



POLICY Brief

Number 23-07, September 2007

From Slash-and-Burn to Sustainability - A Study from the Chittagong Hill Tracts of Bangladesh

In Bangladesh many rural hill communities are in trouble because their traditional 'slash and burn' agriculture is becoming increasingly unsustainable. Farmers in these communities have to farm more intensively and this is causing a whole host of environmental and social problems. This challenge is not limited to this region, but is being experienced by traditional farmers across the developing world. To help find a solution to this crucial problem, a new SANDEE study looks at the economic and social feasibility of replacing shifting cultivation in the hill district of Khagrachari with settled agriculture and new soil conservation techniques based around orchard growing.

The study is the work of M. A. Monayem Miah and S. M. Fakhru Islam from the Bangladesh Agricultural Research Institute (BARI) and the Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU). They find that the soil conservation approach can be very profitable and that it brings significant environmental benefits. However, it is clear that there are a number of issues stopping local farmers adopting it. These include high initial costs, the time that it takes for the new system to become established and profitable, and problems associated with unclear land rights. In particular, the study finds that poor farmers, who cannot afford to invest in an approach that will only benefit them in the future, face particular problems. Such farmers will only abandon shifting cultivation if the returns are significant and if financial support and technical assistance is made available.

THE IMPACT OF SHIFTING CULTIVATION

In the Chittagong Hill Tracts of Bangladesh, a type of shifting cultivation called *Jhum* has been practiced for many hundreds of years. Under *Jhum* cultivation, vegetation is slashed and burnt between January and May and crops are then planted. These are harvested between June and December. The important *Jhum* crops are rice, turmeric, brinjal, chili, marpha (cucumber), sesame, arum, sweet-gourd and cotton. In the past, *Jhum* was practiced with a

fallow period of 15 to 20 years. This ensured the long-term sustainability of soil fertility. However, due to rapid growth in local populations, this fallow period has been reduced to between three and four years. This allows very little time for soil regeneration and has led to the loss of top soil and a decrease in biodiversity. Hill farmers therefore face a bleak future.

In response to this challenge, BARI launched the Hill Farming Research and Rehabilitation Programme (HFRRP) in 1998. The aim of this programme is to gradually replace *Jhum* cultivation with Multi Strata Fruit Orchards (MSFO). Under this approach, a hill farm is converted into a fruit orchard, interplanted with pineapples, over a period of 8-10 years. The fruit trees prevent heavy rain from directly hitting the topsoil of the hills. This results in decreased topsoil erosion. Under the HFRRP, BARI has established a number of MSFOs, mostly on non-tribal farmers' hills, in three hill districts of Bangladesh.

This policy brief is based on SANDEE working paper No. 24 -07, 'Shifting Cultivation And Its Alternatives In Bangladesh: Productivity, Risk And Discount Rates' by M A Monayem Miah and S M Fakhru Islam. The full report is available at www.sandeeonline.org



KHAGRACHARI – TRADITIONS AND DEVELOPMENT IN CONFLICT

Khagrachari district is part of the Chittagong Hill Tract (CHT), which amounts to about one tenth of the area of Bangladesh. Some half of the inhabitants of CHT belong to ethnic hill communities (12 tribes) while the rest are Bengali migrants from the plains. The Hill people are, in general, poor and illiterate. Their livelihoods depend on wage earnings and *Jhum* cultivation. Livestock and poultry provide additional income, as does the collection of timber, firewood and house-construction materials.

Shifting cultivation, *Jhum*, is a traditional crop cultivation system of the tribal hill people. Traditions and beliefs are part and parcel of the selection of *Jhum* lands. When they are selecting a site they usually take a bath, wear clean clothes, offer prayers before going out on their search. If a suitable site is found, they collect a lump of soil from the site for a 'dream test'. If they experience positive dreams, they select the land for cultivation. However, due to demographic pressures and a relative shortage of appropriate land, the choice of land available for *Jhum* has shrunk. Land ownership is a complex issue. Generally, people have settled wherever there is enough land. Over time, however, more and more lands have been registered under the name of private persons for agriculture and horticulture. Not surprisingly, this has led to tensions and disputes between those holding private property rights and those who claim traditional customary rights over the same areas.

ASKING THE FARMERS

Although this new MSFO farming approach is more environmentally sustainable than *Jhum* agriculture and has been found to increase cropping intensity and farm income, many traditional farmers are reluctant to adopt it. To find out why, the study assesses and compares the costs and benefits of *Jhum* cultivation and the MSFO approach. In particular, it looks at how farmers' perceptions about the future affect their willingness to move away from shifting cultivation. This approach highlights the way in which farmers weigh potential risks and returns when they make decisions.

Three areas of the Khagrachari district (Matiranga, Ramgar and Sadar) were chosen for studying MSFO. A total of 60 MSFO households were chosen and interviews were conducted twice during April and May 2005. The study of *Jhum* farmers was carried out in the Dighinala area. Forty *Jhum* farmers were randomly selected and information was collected on a weekly basis between May and December 2005.

COSTS AND BENEFITS

The study calculates the profitability of *Jhum* farming by assessing costs, such as human labour, seeds and fertilizer, and by calculating the sales value of the different crops that are grown. Projections for *Jhum* production over the next 25 years are made and the impact of different fallow periods is estimated. An assessment of the costs and benefits of the MSFO approach is also made for the same 25-year period. MSFO (for the first four years) are calculated from data collected from interviews. These costs include

Farmers' Responses to the Adoption of MSFO Technology

Reasons for not Adopting	Percentage
A. Willingness to Adopt (<i>N</i> =40)	
Yes	90
B. Reasons for not Adoption	
1. Technique of establishing MSFO is unknown	58
2. Require higher investment	42
C. Facilities Demanded	
1. Provision for supplying fruit saplings free of cost	39
2. Provision for full financial support to set up MSFO	36
3. Provision for providing training on MSFO	25



the price of fruit saplings, pineapple suckers, fertilizer and human labour. Ongoing maintenance costs are also estimated. The benefits of MSFO include the money received from the sale of fruits and the salvage value of trees.

It is clear that *Jhum* cultivation involves little cash expense and relies largely on the natural fertility of the soil. For example, about 75% of all labour and 100% of the seed stock is provided by 'family' sources. The net return per hectare from *Jhum* farming is Tk. 17,786 per year. In contrast, the initial cost of setting up a MSFO farm is Tk.106,254 per ha. Because of this high initial investment, farmers who adopt the MSFO approach have to pay out money in the first year. However, annual MSFO benefits increase substantially from the second year onwards (when they are Tk. 39,416 per ha.) up to the 25th year (when it is estimated that they will be Tk. 1,624,978 per ha). This shows that in the long term the MSFO approach is more profitable than *Jhum* agriculture. A *Jhum* farm will also typically use three times the amount of land used by a MSFO farmer. Therefore, if the gross cropped area is used to compare the two approaches, the total gain from switching to MSFO is even higher.

THINKING ABOUT THE FUTURE

Although the MSFO approach is more profitable than *Jhum* in the longer term, many farmers do not readily want to switch to the

new type of farming. It is clear that the initial cost of setting up a MSFO farm is a major deterrent: Tk.106,254 per ha, is beyond the capacity of poor *Jhum* farmers. This problem is compounded for *Jhum* farmers who enjoy only customary rights on their land; hence they find it risky to spend such large amounts on land that they do not fully own. The fact that there is also a lag between this initial investment and a flow of returns is a further deterrent, since many *Jhum* farmers find it difficult to sustain themselves and their families beyond one cropping season. Finally, many *Jhum* farmers know little about orchard farming. This further increases their perception of risk.

In general, a farmer may switch to MSFO farming when his gain from the switch is equal to or greater than his gain from *Jhum* farming. However, this decision is affected by a farmer's perception of the future pay-back he will get. The poorer the farmer, the more reluctant he will be to switch to the new approach. This is because impoverished farmers discount the future more heavily — they care a great deal more about what they have 'in hand', than they do about any potential future profits. Thus if farmers are very poor, only a very high return from MSFO will tempt them to adopt this new approach.



SANDEE

The South Asian Network for Development and Environmental Economics (SANDEE) is a regional network that seeks to bring together analysts from the different countries in South Asia to address their development-environment problems. Its mission is to strengthen the capacity of individuals and institutions in South Asia to undertake research on the interlinkages among economic development, poverty, and environmental change, and, to disseminate practical information that can be applied to development policies. SANDEE's activities cover Bangladesh, Bhutan, Nepal, India, Pakistan and Sri Lanka.

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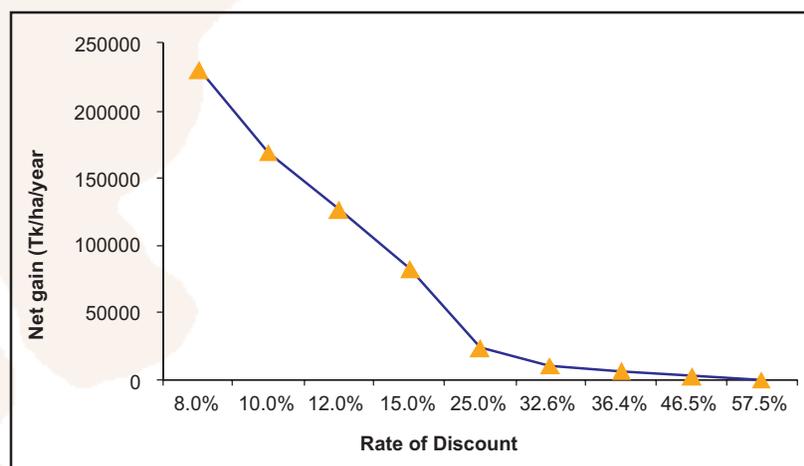
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This policy brief is an output of a research project funded by SANDEE. The views expressed here are not necessarily those of SANDEE's sponsors.

Annual Net Gain from Switching to MSFO Technology at Different Discount Rates



HELPING FARMERS TO MAKE THE SWITCH

Most hill farmers realize the importance of soil conservation and the harmful environmental effects of shifting cultivation. It is also clear that they are interested in the new MSFO approach and understand its benefits. However, of those willing to accept MSFO, 36% say that they need financial support, 39% want free supply of saplings and 25% need training. Some of the problems associated with the MSFO approach could be overcome if financial support and technical assistance are made available by state authorities. If farmers are made more aware of the benefits of MSFO, they could become less reluctant to start on this new venture. This can be done with the help of NGOs, the hill development authority and other organizations. Loans, provided at reduced rates of interest, should also help farmers overcome practical financial hurdles. However, it must be remembered that farmers embarking on an MSFO project will not be in a position to repay their loans in the early stages of their work.

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