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Role of Sundarbans in Protecting Climate Vulnerable Coastal People of Bangladesh

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ABSTRACT

Bangladesh is one of the top 10 nations mostly vulnerable to climate change, where Sundarbans is the world largest mangrove forest. The Sundarbans was declared as a Reserve Forest in 1875 and at present it is occupying an area of around 6,017 sq. km. About 32,400 hectares of the Sundarbans have been declared as three wildlife sanctuaries and came under the UNESCO World Heritage Site in 1997. With an organized array of trees and wildlife variety, the forest itself is a showpiece of natural history that offers subsistence to around 3.5 million coastal people. It also controls economic activities, such as extraction of timber, fishing, collection of honey and tourism. Devastating climatic disasters like Aila of 2009 and Sidr of 2007 have taken around 3,777 lives of coastal area of Bangladesh. Besides, a million of people became homeless and forced to be migrated. The situation could be even worse in absence of the protective roles of the Sundarbans. But the adverse effects of climate change have changed and still changing the overall scenario of the Sundarbans to a great extent. The paper aims to explore the roles of the Sundarbans, its damage scenario and recommendations for conserving the Sundarbans.

Keywords: Aila, climate change, climate vulnerable, coastal people, Sidr, Sundarbans.

1. INTRODUCTION

Rapid change in climate is anticipated to have a wide range of impacts on coastal Bangladesh. More than 259 extreme natural events hit Bangladesh during the period 1991 to 2009. About 39 million people have been displaced by major natural calamities like flood and cyclone since 1970 till 2009. Moreover, experts warn that a further 6-8 million people could be displaced due to increase in global temperature and sea-level rise by 2050 (The Daily Star, 2011). The consequences of climate change include more frequent and more devastating floods, tidal waves, cyclone etc. that will result in loss of coastal plain lands as well as lives and livelihoods. Devastating climatic disasters like Aila of 2009 and Sidr of 2007 have taken 3,777 lives in official papers but the unofficial sources confirmed that the figures should be doubled at least. Besides, a million of people became homeless and forced to be migrated. However, the situation could be even worse multiplying the deaths and suffering of the people in absence of the protective roles of the Sundarbans.

Sundarbans is the largest single block of tidal halophytic mangrove forest in the world. It consists of about 200 islands and separated by about 400 interconnected tidal rivers, creeks and canals. It was declared as a Reserve Forest in 1875 and at present it is occupying an area of around 6,017 sq. km. About 32,400 hectares of the Sundarbans have been declared as three wildlife sanctuaries, and came under the UNESCO World Heritage Site in 1997 (Banglapedia, 2014). With an organized array of trees and wildlife variety, the forest itself is a showpiece of natural history that offers subsistence to around 3.5 million inhabitants who live within and around the forest boundary (Uddin, 2013). It also controls economic activities, such as extraction of timber, fishing, collection of honey and tourism. But the adverse effects of climate change such as high temperature, sea level rise, cyclones and storm surges, salinity intrusion, global warming etc. have changed the overall scenario of the Sundarbans to a great extent.

Most of the coastal communities close to the Sundarbans do not have electricity or safe drinking water. Agricultural productivity in this area is lower than the state average. Inadequate infrastructure, poor communication facilities, lack of access to clean drinking water, health, education and services have contributed to a low level of development and high poverty incidence in the region. This huge number of people directly or indirectly depends on Sundarbans for their livelihoods (Abdul, 2014).

Mangrove plays a great part in shore line stabilization through the binding and cohering of soil by plant roots and deposited vegetative matter, the dissipation of erosion forces such as wave and wind energy, and the trapping of sediments. The mangroves reduce the intensity of cyclone and tidal surge acting as a natural barrier for the coastal human habitations. After the super cyclone Sidr, the protective role of the Sundarbans was widely felt. It is commonly assumed that the damage from cyclone Sidr and Aila would be many times higher without the Sundarbans.

2. ROLE OF THE SUNDARBANS

2.1. Sundarbans in Socio-economic and Environmental Development

Sundarbans and its surrounding buffer zone is one of the most diverse and richest natural resource areas of Bangladesh. It is considered as a highly productive ecosystem that provides a wide range of valuable forest product. The Sundarbans play a significant role for supporting wide range of floral and faunal biodiversity and ecosystem services that support livelihoods of local communities (Islam, 2011). Most of the communities in the buffer zone of Sundarbans are dependent on Sundarbans resources for their livelihoods. But, the Sundarbans is vulnerable to natural catastrophes such as cyclones and floods. Frequent cyclones and floods have destroyed the homes of residents along with other livelihood assets such as fishing gears. The lack of adequate cyclone shelters in the vicinity seriously affects the lives and livelihoods of the fisher community. Cyclones have high costs in terms of human and physical capital. Sundarbans provides critical habitat for a diverse marine and terrestrial flora and fauna, and 3.5 million people are dependent on Sundarbans forests and waterways for their survival (Abdul, 2014). Approximately 100,000 to 200,000 people work inside the Sundarbans for at least 6 months, while the number of people entering the forest in a year could be as high as 3,000,000. Of these, about 25,000 people work in fish drying and 60,000 – 90,000 people in shrimp PL (Post Larvae) collection inside the Sundarbans (Abdul, 2014). Contribution of Sundarbans in income of the community people adjacent to sundarbans are described below:

2.1.1. Sundarbans as source of honey

Sundarbans is a store house of various natural resources. Honey is an important and unique one resource. The traditional honey collectors, known as '*Mouaals*' harvest about 16,000 maunds of honey from the Sundarbans every year (Mamun, 2013). Flower blooms in the trees during summer and honey bees are attracted by different and mixed fragrances spread through the forest. The honey bees collect the honey from the flowers and build honey stores/hives (*Chaak*) on the trees. During this period, the traditional honey collectors or *Mouaals* built their homesteads adjacent to the western Sundarbans forest centering around the honey collection and trade. The forest department issues the *Mouaals* with a three-month permit to enter the forest and harvest honey every year. The Buri Goalini Forest Office under Satkhira Range issues such permits and the *Mouaals* get a month's pass at a time. They spend a week or a fortnight in the forest for collecting honey. It depends on the availability of the cargo (Mamun, 2013).

One kilogram (kg.) of honey is sold at the rate of Tk. 350/= to Tk. 700/= in local market. It depends on the types and variation of the trees from where the honey is collected (Mamun, 2013). Apis dorsata or fiery bees are the majority among the Sundarbans resident bees. The first honey collected in the Sundarbans every season is "*Kholse Modhu" or Kholse* honey. This is also the expensive honey among all.

2.1.2 Sundarbans as source of fish, shrimp and crab

The Sundarbans and its surrounding area are popular for shrimp, fish and crab faming and collection. Shrimp farming has a huge contribution to our local, regional and national economy. It is the main income source for male fishers while they also earn working as daily labor in shrimp farms and factories. Daily wages in the farms and factories vary from Tk. 70/= to Tk. 130/=. Women get lower wages for the same work. Poor people often fish and collect crabs in canals and ditches in the vicinity of their villages as secondary sources of income. Most fisher households suffer from food deficiencies two to three months each year. But, in 2009, the food shortages lasted from four to six months because of cyclone Aila. During this period, no work was available in the shrimp farms. About one million people are engaged in shrimp PL collection in the rivers and creeks in and around of the Sundarbans (Abdul, 2014).

The environmental benefits of mangroves, as well as their commercial uses, have made mangrove forests very important ecosystems. Mangroves act as root of sea and if there is no mangrove along the coast, there will be no or fewer fish in the sea and the sea will act as tree without its root. Mangroves provide nursery grounds for fish, prawns and crabs, and support fisheries production in coastal waters.

2.1.3. Sundarbans as source of wood and fuel wood

All the households living close to the Sundarbans depend on Sundarbans fuel wood for their fuel consumption. People generally bring branches of the trees which are naturally fallen on the ground. But, for making houses and furniture they cut trees. There are some people who illegally cut trees to sale and get benefit from it.

2.1.4. Sundarbans and tourism development

World famous and rare 'Royal Bengal Tigers' and beautiful "Spotted Deer" with *Sundari* trees make the Sundarbans versatile and tourist attracted place in the world (Sohela, 2013). The natural beauty and adventurous environment brings a huge amount of local and foreign tourists to the Sundarbans every year. Tourists and the intelligence have a great attraction to come and know the secret of Sundarbans beauty. Taking under commercial purpose Bangladesh government is also interested to include the Sundarbans under world tourism. This has a great contribution to national economy and in the coming year it could be one of the largest income-generation sources of the country. Table 1 shows that during 2000-2010, a total of about 7.27 lac tourists visited the Sundarbans and total revenue earning from the Sundarbans tourism was Tk. 26.364 million.

Table 1

Tourists in the Sundarbans and revenue earning from its tourism during 2000-2010

Year	Number of Tourists	Revenue Earned (in Lac Tk)	Year	Number of Tourists	Revenue Earned (in Lac Tk)
2000-2001	5150	0.95	2005-2006	94214	32.87
2001-2002	59369	11.38	2006-2007	96002	29.66
2002-2003	50595	17.4	2007-2008	85188	27.46
2003-2004	48828	13.66	2008-2009	99427	44.20
2004-2005	71202	21.86	2009-2010	116990	64.20

Source: Department of Forest, Government of Bangladesh, 2012.

Many people of the villages adjacent to Sundarbans earn their livelihoods from different tourism related activities such as selling handicrafts and other handmade crafts to the tourists.

2.1.5. Sundarbans as source of paper pulp

Pulp is a lignocellulosic fibrous material prepared by chemically or mechanically separating cellulose fibres from wood, fibre crops or waste paper. The wood fiber sources required for pulping are 45% sawmill residue, 21% logs and chips, and 34% recycled paper. There are lots of paper mills in the Khulna region. The main sources of wood of those mills are wood collected from Sundarbans. The local people cut trees and sell to the mills or some places. Local people work for mills in a fixed amount of salary. Their work is to cut trees and send to the mills they work. *Gewa* is the principal supply of raw material for Khulna Newsprint Mills, a 48,000 ton facility built in 1959 and a significant export earner.

2.1.6. Sundarbans in coastal ecosystem and environmental development

The Sudarbans covers 4.2% of total land area and 44% of total forestland area in Bangladesh (Iqball, 2010). It is a globally significant ecosystem rich with biodiversity that provides a habitat for around 334 plants and 375 animal species including Royal Bengal Tiger, ferocious estuarine crocodile, lots of beautiful birds etc.

The biodiversity of the Sundarbans is on the verge of reduction for different natural and manmade destruction. As a result, a wide range of impacts on socio-economic scale and on the mangrove ecosystems are anticipated, including the increased damage to crops, fisheries, forests and livestock. Various kinds of natural disaster like cyclones, flood, and salinity are very common and they attack them almost every year. As a result, people (like *Mouaals*) who are totally dependent on Sundarbans suffer a lot. Due to disaster a lot of trees are destroyed and uprooted and many animals and insects become food and shelterless. For example, in 2007 cyclone 'Sidr' made many people jobless as this was one of the severe cyclones in their lifetime. This cyclone uprooted many trees and created difficulties for the ecosystem diversity.

Forests and climate are intrinsically linked. Destroyed or over-harvested and burnt forests are the sources of greenhouse gas and carbon dioxide. On the other hand, the forests and the wood trap and store carbon dioxide, playing a major role in mitigating climate change. To combat climate change impact, restoration of the Sundarbans mangrove forest along with other forest ecosystems in the world is an urgent need.

2.2. Sundarbans as Protector from Natural Disasters

Various natural calamities like cyclone, flood, storms, coastal erosion, naturally shifting hydrology, climate change and sea level rise may destroy trees and animals even faster. The damage in Bangladesh part was extensive, including tin shacks flattened, houses and schools blown away and enormous tree damage. Some local officials have described the damage as being even worse than that from the Cyclone in 1991. The entire towns of Patuakhali, Barguna and Jhalokati districts were hit hard by the storm surge of over 5 meters (16 ft). Much of the capital city of Dhaka was also severely affected, as electricity and water service were cut and significant damage was reported there due to winds and flooding. The local agricultural industry was also devastated, as many rice crops which have a December harvest were lost. At least 3,447 deaths have been reported. The southwestern coast of Bangladesh was ripped through and tidal surge of several meters killed more than three thousand people and demolished houses, crops, vegetables and plants alike along its trail of devastation over an area of thousands of sq. km. The cyclonic storm of hurricane strength, SIR, was one of the 10 fiercest cyclones that hit the region of Bangladesh in the 131 years between 1876 and 2007. Around 95 percent standing crops in eleven coastal districts were been affected badly by the cyclone Sidr and the farming of shrimp and cattle were also damaged immensely (CEGIS, 2007). But the situation could be even worst in absence of Sundarbans. The wind speed of the cyclone was reduced by the impact with Sundarbans in the initial stages. The highest wind speed recorded 260km/hr was faced by the Sundarbans. On an average of 215km/hr speed was the hitting speed of the cyclone Sidr. While reaching the adjacent locality, the wind speed was reduced to a great extent. Otherwise the destruction and death toll could be more and more.

3. CLIMATE CHANGE AND DAMAGE TO THE SUNDARBANS

Sundarbans, the unique coastal tropical forest is among the most threatened habitats in the world due to climate change impact. The forest may be disappeared more quickly than inland tropical rainforests and so far with little public notice. Along with the biotic factors and human induced changes, adverse impacts of climate change are causing enormous damage to the Sundarbans. Impacts of climate change include sea-level rise, extreme weather events, precipitation, elevated temperature and atmospheric CO2 concentration, and ocean circulation patterns. Specially, sea-level rise and extreme weather events such as cyclone, typhoon and tidal surge are the most threatening for mangrove ecosystems. A rise in the sea level of 10 cm, 25 cm, 45 cm and 67 cm will inundate 15%, 40%, 75%, and 100% of the Sundarbans respectively and a one meter rise will destroy the whole mangrove forest (Mamun, 2011). The Intergovernmental Panel on Climate Change predicts that climate change will intensify extreme weather events such as cyclone and associated storm surges, especially along the Bay of Bengal. The Bay of Bengal is heavily affected by tropical storms: about 10% of the world's tropical cyclones occur in this area and 17% of this sweep the land in Bangladesh. Cyclone Sidr is considered to be the most severe storm event in Bangladesh hitting the eastern part of Sundarbans with a diameter of nearly 1000 km. and sustained wind speeds of up to 240 km. per hour along with a surge height of 5.2 metres causing severe damage in 30% of the forest. It severely affected approximately 30,000 acres of forest resources and another 80,000 acres were partially affected along with huge infrastructure damage (Mamun, 2011).

The damage to Sundarbans caused by recent cyclone 'Sidr' has been preliminary assessed at $142.9 million. It has left 26 % of the forest severely damaged. About a quarter of the world heritage site Sundarbans were damaged. Researchers said mangrove forest Sunderbans will take at least 40 years to recover itself from this catastrophe.

The mangroves act as a natural buffer against tropical cyclone. Therefore, no matter whether the frequency or intensity of cyclones change in the future due to climatic disturbances, exposure of the region to the devastating effects of storms will increase if the mangroves cannot be conserved successfully. Therefore, further destruction of the Sundarbans mangroves by any means is strictly required to be stopped.

Increased salinity is changing the habitat pattern of the forest. Sundari, the most typical kind of tree in the Sundarbans is thought to suffer from *top dyeing disease* because of increased salinity. Aquatic organisms are likely to migrate inward, because of increased salinity too. The resultant increase in salinisation and accretion of sediments may alter vegetation composition. Impacts on animal communities may also occur due to both, the direct effects of salinity and indirectly through food chain modifications caused by the alterations in the nature and amount of detritus available in the mangrove ecosystem, which is directly a threat to the living bio-diversity. Natural habitat may also be destroyed due to inundation.

4. RECOMMENDATIONS FOR CONSERVATION OF THE SUNDARBANS AND PROTECTION OF COASTAL PEOPLE

Following recommendations can be drawn for conservation of the Sundarbans and protection of the climate vulnerable coastal people:

- Steps to be taken by the Government and Non-government Organizations (GO-NGOs) to create alternative livelihood options for the Sundarbans dependent coastal people
- Steps to be taken to ensure involvement of researchers, academics, development activists and policy makers for seeking better solutions of the problems related with the management and conservation of the Sundarbans
- The forest conservation and management plan should have options of taking immediate actions for reforestation, restoration and development of the mangroves especially after every destruction by the natural disasters.
- More freshwater ponds inside of the Sundarbans can be excavated so that the tigers and other animals can get their drinking fresh water to be sustained being the great part of the Sundarbans ecosystem and biodiversity
- Artificial forests can be established within the comparatively less densified parts of the Sundarbans by planting trees considering the ecological relations with specific species of animals
- More emphasize to be given by concerned authorities i.e. Department of Forest (DoF) and others for proper maintenance and conservation of new-born trees in and around of the Sundarbans after Cyclone Sidr and Aila
- More training and workshops to be organized for the coastal people to introduce them with the proper, planned and scientific method of collecting the Sundarbans resources
- Mass education and awareness campaign can be a good option to make local communities understand about the benefits of tourism industry. Programs can be taken to develop the skill of Sundarbans dependent people in making different handicrafts for selling to the tourists.
- Small handicraft industries including basket work, weaving, leather goods, brass ware, jute products and clay pots can be established in nearby villages of the Sundarbans. One such industrial area named Shiromoni BSCIC Industrial Estate already exists in Khulna City can be the center of such industry. When the nearby people and the workers will be benefited economically from tourism, they may support habitat-protection in the Sundarbans.
- Steps to be taken to introduce environment friendly tourist boats under the packages and programs of eco-tourism for fostering not only tourism but also environment.
- More researches to be conducted on impacts of climate change on the Sundarbans and its dependent people.
- A sustainable conservation and management plan for the Sundarbans should be developed by involving all beneficiaries and stakeholders and should be effectively implemented to conserve the Sundarbans for the present and future generations.

5. CONCLUSION

The economic and ecological significance of the Sundarbans is a well-established fact. Lives and livelihoods of the southwestern climate change vulnerable coastal people largely depend on the natural resources of the Sundarbans. Approximately 2.5 million people live in small villages surrounding the Sundarbans, while number of people within 20 km. of the Sundarbans boundary is 3.14 million. The gradual deterioration of the Sundarbans due to climate change is leading to some serious consequences, including reduction in biodiversity, species decline, genetic erosion, increased flooding and decline in water quality. Formulation and implementation of a well thought and good policy strategy can play a significant role to conserve the Sundarbans and thereby to provide economic, socio-cultural and environmental benefits to the local, regional, national and global community.

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