



Fuelwood, Alternative Energy and Forest User Groups in Chunati Wildlife Sanctuary

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Abstract

This study examines the introduction of improved, energy-efficient 'chulla' stoves and their potential to help reduce local people's dependence on Chunati Wildlife Sanctuary for fuelwood. Six villages in close proximity to Chunati Wildlife Sanctuary (CWS) were selected for this study. Data were collected from members of female forest user groups (FUGs) who are associated with the Nishorgo Support Project. The roles of the Co-Management Committee, Co-Management Council and community patrolling groups in the co-management process were studied. Information about relevant demographic and social factors of FUGs was also gathered and analyzed. The collection, consumption and selling of fuelwood were key issues researched in this study. Specifically, I examined whether improved chulla users were more involved in fuelwood collection, consumption and selling in the study area than users of traditional stoves. The introduction of improved chullas is an important issue because these stoves help to minimize people's forest dependence by reducing the amount of fuelwood required to meet their household needs. This study discusses implications for improving the livelihoods of FUG members through the introduction of improved chullas and examines the effectiveness of these efforts. It aims to promote enhanced access to improved chullas to all members of the local communities surrounding Chunati Wildlife Sanctuary and other protected areas.

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Introduction

Nearly 36 million acres of natural forests are lost each year worldwide – an area bigger than the state of New York. The world's poorest people bear the brunt of this loss, since forest resources help to sustain eighty to ninety percent of the 1.2 billion people in the world who live in extreme poverty (WWF 2007). In many developing countries, wood is the primary source of fuel because rural communities cannot afford other alternatives. Bangladesh suffers from a scarcity of energy resources and is thus largely dependent on wood for fuel. Furthermore, its forests are subject to increasing land encroachment and there is a lack of both commitment toward and education for nature conservation. The total area affected by encroachment is estimated to be about 36,000 hectares, with approximately 100,000 people thought to be encroaching on forest land (Haque 2007). The primary reasons for encroachment in Bangladesh include the loss of legal rights to lands that local populations historically had tenure over, ambiguous boundaries between forests and cultivable lands, and a failure to complete the forest settlement operations initiated in the 1950s (Haque 2007). Education and awareness-raising programs can play an important role in improving the capacity of people to address environmental conservation issues (Rahman 2007).

The Bangladesh Forest Department is the primary government agency responsible for forest conservation and wildlife protection. However, despite their efforts and due to the factors mentioned above, the previously dense forests of Bangladesh have been continuously threatened by land encroachment and logging. As a result, the forest area has been reduced by more than 50 percent over the last 20 years and currently comprises only seven percent of its total land area (FAO 2004). Simultaneously, support has arisen for nature conservation in Bangladesh through the improved management of protected areas via a co-management process. The Nishorgo Support Project (NSP) was initiated in 2004 to coordinate government efforts for co-management. NSP is administered by the Forest Department in collaboration with key conservation stakeholders and has been charged with developing and implementing a co-management strategy for the country's protected areas based on the premise that such partnerships are essential to achieving conservation goals. The project is being carried out at five protected area pilot sites, including the Chunati Wildlife Sanctuary (CWS) (NSP 2004). Nishorgo has



undertaken various programs at Chunati, where the fuelwood crisis is a major concern and local people are heavily dependent on forests for their energy needs.

To address the problem of forest degradation from fuelwood harvesting, NSP has developed a program for the introduction of improved “chullas” (cooking stoves). Traditional chullas are mud stoves while improved chullas have an internal metal plate and a plastic pipe that reduce indoor air pollution and increase energy efficiency. Introduction of more efficient cooking technologies is an important tool for minimizing the fuelwood crisis in rural areas without electricity. In collaboration with NSP, the German Technological Cooperation (GTZ) provided initial technical support for installing improved chullas in 2004. Recently, NSP and Grameen Shakti, a Bangladeshi NGO, have partnered to launch a program to promote improved cooking stoves in communities near NSP’s pilot protected areas. The aim of this partnership is to address the high demand for biomass fuels and the adverse health effects of indoor air pollution caused by cooking on traditional stoves (Grameen Shakti 2007). Grameen Shakti will provide the technical support for installing improved chullas with financial support from NSP (Biswas, personal communication 2007). The improved chulla is an important new technology because of its low maintenance costs. Furthermore, the average consumption of fuelwood using the improved chulla is 50% less than the consumption using a traditional chulla. It is also healthier to use because it significantly reduces the level of indoor air pollution that is a major contributor to respiratory illness among rural dwellers. In addition, the improved chulla is easier to handle and helps to reduce cooking time.

During the last two years, the provision of improved chullas has been an important part of NSP’s co-management activities in Chunati Wildlife Sanctuary, and they have worked to provide stoves and training on their use to members of various forest user groups (FUGs). At the beginning of the project in 2004, NSP gave their commitment to FUGs that improved chullas would be installed free of cost. However, due to unforeseen decision making changes and planning difficulties, chullas could not be provided to the majority of FUG members. Many FUG members have shown an interest in installing improved chullas, especially after seeing the advantage of such chullas from their neighbors. Nonetheless, due to the high cost of installing the stoves and the changes in NSP policy, many households have

not benefited from this technology. As a result, many FUG members continue to extract large amounts of fuelwood from the forest of CWS.

The purpose of this study is to explore the evidence for improving the livelihood status of FUGs and reducing their fuelwood dependence through the introduction of improved chullas in the villages surrounding Chunati Wildlife Sanctuary. In particular, I will examine the effectiveness of the improved chulla stove program in minimizing reliance on fuelwood by local people.

Background

Chunati Wildlife Sanctuary is comprised of a tropical semi-evergreen forest, situated about 70 km south of Chittagong city and to the west of the Chittagong-Cox's Bazaar Highway at 21°40'N latitude and 92°07'E longitude. The sanctuary's terrain is quite varied, with shallow to deep gullies and gentle to steep slopes. The elevation ranges from 30 to 90 meters. The forested land is composed of about 890 hectares of bush, 84 hectares of Garjan (*Dipterocarpus species*) forest and 13 hectares of small crown forest. Chunati Wildlife Sanctuary was formally established under the Wildlife Act of 1986. Until the mid-1980s, the area was covered with a dense forest of Garjan and other hardwood species. However, demand for wood for boat building and other commercial enterprises contributed to rampant harvesting and rapid deforestation during the late 1980s.

It is estimated that the Chunati Range is home to 7,810 households and a total population of approximately 50,000 people. They live in forty-four paras (villages) in and around the sanctuary. Among them, twenty-four "paras" are located inside CWS and another twenty are located within one kilometer of the sanctuary boundary. Of these forty-four paras, twenty-nine are located in Chunati Beat (a local geographical unit of forest administration), nine in Aziznagar Beat, and the remaining six in Herbang Beat. The most common occupations of people in the Chunati Range are agriculture and wage labor.

FUGs were established by NSP in 2004 and participants were invited from communities living in the protected area or relatively near to the forest. The groups are intended for people dependent on the sanctuary's forest resources. After the formation of the Co-Management Council and Co-management Committee, the



communities of the Chunati Range were divided into five sectors. The total population and distribution of FUGs in Chunati Wildlife Sanctuary is shown in Table 1 below.

Table 1: Population and distribution of FUGs in Chunati Wildlife Sanctuary

Name of Beat	Name of Sector	Male FUGs		Female FUGs		Total FUGs	Total members
		Number of FUGs	Male members	Number of FUGs	Female members		
Chunati	Sector 1	2	34	4	71	6	105
Chunati	Sector 2	2	55	4	105	6	160
Chunati	Sector 3	0	0	11	240	11	240
Aziznagar	Sector 4	4	73	3	74	7	147
Harbang	Sector 5	3	60	5	155	8	215
Total		11	222	27	645	38	867

Nishorgo Support Project activities related to FUGs

In 2004, Chunati Wildlife Sanctuary was selected as one of five pilot sites for co-management under NSP. NSP considered thirty-eight paras for inclusion in the project activities during the pilot period. With financial support from NSP, a baseline survey was conducted at the beginning of the project to collect data on the communities' demographic profiles. Since then, NSP has provided training and support for a variety of activities, including plant nurseries and seed collection, small businesses (e.g., poultry, fishing, rickshaws) and seventeen improved chullas, eight of which were funded. Data on NSP's activities at CWS show that out of 867 FUG members, 165 individuals (19%) have received financial benefits or training from NSP. The rest of the FUG members are to receive the same benefits during the remainder of NSP's implementation period. One objective of NSP support to FUGs is to raise awareness about the need to protect the forest, and to thereby enhance biodiversity in the Chunati Wildlife Sanctuary. FUGs are responsible for raising awareness among villagers.

Pressures on the forest

The most common direct cause of deforestation in Bangladesh is land clearance for agriculture, which is often facilitated by shifting cultivation in hillside forests. Bangladesh's high population density results in intensive competition for very limited land resources. Thus, at the local level, land encroachment due to the expansion of agriculture and settlements, combined with increased timber extraction, hunting, and collection of NTFPs (e.g., fuelwood, bamboo, cane), is resulting in deforestation and the degradation of Bangladesh's natural resources (Haque 2007). Wealthy and elite community members have exercised their influence over the forest for many years through bribes to the Forestry Department and other forms of corruption. As a result, wildlife numbers in the forest have declined. The forests continue to be burned and cleared for both cultivation and settlements. The FD does not permit the FUGs to patrol the forest during the daytime because the perceived threat of members potentially taking part in these illegal activities. Only forest guards and other FD staff are allowed to go inside the forests during the daytime. FUGs are only allowed to patrol forests at night from the roadside and are not permitted to go inside the forest during the patrol period.

Local institutions

There are several local institutions involved in managing and protecting CWS. The Co-Management Council (CMC) serves to monitor and perform tasks according to the work plan for landscape development activities. The CMC's primary concerns are the changing livelihoods of FUG members and the conservation of natural resources and wildlife in CWS. There are also several Community Patrolling Groups (CPGs) that have been formed to protect the forest and its wildlife. They work from 10 pm to 4 am. Seven groups perform their duties on a rotating (weekly) basis. Each group is comprised of 5-6 members who patrol together one day per week.

Research Objectives

The main goal of this study is to demonstrate the potential of the introduction of improved chullas for reducing pressure on natural resources in Chunati Wildlife Sanctuary. The specific objectives of the study are to reveal:



1. The social and demographic characteristics of FUG members
2. The influence of improved chulla use on household fuelwood consumption
3. The influence of improved chulla use on involvement in fuelwood selling
4. How chulla introduction has helped reduce dependence on the forest
5. How certain marginalized groups and the poor have insufficient access to chullas

Methodology

This research was carried out by means of key informant interviews and stakeholder group discussions. In each of the six study sites, questionnaires were given to female respondents only. The reason for this was because women are generally more available in the household during the daytime than men. There are also more female FUGs (38) than male FUGs (27) at CWS. The breakdown of the location, composition and size of the various FUGs sampled is shown in Table 2.

Table 2: Location, composition and size of FUGs sampled

Name of village or para	Sector	Beat name	Total FUG			FUGs in sample	Members per FUG	Sample size	Percentage of FUG members
			Male	Female	Total				
Roshider Ghona	1	Chunati	2	4	6	1	17	10	59%
West Shuphinagar	2	Chunati	2	4	6	1	25	10	40%
Borua Para	3	Chunati	0	11	11	1	23	10	43%
Rohomania para	3	Chunati	0	11	11	1	18	10	56%
Moddho villagers' para	4	Aziznagar	4	3	7	1	22	10	45%
Vandarir Deba	5	Harbang	3	5	8	1	30	10	33%
Total	5	3	11	38	49	6	135	60	44%

Sixty women from six different villages were interviewed, which amounted to about 44% of the total FUG members of these villages (see Table 2). Out of the sixty respondents, 83% were Muslims and the remaining 17% were Buddhists from the Barua ethnicity. Key informant interviews were carried out with CMC members and group discussions were held with the CPGs. The study was conducted from February to August 2007. Within the six sample villages, stratified random sampling was utilized for selecting individual respondents with educational level considered as a major factor. Focus group interviews were conducted with members of female FUGs in the Chunati Range. There were approximately nineteen members in each group discussion. For the CMC and CPG discussions, a questionnaire was also used for collecting information about NSP activities and about the FUGs. The questionnaires and interviews emphasized people's knowledge, views, and experiences with respect to NSP activities. Lastly, data tabulation and analysis was completed using the statistical computer software program SPSS (Statistical Package for Social Science).

Results and discussion

Social and demographic characteristics of female FUGs

In order to get a better picture of the socioeconomic profile of the FUGs, some basic demographic information was collected on age distribution, education level, literacy, household earning patterns, gender work roles, occupation, food sufficiency and income. Among the respondents, the 25-34 age class was the largest (46.7%) in the six villages, followed by 15-24 year olds (30%), 35-44 year olds (15%), and those who are 45 and older (8.3%) Results also revealed that 72% of the female FUG members have no formal education, 17% have a primary school education, 10% have a secondary school education, and less than 2% have a higher degree. Of the 72% who had not gone to school, many had received an informal education at home and most were able to read and write basic Bengali.

According to social customs in Bangladesh, husbands are typically considered the head of the household. Men normally work outside of the household while their wives take responsibility for most tasks within the home, including cooking and collecting fuelwood from the forest. The women interviewed for this study were



also involved in a variety of economic activities outside the home to help support their family. Almost fifty-seven percent of interviewees reported being involved in both agriculture and day labor (pulling a rickshaw, collecting sand or fuelwood for sale, etc.). Nearly thirty-two percent of the interviewees are engaged in vegetable cultivation, agriculture, and day labor throughout the year. Ten percent said that they were engaged in day labor only, while less than two percent had no occupations outside of the home other than occasionally earning day wages through vegetable cultivation.

Based on the data gathered and direct observations, I conclude that all of the interviewees from the FUGs are living in poverty. For instance, all of the interviewees expressed that they had gone through times when they had insufficient food and lacked adequate shelter. An estimate of the monthly income of each individual household was converted into annual income. For those who do daily labor, wages vary from person to person depending on the type of work performed (from about 120 to 150 BDT per day). Individuals who assist with agricultural work during peak harvest times can earn 5,000 – 10,000 BDT annually after deductions from barga (sharecropping). Each of the interviewee's approximate household incomes was calculated and FUG households were then categorized into five income groups. It was determined that 45% of the households interviewed had income ranging from 40,000 to 60,000 BDT per year (1 US Dollar = 68.425 Bangladesh BDT as of October, 2007), 50% earned 60,000 to 80,000 BDT per year, and 5% earned household incomes above 80,000 BDT annually.

Household fuelwood consumption

In response to questions on the use of forest resources for fuel cooking stoves, 94% of the improved chulla users reported using only fuelwood for their stoves, while the remaining 6% used both fuelwood and fodder. Fodder increases the amount of dust and level of indoor pollution resulting from cooking. The households using traditional stoves depend more heavily on fodder. Twenty-eight percent of homes with traditional chullas use fuelwood alone while the remaining 72% collect both fuelwood and fodder to heat their stoves. All of the interviewees are primary users of forest resources and are highly dependent on fuelwood from either their own forests and/or the forest within CWS. Many of the interviewees have been living inside the forest at CWS for a long time.

This study showed that improved chulla (IC) users collect comparatively smaller amounts of fuelwood than traditional chulla (TC) users. IC users collect more fuelwood during the dry season than during the rainy season and then store it for future fuelwood consumption. TC users do not make any prior arrangements for collecting fuelwood and have a greater likelihood of running short because TCs require more fuelwood to produce the same amount of energy as ICs. TC users have a greater need for fuelwood and face more stress with regard to fuelwood collection. Most TC users do not have the same knowledge as IC users about which types of wood are better or worse for fuelwood consumption. As a result, they collect whatever fuelwood and other sources of fuel they can find for their cooking needs. In the rainy season, TC users have difficulty finding sufficient fuelwood supplies.

Sources of fuelwood for household consumption

Of the households with improved chulla stoves, 76% gather most of their fuelwood from the forest while 24% have sufficient trees on their homestead to meet the majority of their fuelwood needs. In contrast, of those respondents who use traditional stoves, 84% said they depend mainly on the forest for their fuelwood, 12% reported they primarily obtain fuelwood from their own homesteads, and 4% said that they go to the market to purchase most of their fuelwood. From these findings, it is evident that improved chulla users have a somewhat reduced level of

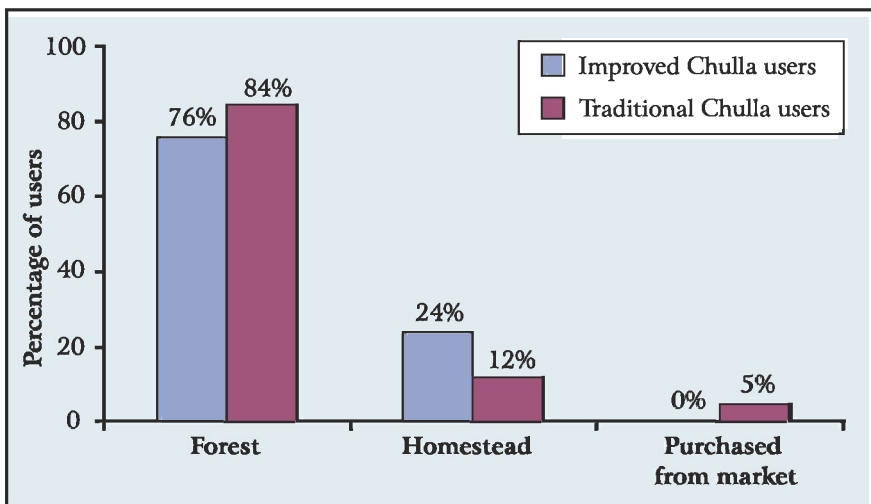


Figure 1: Primary sources of fuelwood for both IC and TC users



household dependence on the forest for fuelwood, and that improved chulla users' households are better able to meet their fuelwood needs from their own homesteads. Not going into the forest to collect fuelwood is a matter of prestige for some people and they will try to avoid collecting from the forest despite being in a vulnerable socioeconomic situation. The primary sources of fuelwood for household consumption for both IC users and TC users are shown in Figure 1.

Frequency of fuelwood collection

A comparison of the frequency of fuelwood collection from the forest between IC users and TC users is shown in Figure 2. The responses from the IC users showed that 24% do not collect fuelwood from the forest, 52% collect fuelwood once a week, and 24% collect fuelwood twice a week or more. Interviewees cooking with traditional stoves collect fuelwood more often, with only 16% not collecting wood from the forest, 9% going to the forest to collect once a week, and 75% collecting two or more times a week. Many households are located very close to the forest. Because they are in an extremely poor economic condition, they collect fuelwood for both family consumption and for sale.

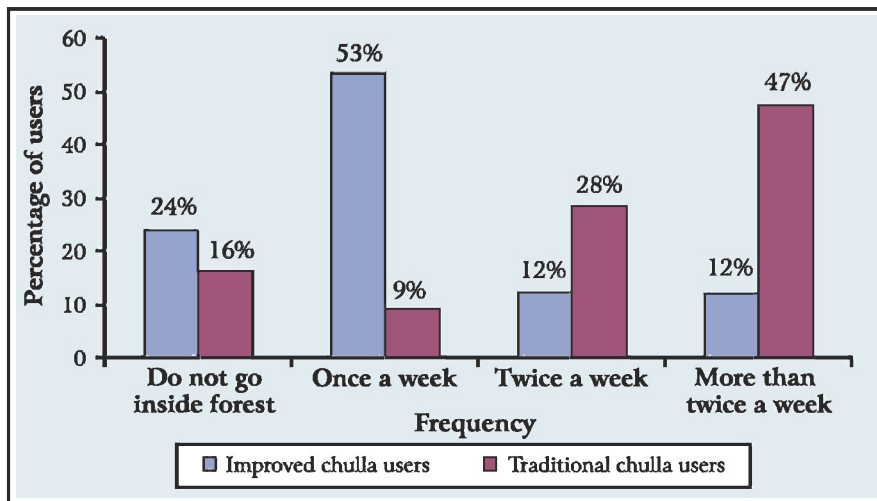


Figure 2: Frequency of fuelwood collection from the forest

Individuals who received an improved chulla from NSP were also given information about conservation measures related to fuelwood collection. As a result of their

increased awareness, owners of the improved chullas are generally more likely to use fuelwood in a more sustainable way. In addition, after learning of the benefits of improved chullas, many traditional stove users have expressed an interest in installing these stoves in their own homes.

About 65% of IC users said that they collect approximately 10 kg of fuelwood per trip into the forest, whereas 12% collect about 20 kg per trip. In contrast, 63% of TC users say they collect 20 kg or more per trip, while only 21% report collecting approximately 10 kg. These results, shown in Figure 3, reveal that improved chulla users collect less fuelwood than TC users.

Figure 3:
Average daily
collection of
fuelwood by
households

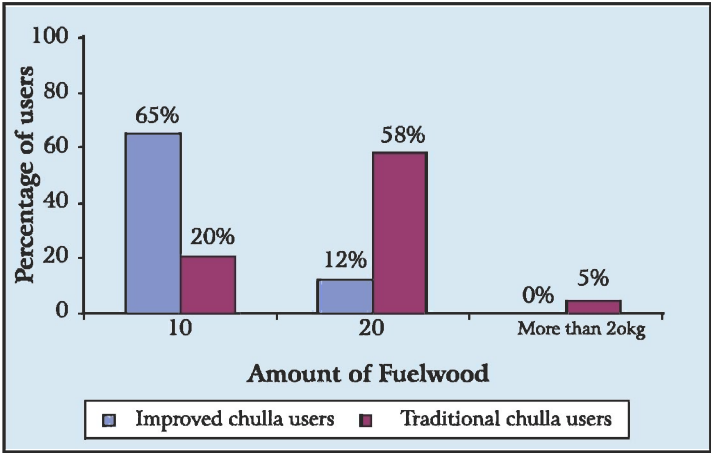
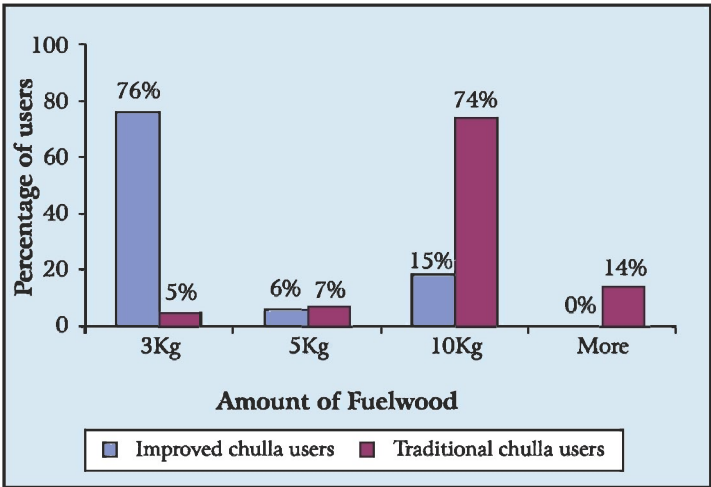


Figure 4:
Average daily
consumption of
fuelwood by IC
user and TC
user house-
holds





Among IC users, 76% of households said they consume approximately 3 kg per day, compared to only 5% of TC users. In contrast, 74% of the TC users said they consume about 10 kg of fuelwood per day, which is the highest percentage between the two groups. In practical use, the majority of users recognized that the improved chulla requires only a few kilograms of fuelwood per day, whereas a traditional chulla typically requires about 10 kg of fuelwood per day. The relative daily consumption of fuelwood for the two groups is shown in Figure 4.

Selling of fuelwood

Forty-seven percent of TC users reported that they sell fuelwood whereas only 6% of IC users said they do. Overall, only 12% of users of improved chullas reported selling 40 kg or more whereas 40% of the TC users sell 40 kg or more. The distribution of fuelwood selling by those interviewees who reported selling fuelwood two times or more a week is shown in Figure. 5.

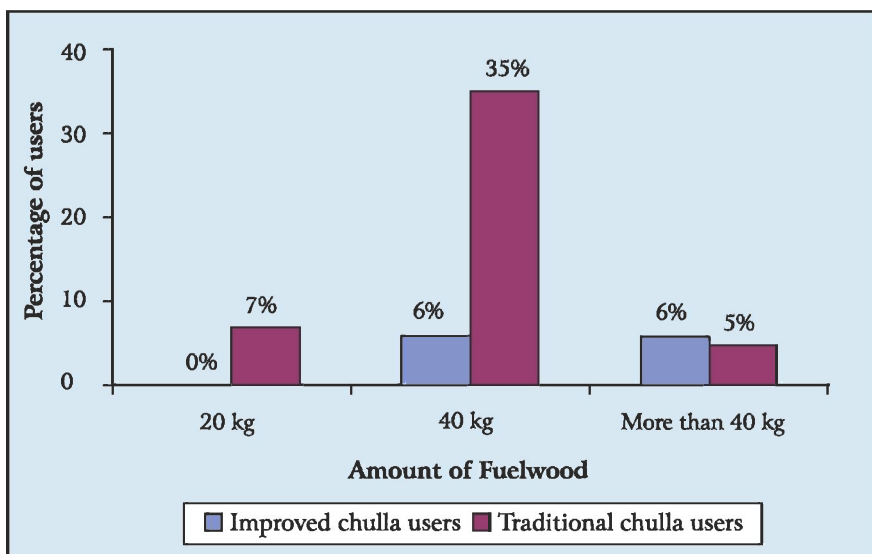


Figure 5: Fuelwood being sold per week by traditional and improved chulla users

Comparing the selling patterns of the two groups, I can conclude that there is a clear relationship between improved chulla usage and decreased engagement in the

fuelwood trade. Specifically, the use of improved chullas seems to coincide with less fuelwood collection in the study area, while those who do not use improved chullas are more engaged in illegal trade. One of the reasons why chulla users are less involved in fuelwood collection is that they also receive more support for alternative income generating activities from NSP than other people in the communities. From this analysis, we can conclude that the use of improved chullas helps to reduce pressure on forests because the stoves consume less than half as much fuel as traditional open fires (Practical Action 2007). Thus, the introduction of improved chullas is a vital tool for reducing pressure on forests.

Fuelwood transport

Regarding how fuelwood is transported for sale in the market, the study results reveal that users of traditional stoves rely more on motorized transport. The reliance on motorized transport of fuelwood indicates a higher volume of sales. Of the traditional chulla users that were interviewed, 35% use vehicles to transport fuelwood to market, 11% carry fuelwood on their shoulders. Among IC users, 5% carry fuelwood to the market with the support of their head, shoulders and the help of vehicles.

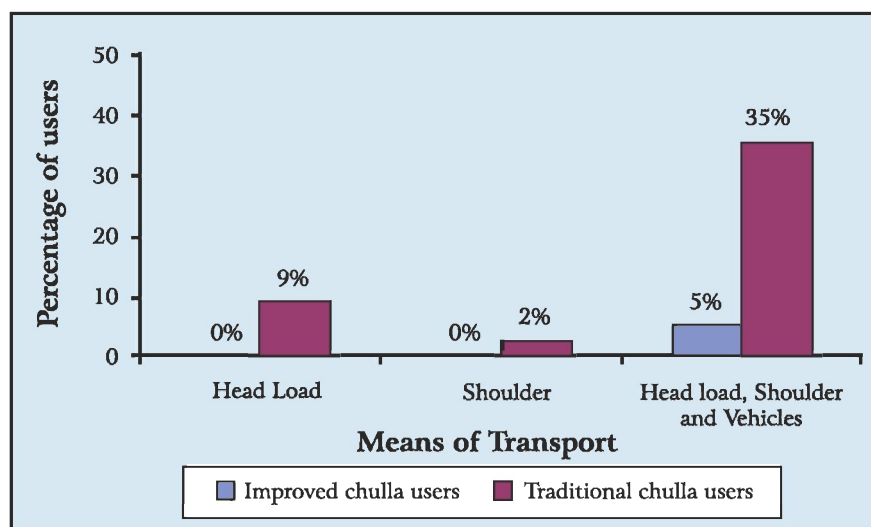


Figure 6: Means of transporting fuelwood to the market for sale



For some, a middleman is involved in the sale of fuelwood. These middlemen have a certain level of power and local FUGs are sometimes forced to sell fuelwood to the collector. If any FUG member sells fuelwood to a middleman, then they receive only about 1 BDT per kg, which is a very negligible amount. However, the middleman can travel long distances with the support of vehicles and receive a high price for the fuelwood. The different means of transporting fuelwood to the market for sale among IC users and TC users is shown in Figure 6.

Conclusion

The primary purpose of this study was to describe an overall scenario for improving local people's livelihood status and reducing their fuelwood dependence through the introduction of improved chullas in the communities surrounding Chunar Wildlife Sanctuary. This study highlights the effectiveness of the improved chulla program in minimizing the fuelwood dependence of local poor.

This study found that all of the female FUG members that were interviewed were primary users of forest resources. Although everyone depends on fuelwood for their household needs, the IC users were found to collect fuelwood on a more limited scale than TC users. During the dry season, IC users collect more fuelwood than during the rainy season and then store it for future fuelwood consumption. On the other hand, traditional stove users do not plan ahead for collecting fuelwood because they are dependent on traditional chullas and collect fuelwood wherever and whenever they find it. TC users lack the knowledge and training about the advantages of improved chullas and fuelwood collection that the IC users have received. As a result, traditional stove users are more likely to face difficulties regarding fuelwood collection and shortages.

Results further reveal that both groups depend substantially on the forest for fuelwood collection and consumption. However, TC users are much more reliant on the forest than IC users. It was also found that IC users discourage illegal trading of fuelwood. Some FUGs actively discourage the practice of going inside the forest for fuelwood. It is a matter of prestige, social custom and values for some individuals, who will try to not go inside the forest to collect fuelwood even though they are in a vulnerable economic situation. The study also found that traditional stove users consistently go into the forest for fuelwood more often, are more likely to sell

fuelwood, typically sell greater quantities of fuelwood, and use greater amounts of fuelwood in their stoves than improved chulla users. All of the interviewees are directly or indirectly dependent on the forest to some extent. After learning the advantages of the improved chullas, traditional stove users expressed an interest in installing improved chullas in their homes in order to reduce fuelwood consumption.

Concerning the differences in fuelwood sales between the TC and IC user groups, I conclude that there is a significant relationship between improved chulla use and the declined engagement in the illicit fuelwood trade. The introduction of more improved chullas would result in less participation in fuelwood collection for both household consumption and trade, and therefore less pressure on the forest. This is because improved chullas consume less than half as much fuel as traditional open fires (Practical Action 2007). More TC users are involved with illegal trade of fuelwood as a profession. Thus, the introduction of improved chullas is vital for reducing forest degradation and encouraging people who are involved in the fuelwood trade to reduce their participation in this illegal activity.

During the last two years, the improved chulla has been an important part of NSP's co-management activities in Chunati Wildlife Sanctuary. They have provided stoves and training on their use to the FUGs living inside CWS. Furthermore, FUG members have shown an interest in installing improved chullas after seeing the advantages of such chullas from their neighbors. However, due to the high cost of installing chullas, many households cannot benefit from this technology. As a result, some FUG members continue to extract fuelwood from the forest of the sanctuary. Therefore, NSP policy should be adapted to make improved chullas more widely available to people of all income levels, especially the very poor. In this way, joint efforts between NGOs and the government of Bangladesh can play a vital role in reducing the physical and financial costs of securing reliable, efficient energy – especially for the forest-dependent poor. Therefore, the government should take immediate action regarding improved chullas and promote coordination among organizations that are already working on this issue. In the long run, improved chullas can help enhance the livelihoods of local communities while reducing their dependence on forests in CWS and other protected areas of Bangladesh.



Acknowledgements

This study was made possible by funding from USAID provided through the Nishorgo Support Project. I would like to thank the project's facilitators for their intensive efforts during the four-week writing workshop, organized by the International Resources Group. I would especially like to thank Dr. Jefferson Fox for his valuable comments and help during the writing process. Thanks also go to Shimona Quazi, Bryan Bushley and all of the other participants at the writing workshop for their very helpful comments on this paper. I am also grateful to IRG, the National Project Co-Coordinator of NSP, the Chief Conservator of Forests, and all of the senior officials of the Forest Department involved in creating this opportunity for learning through the writing workshop.

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