Chapter IX

Nature/Society Interface and Man-made Hazards

9.0. Introduction

Beaujeu-Garnier (1966) stated that the unity in geography rests on a single theme, the linkages and interrelationship between man and his environment.

Presently geographers are concerned with mainly different viewpoints regarding ‘man’ in relation to nature. However, between the physical environment and human activity, there is always a middle term, a collection of specific objectives and values, a body of knowledge and belief, in other words a cultural pattern (Biswas, 1981). Ecosystem touching upon realities is mainly identified in areas of primary occupation, because man in these occupations is bound to face either the environmental resistance of natural advantages in his day-to-day life in a more realistic manner, than an industrialized or urban society.

9.1. Forest Society Interface

It may be easy to conceptualize the field through short terminology of man-nature interface; but it is the hardest of all jobs to define its limits or to enumerate all meaningful sub-area of interests which can be tackled by methods and tools devised and applied exclusively by the geographers.

The land water interface and the forest village interface are the two major areas, which are drenched with several socio-eco-environmental problems. The wild animals with the dearth of food, try to enter the village adhering the forest. As the mangrove forests are receding, the deterioration of natural habitat occurs.

The land water interface is massively affected with deforestation and saline water influx.
The large forest areas of India have been shamefully and wastefully denuded of valuable timber not for the work of the cultivators but for the work of the contractors.

It was realized that in the name of national interests, cultivation of land was shown as forestlands, but without any actual tree cover, it was treated as encroachments. Adivasis (Tribal People) living near forests were discouraged from using the forests. The Government tried to obtain more and more revenue from the forests. India’s technically skilled professional forest service thought mainly of increasing the revenue from forest, treating adivasis as the enemies of the forests.

9.1.1. Deforestation

In the Sundarban, the forests have gained importance as the essential cooking fuel, building materials and food. This is the scenario observed in most of the rural third and developing countries.

Mangrove forests, covering about 17 million hectares along tropical coasts have been waning and declining in recent years. Mangrove forests are often greatly burdened by population and many of them are now on the verge of complete destruction; problems are also complicated with various other man-made impacts, which destroy the habitats. Slow decline of forests in tropical tidal zones are likely to continue in the future and the general public is not likely to become seriously concerned unless these are accompanied by some dramatic events such as the collapse of fish stocks and a massive contamination of oysters, which can attract the notice of politicians.

It has been observed that deforested area within the Sundarban region of West Bengal has been on the rise in the past century. It has also been estimated that the mangrove coverage has
shrunk from 9630 square kilometers. The major cause for this depletion has been land reclamation for human settlement.

9.1.1. Impact of Deforestation

Deforestation as well as forest degradation often creates negative consequences within the mangrove ecosystem.

a) Deforestation has affected the Sundarban on a regional scale by altering heat flux, precipitation and albedo. In future it may lead to climatic changes also. The gradual depletion of the largest carbon sink in the region would increase global warming and ultimate change may occur of the climate of entire South-East Asia.

b) It is felt that the continued erosion of mangrove vegetation on the coastal belt of Bakkhali will gradually lead to its submergence, because the island will not have any forest cover to prevent soil erosion or stand as barrier preventing occasional cyclones.

c) With the felling of mangrove species, the associated fauna is not able to find its natural habitat. Gradually, this will lead to the extinction of associated fauna as well.

d) It is found that the indiscriminate felling of trees has created shortage of resources and can even cause irreversible change, which may have adverse impact on the ecosystem. The indiscriminate felling of the mangroves has created a shortage of fuel wood and drinking water. There is also a chance of submergence of Kolkata if the forest depletion continues at this rate.

e) Deforestation has its impact upon the natural environmental systems. Deforestation decreases the shade cover, which leads to the gradual erosion of the topmost layer of the soil and also the dead remains of plants and animals. Gradually its effect is felt upon the local climate. Intensified rainfall and increased insolation, increase in the
rate of evaporation finally leads to flooding and top soil depletion. Gradually, siltation of the river bed at a rapid rate leads to the reduction in carrying capacity of the river. The salinization of land and water has been the major cause for less agricultural production over the years. The major transformation occurred from fresh water to saline water ecosystem.

f) With the decreased evapo-transpiration and water retention capacity several parts of reclaimed Sundarban have become prone to aridity.

g) Another major impact of deforestation is dislocation of the major or whole communities. This is responsible for pressurizing people to migrate elsewhere in search of food and shelter. The fate of ecological refugees is quite alarming.

9.2. Problems of Man Vs. Forest

The natural cycles, flora and fauna never create problems unless they are disturbed and man decides to extend his mastery or control over the land. When this occurs in a negative manner, the entire ecosystem is disturbed.

With the absence of suitable alternatives, the poor villagers adhering the forest have no other means of survival than relying heavily on the forests. No forestry operations or interference is allowed in the core area of the Tiger Reserve. However, as tigers are concerned, man's greed at times becomes quite difficult to control. The tigers make a very lucrative business in the far eastern market.

Another major problem is the need of development. The policies aim at uninterrupted development of Sundarban. The gradual tendency towards providing employment (to the local people) gives stress towards setting up industrial units, which flout environmental
norms. Any oil spill in the tidal locality would carry the toxic effluents far inland. The threat would be massive to the marine habitat.

Way back in 1986 it was found that within the Tiger Reserve, 35,330 people were engaged in forest related activities. However, when man resides within the habitat of a top predator it is likely for the humans to form an easy prey with the rapid depletion of forest cover.

9.3. Poaching

Hunting and poaching resulted in a sharp decline of the different rare species quite unique to the Sundarban. Besides tiger, exploitation and poaching of deer, wild pig, birds, reptiles, turtles and various other invertebrate fauna is also an important aspect where negligible or no proper attention is given by concerned authorities. Killing of tiger indiscriminately led to their loss in huge numbers until 1973, when the tiger population came down to 135. Obviously it is found that the poachers dislike to obey the forest protection laws some times in connivance with the forest guard or local people.

9.4. Man in Tiger Land or Tiger in Man Land

It is found that the ever-growing population and land-acquiring tendency poses a major threat to our tiger population resulting in mounting human-animal conflict.

Another threat to the tiger comes from developmental activities, which often leads to the encroachments of the natural areas. The tiger and the mangroves maintain a unique ecology with the dense inaccessible forests protecting the tiger and the tiger with its reputation of being a man-eater protects the Sundarban. (Gadgil and Guha, 1992)

Since the launch of Project Tiger in 1973, the human inhabitation around areas has increased with the consequent pressure for land and natural resources like the grasslands and forests, many of which were once home of the tigers.
Large tiger areas have been fragmented and the tigers find themselves confined in smaller groups, thus becoming unsuitable for survival and breeding. The poor villagers destroy the prey base species, such as deer and wild boar for food leading to increased attacks on man and his livestock. (Chattopadhyay, 2002)

9.5. The Reasons behind The Tigers Attempt to Make a Meal of Man

The tigers chase mainly the villagers who enter their domain either for fishing, honey collecting or collection of wood. There can be drawn a close analogy to a person killed in a road accident while going to his place of work and the villagers entering the forest in search of livelihood. The official records of the forest department stated that in the Sundarban death toll of about 45 to 60 men annually while the local estimates state that it is around 300.

The local people believe that the tiger enjoys human flesh due to the salty taste. The local people believe that some tigers swim in the salty water of the creeks they are familiar with the flavour.

The local people also believe that the pneumatophores, sharp tree roots hurt soft paw of the tigers, adding more to the impatient hungers. Thus a fisherman seems to be an easy target in preference to the herbivores who are capable to move faster amidst the wild undergrowth.

A wounded tiger is a ferocious creature. In case the wound is inflicted by a poacher it is left to the big cat’s instinct to wait for the opportune moment to take revenge on any human being.

It also happens that an aged tiger, being unable to chase a deer, tries to swim across the creek in search of a cow or an unsuspecting cowboy.

9.5.1. Co-Existence of Man and The Tiger

When the villagers enter the forests for exploitation of the forest wealth, they happen to intrude the kingdom of the big cats.
9.6. Loss of Biodiversity

Estimates of the number of plant and animal species living on earth, range from three millions to more than ten millions. Yet to date only about one and one-half million species have been recorded in the scientific literature; about most of these, little more is known than their appearance and location. (Eckholm, 1982)

Most of the natural resources of the Sundarban have been destroyed, but still, whatever is left behind is still abundant. However, need of the hour is to protect and preserve the biodiversity that still persists.

With the ever increasing migrant population and rapid depletion of the forest cover, the habitat so unique for mangrove ecosystem (like all other deteriorating ecosystem) gradually started to lose its species diversity. Thus at the land-sea and forest-village interface, the transformation was vividly noticed which gradually inflicted into the marine or aquatic and swampy environment. The active delta region is mostly affected with the gradual extinction of several faunal varieties with large-scale deforestation along the shores of Ganga Sagar, Frazerganj and Bakkhali.

Since the declaration of Biosphere Reserve, legal steps are being taken against those caught red handed inside the forest without permit. Of course vigilance is not strict enough. However, unless the socio-economic condition experiences a rapid change the main target of the people will be the ruthless extraction and exploitation of the forest resource — with the scenario of loss of biodiversity. Deforestation is the consequence of a century-long process of colonization, as settlers cleaned the forests to organize agricultural activity, and sustain themselves. Thus deforestation is a major cause of loss of biodiversity and the entire problem is traced back to the premature reclamation and expansion of settlements.
9.7. Embankment

The colonial rulers of India did not take into account the fact that many of the islands of Sundarban, which were not high enough for human settlements, were prematurely reclaimed.

The siltation process thus remained incomplete. In order to prevent flooding the people constructed embankments, which provided the answer to the problem of perennial flooding, with the rivers overflowing and inundating the land with large volume of saline water. (Fig. 33)

9.7.1. The Option Between the 'Open System' and 'Closed One'.

It has been found that obstruction to the free entry of water results in increasing pressure of currents in the rivers to enable the same volume of water to pass. This is the main cause of widening of the river channels and changes in the flow of rivers. Thus branches in the embankment are the result of the undercurrents.

9.7.2. Redressal of Unscientific Embankment Construction

The system of protecting the arable land with embankments requires a thorough review. Two options are there, one is a 'Closed System' and the other is an 'Open System'. The 'Closed System' involves a series of interventions such as building sea dykes, closing river arms and construction of large sluices in order to eliminate the tidal movements in the area. Experts in Holland has opted for it and created a marvel of engineering skill through Polder Reclamation. It is difficult to follow the exact blueprint in Sundarban, because they created a city named Amsterdam through successful implementation of the 'Closed System'. Priority in Sundarban is not to develop a city but to maintain the blanket of mangrove forest with its rich endowment of species diversity. At the same time it is also necessary to protect the arable land in the reclaimed area. Therefore, it becomes impossible for the regional planners to
NEGATIVE IMPACT OF EMBANKMENT

Mangroves

Limit of Mature Reclamation

High Water Level

Low Water Level

Embankment

Area of Premature Reclamation

High Water Level

Low Water Level

Marshes

Raised Floor

After Mukherjee, 1996
follow either the Bangladesh model of ‘Open System’ or to follow the blue print of Polder Reclamation. A full proof system is constrained with two other difficulties. The first and foremost one is the scarcity of fund for a developing country like India, the second problem is the devastating fury of the Tropical Cyclone which is unknown in Europe, but the experts in Holland formed three rings of dams with apprehension of ruptures in the dams and thereby reduced vulnerability of the ‘Closed System’. The strategy involves enormous capital investment in the initial stage of implementation. Neither the Government of West Bengal nor the NGO’s can afford such artificial control mechanism.

The River Resource Department of the Government of West Bengal floated a proposal entitled “Project Delta” way back in 1968 which was based on the findings of a research conducted by an expert, Professor Jenson and his team. The project outlined a plan of operation to be carried out in three stages. About 1.3 million hectares of land intertwined with Saptamukhi and Thakuran estuaries and Curzon creek were proposed to be protected with an estimated time of implementation of eight years involving approximately Rupees 190 million for the first stage of operations. Such a project was never considered viable and was shelved.

It is often felt that spending money and energy on repairing the embankments is useless while ignoring the root cause of their weakness, which is related to the phenomenon of underwater flows and currents. The alternative suggestion put forward by Kanjilal (2000) seems to be viable enough. He suggested to pushback the existing embankments and build ring embankment. How far back the embankments have to be pushed has to be determined on the basis of scientific enquiry. The move is likely to dislocate certain sections of the resident population who will have to be rehabilitated elsewhere. Development of mangrove forest along the riverbanks, inside the embankments was suggested, in order to minimize the impact of washing waves and undercurrent. Local people often raise objection against creation of
forestry on the margin of inhabited islands and on the reclaimed areas opposite to the forests. They apprehend that existence of such a narrow forest belt would provide shelter for the hungry tiger. Persuasion, regular monitoring, strict vigilance and involvement of the vulnerable society can help to evaporate apprehension of possible attack.

Right kind of embankment is another area of serious consideration. It will be better to use mud as the principal raw material in preference to bricks. This mud should be compact enough for making the embankment more durable. It would be better not to use the loose and crumbly variety of the cultivated field or of the riverbanks. Of course, brick pitching could be used wherever necessary.

The ‘Open System’ seems to be the solitary option for the southern part of the Sundarban. Any obstruction in the flow lines of the rivers and creeks would have its detrimental effect on the mangrove ecosystem inclusive of the wild life. The efficacy of the ‘Open System’ is however, dependent on an improved database relating to tidal regimes, impact of water flows in the creeks as well as the accumulation and erosion of silt deposit. Successful operation of such a system involves alert monitoring of physical developments and taking adequate measures in anticipation and initiating natural defense mechanisms.

A well-orchestrated effort involving the State Government, the Planning Commission, International Funding Agencies and the Local Self Government (*Panchayet*) is a precondition for the success of such a strategy. It is also essential to assure involvement of the grass root people for such a collective enterprise. They need to be sensitized to the urgency of maintaining and strengthening their embankments.

Organizing the public opinion in favour of preservation and strengthening the embankments is required, because these are the ‘life-long’ protector of the villagers and their properties in Sundarban.
INHERENT PROBLEMS,
NATURAL HAZARDS AND HUMAN INTERFERENCE

REFERENCES
Areas Affected By:
- Cyclonic Storms
- Flood
- Tidal Surge
- Salinity / Alkalinity of Soil and Water
- Deforestation
- Uninhabited Area

Fig - 34
9.7.3. Misutilization of Land

Absence of any land capability map based on any scientific method (e.g. Stories Index, Stamps Method, USDA or FAO System) at the disposal of Sundarban Development Board. Following the principal of land classification the total area of Sundarban could have been divided into several categories of arable and non-arable lands, with specific restrictions on the nature and intensity of land utilization.

Obviously, the farmers are not getting proper guideline regarding suitability and selection of crops, efficacy of fertilizer response, befitting dose of fertilizers and pesticides and amelioration of soil.

Dearth of database on land has adversely affected the process of land use planning. Consequently, vast area in Sagar Island having soils of sandy loam texture has been engaged in the cultivation of paddy where the better option would have been potato, vegetable and orchards.

Over emphasis on food crops is a lacuna in the agricultural system of Sundarban. Areas suffering from low productivity could have been converted into pasture. In selected plots there is scope of introduction of fodder culture based on which well organized animal husbandry can be developed with a background of high density of bovine population, scope of dairy farms need to be explored.

Most unfortunate part of the saga of Sundarban lies in the reclamation of the swamps. Preservation and maintenance of wetland ecosystem outside the forest area would help to strike the ecological balance in the fragile ecosystem of Sundarban. (Fig. 34)

It is evident from the field survey that the Ghoramara Island located near the confluence of Hugli has been severely affected by erosion. Another island named Lohachar has already
been submerged. A guard wall was constructed with the help of laterite blocks beneath the sea, by the port engineers with a need to protecting the Haldia port on the right bank of the river Hugli. Sea waves getting resisted on the guard wall is being diverted towards the east thus eroding small islands. It can hardly be believed that creation of embankments around the islands would be able to save them. The best suitable proposition would have been to allow the mangroves to grow and to stabilize the islands but this move would be resisted by the residents of the islands concerned. Rehabilitation of these people elsewhere through persuasion followed by regeneration of mangrove ecosystem there is the need of the hour. Recently, Jambudwip, located on the south of Sagar Island has been reoccupied by the Department of Forest of the Government of West Bengal and prohibition has been imposed on the fishermen who destroyed the blanket of mangroves for making the space available for drying and dehydrating the fishes. This is indeed the correct approach of saving the islands susceptible to marine erosion.

9.8. Conclusion

Nature and human induced disturbances pose serious threats to the functioning of mangrove systems. Many countries are experiencing losses in excess of 1% of mangrove forest annually.

Being situated primarily in the inter-tidal zone, mangrove forests influence both marine and terrestrial systems. They contribute to the expansion and protection of shorelines, channels and coral reefs, and support both pelagic and coastal fisheries. They are important sources of fuel and fiber and provide opportunities for tourism. As these goods and services support local economies and transnational industries, the need for preservation and sustainable management of these systems cannot be overstressed. (Kumar, 2001)
Economic development occurs mainly through agricultural surplus in an agrarian society. However, within the mangrove ecosystem the two main facets which have been given due importance by the villagers are resource extraction from the forests and extraction of marine resources. There is a two way problem in solving the environmental losses and socioeconomic development. The task is vested upon the regional planners to convince the local people, the policy makers so that the protection and preservation of the flora and fauna is maintained as well as transformation of cultural landscape. Problems at the interface (forest-village and land-sea) have developed lately when the rich biodiversity had been threatened. Thus need of the hour is to provide the villagers with alternative sources of work with job diversification within the existing domain of infrastructure.

**Reference**


