

# Mangrove Conservation through Community Participation in Pakistan: The Case of Sonmiani Bay

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**Abstract**— Being fragile ecosystem, mangroves are under threats throughout the world. Various techniques and methodologies are under vogue in different countries for conservation of mangroves. Local communities as an important stakeholder can play effective role in mangroves conservation. As in the case of Pakistan, the Indus delta alone spread over 0.6 million ha and has mangroves over an area of 0.16 million ha along the coastline. The most significant characteristic of Indus delta is that it receives an average of only about 220 mm of rainfall per year, and sometime no rainfall at all. Sonmiani is the only place along the coast of Pakistan where three species of mangroves viz-a-viz *Avicennia marina*, *Ceriops tagal* and *Rhizophora mucronata* exist naturally. The mangrove forests are used for fuel wood, fodder for cattle and browsing areas for camels. Despite the area is subjected to grazing and fuel wood collection, different techniques were developed to restore the mangrove ecosystem through community participation with the assistance of WWF-Pakistan and local NGOs. Local community, whose main profession is fishing, has planted a considerable degraded area with mangroves, thus playing their role in protection and conservation of mangroves for future young Pakistani generations

**Keywords**— Fragile ecosystem, Arid mangroves, Community participation, Conservation.

## I. INTRODUCTION

The coastline of Pakistan is 1050 km long and 40-50 km wide shared by the provinces of Sindh (350 km) and Balochistan (700 km). In the Sindh province, mangroves are found in the Indus Delta which occupies approximately 600,000 ha extending from Korangi Creek in the north to Sir Creek in the South. Indus Delta comprises 17 major creeks, numerous minor creeks and extensive mudflats and constitutes 97% of total mangrove forests found in Pakistan. Mangroves of Indus delta are unique in being the largest arid climate mangroves in the world. The survival of these forests is largely associated with perennial freshwater supplies from the River Indus, which flows through the delta before reaching the Arabian Sea. An area of 344,845 ha of the Indus delta has been declared as protected forests and is under the control of Sindh Forest Department [2]. The Indus Delta is believed to

have had as many as eight mangrove species in the past. However, at present only four species have been left. Nearly 95% of the mangroves located in the Indus Delta comprise the species *Avicennia marina*. Very small patches of *Ceriops tagal* and *Aegiceras corniculatum* are found near the mouth of the Indus at Keti Bunder. *Rizophora mucronata* and *Ceriops tagal* have been introduced in the Indus delta through replantation work.

In Balochistan province, the mangroves occur at three sites, Miani Hor, Kalimat Khor and Gwatar bay. Total area under mangrove cover in all three sites has been estimated to be 7,340 ha [1]. This area is equal to 3% of total mangroves found in Pakistan. Miani Hor is the only area in Pakistan where three species of mangrove *Avicennia marina*, *Rhizophora mucronata* and *Ceriops tagal* occur naturally.



Fig.1 Mangrove sites in Pakistan

Miani Hor or Sonmiani Bay is situated at a distance of 90km, from Karachi on the east Balochistan coast. It

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comprises of three villages viz. Dam, Sonmiani, Bhira and a settlement called Baloch Goth .Sonmiani constitutes the smallest administrative unit known as Tehsil of the District Lasbela.

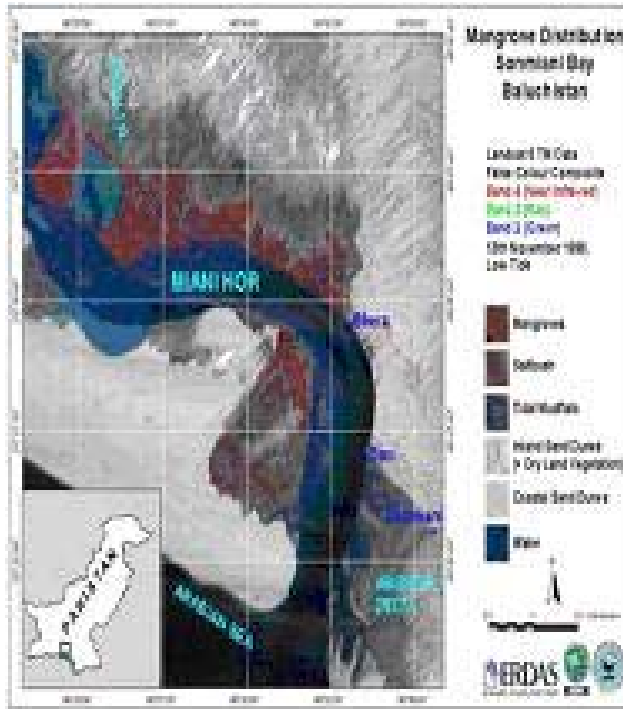


Fig.2 Mangrove Distribution in Sonmiani Bay

According to the census (1988) the estimated population was 4000 and during a study conducted by WWF recently, the total population of the area is more than 11,000 (Table 1).

Table: I: Total population of Lasbela district

S.#	Villages	No. of household	Population
1.	Sonmiani	225	3,000
2.	Dam	550	6,500
3.	Bhira	171	1,300
	<b>Total</b>	<b>1079</b>	<b>11,678</b>

It is general perception that the population of the area has been increasing. The population of the area further rises temporarily during the fishing season, when working forces from other parts of the country come to the area for earning livelihood through fishing.

These villages are directly dependent on coastal resources, especially fisheries and mangrove forests. The people belong to different tribal groups such as Lasi, Rajput, Khaskheli, Mirbahar, Jumari, Soomra and Zikri

Baloch. Families of the same group live in their own mohallas or paras (neighbourhoods). A few Hindu families also live in the area. The main occupations of the local people is fishing (90%), only a few people work for government departments (e.g. fisheries, electricity and education) or are involved in trade.

According to Balochistan Fisheries Department Statistics (2003), there are 5,610 fishermen (3,320 fulltime, 1,490 part time and 800 occasional fishermen) in the area. There are 104 mechanised boats fitted with inboard engine, 672 motorised boats fitted with outboard engine, 03 sail boats without engine and 42 Life boats with inboard engine in the area. The community spends whatever they earn and there is nonexistence of saving habits. Further, they are also indebted by loans taken from moneylenders. Most of the population is only acquainted with fishing and unable to switch to new trades.

Women are deprived of developmental opportunities due to various socioeconomic and cultural reasons. They are primarily responsible for family and household activities. They lack access and control over resources and have very restricted mobility outside their communities. Women have generally no or lower formal education thus, lowering their income generating potential. They do not take part in economic activity. Women are however, knowledgeable about the problems and issues of the area.

The community primarily depends on natural resources. The following natural resources were identified and prioritized by the local community.

#### A. Sea/Coast

These are perhaps the earth's greatest natural resource, with life from tiny plankton to huge whales. More than 90% of the living biomass is found in the sea or ocean. The living resource under ocean and sea has not yet been fully explored. The invertebrate fauna include protozoan, coelenterates, annelids, mollusks, crustaceans and echinoderms. Fish, reptiles, mammals and birds represent the vertebrate fauna in which fish is the major group. Marine flora also shows high diversity. Sonmiani is a bay on Balochistan coast and the total area of the bay is 125.25 sq. km and the shelf adjacent to it is 80 km wide.

#### B. Fishery

Marine fish is the major natural resource of the area, on which the livelihood of the community depends. More than 350 species of fish are known to exist. Marine fishing is an important activity in the area. More than 90% of the population earns an income through fishing or fishing related activities (Fig. 3). Shrimping is also carried out in shallow waters and shrimp trawling grounds are located in Miani Hor/ Sonmiani bay. Karachi is the main market of fish and shrimp catch in Miani Hor (Fig. 4).

Balochistan Fisheries Department Statistics shows that in the year 2003, a total of about 11,000 metric tons of fish was caught in this area, which was about 9% of the total catch on Balochistan coast (about 12,000 metric tons).

The main categories of fishery resources are small pelagics and demersal fishes, sharks, shrimps, lobsters and crabs. Fishery can be divided into three classes, large scale fishing, medium scale fishing and small scale fishing. Small boats do small scale fishing within 5 km radius.



Fig. 3.a fish catch in study area



Fig. 4. A Shrimp catch as one of the economic activities in the bay

#### C. Water birds

The site is important for large concentration of water birds including migratory and resident population. More than 20,000 birds representing 52 species usually visit Sonmiani/Miani Hor in winters. The area is one of the designated Ramsar sites in Pakistan. The area is also included in to Global 200 eco-regions of WWF, means the area is representing a globally outstanding example of major habitat types. It is a part of the Arabian Sea Eco-region. The water birds that are found in the area include grebes, pelicans, cormorants, flamingos, egrets, herons, storks, ibises and spoonbills, cranes, coots, shore birds (waders), gulls and terns (Fig. 5).

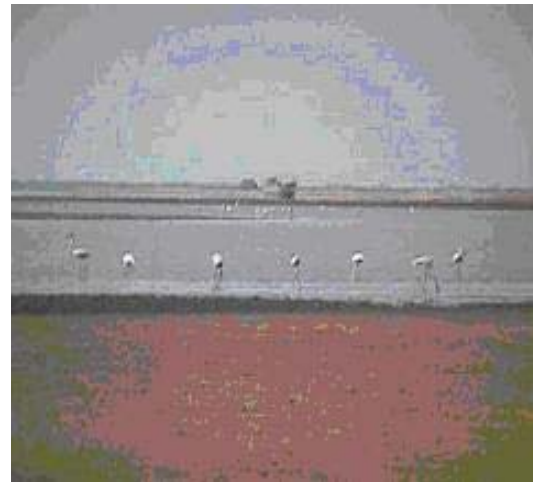


Fig. 5. Flamingos at Sonmiani Bay

#### D. Agricultural land

Practically, agriculture is non-existent in Sonmiani but the community has some land in the south of the village where in the rainy season some pulses and vegetables are grown. It is said that agriculture was done in the past along Winder River but the river has changed its path and has engulfed the land of the community. Further, due to drought and scarcity of freshwater, agriculture is not practiced. However, some locals grow castor oil in July, when there is little rainfall.

#### E. Mangrove Forest

Mangrove forest has a great economic and ecological significance. It is the habitat of a diverse community of organisms ranging from bacteria and fungi to fish, shrimps, birds, reptiles and mammals. It provides fuel wood and fodder for domestic animals of the local communities. The mangrove forest in Miani Hor is spread over an area of about 2500 ha, which represents 42% of total cover of mangrove forest in Balochistan (Fig. 6). It is

the only area in Pakistan where three species of mangroves i.e. *Avicennia marina*, *Ceriops tagal* and *Rhizophora mucronata* grow in natural condition.



Fig.6. Mangrove Forest in the area

## II. PROBLEM FORMULATION

Almost wholly dependent upon silt-laden freshwater discharges from the Indus, the Indus delta mangroves are an important, complex and life supporting ecosystem both economically and ecologically. They are a pool of biodiversity supporting many forms of plant and animal life, providing habitat, shelter and breeding ground for an economically important marine life and migratory birds, protecting coastline and sea ports from erosion due to wave wash and siltation, meeting fuelwood and fodder requirements of local communities and livestock, providing livelihood to a coastal population of more than 100,000 people, and serving as laboratory for marine research.

Reduction in inflow of freshwater from Indus on account of diversion of water for other purposes, inflow of pollutants from industries, navigational activities and intermix of industrial effluent, and human and livestock population pressure for fuelwood and fodder collection have exposed this complex ecosystem to severe environmental and social stress in the form of loss of habitat and biodiversity, decline in fish productivity and social problems for coastal communities.

## III. PROBLEM SOLUTION

WWF-Pakistan is implementing a project on Tackling Poverty in Pakistan's Coastal Communities through the Sustainable Livelihood with support from EU through WWF – UK[3]. The project will contribute to improved livelihood and sustainable resource use in the area in two ways:

- By working with partners on an advocacy programme, to address some of the root causes of livelihood and natural resource threat which are outside the control of individual communities.
- By adopting learning centered approach and disseminating lessons to the committees, thereby stimulating best practice over the wider area.

The emphasis of the project is to focus on the overall livelihood of the community and to treat the sustainable management of natural resources mainly mangrove and fisheries as a part of this.

WWF-P started Mangrove Conservation activities in this area in 1995[4]. In 1997, a project was supported by the DGIS, Government of the Netherlands through WWF-International. The overall objectives of the project were “to contribute to the conservation of mangrove forests at coastal areas of Sindh and Balochistan through the promotion of sustainable management and information dissemination”.

WWF-Pakistan facilitated the local communities in establishing Community Based Organization (CBOs). As a result three CBOs have formed i.e. Society for Social Development and Conservation of Nature (SSDCN) in village Dam, Sonmiani Development Organization (SDO) in village Sonmiani and Mahigeer Tarquati Tanzeem (MTT) Bhira. Two of them i.e. SSDCN and SDO have been registered with Social Welfare Department of Government of Balochistan. They have been provided skill-based and issue-based training to deal with the environmental, social or development issues. Their linkages with other organizations addressing social or development sectors have also been developed. The Forest Department of Balochistan has also been collaborating with WWF-P in developing activities aimed at conservation of mangrove forests in the coastal areas in the province. WWF along with CBOs is actively involved in mangrove restoration activities.

SSDCN implemented an 18-months project on Mangrove Rehabilitation with the support from the Small Grants Programme of the Ministry of Environment, Government of Pakistan in 2001 – 02. They also established a mechanical boat repairing workshop at Dam Bunder with support from Trust for Voluntary Organisation (TVO). Currently, SDO has been implementing a 3-year project on Conservation of Mangrove Forests at the Coastal Areas of Miani Hor, since November 2003 which is being financed under small Grants Programme for promotion of Tropical Forests being implemental by UNDP.

A two-pronged approach was used to identify various issues and their suggestive solutions.

A workshop followed by a PLA exercise (by a multidisciplinary team) was conducted with the communities of Sonmiani, Dam, Bhira and Baloch villages where a participatory approach was adopted to develop the plan (fig. 7). Help was also taken from other aids such as flip-cards, coloured cards etc.

Participants' thoughts and ideas were noted either on flip charts or coloured cards and were organized for the purpose of discussion, review and agreement by the group; in this way everyone had a chance to express him or herself. Social issues were discussed in PLA exercise. PLA stands for Participatory Learning & Action. As its name suggests, it is participatory in nature, was developed in the context of rural areas, and is concerned with the appraisal of existing conditions and attitudes. PLA facilitates and enables local people to do their own investigations, analysis, presentations, planning and action to own the outcome. This tool helps in participatory appraisal and planning as well as participatory implementation. A wide range of methods has been used in PLA.

These include Semi-structured interviews (SSI), transect walk, development of resource map, Venn diagram, trend analysis etc. The exercise was conducted with both male and female groups. SSI aimed to explore priority problems in more depth, using discussion starters. The maps and diagrams focused to analyze situations and plan of action.

Participants were divided into two groups, one male and one female. Both groups represented and conducted activities from Dam Sonmiani, Bhira and Baloch village. The facilitator briefed the community about the process and asked the groups to list down the natural resources of their area that are linked to the livelihood of the community, both directly or indirectly. Both of the groups identified the resources of the area according to their perception and then natural resources were matched and prioritized. Then the participants identified the problems/threats to the listed natural resources and determined the causes of the problem and identified the actions to be taken.



Fig. 7. Workshop with community at Sonmiani

The following questions were also discussed/addressed during formulation of the Development Plan:

1. How the community benefits from various actions?
2. What are the main obstacles that will or may be encountered?
3. What are the key people or organizations that can support the action?
4. What type of support they can provide?
5. How will they be involved?
6. How much time is required for the specific action?

Finally, it was ensured that all community representatives agree with the plan of action that has been formulated with their input and participation and that they would implement it. Some selected pictorial overview of coastal community activities in mangrove conservation are illustrated in Figures 8a-f.



Figs.8a-f. Mangroves afforestation and reforestation by community

#### IV. CONCLUSION

The purpose of Mangrove conservation program is to bring the local coastal community in a common vision of how their area should develop. Further, as to how the link between poverty and environmental degradation could be made. Therefore, WWF –Pakistan facilitated the community to develop a strategic plan that reflects the challenges and their solutions with regard to the existing natural resources of the area that will ensure sustainability of community efforts. The main goal behind this plan is to conserve, restore and assure the quality of the natural resource base for future generation.

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