

# 4

## **Climate Resilient Coastal Zone Development in Bangladesh: Participatory Governance for Common Resources Management**

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### **1. INTRODUCTION**

The current scenario in coastal zone of Bangladesh is characterized by a dispersed and ineffective manner of increasing/regenerating natural capital, which leads to increased competition and conflict over scarce resources. In context to this scenario, appropriate processes to adapt policy, governance arrangements and co-management practices for forest resource development along the coastline in response to climate change have not been developed or implemented. This is further aggravated, as there is a communication gap between local resource management initiatives and scientific communities engaged in natural resources management. There is also a lack of both financial and technical assistance for local community-based users to improve their adaptive capacities through targeted training and funding for innovative trial and demonstration which can make a breakthrough in poverty reduction. Poverty Reduction Strategy Paper of the country always focussed on the economic development and income generation activities but the issue of the empowerment of rural community efforts for resource generation hardly received due attention while the latter can be instrumental as a catalyst for the sustainability of poverty alleviation strategies of the country. The trend of economic development is not eco-friendly. Such a mismatch of productive interaction between social capital

and natural capital is one of the critical factors for sustaining the vicious cycle of poverty. Natural resources of Bangladesh coastal belts are under considerable threat where high incidence of natural disasters coupled with population pressures highly contributes to the environmental deterioration. Accordingly, the question of sustainable development needs critical attention for ensuring support to the survival strategies of poverty stricken rural community efforts for the enhancement of their access to natural capital.

This article highlights on bottom-up innovative participatory management approaches for local and regional level coastal zone specific common property resource development. This initiative is intended to bring a win-win situation for enhancing climate resilient natural resource base and poverty reduction through a change by interacting arrangement among institution, technology, natural capital and target community. Further consideration made to mainstream the effective management of common pool resource generation involving poor communities through an appropriate strategy needs responsive planning and policy formulation.

## **2. COMMON PROPERTY REGIME: AN ENTRY POINT FOR POVERTY REDUCTION**

In a densely populated and poverty stricken coastal zone, the importance of common property regime (CPR) in natural resource management policy making and sustainable development can hardly be over-emphasized. As things stand now, ownership, access and management of natural resources in coastal zone, especially relating to land, water and forestry lie at the heart of at least three fundamental problems in coastal area: (i) poverty, (ii) resource degradation and (iii) resource use conflict. Thus, the long-standing commons should be reinvented as important topics for serious research and continued policy analysis. In an age of private property regime and dominance of market forces, a major challenge is to revive the concept of CPR and make it widely acceptable to policy makers and other social forces that matter.

### **2.1 Participatory Governance of the Common Resources**

Till today, creation of common wealth for common people and its common management has not been successfully considered as an important aspect of in-country poverty alleviation programmes. Its central importance is that it would encourage and increase the capability approach of rural stakeholders as well as contribute to the welfare economics of the country. This is particularly the case if large number of rural people can be involved in group-wise resource generation activities through immediate application of locally developed technologies by the public institutions of the country. In this article, poverty alleviation through resource regeneration and its participatory governance has been regarded as an effective measure for maximum use of community

capability production and sharing with equity and justice. In this regard, formation of multiple groups of communities by type of occupation, by type of resource harvesting nature as well as management may contribute to multidimensional poverty alleviation programmes of Bangladesh. In this article, attempt has been made for a balanced and multidimensional poverty alleviation programme through community-based formation of numerous groups to be engaged in common resource generation under common management. Particular emphasis in this article has been given to the formation of resource user groups associated with climate change impact in the coastal areas.

## 2.2 Case Studies on Individual, Community and Systematic Capability Approach

Out of eight case studies conducted by the Empowerment of Coastal Fishing Communities (ECFC) for Livelihood Security (BGD/97/017) project supported by UNDP, four unique examples of enhancing capability approach after getting one time capital grant from Micro Capital Grant (MCG) of the project have been highlighted in this article.

**Case 1:** Rahmatullah (22 years), son of Osman of Shahaparirdip, a poor vulnerable coastal fisherman consisting 11 family members having no cultivable land had been maintaining his family (hand to mouth) by selling his labour to other fishing boat owners. He was the only earning member of his family and had to be at sea all day fishing. He received training on improved dry fish processing and started dry fish business with support of Tk. 5,100/- from MCG of ECFC project in August 2004. Within two years, he was able to pay back his loan with a running capital of Tk. 20,000/- after maintaining his eleven member family expenditures.

**Case 2:** Abul Fayeze (32 years), son of Zafar Ahmed of North Moheshkhalipara, a poor coastal fisherman received training on cow fattening and started his business with the procurement of single oxen for Tk. 7,200/- with the support of Tk. 5,100/- from MCG of ECFC in October 2003. He reared it for three months and sold it for Tk. 10,750/- and was immediately able to pay back his loan.

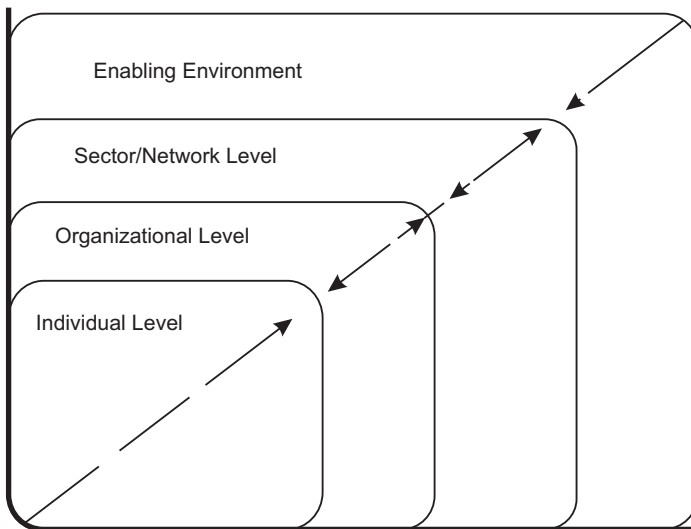
**Case 3** – Community based resource development: Poor fisher community mobilized themselves to take lease of a derelict big tank of the local Union council for fish-culture under the ECFC project in Teknaf Union. The project supported the community to develop skill in cultured fish resource development and its cooperative management. Community participants in this common resource development seem to be optimistic in getting bumper production as a result of collective strength. This successful endeavour opens up an opportunity to go for bigger venture to plan for adaptation to meet the disasters including climate change risk.

**Case 4** – Participatory governance: Community based small-scale irrigation system during February to April in rice cultivation of Bangladesh is another

example of successful participatory governance of natural resources. Rural farmers themselves made a provision of annual fee for the access to irrigation per unit cultivated area which was used to cover the cost of irrigation and maintenance of water pump machine given by the Bangladesh Agricultural Development Corporation (BADC). Since 1968, such community based small-scale irrigation system has been maintained efficiently till 1986 and it did not require any intervention of new technologies. It appeared as most successful and sustainable system to getting more output per unit area leading to poverty alleviation of poor farmers spontaneously. However, the provision for auctioning the water pump machines by BADC in 1986 has appeared worsening the situation. In most cases individual big farmers bought and became the owner of these machines. Irrigation charges have been raised from Tk. 625/- per hectare in 1968 to Tk. 5,000/- per hectare in 1987. Thus, the community approach became unsustainable and has been converted to individual business approach.

Figure 1 provides a horizontal and vertical linkage of capacity building. This diagram represents the integration between four important capacity building levels. The figure highlights the linkages between capacity at the individual level and the linkages; therefore it also needs to be considered as a capacity for relationships between organizations (network level) and the broader enabling environment and so on as and where needed.

The above four cases are excellent examples of poverty alleviation activities because every one either individual or in group is involved in one way or another which ultimately provided positive changes in the economic condition of individuals or groups of the society. However, the economy of the country appears as one of the vulnerable in the world due to high density of population



**Figure 1:** Horizontal and vertical linkage of capacity building.

Source: <http://www.recoftc.org/site/index.php?id=376>

and high incidence of natural disasters coupled with persistent political instability. Nearly half of its population is living below poverty line. What is urgently needed is to prioritize the area for natural resource regeneration through mass involvement of these rural people. To end this maximization of community capability approach and participatory governance of natural resources rather than individual approach could be the sustainable way of securing livelihoods of the people living in the areas of intense poverty. However, capacity building for such a resource generating initiative with equity and justice managed through a participatory management is the need of the time.

## **2.3 Discussion on Case Studies and Way Forward**

Analyses of the above case studies apparently indicate that the development of alternative income generation opportunities have been introduced successfully in the coastal fishing communities. However, individual income generation activities cannot serve as an appropriate corridor of community empowerment for poverty reduction in the intense poverty areas like Bangladesh coastal areas where more than 20 million people are living below poverty line. It requires large-scale community led initiatives to accelerate the progress in poverty reduction. However, community led initiatives often are thought as an involvement of large group of homogeneous people while most of the rural communities are not homogeneous. In order to overcome this constraint, it is suggested to grouping of the rural communities by occupation, by resource harvesting nature, by resource type and use and so on as and where needed. Smaller multidimensional resource generating groups would be more effective than larger communities provided the participatory governance and decision making structure of each group can be put in place. Community risk assessment followed by the preparation of their own action plan and supported by the local government to implement priority options is found to be very effective.

With a view to involve the communities in resource generation activities in an organized group, it is suggested to identify the comparative geographical advantage and accordingly prioritize the area of resource generation in the targeted villages. After proper identification of priority areas and associated problems, the proposed strategy includes the formation of numerous groups for resources regenerations. It is recommended to constitute regional committee of multidisciplinary experts which will provide resource based group training at the expense of concerned public institutions as a part of transferring technologies developed by respective institutes.

## **3. COASTAL FOREST RESOURCES MANAGEMENT THROUGH SCIENTIFIC APPROACH**

The coastal areas of Bangladesh experienced severe cyclone and tidal surges and hence planned to make vegetative shelterbelts throughout coastal regions.

At a glance, Bangladesh coastal forest today is absolutely a keora (*Sonneratia apetala*) forest with some patches of baen species (*Avicennia officinalis*) somewhere in the eastern coastal belt. This type of monoculture practice now encounters a number of problems viz. sudden onslaught of keora with stem borer infestations, non-existence of preferred mangrove species for regeneration and overall, there would be no vegetation after maturing/felling the existing keora trees. In response to climate change, this problem is further aggravated due to absence of other mangrove species endurable against natural disasters. The total area of man-made keora forests now comprises 151,000 hectares, two-third of which can now be involved in man-made afforestation with economically preferred mangrove species. However, for the creation of artificial coastal forests with preferred mangrove species, what is urgently needed is the selection of suitable coastal habitats for the favourable growth of individual mangrove species. The investigated species are the key mangrove species belonging to Sundarban natural forest. Bangladesh is blessed with the larger single tract of natural mangrove forest in the world. The southwestern coast of Bangladesh is greatly sheltered against natural disasters by the existence of Sundarban.

It is apparent from the investigations that ten mangrove species can be accommodated in most of the coastal areas as under-planting species in existing keora plantations. Thus, suitable coastal habitats/sites for the accommodation of ten mangrove species have been selected (Islam and Nandy, 2001) and found suitable for artificial plantation of these species in differently inundated coastal habitats (Table 1).

Application of above scientific approach will enrich and sustain coastal vegetation and also play a vital role to protect the lives and assets of millions of coastal dwellers from tsunamis, cyclones and other tidal surges. It will not only minimize the adverse impact of monoculture but also help to establish a planned man-made coastal forest with economically preferred mangrove species. It would appear as proven security against climate change impact as well as unique source of community-based resource generating activities for sustainable livelihood of coastal communities.

**Table 1:** Selection of suitable coastal habitats for favourable growth of selected species

Sl. No	Frequency of Inundation (FI)	Suitable species
1.	Sites with 3 months FI	<i>Cynometra ramiflora</i> .
2.	Sites with 3 and 6 months FI	<i>Ceriops decandra</i> and <i>Phoenix paludosa</i> .
3.	Sites with 3, 6 and 9 months FI	<i>Heritiera fomes</i> , <i>Excoecaria agallocha</i> , <i>Xylocarpus granatum</i> , <i>Lumnitzera racemosa</i> and <i>Bruguiera sexangula</i> .
4.	Sites with 3, 6, 9 and 12 months FI	<i>X. mekongensis</i> and <i>Aegiceras corniculatum</i> .

The same is applicable for mass propagation and plantation of palmyra palm (*Borassus flabellifer*) species. After devastating cyclone of 1991, which caused the death of 140,000 people in the coastal areas, this species has got priority and came into consideration as a disaster resistant tree component for coastal areas of Bangladesh. The spongy cotyledon of germinated seeds is attractive and highly tasty and hence seeds disappeared from planting spots. The main reason why the seedlings of this species are not available in commercial nurseries or why this species is not popular to the nursery men is the lack of easy technique for raising palm seedlings. An easy technique for raising palm seedlings from detached germtubes (Nandy et al., 1999), especially in polybags has already been developed by Bangladesh Forest Research Institute (BFRI). Thus, the problem of taking away germinated seeds and re-sowing of new seeds in the same spot can be overcome by raising polybag seedlings. It contributes to the national economy by saving the investment, securing the climate change impact through ensuring the sustainability of palm plantation in the fragile coastal belts. It also encouraged coastal rural people in raising commercial palm nurseries and thus contributes in alleviating the poverty through greater employment and income generation activities.

#### **4. COASTAL LAND RESOURCES MANAGEMENT THROUGH PARTICIPATORY APPROACH**

Bangladesh contains the largest river delta in the world. Its coastline is about 710 km long and broadly divided into three distinct regions viz. Eastern, Central and Western coastal regions. During pre- and post-monsoon period, cyclones are common in either part of these coastal regions. The low-lying areas, particularly the newly accreted (char) areas, are more vulnerable to floods and cyclones from Bay of Bengal.

Government land tenure policy narrates that the coastal lands are new formations and free from all rights and privileges. Newly accreted coastal lands are managed and controlled by the state owned Forest Department (FD) and solely used for forestry practices. Little consideration is provided on sustainable use of coastal land resources. These accreted lands are gradually raised and become suitable for human settlement in the mangrove plantations. Moreover, coastal land and aquatic resources provide numerous livelihood opportunities encouraging migrants from other places. In 1999, more than 8000 hectares of coastal plantations have been encroached in Noakhali Division alone (Canonizado, 1999) for which the participatory management approach appeared to be the best option for future sustainability. Regarding land resources management, Participatory Rural Appraisal (PRA) was conducted in each coastal region. It was revealed that the coastal dwellers have no tenural rights to use coastal lands and its resources. The limiting factor is the ownership of land which traditionally lies with the FD. Settlers deliberately keep a small portion of land in possession for securing their livelihoods which resulted in



antagonistic relationship between local people and the FD. Antagonistic relationship between them encourages illegal activities by outsiders in the coastal forest resulting in major destruction of vegetative shelter belts.

Resettled population in the newly accreted coastal land opted for an interesting land-leasing schedule (Nandy et al., 2003) which includes initial leasing of land for five years with a provision of its renewal for 15 years. However, they can continue to settle in the allocated land with an arrangement of a deed called Semi-permanent Ownership for not less than 50 years. It has been recommended to introduce a practical Land Tenure Policy highlighting the importance of people's participation. It is apparent that the legal relationship, mutual trust and land ownership could be the essential part of a successful participatory management of coastal land resources.

## 5. CREATE MECHANISMS TO ENSURE STAKE-HOLDERS' PARTICIPATION IN BIODIVERSITY CONSERVATION AT LOCAL LEVEL

Decentralized management of biodiversity through local capacity building and empowerment has emerged as an important strategy throughout the developing world. Local level institutions have many advantages over central agencies in that they are familiar with the local biodiversity, its history and value. However, since many of the existing local institutions have disintegrated or been ignored in the decision-making process, there is an urgent need to strengthen and revitalize the existing ones and create new institutions wherever necessary. The national government should direct all efforts to build infrastructures and provide the necessary financial resources to the local institutions. There should also be provisions to build capacity in local-level institutions to maintain books/database and develop management plans for biodiversity that has market value.

### Specific actions

<i>Action</i>	<i>Key actors</i>	<i>Priority</i>
Build capacity of the local governments to manage biodiversity locally	MoEF and NGOs	High
Empower local-level institutions including religious ones to evaluate, monitor and regulate the harvest and trade in biodiversity	MoEF and NGOs	High
Establish cooperatives and regulated markets locally exclusively for biodiversity trade	MoEF, MoA, LGRD NGOs and CBOs	High
Build capacity in women to run the local level institutions	Ministry of Women Affairs, NGOs	High

MoEF is the Ministry of Environment and Forest

MoA is the Ministry of Agriculture

LGRD is the Local Government Engineering Department



## **6. ESTABLISHMENT OF COMMON WEALTH AND PARTICIPATORY MANAGEMENT**

### **6.1 Common Wealth for Sustainable Management (CWSM) – With Special Reference to SPA**

Earlier, it was not realized that the poverty alleviation programmes should be aimed at creating common wealth for common or joint management in a sustainable manner. Active participation of rural people can contribute substantially to the poverty alleviation of rural coastal dwellers through creating easy available improved resources where there should have entrance of the rural people for resource-use. Since 2000, BFRI has been establishing a series of SPA suitable for each coastal region of Bangladesh which may serve as a source of common resource pool. The seed sources with best trees owing to their superiorities over surrounding base populations are expected to have increased ability to withstand extreme conditions. Expected practical gain has been derived from in situ growth variations of these species. It has been shown that the use of selected tree seeds from SPA of eastern coastal belt may provide 24.1% more wood volume/ha, while it may increase up to 66.5% in keora plantations to be raised by using only the best tree seed sources of SPA (Nandy et al., 2004). Similarly, there would be 33.7 to 121.2% gain in central and 26.4 to 57.8% gain or increased yield/ha in western coastal belt (Nandy et al., 2001). The use of improved seed sources from the established SPA of baen species may provide 20.3 to 59.1% gain per hectare.

### **6.2 CWSM – With Special Reference to Shrimp Cultivation**

Shrimp farming in the coastal areas is gaining popularity due to quick income generation. In 1984, the total area of shrimp farming was 51,834 ha which has grown to 108,279 ha in 1990. It is important to mention about the dramatic change of Bogda (*Penaeus monodon*) shrimp cultivation area which is highly practiced in Rampal, Paikgacha and adjacent areas of Sundarban. Bogda farming area has been increased from 80,015 ha in 1992 to 187,644 ha in 2005 and appeared to be commercially viable practice leading to land-use conflict in the above mentioned high saline zones.

In spite of the fact that the shrimp farming is an important and viable aspect of aquaculture in the coastal areas, it is associated with the major destruction of mangrove plantations. Its management in Bangladesh is unplanned and unscientific (Siddiqi, 2001). As for example, Chowdhury et al. (1990) reported that the maximum yield from shrimp farming was 180 kg/ha/yr in the Chokoria and 330 kg/ha/yr in the Cox's Bazar of eastern coastal belt while the same was 345 kg/ha/yr in the western parts of Bangladesh coasts. It indicates that unplanned shrimp cultivation by removing mangrove plantations

is not only hazardous to the environment but also may substantially decline the availability of fish near coast line.

Sustainable Environment Management Programme of the Ministry of Environment and Forest with UNDP support has carried out a study to identify land suitability areas in south western coastal area to take the policy decision and guideline where and what type of crops including shrimp farming may be allowed by suitable zones. Accordingly, shrimp cultivation should be practiced and concentrated in well planned, selected, suitable and productive areas in order to minimize the land-use conflict and destruction of mangrove forests. In this regard, participatory approach by involving trained coastal farmers in large scale planned productive sites could contribute and accelerate the poverty alleviation of participated coastal dwellers. What is needed is to conduct thorough surveys to locate and quantify areas suitable for either component of aquaculture and involve trained group of farmers for the creation of their common resource for sustainable management and resource-use.

### **6.3 CWSM – With Special Reference to Coastal Embankments and Its Erosion Control**

Bangladesh Water Development Board (BWDB) has constructed over 4000 km of coastal embankments along the Bay of Bengal and offshore islands to safeguard against inundation, intrusion of saline water to the farmers' field and devastation associated with repeated attacks to tidal surges and cyclonic storms. These earthen embankments are subjected to erosion which is acute in offshore islands. In order to protect these embankments from erosion, FD undertook extensive programme for quick afforestation on the shoulder of these embankments. Owing to the urgent necessity of establishing vegetative cover in both inner and outer slopes of the embankment, there was no opportunity to select the species tolerant to different degree of salinity or species suitable to either inner and outer slopes of the same embankment.

Site-suitable species have been selected (Nandy et al., 2002) for inner and outer slopes of these embankments, particularly for low, moderate, moderately high and extremely high saline zones of Bangladesh coastal regions (Table 2). The selection of adaptable species to specific coastal site(s) may have greater climate change impact and provide sustainability of coastal embankment plantations in Bangladesh.

Now a days, there is a dilemma about the erosion and stabilization of the embankment. Trees planted on the shoulder of the embankments are apprehended to cause erosion due to easy penetration of rain and tidal water into the embankments through root systems. Moreover, trees do not allow grass cover as undergrowth and enhance the erosion of surface soil from the slopes of the embankments. In view of this, trial plots with simultaneous planting of tree and vetiver grass (*Vetiveria zizanioides*) have been established on the slopes of the embankments in central and western coastal regions. Vetiver grass was

**Table 2:** Selection of saline tolerant mainland species for coastal embankments

Sl. No.	Saline zones (SZ)	Selected species	
		Most suitable	Suitable
1.	Low SZ	<i>Dalbergia sissoo</i> , <i>Acacia auriculiformis</i> and <i>Pithecellobium dulce</i>	<i>Acacia nilotica</i> , <i>Terminalia arjuna</i> and <i>Samanea saman</i>
2.	Moderate SZ	<i>Casuarina equisetifolia</i> , <i>P. dulce</i> and <i>T. arjuna</i>	<i>Leucaena leucocephala</i> , <i>D. sissoo</i> , <i>S. saman</i> and <i>A. auriculiformis</i>
3.	Moderately high SZ	<i>S. saman</i> and <i>L. leucocephala</i>	<i>C. equisetifolia</i> , <i>D. sissoo</i> , and <i>A. auriculiformis</i>
4.	Extremely high SZ	<i>A. nilotica</i> and <i>C. equisetifolia</i>	<i>A. auriculiformis</i> , <i>D. sissoo</i> , and <i>L. leucocephala</i>

found to stabilizing newly established embankments for which nursery and plantation techniques have been developed (Nandy, 2003). Being a low cost and easily adopted technique, introduction of *V. zizanioides* under the trees would provide better protection against soil erosion of coastal embankments.

Whatever technologies are developed, physical protection of the embankment depends on its close supervision by the adjacent farmers whose crop fields and assets are protected and secured. The embankments are found to disappear within a year or two of the start of erosion, which requires immediate repairing. Unfortunately, the mandate of BWDB has been restricted to major repairs only when embankment is close to failure or completely failed. Accordingly, the farmers could be the real and close supervisors of these embankments if they are involved in the group of beneficiaries from embankment plantations. Existing rules of FD provide 50% output (yield at maturity) of plantations to the interested stakeholders. Owing to their own necessity, they will take immediate measures to minimize the embankment erosion and provide security of its plantations. Appropriate technologies, as developed by BFRI, offer unique opportunity for participatory resource generation in the exposed embankments through the involvement of farmers group in raising plantations and its subsequent maintenance. And, this could be the right way for sustainable and participatory governance of common wealth.

## 6.4 CWSM – With Special Reference to Joint Coastal Forest Management

Forest department developed a new, collaborative approach to ensure more effective protection, conservation and sustainable utilization of designated Protected Areas with support from USAID under Nishorgo project. This new approach may be applied along the coastal forest resource development with

community involvement under joint or co-management model adopted. Joint forest management lessons learnt in West Bengal for the conservation and management of forest protected areas contribute more effective biodiversity conservation as well as provide a higher level of economic benefit and alternative income generation opportunities for the surrounding communities.

In general, before initiating the activities of any development project in the coastal areas local farmers are never asked for how to maintain the existing resources, what their demands are, how to make the fair share of resources or how to address for sustainable resource management. As a result, most of these projects are found unsustainable or ended with minimum contribution to the national poverty alleviation programmes. With these in view, local farmers were organized to discuss among themselves regarding various issues and particular emphasis was given to the Joint Forest Management (JFM) in encroached afforested coastal areas of Bangladesh. Problems regarding participatory approach for productive use of allocated land and its resource control were prioritized at farmers level and validated (Nandy et al., 2003). Summary of farmers opinions for a number of provisions for each of following issues have been provided in Table 3.

This article discusses on the issues how to reduce the pressures for encroachment and conversion of the remaining mangrove forests by addressing the driving forces and root causes of the pressures on the coastal mangroves. In order to meet this challenge, it is suggested to ensure support for increased local participation in the collaborative or joint management of these forests and regeneration or enhance productive potential of the forest resources, in a manner that integrates opportunities for partnership governance. This approach also emphasized on sustainable use in association with poverty reduction in tandem with more effective conservation where local communities would be mobilized through co-management of public-private or community partnership.

## 7. CONCLUSIONS

This article reveals the fact that a paradigm shift from conventional income generation activities to resource generation activities all along the coastal zone opens up the threshold point to unlock the poverty trap through participatory governance of conservation of biodiversity and management of common property regime by the landless and marginal farmers who constitute majority of the population. Policy dimension toward creating enabling environment for bringing benefit beyond the boundary should consider the issues of climate resilient development.

The impact of inundation and severe storms on the natural forest of Sundarban is profound. Its key mangrove species had been surviving against climate change impacts for over a century. Its ten key species have been considered as enduring species against climate change impacts and successfully evaluated in the coastal areas of Bangladesh. Bangladesh coastal belt is most

**Table 3:** Perceptions of participating stakeholders

<i>Sl. No</i>	<i>JFM issues</i>	<i>Possible solutions</i>
1.	Farmers selection	Farmers unanimously agreed that the participating farmers should be landless having family and recognized by local authorities including Govt. and NGO.
2.	Allocation condition	Concord of opinion is that they are bound to reside and invest own labour/inputs in allocated plots. Considering their economic condition, they may earn money by using their additional labour outside.
3.	Allocation committee	Special Land Allocation Committee comprising members from Govt., NGO and farmers can be formed.
4.	Allocation size	Minimum allocation of land (1 ha) per family with valid land-leasing document may satisfy the farmers.
5.	Group size for JFM	They prefer 50 farmers in a group so that they can resist any attack from outside.
6.	Plot size for JFM	Farmers unanimously agreed that they need at least 30-40 m wide agri-plots in between shelter belts comprising six lines of trees per belt.
7.	Farmers right for resource use and resource replacement	Farmers assured not to cut the trees but to keep the allocated forest land always covered with mainland species provided the seedlings are available (it may be mentioned here that the mangroves are no more suitable in raised land while climate change impact necessitates to create vegetative protection belt).
8.	Share for common wealth to be created through JFM	Farmers agreed for 50:50 share of commercial produces at the end of maturity and also expect to get all dry leaves, lops, tops etc. after felling as remuneration for taking care of trees in shelter belts.
9.	Authority for community management	Farmers consider themselves as the main authority for their common wealth management while they unanimously agreed to form Community Development Committee by involving Govt., NGO and farmers.
10.	Responsibilities of such authority	Periodical monitoring of common wealth management as well as development of school, bazar, prayer house, community centre and even provide support in raising nurseries.

vulnerable to sea level rise. In this regard, the introduction of selected species is the best option to cope with different scenarios of sea level rise. Several techniques have been provided for eco-friendly maintenance of coastal embankments. In order to set the congenial environment for group-based resource generation activities of coastal dwellers, it has been recommended to combat poverty alleviation through the integration of both scientific and participatory approach.

PRA conducted throughout coastal belts of Bangladesh provides an interesting land leasing schedule, which can be incorporated at introducing coastal land tenure policy highlighting people's participation and their access for productive use of land to overcome land-use conflict. The same is applicable for shrimp cultivation, which should be practiced in the selected productive areas through the application of CPR in order to minimize land-use conflict and destruction of mangrove forests, while the CPR scheme will provide sustainability of poverty reduction for group farmers.

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