

WATERSHED MANAGEMENT AND SOIL CONSERVATION IN THE HILLY AREAS OF BANGLADESH

M. Omar Ali and S. M. Ruhulamin

(Bangladesh Agricultural Research Council, Dhaka)

Introduction

Bangladesh has a large population (95 million) spread over a habitable area of just over 110,000km².) The rest of the total area of Bangladesh (143,700km² consists of major rivers and estuaries, mountains and highland forests, tidal mangrove forests, and general tree cover. The majority of Bangladesh lies within the flood plains of three great river systems, the Ganges, the Brahmaputra, and the Meghna. The monsoon accounts for 80 per cent of the total annual rainfall between May and October, and is used chiefly to the production of rice and jute. During the dry season a variety of other crops are grown, including wheat and oilseeds. In all, the hills account for about 12 per cent of the total land surface area of the country and are largely in the Chittagong and Sylhet regions.

In Bangladesh, priority has so far been given to construction of dams, irrigation development, and to flood protection in the plains. The Bangladesh Water Development Board has been given the supervising authority. But in the hilly areas, where there is not a single institution to manage the problems relating to soil conservation and watershed management, active soil erosion and land degradation are taking place at an alarming rate.

Problems in Watershed Management

These are caused by a variety of factors:

In Sylhet, the cultivation of unsuitable crops such as pineapples are causing massive erosion because they are grown in rows oriented vertically down the slopes and the inter-row spaces are highly vulnerable to sheet and rill erosion. Another factor is the burning of sun-grass stubble at the end of the dry season to stimulate regrowth. As a consequence; the following heavy monsoon rain causes the denuded hillsides to erode. Both cause the deposition of sand into the low land paddy fields and into the rivers, which rise and cause river bank erosions and eventually major flooding. During 1981, two road bridges were washed away. Previously, the Forest Department could raft logs and bamboos down these rivers for six months of the year, but now due to flooding this is only possible for two and a half months.

In the Chittagong Hill Tracts, soil erosion is mainly caused by shifting cultivation. The people who practise this are known as *jhumias*, and they used to plant the hillside without really cultivating the soil. The seeds^a were planted near the surface and harvested progressively throughout the year. When the area showed signs of declining fertility it was allowed to revert back to the forests for 8 to 10 years, thus gradually rebuilding its fertility and soil structure. Population pressure and reduced availability of agricultural land due to the construction of the Kaptai Hydroelectric Dam have sharply reduced the timespan that the land is left to rejuvenate. It is now down to about 4 to 5 years. Another reason, for land degradation in this area is the planting of rubber trees on bench terraces cut out of steep slopes of sandy soil, with little or no ground cover.

The Government is now taking steps to improve the situation. The multi-sectoral Chittagong Hill Tracts' Development Project (funded by the Asian Development Bank and UNDP) is resettling the tribal people on individual 2 to 3 hectare plots in three catchment areas (Myani, Changi, and Kasalong). One-third of the population of the valleys are being resettled in villages of 50 to 100 families, with rural development facilities such as schools, access roads, and health services. The Bangladesh Agricultural Development Corporation (BADC) is providing seeds and fertilisers to the forest dwellers.

The Forest Department and the Department of Agricultural Extension (DAE) are also resettling *jhumias*. The DAE does so on an individual basis, giving credit for clearing, cultivating, and preparing the land, repayable over 10 years with a 3 year moratorium. The planting material is given free of charge and consists of mixed orchards that take 8 to 10 years to mature.

The Forest Department also works with groups of families, combining afforestation with resettlement. The plantations consist of long rotation high-value timber species and short rotation pulpwood species. During 1985 to 1990, it was planned to carry out forest plantation on 40,000 ha. Under a scheme that was initiated in 1962, land that had eroded has been identified and is now classified as Protected Forest. With this afforestation scheme, there is also provision to rehabilitate 3,400 landless shifting cultivators in the operational areas of afforestation. The rehabilitation includes land allotment and financial assistance for the construction of houses and the supply of agricultural and horticultural inputs for the development of the land.

Despite all these measures, further research and training needs to be carried out. In 1964 Soil Conservation and Research Station was established at Ramgarh and is now called the Chittagong Hill Tracts' Agricultural Research Station. Specifically the station researches into soil use and conservation, combining the production of different kinds of arable crop with the plantation of fruit trees and timber without losing the fertility of the topsoil. Training is also provided to the extension staff and interested farmers, in the technology that is available on soil conservation and hill farming. Although experiments have been done on infiltration rates of different soil types, and the basic data on rainfall intensity maintained, results have not been distributed widely enough.

Before a cohesive policy can be devised, data must be gathered on the entire range of conditions relating to soil, geology, climate, natural vegetation, and land use. The urgent need, however, is for an operational type of research that will produce measurable trends in gross hydrological behaviour in various land use patterns, such as natural forests, plantation forests, horticultural forests (tree planting), and *jhum* cycles. The correct combinations of soil conservation measures, cropping patterns, crop variety, and fertiliser application for optimum production on a long-term basis while keeping soil losses within reasonable limits, need to be ascertained through research and experiment.

Watershed management will reduce the siltation of river beds including the Kaptai Hydel reservoir, through the control of erosion, and the improvement and maintenance of the productive capacity of the soil. Subsequently, flood hazards in the piedmont plains will be reduced and efforts could be made to increase hydro-power production. The major problems in relation to the eastern hills are (a) uneven distribution of rainfall, (b) shifting cultivation by the tribal forest dwellers, (c) a high deforestation rate, and (d) increased population pressure in the hilly areas due to migration from the plains.

Problems in Planning and Coordination

There is no overall plan to tackle the problem and no single department/organisation within the Government, with the manpower or required expertise, to formulate and implement integrated policies. In the Chittagong Hill Tracts various agencies are involved in the resettlement of displaced families but lack of planning leads to settlement often being on very steep slopes, without being made the provision for the supply of water or fuelwood, or adequate plots of land. At the present growth rate, the population of Bangladesh might rise to 140 million by the year 2000. To feed the people will require a drastic increase in production from the existing land under cultivation or an increase in the area under production. The present cropland is already being extensively cultivated and the possibility of further expansion of cultivation lies in hilly areas only. At present, the hilly areas in general though often cultivated with cereals, vegetables, fruits, as well as forests are not being properly used. This should not continue.

In 1982, the Government formed a task force to investigate, report, and advise on soil degradation problems. It recommended that, the Government should form a Division of Watershed Management and Soil Conservation and approach an international funding agency for assistance in training and the provision of expert services; that legislation should be drafted for the control of erosion; that immediate action should be taken to control the deteriorating situation on the rubber estates; and that the Task Force should remain operational until such time when an effective anti-erosion capability had been achieved. The Task Force also prepared a project document for a Soil Conservation, Training, Research, and Extension Project for increased agricultural production.

After a lapse of two years, the Ministry of Agriculture reconstituted a multidisciplinary Task Force to review the earlier report and the proposed document on Soil Conservation. It was recommended that an independent organisation be created under the name of the Department of Hill Agriculture, Soil Conservation, and Watershed Management (HASCWM), under the Ministry of Agriculture; that legislation be framed in connection with the control of soil erosion, particularly on two major issues: (a) to give HASCWM the power to close an over-cultivated area or stop bad land use practices, and (b) to define the soil conservation practices needed in each area; that a National Coordination Board be set up drawing members from all concerned agencies; and that the proposed Board undertake the considerable research needed to find the correct combination of soil conservation and cropping practices, and that trained staff be thereby forming a nucleus for the Department. The recommendations to take immediate action on the rubber estates and to explore the possibilities of getting both technical and financial assistance from any donor agency, were reiterated.

Conclusions

The conditions prevailing in the Chittagong Hill Tracts, increased land abuse, and the consequent stagnation of agricultural output render economic and social betterment a challenging task. There is an urgent need to develop the productivity of the area and thereby achieve a greater commercial interchange and equity of economic and social benefits.

In view of the limited scope for expansion of arable lands in the hilly areas and uncertainties in improving irrigation facilities, the development and application of improved technology is immediately required to increase the productivity of hill farming areas. Practices that have evolved over the years should be reassessed and adapted to present needs and should include the various components of the farming systems.

It should be emphasised that in order to tackle the problems of soil erosion and land degradation on a natural basis, and because of the multidisciplinary expertise required, there is a need for the proposed, separate Department of Soil Conservation and Watershed Management, with its headquarters in Chittagong. Because of the interdisciplinary and inter-institutional complexity of the problem, such a department could provide the coordination and integration that leads to successful management on a national scale.

At the present growth rate, the population of Bangladesh might rise to 140 million by the year 2000. To lead the people to a better life, it is essential to increase the production of food and other necessities. The present expansion of cultivated areas is being extremely slow and the possibility of further expansion of cultivated areas is being extremely slow. At present, the rate of expansion of cultivated areas is being extremely slow. At present, the rate of expansion of cultivated areas is being extremely slow.

It is essential to increase the production of food and other necessities. The present expansion of cultivated areas is being extremely slow and the possibility of further expansion of cultivated areas is being extremely slow. At present, the rate of expansion of cultivated areas is being extremely slow. At present, the rate of expansion of cultivated areas is being extremely slow.

It is essential to increase the production of food and other necessities. The present expansion of cultivated areas is being extremely slow and the possibility of further expansion of cultivated areas is being extremely slow. At present, the rate of expansion of cultivated areas is being extremely slow. At present, the rate of expansion of cultivated areas is being extremely slow.

It is essential to increase the production of food and other necessities. The present expansion of cultivated areas is being extremely slow and the possibility of further expansion of cultivated areas is being extremely slow. At present, the rate of expansion of cultivated areas is being extremely slow. At present, the rate of expansion of cultivated areas is being extremely slow.

It is essential to increase the production of food and other necessities. The present expansion of cultivated areas is being extremely slow and the possibility of further expansion of cultivated areas is being extremely slow. At present, the rate of expansion of cultivated areas is being extremely slow. At present, the rate of expansion of cultivated areas is being extremely slow.