# Sundarban and Global warming – the real threat

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## Sunderbans

The Sundarban Region in India is located between $21^0$ 32' and $22^0$40'N latitude and $88^{03}$0'N and $89^0$00'E longitude. It is bounded by the river Hooghly on the west, Ichamati-Kalindi-Raimangal on the east, Dampier-Hodges line on the north and the Bay of Bengal on the south. For administrative convenience the northern boundary has been adjusted to coincide with the Police Station boundaries along the Dampier-Hodges line, which demarcates the inter-tidal zone.

## Area and Extent

The total area of Indian Sundarban region is about 9630 sq. km., out of which the Reserve Forest occupies nearly 4260 sq. km. At present, out of the 108 islands of the Sundarban region, 54 are inhabitated with a population of about 3.2 million (1991 census), spread over 1093 mouzas. Administrative boundary of the Sunderban is spread over two districts i.e. North 24-Parganas (6 blocks) and South 24-Parganas(13 blocks), totalling 19 blocks.

There has been premature reclamation of land in the region from 1883 onwards, with more than 3500 km. of earthen embankments protecting the settlements in the region. Most of the reclaimed areas, guarded by the embankments, are lying at lower depth than the riverbeds. The aquifer of potable water lies at a depth of about 350 m below the ground level.

## Origin of Sundarbans

Two great rivers, the Ganges and Brahmaputra meet the Bay of Bengal along India and Bangladesh to form an intertidal zone, developed by the accretion of alluvium deposited by these rich systems, covering an area of nearly 26000 sq. km., which is known as the Sundarbans. The area contains a rich inter tidal mangrove forest which provides appropriate habitat and sanctuary to many rare and endangered animals including about 500 to 600 Royal Bengal Tigers.

The Indian part of this Sundarban region covers an area of 9630 sq. km., which is bounded in the north by an imaginary line, called Dampier-Hodges line (which runs continuously from Kakdwip in the west to Basirhat in the east), the south by Bay of Bengal, the east by Ichamati-Kalindi-Raimongal rivers and in the west by river Hooghly. It falls within two district of 24-Parganas North and South, in the State of West Bengal and consists of an expanse of low flat islands and mud banks separated by a network of anastomotic tidal channels and rivers. This ramified riverine system has carved out about 102 small islands harboring different habitat conditions, which has encouraged establishment and growth of mangrove forests of a very rich bio-diversity and displaying multiple associations and zonations.

Initially the whole of this Sundarban region was under mangrove forest. Its history is a continuous process of reclamation of mangrove forests for agriculture and settlement.

## Sundarban – a Developing Estuary

Sundarban estuary is still in the process of formation. In the natural process, silt carried from the catchment of the rivers, draining into the estuary, gets deposited and the islands are built up. Simultaneously, because of tidal waves and oceanic current, shape of the islands keeps on changing and accretion/ erosion go hand-in-hand.

The effect of High tide causes the water level in the tidal rivers to rise as high as 12 ft – 15 ft every six hours and large parts of the islands containing mangrove forests get inundated. Species like *Avicennia* and *Ceriops*, which tolerates prolonged water logging and high degree of salinity, come up naturally in such inter-tidal mud flats.

A study of island formation process for two southernmost islands of Jambudwip and Thakuran Char, over a period of more than 20 years, using the satellite imageries, shows that while the elongated shape of the former has changed into Bell-shape, the latter has grown from below the low-tide level to an island of more than 2 sq km. Similarly, large char land have come up in the coastal region near Kalas, Chaimari and Baghmara under Sundarban Tiger Reserve, while erosion of river banks/ coastal region have taken place in Goasaba Blocks of STR and Sagar island of 24 Parganas (South) Forest Division. Many small islands like New Char, Haribhanga etc have come up within/ just outside the estuary over last few decades.

## Sundarban Delta and Human Habitation

Out of the 102 islands in Sundarban region, 48 islands in southern-most region are declared as Reserved Forest and is out of bounds for human settlement. In the rest 54 islands, which are densely populated, there are 3500 km long embankments, all around these islands, to prevent entry of saline water during high tide. As a result, while the natural island formation process is continuing un-hindered in the forested islands, the silt-load from the fresh water river cannot get deposited on the inhabited islands due to the embankments and the same are deposited on the river bed thus gradually raising the river beds even

above the village ground level. If, therefore, there is a breach in embankment, the saline tidal water will inundate the villages and won't be able to come out even during low tide.

**Ghoramara – Lohachara Episode**

A recent study by an Institute on the changing size and shape of Ghoramara and Lohachara islands, in Hooghly river near Bay of Bengal has tried to conclude that the cause of such change is the rising sea level, forcing thousands of inhabitants to leave the islands and become environmental refugees. However, a comparison of 1929 survey map, prepared by the British Forester Mr Curtis, with the earliest available satellite imageries of 1980s reveal that the change in shape of these two islands have taken place as per the natural geological process of island formation in the estuaries. In keeping with the natural trend of the estuarine region, these two islands in the western part have also suffered erosion while some new islands have come up on the eastern side. A mere 15 – 20 years study of the islands, using satellite imageries, cannot conclusively infer about inundation of the two islands due to sea level rise – such observations have to be done on geological time scale of at least a few hundred years. Though the fact of sea level rise at global level is beyond controversy, yet over-simplification of the threat with respect to Sundarban estuary is un-scientific.

**Sundarban and Climate Change**

Of late, there is a global concern regarding the threat posed to Sundarban, due to the global warming and projected sea level rise. It is beyond any controversy that the projected climate change will bring in its effect globally, and different regions of the world will be affected in different ways. However, it must be kept in mind that the threat of sea level rise near Sundarban and elsewhere will originate most possibly due to global warming caused through uncontrolled industrial pollution elsewhere, far away from Sundarban, and no amount of ameliorative measures in the deltaic region can stop the projected danger. If we are concerned about the conservation of Sundarban, we should look at the root of the possible dangers and stop diverting attention from the real issues by undertaking localised measures. The mangrove forests in 4200 sq km of Reserved area is well protected and the natural vegetation dynamics will take care of the changing soil-water-climatic conditions in the region.

**The Real Threat and a Thought for Future**

- Arrest the present trend of reduced fresh water flow in Indian Sundarban
- Allow the process of formation of islands in this young estuary
- No more increased human pressure on the over-populated islands
- Review the conventional development process: Island embankment – breach – rebuild – rise of river bed – increase of embankment height – more flooding – more money to repair breaches – less fund for socio-economic development
- Reduce dependence of forest fringe population on mangrove forest, by providing sustainable, alternate livelihood in the villages
- Leave the estuarine forest to itself – nature will take care of mangrove species and its wildlife

"Adopting a central organizing principle means embarking on an all-out effort to use every policy and program, every law and institution, to halt the destruction of the environment."

***Al Gore***,
*former Vice President USA*