Problems and Prospects of the Hilly Watersheds in Bangladesh, Priorities for their Conservation

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1. Introduction

Bangladesh with its population of 123.1 million and a land area of 14.757 million ha is one of the densely populated countries (834 persons/sq. km.) in the world with a per capita land availability of a mere 0.12 ha (Mondal *et al.* 2004). Most of the land surface in this country is formed by the recent delta and alluvial plains of the Ganges, Brahmaputra and Meghna rivers. Within the alluvial plain there are several slightly elevated areas of older alluvium called terraces. The highest areas are the hilly region consisting of a series of valleys and ridges varying in elevation between 70 and 1000 m on the northeast, east and southeast margins of the country (Fig. 1). Because of the geographic and geological conditions, most of the land surface of the country could be thought of having a number of water catchments or watersheds. Being a lower riparian country, watershed management bears a strong significance for the country's ecological and economic health. Although watershed boundaries are not very clear in the plains, in hilly areas as in Chittagong and Chittagong Hill Tracts, they are well defined (Khan 1991). The current environmental concerns now in the region are rapid depletion of natural forest resources, land and watershed degradation due to improper land use practices mainly by the migrants and the shortened rotational jhum cycles by some indigenous groups. These factors combinedly cause soil erosion, siltation of lakes and rivers and soil fertility decline thereby creating a food insecurity situation in the region (Khisa *et al.* 2006).

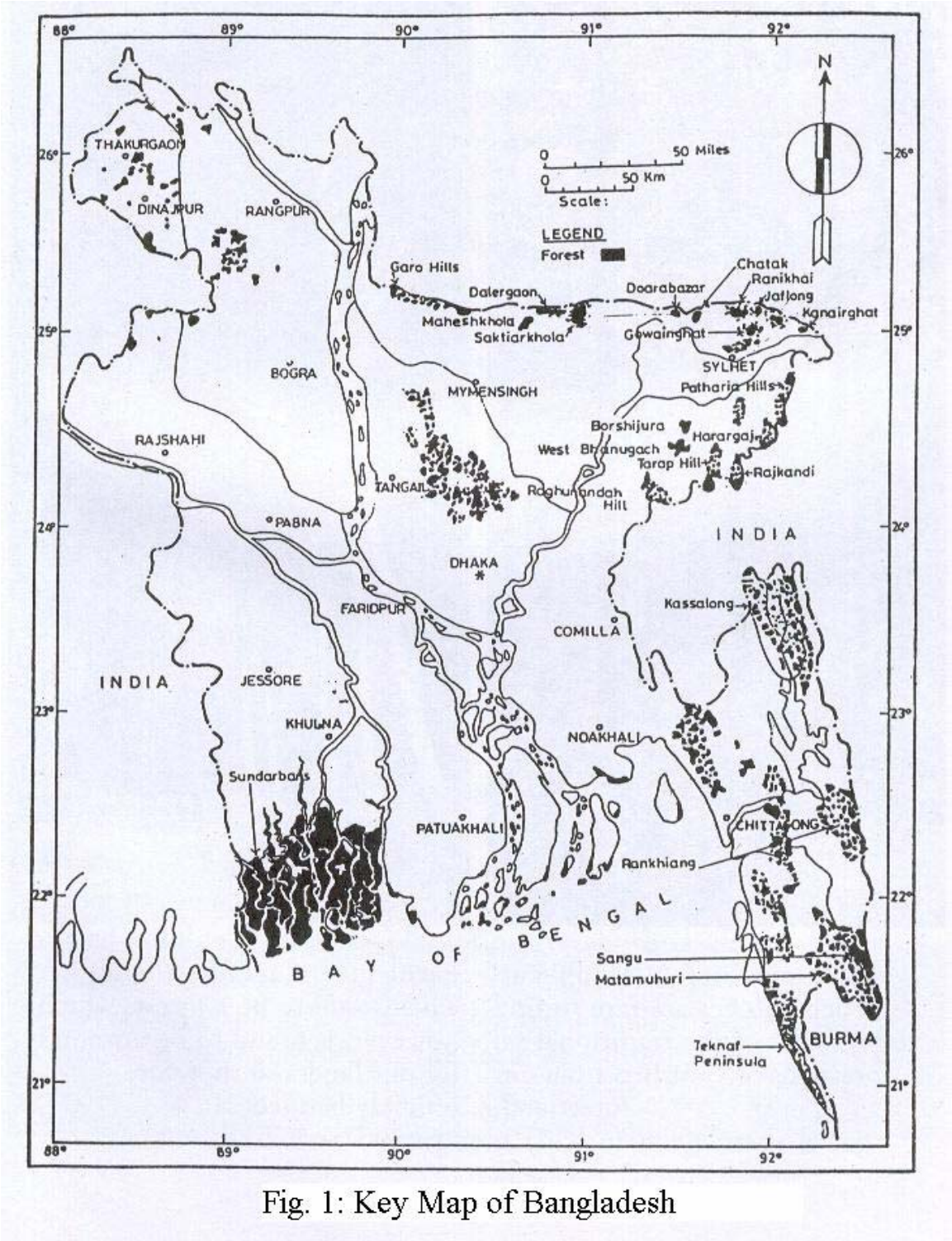

Fig. 1: Key Map of Bangladesh

1.1 Context of watershed conservation in the hilly areas of Bangladesh

Forests of the Chittagong Hill Tracts (CHTs) in the south eastern part of Bangladesh occupy about 30% of the nation's total forest area and represent the most valuable watersheds of the country. Their importance lies not only in providing soil and water conservation for sustainable natural resources management in this part of the country but also in supporting subsistence farming to 13 forest-dwelling indigenous communities. An area that consists of 77% sloping land was once covered by natural forests (Roy and Halim 2001) and used to principally support shifting cultivation. However, over the last two centuries the land use of the area has gone under a tremendous change that involved clear felling of forest trees to make way for establishment of mostly monoculture plantations of valuable timber species such as Teak (*Tectona grandis*) and fruit trees, and other economically important cash crops. Due to scarcity of land and flood havoc in other parts of the country almost every year people have been migrating to the CHTs. The population of the area, according to the latest census conducted in 2001, stands at 1.06 million, which is 0.14 percent of the national population of 129.25 million. Over a period of 50 years, the density of population in the area has gone up from 22 per km^2 in 1951 to 78 per km^2 in 2001, marking an increase of 354.54 percent. Population explosion necessitated an expansion of agricultural activities in the hilly landscape at the cost of environmental values of the watersheds. Degradation of watersheds accelerated due to the combined effects of deforestation and unsystematic practices of slash and burn agriculture. Watershed degradation has contributed to severe soil erosion and deterioration of water quality.

1.2 The key area of study

The study has been conducted in some critical of the CHTs where the forest user groups maintain traditional community-managed 'mauza reserves' or the Village Common Forests (VCFs). VCFs are crucial for watershed management as many of them contain headwaters of streams, natural springs and other aquifers. VCFs are large repositories of biodiversity. They are the homes of diverse animal and plant life (including herbs and plants used in indigenous medicine) which have significant potential for modern medical science. As access

to reserved forests is restricted, VCFs are the main sources of wood and bamboo required for house building, medicinal and other sustainable biomass needs of hill villagers. However, no attempts were made by the government agencies to formalize the management systems concerning the VCFs. VCFs have been declining both in numbers and in size due to various factors that controls sustainable livelihood of the hill people.

2. Scope and methodology of study

2.1 Scope

No systematic attempts were made previously to assess the potential of resource conservation by the ethnic communities in the VCF areas and neither relationship between the VCF resources and people's livelihood is well understood. Therefore, the present study has been undertaken to explore the livelihood and resource conservation strategy of the people that live in the VCF areas and to critically assess the relationship that exists between their indigenous knowledge of resource conservation and that of their livelihood patterns.

2.2 Methodology

In the present study, 120 households from 4 VCF villages 2 each from Rangamati and Banderban districts were interviewed with pre-tested structured questionnaires to collect information on livelihood and conservation approaches. An additional 40 non-VCF households (households that had not directly depended on VCFs) were also interviewed under the same procedure. Results from the preliminary study were used to frame the subject matter of this paper. However, year round seasonal variation in livelihood patterns and resource conservation practices of the VCF and the non-VCF communities are also being assessed to examine their impact upon resources exploitation and thereby evaluate the status of watershed conservation in the area.

4. THE KEY ISSUES AND PROBLEMS OF WATERSHED MANAGEMENT

4.1 *Jhum* and its impact on watershed conservation and people's livelihood

Traditionally, the communities practice a farming method called *jhum* which basically involves cultivation of food crops in forest land through clearing and burning of undergrowth in the dry season usually leaving a certain fallow period (3-15 years) between the two successive crops in the same piece of land. However, population pressure necessitated a higher production from an ever shrinking land base for *jhum* (due to inclusion of *jhum* land into reserved forest) that has resulted into a gradually shortened fallow period to as low as 2 or 1 year to date contributing to a sharp decline in *jhum* productivity and deterioration of forest ecosystem.

4.2 Monoculture plantation versus mixed cropping and their impact on watershed

The successive governments had leased out big chunks of forest lands to often wealthy individuals for cultivation of monoculture crops such as rubber and other horticultural species on the basis of economic considerations only, and thereby ignoring people's traditional user rights and values. Also land percels were distributed to ethnic communities to encourage monoculture based farming strategy. Unsystematic tillage in the hill slopes for establishment of monoculture based plantations has led to serious land degradation.

4.3 Natural resources use affecting watershed conservation and peoples' livelihood

The extent and intensity of exploitation of natural resources in the hilly landscape is an important controlling factor in the conservation of watershed as well for sustainable livelihood. Seasonality of resource extraction or harvesting of forest produces affects food security of the inhabitants as well as plays a key role in controlling soil and water quality in the watersheds.

4.4 Cultural operations and plantation establishment techniques

In the clear-felled natural forests, land preparation prior to establishment of plantation involves uprooting of tree stumps and burning of debri in the forest floor that leads to serious soil erosion and depletion in soil moisture. The most serious problem with regard to gardening of particularly pineapple and citrus fruits, and some root crops such as ginger and turmeric, is the direct exposure of soil surface to heavy downpour and surface run-off resulting into top soil

erosion which not only leads to gradually diminishing harvest of the concerned crops, but also ultimately renders the land virtually useless for cultivation or plantation purposes.

4.5 Apathy of the government agencies regarding the gravity of the problem

Bangladesh has lagged behind its neighbors in the promotion of watershed management largely because the subject failed to receive adequate attention from the relevant policy makers as well as the major international development partners. The reported increase in sedimentation and soil erosion in the CHTs, however, has significantly increased the level of concern in the Government. Forest Department is planning to introduce participatory agroforestry in the degraded land through adopting cropping models that would involve cultivation of agricultural crops by exposure of surface soil in between rows of trees which too may pose the indigenous communities to further environmental problems.

5. AN OVERVIEW OF ISSUES EXPLORED

The present study carefully evaluates and compares the ethnoecological knowledge and practices of resource management in the VCF communities with that non-VCF communites. A comparative assessment on resources use between the VCF and the non-VCF communities has been done and its impact upon conservation of watershed and local livelihood has been examined. Existing techniques of plantation establishment or forest management practices between the VCF and non-VCF communities have been compared.

6. THE MAIN FOCUS OF THE PRESENT STUDY

The key focus of the study is to explore the indigenous techniques of resource conservation and livelihood by looking at the system from a holistic point of view including biophysical as well as socio-politico-cultural dimensions.

7. KEY RESULTS AND LESSONS

7.1 VCF management

Since 1900, VCFs represent excellent examples of traditional practices of forest management by the indigenous communities in the CHTs. There is a management committee headed by *karbari* (village head) who manages it with the customary

rules and laws. The natural forest land under VCF is never used for *jhum* cultivation. Harvesting of forest products from the VCFs are only permitted by the village leader only when there is demand for internal use of such products and not for commercial sale or for individual cash earning. Timber is not generally extracted from VCFs except when required for some community uses such as construction of school, prayer centers or any other community purposes. However, firewood, culinary herbs and non-wood products such as bamboos are allowed to harvest. Very poor villagers, who cannot afford to buy house construction materials, are given special consideration to harvest wood, bamboo and sun grass with permission of the VCF management committee. Generally forest resources are open for all the households of the community but they require permission from the community chief. One striking example of plant conservation method practiced by the VCF communities is that only the local *kabiraj* or medicine men that would treat the sick persons are permitted to enter VCFs for collection of medicinal herbs.

7.2 VCF as means of conservation and livelihood

Presence of good understorey vegetation consisting of many herbs and other plants is the primary indicator of good site conditions that prevail in the VCF areas which are helpful in soil and water conservation. In some places communities are totally dependent on VCFs to sustain water flow of perennial stream so as to meet year round water requirement. Besides VCF management, the indigenous techniques of *jhum* cultivation such as terracing, minimum tillage, controlled burning of debri, mulching and gully control by vegetative cover appeared to have a time-tested and proven positive impact on soil and water conservation. Generally people in the VCF communities have been found to be more meticulous in gathering forest produces or hunting animals compared with those in the non-VCF communities, that is, they do not harvest or hunt anything in short supply and they strictly maintain seasonality in harvesting which therefore help in regeneration of these resources thereby securing their conservation. Under the current scenario VCFs did not appear to have contributed significantly to daily livelihood needs of the communities because most members of the families either have to work as daily wage-laborers or depend on government food subsides for supply of staple food (rice) while some practice *jhum* for subsistence. However, annual overhead costs towards construction and repair of houses are

largely offset through harvesting house construction materials from the VCFs while gathering of culinary and medicinal herbs from the VCFs remains a year round activity as essential supplement to dietary and medicinal requirements for the communities. In some cases, pressures on VCFs in response to an increased demand of forest produces from the communities pose as threat to their long term sustainability.

7.3 Livelihood enhancement for the VCF communities

For reducing the already emerged pressure on VCFs for collection of forest produces at increased rates it seems practicable that appropriate farming technologies in line with indigenous knowledge may be developed for enhancing livelihood opportunities of the communities involved. Respondents particularly from Banderban who were familiarized with 'Sloping Agricultural Land Technology' or 'SALT' appeared to have showed interest for it as it helps formation of natural terraces through gradual stabilization of soil as farming progresses in contoured lines of hedgerows of suitable plants among forest trees.

7.4 Policy implications of research results

The study demonstrates that there is a huge potential of VCFs in conservation of forest, soil and water in some critical locations, and that there is a wealth of indigenous knowledge and cultures involved in management of these resources. In the face of government's disappointment in tackling land degradation problem in the CHTs despite implementation of a whole host of projects, these VCFs present themselves as glimpses of light at the end of tunnels. VCFs could certainly act as models of resource conservation in the degraded hilly landscape. However, a big constraint to these community forests is lack of tenure security. There is pressure from the Forest Department (FD) to acquire the land for monoculture plantation purpose. This trend must change, and existence of VCFs needs to be formalized in context of the land use policy for the hilly land of the country. Not only formalizing them would be sufficient, but also adequate measures should be taken for rejuvenation of the already deteriorating VCFs.

8. CONCLUSIONS AND RECOMMENDATIONS

The forest dependent communities depend on forest resources for their livelihood. They need bamboo, pole, cane etc. for their house repair and fire wood for domestic consumption, medicinal plants etc. for their medication and many other minor forest produce in their daily diet. These resources are gradually shrinking with the decrease in sizes and numbers of primary forests such as those represented by many VCFs. VCFs are not recognized as common property of the communities. There is no technical and financial support from any government departments to maintain these forests. The important role of these community protected forests in the livelihoods and culture of the indigenous communities should be recognized, including their function in local water supply protection and as a social safety net for the poorest. Therefore, if the VCF areas remain protected and communities that look after the VCFs are given better living conditions through introduction of suitable farming technology among others, the hilly watersheds may in parts save themselves from facing further degradation. The long term sustainability of the VCFs will depend upon how useful the local communities feel that VCFs are in their everyday life. Given the rising prices of timber and bamboo, among other reasons, the economic needs for VCFs will likely remain for a long time. Sustainability of VCFs is threatened by population pressure, scarcity of agricultural land etc. These threats will have to be met primarily by the villagers themselves although external agencies can extend a helping hand. The fact that VCFs have survived for such a long time, but with a gradually diminishing area, suggests both that some VCF communities can sustain their VCFs while others have failed. Therefore, lessons will have to be drawn from the successes and failures. Awareness and capacity building seem to be the important measures for helping sustainability of the VCFs. Ultimately, the tenurial security of the VCFs will perhaps be crucial factor towards the long term sustenance of VCFs. This will call for political support of the Government.

9. References

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