

## **ECO-TOURISM OF SUNDARBAN IN GANGETIC DELTA**

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### **ABSTRACT:**

Eco-tourism is extraordinary that in a country as beautiful in Sundarban, tourism has not yet been targeted as a way to make money for a nation that is desperate need of funds. Tourism, or more accurately 'eco-tourism', could be a way of exploiting the Sundarbans to create funds for its preservation. According to Mr. Aminul Islam, an environmental specialist at UNDP, "if proper ecotourism is promoted in the Sundarbans, then conservation will come naturally." It is important to first understand what eco-tourism is. Eco-tourism can be defined as "responsible travel to natural areas that conserves the environment and improves the well-being of local people. Cultural landscapes are areas of exceptional beauty, containing superlative natural phenomena and are of ecological importance. At present cultural landscapes and wetlands are the most spectacular global issues for economic growth and balancing of ecosystems. The Sundarbans has an outstanding universal value where the cultural landscape was shared by the indigenous pastoral society over thousand years ago and it is still visible. The site is representing significant ongoing ecological and biological processes in the evolution and development of mangrove ecosystems and communities of plants and animals.

### **BACKGROUND OF STUDY:**

Sundarban is a nature's school for the Eco-tourists. Though Bengal Tiger is the flag ship species of this unique mangrove Forest , it also offers many other wonders of the nature to the visitors. Seeing a Bengal tiger in this 4200 sq km of dense mangroves, where visitors have only access to water ways, has a chance of one in thousands. Thanks to the shyness and cautious attitude of this magnificent animal, it has survived the bullets and trap nets of poachers in this most difficult terrain, over the ages. However, the more curious spotted deer out on the mud flat for grazing during low tide, the lazy estuarine crocodiles basking in the winter sun, the water monitor lizards moving like the fabled dragons and the avifauna like kingfisher, adjutant stork or white-bellied eagles are common sights for the nature lovers. The nature's magic of high tide-low tide, the Mangrove species like Rhizophores having stilt roots, or Pneumatophores having breathing roots, or Phoenix (Golpata) providing perfect camouflage for the tigers, teach the tourists about Nature's determination to survive and sustain. The pre-historic Mud-skipper or



Fig-1:A Tourist Hotel of Sundarban

many species of crabs, fish and oysters/mollusks can make the visitors enthralled. And a nature's trail at Burir dabri camp, glorious Sunrise at Kalash, or enchanting Sunset in the Sundarban Tiger Reserve can be a "Joy for ever".

Fourier Polynomial Models have been done on 13 rivers where the time series approach (4 years) has been considered. The results show that only one river has crossed the salinity threshold line of 20 ppt or 43,220 dS/m which was the maximum value in 2000. Whereas 6 rivers have crossed in 2001, 8 rivers have crossed in 2002 and important 11 rivers have crossed the water salinity threshold line in 2003. According to average peak values of river water salinity there are 4 rivers (basin 1, 2, 3 and 4) that are in good condition, two rivers (basin 7 and 9) carry the moderate situation and 7 rivers (basin 5, 6, 7, 8, 10, 12 and 13) carry the high salinity rate in the dry season, which are major threats for mangrove ecosystems in the Sundarbans. The high salinity zone is located in the south-western corner of the Sundarbans; the previous values were 38,898-54,025 dS/m while the present values are 54,025 – 69,152 dS/m. Furthermore the area has been extended from South to North and East to West direction. The Fourier Polynomial models show the cyclic increasing behaviour of water salinity in the Sundarbans Rivers.



Fig-2:A Natural Image of Sundarban

Considering the results of all models and threshold values of water salinity for the Sundarbans case, it is clearly indicated and forecasted the message that upstream fresh water supply is necessary and emergent for the protection of cultural landscapes and mangrove wetlands ecosystems in the Sundarbans region. As priority is given by surface water salinity modelling, statements are formulated to support planning activities and to protect a special natural heritage site. The findings of this study would be a potential contribution to make a comprehensive management plan for the long-term conservation and protection of the cultural landscape and mangrove wetlands ecosystem in the Sundarbans region.

## **METHODOLOGY:**

The present study investigates the projected impacts of climate change on Indian forests using a dynamic global vegetation model (DGVM). It specifically assesses the boundary shifts in vegetation types, changes in NPP and soil carbon stocks as simulated by the dynamic model IBIS (Integrated Biosphere Simulator), and the vulnerability of existing forests to future climate change.

### **About IBIS (Integrated Biosphere Simulator)**

A dynamic global vegetation model (DGVM) is a computer program that simulates shifts in potential vegetation and its associated biogeochemical and hydrological cycles as a response to shifts in climate. It is mention before that DGVM assesses on the basis of some parameters such as boundary shifts in vegetation types, changes in NPP, soil carbon stocks and vulnerability of existing forests to future climate change.

## **NPP:**

The remotely-sensed mean NPP data from satellites for the period 1982–2006 was obtained from Nemani et al. (2003). It was regarded to a  $0.5^{\circ} \times 0.5^{\circ}$  format and the geographical region outside India was marked out. The correlation between this distribution and the NPP simulated by IBIS control case is estimated to be about 0.65, indicating fair agreement IBIS simulations of NPP (Mean: 424.0, Min: 7.0, max: 1374.0 g/m<sup>2</sup>/year) show a reasonable match with satellite observations (Mean: 431.0, min: 0.0, max: 1195.0 g/m<sup>2</sup>/year) over India. . It should be noted that simulated NPP represents the NPP of natural potential vegetation but observations represent NPP of current vegetation (including croplands).

## **Soil organic carbon:**

It was compared the soil organic carbon data from IGBP (IGBP-DIS 1998) with the IBIS simulated soil carbon estimates for the control case. The researchers find that the mean from both the sources is approximately 5 kg/m<sup>2</sup> over India (mean of IBIS=5.0 kg/m<sup>2</sup> and mean of IGBP=4.7 kg/m<sup>2</sup>).

## **OBJECTIVES:**

- #. To realized about ecosystem in sundarban, basically floral diversity and faunal life and threats.
- #. To do minimizing impact of tourism hazards and environmental and cultural awareness and respect.
- #. Providing financial benefits and empowerment for local people and raising sensitivity to host countries' political, environmental, and social climate.

## **RESULTS:**

### **Tourism of sundarban**

Currently, tourism in the Sundarbans is not eco-friendly and it does not provide tourists with a good variety of activities to participate in. Furthermore, tourism programs are not structured and government involvement can often be hindering. The volume of tourists entering the Sundarbans is also not very high. In the year 2000/2001, day excursionists entered the Sundarbans and stayed an average of 3-4 hours in the park and spending an average of 30 taka (\$0.50 USD). (Chaves 23). In the same year, 6400 domestic tourists visited the Sundarbans staying for an average of 2.5 days and spend around 1300 taka (\$21.60 USD) per day. (Chaves 23). Also in 2000/2001, 600-700 international tourists came and spent an average of 3.5 days in the Sundarbans spending an

average of 3700 taka (\$61.60 USD) per day. (Chaves 23). There are some private tourism companies such as The Guide Tours, Royal Bengal Tours and Contic who offer private boat trips in to sundarban.



Fig-3: Map of Sundarban

The Guide Tours have been taking their three cruise ships (M.L. Bonbibi, M.V. Chhuti and M.V. Aboshar) to the Sundarbans since 1995. The company was founded by Mr. Hasan Mansur who is considered a pioneer in Sundarbans tourism and he is very optimistic about the prospects of eco-tourism. His family run company employs around sixty people full-time and they are amongst the largest tour operators in the Sundarbans. Their trips are very structured and involve a variety of different activities for travelers but their operations are not wide scale and they and other small tour operators have yet to make the Sundarbans a very popular tourist destination. The Guide Tours who have recognized the potential of eco-tourism in the Sundarbans and they can be used as springboards to further tourism success. Private tour operators must be seen as the key to eco-tourism flourishing in the Sundarbans because the West Bengal government does not have sufficient resources to invest in this sector. While the Sundarbans must be accessible to those high paying customers, it is also important to make sure that Bengalis who live on less extravagant incomes are also capable of visiting the beautiful forest. The Sundarbans is, after all, their World Heritage Site and they have every right to come and revel in its sheer beauty.

### **Impacts on the Sundarban's Eco-System:**

Before any steps are taken to conserve the Sundarbans, one needs to understand the importance of the world's largest mangrove forest to its host country. For one thing, the Sundarbans is important for socio-economic reasons. It supports many industries such as shrimp farming and timber as well as the local economy and communities by supplying raw materials while providing a livelihood for many people who work in these industries. Crucially, mangroves help protect coastlines from erosion, storm damage and most importantly, wave action; making them a vital barrier between land and sea.

The coastal active delta of Sunderbans at the mouth of Bay of Bengal in Bangladesh, having a complex geomorphologic and hydrological character with climatic hazards, has a vast area of mangrove forests with a variety of flora and diverse fauna in a unique ecosystem. The natural environment and coastal ecosystem of this Biosphere Reserve and World Heritage Site is under threat of physical disaster due to unscientific and excessive human interferences. Conservation and environmental management plan for safeguarding this unique coastal ecology and ecosystem is urgently required. Mangroves forests are result of the inter-relationship between flora, fauna, aquatic and water resources and are often described as 'forests by the sea,' lining many subtropical and tropical coastlines around the world and the Sundarbans is the largest contiguous mangrove forest in the world.

A mangrove biome is characterized by waterlogged soil and sediment and is most frequently found around costal areas where they act as an interface between land and sea. Mangroves also act as the meeting point for fresh and saltwater, which is perhaps their most unique characteristic. The mangrove forest detritus which consists of fallen leaves and branches from mangrove trees provides crucial nutrition to the marine environment, supporting a number of complex food webs that the aquatic life is associated with. (Chowdhury 5-16).

### **Floral Diversity and Threats**

The mangrove vegetation of Sundarbans consists of 64 plant species and they have the capacity to withstand estuarine conditions and saline inundation on account of tidal effects. In the month of April and May the flaming red leaves of the Genwa the crab-like red flowers of the Kankra and the yellow flowers of Khalsi (*Aegiceras corniculatum*) can be seen. Some of the other commonly found plants and trees in the park are Dhundal (or cannonball mangrove, *Xylocarpus granatum*), Passur (*Xylocarpus mekongensis*), Garjan (*Rhizophora* spp.), Sundari (*Heritiera fomes*) and Goran (*Ceriops decandra*).

**TrueMangrovespecies=26**

**•Mangroveassociates=29**



•Backmangrovespecies=29

•Family=40Genera=60

•TotalSpecies=84



Fig-4:Mangrove Forest of Sundarban

While mangroves are not renowned for having a large variety of plants compared to other rainforest ecosystems, the seventy-five or so mangrove-unique species of plants would not survive in any other conditions. The Sundarbans is the most diverse mangrove forest and is composed of roughly 60 unique mangrove species, some of which are found exclusively in the Sundarbans. Each and everyone of the 330 total plant species in the Sundarbans faces an uphill struggle to grow and survive because of the environmental hazards presented in the forest. Salinity, soil conditions, nutrients, tides and cyclones are all natural conditions that hamper the existence of the plants. The salinity, which refers to the amount of salt present, of the water in the Sundarbans has a lot to do with the types of plant life that are able to survive in the forest. There is a freshwater zone, moderately saline zone and a highly saline zone. Interestingly, the salinity increases from east to west and north to south. The Sundari tree, which is the most famous tree in the Sundarbans, thrives mainly in the freshwater zones. The Gewa tree is dominant in the moderate salinity zone while the Garan tree is found mainly near the Bay of Bengal and can tolerate amazingly high levels of salinity. It is the Garan species that stands guard over the rest of the Sundarbans and takes the full force of the mighty tidal waves from the Bay of Bengal.

### **Faunal Life and Threats**

The Sundarbans forest is home to more than 400 tigers. The Royal Bengal Tigers have developed a unique characteristic of swimming in the saline waters, and are famous for their

man-eating tendencies. Tigers can be seen on the river banks sunbathing between November and February. Apart from the Royal Bengal Tiger; Fishing Cats, Leopard Cats, Macaques, Wild Boar, Indian Grey Mongoose, Fox, Jungle Cat, Flying Fox, Pangolin, Chital, are also found in abundance in the Sundarbans.

### **The Fauna**

Total No of Species = 1586

Vertebrate Spp = 481

Hemichordate Spp = 1

Invertebrate Spp = 1104

Protozoan species = 106

### **Species included in Sch. I &II of WLP Act**

Mammals = 7

Birds = 8

Reptiles = 17

TotalspeciesincludedinSch.IofWLPAct=24

TotalsppincludedinAppendixIofCITESRegulation=14

The Sundarbans also provides a unique environment for its animal residents who are specially modified to live in a mangrove forest ecosystem. For one thing, they are all adapted to ensure that they can obtain part of their diet from the water. They are also well developed and powerful swimmers who are familiar with the daily, periodical and seasonal tidal patterns. All of the animals tend to restrict their movement during high tide, which makes it a good time for the fish to feed. (Chowdhury 5-16). The Sundarbans is home to approximately 32 species of mammals, 226 species of birds, 35 species of reptiles and 8 species of amphibians.



Fig-5:Blue-eared Kingfisher sighted in the Sundarban

The most famous resident of the Sundarbans is the legendary and majestic Royal Bengal Tiger. Experts are confused as to why the tigers, who are supposed to favor hard ground, thrive in a muddy terrain such as the Sundarbans. The first organized tiger census, done in March 2004,



revealed that there are approximately 1500 tigers remaining in the Sundarbans . There were once far more tigers in the Sundarbans but they have been killed by poachers and local residents who retaliate to tiger related deaths.

The tigers and the people of the Sundarbans have not yet learned to live peacefully with each other and this adds heavily to the strain of protecting the population. Deacon Anthony who has lived in the Sundarbans for many years told a tale of how a Sister at his church lost her husband to a tiger attack, prompting the men of the village to go out and kill this tiger. “The tigers kill people, how can one expect them to protect them? If the tigers leave us alone then they will leave the tigers alone.” (Deacon Anthony, long time Sundarbans resident).



Fig-6: Royal Bengal Tiger of Sundarban

When asked if he was aware of the ramifications of tiger extinction Anthony responded by saying “No, I do not think the people know the tigers are crucial to the Sundarbans. Maybe they are but we are not scientists so we do not know.” The Royal Bengal Tiger is the pride and joy of the Bangladeshi environment but tiger protection efforts need to be stepped up.

The Sundarbans is also home to a variety of snake species including the King Cobra, the most feared snake on the planet. Perhaps the most threatened species in the Sundarbans are some of the turtles that are found there. The estuarine and peacock shell-turtle are both listed on the endangered species list and are commercially exploited in the Sundarbans. There are also a large variety of fish in the rivers of the Sundarbans but no data for how many species are found currently exist. The Sundarbans is a rich habitat for around 226 species of birds, some of which are resident birds and others that are migratory during the winter season. For some 100 species of waterfowl, around 50 of which are migratory, the Sundarbans provides a great habitat for seasonal migration. The periodically inundated mud banks provide the birds with nesting and feeding grounds. It is because of these various species of birds that many wildlife experts flock here to observe them during the migration season.

The waters of the Sundarbans are now littered with shrimp farmers and the fishing that they currently partake in is not considered sustainable (Chowdhury 22-29). Rimon from *The Guide Tours* says that “for everyone 1000 small fish that the shrimp collectors trap in their nets every day, only one of them is a shrimp fry that can sent to a farm.” This is a serious example over overfishing and while the shrimp farming industry is currently generating income for Sundarban’s people, it is not a sustainable industry. But Mr. Khan of USAID is certain that the shrimp farming industry can become a sustainable one if efforts are made to control the current fishing levels.

### **CONCLUSION:**

There is precious little time to start launching efforts to conserve the Sundarbans. This natural wonder is under serious threat but it is not too late to try and save this forest from ruin. Promoting eco-tourism is an innovative new plan that can drastically increase the chances of the forest’s survival. It is a plan that protects the forest by raising the funds for its conservation. It is crucial that people can recognize the significance of the Sundarbans to the future of Bangladesh before it is too late. If it is not preserved, then disaster will strike. If they do not fight for this forest now, then it may be too late before West Bengal can realize its importance of its largest and most important World Heritage Site. Someone has to tell the nation of Bangladesh to protect the Sundarbans, because the Sundarbans is what protects them.

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