Responses to the changes in the Sundarbans

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Introduction:

Sundarbans is the world's largest single block of mangroves comprising a total area of 10000 square kilometres land and waters, placed in between Bangladesh and India. The share of Sundarbans is higher in Bangladesh part and it belongs to the area of 6071 square kilometres (62% of the total Sundarbans area), which constitutes 4.2% total land area and 39.5% total forested area of Bangladesh respectively. In Bangladesh part, 4071 square kilometres of the Sundarbans is land and rest is water body. The forest area consists of about 200 islands, separated by about 400 interconnected tidal rivers, creeks and canals. The Bangladesh section of the Sundarbans was declared as Reserve Forest (RF) in 1875, where some form of resource extraction is allowed but no one is permitted to settle, cultivate and graze inside the forest except the forest department. The forest is administered under two forest divisions and four ranges viz Chandpai, Sarankhola, Khulna and Burigualini and has 16 forest stations. For furthering the protection and conserving the valuable biodiversity resources, three areas such as Sundarban West, South and East have been designated as wildlife sanctuary and most intriguing news is that UNESCO has declared these sanctuaries as 798th World heritage site in 1997. Moreover, the water body of Sundarbans has been designated as wetland of international importance under Ramsar convention in 1992 and thus Sundarbans is the 560th Ramsar site.

Besides wide array of biodiversity resources, the Sundarbans provides livelihood to about 300,000-500000 people. Wood and Goalpata cutters (Bawalis), Fisherman (Jele), Honey and wax collectors (Mouls), Fuel wood and Grass collectors (Kathkuani), Shell collectors (Chunary), Crab collectors etc. are some major occupational groups are to be found in the Sundarbans and its adjacent areas. Previously, number of industrial units such as Khulna Newsprint Mill, Khulna Hardboard Mill, Dada Match Factory were run by raw materials collected from the Sundarbans. However, most of those are now closed or declared lay-off due to mismanagement and shortage of raw materials. Conversely, number of shrimp firms, saw mills, fisheries industry, wood and furniture making industry are now running based on the Sundarbans resources. Even though some of their activities are considered as environmentally degrading, but they have provided employment to near about 50000 people.

Over the last few decades Sundarbans has been experiencing major ecological and physiographical changes due to some human and natural interventions which are taking a toll on the forest regenerative capacities and its ability of self sustainability. Gradual exploitation of the natural resources beyond its sustainable yield, industrial

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and marine pollution, oil spills, effort made for oil, gas and mineral exploration, deforestation for settlements, shrimp firms and fishing with chemicals in canals, agricultural activities, construction of polder in upstream are all playing negative role in gradual destruction of this diverse ecosystem. This situation is further aggravated by havoc natural disasters like cyclone of 1988, the super cyclone Sidr 2007 and a very recent cyclone Aila. It is commonly observed that the Sundarbans has ability to recover from the damages incurred by natural calamities. However, the frequency and intensity of natural calamities has increased many folds which leave a little time to recover, hence natural recovery capacity of the Sundarbans is eroding day by day. On the other hand, the adjacent communities are continuously trying to cope with changed condition through initiating some innovative management practices such as practicing agro-forestry, introducing community based management, developing mangrove plantation in private land etc. In this paper some of the anthropogenic and natural causes of change and subsequent response mechanisms will be discussed.

Biodiversity resources in the Sundarbans

Sundarbans is a special type of forest with dominance of halophyte species. Being the most bio-diverse forest in Bangladesh Sundarbans alone supports 53% of birds, 43% of animals, 42% of reptiles, 36% of amphibians, 29% of plants and 17% of fish species of the country's total biodiversity resources. The total growing stock of the Sundarbans has been estimated as 10.6×106 m^3 (Canonizado and Hossain, 1998). Prain (1903) recorded 334 species of vegetation under 245 genera. However, many species already extinct and some are threatened. In a recent study Hussain and Acharya (1994) estimated 123 plat species including 22 tree species in Bangladesh part of Sundarbans. The distribution and composition of plants in the Sundarbans largely depends on saline gradient and fresh water availability. Sundari (*Heritiera fomes*), the flagship tree species, is found in low saline zone to moderate fresh water zone all over the Sundarbans. Moreover, gewa (*Excoecaria agalocha*) is abdundant in medium saline zone. Other common tree species include *keora, baen, kankra* (*Bruguiera gymnorrhiza*), *jhanna garjan, dhandul (Xylocarpus granatum),* and *passur (Xylocarpus mekongensis)*. Goalpata (*Nypa fruticans*) and hargoza (*Acanthis ilicifolius*) are common along the muddy creeks and river banks and high saline zones. The ground is mostly covered by dense patches of thorny hental (*Phoenix paludosa*) and Tiger fern (*Achrostichum aureum*). Tiger use these bushes to camouflage themselves.

The Sundarbans hosts a large variety of mammal species. There are about 49 species of mammals already recorded including the spectacular Royal Bengal Tiger. Other notable mammalian fauna are spotted deer (*Axis axis*), rhesus macaque (Macaca *mulata*), jungle cats (*Felis chaus*), otters (*Lutra perspicillata*) and wild boar (*Sus scrofa*). Deer and wild boar constitute the main prey for the tiger.

Sundarbans is one of the last remaining homes of the Irrawady dolphin (*Orcaella brevirostris).* Moreover, it supports Ganges river dolphin (*Platanista gangetica*) to a considerable number. Monitor lizards (*Varanus sp.*) and estuarine crocodile (*Crocodylus porosus*) are two most commonly found reptiles out of 59 species of reptiles that supports Sundarbans. A total of 315 species of birds have been recorded so far in the Sundarbans including 95 species of waterfowl, 38 species of raptor, and nine species of kingfisher (Sarker and Sarker, 1986). Sundarbans provides livelihood

through fishing to a hundred thousands of fishermen by hosting more than 300 species of fish including 20 species of prawns, 8 species of lobster and other economically valuable fish species.

People and Livelihoods in the Sundarbans

The Sundarbans is a mangrove forest as well as protected area; therefore no one is allowed to live inside the forest. Therefore, forest dependant communities mainly live in adjacent area, which is known as Sundarbans Impact Zone (SIZ). Settlement in the SIZ began at the starting of the 19th century. However, the density of settlement is increasing with increasing population and shear dependence on natural resources collected from Sundarbans. The MARC survey showed that 78% of the households within 0-2 km from the forest were dependent upon the forest for income generation, while 64% were dependent who lived 8-10 km away. Participation rate varied between resources, with strong participation in goalpata collection from the 0-2 km band and virtually no participation in the 8-10 km band. On the other hand, prawn fry collection participation was almost uniform irrespective of distance.

The livelihood pattern in the Sundarbans area varies with season and supports an estimated 3.5 million people, working variously as woodcutters, fishers, and gatherers of honey, goalpata leaves and grass. Local people are themselves dependent on the forest and waterways for such necessities as firewood, timber for boats, poles for houses and rafters, goalpata leaf for roofing, grass (e.g. mele grass (*Cyperus javanicas*), ulu grass (*Imperata cylindrical*), nal-khagra (*Eriochloea procera*) for matting, reeds for fencing, fish (mostly for their own consumption) and medicinal plants for herbal treatment. The people involved in various resource collenctions from The Sundarbans have separate identities and traditional cultural practices for harvesting resources in a sustainable manner. (Kabir and Hossain, 2008)

Anthropogenic pressures on the Sundarbans

Like other forest areas of Bangladesh, Sundarbans is also experiencing degradation due to different anthropogenic causes. Although the forest is under scientific management for about 100 years or more, steadily and illicit destruction of the forest could not be stopped due to local peoples' demand and corruption by the forest officials. There has been overexploitation of the forest resources possibly due to the over estimate of volume increment and illicit removal procedure. As a result standing volume of the dominant tree species has been declining sharply. Moreover, increased water salinity is another problem for the Sundarbans ecosystem. This excess salinity is partly due to upstream Farakka dam built in 1970s on the Ganges and partly due to climate change. After construction of the Farakka dam freshwater flow has been reduced drastically in the downstream rivers (Ganges) which impacted the vegetation composition of the Sundarbans. In the Sundarbans water salinity varies from 5 ppt (east) to 30 ppt (west) during dry season (Siddiqi, 1992). Sundari (*Heretiera fomes*) is the climax species in the Sundarbans which alone contribute 65% of the standing volume of merchantable timber, affected most by increased salinity. Reportedly, 17% of the Sundari coverage has been decreased after 70s. Table 1 presents status of Sundari and Gewa in different period.

Table 1: Number of tree per hectare over time Sundari (*Heritiera fomes)* and Gewa (*Excoecaria agallocha)* as found in different inventories

Species	Inventory/year	Trees>10cm dbh*	Trees>15cm dbh*
Heritiera fomes	Forestal 1959 ODA 1983 FRMP 1996	511 296 124	211 125 106
Excoecaria agallocha	Forestal 1959 ODA 1983 FRMP 1996	345 224 41	61 34 20

Sources: Canonizado and Hossain (1998). *Diameter at Breast height (1.3m from ground)

Major threats to the Sundarbans have come mainly from the growing population and their increased demand of wood, non-wood forest resources and conversion of forested land to agriculture and aquaculture. Numerous people are engaged in the commercial exploitation of sundari and other tree species, while the local people depend on the forest for firewood, timber for boats, poles for house-posts and rafters, golpatta (*Nipa fruticans*) leaf for roofing, grass for matting and fodder, reeds for fencing, and fish for their own consumption (Gopal and Chauhan, 2006) .

Shrimp culture is one of the major causes of Sundarbans destruction. A vast area already converted to shrimp pond, which was earlier forested. Tens of thousand of fishermen are engaged in fishing and shrimp farming. Moreover, collection of shrimp juveniles has increased manifold in recent years, particularly for aquaculture in reclaimed areas (Hoq *et al.,* 2001, 2006).

Pollution both the landward and seaward sides also considered as threat to mangrove destruction. The agrochemicals (fertilizers and pesticides) used extensively in the catchments of the Ganga and Brahmaputra rivers and their numerous tributaries, as well in the fields close to the mangroves, pollute both the waterways and the landmass, and affect the aquatic vegetation and fauna directly. Moreover, industrial plants located in the vicinity of the Sundarbans and spillages from ships in Mogla port contribute significantly to the pollution load in the Sundarbans. Oil and gas exploration activities and exploitation by the multinational companies in the name of development also cause destruction to the Sundarbans, even though still those activities kept to a minimum level.

Sometimes development projects in the name of conservation impose negative externalities to the forest. The so-called Sundarbans Bio Diversity Project (SBCP), designed to restore the original ecosystem and funded by the Asian Development Bank (ADB), the Global Environment Facility (GEF), and the Netherlands Development Fund, is being strongly criticised because of the infrastructures for ecotourism built in the heart of the mangrove and the non-transparent way in which the whole project is being implemented, disregarding the viewpoints and interests of local communities. The project failed to understand the local people involvement and their traditional livelihoods. As a result all efforts of SBCP are seen as a wastage rather than becoming a successful story of the Sundarbans management (Hossain and Roy, 2007).

Invasion of alien species is considered as detrimental to the natural ecosystem. To increase the forest coverage and also in an experimental basis, with the suggestion from the donor agencies, government has introduced some exotic species in the adjacent areas of the Sundarbans under social forestry programme. Local people also introduced some invasive species to the Sundarbans due to their lack of knowledge on ecosystem process. Those exotic species do not comply with natural ecosystems and consequently altering the whole ecological process. Biswas (2003) recorded 23 invasive species in Sundarbans of which 19 are native or naturalized in Sundarbans mangrove. Based on the severity of damage, species were classified as highly invasive, invasive and potentially invasive. Table 2 provides a list of invasive species found in the Sundarbans with their severity of damage.

Table 2: A list of Invasive species found in the Sundarbans

Scientific Name	Local Name	Remarks
Acrosticum aureumL.	Hodo, Hoda, Tiger fern	Invasive
Derries trifoliate	Gilalota, Gwalaelota,	Highly invasive
Dendropthoe falcata	Porgassa	Potentially invasive
Excoecaria indical	Batla, Batul	Invasive
Flagellaria indica	Abetaa	Potentially invasive
Hibiscus tilliaceus	Bhola	Potentially invasive
Hoya parasitical	Agusha	Potentially invasive
Clerodendrum inerme	Sitka, Sitka	Potentially invasive
Pongamia pinnata	Karanj, Karanja	Potentially invasive
Sarcolobus globosus	Bowali lota	Potentially invasive
Tamarix indica	Jhao, Nona jhao	Invasive

In general borders of the Sundarbans are severely affected by invasive species than that of inner side. It is a matter of concern that among the invasive species from Sundarbans several species are mangrove associates, with the combination of salt and flood tolerance (Binggeli, 2003). As a result it poses a potential impact on the Sundarbans. It is notable that still species invasion in the Sundarbans is in a controllable stage, but delayed identification of the invasive species and subsequent intervention measures to control their spread will result at a higher cost.

Natural causes of Sundarbans Degradation

Besides the human induced destruction, the Sundarbans is situated in most active delta which is subject to continuous change and also vulnerable to cyclonic events due to their direct exposure to the Bay of Bengal. Climate change and the associated sea level rise possibly the biggest threat to the Sundarbans. Climate change will also affect rainfall pattern which in turn affect fresh water inflow in the Sundarbans (Agrawala *et al.,* 2003). Taking into account 4 cm per decade sea level rise, which is consistent with the 4th IPCC report and local tidal gauge records (SMRC, 2003), it is predicted that the Sundarbans will realize a 28 cm increase in sea level around 2070. Moreover, climate change induced tropical cyclones' consecutive attack (Sidr in 2007 and Aila in 2009) has caused huge damage to the Sundarbans including death of valuable wildlife resources. Table 3 depicts areal damage statistics of the Sundarbans caused by cyclone Sidr (2007).

Table 3: Statistics of the Sundarbans area damaged by cyclone Sidr (Nov, 2007)

Type of damage	Area (ha)	Damage by category (%)	Damage by total area (%)
Highly affected	14,840	11	2.5
Moderately affected	91,420	59	15.2
Slightly affected	26,700	20	4.5
Total	132,960	100	22.2

The interconnecting rivers and canals in the Sundarbans are more unstable than the Ganges and Brahmaputra. Natural sedimentation process also affects vegetation composition in the Sundarbans. Low deposition of silt in the western part does not support vigorous tree growth. While, too much deposition of silt gives rise to the forest floor in the north-eastern and mangrove regeneration does not become established due to irregular flow of tidal water. Top dying of *Sundri* tree (*Heritiera fomes*) is another cause of mangrove destruction. Even though the root cause of top dying is yet to discover, but most of the scientist perceived that salinity increase might be the major cause of top dying. The ODA inventory report estimated that about 0.45 million (114 trees/ha on 395.514 ha) Sundari tress of 5 cm dbh classes are already affected by top dying (MoEF, 2010).

Changes in the Sundarbans over time

The vegetation succession process in the Sundarbans depends upon the land building process which follows particular sets of the fluvial regime and salinity gradients. The Sundarbans vegetation consists of recurrent patches of vegetation types. Trend of coastal mangrove forest composition has been assessed by CEGIS between 1985 and 1995 using data obtained from the Forest Department. During this period, major changes have occurred in the Sundri (*Heritiera fomes*) and Gewa (*Excoecaria agallocha*) dominated areas. Gewa is gradually replacing Sundri as the dominant tree species. Pure Sundri dominated areas reduced by about 86 km or about 11 percent of their previous extent, most of which are converted into the Sundri-Gewa and Sundri-Passur-Kankra (*Heritiera fomes-Xylocarpus mekongensis- Bruguiera gymnorrhiza*) community. The Sundri-Gewa community also followed a decreasing trend, as it lost 146 km or more than 10 percent of its land to the Gewa-Sundri and Gewa-Mathal (Gewa Coppice) community. Therefore, the overall shift is from Sundri to Gewa and from Gewa to other more saline tolerant species. A similar trend is also visible even in the higher saline zone where the high saline loving Goran (*Ceriops decandra*) is replacing the Gewa and Sundri. Keora (*Sonneratia apetala*) dominated areas have also increased from 37 km to 79 km resulting in an expansion of 43 km or 110 percent. Grass and bare ground areas also increased by about 15 km . The general trend during this ten-year period indicates the reduction of important tree species like the Sundri and Gewa and increase of smaller tree species. From Table 4, it is evident that the changes that occurred during this period are mostly concentrated in the eastern part of the Sundarbans. This might be because of a changed salinity regime there due to decreasing freshwater influx and climate change as well. On the other

hand, the vegetation community in the western region seems to be more stable as the hydrological regime in this area remained stable during the period. (MoEF, 2010)

Table 4: Changes in vegetation composition in the Sundarbans over time.

Vegetation communities	1995	1985	Difference	% area of 1985 remaining unchanged in 1995	% area of 1995 remaining unchanged from 1985
Water	4.46		4.46		
Sundri	750.30	836.50	- 86.20	72.70	81.05
Sundri-Gewa	1061.70	1208.29	-146.59	66.70	75.91
Sundri-Passur	24.71	21.84	2.88	77.40	68.39
Sundri-Passur-Kankra	73.94	67.32	6.63	85.18	77.54
Gewa and Gewa - Mathal (Coppice)	213.86	193.40	20.46	56.05	50.69
Gewa-Goran	348.96	373.70	- 24.74	73.52	78.74
Gewa-Sundri	764.83	597.97	166.86	70.44	55.07
Goran	83.34	85.50	- 2.16	65.35	67.04
Goran-Gewa	563.70	5 71.87	- 8.17	86.87	88.13
Passur-Kankra	2.86	9.55	- 6.70	15.65	52.36
Passur-Kankra-Baen	25.85	16.77	9.08	78.29	50.80
Baen	11.47	9.28	2.19	32.48	26.28
Keora	79.32	36.61	42.71	75.62	34.91
Grass and Bare Ground	58.91	43.68	15.23	38.63	28.64
Tree Plantation	2.10	3.52	- 1.42	31.20	52.26
Sandbar	9.45	3.97	5.49	26.54	11.14

Source: Forest Department

Sundarbans came under formal management system about 125 years ago. Basically, management systems were developed to improve of the resources collection procedure, mainly selection-cum-improvement of the tree felling system. Even though at the beginning the management system only concentrated on tree, but later it covers the entire forest resources including non-timber forest products. Regrettably, other aspect of sound ecological balance like wildlife, fisheries, biodiversity conservation, livelihood options of the local indigenous people were neglected in the management system (Siddiqi, 2001). Historically, management of the Sundarbans was started in the view of revenue collection in a proper way rather than the consideration of its ecological services and societal values. However most of these management plans were superannuated schemes and which developed when resource base and intensity of its natural resource uses were very negligible from the present situation. The trend continued even after independence of Bangladesh when they took charge of Sundarbans' management. Likewise, the government has treated Sundarbans as revenue collection point rather than valuing its ecosystem services. However, in recent time the partial views of considering the Sundarbans as revenue unit have changed slightly in terms of valuing the Sundarbans' ecological values, and most recognition came from its recent performance in face of super cyclone Sidr.

Local forest dependant people's livelihood activities are considered as major threat to the Sundarbans destruction by formal management body. Livelihood patterns have changed significantly since the time of settlement. Only a few decades back, the majority of the settlers were involved in agriculture activities. However, in recent times non-agriculture activities such as extraction of wood and non-wood forest resources and prawn cultivation have become as major occupations. The traditional resource users of the Sundarbans have no resource rights inside the forest according to the formal forest law. Therefore, they have to rely on seasonal permits to harvest and collect resources and those are literally at the mercy of Forest Department officials, money lenders and influential people in order to obtain permits and means to enter the forest. Rights to land in villages adjacent to the forest have in recent years been severely affected by the expansion of shrimp/prawn farming. Prawn farming is one of the major reasons for the permanent water-logging in the south-west region of Bangladesh. The prawn farm owners have taken most of the khasland (common property covering land and water) for farming. Poor people living within the impact zone do not want but have been forced to extract resources from the Sundarban reserve forest (SRF) beyond sustainable limit as wage labourer due to lack of other opportunities and the conversion of farmland to other uses (such as prawn ponds) (Kabir and Hossain, 2008; FPP, 2010).

Responses to changes

Even though anthropogenic intervention is regarded as major cause of the Sundarbans degradation, but the local and indigenous communities follow some traditional rules while collecting resources which in turn establishing a sustainable resource management system rather than degrading the forest. In the Sundarbans, some of the rules followed by the mouals when collecting honey include: cutting a section (about two thirds) of the honeycomb, leaving the rest for reproduction; making sure that no young bees are killed; and squeezing beehives by hand. Bawalis follow several rules to ensure sustainable harvests of wood such as: leaving at least one stem/shoot in each clump after cutting; goran stems that are 2.5 cm in diameter and above and 2.25 m in length and over are separated out as poles and the remaining stems are classed as fuelwood; once bawalis have harvested wood from a compartment, in the following year they will not use this compartment for harvesting, but will harvest wood on a cyclical basis so that there will be adequate re-growth of the plants by the time of the next harvest in that area. Golpata harvesters also follow rules for resource reproduction, such as: exploitation in any area is not allowed more than once a year and is not allowed during June to September, which is the growing period; only the leaves that are approximately nine feet long are to be cut; the unopened frond (the central leaf, locally called *maij pata)* and the leaf next to it (locally called *desh pata)* in each clump must be retained. If the collectors cut all the leaves in a clump it will permanently vanish from there, because the bush is unable to produce *golfal* (nypa fruit); flowers and fruits should in no way be disturbed when cutting leaves. Some of the customary practices that the traditional fishers maintain for sustainable harvesting include: not catching fish fry; not using *jal* net (very small-mesheded net); using big-meshed net for rivers, and small-meshed net for ponds or closed water bodies; not catching all species of fish, nor smaller fish; and avoiding fishing in the spawning period. (Kabir and Hossain, 2008; FPP, 2010).

In face of resource degradation in the Sundarbans, the forest dependent communities in SIZ are diversifying their livelihood patters. They have developed some innovative techniques in agriculture that are adaptive to local biophysical condition while ensuring environmental sustainability. They grow their rice seedlings in raised land with less risk of saline water contamination to ensure maximum survival then transplant to field (Plate 1). While, for rice harvesting they have developed innovative technique that is adaptive to saline contaminated land. The local communities harvest rice pant 8-12inch high from the ground (Plate 2). They argued that due to high salinity in soil and water they follow this technique. Practically this saline contaminated rice straw will be decomposed within very short time if they use it for their roofing material. Therefore, they let those to be decomposed in the field which in turn add organic matter mainly nitrogen in soil and also reduce saline intensity which is beneficial for their next crop growth. Since most of the people in the local community are landless, they grow vegetables on shed or roofs, yard or back yard of their houses (Plate 3,4 &5).

Plate 1: Rice transplantation

Plate 2: Rice harvesting leaving stag height of 10-12 inch

Plate 3: Vegetables on shed.

Plate 4: Indian Spinach (*Basella alba) grown* in roof

Plate 5: Climbing vegetable named, Bottle gourd *(Legenaria siceraria) grown in the roof of rice storage*

Figure 1: Adaptive agriculture techniques in the Sundarbans Impact Zone (Photo credit: Uthpal Kumar)

Local people also started to raise mangrove plantation in their salinity ingressed land. Following influential example of Khaibor Sardar, first started mangrove plantation in 1.3 acres of his own land with goal-pata and earned 4000 taka from selling the leaves,

many people now planting goal-pata and other mangrove species around their homestead and saline water-logged land which were earlier remain unused.

Community Based Management of the Sundarbans (CBMS): The project Community Based Management of the Sundarbans (CBMS) has been running since 2005 to date funded by Forest People Programme (FPP), UK is being implemented in two upazilas of Khulna districts of Bangladesh by Unnayan Onneshan (UO), a research based organization in Bangladesh. The project is set to achieve the primary goal of ensuring the implementation of the Article 10c of the Convention of Biological Diversity which states to ensure peoples participation in forest management through their traditional and customary knowledge. Under this project Forest people recognition activities, Agro-forestry research activities, Media campaign, upazila workshop, forest people group formation to initiate indigenous peoples' organization should be marked as success and the learning from them revealed new possibilities of actions towards developing livelihoods of those forest living communities.

Participatory Model for Identification and Recognition of Forest People (ParMoRec): participatory model for identification and recognition of forest people in the Sundarbans Impact Zones (SIZ), shortly known as ParMoRec-Sundarbans, has been developed to provide an authentic list of Forest Peoples in a model union of the SIZ to support the Forest Department and local government in ensuring forest people's rights, is a part of larger CBMS project. The local people themselves felt necessity of identifying real forest users to restrict illegal resource collectors. Moreover, some real forest people cannot get the 'pass-permit' from the forest department to collect forest resources from the Sundarbans, because the FD issues 'pass-permits' to only those who have Boat Licence (with a boat). Therefore, the local people claimed to FD to change their procedure of issuing 'permit'. The FD agreed to the demand of the local people but problem arose from lack of criteria of identifying forest people. Therefore, upon consultation with local people, local government officials and forest department officials 20 variables have been set under this model to identify forest people. This model will serve as the primary methodology for establishing a set of common criteria of identifying forest people in a model union (in this case Amadi union of Koyra, Khulna District located south-west of Bangladesh. Data collection already completed and now analysis of then analysis is going on. The preliminary result will come out by end of July, 2010.

Government initiatives: Taking into account the causes of failure of SBCP, government has now started new project with funding assistance from USAID named Integrated Protected Area Co-management (IPAC) including local community as stakeholder.

Figure 2: Objectives of Integrated Protected area Co-management (IPAC)

However, most of the local peoples are still sceptical about the project and they alleged that till now the process is top down. The experts design the programmes and without Free, Prior and Informed Consent (FPIC) of the local community try to implement. Moreover, local peoples demand to recognise them as right holders rather than stakeholders.

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