on the second floor; the ground floor is used as a livestock shed. The wooden floors are also not suitable for constructing mud stoves. Furthermore, many of these communities are located at high altitudes and have cold winters, but the stoves promoted by the project were not suitable for space heating. The traditional stoves allow family members to come together and have meals



Figure 4.1: Modified bhukhari type stove in Bhutan



Figure 4.2: One pothole stove for livestock feed, Bhutan

near the fire, and are convenient for roasting maize and potatoes. The area around the stove used to be the place for important household meetings, discussions, and the sharing of stories and community myths. Such socioemotional occasions are what many seem to miss after having installed improved stoves.

Himachal Pradesh, India

The ICS promoted in HP was an all metal stove with a chimney and water heating system (Figure 4.3, 4.4). The stove proved very popular among the women's groups (Nager and Kotla sites) as did other energy-saving devices that reduced their heavy workload. These areas already face a scarcity of firewood and women have to travel long distances (three hours a day) to collect firewood. The traditional mud stoves also give off a great deal of smoke. The needs identification, motivation, awareness campaign, and

demonstration convinced many women of the multiple benefits arising from the installation of an ICS with a built-in water heating system – savings in fuelwood, the provision of hot water without using extra wood, a smoke-free kitchen, and a reduction in drudgery. The cost of the ICS was IRs 2350, of which the women paid about 40% with the rest being subsidised. Altogether 25 women at these project sites installed the multifunctional ICSs promoted by DEEP, the local NGO partner. Women were also trained to construct, use, and repair the ICS.

Nepal

The ICS promoted in Nepal was a two hole mud stove (for two pots), with an enclosed fire and chimney. This was the first time that people at the Dhankuta project site had been introduced to ICS. The stove reduces indoor smoke and helps improve health, especially that of women and children. It also reduces fuelwood consumption and cooking time. When the project began, it was very difficult to convince the ethnic Rai and Limbu communities in the project area of the advantages of ICS. However, the intense efforts of the field staff and the trained women motivators, led to 72 households installing the ICS within the first two years. Others are in the process of installing an ICS in their homes. Some women from outside the

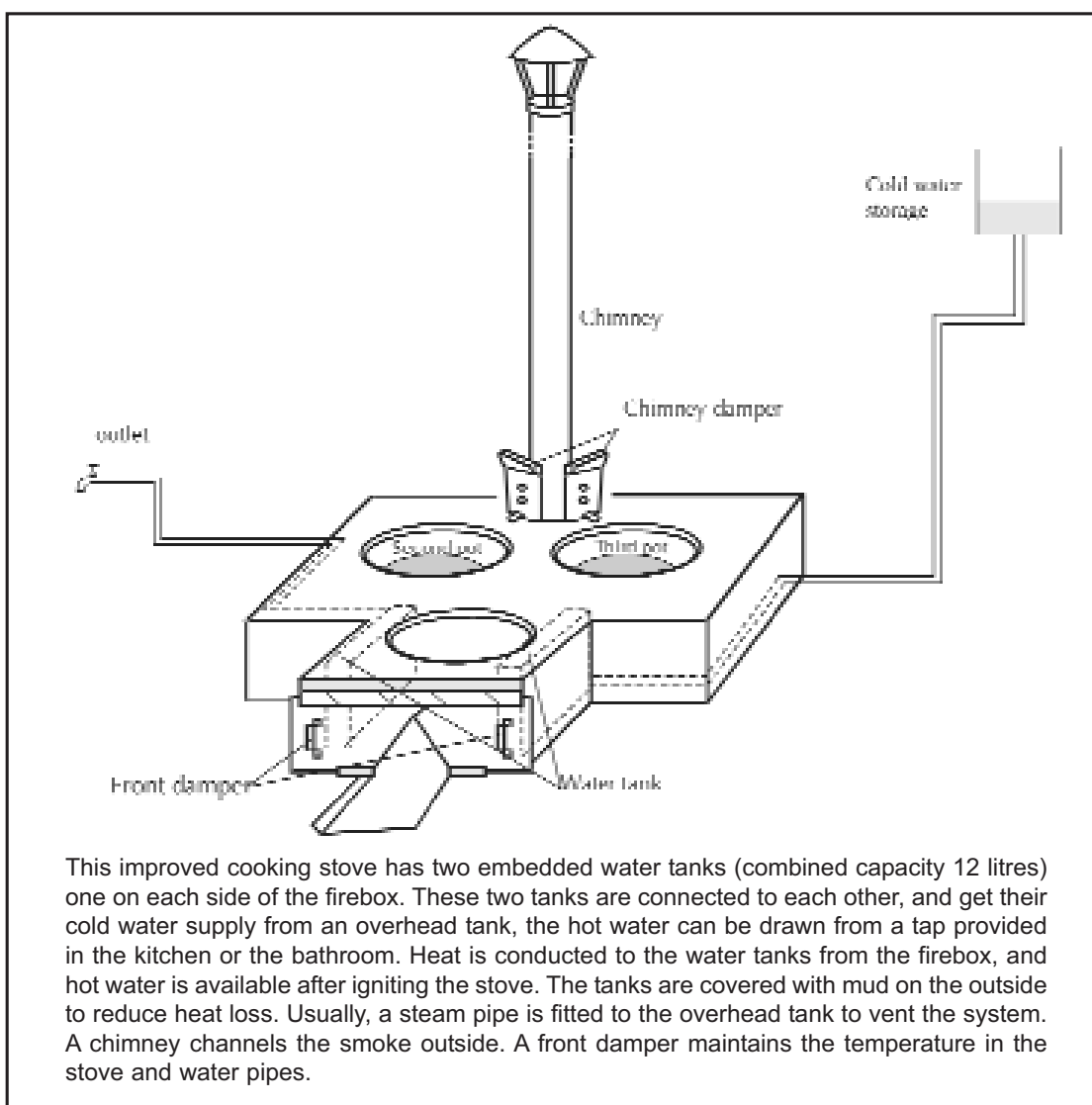


Figure 4.3: Layout of the ICS promoted in Himachal Pradesh

project area have already installed an ICS, and many more women from neighbouring areas have already expressed a desire to install one. In Palpa most of the women in the group installed an ICS in their homes during the project period. The women who received training on ICS construction are busy selling their services to other villagers; they charge from NRs 100 to NRs 150 for the construction of an ICS (Figure 4.5). In total, 108 ICSs were constructed in the homes of the project beneficiaries (see Table 4.2). Box 4.1 illustrates how women can be successful energy entrepreneurs provided they are given the opportunity. The construction of kitchen racks and ‘juthyanj’ (a place for washing utensils and hands after meals) has also helped women to improve hygiene and sanitation in their kitchens.

Pressure cookers

Pressure cookers, an energy saving end-use device, were requested by the women in both Uttaranchal and HP. Women took up 100 pressure cookers in Uttaranchal and 30 in HP. One pressure cooker costs about IRs 565, of which the project provided a 50% subsidy as an incentive for ‘pump priming’ – the initial dissemination of this energy-saving cooking device.



Figure 4.4: Mud covered three-hole metal ICS in HP, India



Figure 4.5: Women constructing an ICS in Nepal

Box 4.1: ICS for income generation

Thirty-four-year-old Narisara Marsangi, a resident of Humin village in Palpa, is a widow from a very poor background and is her family's sole wage earner. After the introduction of the Women in Energy and Water Management Project in her village, she became a member of the Saujanya Women's Group and received training in the construction of improved cooking stoves (ICS). This skill has provided her with a new source of income. Narisara charges NRs 120 for the construction of an ICS in the homes of her women's group members, and NRs 200 for non-group members. Awareness about the effectiveness and efficiency of the ICS is increasing in the community leading to increased demand for their construction. Narisara receives invitations to construct ICS in other villages too, and has already installed 17 ICSs in villages other than her own. Some women have been so happy with the performance of the ICS that they even paid Narisara as much as NRs 300 for her service. She has already earned NRs 5100 from the construction of ICSs.

Source: District Coordinator, Palpa

Solar lanterns

A number of women's groups (especially in India, and Nepal) adopted solar lanterns. The price per solar lantern is IRs 3000 of which the project provided a 90% subsidy. In Nepal, this technology is promoted for demonstration purposes; so far eight women in Dhankuta and one in Palpa have taken up solar lanterns.

Solar driers

Solar drier production business in Limukha, Bhutan

The solar drier technology attracted the women of Limukha in Bhutan (Figure 4.6 and Box 4.2). The women realised that the solar drier was a safe technology that could be used to dry meat, chillies, and other vegetables in a hygienic manner. Training in construction and maintenance of solar driers was provided by RSPN. Two local carpenters were also hired to make the solar driers in front of the women. After the training and the demonstration, the women's group became interested in starting up a solar drier production venture. The project provided the seed money while RSPN provided the women's group with the raw materials for 20 solar driers. In consideration of the transportation problem, women set up their production outlet down the hill in a house on the bank of the Punakha river, which is close to the market.

The group has already produced nine driers for sale to interested customers. RSPN is planning to help them market this product through the media and exhibitions; the women themselves are displaying their solar driers at various vegetable markets as an advertisement. Women have fixed the price at Nu 3000 per system. The profit made from the sale of the solar driers will be retained as their community fund, which will then be used to provide small loans to members for income-generating activities.

Box 4.2: Solar drier technology: how it works

Solar drier technology is used to dry food by extracting the moisture from the food placed inside the drier. Sunlight passes into the drier through a glass sheet and the heat is trapped inside. The bottom plate of the drier is painted black, absorbing more heat. The drier is placed in a slanting position so that the hot moist air, rises and goes out and cool air enters from the bottom. The temperature and the airflow inside the drier are controlled by regulating the inlet and outlet vents.



Figure 4.6: Solar dryer produced by women's group in Limukha, Bhutan

Solar driers in Dhankuta

In Nepal, solar driers were mostly of interest to the women in Dhankuta. Seven solar driers of the type described above were taken up. A low cost solar drier constructed mainly of mud with a plastic roof was also installed to demonstrate the operational procedures and the use for drying fruit (amala). So far, five low-cost solar driers have been adopted by women in Dhankuta. The project provided a 75% subsidy. The dried amala is marketed by SOLVE (a local NGO partner) in the Kathmandu market. SOLVE is also looking at the possibility of producing dried vegetables so that the solar drier can be utilised effectively in the near future.

LPG depot in Phobjikha

The women's group of Phobjikha in Bhutan proposed establishing a gas depot. The Phobjikha valley is the wintering ground of the protected black-necked crane and development interventions in this valley are thoroughly scrutinised before they can start. The valley has no grid electricity because the high voltage wires could hinder the flight of this rare and endangered species. Equally, the ICS introduced in the TOT was not suitable for use in the local houses. People here already use LPG, but have to travel a long way (half a day) to purchase cylinders.

In this valley, where conservation takes priority, women saw many advantages in LPG and decided to open an LPG depot. The project supported the venture as LPG was the most suitable energy option available; it did not have any negative effect on the conservation efforts being made in the valley and also helped reduce pressure on the forests. Having a depot close by helped reduce the time and effort put in by women to obtain gas cylinders.

The LPG depot in Phobjikha was established after obtaining the necessary approval from the Ministry of Trade and Industry. The LPG distributors from Tashi Commercial Corporation agreed to supply the cylinders, as per the issue ordered by the Ministry of Trade and Industry. The capacity of the LPG depot in Phobjikha is 340 cylinders, of which 240 cylinders were contributed by the end users at a rate of Nu 1400 per person. The remaining 100 cylinders were provided by the project. The project also paid for the transportation of the cylinders from Phuentsholing to Phobjikha. The 240 cylinders were distributed among the three blocks (Bjena, Gangtey, and Phobji). The remaining 100 cylinders are kept as a reserve to provide refilling facilities for the whole of the Phobjikha community. The process of getting approval from the government for the construction of a permanent house on public land is underway; until this is approved, the gas depot has been set up safely in a private house.

Income from the sale of each cylinder will be distributed as follows: a) Nu 3 for PCAP community fund; b) Nu 10 per cylinder for the sales person; and c) Nu 2 per cylinder for house rent. The income from the gas depot benefits all the women in terms of providing easy access to loans for income-generating activities.

The Phobjikha women's group is responsible for the management of the depot. A board of committee members (executive committee) comprising the chairperson, secretary, treasurer, member representative, and a messenger was formed to oversee the day-to-day management of the group, in close consultation with the members. The treasurer of the group volunteered to be the salesperson; she is responsible for the overall management of the depot (including travel costs, loading and unloading charges, and dialogue with Bhutan Oil Distributors, Wangdi, from where the 100 cylinders in the reserve will be refilled). The allocated Nu 10 per cylinder sold covers the management costs as well as a nominal salary. The members of the women's group have responsibilities at home and opening the depot everyday would be difficult, thus it opens twice a week, in the morning.

The LPG depot in the Phobjikha valley has helped reduce the time and effort for many women besides reducing pressure on the forests. Women can undertake other activities with the time saved. Use of LPG also improves the kitchen environment and has health benefits. Besides promoting the energy needs of the women, the case of the LPG gas depot demonstrates how women can be successful energy entrepreneurs (Figure 4.7).

Water-related Interventions

Women are usually responsible for collecting water for cooking, cleaning, health and hygiene, and often spend long hours (4 to 5 hours per day) carrying heavy containers and suffering acute physical problems. Lack of clean water is a major problem. The World Health Organization estimates that 80% of all sickness in the world is attributable to unsafe water and sanitation, with water-borne diseases killing 3.4 million people, mostly children, annually. Women are likely to be at a disadvantage in situations where there are competing claims for water, particularly in water-scarce areas. Some of the water-related technologies implemented in the project areas of each country to address this need are highlighted below.

Construction of a water supply scheme in Phobjikha, Bhutan

A water supply scheme was constructed in Phobjikha which fulfills the water needs of 17 households in Kumbu and Haal villages. This scheme was initiated in September 2003 in



Figure 4.7: LPG depot run by the women's group in Phobjikha, Bhutan

close collaboration with the Dzongkhag Engineering Cell of Wangdue at a cost of US\$ 6000, with labour being contributed by the beneficiaries. An intake tank and storage tank were installed, together with six water taps each in Haal and Kumbu (Figure 4.8). One tap was also installed at the cremation ground, which benefits the whole community of Phobjikha valley. The women formed a three-member committee for the operation and maintenance (OM) of the scheme. Each member contributed Nu 100 to the O&M fund. One person has been employed for the repair and maintenance of the scheme; he receives Nu 20 per month from each household for his services.

Water technologies in India

The project sites in the Indian hills of HP and Uttaranchal also suffer from water scarcity, especially during the dry seasons. This scarcity is increasing as deforestation continues and the vegetation on mountain slopes becomes more degraded, both of which accelerate erosion. The women at both sites have to travel long distances – 6 kms per day – to collect water. Over time, traditional water sources such as rivulets and springs have mostly dried up. Water infrastructure constructed by various agencies has also failed to function due to faulty schemes. The main interventions selected to address the water crisis faced by women in the project areas were the installation of rainwater harvesting tanks, the repair of naula (traditional wells), the construction of infiltration wells, and the recharging of natural water springs. These were designed to meet the prioritised needs of the women.

Recharging the traditional water spring in Bajeena, Uttaranchal

There are two sources of drinking water in Bajeena: a naula and a water tap. The naula, is the most important source as it is located close to the village. Over time the source has dried up and is not able to meet the water demand of the village. The situation is worst during the dry



Figure 4.8: Water supply scheme constructed in Phobjikha, Bhutan

season. The water tap is located in another village and the water supply is not adequate even for that village. The tap water comes for only half an hour a day and its supply is highly erratic. Thus the water problem is almost a water crisis for the women of Bajeena. The women's group decided that recharging the traditional water spring was a viable option as part of the task of finding a sustainable source of water.

A site was selected in a micro-watershed located above the traditional water spring. Except for a small patch of forest at the top of the hill, the slope was entirely barren and did not have the capacity to retain any water during the heavy monsoon downpour. It was decided that if water could be allowed to seep inside the ground it might be possible to recharge the traditional water spring. However, the slopes were hard and barren after many years of soil erosion. To facilitate seepage, it was essential that micro-reservoirs be constructed to trap the water flowing down the slopes. Once trapped, the accumulated water, would gradually percolate into the soil and be able to gradually recharge the spring. Fourteen micro-reservoirs (20m² to 30m² each) were constructed (Figure 4.9). The women also decided to plant the hill slope with multiple species of trees, selecting different varieties including medicinal plants that could provide income earning opportunities later, as well as firewood and fodder species. Thus the trees were useful in themselves and also enhanced the water absorption properties of the soil and strengthened slope stability. The women controlled grazing through social fencing. The water collected in the micro-reservoirs is used to irrigate the planted saplings and has also reduced the burden of having to carry water up the hill slopes.

The result of this work has been encouraging, water discharge increased notably within six months (Figure 4.10). During the monsoon, when the downpour is heavy, the water discharge from the spring increases significantly but the flow reduces once the downpour stops. The



Figure 4.9: A micro-reservoir for recharging the traditional spring in Bajeena, Uttarakhand



Figure 4.10: Tank and water outlet of the recharged traditional spring in Bajeena, Uttarakhand

relationship between the downpour and flow of water from the spring is obvious, say the villagers, but they also maintain that the overall flow of water from the spring has increased. The actual discharge is shown in Table 4.3. Box 4.3 shows how this innovative method of water recharging can go a long way to providing a permanent solution to water scarcity problems in many parts of the Himalayas.

	Time of measurement	Discharge l/hr	Total discharge	Requirement*
Before treatment	July 2003	211	5064	15,840
After 3 months of treatment	November, 2003	514	12,336	15,840
After 4 months of treatment	December, 2003	327	7848	15,840
* Taken as 30 litres per person per day				

Box 4.3: Recharging the traditional spring in Bajeena

Women have found an innovative way to recharge traditional water sources on a mountain slope in Uttarakhand. Due to the acute shortage of water, women spent a large part of the day collecting water. To overcome this problem, the women constructed 14 micro-reservoirs spread spatially on slopes to trap/store rainwater, which then percolates inside the slope and recharges the traditional village water source. Women also planted 2500 saplings on 5 hectares of the slope using horticulture, fodder, and fuelwood species, to ensure slope stability, to generate income, and to ensure the availability of firewood and fodder. They have controlled grazing through social fencing. The women manage a small fund for operation and maintenance. The full impact of this innovation is only likely to be felt after a few years, but the women report that water availability has already doubled and that this has reduced their water collection time as well as reducing drudgery. Women are making productive use of their saved time and have begun taking loans from revolving funds to initiate income-generating activities.

Construction of infiltration well technology in Naila

Naila, the other project site in Uttarakhand, was also facing a water crisis for similar reasons to Bajeena village. According to local views, the chir and pine trees near the village were also responsible for the decreasing water table in the area. According to the baseline survey estimate, the water availability from the existing water sources (475 litres/day from two naula located 500m from the village) was much lower than the water requirement of the total population (3660 litres/day assuming a per capita daily consumption of 30 litres).

After a preliminary visit to the village and a subsequent meeting with the villagers, infiltration well technology was identified by the national partner TERI as the only feasible option for meeting the water requirements of the village. TERI was able to mobilise the whole community and enlist their active participation in constructing the infiltration well. The water is lifted through a hand pump installed inside the covered well (see Box 4.4). A woman contributed the land on which the well is built and each household contributed INR 200 for well construction. The money was deposited in the bank in the name of the village water (‘jal’) committee. As per the decision of the committee, each household contributes a token amount per month for operation and maintenance. The women’s group has introduced an innovative way of managing the system – the responsibility for opening and closing the hand pump is rotated each day from one member to another. The pump is opened for two hours in the morning and the evening, and is closed with an iron chain and lock at other times (Figure 4.11).

Box 4.4: Success story from Naila, Uttarakhand – infiltration well technology

Naila, a small village in the Tarikhet block in Almora district, lies 12 km from Raniket. The twenty-four families in this village face an acute scarcity of drinking water all year. Past efforts to provide water have failed. When TERI visited the area, women had to travel 6 kms every day during the summer months to collect 40 litres of water. People had also been forced to sell their cattle at lower prices due to the lack of adequate water for livestock. People travelled 10 km from the village twice a week for washing clothes and bathing purposes. There is only one water source in the village whose discharge was so low that women had to wait 45 minutes to fill a 15 litre bucket. Women are busy filling their vessels with water even late at night. In this situation, it is not uncommon to see conflict among women over water and related issues.

A meeting was organised among the villagers to discuss the infiltration well technology and the need for the women's and the community's participation. The villagers agreed with the proposal and formed a committee that would be responsible for implementing the scheme. It was decided that each family would contribute INR 200 for the basic land. Two respected people from the village (Mr. Madan Singh and Ms. Prema Devi) were nominated to collect the funds which were deposited in a savings account in the village post office in the name of the water committee. Mrs. Devika Devi donated land to construct the well.

The infiltration well took one month to complete. A skilled mason was hired and was also able to train one man and one woman in masonry work. Now each family is able to collect 4-6 vessels of water per day with ease. Although this amount is still not sufficient, at least the drudgery and tension associated with collecting water is considerably less than before. Women do not have to line up late in the night to collect water. The women evolved a system whereby each household is assigned the responsibility on a rotational basis of opening and closing the well in the morning and evening for two hours. All the families, worked together irrespective of their economic status.

Source: Rakesh Prasad, TERI

Rainwater harvesting tanks in Uttarakhand and HP

Rainwater harvesting is a practical method for collecting and storing rainwater. The water can be used to irrigate kitchen gardens and reduces the drudgery of transporting water. Under this system, rainwater collected from the roof pass through a pipe to a small, multi-layered filtering tank attached to the top of a main tank where the water is ultimately stored. Twenty-five roof rainwater-harvesting tanks were constructed in Uttarakhand (mainly in Bajeena) and 22 in HP (Figure 4.12).

Locally available materials were used to construct the tanks. The whole set-up costs about INR 9900, of which the beneficiaries paid 25% on average. The capacity of the promoted tanks was 5000 litres. Most of the women use the water to irrigate vegetables, the water is adequate for this for about two months. Initially women were faced with problems of water seepage and clogging of the outlet pipe, but these problems were resolved. The women benefited both from having better quality meals with vegetables and also from income from the sale of vegetables.

Construction of community water tank in HP

A water tank was constructed/repared at the site of a traditional pond near the road head at Ghagar-Sayawan in HP and has benefited 38 households in the village. Before the tank was constructed, the water source was very small and provided no water during the dry season as there was no means for retention. Women had to travel some 3 km to collect water. The new tank for the well is now deep enough to allow water to be retained even during the dry season and it is properly designed with cement steps down to the water level in the well (Figure 4.13). The water tank area has been enclosed by barbed wire and there are plans to develop the



Figure 4.11: Infiltration well constructed in Naula, Uttarakhand



Figure 4.12: Harvesting tank for rooftop rainwater in India

space as a community park in collaboration with the village panchayat. The easier availability of water even during dry season has reduced the drudgery of women

Water technologies in Nepal

Construction of a traditional well in Dhankuta

The project supported the women beneficiaries of Cheribote Kuwa in the construction and management of a traditional water well. This is the sole source of drinking water for 11 households at the project site. The local people provided in-kind contributions and labour, while the project provided the necessary materials. A users committee was formed and is functional and active. Women have benefited as they have to spend less time waiting to collect water. The quality of the water has also improved.

Construction of an irrigation tank in Dhankuta

A small pond for multi-purpose use was constructed in the Tangkhuwa area of Dhankuta. This area suffers from acute water scarcity during the dry season (March to June) and women have to travel more than two hours to fetch a bucket of drinking water. The water shortage meant there was no possibility to use water to cultivate vegetables during the dry season. The irrigation pond was constructed to collect rainwater in the rainy season and store it for use during the dry period for vegetable cultivation and for cattle (Figure 4.14).

Improved sanitation in Palpa

The information and orientation provided by the women facilitators who received the TOT training was effective in creating awareness about health and sanitation among the Magar ethnic community at the Palpa site. As a result, 48 modern toilets and 10 pit latrines were constructed in the community. Although this activity was not part of the intended project interventions, increased awareness about water and sanitation issues led to the outcome.

Technologies for income-generation

Construction of organic and vermicomposting pits

At the two project sites in India, women adopted two different types of composting techniques – the organic compost pit (called NADEP, after the name of the promoter) and vermicomposting (Figure 4.15). Sixteen women in Uttaranchal (NADEP) and eighteen women in HP (16 vermicomposting, 2 NADEP) constructed such pits near their cowsheds. Women now have to walk less far to deposit the heavy raw dung. The cost of producing the compost is low (IRs 0.5 to IRs 0.7 per kg) and its nutrient content is satisfactory (0.5% – 1.5% N, 0.5% – 0.9% P, 1.2% – 1.4% K). The use of the compost (especially the vermicompost) has resulted in higher crop productivity (40% higher) particularly of vegetables. The reliance of some women on chemical fertiliser was reduced. After witnessing the multiple benefits of the compost pits, other women in the village have shown an interest in constructing such pits on their farms.

Drip and sprinkler irrigation technologies for vegetable farming

Drip irrigation technology has become very popular among women at the project sites and beyond in Nepal. The technology is very simple and uses water very efficiently – even wastewater from household use can be used for irrigation through this technology. In Palpa and Dhankuta, drip irrigation has helped women cultivate vegetables for the first time in their lives (Figure 4.16). In Palpa, 73 women installed the technology during the project phase and



Figure 4.13: Newly-constructed retention tank for traditional pond at Ghagar-Sayawan in HP, India



Figure 4.14: Irrigation pond constructed in Dhankuta, Nepal



Figure 4.15: Vermicomposting pit in HP, India



Figure 4.16: Drip irrigation for vegetables in Nepal

are operating it successfully, backed up by the training provided by the project. In Dhankuta, 11 women adopted the drip irrigation system and a further 10 adopted a sprinkler irrigation system for vegetable farming. Use of the techniques is now spreading.

Wastewater management in Dhankuta

To address the water problem in Dhankuta, where water scarcity is pronounced, ten wastewater systems were constructed to collect and store wastewater from the kitchen to be used in drip irrigation. This enabled women to cultivate vegetables and earn some additional income (see Box 4.5). More women have now shown an interest in managing the wastewater from their homes for use in vegetable farming.

Box 4.5: Harvesting wastewater brings money

Mrs. Sita Chaulagain, a member of the women's group in Tankhuwa, has been successful in using wastewater. As she said "Our village has severe water shortages and drinking water is always insufficient, making activities such as vegetable farming out of the question. I found out about drip irrigation technology through this project and have also come to know that wastewater can be used for vegetable farming. I bought a drip irrigation system with a 50% discount with support from the project and installed it on my land. I planted tomatoes, cauliflower, coriander, and carrots after receiving technical advice. The wastewater collected in a drum was sufficient to irrigate over 7000 vegetable plants. Other members of my family also helped me in this endeavour. The drip irrigation system and use of wastewater enabled us to cultivate vegetables and I was also able to earn NRs 8000 from selling the vegetables. I used part of this money to pay off some of my parent's debt, some I spent on the home, and some I have saved with my group savings fund."

Group nursery in Palpa

Members of six of the women's groups in Palpa and one in Dhankuta established group nurseries to increase the supply of off-season vegetables and cash crops. The members decide which vegetables to plant in the nursery and then collect money from among themselves to buy the seeds. When the seedlings are ready for transplantation, the women distribute them equally among themselves and transfer them to their own fields. Some of the vegetables produced are eaten and some are sold, providing additional income (Figure 4.17).

Beekeeping in Nepal

In both Palpa and Dhankuta, the interest in beekeeping has grown considerably owing to the training provided to the group members (17 each in Palpa and Dhankuta) and the potential of beekeeping as a source of income. Many of those who received training have already started to earn an income from the sale of honey from their hives and have shown interest in follow-up training (see Box 4.6). In Palpa one local resident began constructing new frame hives for sale. Twenty-nine women established beehives in their backyards in Palpa and 23 in Dhankuta. Many women from both project sites have shown an interest in receiving beekeeping training so they can use it for income generation.



Figure 4.17: Growing vegetables for sale

Box 4.6: Surendra wants to be a bee entrepreneur

Surendra Limbu, resident of Tankhuwa VDC, was selected to participate in the beekeeping training programme. He has this to say, “Beekeeping has been in practice in the village for a long time but we did not know how to raise them in the proper way. After the training I know many new things about beekeeping – e.g. the advantages and disadvantages of bees, their diseases, their susceptibility to diseases, and disease prevention. Beekeeping is easier in modern beehives than in the traditional ones. I also know now that to be a good beekeeper it is equally important to know about plantation of vegetables and fruit trees that attract bees. Beekeeping combined with improved plant management also helps increase pollination. Bees are very helpful and beneficial insects and it would be very good if all the villagers began keeping bees. I have already bought one hive and I am planning to buy more hives and gradually become a bee entrepreneur.

Compiled by: District Coordinator, Dhankuta

Establishment of a Technology Demonstration Village at Project Sites in Nepal

A technology demonstration village (TDV) was created at both the project sites in Dhankuta and Palpa, in order to promote and demonstrate the application of various field-tested water- and energy-related technologies. The main idea was to encourage the creation of a pilot village that people could visit to learn about technologies that meet women’s needs (see Table 4.4).

Technologies	Palpa	Dhankuta
Number of households in cluster	12	12
Improved cook stove	12	12
Solar lantern	1	1
Waste water management	-	1
Rainwater harvesting jar	-	1
Low-cost solar drier	-	1
Greenhouse	-	1
Drip irrigation	1	1
Bee hives	1	4
Honey extractor	-	1
Resource centre*	1	1
Biogas	1	-
Kitchen rack with 'juthyan' & 'machyan'	1	-
Plastic pond	1	-
Packaging machine	1	-
Maize opening machine	1	-
Solar drier	1	-
*The resource centre contains 20 documents and posters in Palpa and 32 documents and posters in Dhankuta		

At the end of the project, 12 households each in Palpa and Dhankuta were participating in the TDV, with participation expected to grow. These villages are operated by the women. The households demonstrate different kinds of water, energy, and income-generating technologies and the women explain the technologies they have adopted to visitors. A management committee made up of members of the volunteer households decides the minimum rental fee structure. In each village, one woman was been nominated as the manager and interpreter for the TDV.

Only a few months after inception, the number of visitors was increasing markedly. Six households in Palpa ordered solar lanterns after seeing the technology at the Palpa TDV. The Centre in Dhankuta is being frequented by villagers, and the Dhankuta District Development Committee planned to replicate the idea in other areas of the district after realising the effectiveness of the TDV in generating a flow of information and awareness. Even one person can be pivotal in convincing others through demonstration (Box 4.7).

Support Mechanisms for the Dissemination and Adoption of Technologies

While specific technological interventions can bring about improvements in the lives of women, it is clear that in the long run, the dissemination and adoption of interventions can be successful only if they are accompanied by mechanisms that enable the women to make use of the opportunities. Given the poverty prevailing at the project sites and women's lack of access to formal credit, it was not possible for most women to take up the technologies

Box 4.7: Devi Darlami becomes a role model

Devi Darlami, a 20-year-old girl, has become a role model for all the members of her women's group. After the inception of the pilot project in her community, Bhumika Mahila Group was established at her initiation and with the support of NRCS, Palpa. She recalls the days six months back when she ran away so as not to have to introduce herself to the project coordinator from NRCS, when she visited the project site. However, after undertaking group empowerment and a series of other training sessions, she has developed the skills and confidence to guide and manage her group so well that no one can resist praising her leadership qualities and her desire to do something for her fellow group members from the ethnic indigenous Limbu community.

Apart from the group empowerment training, she also benefited from the beekeeping and food processing training after the introduction of the project. Immediately after participating in the beekeeping training, Devi Darlami started modern beekeeping with the provision of a loan from NRCS. Now the honey is ready in her hive and she will harvest it as soon as the honey extractor is available.

Within 15 days of her participation in the food processing training, she produced a number of processed items of 'lapsi', which she also taught the women of her community how to make. She says that she is confident about being able to generating the maximum amount of income by utilising her beekeeping and food processing skills, provided she gets further capacity building training on packaging, quality control, and other marketing aspects. Devi Darlami was also one of the visiting members in the study exchange visit programme. When one visits her household, it is clear how worthwhile the exchange visit was. She learned the technique of growing vegetables in a sack filled with soil and nutrients during her visit to the ICIMOD Demonstration and Training Centre site, which she now practices and has shown her community just a few days after returning home.

She also taught and illustrated to her group members how to produce green manure. She had learnt this during her visit to the Dhankuta pilot project site. She also cooks food on an ICS in her kitchen and irrigates her cultivated land with drip and sprinkler irrigation. It seems as though her household has become a tiny technology demonstration centre. Being modest, she delivers all this credit to NRCS for introducing the project in her area and she desperately appeals for further training and project activities so that every woman not only from her community but also within and outside the entire village can benefit and become like her in the foreseeable future. She has been instrumental in initiating new technologies within a short time, succeeded in serving as a young 'role model' with a vision of empowering the local community. She deserves a lot of credit.

Compiled by: the District Coordinator, Palpa

demonstrated unaided. For the pilot demonstration, enabling support mechanisms were created to allow the women to adopt the technologies. These support mechanisms included the creation of a revolving fund and encouraging women to save money.

The project provided support for pilot demonstrations in the form of seed money. The 'seed fund' was used to meet the immediate funding requirements as a 'start-up' financing mechanism to finance water- and energy-related technologies. Part of the seed money was used as a zero interest loan to create a revolving fund managed by the women. The revolving fund provides loans to members of the women's group at low interest for the purchase and maintenance of technologies and to start productive income-generating activities based on the training acquired from the project.

All the members of the women's groups at the project sites were encouraged to save a nominal amount of money every month to form a group saving fund of their own. The rules and regulations formulated by the women members to run the saving and credit groups differed somewhat in the different countries.

The need for 'start up' financing is expected to reduce gradually over time as women use the time saved from water and energy activities to generate income, which will improve the affordability of the technologies.

Revolving funds

The project adopted a flexible approach to the creation and management of revolving funds. However, creation of an exclusive women's self-help group (SHG) was a prerequisite for provision of credit from a revolving fund. The size of the revolving fund created varied at the different sites. In HP, it was IRs 10,000 (IRs 5000 for each of two women's groups formed in Kotla and Arti Nager villages); in Uttaranchal, it was IRs 13,100 for three women's groups; in Nepal, it was NRs 159,000 in Palpa and NRs 50,000 in Dhankuta; and in Bhutan, it was Nu 5000 for each of the two sites in Phobjikha and the site in Limukha.

The members of the women's groups generally decide by consensus on the rules and regulations regarding the use of the revolving fund. A loan management committee with members from the women's group and in some cases (Nepal) the local NGO partner, was formed in each country. Women were provided with managerial and record keeping/accountancy training for operation of the micro-finance activities. The committee appraises loan applications, recommends loans to members for the purchase of different water, energy, and income-generation technologies, fixes lending terms, and monitors the utilisation of loans.

The funds were strengthened by group savings created through monthly savings from each group member. Through such group savings, women at some project sites (e.g. HP) were able to link to financial institutions (banks) to strengthen the financing mechanism established with support from the project. Women are able to use their group savings as collateral to obtain larger loans from the banks (as much as IRs 80,000 in Kotla). Women's groups are maintaining the revolving fund and group savings with the assistance of local NGO partners.

The nature and extent of use for income-generating activities of the group revolving funds varied across the countries, and in general was still in its infancy at the end of the project. In Bhutan, the group saving fund had reached Nu 10,400 in Phobjikha and Nu 9800 in Limukha, but had not been used for loan disbursement.

In HP, the women's groups had already disbursed loans (exceeding IRs 100,000) for various purposes among their group members at 2% interest. Loans were used for such diverse purposes as buying seed, animals, and ICSs; setting-up different types of shops; constructing houses; and a daughter's marriage. Women are just beginning to use their saved time for productive income-generating activities.

In Palpa, the revolving fund has been used to procure water and energy related technologies and to initiate small-scale enterprises. The women are currently charging 10% interest, with

loans given for 1-2 years. Installments have to be paid every 3 months. By 2004, 23 women had taken loans to procure drip irrigation systems and another 20 had taken loans for beekeeping. A part of the fund had already been reimbursed.

In Dhankuta, NRs 50,000 was deposited in a separate bank account for the revolving fund. Rules and regulations have been developed to manage the fund effectively. Only group members who have received training are eligible to take loans. The first loan amount cannot exceed NRs 3000. The interest rate is fixed at 18% and the loan repayment period is 6 months. Loans that cannot be paid back within the stipulated time have to pay a 24% interest rate. In Dhankuta, loans from the revolving fund have been provided for raising goats (NRs 24,000), for beekeeping (NRs 18,000), and for horticulture (NRs 9000).

Group savings fund, credit and micro-finance schemes

In Bhutan, the community fund was only created towards the end of the implementation period. The groups' constitution, which describes the management of the community fund, was drafted. It specifies a membership fee of Nu 500 and a monthly compulsory savings of Nu 100 per member. A new member wanting to join the group must pay an amount equal to the total savings of the group to date, including the interest earned from lending, divided by the number of members plus Nu 500 as a membership fee. The profit generated through the enterprises (gas depot and solar drier) in Phobjikha and Limukha will also be put into the community fund. The women's groups are required to meet twice a month to monitor and update the fund. In Phobjikha the group's savings has reached Nu 35,000. The women's group in Phobjikha developed a methodical record keeping system. The savings are kept in an iron safe with the chairman, treasurer, and a women member representative keeping one key each. The group was planning to initiate the disbursement of this saving fund to meet their credit needs soon after project completion.

In India the group rules mainly include, a) not more than 20 members per group; b) collection of IRs 20 from each member at a regular monthly meeting; and c) allocation of the group saving fund to income-generating activities by taking loans from the bank. For instance, using group fund as collateral, women's groups in Artinager and Shitla-Kotla, HP, have taken IRs 18,000 and IRs 80,000 as loans provided by a bank loan at an annual interest rate of 12%.

In Nepal, too, the rules and regulations of the group saving funds are decided by the women's group members. According to the group rules, a minimum of NRs 10 and maximum of NRs 500 can be deposited in the group savings fund by the group members at their regular monthly meeting. In Palpa the group's saving was NRs 121,000. The women's group invested NRs 10,000 to connect the village to the national electricity grid and now has electricity. In Dhankuta the group savings was NRs 120,000. Here the women's group in Dhankuta is in the process of registering itself as a cooperative but is facing constraints due to problems in the district government body, which has postponed the registration process until a new policy regulation is announce. All the sites where women have begun to save report reduced reliance, albeit small, on external sources of credit.

Coordination and linkages with different organisations

Coordination and linkages with various line agencies and NGOs have been quite good. Various organisations have provided different types of support to the programme and have

also helped to leverage funds and make incentives available with the line agencies into the programme. This has also motivated some line agencies to incorporate the project activities into their own programmes.

In Dhankuta and Palpa districts in Nepal, the collaborating partner NGO developed good linkages and received institutional support from different government agencies and NGOs (Box 4.8).

Box 4.8: Example of coordination and linkages with district line agencies in Palpa and Dhankuta

Palpa

- One woman from Humin VDC received training on fodder grass production from the District Livestock Office, Palpa. The District Livestock Office distributed fodder grass seed free of cost.
- The District Agricultural Office distributed different types of fruit plants and provided a subsidy (25%) for drip irrigation tanks.
- One woman from Humin received TOT training in ginger production from the Rural Economic Development Association (REDA), Palpa. After the training she transferred her acquired skills and knowledge to other members.
- The Cottage and Small Industry Office and ICIMOD supported the beekeeping training.
- One man received a 35-day village health worker (VHW) training from the District Livestock Office.
- The DDC and PDDP programme helped to solve the drinking water problem in Humin.
- Five women received a subsidy from the District Agricultural Office to initiate a bee enterprise.
- Both the DDC and the District Livestock Office signed an agreement to provide training on goat raising for 25 families in Palpa.
- Two people from the community bought drip irrigation tanks with a 25% subsidy from the District Agriculture Office.
- The District Education Office allocated seats to two participants from the Palpa project site in their TOT on informal education.
- DDC and HELVETAS provided financial support to women with low incomes from the Jalpa Devi Women's Group for the purchase of 50 goats. The District Livestock Office provided technical support.
- SIMI Nepal provided support to establish an off-season vegetable nursery in Palpa.

Dhankuta

- The District Agricultural Office provided 5 women with a 50% subsidy to purchase beehive frames and 2 swarms of bees. The total subsidy was NRs 2700. Some women also received a subsidy (25%) for the purchase of fruit plants and drip irrigation tanks.
- The District Livestock Office provided support for training in the production of fodder grass and seedlings, veterinary health, and raising goats.
- International Development Enterprise (IDE), Nepal, gave training in drip irrigation technology.
- REDA provided ginger production technology training (TOT).
- The Cottage and Small Industry Office and ICIMOD gave beekeeping training.
- UNDP/PDDP provided answers to the drinking water problem.

In Summary

The training provided during the project implementation period and the technologies disseminated responded to the needs of women in water and energy management and income generation. The adoption of technologies such as ICS and drip irrigation resulted in some reduction in the work time and effort of the women beneficiaries and led to an improvement in their health and economic condition. Before adopting ICS, women complained about the unhealthy kitchen environments and suffered from various smoke-related diseases. With the use of ICS together with better kitchen management, kitchen environments have improved considerably along with women's health; significant cooking time has been saved, and the use of fuelwood reduced. Moreover, the ICS promoters trained by the project have a new avenue of income generation in the form of ICS construction to sustain their livelihoods. The demand for ICS is increasing in rural communities, so these promoters are moving out of the project area for ICS construction.

Drip irrigation along with wastewater management has reduced the problems of fetching water for irrigation, and with the increased information on off-season vegetable farming beneficiaries have learnt about systematic and effective methods of farming and have been generating considerable amount of income from higher productivity. There have been many cases like that of Ms. Shreemaya Sunari of Palpa who was able to generate more than NRs 5000 in just six-months of cultivating vegetables after adopting drip irrigation. Similarly, the women who have initiated beekeeping enterprises and food processing with solar driers have started generating an income which is likely to increase in the future.

Chapter 5

Emerging Impacts

Introduction

This chapter looks in more detail at how the project has contributed towards achieving its desired results and what impacts have already emerged at the grassroots level, or are likely to be generated as a result of the project. An impact assessment survey was carried out focusing on three issues:

- a) assessment of the impacts of water- and energy-related technologies on energy (fuelwood) use, and time saving;
- b) perceived project impacts on skill enhancement, time and drudgery reduction, and widening women's livelihood options through skill-based, income-generating activities; and
- c) assessing the strength of local organisational capacity building of women and social capital formation as a vehicle for women's empowerment at the community level.

Impact Assessment Survey

The impact assessment survey of women beneficiaries was carried out at each project site using a set of pre-structured questionnaires developed by ICIMOD. In the absence of a scientifically-designed baseline survey, the impact survey used a historical recall memory method ('before and after' situation) to capture the emerging impacts using both quantitative and qualitative indicators. The sample survey covered all the women members of the project sites in Bhutan, and 57 and 40 women beneficiaries selected at random from the project sites in India and Nepal respectively (Table 5.1).

General socioeconomic profile

The detailed socioeconomic profile of the women sampled is shown in Table 5.2. Some 43% of the women surveyed in India were literate compared to 75% in Nepal and 11% in Bhutan. About one-third of the women members surveyed in Palpa and 10% in Dhankuta were female heads of households, but only one woman in India. In Bhutan, most women were classified as heads of household reflecting the different social system.

The largest average family size was found in HP, about 9 members compared to less than 6 at the other project sites. The average size of livestock holdings, expressed in terms of livestock standard units (LSU)¹, was highest in Bhutan (8.4) compared to about 3 in both India and Nepal; livestock holdings were also much higher in Palpa Nepal, than in Dhankuta. Agriculture was the mainstay of most women at all the project sites with the exception of HP where about 70% of women depended on non-agricultural occupations (trade and business, service, and wage labour) to sustain their livelihoods (Table 5.3).

¹ The conversion factors used to convert livestock to Livestock Standard Units (LSU) are: cattle = 0.7; buffalo = 1.0; sheep/goats = 0.2; pigs = 0.3; poultry = 0.025.

	Bhutan			India			Nepal		
	Phobjikha	Limukha	Total	U'chal ¹	HP	Total	Palpa	Dhankuta	Total
Total group members	11	7	18	64	40	84	179	112	291
Sample women (no)	11	7	18	20	20	40	29	28	57
Sample coverage (%)	100	100	100	31	50	47	16	25	20
¹ Uttaranchal									

	Phobjikha	Limukha	Bhutan	U'chal ¹	HP	India	Palpa	Dhankuta	Nepal
Sample size	N=11	N=7	N=18	N=20	N=20	N=40	N=29	N=28	N=57
Age of respondent									
Mean	33.0	33.6	33.2	37.2	42.6	39.9	29.5	33.3	31.3
SD	12.0	16.6	13.5	14.3	11.3	13	9.1	12.6	11
Household size									
Mean	5.2	4.7	5.0	4.7	9.2	7	5.7	5	5.4
SD	2.9	2.2	2.6	2.6	2.6	3.4	2.5	1.8	2.2
Female-headed household									
%	82	100	89	0	5	2	35	11	23
Literacy rate of respondents									
%	9.1	14.3	11	45	40	43	69	82	75
Size of land holding									
Mean	3.4	3.6	3.4	6.4	2.4	4.4	1	1.8	1.4
SD	2.1	2.2	2.1	4.1	3.7	4.3	1.1	1.2	1.2
Proportion irrigated									
Mean	9.0	2.3	6.4	0.2	0	0.1	18.5	24.4	21.4
SD	19.8	1.5	15.6	0.9	0	0.6	29.1	18.8	24.5
Livestock unit s (LSU)									
Mean	9.0	7.2	8.4	2.6	3.3	2.9	5.3	0.9	3.1
SD	4.0	3.7	3.9	1.9	2.1	2	3.3	1	3.3
SD = standard deviation ¹ Uttaranchal									
Source: Impact Survey 2004									

Main Source of Income	Phobjikha	Limukha	Bhutan	U'chal ¹	HP	India	Palpa	Dhankuta	Nepal
Agriculture	90.9	100	94.4	80	30	55	62	96	79
Trade & business	0	0	0	10	20	15	0	0	0
Service	0	0	0	10	20	15	7	4	5
Wage labour	9.1	0	5.6	0	30	15	3	0	2
Occupational work	0	0	0	0	0	0	17	0	9
Other	0	0	0	0	0	0	10	0	5
Source: Impact Survey 2004 ¹ Uttaranchal									

Food deficit was a recurring phenomenon for most of the women, especially in the project areas in India where no woman produced enough food to last more than six months of the year (Table 5.4). In contrast, some 10% of women in Palpa and 39 % in Dhankuta reported having surplus food for sale. About two-thirds of the women in Uttaranchal, 45% in HP, and 43% in Limukha had an annual household income of less than IRs or Bhutanese Nu 15,000. In Phobjikha and Dhankuta almost all women had more than this, in Palpa less than 20% had an annual income of less than NRs 15,000, and around one-third had less than the equivalent of IRs 15,000 (NRs 24,000).

	Food Sufficiency Months							
	< - 3 months		4-6 months		7-12 months		Surplus	
	%	N	%	N	%	N	%	N
Phobjikha	9.1	1	27.3	3	45.5	5	18.2	2
Limukha	0.0	0	28.6	2	71.4	5	0.0	0
Bhutan	5.6	1	27.8	5	55.6	10	11.1	2
Uttaranchal	55	11	45	9	0	0	0	0
HP	15	3	85	17	0	0	0	0
India	35	14	65	26	0	0	0	0
Palpa	20.7	6	51.7	15	17.2	5	10.3	3
Dhankuta	0	0	3.6	1	57.1	16	39.3	11
Nepal	10.5	6	28.1	16	36.8	21	24.6	14

Source: Impact Survey 2004

Impact on fuelwood savings

Fuelwood was the major source of energy for cooking at the project sites in HP and Uttaranchal, although a few households also used LPG and kerosene. The baseline estimate indicated that about 20% of households in Naila and 14% in Bajeena used LPG. Although 88% of the households in Nager and 71% in Kotla had LPG, biomass-based fuel still contributed to over 93% and 98%, respectively, of total energy consumption. With the gradual degradation of HP's forest resources in the vicinity of the villages, women are finding it increasingly difficult to meet their daily fuelwood requirements, and are often forced to rely on inferior fuels like shrub twigs and dung cakes.

Some energy efficient technologies (improved cooking stoves and pressure cookers) were introduced at the project sites based on the prioritised needs of women beneficiaries. This had some impact on fuelwood saving, depending on the type of technology and the duration of use (Table 5.5). Survey results on the average weekly consumption of fuelwood before and after the project indicated that net savings in fuelwood consumption at the project sites ranged from 13% in Uttaranchal, India, to 53% in Punakha, Bhutan. The average weekly consumption of fuelwood at the project sites in Bhutan was considerably higher than in other project areas even after the savings in fuelwood after the project. The per capita fuelwood consumption in Bhutan (1200 kg per year) is one of the highest, in the world perhaps because of its abundance, proximity, and the cold climatic conditions (RSPN 2004). The use of pressure cookers as the only energy-saving device led to limited gains in fuelwood savings for women in the project sites in Uttaranchal (Bajeena and Naila) compared to those in HP where women adopted multi-functional improved stoves. The impact in Palpa, Nepal, was even higher after the adoption of ICS, with a 35% reduction in fuelwood consumption.

	Before project		After project		Cases (N)	Saving in fuelwood (% decline)
	Mean	SD	Mean	SD		
Phobjikha	199	102	158	109	11	-21
Limukha	257	45	120	30	7	-53
Bhutan	222		143		18	-36
Uttaranchal	107	35	93	31	20	-13
HP	167	28	120	35	20	-28
India	137		107		40	-22
Dhankuta	145	18	114	19	28	-21
Palpa	155	110	101	72	23	-35
Nepal	150		108		51	-28

Source: Impact Survey 2004

Time saving through water and energy technologies

The baseline scenario in the project sites in India revealed an acute shortage of drinking water due to the drying up of existing natural springs, especially during the summer, forcing women to spend considerable time (three to six hours daily) and effort in collecting water. In HP, the newly-connected water tap was only able to meet a quarter of the total water requirement. In Uttaranchal (Bajeena and Naila), women in the past sometimes had to spend the whole night collecting water from 'naulas' (underground springs). This situation changed after the provision of water harvesting technologies with an average 35% saving in the time taken to collect water (Table 5.6). In India the time saving in collecting water was somewhat offset by an increase in the number of trips – with more water available, women collected much more water than before, but still in less time (Figure 5.1). There was no time saving in water collection in Nepal because there were existing sources of drinking water. However, there was a saving in time in using water after the installation of drip irrigation technology.

The women also saved time through the adoption of energy technologies at the project sites. Prior to the project, women had to make many trips to collect fuelwood from the forests to meet their daily energy needs. Following the adoption of new technologies, women reported saving about 20-30% of the total time they were taking to collect fuelwood (Table 5.6).

	Fuelwood collection time hours/month)			Water collection time (hours/day)		
	Before	After	% Saving in time	Before	After	% Saving in time
Phobjikha	60	45	-26	3.7	1.1	-70
Limukha	58	34	-41	4.5	2.5	-45
Bhutan	59	41	-30	4.3	1.6	-62
Uttaranchal	22	19	-17	3.5	2.2	-35
HP	101	82	-19	6.0	4.0	-34
India	63	51	-18	4.8	3.1	-35
Palpa	29	24	-17	0.2	0.2	0
Dhankuta	66	53	-20	2.8	2.8	0*
Nepal	50	40	-20	1.7	1.7	0

Source: Impact Survey 2004 * Respondents also reported a considerable reduction in time spent as a result of drip irrigation.



Figure 5.1: Collecting water from the recharged spring in Bajeeena, Uttarakhand

Perceived Impacts

The survey used a set of qualitative indicators to assess the impacts of pilot interventions on various aspects of the women's lives. They were asked to classify whether the existing situation for selected attributes of livelihoods had 'increased a lot', 'increased', 'remained the same', 'decreased', or 'decreased a lot' compared to before the interventions. The tables in the following sections show the judgments of the women respondents on the status of different indicators, reflecting the impacts of knowledge and skills, improved access to technologies, reduced workload and drudgery, use of saved time for productive income-generating activities, access to credit facilities, increased household income, and others. While the record across the regions varied, overall the improvements were encouraging. In most cases the majority of the women saw some improvement in the majority of indicators.

Water- and energy-related knowledge and skills enhancement

The question on knowledge and skills on water and energy related in particular to the combination of awareness and technology management skills the women acquired through different training sessions. A large majority of the women reported that their knowledge and skills on energy and water technologies had increased after the implementation of the project in their villages (Table 5.7).

Improved access to drinking water and its availability for other uses

Overall the majority of the respondents in India and Nepal, and all of those in Bhutan, experienced improved access to drinking water after the project (Table 5.8). In Palpa, there was an adequate water supply system before the project so most women reported the situation

	Increased a lot	Increased	Same	Decreased	Decreased a lot
Knowledge & skills on energy technologies					
Phobjikha	63.6	36.4	0.0	0.0	0.0
Limukha	83.3	16.7	0.0	0.0	0.0
Bhutan*	70.6	29.4	0.0	0.0	0.0
Uttaranchal	80.0	20.0	0.0	0.0	0.0
HP	35.0	45.0	20.0	0.0	0.0
India*	57.5	32.5	10.0	0.0	0.0
Palpa	25.0	40.0	35.0	0.0	0.0
Dhankuta	0.0	100.0	0.0	0.0	0.0
Nepal*	10.4	75.0	14.6	0.0	0.0
Knowledge & skills on water technologies					
Phobjikha	72.7	27.3	0.0	0.0	0.0
Limukha	66.7	33.3	0.0	0.0	0.0
Bhutan*	70.6	29.4	0.0	0.0	0.0
Uttaranchal	15.8	63.2	21.1	0.0	0.0
HP	40.0	40.0	20.0	0.0	0.0
India*	28.2	51.3	20.5	0.0	0.0
Palpa	26.3	52.6	21.1	0.0	0.0
Dhankuta	0.0	100.0	0.0	0.0	0.0
Nepal*	10.9	80.4	8.7	0.0	0.0
Source: Impact Survey 2004 * Averages weighted according to number of respondents					

to be the same as before. In India, just over one-third of the women in HP perceived no change in the drinking water situation after the project, perhaps because of the size of the water harvesting tank. In India and Palpa in Nepal, the majority of women felt the bathing water situation and water for livestock was unchanged, whereas in Bhutan most women felt it had improved. One-third of women in Bhutan and the majority in India, especially in Uttaranchal, perceived no change in availability of water for vegetable gardening, whereas the great majority in Nepal experienced some improvement. This reflects the uptake of wastewater/drip technology in Nepal.

Impact on drudgery reduction and time saving

About 95% of the women in Uttaranchal, 75% in Dhankuta and 70% at both sites in Bhutan experienced reduced drudgery through introduction of the water-related technologies (Table 5.9). Because of the existing drinking water source in Palpa, more than half of the women found no change (or worsening) in the drudgery associated with collecting water, but at both sites in Nepal there was a considerable reduction in water associated drudgery resulting from the introduction of (semi-automatic) drip irrigation (Table 5.9). Most of the women in India, and more than half in Bhutan and Nepal, experienced drudgery reduction as a result of the energy-related technologies (Table 5.9).

Use of saved time for productive activities and leisure

The introduction of better water- and energy-related technologies had a positive impact on the workload and time use of women. Almost all the women in Bhutan and nearly two-thirds to

	Increased a lot	Increased	Same	Decreased	Decreased a Lot
Supply of drinking water					
Phobjikha	100.0	0.0	0.0	0.0	0.0
Limukha	33.3	66.7	0.0	0.0	0.0
Bhutan*	76.5	23.5	0.0	0.0	0.0
Uttaranchal	0.0	80.0	20.0	0.0	0.0
HP	0.0	64.7	35.3	0.0	0.0
India*	0.0	73.0	27.0	0.0	0.0
Palpa	5.9	0.0	94.1	0.0	0.0
Dhankuta	0.0	100.0	0.0	0.0	0.0
Nepal*	2.2	62.2	35.6	0.0	0.0
Water use for livestock					
Phobjikha	27.3	45.5	27.3	0.0	0.0
Limukha	0.0	100.0	0.0	0.0	0.0
Bhutan*	17.6	64.7	17.6	0.0	0.0
Uttaranchal	0.0	0.0	100.0	0.0	0.0
HP	0.0	60.0	40.0	0.0	0.0
India*	0.0	30.0	70.0	0.0	0.0
Palpa	11.8	5.9	82.4	0.0	0.0
Dhankuta	0.0	100.0	0.0	0.0	0.0
Nepal*	4.4	64.4	31.1	0.0	0.0
Water use for productive activities (kitchen garden)					
Phobjikha	9.1	54.5	36.4	0.0	0.0
Limukha	0.0	50.0	16.7	33.3	0.0
Bhutan*	5.9	52.9	29.4	11.8	0.0
Uttaranchal	0.0	10.0	85.0	5.0	0.0
HP	5.0	55.0	35.0	5.0	0.0
India*	2.5	30.0	60.0	7.5	0.0
Palpa	25.0	55.0	20.0	0.0	0.0
Dhankuta	0.0	100.0	0.0	0.0	0.0
Nepal*	10.9	80.4	8.7	0.0	0.0
Water use for bathing					
Phobjikha	72.7	27.3	0.0	0.0	0.0
Limukha	33.3	66.7	0.0	0.0	0.0
Bhutan*	58.8	41.2	0.0	0.0	0.0
Uttaranchal	0.0	0.0	100.0	0.0	0.0
HP	10.0	45.0	45.0	0.0	0.0
India*	5.0	22.5	72.5	0.0	0.0
Palpa	6.7	0.0	93.3	0.0	0.0
Dhankuta	0.0	100.0	0.0	0.0	0.0
Nepal*	2.3	65.1	32.6	0.0	0.0
Source: Impact Survey 2004 * Averages weighted according to number of respondents					

	Increased a lot	Increased	Same	Decreased	Decreased a lot
Water-related drudgery					
Phobjikha	20.0	10.0	0.0	10.0	60.0
Limukha	0.0	16.7	16.7	66.7	0.0
Bhutan*	12.5	12.5	6.3	31.3	37.5
Uttaranchal	0.0	0.0	5.0	80.0	15.0
HP	5.0	35.0	25.0	35.0	0.0
India*	2.5	17.5	15.0	57.5	7.5
Palpa	16.7	0.0	44.4	38.9 ⁺	0.0
Dhankuta	0.0	25.0	0.0	75.0 ⁺	0.0
Nepal*	6.5	14.6	18.4	60.4	0.0
Energy-related drudgery					
Phobjikha	0.0	30.0	10.0	40.0	20.0
Limukha	0.0	33.3	16.7	50.0	0.0
Bhutan*	0.0	31.3	12.5	43.8	12.5
Uttaranchal	0	0	5	95	0
HP	5	5	10	75	5
India*	2.5	2.5	7.5	85	2.5
Palpa	5.3	10.5	15.8	36.8	31.6
Dhankuta	0	25	0	75	0
Nepal*	2.8	2	6.4	58.9	12.8
Source: Impact Survey 2004 * Average s weighted according to number of r espondents ⁺ Drudgery reduced by drip irrigation					

three-quarters overall of those in India (especially Uttaranchal) and Nepal (especially Dhankuta) used the saved time for productive income-generating activities (Table 5.10). The women's group in Dhankuta is already in the process of registering itself as cooperative based on the sizeable group savings (NRs 120,000) and their experience in micro-finance activities, which they have tapped to initiate various income-generating activities with marketing support from a local NGO. Other enabling mechanisms such as economic opportunities, skills training, and proximity to the market are equally important. Even women who did not perceive a time saving in water and fuelwood collection were involved in productive income-generating activities.

At the same time, women also appreciated the importance of leisure time for home life (rest, child care, and others). For example, prolonged sleeping time (by three hours) was one of the major impacts reported by the women's group in HP after the adoption of the rainwater harvesting tank and multifunctional ICS. With these technologies, women no longer have to wake up early in the morning and work until late in the evening.

Perceived impacts on health

Almost all the women in Nepal, and half in HP, India, felt that the level of indoor pollution had been reduced – mainly as a result of the use of ICS (Table 5.11). In Bhutan and Uttaranchal, India, little or no change was perceived – reflecting the much lower rate of adoption of ICS. In Bhutan, use of LPG was just starting at the time of the survey and was generally restricted to special cooking and not used for space heating.

	Increased a lot	Increased	Same	Decreased	Decreased a lot
Phobjikha	27.3	72.7	0.0	0.0	0.0
Limukha	0.0	80.0	0.0	20.0	0.0
Bhutan*	18.8	75.0	0.0	6.3	0.0
Uttaranchal	5.3	78.9	15.8	0.0	0.0
HP	0.0	36.8	63.2	0.0	0.0
India*	2.6	57.9	39.5	0.0	0.0
Palpa	7.7	23.1	69.2	0.0	0.0
Dhankuta	0.0	96.4	0.0	3.6	0.0
Nepal*	2.4	73.2	22.0	2.4	0.0

Source: Impact Survey 2004 * Average s weighted according to number of respondents

Furthermore, 90% of women in Dhankuta, 60% in Palpa and Uttaranchal, and 45% in HP felt that the frequency of illness due to smoke had decreased. All the women in Bhutan and Dhankuta, and around half of those in Palpa and India considered that the level of hygiene and sanitation in the kitchen had improved after the adoption of the new technologies (Table 5.11). Improvement resulted from the adoption of toilets as well as an improved kitchen environment, e.g., through the use of kitchen racks.

Perceived adequacy of support from the project

The great majority of women at all sites felt that the level of support from the project was adequate or more than adequate in all areas — meeting water and energy needs, skills development, and access to loans for income-generating activities (Table 5.12). In India, and especially Uttaranchal, the women were somewhat less satisfied with the level of support in meeting energy needs than in Bhutan and Nepal, and in Nepal, especially Palpa, they were less satisfied with the support to meet water needs. In Dhankuta they were less satisfied with support for skills development and access to loans, reflecting the higher expectations arising from their decision to form a women's cooperative to run micro-enterprises.

Perceived impact on access to credit, skills training, and income-generating opportunities

For most women surveyed, the main reasons for joining the group were the desire to meet their water and energy needs and the expectation that they would learn new skills that would enable them to take up income-earning opportunities. For the great majority, these expectations were fulfilled (Table 5.13).

In Nepal and Uttaranchal, the majority of women considered that their access to credit had increased. In HP slightly less than half experienced this improvement, and in Bhutan only a quarter. The credit scheme was only just coming into operation in Bhutan at the end of the project period when the survey was conducted. The overwhelming majority of women at all sites considered they had had improved access to training in employable skills. Most of them had been able to use their skills for income-generating activities, although fewer in India than in Nepal or Bhutan. Women have thus been able to increase their incomes. Between a half and three quarters of women at all sites, and nearly all in Dhankuta, reported that their farm production had increased after the adoption of the new farming technologies such as organic composting, vermicomposting, and drip irrigation.

	Increased a Lot	Increased	Same as Before	Decreased	Decreased a Lot
Indoor pollution due to smoke					
Phobjikha	0.0	0.0	90.9	0.0	9.1
Limukha	0.0	0.0	66.7	33.3	0.0
Bhutan*	0.0	0.0	82.4	11.8	5.8
Uttaranchal	0.0	0.0	78.9	21.1	0.0
HP	0.0	0.0	45.0	50.0	5.0
India*	0.0	0.0	61.5	36.1	2.4
Palpa	0.0	0.0	10.0	15.0	75.0
Dhankuta	0.0	3.6	0.0	96.4	0.0
Nepal*	0.0	2.1	4.2	62.5	31.3
Frequency of sickness due to smoke related diseases					
Phobjikha	0.0	0.0	90.9	9.1	0.0
Limukha	0.0	16.7	50.0	33.3	0.0
Bhutan*	0.0	5.9	76.5	17.6	0.0
Uttaranchal	0.0	0.0	35.0	65.0	0.0
HP	0.0	5.0	50.0	40.0	5.0
India*	0.0	12.5	42.5	52.5	2.5
Palpa	30.0	0.0	10.0	20.0	40.0
Dhankuta	0.0	7.1	0.0	92.9	0.0
Nepal*	12.5	4.2	4.2	62.5	16.7
Improved levels of hygiene & sanitation					
Phobjikha	60.0	40.0	0.0	0.0	0.0
Limukha	83.3	16.7	0.0	0.0	0.0
Bhutan*	68.8	31.3	0.0	0.0	0.0
Uttaranchal	0.0	60.0	35.0	5.0	0.0
HP	0.0	44.4	55.6	0.0	0.0
India*	0.0	52.6	44.7	2.6	0.0
Palpa	27.8	55.6	16.7	0.0	0.0
Dhankuta	0.0	100	0.0	0.0	0.0
Nepal*	11.1	82.2	6.7	0.0	0.0
Source: Impact Survey 2004 * Average s weighted according to number of respondents					

	Not Adequate	Less Adequate	Adequate	More adequate	Highly Adequate
Meeting energy needs					
Phobjikha	0.0	0.0	0.0	50.0	50.0
Limukha	0.0	0.0	0.0	66.7	33.3
Bhutan*	0.0	0.0	0.0	60.0	40.0
Uttaranchal	0.0	15.0	40.0	45.0	0.0
HP	0.0	6.7	26.7	53.3	13.3
India*	0.0	11.4	34.3	48.6	5.7
Palpa	5.0	5.0	30.0	45.0	15.0
Dhankuta	0.0	3.6	10.7	53.6	32.1
Nepal*	2.1	4.2	18.8	50.0	25.0
Meeting water needs					
Phobjikha	0.0	0.0	0.0	0.0	100.0
Limukha	0.0	0.0	0.0	0.0	100.0
Bhutan*	0.0	0.0	0.0	22.2	77.8
Uttaranchal	0.0	0.0	25.0	25.0	50.0
HP	0.0	0.0	26.7	46.7	26.7
India*	0.0	0.0	25.7	34.3	40.0
Palpa	5.0	20.0	30.0	35.0	10.0
Dhankuta	7.4	3.7	29.6	11.1	48.1
Nepal*	6.4	10.6	29.8	21.3	31.9
Skills development					
Phobjikha	0.0	0.0	0.0	33.3	66.7
Limukha	0.0	0.0	0.0	66.7	33.3
Bhutan*	0.0	0.0	0.0	72.7	27.3
Uttaranchal	0.0	0.0	26.3	63.2	10.5
HP	0.0	0.0	57.1	28.6	14.3
India*	0.0	0.0	39.4	48.5	12.1
Palpa	4.8	14.3	28.6	23.8	28.6
Dhankuta	0.0	28.0	24.0	28.0	20.0
Nepal*	2.2	21.7	26.1	26.1	23.9
Loan for income -generating activities					
Phobjikha	0.0	0.	50.0	50.0	0.0
Limukha	0.0	0.0	0.0	100.0	0.0
Bhutan*	0.0	0.0	25.0	62.5	12.5
Uttaranchal	0.0	0.0	40.0	60.0	0.0
HP	0.0	7.1	21.4	50.0	21.4
India*	0.0	2.9	32.4	55.9	8.8
Palpa	10.5	5.3	31.6	26.3	26.3
Dhankuta	9.5	33.3	33.3	19.0	4.8
Nepal*	10.0	20.0	32.5	22.5	15.0
Source: Impact Survey 2004 * Average s weighted according to number of respondents					

	Increased a lot	Increased	Same	Decreased	Decreased a lot
Access to credit facilities					
Phobjikha	0.0	27.3	72.7	0.0	0.0
Limukha	0.0	16.7	66.7	16.7	0.0
Bhutan*	0.0	23.5	70.6	5.9	0.0
Uttaranchal	45	55	0	0	0
HP	0	45	55	0	0
India*	22.5	50	27.5	0	0
Palpa	42.1	47.4	10.5	0	0
Dhankuta	0	100	0	0	0
Nepal*	17	78.7	4.3	0	0
Access to employable skills training for income -generating activities					
Phobjikha	20.0	80.0	0.0	0.0	0.0
Limukha	16.7	66.7	16.7	0.0	0.0
Bhutan*	18.8	75.0	6.3	0.0	0.0
Uttaranchal	15	65	20	0	0
HP	15	55	30	0	0
India*	15	60	25	0	0
Palpa	61.1	33.3	5.6	0	0
Dhankuta	21.4	78.6	0	0	0
Nepal*	37	60.9	2.2	0	0
Access to income generating opportunities					
Phobjikha	0.0	100.0	0.0	0.0	0.0
Limukha	0.0	83.3	16.7	0.0	0.0
Bhutan*	0.0	94.1	5.9	0.0	0.0
Uttaranchal	20	60	20	0	0
HP	5	65	30	0	0
India*	12.5	62.5	25	0	0
Palpa	35	60	5	0	0
Dhankuta	0	100	0	0	0
Nepal*	14.6	83.3	2.1	0	0
Farm production					
Phobjikha	9.1	45.5	45.5	0.0	0.0
Limukha	0.0	66.7	33.3	0.0	0.0
Bhutan*	5.9	52.9	41.2	0.0	0.0
Uttaranchal	20	55	25	0	0
HP	5.3	63.2	31.6	0	0
India*	12.8	59	28.2	0	0
Palpa	33.3	13.3	53.3	0	0
Dhankuta	0	96.4	0	3.6	0
Nepal*	11.6	67.4	18.6	2.3	0
Source: Impact Survey 2004 * Average s weighted according to number of respondents					

Assessing the Organisational Capacity Building of Women and Empowerment

The project strongly emphasised empowerment of the women involved. Great importance was attached to social mobilisation as a mechanism for organisational capacity building, a dynamic process by which women living in a community are organised into groups to share and discuss problems, to seek solutions by mobilising their own and outside resources, and to become more active participants in the decision-making processes that affect their lives as individuals, households and members of the community. The objective is to create self-governing/empowering community organisations which take responsibility for, and gain control over, the decision-making process in community-level activities. This is achieved through ensuring ownership (or genuine participation), sharing benefits equitably, and transparency in decision making, accountability, productivity, and sustainability. An attempt is made in the following to assess these through a set of indicators that reflect the various dimensions of women's organisational capacity building at the grassroots level, based on the information obtained from the sample survey.

Community empowerment takes place when individual human capabilities (interpersonal or psychological empowerment) are blended with social capabilities (organisational empowerment) through awareness building and training. This allows individuals and groups to organise and mobilise themselves towards a commonly defined goal or towards solving collective problems. Organisational factors influencing community empowerment include such things as participation, leadership, interdependence (bonding, social capital), and programme management. Women's empowerment encompasses some unique additional elements as women not only comprise a crosscutting category of individuals that overlaps with disempowered subsets of society (the poor, ethnic minorities, and so on), they also face household and interfamilial relations as a source of their disempowerment in a way that is not true for other disadvantaged groups.

Social capital formation at the local level is the basic building block for ensuring the sustainability of all other forms of capital – human, physical, financial, and natural – and better development outcomes. Social capital is an accumulation of various types of social, psychological, cultural, cognitive, institutional, and related assets that increase mutually beneficial cooperative behaviour, a behaviour that is productive for others as well as for one's self. Experience suggests that local-level institutions with high social capital are in general relatively more successful than others. The core issue in this context is how to measure social capital. Keeping in view the major area of concern of the project in the promotion of women's groups together with the underlying principle of participatory/self-governing institutional development, the following major dimensions of organisational capacity (DOC) building were identified for assessing the building of women's organisational capacity. (See UNDP, 2004 for a conceptual and empirical exposition of the application of measuring social capital.)

- Decision-making process
- Degree of participation
- Programme knowledge /transparency
- Leadership
- Accountability
- Coordination and interdependencies
- Trust and solidarity
- Conflict management capacity

Box 5.1 shows the rationale behind these DOCs. Several qualitative indicators were used to assess the perceptive judgment of women respondents on DOC. The indicators were measured using a standard scoring method rated on a five-point ordinal scale between the most desirable (5 points) and least desirable (1 point) outcome. The average index for each indicator was then derived by dividing the total score by the total sample cases. The total score is simply the actual response count of an indicator multiplied by its respective predefined value (1 to 5). Composite indices for different dimensions are then derived by taking the average of the respective individual indices. Likewise, the overall index of institutional capacity building was computed by taking the simple average of the composite index of each dimension. Such an aggregated composite index of each organisation can be further classified into five major groups indicating the state of the organisation using the following rating scale.

State of local organisation	Score
Self -sustaining	4.51 and above
Well-functioning	3.51 to 4.5
Satisfactory	2.51 to 3.5
Fair but unstable	1.51 to 2.5
Not functioning	Below 1.5

Status of organisational capacity building

The relative positions of different dimensions of organisational capacity building and underlying indicators across the project sites in Bhutan, India, and Nepal are shown in Table 5.14 and summarised in Figure 5.2. The overall index of organisational capacity building ranged from 3.35 in HP to 3.95 in Palpa (maximum value 5). Taking all groups together in each country, the average score for organisational capacity building was 3.92 in Nepal, slightly higher than in Bhutan (3.67) and India (3.53). In India, the average DOC score lay between 3.09 (capacity for conflict management) and 3.88 (decision-making process), while in Nepal it ranged from 3.71 (capacity for conflict management) to as high as 4.14 (trust and solidarity). In Bhutan the average score ranged from 2.96 (linkage and coordination) to 4.7 (decision-making process) (Figure 5.3). The relatively higher value of Uttaraanchal compared to HP is due to its higher position in all dimensions of organisational capacity building except for organisational linkages and capacity for conflict management (Figure 5.4). Likewise, women's organisational capacity building in Palpa surpassed that in Dhankuta mainly due to their higher position in five dimensions (decision-making process, degree of participation, accountability, leadership quality and capacity for conflict management) (Figure 5.5).

In aggregate, the relative position of organisational capacity building in Nepal was found to be slightly stronger than that of Bhutan and India in terms of almost all dimensions except decision-making criteria, which scored similarly in all cases (Table 5.14). The difference in the relative status of different dimensions of organisational capacity building between the project sites in Bhutan, India, and Nepal can be better judged from the spider-web diagram (Figure 5.2).

Overall, the average score for the decision-making process, participation, leadership, and trust and solidarity among group members was rated as quite high (about 4 out of a maximum 5). The perceived level of partnership/alliances with other organisations and capacity for conflict management including transparency and accountability were weaker.

Box 5.1: Dimensions of institutional capacity building and underlying indicators

Decision-making process: Proper understanding of how group decisions are made in the formulation of rules and regulations, programme selection, and programme implementation becomes important for the sustainability of the grassroots institution. If decisions are not made with the full participation and consensus of group members, other crucial attributes of institutional capacity building are unlikely to emerge and be sustained. The group's decision-making process is assessed by specifying a number of criteria: consensus, persuading members to reach consensus, majority rule, and imposition by the outsiders/project.

Degree of participation: The types of indicators designed to monitor the degree of participation are influenced by organisational growth, group behaviour, and group self-reliance. In the present study, the participation of group members was assessed in terms of their degree of participation in the planning, implementation, and maintenance of the pilot projects, including their participation in making rules and regulations.

Knowledge and transparency: Transparency in project information and the decision-making process means that decisions have to be made so they are easily understood by all participants, who should be fully aware of and responsible for the outcome of their decisions. Transparency in the decision-making process is measured by assessing the group members' degree of knowledge and information about project objectives, about group rules and regulations, about the revolving fund, and about group savings and investment.

Accountability: Related to transparency is the degree of two-way accountability of the group to its members and vice-versa. Three indicators included to capture this critical element of group empowerment include the accountability of women members for group decisions, the group's accountability to its members, and NGO/social mobilisers' accountability to the group members.

Leadership quality: The success or failure of grassroots organisations, as long-enduring participatory institutions, depends among other things upon how honest, devoted, responsible, and efficient (skillful) the leaders are in managing group activities in a sustained way. The most effective and sustainable leadership is the one that follows the decisions and desires of the community as a whole, playing an enabling and facilitating role.

Organisational linkages and coordination: The sustainability and capacity for the organisation's self-help can also be judged by the extent to which the local organisation has established its networking and partnership/alliances with other organisations, both vertically and horizontally. A sound rapport established by the group with other entities such as village organisations, district line agencies, financial institutions, and other village-level government and NGO-sponsored groups for support will result in the multiple benefits of sharing experiences, knowledge/information, and resources.

Trust and solidarity: Mutual trust and cooperation among members of communities is a significant factor in explaining institutional performance. The features of social organisation that enhance trust and cooperation increase community well-being by making institutions more democratic and efficient in delivering public goods and services. The degree to which members of the community trust each other has been measured by three sets of indicators, namely trust and solidarity among group members, trust/unity between group and non-group members, and levels of self confidence.

Conflict management capacity: At the micro-level, unmanaged conflict is a threat to the survival of the group and, at the least, tends to make the group less effective. Conflict can occur within groups (intra-group conflict) or among groups (inter-group conflict), and arises from differences in values, beliefs, and attitudes regarding different issues (inclusion/participation, control over resources and benefit sharing etc). Group members' perception of the degree of conflict management both within and between groups has been assessed, along with the groups' ability to claim government services and to work with other groups for mutual benefit.

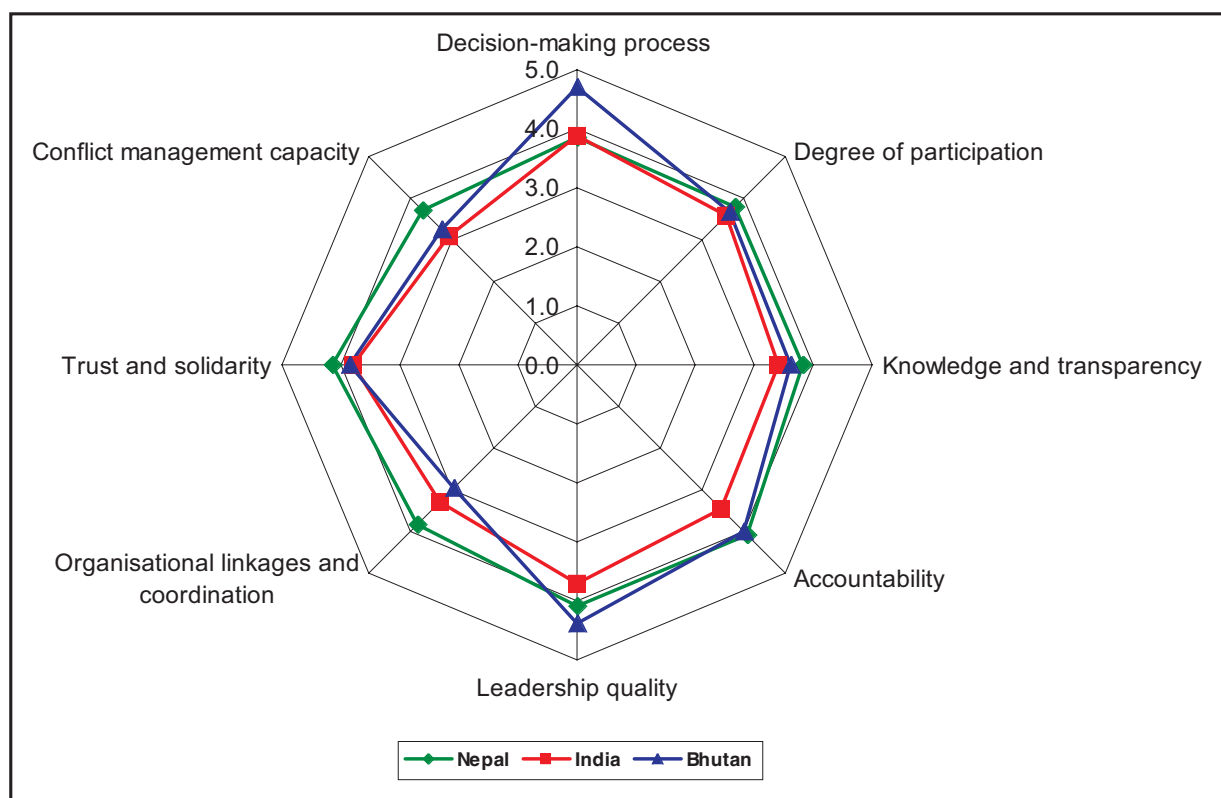


Figure 5.2: Status of women's organisational capacity at project sites in Bhutan, India, and Nepal

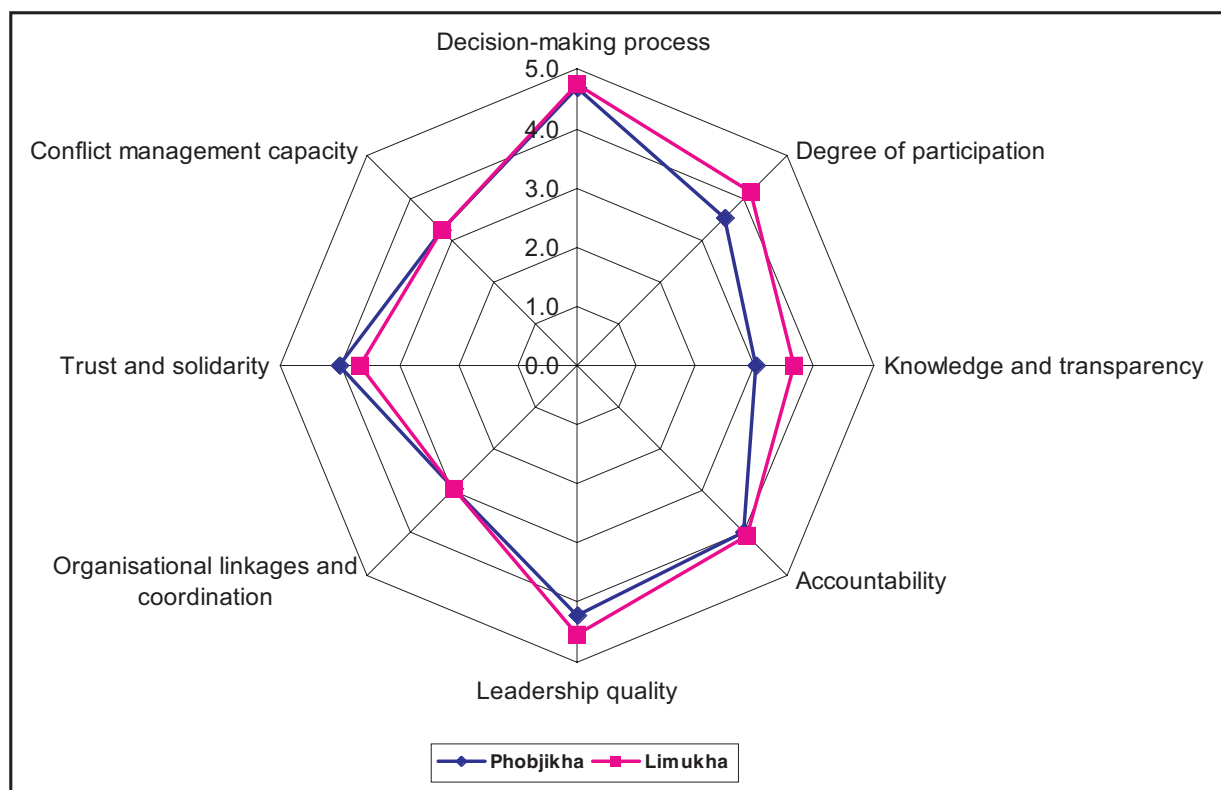


Figure 5.3: Status of women's organisational capacity in Bhutan: Phobjikha versus Limukha

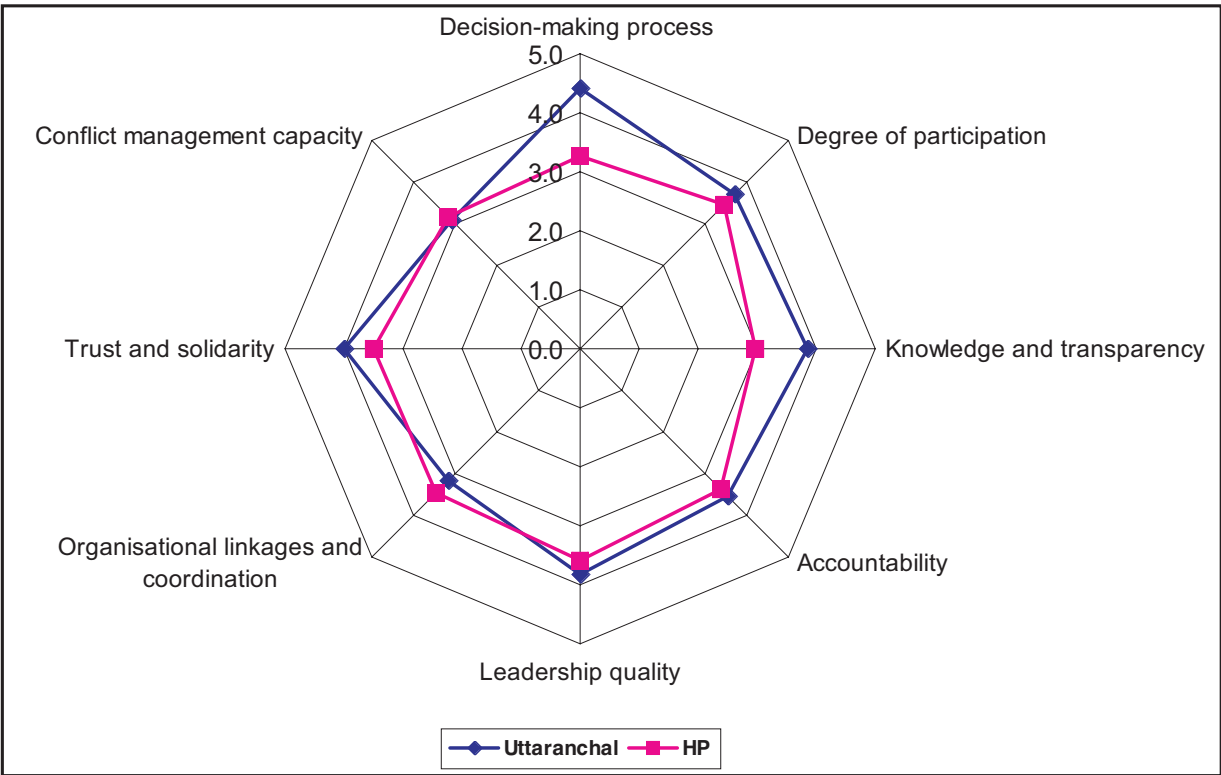


Figure 5.4: Status of women’s organisational capacity in India: Uttarakhand versus HP

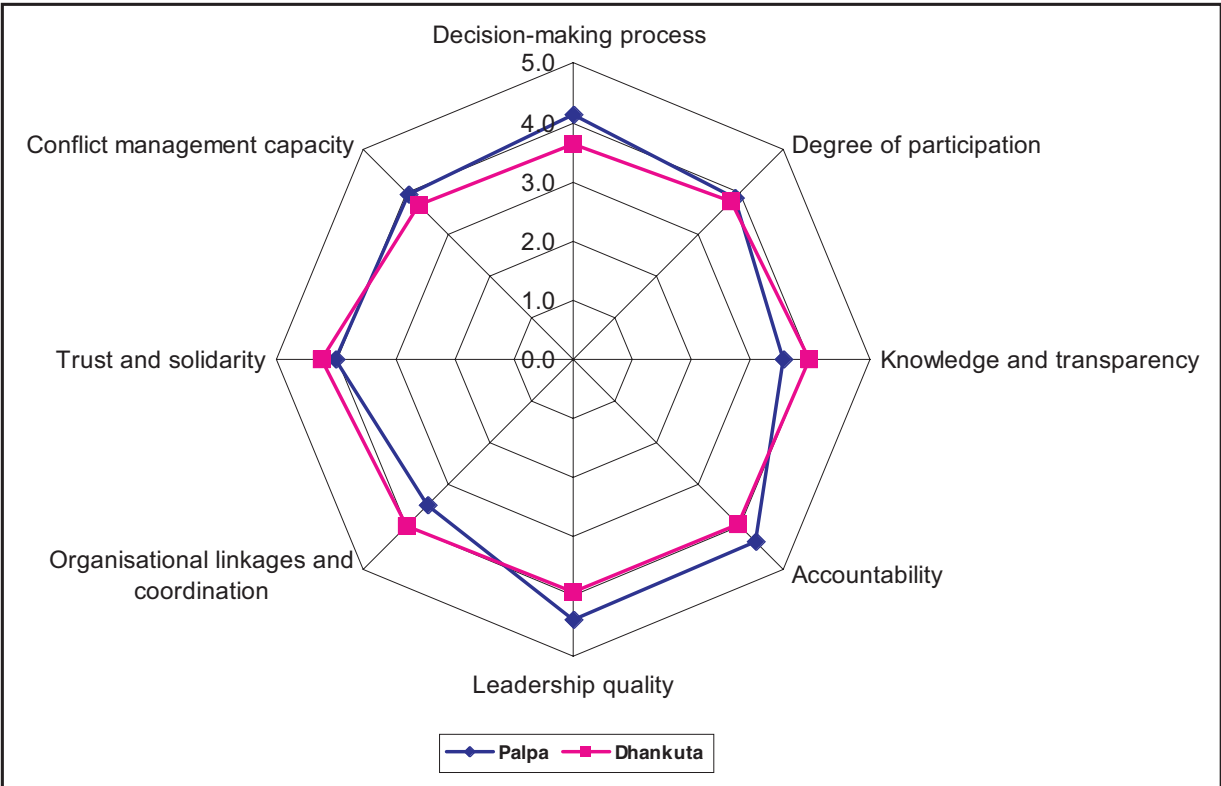


Figure 5.5: Status of women’s organisational capacity in Nepal: Palpa versus Dhankuta

	Phobjikha	Limukha	Bhutan	U'chal*	HP	India	Palpa	Dhankuta	Nepal
Decision-making process	4.69	4.73	4.70	4.40	3.27	3.88	4.11	3.63	3.85
Committee formation	5.00	4.43	4.78	4.45	4.41	4.43	3.81	5.00	4.43
Making rules & regulations	4.55	4.71	4.61	4.50	3.65	4.11	4.46	5.00	4.74
Selecting programme/technology	4.64	4.83	4.71	4.25	2.71	3.54	4.12	2.86	3.45
Preparing action plan	4.73	4.67	4.71	4.45	2.82	3.70	4.08	3.21	3.63
Project implementation	4.55	5.00	4.71	4.35	2.78	3.61	4.08	2.07	3.02
Degree of participation	3.50	4.14	3.64	3.72	3.43	3.59	3.87	3.75	3.79
Making rules	4.00	4.43	4.17	4.10	4.41	4.24	4.35	4.04	4.16
Needs identification	3.50	4.25	3.75	3.80	3.47	3.65	4.06	4.00	4.02
Action plan for pilot programme	3.22	4.00	3.30	3.65	2.81	3.28	3.80	4.00	3.93
Implementation of the pilot programme	3.44	4.00	3.58	3.65	3.29	3.49	3.80	4.00	3.93
Monitoring the programme	3.33	4.00	3.40	3.40	3.18	3.30	3.33	2.70	2.93
Knowledge & transparency	3.01	3.67	3.63	3.84	2.96	3.41	3.53	3.96	3.81
Project goal/objective	1.00	4.00	3.63	3.85	2.79	3.33	3.20	3.96	3.70
Saving & investment	3.91	4.00	3.94	3.47	2.74	3.11	3.87	3.96	3.93
Revolving fund	3.73	3.50	3.65	4.21	3.05	3.63	3.07	3.96	3.65
Rules & regulations	3.40	3.17	3.31	3.84	3.26	3.55	4.00	3.96	3.98
Accountability	3.97	4.06	4.00	3.53	3.37	3.45	4.36	3.93	4.08
Accountability to group decision	3.91	4.00	3.94	3.53	3.53	3.53	4.13	3.93	4.00
Group accountable to members	3.91	4.17	4.00	3.42	3.05	3.24	4.33	3.93	4.07
Accountability of NGO social mobiliser	4.09	4.00	4.06	3.63	3.53	3.58	4.60	3.93	4.16
Leadership quality	4.20	4.54	4.39	3.81	3.59	3.72	4.38	3.91	4.10
Leaders honesty/sincerity	4.10	4.25	4.17	4.00	4.06	4.03	4.47	4.00	4.20
Dedication	4.30	4.70	4.50	3.79	3.00	3.45	4.37	3.07	3.60
Responsible/accountable	4.40	4.73	4.57	3.79	3.56	3.69	4.42	4.57	4.51
Skill & capacity	4.00	4.50	4.33	3.67	3.75	3.71	4.26	4.00	4.11
Linkage and coordination	2.97	2.93	2.96	3.15	3.47	3.31	3.47	3.99	3.83
With other group/SHGs	3.00	2.40	2.80	3.85	3.84	3.85	3.58	3.96	3.85
With district level line agencies	3.10	3.00	3.07	3.20	3.21	3.21	3.50	4.00	3.85
With financial institutions	2.80	3.40	3.00	2.40	3.37	2.87	3.33	4.00	3.80
Trust & solidarity	4.00	3.67	3.86	4.00	3.51	3.79	4.00	4.23	4.14
Trust & solidarity among group members	4.20	4.00	4.12	4.11	4.07	4.09	4.24	4.71	4.51
Trust/unity between group & non-group members	3.50	3.14	3.35	3.74	3.14	3.48	3.57	3.96	3.83
Level of self confidence	4.30	3.86	4.12	4.16	3.33	3.79	4.19	4.00	4.08
Strength for conflict mgnt.	3.25	3.21	3.23	3.07	3.14	3.09	3.90	3.69	3.71
Strength to claim gov. services	3.00	3.00	3.00	2.26	3.08	2.59	3.75	3.67	3.68
Working with other groups for mutual benefit	3.00	3.00	3.00	2.89	3.00	2.94	3.29	3.67	3.59
Conflict mgnt. within group	4.00	3.83	3.94	3.79	3.31	3.57	4.08	3.71	3.83
Conflict mgnt. between groups	3.00	3.00	3.00	3.32	3.19	3.26	4.50	3.70	3.76
Overall index	3.56	3.74	3.67	3.69	3.35	3.53	3.95	3.89	3.92
Source: Impact Survey 2004 * Uttarakhand									

The measures of organisational capacity building of women have important policy implications for building the social skills of external agencies approaching local communities to facilitate social capital formation and organisational empowerment. Such social skills include ways of approaching local communities, methods for facilitating group formation/institution building, skills for fostering group participation (especially women's groups), conducting participatory planning, supporting networks/linkages, and identifying ways of sustaining the participation of women and other marginalised sections of society. The values needed by external agencies are transparency and honesty of purpose; respect for existing knowledge, experience, and views of local women and men; and listening to the poor as a process of learning-by-doing. No 'blueprint' is available for the formation and enrichment of social capital as a basic ingredient for building this critical pillar of empowerment at the community level.

A few examples of the progress achieved in capacity building and empowerment among women are worth re-emphasising. Social empowerment has increased among women in the project areas and they now feel more confident. Their access to credit (for small amounts) has also improved. Besides their strong desire to meet their immediate subsistence needs for water and energy, regular saving and emergency borrowing facilities are another important reason why women have been attracted to the project. Control over the income that they earn is an important indicator of economic empowerment. The majority of women who are generating an income have the freedom to utilise the income they earn, which has also enhanced their economic empowerment.

Self-confidence relating both to women's perception of their capabilities and their actual level of skills and capabilities has contributed to their empowerment. Most women members during the interview stated that their self-confidence had improved after receiving training and forming their own organisation (which provided them with a platform to come together, discuss their problems, nurture social capital, build awareness, address their water and energy problems, and initiate productive activities). With a small amount of savings and a modest scale of investments, the women are generating income through various income-generating activities. Many benefits in terms of health as well as other aspects of social awareness have emerged with spill-over benefits to neighbouring communities. Their husbands, families, neighbours, and communities regard these women as more knowledgeable after the project than before. A process of empowerment has slowly emerged among the women's groups, demonstrating that women can become effective agents of change if they have the opportunity to manage their own lives.

Contribution Towards the Achievement of Intended Results

The project sought to address five key results through a number of interventions (see Annex 1 for details).

- 1) Improved self-sufficiency in energy and water needs
- 2) Enhanced integration of women in the decision-making process in the management and use of water- and energy-related technologies at the household level
- 3) Enhanced capability of women to adopt, implement, and manage clean and renewable energy and water technologies
- 4) Enhanced integration of women in the management of household water and energy resources through the establishment of gender-sensitive and pro-environmental policy

guidelines for designing future programmes for implementation by line agencies and other development organisations

- 5) A reduction in health-related hazards from access to less polluting water and energy technologies.

Various focused training programmes and awareness raising through information sharing (exposure visits) between participating communities, and the organisational capacity building of these women's groups in each of the three countries have contributed towards the achievement of the results. The individual results are described in more detail below.

Improved self-sufficiency in energy and water needs

The contributions of the project in helping meet water and energy needs have been positive according to the majority of the women at the project sites in India and Nepal. In Bhutan, the establishment of the LPG depot together with the construction of a drinking water supply scheme at the Phobjikha site and the solar drier production venture at the Limukha sites have contributed towards meeting the water and energy needs of women in these areas.

Even where the overall quantity of water consumed may not have increased, as in the case of Naila (HP) which has severe water scarcity, the drudgery involved in obtaining water has been significantly reduced, as women do not have to wake up early in the morning to line up to their get water quota. In Bhutan women now have access to both improved quality and quantity of water. In Nepal women have been able to manage the available water better enabling them to use some water to irrigate their fields for vegetable farming. There is little doubt that self-sufficiency in water has improved. The same can be said about energy, judging from the fact that a large number of women have adopted ICS and other fuel saving devices in Nepal and India and in Bhutan have established an LPG depot and solar dryer. These have helped reduce workloads, drudgery, and indoor air pollution.

Enhanced integration of women in decision-making

The formation of women's groups at each project site and the building of their organisational capacity through various gender sensitisation and orientation training and awareness-raising activities has created a forum for women to come together, nurture social capital, build awareness, address their water and energy problems, resolve disputes, and initiate productive and community development activities enthusiastically (Figure 5.6). This forum has been able to trigger a process of community consciousness at various levels, resulting in the integration of women's roles in decision making and a gain in the momentum of women's empowerment.

Recognition of the roles and needs of women in the decision-making process at the household and community levels is slowly emerging at the project sites. There is a growing sense of self-confidence among women about their ability to manage their water and energy technologies. They have begun to share their knowledge within their homes and with community members. The gender sensitisation training and consultation with the community prior to the implementation of the project together with the benefits generated from the adoption of the technologies has been instrumental in influencing men in the family/community to share the decision-making role with women regarding the purchase of technology, its installation, and the sale of skill-based products from income-generating activities. Faster cooking, less pollution in the kitchen, and in some cases (for example, the Kotla site in HP) the availability



Figure 5.6: Meeting of a women's group in Bhutan

of hot water through multifunctional ICS, as well as an improved supply of vegetables have also benefited men and the welfare of families as a whole. For instance, it was only after there was an assured supply of hot water in the bathroom that the women in HP were able to convince their husbands about the benefit of the proposed technologies, making their voices heard at the household level. Likewise, the demonstration of recharging water springs through micro-reservoirs and plantation activities (in Bajeena, Uttaranchal); establishing technology demonstration model villages (in Palpa and Dhankuta); and an LPG depot (in Phobjikha, Bhutan) have slowly started to gain the attention of local and district planners towards the integration of women's role and concerns in the decision-making process.

To sum up, the project has helped to achieve these changes through the creation of separate women's groups, freeing women from time-consuming drudgery, opening their minds to new technological possibilities, supporting this by creating enabling mechanisms for them to best utilise the freed time, and demonstrating good practices at the community and district level.

Enhanced capability of women to adopt, implement and manage technologies

The training, the creation of the savings and credit groups, the revolving fund, and various awareness-raising activities were instrumental in enhancing both the individual and collective capability of women in the adoption and management of renewable energy and water technologies in the three countries. The training of trainers has been effective in transferring skills to more women. The preparation of manuals for trainees in national languages has helped to further strengthen their skills and knowledge about the use and management of the adopted technologies. Other specialised skills and managerial training provided by the project partners have also been critical in enhancing the capacities of the women.

Women are slowly emerging as successful energy entrepreneurs. Some ICS (women) promoters in Nepal are able to sell more stoves to other women both within and outside the project areas, as their access to potential female clients is not hindered by social constraints. They are selling their stove construction services and making an income. Women in Bhutan are also emerging as energy entrepreneurs with the establishment of solar drier production ventures and the LGP depot. In one project site in India, the women's group demonstrated its ability to find a more permanent solution to the water scarcity problem through an innovative water recharging method.

The establishment of the TDVs initiated and successfully managed by women's groups in Nepal is another innovative example of enhanced capacity building of women. Women operate and manage the TDVs in order to speed up the transfer of field-tested technologies that are operating in their member's homes to other areas. Many women from neighbouring districts have already visited the TDVs to learn about the technologies.

With respect to collective capabilities (organisational empowerment), the assessment of organisational capacity building of women at the project sites indicates that the women's organisations are functioning well and are in the process of becoming self-sustaining. All these illustrate the increased self-esteem and confidence of women who are slowly emerging as potential change agents in society.

Enhanced integration of women through gender-sensitive and pro-environmental policy guidelines and institutional frameworks

Based on the impacts and lessons learned from the project experiences in each country, gender-sensitive policy guidelines have been prepared to enhance the integration of women in the management of household water and energy. The policy guidelines have been prepared based on the inputs provided by the national partners in consultation with the steering committees formed in each country. During this process, existing national policies and programmes on women and energy in each country were reviewed and the gaps identified. The key findings emerging from each country were further discussed during a Second Regional Stakeholder Workshop held in Kathmandu (November 2004), which helped chart out the policy framework. The guidelines and training manuals that have been prepared through extensive consultation are expected to serve as policy advocacy tools for better design of future programmes for implementation by line agencies and other development organisations. The internalisation of these strategies and guidelines into a policy programme and action continuum is expected to enhance the integration of women in water and energy management practices.

Reduction of health-related hazards from access to energy technologies and less polluting water

The nature and type of water- and energy-related technologies installed by the women in the project areas are not only based on the actual needs of the women but are also pro-environment and less polluting compared to their predecessors. For example, the ICS is far less smoky than the traditional stoves. With less smoke in the kitchen women have indicated less eye sores, less coughing, and have also indicated that they are able to monitor/teach their children in the kitchen while cooking. Some women indicated that their children were

performing better in school due to their coaching, which was not possible in the past in a smoky kitchen. In Bhutan, women indicated that better water quality has meant a reduced occurrence of water-related diseases. Other factors that have contributed to better health and hygiene relate to an assured supply of water and an improvement in the quality of water (India and Bhutan). Women are better able to plan activities such as washing clothes and bathing their children. Regular washing of clothes and bathing have been made possible through increased or assured supply of water in Bhutan and Indian. In Nepal a sanitation campaign was able to promote the installation of toilets by many households.

Contribution to the advancement of women as envisioned by UNEP's commitment to related provisions of Agenda 21, Chapter 24

Gender mainstreaming of all development work towards sustainable development is possible only if the needs and roles of women in water and energy management are incorporated in development activities in the first place. It is in this context that the contribution of the project to the advancement of women with regard to their participation in ecosystem management and the control of environmental degradation as envisioned by UNEP's commitment to the related provisions of Agenda 21, Chapter 24 needs to be assessed. Taking an intermediate position on two differing gender approaches – efficiency and equity – this project sought to address how the equity approach can build on the successes of the efficiency approach where the implementing agency is really aiming at longer-term empowerment. Recognising that the project to assist women may fail unless men's needs and reservations are also taken into account and dealt with, the project is based on the underlying principle that women are not just different from men in their gender roles, but that they are in a weaker position socially and economically. Women-only projects focusing on women's water and energy needs as an entry point of intervention is thus deemed important to confront their immediate needs, and thus enable women to meet their strategic needs through the empowerment approach until a certain stage or threshold is reached. Beyond this a more holistic gender approach is necessary to sustain the process. As women become more involved, they may become more articulate and experienced: gender sensitive project planning may lead to a greater level of emancipation for women in a more natural way.

The gender-sensitive activities undertaken by the project to empower the women both socially and economically related to the following:

- the primary focus of the project was on women and including their decision making in project planning, designing and implementation;
- the formation of women's groups at each project site;
- the strengthening of women's organisational capacity building through various orientation, training, and awareness-raising activities;
- helping women undertake income-generating activities.

Even in a short period, the project was able to create an institutional space for rural women on which many other programme activities could be uploaded through both horizontal and vertical initiatives. While progress in these aspects varies across the countries involved, the process has started to gain momentum in empowering women.

Linking Project Impacts to the Millennium Development Goals

The project interventions can contribute to meeting a number of the MDG targets at the local level. Although the MDGs have no specific target on energy and only Goals 7 and 4 focus respectively on water and women, not all MDGs can be achieved without focusing on women, water, and energy. Water and energy are two of the most essential resources for human survival and well-being. Women are the primary collectors, users, and managers of water and energy at the household level. Focusing on women's role in and need for these two basic resources can therefore make a significant difference in meeting the MDGs. Box 5.2 provides details of how the impacts of the projects at the micro level are linked to the MDG targets.

On Sustainability

It is too early to judge the long-term sustainability of the programme given its short duration, as many elements of sustainability have yet to surface and may unfold only slowly. However there are some good reasons to believe in the potential for sustainability as the project has created, and the women have consolidated, organisational space by nurturing their social capital, mobilising group savings and a revolving loan fund, and building their organisational capacity. More specifically, the sustainability of the project can be better judged in terms of the following three key areas of concern.

An enabling environment

The initiatives taken to create an enabling environment for sustainability include analysis of the existing national legislative framework, policies, and gaps in the formulation of guidelines; and the formation of steering committees representing key stakeholders at the central level as well as coordination committees at the district level.

Institutional capacity

The training of women trainers and trainees and the building of organisational capacity through orientation and awareness and partnership building are some of the key elements for ensuring the sustainability of institutional capacity at the grassroots level. Women participating in the project have gained knowledge through training on technical and institutional aspects and energy- and water-related business development. The trained women are actively engaged in providing information and technical services to the project communities. The necessary institutional support is further guaranteed by the presence of local NGOs, especially at the project sites in India and Nepal. In Bhutan, the formation of a women's welfare association for the operation of the LPG depot and the community development fund, and its linkage with the ICDP programme of RSPN can be instrumental in ensuring institutional sustainability even after the phasing out of the project.

Financial sustainability

While collaborating partners in each of the countries have developed good linkages and some have received support from different government agencies, the lack of reliable funding after the termination of the pilot project has been a concern. However, the financial sustainability of the project was addressed by establishing a revolving project fund to provide women with access to credit for investing in the procurement of the technologies and to support income-

Box 5.2: Linking project impacts at the micro level to the MDGs and targets

Goal	Target	Linking Project Impacts to the MDGs
Goal 1: Eradicate extreme poverty and hunger	<p>Target 1: Reduce by half the proportion of people living on less than a dollar a day</p> <p>Target 2: Reduce by half the proportion of people who suffer from hunger</p>	<ul style="list-style-type: none"> • After the adoption of water- and energy-related technologies, women are able to save several hours they spend on collecting water and fuelwood. The time saved is utilised for income-generating activities to increase income and improve family well-being • Use of new technologies improves farm productivity and diversifies rural income • Improved farm productivity enhances household income and nutrition of family members
Goal 2: Achieve universal primary education	Target 3: Ensure that all boys and girls complete a full course of primary schooling	<ul style="list-style-type: none"> • Access to efficient fuels and technologies frees up children's time, especially girls who are unable to attend school because they are needed to fetch wood, collect water, and undertake other domestic chores • Income generated through use of improved water and energy technologies is used for children's education and well-being • Solar lanterns permit children to study at night in a less smoky environment (due to ICS)
Goal 3: Promote gender equality and empower women	Target 4: Eliminate gender disparity in education	<ul style="list-style-type: none"> • A decentralised water and energy system reduces the time and burden involved in fetching water and fuelwood, thereby enabling women and girls to use the time saved on education (adult literacy and schooling) and income earning activities (economic empowerment) • Solar lanterns permit women to use time productively even at night • Women's individualised (e.g. adult literacy and training) and collective organisational capacity enhances their self-esteem and self-confidence to address their strategic needs (social empowerment), which in turn has strengthened women's decision-making role at the household and community levels • Mobilisation of financial resources has allowed women to participate in community development activities
Goal 4: Reduce child mortality	Target 5: Reduce by two-thirds the mortality rate among children under five	<ul style="list-style-type: none"> • Reduction of indoor air pollution and water-borne diseases through the use of smokeless ICS and clean water reduces exposure to diseases and improves child health • Women have more time for child care as they spend less time on water and energy activities • Education helps to increase awareness on health, hygiene, and sanitation issues
Goal 5: Improve maternal health	Target 6: Reduce by three-quarters the maternal mortality ratio	<ul style="list-style-type: none"> • Reduction of excessive workload and drudgery associated with carrying heavy loads of fuelwood and water have positive implications on women's health • Cooking in a less smoky environment improves women's health and well-being • Empowerment and increased incomes enhance awareness and access to health facilities
Goal 7: Ensure environmental sustainability	<p>Target 9: Reverse loss of environmental resources</p> <p>Target 10: Reduce by half the proportion of people without sustainable access to safe drinking water</p>	<ul style="list-style-type: none"> • Rainwater harvesting through micro-reservoirs recharges traditional water springs • Plantation ensures slope stability and retards soil erosion • Adoption of social fencing by women to control livestock grazing promotes healthy growth of trees and ground cover and promotes carbon sequestration and other environmental services • Availability of cleaner fuels and energy-efficient technologies reduces demand for fuelwood, increases availability of dung and agricultural wastes for fertiliser, and reduces air pollution and greenhouse gas emissions

generating activities even after the phasing out of the project. This was further complemented by women's group savings and credit schemes operating at the project sites, and linkages and coordination with different development partners and support agencies.

Chapter 6

Lessons and Conclusions

In the following, we summarise the key findings, experiences gained, and lessons learned from the pilot project implemented in Bhutan, India, and Nepal over period of two-and-a-half years. These highlights of the key lessons learned and the conclusions emerging from the project are preceded by a brief overview of the project's major emphasis, approach, modalities used, and impacts.

Overview of the Project Approach and Experiences

The project was implemented in two hill and mountain settlements each in Bhutan, India, and Nepal to promote the integration of women in decision making and implementation, and in the management of household energy and water initiatives. The focus was on meeting basic household water and energy requirements (practical needs) and meeting women's productive and strategic needs (empowerment). This was done by helping women to organise themselves in order to identify their needs and roles and to implement energy- and water-related technologies. The underlying principle of the project was that new interventions for women in the Himalayas should aim to: 1) reduce the hours of work and drudgery that women are involved in; 2) minimise hazards and risks to health and life; 3) increase productivity; 4) enhance equity in the sharing of work and benefits; and 5) widen options for productive work by saving time and energy.

Approach and modalities

Groups made up exclusively of women were formed and implementation took a 'learning by doing approach' based around participatory action research. Women were placed at the forefront in the dissemination of technological options that catered to their needs (pro-poor) and helped promote environmental sustainability (pro-environment). Case studies were carried out to understand how women's roles and needs are incorporated in the use and management of energy and water resources. Gender analysis was conducted to identify water- and energy-related technologies to meet women's needs.

Training manuals were prepared in local languages on traditional and new energy and water technologies to train selected women as trainers during the training of trainer (TOT) workshop. The trained women trained other women on various water- and energy-related technologies. Observation/exposure visits and exhibitions of various technologies were also organised.

Seed money was provided to carry out demonstrations and to create a revolving fund (managed by the women's groups) for the purchase and maintenance of the technologies promoted. This seed money also supported the credit needs of women for income-generating and drudgery-reducing activities. In order to better capture the varied roles and needs of women in water and energy management, the approach and modalities utilised by the project were flexible. The entire implementation process was documented in various forms: training manuals; a video documentary; and policy guidelines for the future design, scaling up and replication of similar projects in the region.

Gender sensitisation

The project sought to sensitise all stakeholders, including community members, on the issues of gender and equity. Participatory workshops were organised to seek to change the attitudes of the communities involved towards women. In Nepal, sensitisation and awareness-raising training programmes were organised to encourage men to recognise and value the contribution of women to the family income. Women field extension workers were hired and were made responsible for the formation and training of the project groups. Sensitisation on these and other problems among women were achieved through training and group meetings. Social mobilisation for institutional capacity building was also addressed. Gender sensitisation and gender analysis focused mainly on raising the awareness and confidence of project participants and women beneficiaries. Gender awareness and sensitisation was incorporated mainly into general training programmes. The use of local organisations and their representatives as 'change agents' was another innovative aspect, contributing to the sustainable continuation of the project.

Technological interventions

Various fuel-efficient and drudgery-reducing energy technologies (such as improved cooking stoves, solar driers, solar lanterns, pressure cookers, and LPG) as well as water-related technologies (rainwater harvesting tank, infiltration well technology, the recharging of traditional water springs, sprinkler and drip irrigation) were promoted according to women's prioritised needs. Overall experience showed that women are realising multiple benefits from pilot interventions: saving of time, reduction in drudgery, improved health, better education of children, productive use of saved time, improved decision-making power, capacity building, and an emerging sense of empowerment.

Enabling support mechanism

Financing and credit arrangements are important for supporting income-generating activities for women. Realising the constraints faced by women in obtaining loans in the absence of collateral and legal rights to land, the project established a revolving fund to facilitate women's access to credit to promote income-generating activities. The project also encouraged women to save regularly. Women have demonstrated their ability to lend money on terms and conditions they have decided. They have also begun to borrow from formal credit institutions relying on their individual and joint liability as a basis for collateral. Besides widening their options for the productive use of time, an improved access to funds has helped the women taking part in the project to access technologies and to overcome a gender-biased lack of credit. In at least one project site (Dhankuta, Nepal) women are in the process of registering their group as a cooperative, which will enable them to access funds from formal financial institutions and government organisations. A women's welfare association was formed for the first time at the project sites in Bhutan, and is expected to promote the creation and mobilisation of community development funds.

Meeting productive needs

A variety of income-generating activities supported by the project (drip/sprinkler irrigation, sewing, food processing, beekeeping and so on) have widened women's options for using the time they have saved from energy- and water-related activities productively. These income-generating activities became possible through the revolving fund and the savings and credit

schemes that they are managing. Women have begun to generate modest incomes and report more control over the income they are generating. Overall, the status of women in the project is improving through the use of the new technologies, the management skills imparted by the project, and through interactions with new institutions such as banks and government line agencies.

Capacity building and empowerment: strategic needs

Women are appreciating that their organisation is a useful platform for coming together, nurturing social capital, building awareness, addressing their water and energy problems, resolving disputes, and initiating productive activities. The formation of SHGs and the strengthening of their capacity to plan and implement prioritised water- and energy-related, needs-based activities has empowered the women at the project sites.

The socioeconomic empowerment of women has also progressed, as many now do not have to approach moneylenders for small loans. They have the freedom to utilise the income they have earned. The confidence gained by the women in managing their own affairs is another substantive area of impact. Their husbands, families, neighbours, and communities regard them as successful and more knowledgeable. All these project interventions taken together have improved significantly the women's quality of life. A process of empowerment has emerged among the women and it is becoming very clear that women need not always be victims, but can become effective agents of change if they have the opportunity to manage their own lives.

Emerging Good Practices and Replicability

One major objective of the project is to establish good practices and then attempt to influence national policy through a demonstration effect, as well as advocacy and lobbying. Experience from Nepal shows that anchoring a successful pilot initiative to an existing national programme is an effective bottom-up strategy to scale up a good practice. For example the formation of a district coordination committee for coordination and networking with the district line agencies was instrumental in integrating the success of the pilot project in Dhankuta into an existing, nationally recognised village development programme currently active in 60 out of 75 districts of Nepal. This decision has already had multiple policy impacts. First, the District Development Committee (DDC) has already allocated funds to replicate the project in Vedetar Village. Second, this decision is already helping to scale up the pilot activity to the village development committee (VDC) level which gives room for other neighbouring VDCs to replicate the programme.

Example of good practice from Nepal

Using a number of internationally accepted criteria of good practice, several projects that fulfilled the application criteria were independently reviewed, and five of them were selected by WISIONS (an initiative of the Wuppertal Institute for Climate, Environment and Energy), to present examples of good practice projects successfully implemented on four different continents with the potential to make a significant impact on global energy and resource efficiency. The UNEP/ICIMOD supported project, 'Capacity Building of Women in Water and Energy Management Implemented in Nepal' (Palpa and Dhankuta sites) was one of the five projects selected internationally to present an example of good practice and to demonstrate promising approaches (see Box 6.1).

Box 6.1: Recognition of UNEP/ICIMOD-supported project in Nepal (Palpa and Dhankuta) as an example of good practice

In order to identify the needs and obstacles concerning water and energy at the household and community level and to initiate appropriate solutions, the Centre for Rural Technology, Nepal (CRT/N), in partnership with local NGOs, implemented a two-year pilot project entitled, 'Women in Energy and Water Management' which took place in two hill districts of Nepal, Palpa and Dhankuta, and was supported by ICIMOD and UNEP. The field project implementation started with the collection of baseline information, the development of guidelines, a training manual, and a variety of training activities for women's groups. The implementation also included the supply of specific, high priority technological equipment related to household energy and water. The project was implemented in a participatory manner and women were involved at all stages, from needs identification to planning and implementation. Emphasis was also given to developing links with other local institutions and support agencies.

Benefits: The project generated a significant impact in terms of improving women's access to household energy and water management services, thereby reducing their workload. The time saved can eventually be used for income generation. These activities are undertaken based on the women's needs, their inherent skills, and the locally available resources, thereby contributing to their economic capacity and increasing their access to improved and efficient water and energy services – which helps alleviate the hardships associated with the livelihoods of these women and their families.

Technology: The technologies adopted are simple, proven, and cost effective. Within the short period of two years, 180 improved cooking stoves, 96 drip irrigation systems, 10 wastewater management systems, 6 solar driers, one large greenhouse, 48 toilets, 10 sprinkler systems, and 52 beehives were adopted at the household level; while 1 water harvesting jar, 1 irrigation tank, and 10 polybag nurseries were built at the community level. A technology demonstration model village centre (TDV) has been established at both the project sites, incorporating the households of users for live demonstration and the promotion of appropriate technologies to the community. The technology village centre has been very well received by the community and line agencies in the district. The demonstrative effect of this has resulted in the procurement of different technologies by members of the community. Realising its effectiveness, the local government body is in the process of replication in other areas outside the current designated project area.

Sustainability: The sustainability of the project is guaranteed by the in depth involvement of the project members. Women participating in the project have gained knowledge through technical training. Twenty women were trained as trainers and more than 200 women throughout the project area have received training on technical and institutional aspects of energy and water, as well as training in energy- and water-related business development. These trained women are actively engaged in providing information and technical services to the project communities. The technology costs are met, for the most part, by the users, which increases a sense of ownership and guarantees optimal use. A revolving fund is available to the women for investment purposes even after the phasing out of the project.

Financial issues: The technology costs were mainly funded by beneficiaries; this contributed towards the effectiveness and sustainability of the project. A revolving project fund was established to provide access to credit for investing in the procurement of the technologies and to support micro-enterprise development.

Obstacles: Initially, it was difficult to convince the local communities, especially the male members, to participate in the project. This barrier was overcome during the project initiation workshop, which clarified that both men and women would benefit from the project.

Replicability: The scarcity of water and energy services, the resulting heavy workload for women, and the increasing degradation of water and energy resources are recognised as critical issues in many parts of Nepal. Due to the positive performance of the project in Dhankuta, the District Development Committee of Dhankuta has decided to support the continuation of the activities within these project areas and to replicate them in another village.

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Lessons Learned

While the project has achieved some notable successes, others are still emerging and others are likely to emerge over time, given the short duration of the project implementation cycle. The project was able to gather many valuable experiences and lessons, which will be useful for the future design and implementation of gender-sensitive water and energy policies, programmes, and projects in the region. The key lessons learned are highlighted below under five broad headings: a) women's empowerment; b) awareness generation and understanding of issues; c) capacity building; d) choice of appropriate technologies; e) monitoring and evaluation; and f) up-scaling and policy integration.

Focusing on women's empowerment

- *In project design, the right choice of entry point is crucial for ensuring the real participation of women and their empowerment*

The project has rightly identified water and energy as the key entry point for intervention. The water and energy sectors are crucial when talking about the well-being of women in the Himalayas. These are activities that take up an enormous amount of women's time in the hills, the problem is further increasing with environmental degradation, water sources drying up, and so on, which has multifarious impacts on women's lives and poses a major bottleneck to their productivity as well as their contribution to society as care providers. By addressing these bottlenecks, the project is trying to open the way for women to bring about improvements in all-round quality of life for their households and themselves. This intervention has helped meet the practical needs (ensuring daily survival) of the women and also addressed their productive needs (income generation and increased economic capabilities), as well as their strategic needs (position in society, in particular to gain greater equality with men, and help them toward empowerment). Improved access to water and energy technologies has saved time, energy, and the effort involved in daily water and fuel collection. This saving in time has been harnessed by uploading other integrated support mechanisms (credit, skills training, and organisational capacity building) necessary for addressing women's productive and strategic needs.

Since the project provides a space for women to participate in and benefit from multiple activities, it addresses the twin challenges of engendering water and energy management and empowering women. It provides an important lesson that engendering development in a real sense is not possible without first addressing the time poverty and drudgery of women. At the same time, projects which consider only the short-term benefits and ignore productive and strategic gender needs are also unlikely to be sustainable in the long run. This experience from the project suggests a method to achieve both efficiency goals (practical needs) and equity goals (strategic needs).

- *Focusing on women as a target group is an essential first step for gender mainstreaming*

Taking a gender approach in project planning and implementation can benefit both the project management (project efficiency) and the intended beneficiaries (women's welfare, gender equity, or women's empowerment). Gender strategies may focus on women or men separately or on women and men together depending on the context and nature of the interventions. Lessons from the pilot project, however, show that targeted initiatives

focusing specifically on women are critical for reducing existing disparities and the subordination of women. A more inclusive gender approach (with the participation of both women and men) may be required for deepening and sustaining the process of engendering water and energy activities and empowering women. This underscores the relative importance of focusing on women's empowerment as a strategy for achieving the goal of gender equality in view of the subordinate position of women that requires a special targeted focus to build women's self-confidence. Women-specific initiatives can create an empowering space for women and act as an important incubator for ideas and strategies that can later be transformed to mainstream interventions. Women's empowerment and gender mainstreaming do not compete with each other but are complementary. Women are to be given priority because they are the key managers of energy and water resources at the household level

- *Involving women and sustaining their participation at each stage of the project should be explicit objectives specified in a project document, with accompanying practical strategies*

Strengthening women's participation at each stage of the project cycle should be one of a project's explicit objectives. Experience shows that if women are effectively involved from early on, success is more likely in sustaining women's participation at later stages of implementation, management, maintenance, and evaluation. Practical strategies for involving women in the project (necessary time, funds, and modes of strengthening women's participation) should be clearly specified in the project document in an integrated way. While women can be involved directly through working with existing women's NGOs or community organisations, there is a need for women's representation at higher levels if their participation at the grassroots level is to be effective. Targeted efforts are needed to include representatives of stakeholder groups, especially women, in national policy-setting processes related to water and energy.

Awareness generation and understanding of issues

- *Awareness-generation programmes are critical for enhancing awareness of women on efficient energy and water services*

Given the mass illiteracy and limited outreach of awareness-generation programmes among rural women in much of the Himalayas, many rural women are unaware about the energy efficient and drudgery-reducing technologies that might be suited to their needs. These technologies include those which reduce the time taken collecting fuel, lead to faster cooking times, and reduce smoke in the kitchen; and should include the knowledge and skills needed to use, repair, and maintain the technologies. Because of the remoteness and relative inaccessibility of where they live, the information gap on technologies, programmes, markets and so on is perhaps the most serious constraint being faced by hill women. The pilot project experience shows that an effective awareness-generation component through a combination of methods such as village-level meetings, house-to-house contact in demonstrating technologies, cultural programmes, market fairs, and creative slogans can go a long way towards convincing women about the appropriateness of different technologies.

- *Gender analysis is essential for understanding water and energy needs before the promotion of technologies*

Baseline and needs assessment from a gender perspective is essential not only to prioritise technological interventions to address women's practical, productive, and strategic needs and roles in water and energy interventions, but also to assess how women and men benefit differently from these technologies. Experience from all the three countries involved shows a distinct gender role, as well as distinct needs and interests. Household work such as cooking, cleaning, fetching fuelwood and water, rearing children, and looking after the household generally are absolutely women's work. Experience from the pilot project indicates that such information is a prerequisite for the promotion of any particular technology to ensure its sustainability. Needs identification is an important step in the identification of technologies for women. Gender analysis needs to be carried out using gender analytical tools to understand the gender roles and relations as well as the gender needs and interests in a given community, and the impact of interventions on women and men.

Gender analysis reveals that women had particular reasons for selecting or not selecting a particular technology depending, among other things, on their situation within the household and the perceived benefits of the technologies involved. It is not savings in fuel alone that concern women when confronting new technologies supplying cooking energy. Other factors such as benefits to health, aesthetics, whether the technology is a good fit with locally-available fuel, if it is convenient, socially acceptable, etc. that attract the women. In general, women desire simple technologies that they can understand and that can be put into practice with local materials with the minimum of external input, and that reduce their time and labour inputs, improve the health and education of their children, and widen their own options for more productive activities. In situations where the acceptance and popularity of technology by rural women is socially administered by the male head of the household, gender sensitisation as taken up in this project, is an essential process where the acceptance of the technologies by the men is addressed. In situations where the women have no opportunity to earn extra income, the decision maker, i.e., the man, may not see the need to spend on improved technologies unless income-generating potential and other benefits are present. The fuel-saving cooking stoves in Nepal, and the solar driers and LGP depot in Bhutan are adopted more readily when they present opportunities for women to earn income. Factors guiding the choice and adoption of technologies are women's status within the household, their role and division within families, ease in adoption and usage, and the social acceptance of the technology.

The cost and design of the technologies must also be an integral part of the gender analysis. Experience from Bhutan shows that a failure to carry out such gender analysis led to the rejection of the improved cooking stove (ICS) promoted by the project, as the cost of the stove was not only higher than that of the bhukhari type already in use, but it was also not suited to the housing design at the project sites. Project staff must be trained to conduct gender analysis properly for needs assessment.

- *Gaining the support of men, particularly community leaders, and attempting to promote positive attitudes towards women's active participation among them is important*

One common lesson learned from all the project sites is that the potential advantages of the project interventions should be explained through gender sensitisation training. Experience further shows how patriarchal attitudes and initial resistance from men to women taking on new roles in water and energy activities can be shifted once the benefits to the community, households, and to the women themselves are demonstrated. In this context, the role of social mobilisers in sensitisation through door-to-door visits and community meetings cannot be over emphasised in devising practical strategies for changing patriarchal attitudes and resistance from men.

Capacity building

- *Making training accessible and suitable to women is critically important for their empowerment*

Training should be made more accessible to women by recognising and responding to the constraints they have on their time and mobility. This means making training courses shorter with the provision of follow-up training, providing training locally, and setting practical criteria for the selection of trainees that women can meet, particularly with regard to educational levels. The perceived value of training to women can be greatly enhanced if it is known to lead to paid employment. Training needs to be a balance between imparting particular technical skills and the development of problem solving and decision-making capacities which can provide the basis for greater project sustainability. PRA techniques are useful for instilling women with confidence about their own knowledge and capacity for solving problems. Experience shows that a 'hands on' approach to learning is more successful than a didactic lecture-based approach focused on imparting knowledge. The technology manuals prepared by the national partners during the TOT appeared not to adequately cover all the technologies later promoted and adopted. This highlights the need for continuous evaluation and revision of training programmes and training materials. Various methods need to be used to sustain the attention and involvement of participants, such as use of posters; non-directive questioning; transect walks in the locality; role plays; demonstrations; the adaptation of popular songs; street dramas and puppet shows among other things.

- *Training of prospective women trainers is an effective way to train other women both within and outside the project villages*

The training of trainers (TOT) approach taken by the project has been instrumental in diffusing knowledge more effectively to many members of the women's groups and to other women as well. This approach was found to be effective as women trainees in the village can have regular access to local women trainers for consultation. Experience further suggests that a more flexible training approach is necessary as per the needs of the women, especially with regard to enhancing their skills for productive income-generating activities. The project partners in each country involved different organisations for imparting such specialised training as per the emerging needs of the women for productive activities.

- *Exposure visits are critically important for breaking entrenched sociocultural barriers to the promotion of technologies*

Exposure visits for women's groups, which were carried out in each country as part of the project's planned activities, were effective in breaking some entrenched cultural norms that were hindering the adoption of new technologies. The Magar community (Tibeto Burman ethnic group) in Palpa provides a good example. Despite several motivational efforts, the Magar community members were not ready to change their traditional cooking stove because of its additional advantage of meeting the space-heating requirements of the family, among other things. After the exposure visit, each of the women in the community installed and used the improved cooking stove. 'Women-to-women' and 'women-to-men' interactions and experience sharing during the demonstration and orientation of technologies at the project sites were found to be an effective means of technology transfer.

Choice of appropriate technologies

- *A more permanent solution to water scarcity problems is possible*

The case of the Uttaranchal project site (Bajeena) demonstrates that water scarcity can be addressed. In Bajeena rainwater was harvested on mountain slopes, micro-reservoirs were built, and trees planted as a permanent solution to recharging traditional water springs (Box 6.2).

Box 6.2: Sustainable water harvesting methods

Due to an acute shortage of water, the women of Bajeena were spending considerable amounts of time every day collecting water. There was only one main source of water in the village, a spring which had gradually dried up over the years. To overcome this problem, the women constructed 12 micro-reservoirs on the mountain slopes above the village spring to trap rainwater and help it percolate to the water spring to recharge it. Over 2500 saplings were planted (fodder and firewood species, as well as medicinal plants and fruit trees) on 5 hectares of hill slopes to ensure slope stability and halt soil erosion. Loose grazing was also controlled through social fencing. While the full impact of this technology is likely to be felt only after a few years, after one year the water flow from the spring had doubled. Neighbouring villages also showed an interest in adopting this practice. This method of rainwater harvesting could go a long way towards addressing the water scarcity problems in many parts of the Himalayas in a sustainable way.

- *Women are good candidates for being successful energy and water entrepreneurs*
Women should not only be seen as passive users and consumers of renewable energy and improved water services, but also as good candidates for being successful energy and water entrepreneurs – provided an enabling environment is created. They are the users of these technologies, so they may be more sensitive to customers' needs. They are effective entrepreneurs with a good credit record and they can market to women more effectively. Some women have proved themselves capable of operating and constructing renewable energy technologies on their own, when provided with the appropriate training and support. A key factor appears to be the ability of the renewable energy source to generate income for the users. Women ICS promoters in Nepal trained by the project are able to sell more stoves effectively to other women both within and outside the project areas than

men, as their access to potential female clients is not hindered by social constraints. The fee for stove construction is comparable to wages in rural areas. This has also contributed to improved status, self-confidence, and financial independence for the women entrepreneurs. An important lesson learned from this experience is that imparting to women artisans the scientific principle of improved stove making will be an effective way to scale up the adoption of wood-saving stoves in the region. Some members of the women's group in Nepal are also emerging as entrepreneurs in beekeeping enterprises, and women in Bhutan are emerging as energy entrepreneurs with the establishment of a solar drier production venture and an LGP depot at the project sites.

These examples from the project provide an important lesson, that an enterprise-based approach to water and energy management with the active participation of women in decision making is necessary for the economic empowerment of women. It shows that not only are women the victims of water and energy scarcity and the potential beneficiaries of energy interventions, but that they can be also managers of energy and water micro-enterprises in the informal sector. The advantages of promoting women as energy entrepreneurs include the advancement of women, the expansion of economic activities, the diversification of productive options, and the creation of new sources of wealth and income to support family investments in education and health. The creation of enabling conditions – particularly the formation of women-only groups – has clearly helped this process. In such groups women feel comfortable taking charge of the technology instead of handing over control to men and being relegated to passive 'beneficiaries'. Once their level of confidence has been adequately enhanced through the initial women-only initiatives, these leaders and entrepreneurs will, it is believed, continue to provide leadership in their communities in mixed groups as well.

- *Time saving from improved access to water and energy and productive use of the time saved is conditional and context-specific*

The productive use of time saved is more visible in those areas where attention is given to simultaneously supporting income-generating activities (fresh vegetable production and beekeeping) and their marketing linkages. The effect of reduced water collection time through improved water technology in previously water-scarce sites in Uttarranchal was mostly offset by the increased number of trips to take advantage of the increased supply of water. Impacts on livelihoods are slow in those areas with a relatively low level of social capital. Experience shows that drudgery reduction in one area can lead to increased drudgery in other areas. The degree of substitutability of saved time/leisure for productive work is conditioned by a host of factors, but more women faced with extreme poverty are more likely to use their saved time for income-generating activities, regardless of the increased workload.

- *Supporting income-generating options through the creation of a revolving fund is crucial for addressing productive needs, thereby increasing the affordability of a wide-scale adoption of technologies*

Given women's generally lower incomes, they tend to spend a higher proportion of their income on energy and water services, even if men's contributions are absolutely higher. One way of tackling the affordability problem is to promote income-generating activities (IGAs) for women in conjunction with water and energy technologies through the

provision of a revolving fund and a group saving/credit scheme. However, unless the income generated from such activities is enough to cover the increased costs of water energy provision, this is rather self-defeating as women may end up working increased hours. If IGAs are to be introduced, this needs to be carefully considered in the early stages of project planning. Experience suggests that promoting IGAs in a meaningful manner requires additional complementary inputs, for which coordination with other agencies in the area with experience in credit, marketing and so on, is necessary. Experience further suggests that the creation of a revolving loan fund and group savings managed by women's groups with comfortable lending terms can serve as an innovative credit mechanism for addressing the needs of women lacking collateral.

- *The technology demonstration village is an effective model for speeding up the technology transfer process*

Technological intervention should be driven by development needs and address women's practical, productive, and strategic needs. Emphasis must be given to technologies that reduce the workload and drudgery of women in day-to-day household work and to micro-enterprises that enhance women's income. Evidence shows that women are better able to make their own choices out of a range of possible technological options provided information is easily available and technologies are made accessible by the project. The live demonstration of such technologies actually operated by women at the project level is essential for wider acceptance and quicker dissemination. In this context, the technology model village as piloted in Nepal is a promising concept that can be experimented with in other regions to speed up the technology transfer process (Box 6.3). The technology demonstration villages and the resource centres established and managed by women's groups at both project sites in Nepal have provided many rural women with a convenient place to learn about new water and energy technologies as well as a place to share their experiences on the uses of these technologies.

Box 6.3: Technology demonstration model villages

Technology demonstration model villages were established at two sites in Nepal to demonstrate the technologies operated by women and to help speed up the dissemination of these technologies. A management committee made up of women was formed to manage the centre. These villages are being visited by women from neighbouring areas and are proving to be an effective medium for learning about the application of all field-tested technologies that meet women's practical and productive needs and which can reduce drudgery. Influenced by the demonstrated success at the Dhankuta pilot site, the Dhankuta Local Development Fund Secretariat under the District Development Committee (DDC) decided to replicate and integrate the pilot project at another site (Vedetar). Similar integration is also envisaged for the other site in Nepal. While it is not always possible for small-scale projects to directly influence national policies, this method demonstrates how good practices can be anchored to a national programme using the bottom-up approach.

Monitoring and evaluation

- *Where baseline data is either absent or weak, this also feeds into weak monitoring and evaluation at a later stage*

Experience shows that impacts are difficult to gauge in a situation where baseline surveys are either not properly conducted prior to the project (especially in Bhutan) or they are

weak (Nepal) in terms of capturing all essential information reflecting the project's major area of concern. Baseline information needs to be broken down by gender on various aspects, such as access to and control over resources provided (training, skills, technology use, employment, income); control over decision making (at the household and community levels); human resource development; the workload and drudgery involved in daily water and fuel collection; improvements in health and productive use of saved time (time allocation pattern); impact on women's status in the community; and changes in women's perception about their empowerment. While the benchmark established at the project sites in India made it easier, relatively, to assess the impact later on, the lack of a well-planned baseline survey strategy (with standard survey design and instruments to be applied to all project countries) early on was a major weakness experienced by the project. To overcome this shortcoming in baseline surveys, the project had to follow a historical recall method ('before-and-after' situation) using both objective and subjective indicators to assess the impacts of project interventions. A better approach would have been to collect data early on from both men and women as part of the baseline data for the project/programme, and particularly to collect information from the respective groups on their own situation and activities.

Other lessons are that the case study reports prepared by each country prior to the implementation of the project were rather generic with little focus on issues of women in water and energy management in the case study areas. A better approach would have been to integrate the baseline assessment in the case study report, to be undertaken only after identifying the pilot site. In general, women should interview women and men should interview men individually. Children can be a good source of information because of their experience of working for their mothers in fuel and water collection. PRA techniques also need to be gender sensitive, as certain techniques like seasonal work calendars are of little relevance to women. Reporting the results of survey or other data gathering exercises back to the community is a useful way of assessing the reliability of information, gaining supplementary insights, and generating further discussions and interest around new activities.

- *Institutionalising participatory monitoring is essential*

Evaluation needs to be seen more as a process and should involve both project personnel and community members as recipients of and participants in evaluation. Experience shows that while monitoring of progress is normally done by women's group members in their regular group meetings, self-evaluation by women's groups and project personnel should be given more emphasis through developing gender-sensitive methodologies and mechanisms. Explicit indicators are needed to examine the level and quality of women's participation in different project activities and their level of capacity building, both individual and collective capabilities ('organisational empowerment'). Subjective perceptions may be as important as 'objective' evaluations by outsiders and this is particularly true of changes in perceptions about gender. For example, the qualitative indicators used in assessing the organisational capacity building in the present project illustrates how the relative strengths of different dimensions of women's organisational capacity building can be better judged by rating a set of subjective indicators on a five-point ordinal scale. The use of similar indicators of organisational strength as a regular monitoring tool for self-evaluation by the groups themselves can go a long way to institutionalising a participatory monitoring and evaluation system.

Policy integration

- *Anchoring good practice to the national programme is possible though a bottom-up approach*

The decision to replicate the demonstrated success of the pilot project in Nepal by the DDC provides an important example of anchoring a good practice to a policy process though the bottom-up approach. Experience shows that the formation of a district coordination committee right from the beginning of the project and advocacy and information sharing are necessary steps for integrating good practice into a national programme. Intensive dialogue and interaction with different stakeholders is critical for the successful implementation of small-scale infrastructure and linking such a project with existing programmes that are operational at the field level. Working together in partnership, as a multi-disciplinary team, with district partner organisations is an effective strategy for successful project implementation and the integration of good practice examples in other on-going programmes at the district level.

- *Existing water and energy policies and programmes in the region are gender-neutral, failing to address the special circumstances and needs of women*

As in much of the South Asian region, the Himalayas (particularly India and Nepal) are dominated by classical patriarchy, in which women have few economic rights (land, formal credit), have low literacy levels, and suffer because of strong traditions of female seclusion. Although Bhutan has a matrilineal system, women there too have little voice in shaping their choices. It is in this context that pro-women water and energy policies call for the confrontation of these societal norms, attitudes, and practices through changing people's mindsets, apart from the enforcement of formal law and regulations against gender discrimination.

A review of the existing national policies and programmes in the three countries reveals that policy makers continue to treat energy and water policy as gender-neutral in terms of impacts, thus failing to recognise the differing roles and needs of women and men in water and energy management. Women are more likely to be represented at policy levels in 'soft' ministries such as health and community development than in technical areas/agencies of water and energy. In addition, a lack of cooperation between 'soft' and 'hard' ministries is hindering the process of introducing more gender-aware approaches. There is no specific policy for integrating the needs and roles of women in water and energy management at the household and community levels.

A large number of women continue to face hardships in fulfilling their basic water and energy needs. The successes of the present project have the potential to be scaled up to benefit many women across the Himalayas. Meeting the water and energy needs of women can have a significant impact on their lives and can bring measurable change. Scaling up such activities would help the efficient use of energy and water resources so that more women can derive benefits quickly from pilot interventions and sustain the activity. Women should be kept at the centre when deciding what is appropriate for scaling up and sustaining the programme. Some key lessons learned for future programme design are as follows.

- Focus on people and not on technologies. Understand first the livelihoods of women and the contribution (or potential contribution) of technologies to improve them.
- Recognise and respect the potential of women for innovation by strengthening their confidence and providing them with opportunities.
- Provide women with the science behind the technology, and not just the technology itself, to encourage them to adapt/innovate technologies appropriate to their own context.
- Avoid activities that require heavy external inputs, and help women to use locally-available resources.
- Help women to organise themselves and address problems on a community basis by establishing access to information, credit, markets, and complementary support.

Conclusions and Recommendations

The lessons learned from the project were reviewed and a number of practical strategies suggested. In applying such strategies, it is important to take account of variations in local conditions, and to adapt the approaches accordingly. In the following we summarise some of the key conclusions and implications emerging from the above review of lessons learned.

Focusing on women's needs and roles in water and energy management can lead to significant advances in meeting development challenges, including the MDGs. Since women are heavily burdened under current circumstances and resource conditions, reducing their heavy work burden is an essential first step towards making it possible for them to participate in and benefit from any form of development. The benefits of an innovation must be clearly understood if women are to allocate time to it. The pertinent question is not merely which technology is best for the end-user (the woman), but rather, more importantly, how women can be enabled to choose which option(s) best meets their needs (practical, productive, and strategic) and fits their circumstances in order to move them out of energy and water poverty – and other manifestations of poverty – for improving their livelihood. From a policy perspective, this raises the twin challenges of engendering water and energy and empowering women to be addressed, which can only be met when women are placed at the centre of the national policy agenda for poverty reduction.

Clearly technology is not neutral; technological options should remain open and be driven by development needs. Addressing women's development needs (practical, productive, and strategic) for saving time, for improved health, for security, and for income generation requires a basket of services and multiple technologies using an integrated planning approach to enable women to access improved energy and water services and to enhance their entrepreneurial and technical skills and their empowerment. Creating a demand-driven, decentralised rural energy market can go a long way to supporting the various initiatives that would reduce the social cost of biomass use and provide an incentive for switching to cleaner and more efficient fuel and technologies. This calls for raising the gender awareness of policy makers and planners so as to fully integrate women's concerns in the policy-programme-action continuum. There is a need to establish enabling mechanisms such as credit, information, and training, along with the necessary legal and institutional reforms. Barriers such as women's legal status, land-tenure opportunities, property rights, and access to public services and facilities which severely limit women's ability to take advantage of available opportunities need to be overcome through substantial shifts in policy and priority for ensuring

gender equity in the development process. While the establishment of gender-disaggregated data using gender analytical tools is critically important for raising such gender awareness at the policy decision-making level, documentation of good practice models and their replication and up-scaling through bottom-up initiatives is equally important for demonstrating what approaches and actions could help make these gender concerns convincing for their full internalisation at the policy, programme, and implementation levels.

The project was fruitful in building the social capital of women and providing options for pilot testing of environmentally friendly and pro-women water- and energy-related technologies. Lack of elected representatives and weak governance has been a crucial factor in weakening the support of poor and vulnerable groups. Although the ongoing violent conflict situation in Nepal has affected the project, particularly in supervision and monitoring visits to the project sites, the local NGOs have thus far been able to successfully implement the project. The project has taken the right steps towards the integration of women in decision making through building their individual and collective (organisational) capacity to implement and manage household energy and water initiatives that have helped reduce drudgery and widen the options for more productive use of saved time. The saving in time and reduction of drudgery provides ample opportunity to scale up and replicate the project through uploading many innovative interventions for empowering women by addressing their productive and strategic needs.

Pilot interventions integrating women's needs and concerns in water and energy management have the potential to support self-help initiatives by local women not served by larger-scale, government-run programmes. The fully-fledged participation of women in water and energy management as a means to more sustainable and effective service provision has many potential advantages. However participatory approaches cannot be assumed to automatically lead to improved women's participation unless specific strategies are pursued to ensure that women are not involved in ways which increase their workload and/or financial burden, or prevent them from using the benefits of improved water and energy services in productive ways. This calls for graduating after a certain threshold from women-only projects to a gendered perspective, which looks not just at women in isolation, but at the relative roles and responsibilities of men and women, and their changes over time.

In a situation when the potential for positive impacts are emerging and the prospects for establishing good practices are high, there is considerable potential for this pilot project to succeed as a new paradigm for empowering mountain women through promoting them as successful entrepreneurs. The beginnings of the mainstreaming of good practices at the district or national level were already being seen even within the short duration of the project. The immediate benefits of the technologies, the clear potential for their replication, and the enthusiasm of the participating women have led to significant interest from local government to expand coverage by incorporating the approaches into their own programmes. This is a very positive sign as it shows the way to scaling up the positive outcomes of this project. For this, efforts in policy dialogue and partnership building for up-scaling and replication remain to be enhanced and some more innovative activities need to be supported in a consolidated manner. One major limitation of this time-bound demonstration project is the lack of sufficient time for further deepening and expanding the project activities to make an impact at the policy level. A second phase would provide a strong basis for further testing the policy guidelines with more focus on working jointly with government and presenting 'demonstration model

cases' (entrepreneurship, technology options, credit and women-centric institutional mechanisms with a larger and more structured component of advocacy and outreach) so as to produce a more concrete, deliverable policy framework on gender mainstreaming.

Lessons learned from the pilot experience of the project in the three countries involved have provided an important basis for developing a gender-sensitive training manual and policy guidelines to advocate women's roles in the planning, design, and implementation of water and renewable energy technologies. New experiences and insights from the field have been incorporated into training manuals and guidelines in a participatory manner, so that knowledge is disseminated on a wider scale. Policy guidelines are expected to make a significant contribution towards the application of a gender-sensitive approach and concepts for devising sustainable water and policy and programmes in the region. Policy makers and rural development practitioners active in the Himalayan region can immediately take these experiences, adapt them to their needs, replicate them, and scale them up. Even so, such efforts do not lead to major changes in approach unless supported by complementary strategies at policy-making levels and by related agencies and donors (Banskota et al. 2005).

Key areas of policy direction emerging from the study

- Placing women's needs and concerns in energy and water interventions at the centre of national poverty reduction strategies
- Promoting technologies to address poor women's practical, productive, and strategic needs
- Offering a basket of services to enable women to access improved energy and water supplies and to enhance their entrepreneurial skills, their technical skills, and their self-confidence
- Establishing gender-disaggregated data at all levels using gender analytical tools to understand gender-based needs, constraints to participation, ability to participate, and different benefits from participation
- Enabling institutional representation of women in decision-making
- Supporting capacity building and partnerships of women and men involved in energy and water management
- Promoting partnerships among governmental and non-government organisations as well as with the private sector

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Annex 1: Project Details

The Project details as given in the project document are as follow.

Expected Results

The project expects to achieve the following results at the end of the project.

- Improved self-sufficiency in energy and water needs with the introduction of environmentally friendly technological options for the participating communities in Nepal, India, and Bhutan.
- Enhanced integration of women in decision-making processes in the management and use of environmentally friendly water- and energy-related technologies at the household level in the rural Himalayan areas of India, Nepal, and Bhutan.
- Enhanced capability of women to adopt, implement, and manage clean and renewable energy and water technologies through women-focused training programmes and awareness raising through information sharing between participating communities.
- Enhanced integration of women in the management of household water and energy resources through the establishment of gender-sensitive and pro-environment policy guidelines and institutional frameworks that could also be instrumental in designing future programmes for implementation by line agencies and other development organisations.
- Reduction of health-related hazards in hill and mountain communities, particularly for women and children, due to improvements in technological options for household water and energy management practices which are less polluting.

There are some basic prerequisites to achieving these results. These include: a) the cooperation of all parties involved (including collaborating institutions, government ministries, local authorities, and participating communities in the three countries) in project implementation, and in monitoring and evaluation; b) water- and energy- related technological options should be explored using the participatory approach; c) useful documents and videos should be prepared so the activity can be replicated by relevant grassroots NGOs and extension agencies working with women's groups; and d) continuous political stability in the Himalayan region.

Planned Activities and Outputs

The planned activities and outputs were:

- **Signing Letters of Agreement** with collaborating institutions in Bhutan, India, and Nepal to implement training and on-site energy- or water-related demonstration initiatives.
- **Developing case studies** in each country to analyse the current status of water and energy needs and constraints for women (in households).
- **Organising the first regional stakeholders workshop and consultation** to discuss the case study findings, reach a consensus on identified needs and constraints, agree on priority sites (two per country), and decide an agenda and timetable for implementation of the pilot activities.

- **Developing guidelines and training manuals** to train women on social mobilisation, gender sensitisation, and implementation of pilot activities and guidelines for trainers to conduct training programmes.
- **Organising training of trainers (TOT) workshops** (one in each country) following the finalisation of the training materials and manuals to train selected women as trainers.
- **Training women's groups by trainers** to impart training to other women in each selected site (about 120 women in the three countries) on the various water and energy technologies.
- **Implementing pilot projects** focusing on: a) women's organisational capacity building, and empowerment; b) observation tours, exposure trips, and exhibitions of various technological options; and c) the provision of seed money to carry out demonstrations and create a revolving fund to service the purchase and maintenance of the implemented technologies as well as to support income generating and drudgery reducing activities to implement the women's skills based on the training they have received.
- **Developing policy guidelines** based on good practices and lessons learned from the pilot activities to enhance gender mainstreaming in national water and energy policies.
- **Organising the second regional workshop**, although not originally planned in the project document, this was later included as a new output in consultation with UNEP, to share the findings, experiences and lessons learned from the implementation of the project, discuss the policy guidelines prepared by each country team, and provide inputs for the formulation of gender sensitive policy guidelines.

Project Implementation Framework, Evaluation, and Financing Mechanism

The project was supported by the United Nations Environment Programme (UNEP) with financial support from Swedish International Development Assistance (SIDA). The support UNEP has provided includes guidance and support, both technically and intellectually, in the development and implementation process through reviews of project documents and reports, through the monitoring and evaluation of the project, through ensuring continuous linkages, and through the mutual exchange of information with other related projects in the region. In this process UNEP was responsible for overseeing the whole project, participating in the identification of sites and the implementation of the project, and undertaking yearly monitoring and a self-evaluation of the project on completion. ICIMOD was responsible for coordinating the implementation, and the monitoring and evaluation of the project activities, and coordinating the logistics involved, including sub-contracting and the production of outputs.

Annex 2: Women's Groups at the Project Sites

(Status September 2004)

Women's Groups	Villages	Women Members
NEPAL		291
Dhankuta		
Laligurans Women's Group	Thankhuwa -3	20
Sayapatri Women's Group	Thankhuwa -4	36
Makhamali Women's Group	Thankhuwa -3	16
Salleri Women's Group	Thankhuwa -3	21
Saraswati Women's Group	Thankhuwa -3	19
		112
Palpa		
New Groups		
Bhumika Mahila Samuha	Humin-8	20
Ekta Mahila Samuha	Humin-1	23
Existing Groups		
Saujanya Mahila Samuha	Humin-9	34
Namuna Mahila Samuha	Pipaldanda -2	33
Jalpadevei Mahila Samuha	Pipaldanda -4	33
Navadurga Mahila Samuha	Humin-8	36
		179
INDIA		104
Uttaranchal		
Asha Jyoti SHG,	Bajeena	20
Pargati SHG,	Bajeena	20
Mahila Mangal Dal	Naila	24
Himachal Pradesh		
Arti Nager	Arti Nagar	20
Shitla-Kotla	Shitla-Kotla	20
BHUTAN		17
Phobjikha	Haal, Kumbu, and Yusa	9
Limukha	Nabchen, Omtekha, Gungkami, Yusakha	8

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