CHAPTER 7

Conservation and Management Plan

Interference of man, as a geomorphic agent, in the functioning of geographic system and frequent recurrence of hazardous morphodynamic processes, are mainly responsible for the intensification of accelerated process, resulting in the degeneration of geomorphic environment. Management of degrading geomorphic environment is necessary by adopting conservative measures which strengthen and intensity the self regulatory and self maintenance mechanism of geomorphic system.

In Buriganga river basin, major impact of human on geomorphic and environmental conditions are generated by land use change through the reduction of forested land by extension of agricultural field. The traditional shifting cultivation in the upper catchment’s is also posing a threat to the environment in the form of soil erosion, diminished soil fertility, low water retention capacity in the hills as well as loss of biodiversity. Thus, management of geomorphic environment is necessary to re-strengthening the degraded land and water of the study area.

A balanced land use system will be found to be the most acceptable to control degradation of land. There have been efforts at minimizing the undesirable impacts of traditional Jhum cultivation in the hilly area through necessary scientific intervention. Change of traditional Jhum practice to modern agro-forestry is necessary for the maintenance of balanced environment of the basin. Agro-forestry is a sustainable land management system which increases the overall yields of the lands, combined the trees and shrubs with agricultural crops or livestock on the same unit of land, either simultaneously or sequentially. The agro-forestry based production systems envisage to conserve and improve the land and optimize the combined productivity of the trees and agricultural crops. Agro-Silviculture and multipurpose trees and shrubs are the two remarkable measures under agro-forestry system to restrengthen the deforested area through the shifting cultivation of the hilly parts of the basin. In Agro-Silviculture, the land is used for the concurrent production of agricultural crops including the fodder crops, trees for fuel and shrubs. The forest tree species are raised and managed on farmlands for their ability to produce not only wood but also leaves and fruits that are suitable for fodder and food in multipurpose trees and shrubs. Similarly the judicious
application of the fertilizers and other input including adoption new techniques and modern measures for agriculture not only to help improvement of crop yields but also improves soil conditions by increasing infiltration capacity as well as control the degraded ground water quality. This afforestation programme on land is to protect the land from erosion and conserve soil moisture and produce fuel, fodder, fiber, fruits, and timber to meet the need of the people. It involves not only low maintenance cost but also more profitable in the long run through sustained supply of fuel, fodder and timber to the local population. This also increases the agricultural productivity and adds aesthetic beauty to the landscape and environmental restoration of the barren sites.

The soil erosion issue in Buriganga basin seems to be related to nature as well as human induced. Human-induced soil degradation, deforestation, removal of natural vegetation and overgrazing are reported to be the main reasons for loss of topsoil and terrain deformation due to soil erosion in the hilly regions of Buriganga basin. Soil erosion is resulting from conversion of forest land into agriculture and cultivable waste land in the villages of Karbi Anglong and Nagaon. Soil erosion severely affects hilly areas in the watershed because of steep sloping fallow land. Certain conservation measures can reduce soil erosion in Buriganga basin. Following measures have been recommended under soil conservation activities-

a) Tillage and cropping practices, as well a land management practices, directly affect the overall soil erosion problem and solutions. When crop rotations or changing tillage practices are not enough to control erosion on a field, a combination of approaches or more extreme measures might be necessary. For example, contour plowing, strip cropping, or terracing may be considered.

b) The cropping systems tried under double cropping are mainly rice, mustered, potato, sugarcane etc.

c) An afforestation activity have been employed in the study area through the plantation on government and private waste lands to reducing rate of soil detachment.

d) Agroforestry with sal, bamboo and other tree species are allowed to grow in the fallow and scrub lands on the hilly areas of the basin.

e) Nala bunds are useful for collecting soil and water to ensure the eventual growth of protective vegetation and to check channel erosion.
In Buriganga basin, stream bank erosion and events as like flood has exhibited sudden changes due to deforestation in the catchment and clearing of stream bank protective vegetation, unplanned extraction of sand and gravel etc from bed and bank. Although the scenario of flood and bank erosion in the lower catchment area of Buriganga basin is within the safe limit, the low socio-economic status of the population of the study area may turn the situation to be more complex. It is because of the fact that most of the population of the region are dependant on forest resources and sand and gravel extraction. Therefore, for sustainable development of the region, it requires as a plan for assessment and management of river channel change.

The expansion of human activities into the natural environment, manifested by population growth, deforestation, expansion of agricultural activities, construction of roads and building has reduced the area of wildlife habitat and increased man-animal conflict in Buriganga basin.

The following measures may be taken to increase animal habitat and reduced man-animal conflict in the study area-
1. to initiate intensive agriculture replacing traditional agriculture to stop expansion of agricultural fields towards animal habitat.
2. to encourage agro-forestry or community forestry in the non cadastral villages of Karbi Anglong and villages of Buriganga Plain within Nagaon district to discourage unplanned cutting of trees, bamboos and grasses etc.

The Buriganga river basin is affected by fluoride contamination in drinking water especially from the sources of groundwater and hazardous for dental fluorosis. Sustainable solutions to drinking water contamination are urgently needed. To present a fluorosis hazards, it is imperative that safe water supply is made available, with more emphasis on surface water sources as they are generally free from fluoride contamination. Fluoride contamination can be prevented by using alternate water sources, improving the nutritional status of population at risk and removing excess fluoride.

Alternative water sources are surface water, rainwater and ground with water low fluoride content. Rainwater is much cleaner water sources and may provide a low cost simple solution. Rainwater harvesting is potentially an effective and cheap method of storing clean drinking water. It is the primary source for all water and is one of the
present forms of water, without any groundwater contamination. Adequate calcium intake is directly associated with a reduced risk of dental fluorosis. Vitamin C is also safe guards against the risk of fluoride. Though, measurable to improve the nutritional status of an affected population might be an effective supplement to the technical solutions of the problems. Various strategies are being worked out for fluoride mitigation, including identifying surface sources and drawing water from them, providing de-fluoridation units at habitation levels as well as household's levels, de-silting tanks and recharging groundwater to dilute fluoride level in the aquifer. Extensive research has been done on various methods for removal of fluoride from water and wastewater based on the principle of absorption, ion-exchange, precipitation coagulation, membrane separation process electrolytic de-fluoridation, electro dialysis etc.

Geomorphic processes such as river (fluvial processes), soil erosion and mass movement (slope processes) are the dynamic actors that help to shape the landscape. The intensity of these processes can vary greatly and when certain thresholds are surpassed these processes manifest themselves as geomorphic hazards.

In the present study area to develop a model, a plan has been developed to identify how the human's interference with the natural environment causes natural hazards and then natural hazards interfere with the socio-economic environment of the population. The model will help in assessment of pattern and intensity of natural and human induced hazards and preparation of management plan for solution of the problem through multi disciplinary approach (Fig: 7.1).
Fig: 7.1 Structure of Plan for Evaluation and Preparation of management strategy, Buriganga basin

Development of plan/strategy for management of hazards

Evaluation

Multidisciplinary and integrated assessment of the problem

Balanced land use system

Understanding of cause and effect of geomorphic hazards

Loss of life and property, reduction of Agricultural area and bank erosion

Flood, soil erosion and Bank erosion

Geomorphic processes

Geology, climate, topography and land use

People’s participation

Understanding of human induced hazards

Soil erosion, degradation of forest area, human health, man-animal conflicts

Degradation, habitat change, water quality, extraction of sand, gravel etc from river bed

Human induced processes

Population growth, development activities and land use change

CONTROLS