

INCREASED SALINITY

Floral life of Sundarbans at stake

Salinity is one of the most important factors of mangrove forest growth and distribution. A salt concentration of 20-40% is suitable for mangrove ecosystems, while 40-80% diminishes the number of species and their size.

DR. MD. MIZANUR RAHMAN

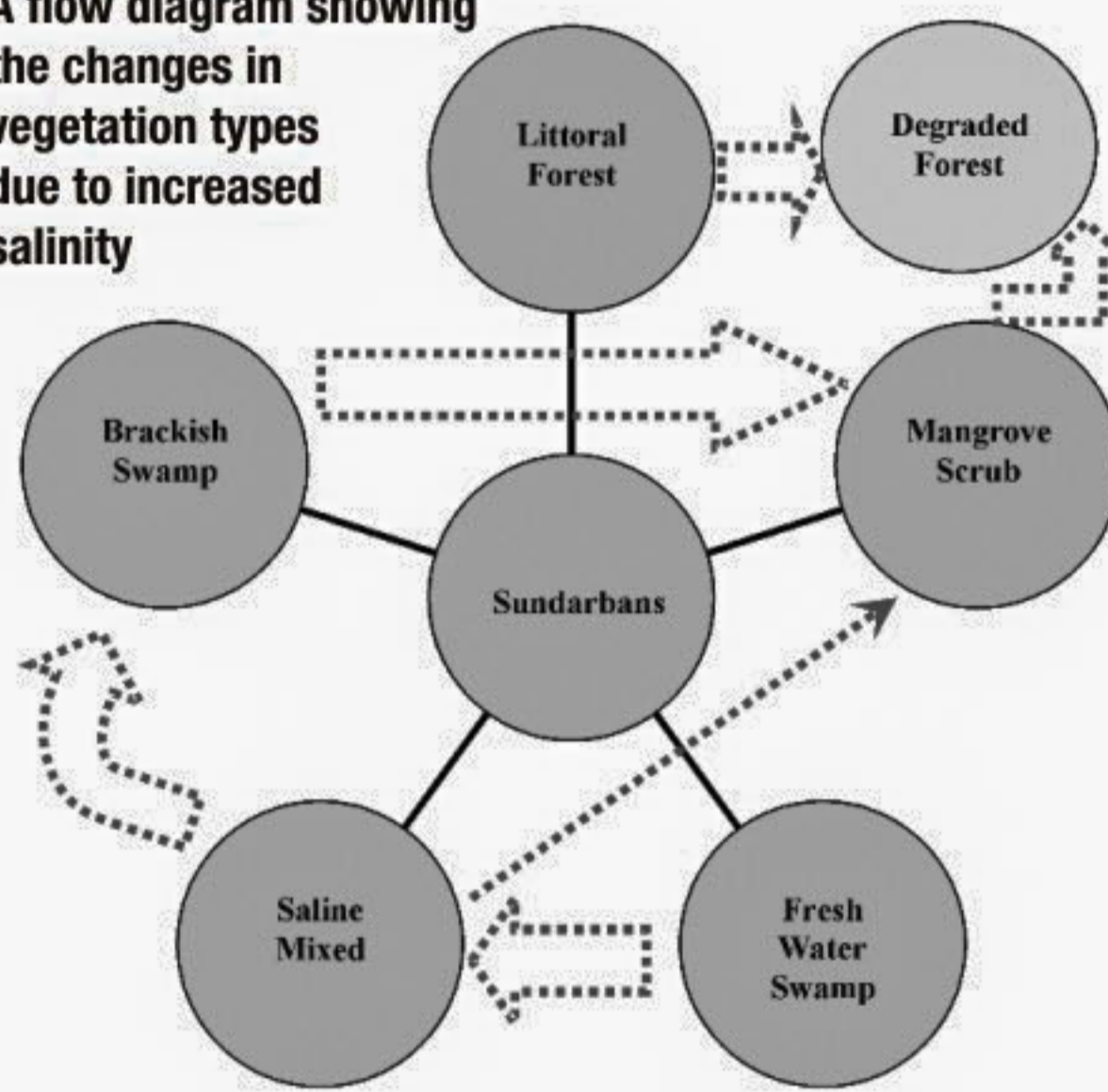
MOST of the rivers of Bangladesh flow from north to south, silting up the mangroves delta and draining into the Bay of Bengal. The mangrove is a transitional territory between the freshwater rivers originating from the Ganges and the Bay of Bengal. The ecosystems of Sundarban react with the increase of salt concentrations. The environmental parameters with the direct influences on Sundarbans in terms of global climate change are sea-level rise, natural calamities like cyclones, rising temperature, salinity and drought. Salinity is more devastating than any other parameter in this territory. It is very difficult to manage salinity because of the lasting nature of its effects on terrestrial and aquatic ecosystems.

Most of the tree species grown in the Sundarbans cannot tolerate high level of salinity and are seriously affected when salts concentrate within the root zone. Trees are severely affected where groundwater is close enough to the surface to discharge or concentrate salts. The most significant off-site impact of salinity in the Sundarbans is the salinization of previous fresh water rivers and canals. The habitats of

aquatic flora are also degraded by increased salinity. Predictions from Sundarbans territory show that salinity may be double over the next few decades posing risks for survival of flora in Sundarbans.

The greatest threat posed by increased salinity to the floral diversity of Sundarbans is the loss of both terrestrial and aquatic habitat. Salinity has severely affected riparian vegetations because they occupy the lowest parts of the landscape where they get submerged by saline water. Natural vegetations of such areas are being destructed causing major changes in landscapes and biodiversity. Destruction of remaining natural habitats

A flow diagram showing the changes in vegetation types due to increased salinity



in core areas, buffer zones and corridors are also occurring. Most of the coastal districts already face severe salinity problems, with saline water pushing up to 250 km inward during the dry season.

Increased salinity acts as a silent disaster in Shoronkhola, Morelganj, Rampal, Mongla, Dacope, Baithaghata and Sheyamnagar upazila. Brackish water from the Bay of Bengal is invading freshwater bodies percolating deep into the soil. But beyond the long-term peril, an immediate threat comes from increased salinity that jeopardizes the Sundarban ecosystems. The factors which contribute to the increase of salinity are, tidal

flooding during monsoon, direct inundation by brackish water, and horizontal movement of brackish ground water during dry season. The whole eco-systems are sensitive to changes in salinity level and the plant communities are continuously struggling to adjust with the new conditions.

Silent killer of Sundari tree

The spread of Dieback of the pioneer species, Sundari, severe poses a large threat to the ecosystem. It is a condition where Sundari trees die or decline prematurely and often rapidly. Almost all Sundari trees are affected more or less. Dieback contributes to the loss of canopy coverage in the fresh water swamp forest eco-regions of Sundarbans. These eco-regions are located in between of Gangetic Lower Uplands' Moist Deciduous Forests and salt dominated Brackish Water Sundarban Mangroves bordering the Bay of Bengal. Water is only slightly brackish and becomes fresh during the monsoon. These areas have many luxuriant broad leaved tree species including Sundari.

Dieback-affected Sundari trees produce weak crowns, with sparse foliage and a good portion of dead twigs and branches. In most cases shoots start to die from the top and root systems become poor. Sundari trees are found in Dangmari, Karamjal, Jongra, Mora Passur, Pashakhali, Nandobala, Harbouria, Choraputia, Buddhomari, Katakhal,

Boroitola, Jeodhara, Amurbunia, Gulishakhali, Dhansagor, Kolomtezi, Nangli, Chandpai, Mrigamari, Andharmanik, Tamulbunia, Supoti, Bogi, Mora Bogi, Dumuria, Charkhali, Shapla, Chandeshwar, Shoronkhola, Panirghat, Bhola, Dashervarani and Kochikhali forest areas of Sundarbans. Increased salinity and prolonged inundation appear to contribute to Dieback of Sundari trees in all these areas. The writer apprehends that after 20 years Sundari trees will be extinct from the Sundarbans and its nomenclature will be changed as the name has been derived from the Sundari tree.

Declining trends of Nypa palm

Nypa palm is an indicator plant species in Sundarbans though it does not exploit truly littoral environment nor can it tolerate saline water for a long time. It occurs most commonly in areas where mixture of brackish water and fresh water flows. It can grow on low lands and depressions, at the base of eroding slopes and cliffs, or on sandy ridges or embankments. It is an undershrub in the riparian zones and the ecological climax of Nypa palm or its associates occurs in pure stands on islets in the main channels or on depressions of the interior river meanders having silt loam soil texture. These deposits are enriched frequently by floods or surface run-off from nearby rivers during monsoon. The abundance of Nypa palm

depends on the availability of fresh water. Saline water tides are highly crucial for Nypa's seed dispersal and germination. Karamjal, Jongra, Mora Passur, Nandobala, Harbouria, Choraputia, Andharmanik, Tamulbunia and Supoti forest areas are considered as the paradise habitats for the Nypa palm. B declining trends in Nypa palm abundance has been observed in these areas over time.

Changes in forest types

The Sundarbans consists of fresh water swamp forest, salt water mixed forest, brackish swamp forest (true mangroves), mangrove scrub and littoral forest. The littoral forests are slightly different from the mangroves. They are found on high but sandy grounds with thick vegetation along the mainland coast offering habitation to birds. Mangrove scrub is the frontier mangrove forest dominated by small trees. Freshwater swamp forest is inundated with freshwater, either permanently or seasonally, while brackish swamp forest with saline water regularly. Salt water mixed forests are located in the transitional zone between freshwater supplied by rivers and saline water pushed by the Bay of Bengal.

Fresh water swamp is being converted into saline mixed forest while saline mixed forest into brackish swamp and brackish swamp into mangrove scrub. The littoral forests are becoming degraded forests due to higher mortality caused by increased salinity.



A Dieback affected Sundari tree

Changes in vegetation types

The species composition, natural regeneration, species richness, vertical and horizontal structure of Sundarbans is undergoing major changes due to increased salinity. Salinity causes a major threat to the successional mangrove ecosystem. The vegetations are responding by changing in productivity, canopy closure, tree coverage and species diversity, or by migrating. Salinity weakens the potentiality of natural regeneration by reducing the viability of seeds, seedling germination and seedling recruitment. The tree mortality rate is being accelerated due to increased salinity. The production of new leaves, leaf longevity and the leaf area, net photosynthesis rate, stomata conductance

and transpiration rate of leaves are being reduced. Salinity is one of the most important factors of mangrove forest growth and distribution. A salt concentration of 20-40% is suitable for mangrove ecosystems, while 40-80% diminishes the number of species and their size. Only a few species can exist and grow in 90% salt concentration. Sundari, Bain, Kakra, Passur and Dhondul tree species are being quickly replaced by Gewa and Keora. Mixed forest stands are being converted into pure stands. The patchily distribution of mangrove date palm (Hanthol) is declining in the fresh swamp and mixed saline forests of Sundarbans.

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TANGUA HAOR

An endangered world heritage site

Tangua wetland is undoubtedly a blessing for Bangladesh. It can serve as a rich laboratory for environmentalists, ornithologists and ecologists while yielding a rare opportunity of representation in terms of world class ecosystem and bio-diversity.

MD. MOKHTAR AHMED

SYLHET Division, in general, is marked for its variance in the nature, topography and geography with resource rich and spectacular sites. Sunamganj -- a remote district of Sylhet Division, is circumscribed by low, somewhere high and somewhere serpentine hills on northern and eastern boundaries of the country which conspicuously brand this region as a district of distinct and panoramic view. Sunamganj is specially featured for the panoramic, fantastic and divine wetland commonly and popularly known as "Tangua Haor" widely and commonly extolled and admired for its rich cultural background, sophisticated flora and fauna, unique biodiversity, extra-ordinary ecological system.

So far from collected reliable statistics, it is found that the Tangua (wetland)

consists of 51 water bodies stretching 11 kilometers in length and 7 kilometers in width. This unique wetland puts on varying and diversified flare, color, flavor and look in various seasons starting from winter to summer to monsoon throughout the year.

At the outset of the diminishing environmental ecology, government of Bangladesh declared this wetland as 'Ecologically Critical Area' on 19th April, 1999 in harmony with which it was later declared as the second RAMSAR site -- a sanctuary for avies and fishes -- by UNESCO on 20th January, 2000. The District Administration, meanwhile, took initiative to select a veteran investor in line with the MoU signed between Ministry of Land and Ministry of Environment and Forest. At the same time, being cognizant of these two consecutive declarations, a group of dynamic people including

experts, consultants, zealots and reformers rushed to the spot on various occasions with innovative ideas, plans and initiatives to protect the topography, ecology and the environment of this wetland.

A mammoth task has so far been done in conjunction and collaboration with District Administration, CNRS- a sister concern of IUCN, the think-tanks of the society and the local representatives, the local people and other stakeholders. This tripartite or quadratic partnership brought about qualitative and quantitative changes in maintaining the ecosystem of this wetland. At the advent of this unique effort and endeavor, the number of reed forests and many other aquatic plants burgeoned considerably along with Hijol-koroch trees which are the outstanding feature of this wetland.

Once a lucrative business of those who were awarded lease was the trade off with the migratory birds hovering over this wetland from Siberian terrain. A professional hunter was given permission and set at liberty to hunt as many birds as possible a day just merely by purchasing a ticket worth 5/10 thousand taka. This malpractice was approved by the lesser on the ground that these birds cause colossal damage to the standing crops but experience shows that these birds never feed on the crops at all rather

they feed on the seeds of reed trees, algae, small fishes, oysters, shells and pests. Thus, later a complete ban imposed on this trade added another dimension in the protection of birds, an important element of the ecosystem consisting of bird-fish-plant.

The writer, while working there (as UNO) was also an enthusiastic facilitator and a dedicated patron of those reform procedures and action plans and interacted effectively with numerous visiting ornithologists, environmentalists and foreign consultants.

While providing assistance and cooperation to those change-agents, the writer extensively studied various reports and research papers prepared by them and constructively and critically evaluated their works whenever he was sought to support in the capacity of local administrator. While evaluating and critically appreciating the works of those policy makers, managerial and reform bodies and the local intelligentsia, the writer noticed that they have undergone an ample painstaking endeavour to turn the wetland (Haor) into a centrifugal force of all livelihood activities of the inhabitants surrounding it obviously with a view to protecting the flora, fauna and the bio-diversity of Tangua.

With that end in view, they have suggested various ways and means of income generating activities concerning the Haor for its sustainable development and effective management while completely maintaining the ecosystem and bio-diversity of the region. Considering those facts and circumstances, research reports and verbal suggestions on many occa-



Tangua Haor

sions by the reformers, the writer has come up with the following suggestions for sustainable development of this wetland:

Suggestions

- The provision for sufficient funding for the demarcation work is crucial for the overall development of this wetland. Demarcation is always a critical and controversial issue for the conservation of this wetland and hence Revenue Department of the District Administration needs to be empowered and allocated with adequate resources to accelerate this process. The existing strength of the surveyors and other revenue staffs is not at all at optimum to perform this heavy task.
- A successful demarcation program would also help to properly determine Monsoon Zone, No-Fishing Zone and Sustainable-Use Zone.
- Before publication of the mauza map and other detail plan of this wetland, the ground work would take a considerable time which also needs to be fixed up before the demarcation process. These issues need to be carefully addressed by

both government and development partners.

- Since Tangua would ultimately emerge as the centrifugal force of all activities, the welfare and well being of the surrounding community need to be emphasized with topmost priority. The various reform procedures and action plans prepared by IUCN are undoubtedly replete with various innovative ideas for the overall development but somehow the education and training plan for the local stakeholders is missing. It is noteworthy that for any reform initiative, the sensitization part is of utmost significance where education and training are vital.
- Health clinics or centres at proper clusters need to be installed so that they can serve for the well-being of the community people. Commuters face the biggest hurdle and hassle in these remote and inaccessible regions during urgency. This important provision might be dealt with utmost consideration.
- Besides health, sanitation needs to be ensured throughout the locality as this is an important element

for their well-being. Health clinics without sanitation facility can hardly serve the purpose of the community.

- Magistrates and law enforcing agencies may be supported with special emoluments or Haor allowances in appreciation of their unique and risky services provided for the community and wetland.
- Development of tourism sites in most suitable places need to be determined with the arrangement of supporting and facilitating components.
- A sustainable, attractive and tourist-friendly infrastructure need to be installed, and maintained which can consequently result in spinning huge amount of money for the government exchequer. The revenue earned through this means can considerably compensate the huge expenses incurred on the maintenance of this wetland by the government.
- Some more innovative steps or way out for the alternate income generating activities for the community people may be incorporated from time to time.

Conclusion

Tangua wetland is undoubtedly a blessing for Bangladesh. It can serve as a rich laboratory for environmentalists, ornithologists and ecologists while yielding a rare opportunity of representation in terms of world class ecosystem and bio-diversity. This wetland is the gnomish home for multi-dimensional aquatic creatures, avies and the flora and the fauna. The tripartite or sometimes quadratic partnership currently in operation for the overall development and management of this wetland has profusely contributed to bring about a paradigm shift in its whole process of development. However, one comes up with the notion that less importance has been laid on the public consciousness and sensitization about the endangered sites of Tangua, its flora and fauna and the aquatic life. The importance of sensitizing people need to be highly stressed so that Tangua wetland can be timely and rightly protected as well as effectively maintained and managed for the welfare of the common mass eventually its principal stakeholders. Strategies in this regard need to be catered in a way that this wetland evolves as the epicentre of all sorts of livelihood and amusement while serving as a unique tourist-spot. All activities need to be performed in the best possible way without hampering the present physical structure of the site or distorting its existing ecology. It needs motivation, training, sensitization, effort and interest of the local people surrounding the Tangua wetland.

The writer, a Senior Assistant Secretary to the government, is now working as Deputy Director at Bangladesh Public Administration



Fish harvest from the Haor