Local Attitude on Deforestation and Forest Degradation in Sundarbans: A Case Study from Sharonkhola and Shyamnagar Upazila

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ABSTRACT

Sundarbans is now well known to provide a range of services that benefits local populations, though such services are at risk from deforestation and forest degradation across much of the region. This study aimed to identify local drivers of those changes in Sundarbans. Secondary data analysis and primary fieldwork were conducted in two upazilla (Sharonkhola and Shyamnagar) of Satkhira district to understand the case. Data for a range of services and biophysical, socioeconomic variables were analyzed to identify the range of trends and the significant drivers of change. Also, community perceptions were consulted to elicit how these changes are felt and how they affect. Results show that most of the services of Sundarbans experienced negative changes over the last two decades. Content analysis and community perceptions held a number of drivers responsible for these changes. Climatic changes, rapid environmental change, demand for mangrove products on the global market, major infrastructure development were identified as primary drivers leading to deforestation and forest degradation in Sundarbans. The study calls for a transformation in the stewardship of ecosystem services of the Sundarbans and other mangroves across the tropics, to escape the situation where negative environmental impacts might be difficult to reverse. The proper identification of drivers of deforestation and forest degradation has been a difficult task. Accurate information is necessary to complete this process. The main problems for the Bangladesh forest sector are deforestation and forest degradation. Coordination arrangements, integration, mainstreaming into national development planning, policies, budgeting and institutional capacity are necessary to manage the deforestation and forest degradation. The Sundarbans is the largest single block of tidal halophytic mangrove forest in the world. It is intersected by a complex network of tidal waterways, mudflats, and small islands of salt-tolerant mangrove forests. A variety of habitats have developed to accommodate the wildlife, including beaches, estuaries, permanent and semi-permanent swamps, tidal flats, tidal creeks, coastal dunes, back dunes and levees. Data collection, Analysis, Reporting, and Verification must be highly accurate before fixing the mitigation option. This study mainly deals with the important drivers of deforestation and forest degradation of Sundarbans mangrove forest those are considered as a threat for achieving sustainable forest development goal of Bangladesh.

Keywords: Environmental damage, Wildlife, Climate change, Reforestation,Sustainable development.

1. Introduction

Sundarban**s** is now well known to provide a range of services that benefits local people, though such services are at risk from deforestation and forest degradation across much of the region.

Deforestation is the permanent destruction of indigenous forests and woodlands. Degradation refers to damage or reduction in quality of certain features of the forests. Forest degradation is often difficult to discern because changes may be subtle (Rahman and Islam, 2010). This does not involve a reduction of the forest area, but rather a quality decrease in its condition. . Forest degradation has been defined as a 'reduction of the capacity of a forest to provide goods and services'. Nevertheless, forest degradation is often difficult to discern because changes may be subtle (Sasaki and Putz, 2009).Bangladesh has a total forest land area of 2.5 million hectares out of that the Sundarbans and coastal forest occupy near 0.8 million hectares and the CHT has nearly 0.9 hectare. The Sundarbans are the world's largest mangrove forests, situated between India–Bangladesh borders. It is known as one of the most diverse and productive ecosystems in the world. Bangladesh lost about 2.8% (~58,000 ha) of its forest coverage between 2000 &2012 and still has one of the highest rates of deforestation in Asia (Hansen et al., 2013). Most of the country's state-owned forests are degraded in nature (Iftekhar and Islam, 2004). Rural people's dependence on forests and diverse stakeholder engagement make forest management in the country very complex and challenging (Mukul et al., 2012). For this reason, identification of drivers of deforestation and forest degradation and finding solutions to them are important for Bangladesh. Forest degradation is a global issue of concern because of the greenhouse gas emissions it causes, the scale of forest change, and because of lost opportunities to derive multiple benefits from forested lands (e.g. Thompson et al.,2013). It can be quantified, however, using a series of criteria and indicators (Thompson *et al*., 2013), often through remote sensing (Asner et al., 2006) making the definition operational. In developing countries about 1.5 billion people rely on firewood for cooking and heating (Giri et al., 2011). Deforestation in Bangladesh is obviously a complex issue and, moreover, scanty scientific studies have been carried out to identify its deep causes, particularly in Sal forests, which are the most threatened ecosystem of the country (Meyfroidt and Lambin, 2011). Forest degradation has been measured in individual studies, from certain

perspectives, using selected variables including canopy density, plant and animal species richness, and/or carbon stocks as measured against a baseline condition (Berenguer et al., 2014). However, identifying a threshold for when a forest becomes degraded is complex and has rarely been done (Van Nes et al., 2012). Deforestation is considered one of the oldest problems of the world, and it is as old as the agricultural revolution 10, 000 to 12, 000 years ago (Mena *et al*., 2001). In developing countries about 1.5 billion people rely on firewood for cooking and heating (Giri et al., 2011). Deforestation is the conversion of forest to other land use type (Ali *et al*., 2006). Often, it is a result of human activities. Deforestation leads to reduction of forest area and loss of ecosystem service.

Deforestation reduces the area; quality and quantity of vegetation cover and alter the spatial structure of landscape through the process of fragmentation (Salam *et al*., 1998). Bangladesh is a developing country having 14.4 million hectares of total geographic area (Islam et al., 2005). Of them, 13.36 million hectares are land surface, and 0.94 million hectares are rivers and other in- land water bodies (Rahman *et al.,* 2010).). A few decades ago, Bangladesh was rich in forest resources but a rapid population growth, land conversion into different commercial activities, increased consumption of energy and wood and maximum utilization of natural resources have led to a rapid degradation of forest resources (Roy et al., 2012). . Bangladesh lost about 2.8% (~58,000 ha) of its forest coverage between 2000 and 2012 (Hansen et al., 2014, 2013), and still has one of the highest rates of deforestation in Asia). Rural people's dependence on forests and diverse stakeholder engagement make forest management in the country very complex and challenging (Rashid et al., 2013; Mukul et al., 2012). For this reason, identification of drivers of deforestation and forest degradation and finding solutions to them are important for Bangladesh.

Research Objectives

- To justify the main drivers of deforestation and forest degradation of Sundarbans mangrove forest.
- To identify the most suitable and effective mitigation measures for solving the problem.
- To secure the protection of wildlife.

2. Materials and Methods

Data are collected from review of relevant documents and interview of local forest people for knowing about the drivers of deforestation and forest degradation in Sundarbans.Among four ranges of Sundarbans mangrove forest, two areas, Sharonkholaupazilla under Sharonkhola range and Shyamnagarupazilla under Satkhira range have been selected purposively as a study area for data collection regarding identification of drivers of deforestation and forest degradation. The criterion of study area selection was closeness of these areas to Sundarbans mangrove forest of Bangladesh.

In this study, primary data collection approach is used for knowing about drivers of deforestation and forest degradation, where two different methods are taken: a household questionnaire survey and interviews with officials of Forest Department.

3.Results and Discussion

3.1. Degradation and comparison of degradation rate of last 10 years:

It was revealed from the study that among 240 respondents, all of them agreed that deforestation of the Sundarbans mangrove was not so quick before. At the same time they also mentioned that deforestation is decreasing at a large scale during the last 10 years (Table 1). They think that forest 3 rates of the Sundarbans mangrove forest is increasing compared to the last 10 years. Majority of the respondents agreed that forest cover is continuously decreasing in the Sundarbans mangrove forest compared to last 5 years though few are disagreed with this thinking. The study also revealed that every respondent agreed that the amount of local forest is decreasing day by day compared to last 10 years.

Table 1: Respondent's response regarding deforestation and forest degradation and the comparison of deforestation and forest degradation rate of last 10 years.

Phenomena	Frequency	Percent (%)
Response regarding Deforestation YES	0.00	0.00
NO	240	100
Comparison of last 10 years YES	0.00	0.00
NO	240	100

Response regarding Degradation		
YES	240	100
NO	0.00	0.00
Comparison of last 10 years		
YES	216	90
NO	24	10

2.2. *Different drivers of deforestation and forest degradation:*

Drivers of deforestation and forest degradation can be broadly classified into two types: direct and indirect drivers. It is important to understand linkages among indirect and direct drivers, in order to begin to assess the most important drivers at which to apply the possible mitigation options. For this reason, driver pathway charts were developed for each set of drivers by forest type. The key indirect causes are economic mostly related to demand for forest and food products and the need for cash by poor people, the social issues of overpopulation, lack of education, and governance issues. As the indirect and direct drivers are linked by one another, and in most cases, several indirect drivers affect the magnitude of each direct driver. The common indirect drivers of overpopulation and poverty/unemployment are directly linked to the direct drivers of fuel wood harvesting, illegal timber harvesting, agricultural clearing and forest encroachment through settlements. These drivers are responsible, in part, for both forest degradation and deforestation.
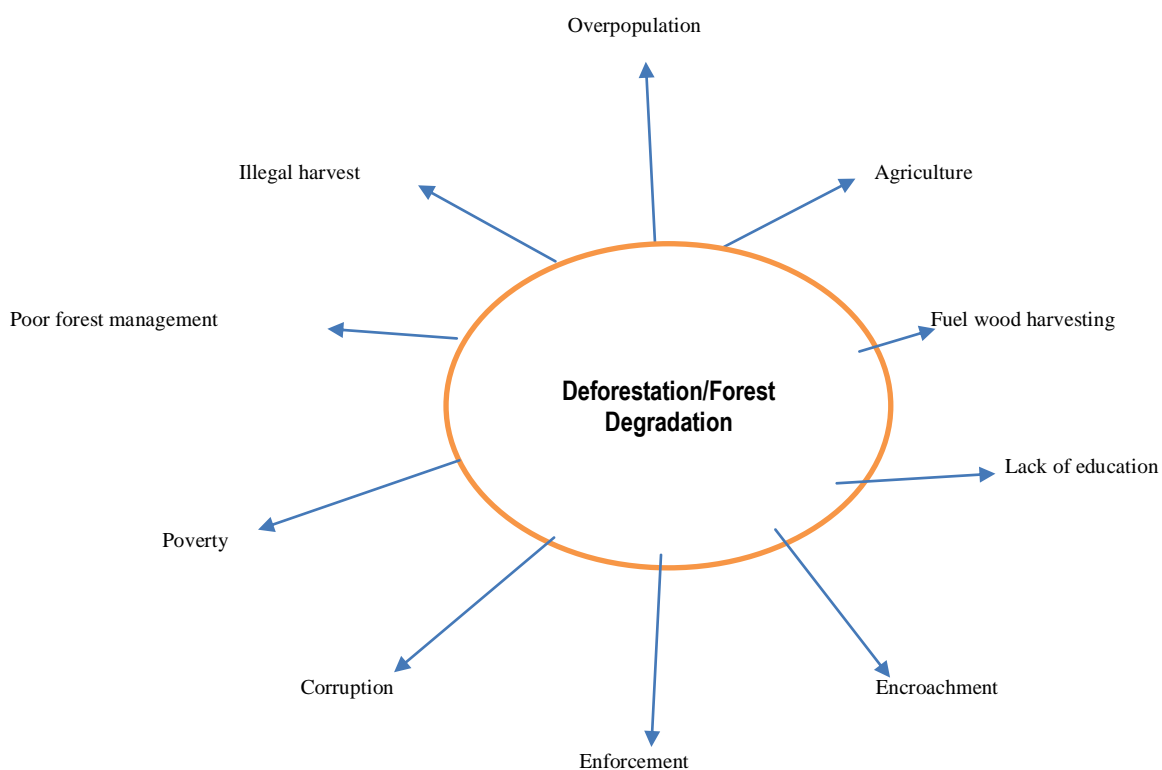

Figure 3. Different Drivers of Deforestation/ Forest Degradation

Responses from the informants showed that among the causes of direct deforestation, forest fire ranks the highest and illegal and excessive harvesting ranks the lowest. In case of indirect deforestation climate change, insufficient stuff of deforestation and lack of education are main reasons whereas poor forest management and overpopulation are general reasons.(Table 4)

In case of forest degradation,; among the direct causes natural disasters, fuel wood harvest, pollution and chemicals from shrimp farm and agriculture are the main drivers. Among indirect causes, reduced flaws and agriculture are main reasons whereas poverty, poor management policy and corruption also occur.(Table 2)

Table 2.Rank of Direct and Indirect Drivers of Deforestation and Forest Degradation in the Sundarbans Mangrove Forest, Bangladesh.

Drivers	Literature Rank
Direct Deforestation	
Illegal and excessive harvesting	1
Fuel wood harvesting	2
Fires	
Pollution	4
Increased salinity	4
Encroachment	4
Indirect Deforestation	
Poverty 2	
Poor forest management/policy	1
Insufficient staff FD	5
Overpopulation	2
Corruption	2
Landuse planning	2
Climate change	5
Lack of education	5
Increased salinity	1
Illegal and excessive harvesting	2
Natural disasters	5
Chemicals from shrimp farm and agriculture	5
Diseases3	

Fuel wood harvest	**5**
Pollution/siltation	**5**
Indirect Degradation	
Reduced flows	**2**
Poor management/policy	**1**
Poverty	**1**
Agriculture	**2**
Landuse planning	**1**
Overpopulation	**1**
Corruption	**1**

Here Highest Rank= 1 and Lowest Rank = 5

The socio-economic study has revealed that the people of the study area are not highly educated and illiteracy rate is very high which increases the dependency of the people on the adjacent forest for their livelihood.

Both in Sharankhola and shyamnagarregion fuel wood dependency from forest is high and timber collection is medium whereas fruits collection is low in Sharankhola and moderate in Shyamnagar.(Table 3)

Table 3. Dependency on Forests

Area	Fuel wood dependency from forest	Timber extraction	Fruits collection
Sharankhola Range	High	Moderate	Low
Satkhira Range	High	Moderate	Moderate

From the reviews of literature it was found that natural disasters, chemicals from agriculture and shrimp cultivation ranks the highest and lowest ranked increased salinity among direct drivers. On the other hand, this study showed that chemicals from shrimp and agriculture ranks the highest and illegal and excessive harvesting ranks the lowest. (Table 4)

In case of indirect drivers,; literature reviews shows that reduced flows and agriculture are main drivers. This study revealed that Land-use planning ranks the highest and poor management policy with corruption ranks the lowest among the indirect drivers of forest degradation.(Table 4)

Table 4. Ranking of Drivers of Forest Degradation after Interview of Local Forest People

Drivers		Literature Rank	Study Rank
Direct	Illegal and excessive harvesting	2	1
	Fuel wood harvesting	2	1
	Diseases	3	2
	Natural disasters	5	2
	Pollution/siltation	5	2
	Increased salinity	1	3
	Chemicals from shrimp and agriculture	5	4
Indirect	Reduced flows	2	2
	Poor management/policy	1	1
	Poverty	1	2
	Agriculture	2	3
	Landuse planning	1	5
	Overpopulation	1	4
	Corruption	1	1

Here, Highest Rank = 1 and Lowest Rank = 5

The ranking is done by counting the number of informants for each driver of forest degradation through converting the number of informants into percentage. The ranges of ranking are following:

1-20 % = 5
21-40 % = 4
41-60 % = 3
61-80 % = 2
81-100 % = 1

3.Conclusion

Based on the results of the present study, the conclusion may be drawn as changes are taking place slowly but steadily in the Sundarban region for years together due to direct and indirect impact of human interventions which are affecting its delicate ecosystem. Due to natural processes, the role of the Sundarban to discharge the water of the Ganges and Brahmaputra catchments is decreasing as main waterways are shifting eastwards. As a result, the salinity of the Sundarban is increasing particularly in the western region.

Urgent steps are necessary to stop and reverse the current trend of deforestation and loss of biodiversity in the Sundarban Reserve Forest (SRF), which is under pressure from a growing number of users. In addition to increased financial resources, a significant improvement in the institutional capacity of the Forest Department (FD) and an improved management approach based on appropriate research, community participation, and scientific innovation should be initiated.

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