Participatory Wetland Management: A Solution to Conservation Challenges in the Sundarbans Biosphere Reserve

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Abstract

The nature of human dependencies on wetland goods and services is various and complex. Despite being vital societal assets, wetlands continue to degrade. Over the last couple of decades, the concept of participatory management of wetlands, particularly mangroves, in India has gained momentum in scope and application. The basis of community-based resource management is the recognition that humans are part of the ecological system and not separate from it. Through the Mangroves for the Future (MFF) initiative, International Union for Conservation of Nature (IUCN) aimed to assess the effectiveness of the participatory management approaches undertaken toward mangrove wetland management, particularly in the Sundarbans Biosphere Reserve, West Bengal, India.

Keywords

Biosphere reserve • Mangrove • Participatory management • Sundarbans

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30.1 Introduction

Healthy wetlands support ecological and human well-being, delivering services for people, livelihoods, and businesses. The Ramsar Convention (1971), the foremost international treaty for conservation and sustainable utilization of wetlands, uses a broad approach in defining wetland ecosystems. It covers a larger number of inland wetlands (such as swamps, marshes, lakes, and peat lands), coastal and near-shore marine wetlands (such as coral reefs, mangroves, seagrass beds, and estuaries), and human-made wetlands (including rice paddies, dams, reservoirs, and fishponds). Virtually all-existing wetlands have been influenced and altered by human use. Conservative global estimates suggest that almost 30% of natural wetlands have been lost in the last three decades alone.

India, by virtue of its geomorphological and climatic variability, has a rich diversity of wetlands spanning over 58.2 million ha (MoEF & CC 2015). In India, wetlands are not delineated under any specific jurisdiction. Nevertheless, the formal responsibility for the implementation of the regulatory framework for wetland conservation rests with the Ministry of Environment, Forest and Climate Change, Government of India. Wetland conservation, however, is indirectly influenced by other governmental departments (and policies and legislations) relating to energy, industry, fisheries, agriculture, transport, and water resources.

Conventional approaches to wetland conservation in India have been along the line of the protected area regulations. Wetlands within protected areas (PAs) are regulated by the Wildlife Protection Act (1972), while wetlands outside of protected or notified areas are regulated by the relevant provisions of the Environment (Protection) Act (1986). Typically, the responsibility for on-ground execution and management has been with the state apparatus. However, over the years, the functioning of the state apparatus has become highly compartmentalized with little coordination among different ministries and departments. Additionally, the link between wetlands and the services they provide toward food, water, and livelihood security is one that not all land managers and decision-makers understand. It has been widely realized that the relationships between wetland communities and their environments are extremely complex and the long-term integrity of PAs in low-income nations depends on the support of the local communities.

Extensive studies by International Union for Conservation of Nature (IUCN) and partners across South Asia have demonstrated that local knowledge with respect to wetlands is integral to effective wetland management and should be understood, acknowledged, and strengthened. In Bangladesh, climate change is having a disproportionately large impact on wetlands, and communities are constantly exploring adaptive measures to alleviate the impacts. For instance, in more than 100 wetlands (*Haors*), communities have developed their own fish sanctuaries whereby harvesting is conducted on a rotational basis; together with the agricultural ministry, they are also exploring and changing the variety of rice crops and the conventional floating rice beds to conserve water. In Sri Lanka, the private sector, local communities, and government departments are partnering to capitalize on filtration abilities of wetlands to address industrial waste pollution. All wetland-associated stakeholder

groups play a fundamental role in applying knowledge and skills in wetland management. Many manage their knowledge through a variety of common as well as specific ways that can be categorized into internal mechanisms (e.g., passed through generations, contained within directives and community-based organizations) and external mechanisms (e.g., nonprofit organizations and governments). It is necessary that stakeholders be supported in developing their capacities to collect, edit, and present their knowledge systematically for effective wetland conservation and management.

Over the last couple of decades, the concept of participatory management of wetlands in India has gained momentum in scope and application. The basis of community-based resource management is the recognition that humans are part of the ecological system. Participatory management is generally defined as *a partnership in which government agencies, local communities and resource users, and perhaps other stakeholders, such as NGOs, share the authority and responsibility for management of a specific area or set of resource.* There are five basic principles that are required for this: (1) empowerment (the transfer of economic and political power from few to the impoverished many and the operationalization of community management and control), (2) equity (community as a whole benefit), (3) sustainability (i.e., intergenerational equity based on the carrying and assimilative capacity of the ecosystem), (4) systems orientation (the community functions in the context of other communities and stakeholders), and (5) gender considerations (women are involved in the control and management of community resources, and their practical and strategic needs are addressed) (Addun and Muzones 1997).

In India, participatory management of wetlands, particularly for mangroves, has met with considerable success. The Joint Mangrove Management (JMM) program was piloted by the MS Swaminathan Research Foundation (MSSRF) and State Forest Departments in India, between 1996 and 2004 in seven mangrove wetlands of Tamil Nadu (Muthupet and Pichavaram), Andhra Pradesh (Krishna and Godavari), Odisha (Devi and Mahanadi), and West Bengal (Sundarbans). It was included in the National Mangrove Action Plan (Selvam et al. 2012). The program is now being replicated in Gujarat. Apart from ensuring access to mangrove resources, particularly fishery resources, a number of other livelihood strengthening and poverty reduction activities are also conducted through the initiative. This incentivizes communities to participate actively in mangrove management. The initiative has allowed for effective channeling of central and state government resources toward mangrove restoration and management programs. During the last two decades, the country's mangrove cover has increased by 616.56 km^2, emphasizing the catalytic role of the JMM program (FSI 2013). The consensus is that location-specific, science-based, community-centered, and process-oriented approaches are necessary for sustainable management of wetlands. Such approaches should be promoted through multistakeholder community-NGO-government-private sector partnerships that allow for equal opportunities for participation in decision- and policy-making processes.

30.2 Participatory Management in the Sundarbans: A Case Study

Vast expanses of the Sundarbans are arguably wilderness areas in their most literal form. Spread across the border between India and Bangladesh at the confluence of three major rivers, Ganges, Brahmaputra, and Meghna, it is the world's largest delta (~80,000 km^2). The Sundarbans hosts the greatest continuous extent of mangroves globally and a unique and unparalleled wetland biodiversity, with distinction as the only existing mangrove tiger habitat (Shunmugaraj et al. 2011). It is an example of an endangered ecological system that is highly populated and both fragile and economically valuable.

The Indian Sundarbans (ISB) was designated a biosphere reserve in 1989 by the Government of India and subsequently brought under the United Nations Educational, Scientific and Cultural Organization (UNESCO) Man and the Biosphere Programme (MBP) in 2001. Around 4264 km^2 of the ISB was designated reserved forest under the Indian Forest Act, 1927. Within this area, intensive protection has been provided to the Sundarbans National Park (SNP) and three wildlife sanctuaries, Sajnekhali (362 km^2), Lothian Island (38 km^2), and Haliday Island (6 km^2). As one of nine original tiger reserves under Project Tiger, the Sundarbans Tiger Reserve (STR) was established within the SNP in 1973 and covers over 2585 km^2 of critical tiger habitat. In recognition of its immense value, UNESCO declared the SNP a World Heritage Site in 1987; discussions are underway to include it as a Ramsar Site of National Importance.

Indian Sundarbans is characterized by extreme poverty, which contributes to and arises from the vulnerability of the human population to natural threats. Over the past century, sea level rise (SLR), salinization of soil and water, cyclonic storms, and flooding have plagued local communities living in the area. Natural stresses are compounded by human-induced stresses, including reductions in freshwater flows to the delta and an expansion in unsustainable tidal aquaculture.

Of the 108 islands within the Sundarbans, 54 are currently inhabited with a population of approximately 4.2 million living in 1060 villages (2011 Census of India). The region is spread over two administrative districts, namely, South 24 Parganas (13 blocks) and North 24 Parganas (six blocks). Post-independence, the region witnessed a sudden influx in population due to migration from neighboring states and Bangladesh. The Sundarbans therefore has a high population density, averaging 800 people per km^2. Studies show that settlement areas have increased from 1226 to 1666 km^2, while agricultural land has reduced from 2149 to 1619 km^2 between 2001 and 2008 (WWF 2010). This conversion raises important questions relating to food and water security in the region. However, the study (WWF 2010) has also recorded an increase in aquaculture farms from 603 to 649 km^2, which could be a result of market pressures or a response to increasing salinity ingress into agricultural lands.

The majority of the population in the Sundarbans lives below the poverty line, subsisting on single-crop agriculture on reclaimed mangrove land, made possible by the development of earthen embankments to keep the brackish tidal water at bay. Over 50% of the agricultural laborers are landless or marginal farmers; the daily

income of the local people involved in agriculture is as low as INR 5–12 per day (Shunmugaraj et al. 2011). Apart from rain-fed agriculture, resource-dependent livelihoods such as fishing, honey collection, and woodcutting are undertaken in the region. The extreme poverty and dense population, coupled with increasing population growth and development rates, have exerted significant pressure on the natural mangrove ecosystem. Conversely, although dependence on non-timber forest produce (NTFP) is extremely high in the ISB, it is observed that the majority of communities are engaged in agricultural labor, despite it being low yielding due to high soil salinities (ten quintals per hectare for main crop) (Singh and Pandey 2010).

Investments in infrastructure development such as roads, embankments, dams, diversions, and power facilities while bringing visible benefits at the local level are also creating multiple risks to the ecosystem. These pressures in the Sundarbans have already led to the extinction of several faunal species (Chaudhuri and Choudhury 1994). Finding appropriate solutions to the demands of human development processes in the Sundarbans seem to be an uphill battle. There is an ongoing conflict in the area between the survival strategies of distressed people and protection of the environment in its natural state.

30.2.1 Setting the Scene

There are three administrative units in the Sundarbans Biosphere Reserve (SBR), namely, the STR, North 24 Parganas Division, and South 24 Parganas Division. Within each of the administrative units, and for management purposes, the areas are further divided into ranges, beats, and *mouzas* (villages).

Forest management, particularly in the Indian Sundarbans, is a multidimensional process that encompasses ecological, technical, socioeconomic, and institutional aspects of management and minimizes human-wildlife conflict. This process, apart from government management, needs greater participation from local communities. In recent years, there has been a paradigm shift from centralized, controlled, and custodial forest management to democratic, devolving, community-based natural resource management. The participatory management model has led to a shift in forest management priorities, from revenue generation to resource development, from single benefit to multiple benefits, from monoculture to multiple cropping, and above all from unilateral decision-making to participatory process (Debnath and Naskar 1999).

A Joint Forest Management (JFM) governance system was introduced for the effective management of the ISB. Under this scheme, the State Forest Department has formed a number of Joint Forest Management Committees (JFMCs), an institution representing the village communities living in and around the reserve forests of the ISB. To date there are 65 JFMCs, 51 Forest Protection Committees (FPCs), and 14 Eco-development Committees (EDCs) registered in the Sundarbans. However, the long-term viability of the JFMCs appears doubtful until issues of poverty alleviation, empowerment, sustainable development, and forest regeneration are addressed satisfactorily.

The JFM institutions referred to as FPCs are led by the local communities in a step toward mobilizing and motivating them to conserve the natural resources, thereby ensuring their participation in planning, executing, monitoring, and evaluating conservation interventions. The funds for these activities come from centrally sponsored schemes of the Government of India, including Conservation and Management of Sundarbans, Conservation and Management of the SBR, Project Tiger, and Wetland Project. The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is also being implemented to provide employment and income sources to the rural poor of the Sundarbans. The members of the FPCs are selected by the Divisional Forest Officer (DFO) in consultation with the Bon-o-Bhumi Sanskar Sthayee Samiti (BoBSSS) of the local Panchayat Samiti. Each FPC has an executive committee that consists of six elected members, who are responsible for protection of the forests and for ensuring smooth harvesting of forest produce by the Forest Department. Additionally, the FPC is entrusted with the duty of ensuring that the usufructuary rights are not misused by any of the members.

Similarly, the local communities living around the protected areas of the Sundarbans have EDCs, which manage wildlife and biodiversity conservation, wildlife poaching, and unscientific harvesting of medicinal plants. The members are selected in the same way as in the FPCs, although 30% of the members of the executive committees must be females.

30.2.2 Study Process

30.2.2.1 Project Conception

The IUCN's interventions in the Sundarbans derived their basis from initial learning developed through a short-term project aimed at assessing the effectiveness of introduced livelihood programs in the region. The following was highlighted in the assessment:

- Following cyclone Aila, the local communities have a deeper appreciation of the protective role of mangroves. As such, they are willing to participate in mangrove plantation activities, and it is recommended that social forestry intervention be explored and taken forward in this respect.
- Through the project, it was realized that the self-help groups (SHGs) were efficient in providing women with the financial support they needed. Sixty-two percent of women interviewed from all the surveyed SHGs in the 24 Parganas claim to have benefitted socioeconomically in one way or the other from being SHG members. The rest of the SHGs said that they found no change in their socioeconomic status at all.
- The JFMCs are responsible for spreading awareness about the harmful effects of fuel wood collection and in reducing the incidence of this among local communities. However, in 40% of the JFMCs in the 24 Parganas, this trend was not visible.

- It is apparent from the study results that goodwill has already been developed between the local communities and JFMCs in the STR. However, the same cannot be said for the 24 Parganas; a lot of grievances from the JFM members toward the Forest Department were reported. It was observed that within the STR, several additional confidence-building activities were undertaken in addition to intensive alternate livelihood programs. The study recommended that the same approach be adopted by the 24 Parganas administration to win over the local communities.

Based on these observations, a larger project was conceptualized to engage in a more efficient and robust JFM process. As such, IUCN (through the MFF initiative) and the SBR, Government of West Bengal, were the leaders in this and provided oversight, while World Wide Fund for Nature (WWF) India undertook the study for assessing the effectiveness of JFMCs in conservation of natural resources in the Sundarbans.

30.2.2.2 Study Methodology

The survey was conducted in 17 JFMCs (25% of the existing JMFCs in the region), selected through a process of stratified sampling. Stratified purposive sampling illustrates characteristics of particular subgroups of interest; it involves dividing the purposefully selected target population into strata (e.g., above average, average, and below average) with the goal of discovering elements that are similar or different across the subgroups. The stratification was based on the following criteria:

1. Incidences of human wildlife conflict
2. Alternative livelihood programs
3. Awareness toward conservation
4. Eco-development activities

The project interventions were implemented in two ranges of the South 24 Parganas Forest Division and ranges in the STR. The South 24 Parganas Forest Division is currently within the jurisdiction of the SBR and includes both reserved forests and human inhabitations. Matla and Raidighi were chosen because they face the highest incidences of human-wildlife conflict in the area and are most in need of infrastructure and supplementary livelihoods to prevent their dependency on the forests (within which subsequent wildlife attacks ensue). The South 24 Parganas Division is managed by a joint director, assisted by a division forest officer, two assistant deputy forest officers (ADFOs), three rangers, and six deputy rangers. They currently work in 18 JMFCs. The project area also includes the STR. A field director, assisted by a deputy field director, two assistant field directors, seven range officers, and six deputy rangers, manages the STR; they collectively look after 25 fringe villages to the north of the STR.

The JFMCs were analyzed for their effectiveness, based on the following factors that affected the JFMC functioning:

- The procedure for membership to a JFMC, its functioning, the development of its micro-plan, and activities were assessed. *Awareness* is the basis of any successful program designed to function with active community participation. This parameter was therefore considered important in the effectiveness assessment.
- *Level of participation of women and youth* in electing the JFMC executive body, in the general body, and their membership in the executive body were assessed.
- Extent of *participation of the ex officio member secretary* of the executive body of the JFMC greatly influences the effective functioning of the JFMC. This factor studied the involvement of the Secretary in the activities of the JFMC and the community's perception of the Secretary.
- The micro-plans were assessed to establish whether community *needs are being addressed*. The economic and social benefits to the community from activities undertaken by the JFMC were similarly examined.
- *Financial transparency:* The levels of awareness among community members concerning the financial affairs of the JFMCs were assessed, including awareness regarding the funds sanctioned to the JFMC and the actual expenditure incurred.
- Well-maintained and easily accessible *records* support transparency in the functioning and progress of the JFMC.
- JFMCs were assessed on the activities they carried out to *protect* the natural mangrove forests and resources.
- Strong *leadership* makes for a successful JFMC; the involvement of the head of JFMCs and the relationship between members and leaders were assessed.

Primary data were collected through interviews conducted in the selected 17 JFMCs. Focus group discussions were conducted with the members of JFMCs and officials from the West Bengal Forest Department, who shared their perception of the JFMCs and their functioning, which helped in collecting comprehensive data on the JFMCs. Secondary data was collected from project reports, annual reports, micro-plans of the JFMCs, and relevant government resolutions. The 17 JFMCs were scored out of 80 points (10 points for each of the abovementioned factors).

30.2.3 Results

A performance matrix was developed based on the results, and in general, it was found that:

- General awareness of the composition and rules of JFMCs was found to be low in all the selected JFMCs. Only 12% of the JFMCs members were aware of the existence of micro-plans for their JFMCs.
- The level of participation from the local communities was found to be low in all the surveyed JFMCs. Incentives need to be provided to encourage participation of all members, and member secretaries should ensure that all members participate in a satisfactory manner. For instance, it was observed that communities

located around the fringe areas of the STR were largely more proactive about registering under JFMCs, compared to those at the 24 Parganas South Division. This can be attributed to the benefits JFMCs, and in particular EDCs, bring to the community; 25% of the government profits generated through ecotourism-related activities and transport entry are given to EDC members within the STR for various activities. However, there are very limited ecotourism initiatives being implemented in the 24 Parganas South Division, with no incentive mechanism in place.

- The participation of the member secretary varied through the JFMCs. Samsernagar FPC (score: 10/10) had good participation by the member secretary, while Nagenabad FPC, Ambikanagar FPC, and Deulbari FPC (score: 4/10) scored very low in this factor.
- Most of the JFMCs studied scored very high when it came to addressing the needs to the local community. However, financial transparency is an area that needs attention; the majority of JFMCs scored very poor in this area. Members were largely unaware of the availability of funds and how much was being spent on implemented activities. Capacity building of JFMCs in financial accountability is required.
- While many JFMCs were managing their records well, some JFMCs like Baghnapara FPC, Nagenabad FPC, Ambikanagar FPC, and Deulbari FPC (score: 0/10) scored zero in this. Capacity building of JFMC members is much needed to improve their performance under this factor.
- The level of protection offered to the forest and its resources varied widely among the JFMCs – while eight JFMCs scored a 10/10, Nagenabad FPC, Ambikanagar FPC, and Deulbari FPC scored a 0/10. Given the high level of natural resource dependability in the Sundarbans, effective conservation cannot be maintained without community participation, for which JFMCs were originally designed. Forest officials need to understand why some JFMCs are more motivated and inclined toward natural resource protection and others are not. For instance, in some villages, it was observed that the community clearly identify themselves as the primary stakeholders and beneficiaries of joint management efforts. As a result of this, the sense of ownership of the resource was visible, which was reflected in the level of protection they afforded the forest and its resources.
- Overall, most JFMCs scored well on leadership-related aspects. It is important that the JFMCs have an influential and proactive leader. Such leaders should be identified within the community and encouraged to participate in JFMC activities.

30.2.4 Recommendations for Strengthening the JFMC Model

30.2.4.1 Improving Accountability and Transparency

The roles and responsibilities of every member of the JFMC should be defined and well explained in local language during the general meetings. Members should be

capacity built to carry forth their responsibilities, and refresher trainings should be conducted periodically. There should be a clear understanding among the members on forest management and protection and access and benefit sharing. The executive body members should address associated issues in the executive body meetings and in general body meetings and report to the Forest Department with respect to capacity building and training needs. The minutes of JFMC meetings should be publicly displayed and disseminated so that each community member is made privy to this information.

Records of the following must be maintained by the JFMC without fail:

- Micro-plans
- Forest management plans – section-wise village perspective development
- Records of all activities undertaken
- Membership registers
- Asset registers
- Meeting and resolution registers
- Receipt and payment registers
- Asset provided by Forest Department register
- Benefit to individual families
- Cash/bankbook
- Journal book/general ledger
- Register of drafts/checks – outgoing and received
- A letter from the department regarding the registration/recognition of JFMC

30.2.4.2 Promoting Transparency

The account rules, disbursement of wages, and distribution of forest produce (NWFP) should be clearly explained and discussed with the members of the JFMC to the mutual agreement of both parties.

30.2.4.3 Training and Capacity Building

All the executive body members should be trained and educated concerning community mobilization and leadership skills and communications, in implementing the rules of the JFMC, and in provisions provided by various government departments for financial and administrative support to JFMC activities. It is equally important that participatory planning and management courses be provided for Forest Officials on the ground, in order that they too are able to contribute effectively by adding value to and strengthening JFMC efforts.

30.2.4.4 Encouraging Experience Sharing

Meetings should be organized frequently (at least once every 3 months), and each member is given the opportunity to voice their opinions. Experience sharing visits should be encouraged. This will further help JFMCs align their activities toward greater conservation impacts.

30.2.4.5 Extending Tenure of Executive Committee to Improve Long-Term Performance

It was recommended that the tenure of the executive committee be extended from 1 to 3 years, to ensure continuity and consistency in decision-making and implementation of interventions for village-level development activities. This recommendation has been acted upon by the Forest Department and it has issued an order for tenure extension.

30.3 Conclusion

As the Anthropocene progresses, humans stand at a critical juncture in history, where biodiversity and habitat losses are accelerating due to exploitation, climate change, population growth, and unrestrained development. The resilience of wetland ecosystems needs to be increased to ensure that the services they provide continue to be available to all stakeholders. Identifying vulnerable human and ecological communities, and increasing their resilience, is an immediate priority of most state governments in India. However, limited human power and infrastructure, development pressures, extreme poverty of the surrounding communities, various inhibiting ecological factors (including lack of accessibility to some regions), and the disproportionately heavy impact that climate change is expected to have on wetlands challenge their effective management. The need to improve adaptive management and develop appropriate conservation approaches for wetland systems has gained momentum. As such, a participatory approach is necessary so that the responsibility of wetland management is shared among stakeholders, for their benefit.

Throughout the study, it was realized that there are several benefits to the JFMC initiatives that often remain unnoticed. For instance, as an offshoot of the awareness-building interventions by JFMCs on mangrove conservation and wildlife-human conflicts in villages on the fringes of the STR, local NGOs have been able to identify several families who have lost members to wildlife conflicts. Some of the families have lost their sole breadwinners and are struggling to make ends meet. For a variety of reasons, they have not received financial compensation from the Forest Department, the policy in such cases. The lists provided by the local NGOs of these affected families have been shared with the Forest Department who is taking the necessary steps to provide appropriate compensation. The work of the local NGOs through the JFMCs will continue to monitor human-wildlife conflicts and periodically report to the Forest Department. The active efforts of the Forest Department and JFMCs to look after the families who have suffered due to human-wildlife conflicts have served to build trust with the communities. This in turn has made local communities more responsive to the conservation interventions being piloted and implemented by the Forest Department.

The effectiveness of participatory management efforts in the case of wetlands across India remains inconsistent, as evident from the above case study. However, it is clear that where they are operationally strong, participatory management interventions are having visible positive impacts on wetland biodiversity and wise use of

resources. Though not limited to, an integrated and holistic participatory wetland management approach includes:

- Capacity building and awareness generation of stakeholders in the concepts of participatory management.
- Autonomy of the local communities in decision-making and monitoring and enforcement of locally made rules. If this is challenging, responsibility could be transferred to an appropriate agency, which recognizes that wetlands are common property resources, and manages them as such (in a decentralized manner). It is essential, however, that there is trust among all stakeholders.
- Carefully planned and executed entry-point activities (including short- and long-term incentives), to meet the immediate needs of the people and to assist in building trust between communities, the State Forest Departments, NGOs, and private sector partners.
- Meeting the interests of equity and gender considerations so that all wetland stakeholders benefit equally from the conservation efforts.
- Systems for knowledge exchange and capacity building must be established. Understanding of the wetland ecosystem biodiversity and the services it provides among all stakeholders and adopt systems to measure ecosystem health must be developed. Stakeholders in restoration and rehabilitation of wetland habitats should be developed.
- Continuation of investment and resources for management of wetlands.

There is extensive literature on the challenges and success of participatory approaches to management of wetlands. Approaches need to be contextualized in order to yield maximum benefit; there is no ready-made blueprint for successful wetland management.

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