

ADAPTIVE MEASURES FOR SUSTAINABLE CONDITION IN SUNDERBAN BY VARIOUS INSTITUTIONS

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ABSTRACT

Sunderban forest is shared between Bangladesh and India, it is the world's largest, continuous coastal wetland. It covers an area of about one million hectares in the delta of the rivers Ganges, Brahmaputra, and Meghna. Enormous amounts of sediments carried by the river system contribute to the expansion and dynamics of this delta. The Sunderban area experiences subtropical monsoonal climate with an annual rainfall of 1,600–1,800 mm and occasional severe cyclonic storms [2]. The maximum elevation within the Sundarbans is only 10 m above the mean sea level. The western and eastern limits of the Sundarbans are defined by the course of the River Hooghly (a distributary of river Ganges) and River Baleshwar, respectively. About 60 % of the mangrove forests lie in the Khulna District of Bangladesh and the rest in the 24-Paragnas District of West Bengal (India). A large number of channels and creeks flow into larger rivers in the Sundarbans. The Sundarbans, shared between Bangladesh and India, is the world's largest, continuous coastal wetland. It covers an area of about one million hectares in the delta of the rivers Ganges, Brahmaputra, and Meghna. Enormous amounts of sediments carried by the river system contribute to the expansion and dynamics of this delta. The Sundarbans area experiences subtropical monsoonal climate with an annual rainfall of 1600–1800 mm and occasional severe cyclonic storms [2]. The maximum elevation within the Sundarban is only 10 m above the mean sea level. The western and eastern limits of the Sundarbans are defined by the course of the River Hooghly (a distributary of river Ganges) and River Baleshwar, respectively. About 60 % of the mangrove forests lie in the Khulna District of Bangladesh and the rest in the 24-Paragnas District of West Bengal (India). A large number of channels and creeks flow into larger rivers in the Sundarbans but due to cyclonic pruned area it is always comes under cyclonic attack and a large damage of life and property is seen .so for this situation to handle there must be some steps to taken and also for improving their livelihood .

INTRODUCTION:

The Sundarbans region is one of the richest ecosystems in the world with globally high levels of floral and faunal diversity. It covers approximately 10,200 Sq Km is known for its exceptional biodiversity, including numerous threatened species such as royal Bengal Tiger, estuarine crocodile, Indian python and several species of river dolphin. It is also home for 25% of bird species and 10% of mammal species in India. The inhabited areas consist of 54 islands populated by over 4.4 million people whose development opportunities are limited. The forest of Sundarbans forms a powerful natural barrier, that protects Kolkata metropolitan area of 14 million inhabitants. Other human settlements from cyclone rising sea tides and other adverse natural events.

Destruction of the mangroves forest will seriously affects the quality of life and expected changes due to global climate changes as well as local anthropogenic forces will only compound losses .it will also threatened the long term survival of of globally of endangered species such as Bengal tiger and many species of fishes that rely on mangroves as reproductive ground .The sundarban contain over 4.4 million of the most impoverished and vulnerable people in India. About half of the population lives below the poverty line (BPL) with poverty incidence highest in block close to the vast mangroves forest .nearly 80% of household pursue livelihood option that that involves insufficient production methods in agriculture ,fishing and aquaculture .The peoples of the sunderban face numerous health challenges that mostly attributed to the poverty, lack of adequate safe drinking water supply and sanitation facilities or airborne diseases, common to the rural lifestyles in India. It is estimated that there is loss of life due to inadequate household water supply sanitation and hygiene in sunderban the public health systems is extremely limited by systemic human resources challenges such as absenteeism and due to which many services cannot provided to the population. The marginal economic condition are further undermined by numerous threat to social fabric persistently low education levels inadequate health care safety and nets and conditions .so desperate that the children's risk falling prey to traffickers, who make them labor .poverty in the sundarban is severely retarding development .potential of the inhabitants and keeping the million from the leaving an extraordinary hazardous life styles.



Figure 1 The Sundarbans Region

ADAPTIVE MEASURES: The social and economic development strategy for sunderban require a major overhaul in order to allow residents to escape from poverty and India ongoing urbanization process provides a context in which an innovative developed strategy can be framed. Current programs that introduce perverse incentives should be considered against alternative policy measures that can help in promoting long term social economic development .vulnerability reduction such as intensifying financial assistance programs in the form of scholarship for education that can potentially serve as a mechanism to lift people from poverty and also give better job opportunity higher wages, improvement safety and greater access to health care ,education and other social services .the most effective poverty alleviation

strategies will be those that empower equip s residents of Sundarbans with human capital necessary to allow and move in a safer area.

Analysis: The recommended strategy for Sundarbans is based on the across sectoral spatially sensitive approach. It includes the multiple sectors such as energy water supply, education and other are highlighted the possibility of development in the region. There are four major issues, vulnerability, reduction, poverty improvement and resource degradation and biodiversity conservation. It provides many benefits such as it assesses potential and trades off among different sectors overarching spatial strategy recognized interventions and investments differ long-term success in helping preparing underserved population of sunderban for economic opportunity depends on three types of spatially intervention spatially blind connected and targeted. The population of sunderban is isolated and lacking public services and infrastructure particularly in transition zone. And faces high levels of poverty, malnutrition, poor health limited access to education and high risk for natural disaster. Post-natal care and nutrition and immunization programs for young children are among the steps which will be stabilized for basis of future learning and success in labor market. Vocational training programs are also needed way to improve employment prospects.in short term we should focus in addressing critical health and welfare wiser, particularly provision of safe water supply less polluting fuel source improves child and maternal health care well as introduction of disaster risk management.

Improving Livelihood: A strategy for poverty reduction and based on the sustainable livelihood opportunity require eliminating all unsustainable income generation activities opportunities exist to develop livelihood cluster in stable zone that is peri urban areas closer to Kolkata. The employment growth for stable zone would primarily be value added resource based jobs primarily fisheries also includes commercial or light Industries, employment jobs.in addition to expanding livelihood option in stable zone enhanced employment opportunities must provide for transition zone who choose to remain in the area and those must be environmentally suistanable. The principal possibility of improving livelihood in transition zone consists of opportunity in the following areas ecotourism, agriculture and fisheries. For poverty reduction based on suistanable livelihood opportunity requires elimination of all unsustainable income generation activities currently taking place in the forest. The livelihood clusters in stable zone could consolidated provides job training and support services these services can help promotes processing and allied services for local fruits honey, vegetables medicinal plants, production of durable and non-durable goods.

Sustainable Ecotourism: The most important reason for visiting travelling to sunderban tiger reserve and sunderban national parks are opportunity to see wildlife scenes, for fragile ecosystems such as sunderban forest ,beautiful and luxuriant forest. But only limited low impact ecotourism spreads unregulated mass tourism ,will degrade natural resources of sunderban to point the tourism strategy for region should be reviewed and modified to eliminate current unsustainable practices which are tied to mass tourism .the spread of poorly regulated to mass tourism will degrade natural services sunderban reserve forest. Environmentally sustainable ecotourism has potential to offer livelihood opportunities for some of the transition zone. The Tourism product now being offered in area is not diverse and mature enough to increase the number and size of local tourism business to level up that provide jobs. The sunderban development board (SDB), created under the development and planning

dept of state in 1973 was entrusted with planning and coordination of developing activities in backward region.

METHODS: INSTITUTION REFORMS FOCUSING IMPLEMENTATION AND COORDINATION

Various national and state level developing administer and agencies are active in Sundarbans this region contains national park with multiple zone and associated with statuary conservation and development requirement and thus there are numerous central agencies present with mandates and activities concerning matters ranging from coastal issues to earn market funding. There are 19 different Govt. Of West Bengal, agencies that have formal mandates to implement one or more programs in Sundarbans. The dept of sunderban area has a specific policy that recognizes regions terrains poverty, and accessibility issues. DSA is only organization with special mandates to addresses to the region challenges. The SDB created and bought under DSA which function as distinct development agency guided by board member though DSA was created in response to clear and specific need and its action have been depended on various factors. Sundarbans development board has four division agriculture, engineering, fisheries and social forestry. DSA is required for looking at the complex and broad ranging issues such as climate change environmental forest and agriculture. It also implements a no of socioeconomic development schemes which are duplicated by sectors dept. Another review of institutional framework deployed in sunderban further duplication problem .SDB presently implements small scale development project, such as construction of roads, bridges culverts sinking of tube well. Various examples exist how sectors working affects socioeconomic condition and biodiversity conservation.

Aquaculture development undermines embankments stabilities. Complete ban on mangroves cutting reduce incentives for management of communities. Ration cards intended to improve livelihood security keep people trapped in poverty. Referral systems for health services ignore the reality that nearest medical care center. The majority of respondents interviewed said that their major concern was either locating to higher ground or to concrete structures nearby. Moreover, respondents unequivocally stated that they did not want to evacuate without taking their belongings. As a result of the lack of time to prepare for evacuation, individuals suffered from three major types of losses: all forms of documentation (ration cards, BPL certificates, MGNREGA work cards, birth and death certificates, proofs of school enrollment, and other documentation); (b) livestock, such as cattle and poultry (Mookerji 2009); and (c) money and food grain reserves (both for consumption and for selling in the market). Those interviewed during the 2009 study also felt that the agencies responsible for assuring that the warning messages were disseminated fell short of their responsibilities. One of the weakest links in early warning dissemination was the inability of local authorities, such as GPs, to send warnings effectively to coastal communities. Warnings, if sent at all, did not clearly explain what actions communities needed to take. Not all coastal districts are well equipped to disseminate early warnings down to the communities in a timely and effective manner. This greatly increased the vulnerability of coastal communities during the Cyclone Aila emergency and will continue to do so unless changes are made. The Jamsetji Tata Centre's 2009 field study also found that there was an absence of any role played by office holders at Panchayat level in organizing or implementing a systematic evacuation plan; providing relief shelters, food

supplies, and medical aid; or organizing health workers to give assistance during the aftermath of the cyclone (Sinha and Bhattacharyya 2009). Relief distribution efforts are also poorly coordinated. There is generally a lack of safe water, sanitation services, and medical aid for cyclone-affected residents; no system of emergency preparedness is in place. The study of the effects of Cyclone Aila by the Jamsetji Tata Centre for Disaster Management revealed that temporary shelters and relief camps for flood victims had inadequate sanitation, hygiene, and safe water availability. Following the cyclone, hundreds of cases of diarrhea were reported. There was a shortage of government-run medical camps in all districts of the Sunderbans (Sinha and Bhattacharyya 2009). Other complaints recorded in the study included mosquito infestation and lack of mosquito nets; provision of uncooked food items such as rice and lentils, even though the residents had neither water nor pots for cooking; and irregular supply of drinking water, especially in Gosaba block. Many residents were also unaware of the type of services that NGOs were providing

Several types of specially designated reserve areas in sunderban has its own distinct level of protection and managed by different govt dept .in 1970 MOEF within GOVT OF INDIA declares entires 9630 km sq of sunderban area as sunderban biosphere reserve thi includes approx. 4260 km sq, of reserve forests of which around 40% has been declared as protected areas including about 1,330 kmsq as national park and around 406kmsq as wildlife sanctuaries. DSA mandated to coordinate all efforts in sunderban many efforts to tackle issues such exampl of addressing special issues includes-

- a) **Irrigation and Forestry:** Cooperation of departments is very important it is must restore.
- b) **Health and Transport:** Many of health-related constraints to transportation issues dept of health and family welfare referral system should be reformed to better access to appropriatel facilities.
- c) **Irrigation and Aquaculture:** Dept of fisheries and aquaculture should be modernize aquaculture practices in ways that do not have negative impact on investment
- d) **Health Issues:** Greater coordination is required to tackle medical case in in high risk area in transition and core zone.

Human Development: The sunderban districts are characterized by poor infrastructure services and relative isolation due to riverine and marsh swamps areas of the sunderban and proximity to reserve forest for drinking water public tube well are the main source for household 88% around a quarter of households surveyed indurated that they do not have a toilet. Household work relies on firewood and chips which they collect in around a hour, these firewood are used for the cooking.

Overview of Possibilities: One option that frequently been molded politically is reinforcement of current embankment system through use of pilings construction and armoring cement to crest high that withstand predicted levels of sea level rise cost benefit studies quickly dismissed this is as infeasible on economic ground.

RISK MANAGEMENT

Currently department of risk management in sunderban focuses on the national programs and stable programs for embankments ,rehabilitisation and realignment national ,state and private programs for

development of cyclone shelter and private and state schemes are for mangroves plantation .a key impact of cyclone shelter construction embankments ,realignments and mangroves restoration that all three elements contribute to vulnerability reduction, cyclone shelter and mangroves plantation ,protects peoples and assets from cyclones .estuary management commitment through realignment, embankments, mangroves plantation or restoration and salinity management provides long term effects. Department of risk management intervention being implemented appropriate DRM and estuary management measures must address fact that significant proportion of the delta has become unstable because of past and present maladaptive management practices recommended adaptive strategy involving measures such as risk that communication to make existing residents and potential migration into region of aware of livelihood.

RECOMMENDATION FOR STRENGTHENING INSTITUTIONAL FRAMEWORK OF SUNDERBAN

Govt of India and West Bengal may consider that new approach for planning socioeconomic development and management of sunder ban this need for a new approach is not only supporting the social , economic, and environment indicators but also by unsustainability of current trends. Studies under world bank NLTA found that incremental salinity intrusion into the sunder ban pushing many of freshwater species and exacerbating human wildlife conflicts most famous with royal Bengal tiger conservation of rich ecosystem of sunder ban forms the cornerstone of recommended long term strategy to protect many flagship species in environment. Responding to diverse challenges of sunder ban requires suite of reforms institutional strengthening intervention that results in bolstered capacity of sectoral agencies to implement programs, strengthening of coordination and monitoring ,evaluation of mechanism and creation of newly spatially oriented organization that sets and acts upon the long term priorities .reforms and realignment of existing organization is not simple .action of GO WB might consider to promote new approach to conserve biodiversity adapting to climate change ,and enhancement of socioeconomic sectors. Currently each of the several different types specially designed reserve areas in sunder ban biosphere reserve has its own level of ecosystem protection and management.

In order to manage coastal areas of sundarban West Bengal coastal zone management should responsible for enforcing overseeing national regulation .

- I. Govt. West Bengal should consider creating sunderban planning risk management as spatially oriented govt organization to set regional priorities under long term vision facilitates interagency cooperation and implementation efforts.
- II. Govt. West Bengal should work with govt India to reassess importance of sunder ban with regard to climate changes in particular efforts should made to gain an agreement to ensure that sunderban identified as priority for climate change mitigation and adaption effort and enable region to benefits from red plus fund.
- III. DSA should be strengthened state agency funding allocation for work in sunder ban should based on evaluation by DSA of performance of agencies that received prior funding.
- IV. Additional institution strengthening efforts focuses on enhancing cooperation between pairs of sectoral agencies including

- a) Irrigation and Forestry to improve and encourage mangroves growth.
- b) Health and Transport: to improve delivery and access to health services to taking into account difficult terrain and lack of resources.
- c) Irrigation and Aquaculture
- d) Forestry

CONCLUSION

Conservation and Management of Sundarban Biosphere Reserve: The scheme primarily focuses on the afforestation of the Sundarbans with mangrove species. It also implements education programs to raise awareness of conservation efforts in the region. Eco-development, and training and capacity building activities have also been conducted under this program.

Conservation and Management of Sundarban Mangroves: the important productive and protective functions of mangroves, GoWB has made significant strides in promoting mangrove development. MoEF has been releasing funds for intensive mangrove conservation and management in the Sundarbans. Decline in mangrove cover had been stopped by 1990s, and between 1997 and 2007, the mangrove coverage in West Bengal, almost entirely in the Sundarbans, increased from 2,123 km² to 2,152 km², an increase of 29 km², according to the India State of Forest Report prepared by the Forest Survey of India. Conservation and Management of Sunderban Wetland: The Sundarban wetland is one of the identified wetlands under the National Wetland Conservation Program. The Sundarbans wetland serves as a breeding ground and nursery for a large number of aquatic species. However, the wetland is threatened due to overexploitation, uncontrolled fishing, pollution, and unregulated tourism. An amount of INR 87.7 million has been allocated to the Govt WB for conservation and management of the Sundarbans wetland. The funds have been provided for activities such as wetland mapping, habitat improvement and restoration. Institutional strengthening efforts should focus on enhancing cooperation between pairs of sectoral agencies, including: (a) irrigation and forestry, to encourage mangrove growth along areas that become available for restoration as a result of embankment retreat and realignment; (b) health and transport, to improve delivery of and access to health services, taking into account the difficult terrain and lack of resources in many health facilities in the Sundarbans; (c) irrigation and aquaculture, to ensure that aquaculture practices do not contribute to embankment failure and erosion; and (d) health and forestry, to handle emergency medical cases in the high risk area occurring in the transition zone and the core zone, including medical emergencies (such as animal attack). The implementation of the recommendations from the World Bank's NLTA will only be possible in an institutional environment that supports the overarching strategy of promoting biodiversity conservation, climate change adaptation, and socioeconomic development goals. To consolidate this supportive environment, a realignment of institutional arrangements is recommended. The institutional arrangements for planning, managing, and developing

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