

# SMALL COMMUNITIES IN DELTIC BENGAL AND WASTE WATER IN THE CONTEXT OF CLIMATE CHANGE

**Ms. Sonia Gupta & Prof. Santosh K Ghosh**

Secretary General and President

Centre for Built Environment

2/5 Sarat Bose Road, Kolkata – 700 020, India

e-mail : (sghoshcbe@rediffmail.com); Telefax : 91 33 2476 1495

## ABSTRACT

The Bengal Delta in India is a complex area of biodiversity and the Unesco has declared it as biosphere reserve. It has canals, streams, marshy land and mangroves, flora and fauna and about 3 million people live in small communities, villages, and towns. The area is vulnerable to storm, cyclone etc. though mangroves protect much of the disaster effects. Tidal surge brings saline water, the water is polluted and there is downstream pollution. Due to climate change sea level will increase and large areas will be submerged damaging crops, fishery and with threat to drinking water. People depend on tube well water but in some areas there is arsenic contamination. Rainwater harvesting is being advocated, small scale desalinisation plant has been experimented also. The draining out the accumulated brackish water has been tried but there are other problems about livelihood of the people. But waste water can be potential for fishery (sea food, prawns variety and salt resistant crops). Dynamic interaction of flooding and sedimentation and storage of waste water has helped aquaculture. A broader discussion in the context of climate change, integration of the ecosocial systems, human activities and the anthropogenic components is required. There are contain criterion – physical, biological, human and environmental. A holistic and integrated environment plan is required. But in the delta Bengal, because of variety of projects, often uncoordinated an environmental audit is to be done from time to time, with participatory process. The problem of waste water in the small communities can be solved.

**Keywords :** Aquaculture, Ecohydrology, Rainwater harvesting, Risk management. .

## INTRODUCTION

The vast Bengal delta region of 1000,000 ha of land and water, also known as the Sunderbans, facing the bay of Bengal of which 38% is in India has been declared by the Unesco as one of the biosphere regions for wide range of biodiversity, plants and animals including Royal Bengal Tigers. It is the largest delta in the world with small industries, agriculture psciculutre etc. It has about 3 million population scattered in towns and villages. There are strong weather changes with cyclone, storm, flooding etc. and there is intrusion of saline water. Mangrove forests protect many areas but composition of plants has changed. It has canals, creeks, estaries, marsh land and small rivers. The people living here have adjusted themselves to natural disasters, they have built embankments and small dunes and as a result upstream water and many places cannot go out. Tidal water has the problem and swamps are created (Mondal and

Ghosh, 1989). On the other hand there is soil erosion and at the mouth of Bay of Bengal new islands appear due to sedimentation.

Rivers, canals and streams take water, waste and sediments from upstream but during the tide saline water enters into the area. Due to sea level rise in the context of climate change more saline water will come causing damage to agriculture with problem for drinking water. Pollution is wide spread, caused by discharge of burnt oil from speedboats and small ships. It is estimated that 397 tons of sewage per day from Kolkata Metropolitan Area are discharged while 22.9 tons are released into the Hooghly rivers from other areas. Waste water is everywhere with industrial effluent and sewage from far way towns (DOE, 1999), Embankment, levees and small earth dams have been built over the decades to control tidal flood, to protect agriculture and people living in small communities. Due to siltation and rising of beds of canals and streams, vast areas water logged with waste water. Tube wells have been sunk for drinking water. Rainwater harvesting has been suggested. However a broader discussion on restoration and environment management is necessary (Ghosh and Kirtikar, 2009). In the Philippines small scale desalinization plant has been developed. There are pollution problems of Arsenic contamination in the tubewell water where aquifer level is low. There are several remedial measures, (Bhattacharyya et al, 2004).

## **METHODS AND DISCUSSIONS**

Small communities suffer from non availability of fresh water and livelihood. They are to live with flora and fauna and natural disasters.

Dynamic interaction of flooding and sedimentation and storage of waste water has helped agriaquulture. In many countires stream channelisation is advocated to remove waste water but this has not helped. Often there are connections between the loss of biological functions and the loss of physical functions of canals and streams resulting from restoration effects. However, a broader discussion on restoration and environment management is necessary (Riley, 1998).

A kind of prawns, crops, shell fish etc. are being cultured in brackish water by villagers. But sometimes embankments fail to protect the area and during flooding this is washed out. Poor fishermen and farmers depend on this type of aquaculture (Mukherjee, 2007). There are standards imposed by the European Union, more stringent than USA about the prawn and aquatic products from brackish water, which are expored to their countries.

It is important to develop an understanding of ecological process and to understand the dynamic role of aquatic and terrestrial biota. There are several research studies to be required such as despite salinity and waste water, the nutrient concentration in storage reservair or trapped water within embankment the nutrients concentration remain high and the potential for toxic algal bloom exists.

Ecohydrology (Zalewski et al 1997, Zalewski, 2000) is a new concept which can be applied here to study environmental aspects of sustainable development of water resources.

Sunderbans deltic area is full or vegetation (incl. forests) and water. Vegetation cover influences all components of water balance. Local climate and the dynamics of water resources is the result of the

interplay between large scale weather pattern and local energy and moisture fluxes which in term modified by vegetation (Kobat, 2002).

Integration of the eco-socio system, human activities and the anthropogenic components is required. Human activities in the application and development of the area have profound impact on the areas including tidal swamps, waste water and non waste water. There are a number of impacts on these. There are certain criterion – physical, biological, human and environmental (IOC, 1997).

A holistic and integrated environmental plan is necessary on the basis of conservation, environment and development. But in the Sunderbans bioregion in Bengal delta there is complexity of environmental issues, variety of projects of Government, private and people, an environmental audit is to be done from time to time with participatory process. The problem of waste water for small communities can be solved in this context.

Various cooperative societies have been formed by fishermen and the State Government has set up monitoring units. Various NGOs are also working.

## **RESULTS**

Degradation of the habitat by poor villagers, conversion of mangrove areas for intensive aquaculture, freak weather patterns and increasing salinity are among the caused factors. Reclamations in the flood plains has created problems as large volume of sediments carried by tidal water are being deposited on the river stream beds causing lower areas to flooding, salinity varies according to distance. There are certain infrastructure development projects that are often uncoordinated. There is absence of risk management and vulnerability analysis. The integrated plan is being prepared. In meanwhile aquacltures in the saline waste water and development of salt resistance crops are being tried. Rainwater harvesting system is being introduced together with solar and other renewable energy.

One of the successful example of utilization of salty waste water in deltic region is at Rangabelia where an NGO's efforts with local community have become environmentally sustainable in multipurpose project.

## **CONCLUSION**

Utilisation of vast amount of waste water by small communities has opportunity which can be implemented only with scientific analysis and public awareness campaign.

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