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"ASSESSING ECOLOGICAL & SOCIO-ECONOMIC SIGNIFICANCE OF MANGROVES ON THE LIVELIHOOD OF COASTAL COMMUNITIES"

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ABSTRACT

Sindhudurg represents an important district with a vast 121 km long coastline, fishery resources being a source of food and livelihood blessed with vast 3,300 hectares of mangrove patches. There are ranges of fish & shellfish species, about 53 species of fish and shellfish varieties, caught in the mangroves and surrounding areas. The article identifies the key socio-economic challenges faced by local communities due to mangroves underpinning local livelihoods, understanding the direct and indirect impact of ecological changes attributed to mangroves on the livelihood of the people and understanding the perception of the people on the policies for mangrove protection in the district. The study reveals that mangroves are perceived differently by the people engaged in fishery and agriculture. While the fishermen do not necessarily detest mangroves, some of the farmers have considered mangroves as intrusive owing to their high fecundity. The study indicates that an economic approach should be adopted to inculcate interest among the locals associated with mangroves for its conservation and sustainable use.

KEYWORDS: Mangroves, Creek fishing, Agriculture, Livelihood, Siltation & Khajan Land

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INTRODUCTION

Mangroves are a group of shrubs and trees that grow in the coastal intertidal zone. They are different from other forests owing to several characteristics such as tolerance to salt level, high tide, and low tide, a presence of breathing roots called pneumatophores and so on. Mangroves represent typical coastal wetlands and their intricate root system also make them lucrative for fishes and other organisms forming the breeding ground, seeking food and shelter from predators etc. (Sathe, 2013; Sarker S, 2010). Mangroves are often considered as ecologically important habitat. In India, approximately 60% of the commercially important coastal fish species are directly associated with mangrove habitats. Apart from fisheries, they also play an important role as protectors against floods and hurricanes, reduction of shoreline and riverbank erosion, maintenance of biodiversity etc. (Sarker S, 2010). In addition to the multiple ecological services provided by mangrove ecosystems, ranges of direct and indirect natural products from mangroves are vital to subsistence economies and provide a commercial base to local and national economies (Patrik, 1999). The mangroves are protected under CRZ notification (2011). (Marale et.al, 2011)A dedicated wing of the forest department, the Mangrove cell, was established in 2012 to protect, conserve and manage the mangroves of the Maharashtra State. For the proper functioning of the mangrove cell, a jurisdiction on mangrove areas needs to be notified and transferred to the forest department, both on private and government land (Lukose, 2014). The mangroves of Konkan are also being viewed for their conservation.

Protection and rehabilitation of mangroves through the state forest department and other institutional efforts for the research and conservation are under stages of implementation (Shindikar M.2012). Human interference is increasing with the mangrove ecosystem where land is being reclaimed. The Kharland Development is engaged in bunding the estuaries to reclaim the saline land for cultivation; however, construction of such bunds at or near to opening of the estuaries have resulted in mangrove destruction(Shindikar M.2012), The mangroves from the land to be reclaimed disappear due to lack of flooding (Yeragi SS et al, 2014). It has been reported that in last 25 years almost 40% mangrove cover of Maharashtra had been destroyed due to human interference and State Kharland Development Board (Shindikar M.2012). Many of the mangroves from an area disappear due to reclamations and especially in urban areas (Shindikar M.2012), given the scenario, that the coastal geomorphology of India is dependent on the human activities and the problems faced by them (Untawale A.G. 1985). Habitat destruction is more in tropical areas where mangroves are being destroyed at an alarming rate. (NBDB, 2003)In creek fishing, Catfish, mullets, non-penaeid prawns and clupeoids mainly constitute the catch. As exceptions, the coastal natives from a few villages especially in the south Konkan areas have been reported to establish plantations of mangrove species *Rhizophora* sp. *Sonneratia sp.* and *Avicennia* sp.regularly to conserve the ecosystem (Yeragi SS et al, 2014). However, despite regulations and different conservation activities, a number of coastal areas and mangrove ecosystems are under stress due to aquaculture, agriculture, encroachment or other activities. (Nitin, B, 2014).

Sindhudurg represents an important district with a vast 121 km long coastline, fishery resources being a source of food and livelihood blessed with vast 3,300 hectares of mangrove patches (**Article:** Hindustantimes.com). Sindhudurg proudly hosts several rare mangroves such as Sundari (*Heritieralittoralis*), Mangrove Cannonball (*Xylocarpusgranatum),* Wrinkled Pod Mangrove *(Cynometrairipa),* Mangrove Trumpet Tree *(Dolichandronespathacea) and* Tall-stilt Mangrove *(Rhizophoraapiculate) (***Article:** timesofindia.indiatimes.com). These mangroves are rare on the west coast and this diversity makes the coastal habitat of Sindhudurg ecologically sensitive as it is very much the hot spot' for rare mangrove species.

Given the district's rich coastline, an elaborate survey was undertaken to understand the link between the direct and indirect influence of mangroves on the livelihood (agriculture, fishery and tourism) of the locals by understanding people's perception about the mangroves as a protected ecosystem. The present study tries to correlate the significance of mangroves with the fishery and agriculture industry, understanding the direct and indirect impact of ecological changes attributed to mangroves on the livelihood of the people and understanding the perception of the people regarding the policies for mangrove protection.

The communities in the study site have lived in harmony with the natural surroundings for generations, with its land providing fertile soil for agriculture and its creeks and seas being rich fishing grounds. There is an immediate need for timely protection for these unique ecosystems while safeguarding the livelihood security of coastal people.

MATERIALS AND METHODS

The Participatory Rural Appraisal (PRA) methodological approach was followed to determine the impact of activities in coastal villages on marine biodiversity and assess the issues pertaining to rural development, at 123 villages (72 in Malvan, Figure 1 and 51 in Devgad, Figure 2), of which 15 villages from Malvan and 18 villages form Devgad practice creek fishing as their livelihood especially in the monsoons when entry into the sea for fishing is banned. PRA techniques such as Focused Group Discussions (FGD's) with villagers, resource mapping, and transect walk along major fish landing sites were carried out. FGDs were conducted with different occupation groups such as farmers and fishermen and informal

interviews with Gram Panchayat members and key informants of villages. Transect surveys were carried out to assess mangrove-related perceptions and significant changes like siltation affecting fish breeding were also observed. The market rate and economic importance of fishes on livelihood from creeks were recorded through the questionnaire approach.

With a coastline of 121 Km Sindhudurg district is surrounded by the Arabian Sea on the west. Southern boundaries consist of Belgaum district (Karnataka) and Goa whereas Ratnagiri District lies on the north and Sahyadri hill range on the eastern side (Pawar, 2009). There are a total of 5 towns and 743 villages in the district with its headquarters at Oras (Kudal). It comprises two revenue sub-divisions viz. Sawantwadi and Kankavali. Sawantwadi, Vengurla, Kudal, Kankavali, Malvan, Devgad, Dodamarg and Vaibhavwadi are the eight blocks of the district. There are 3 major estuaries viz. Achara, Kalaval, and Karli in Malvan Block and 3 in Devgad Block viz. Waghotan, Wadatar, and Mithbav.

STUDY AREA

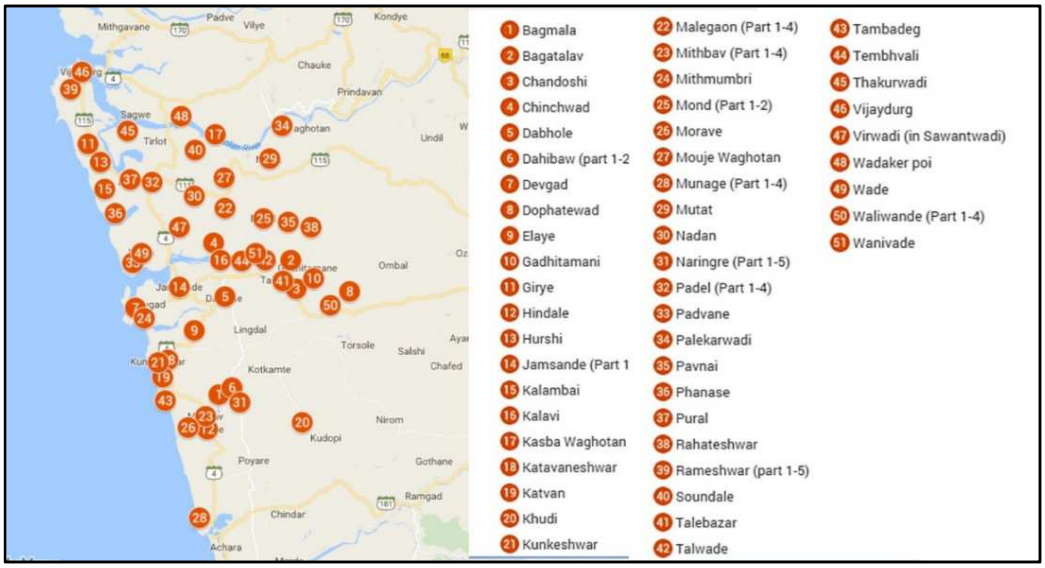

Figure 1: Villages and Their Location at Malvan Block (Prepared by TERI)

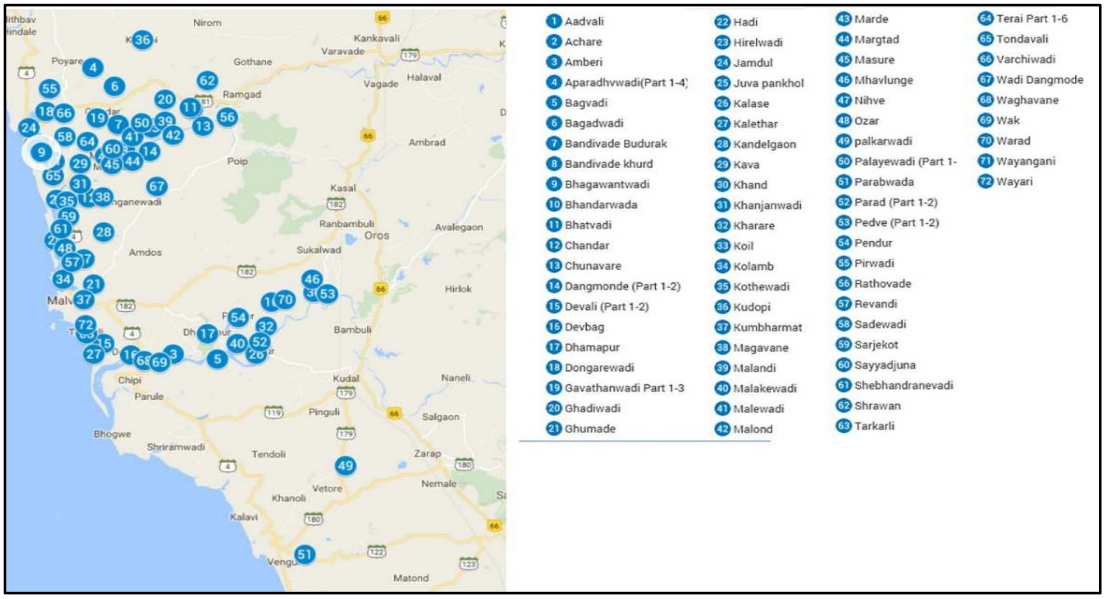

Figure 2: Villages and Their Location at Devgad Block (Prepared by TERI)

RESULTS AND DISCUSSIONS

Mangroves are often considered as ecologically important habitats. In India, approximately 60% of the commercially important coastal fish species are directly associated with mangrove habitat. Apart from fisheries, they also play an important role as a protector against floods and hurricanes, reduction of shoreline and riverbank erosion, maintenance of biodiversity etc.

The major livelihood options in this region are fishery and agriculture followed by tourism in a few coastal villages. Agriculture is mostly rain-fed and rice (*Oryza sativa*) is the major crop grown and followed by the cultivation of finger millet (*Eleusinecoracana*), horse gram (*Macrotylomauniflorum*), and a few pulses.

The study helped establish a correlation between the ecological, commercial, and policy-related issues pertaining to mangroves. The study revealed that mangroves play an important role in the livelihoods of the locals living along estuaries and the coast. The most important uses of mangrove forest to the villagers were ecological functions in terms of protection against Tsunami, floods, and heavy winds, as fish breeding sites and economical in terms of firewood, fodder, medicinal purpose, construction of fences & fish traps.

Although there are multiple ecological services provided by mangroves, during our study we recorded certain conflict of interest towards the conservation of mangrove ecosystems in some coastal communities of Sindhudurg. There are certain negative perceptions recorded during the study, about this ecosystem which is affecting the livelihood options of the locals.

In all 2 mangrove species belonging to 12 genera have been recorded from the region(Yeragi SS et al, 2014). The unrecorded species Sundari (*Heriterialittoralis*) was recorded as recently as 2009. (S S Shaikh et. al 2011) The major sites of mangroves in the project study area are Phanasewadi, Wadatar, Mithmumbri, Mithbav, Achara, Kolamb, Karli, Vengurla, Kelus, Mochemad, Reddi, and Terekhol.

The economic role in terms of the fishery is that, of the 53 species of commercial creek fish& shell fishes caught and sold at Malvan and Devgad, 50% of the populations depend on mangroves, directly or indirectly, along with the estuaries in the study area. Secondly, siltation and the consequent spread of mangroves to other areas has resulted in a decrease in species diversity as well as the catch size in certain regions and has increased the populations of shrimps and mud crabs, thereby altering the livelihood of the people. Interactions with villagers indicated that the mangroves are perceived differently by the people engaged in agriculture and fishery. While the fishermen do not necessarily detest mangroves, almost all farmers were of the opinion that mangroves are intrusive owing to their high fecundity (Lugo A.E, 1998). Also, one perception reported was that the increased population of mangroves near the residential areas is having deleterious effects on health as sometimes the mangroves act as a breeding site for mosquitoes and other insects as well. There has been an increase in saltwater intrusion into paddy fields at certain locations along the creeks, encouraging certain mangrove species to grow in agricultural fields. On the other hand, the perception of the locals is that land left unattended due to saltwater intrusion in agricultural fields encourages species of *Avicennia* and *Rhizophora* to infringe within a year. Saltwater intrusion is more in the villages which are situated near the creeks and consequently as per the perception of villagers the khajan land is increasingly affecting the livelihood of the farmers. The three important correlations with the mangroves are described below:

Correlating the Significance of Mangroves With the Creek Fishery Industry

It has been recorded that mangroves are a permanent residential space for a few fish species while numerous marine species use the mangroves as nursery grounds (Robertson, 1992). The mangrove ecosystems mudflats are richly supporting fish, molluscan, shrimp and crab fisheries. These estuaries are connected by several lagoons which serve as breeding, feeding and nursery grounds and are densely lined by more than fourteen true mangrove species, amongst which *Excoecaria sp., Avicennia sp., Rhizophora sp., Sonneration sp., Kandelia sp., Bruguiera sp.* are dominant.

The estuarine mangrove mud-flat act as breeding ground for certain fish like *Mugil*sp., *Lates*sp. and shellfish like *Scylla* sp. *Portunus s*p. oysters, shrimps, as well as act as rich food sources and protection from predators etc.(SG Y. S., 2014) A diversity of fish species has been reported to be high as almost 200 species are reported so far in mangrove-dominated estuaries and embayments in Australia and India.(Haque et.al, 2005)In the study area, creek fishing is observed throughout the year with the peak season being monsoon since the coastal deep sea fishing is banned during this period, however, on the other hand, there is a high demand for fish from the hotel industry. The previous study indicated that the local people used almost 22 different fish species from estuaries of Malvan Tahsil. However present study documented 53 species of commercial fishes (38 species of fin-fish and 13 species of shellfish) from both Malvan and Devgad blocks. The harvested fish is mostly sold directly in the market but is also sometimes processed for canning and pickling. The rates of fish are variable and depend upon; size, type, as well as weight on per piece basis. The average cost of different types of fish per kilogram ranges between INR 40 to 300. Indian whiting (*Sillagoindica)* and Prawn species like Giant tiger prawn (*Penaeusmonodon)*and Indian prawn*(Penaeusindicus)*were recorded to be the high-income fetching species, however there catch size was the lowest.

It is a known fact that the leaf detritus from mangroves contribute a major energy input into fisheries(Sukardjo, 2004). In order to ascertain the dependency of commercial fishes on the mangrove ecosystems, a habitat-wise analysis of the creek fishes caught and sold in study blocks was undertaken. As shown in the **Appendix 1.1**, of the total53 species identified during the survey at the jetty, adults of 7 species prefer estuarine habitat, 30 species prefer oceanic and marine ecosystem, 7 prefers intertidal zones such as mangroves, lagoons, brackish and 9 prefer freshwater ecosystems. On the other hand, juveniles of approx. 11 species prefer estuarine habitat, 6 species specifically found near mangrove ecosystems; 28 species prefer oceanic, marine and coastal areas, whereas 8 prefers freshwater ecosystem. Amongst estuarine fish catch, the fishermen are more interested in prawns and Indian Whiting catch owing to higher market value. Over 50% of commercial fishes caught in Malvan and Devgad rely directly or indirectly on mangroves for breeding, food, and shelter, providing livelihood options of the fishery to the locals. On the other hand, the advent of new mangrove growths along several fringes of creeks as observed at villages like Achra, Wadatar, Tembavli, Tondavale, Phanse, Padavane, Pural and so on, the steady change of the habitat is also economically influencing the livelihoods of the people.

Understanding the Direct and Indirect Impact of Ecological Changes Attributed to Mangroves on the Livelihood of the Communities

The mangrove ecosystem has been described by Kostermans (1982) as "walking vegetation", as it follows a step by step succession along with siltation and tidal inundation effects (Kumudranjan Naskar, 1999). The observations during the FGD and transect walk revealed that there has been an increase in siltation in all the major creeks at both Devgad and Malvan blocks. The people's perception was that the mangroves led to increased siltation, thereby affecting the species

diversity as well as the population of clams, mussels, and oysters which were harvested in large quantities by the locals in the past. The oyster species green mussel is almost entirely vanished from Malvan due to heavy siltation in Achara, Kalaval, and Karli creeks. Also, siltation caused due to heavy inflow of silt with oceanic currents resulted into decline in available fishing areas. It is perhaps imperative that the people's livelihood modifies with a change in the landscape. A case to note is that of the village Achara, where mangroves were blamed for the increase in siltation in Achra creek, thereby affecting the population of clams which were harvested by the locals. Today, although clams have significantly reduced, there has been an increase in shrimps and crabs which are commercially important with a higher market value. About 76900 ha of agricultural land is turned saline due to sea water ingress along the coast and creeks (CGWB Report, 2011).35 villages from Malvan and Devgad blocks have noted intrusion of saltwater into the adjoining agricultural lands and the resultant growth of mangroves over the years affecting their livelihood significantly. It was observed that the causes of this issue ranged from infrastructure gap leading to saltwater intrusion and the anthropogenic impact such as siltation due to heavy soil erosion upstream. In few villages, the mangrove areas are brought under cultivation by restricting the intrusion of salt water. This is mechanically done by constructing of dykes locally known as Khar-bandhara. (Apte Deepak et.al., 2013)

Understanding the Community Perceptions About Policies
On Mangrove Conservation with the Ground Reality

In India, a statutory law framework for the preservation and management of mangroves already exists. The Indian Forest Act, 1927 and the Wildlife (Protection) Act, 1972 provide protection to flora and fauna, however, there is no special mention mangroves protection under it. (Kumar R., 2000). Since 1927, as per the Indian Forest Act, mangrove forests of the Sundarbans are declared as a reserved forest area (Kumudranjan Naskar, 1999). The Forest Conservation Act, 1980 states that any forest area cannot be diverted for any non-forestry purpose without prior approval of the Government of India. This act effectively prevented the diversion of mangrove forest areas for non-forestry purposes. The Environment (Protection) Act, 1986 also plays an important role in the conservation and management of mangrove ecosystems. As per the act for the protection of the coastal environment, Coastal Regulation Zone (CRZ) is an area where no industrial and other harmful activities such as the discharge of polluted water and effluents, waste dumping, reclamation of coastal land (for commercial purposes) and bunding is carried out. As per the Coastal area classification, there are four categories, and mangroves are included in category I (CRZ-I) i.e. the most ecologically sensitive category. However, there is still the need to implement all these laws and legal enforcement strictly (Untawale, 1986).As per the draft of CRZ notification the study area is classified in Critically Vulnerable Coastal Areas (CVCA) category. Also as per a recent resolution of Government of Maharashtra, mangrove forests on government land in the state have been classified as "reserved forests" along with the Forest Conservation Act, 1980. (Akshay, 2013) Mangrove cell does not have any jurisdiction until the mangroves are present on government land. There is a need to notify and transfer that land to the forest department as there has been very little protection provided to mangroves in the state, both on private and government land(Lukose, 2014) Maharashtra, for instance, in its Coastal Zone Management Program (CZMP) devised in 1995, mangrove areas were not designated as CRZ-I. It also wrongly classified no-development areas with a view to developing them in the future (MoEF-ICZM Project, 2009) (Development, 2009). Similar to this initiative an amendment, dated 24th July 2003 was made in CRZ policy(CRZ Policy Government of India, 2003) and relaxation in no development zone to 50 meter from 200 meter from High Tide Line (HTL) in Andaman & Nicobar and Lakshadweep for promoting tourism based on Integrated Coastal Zone Management study was amended(Development, 2009). The communities of the study area consider the CRZ restrictions

affecting their additional livelihood sources like income from the tourism industry which had been blooming in the recent past. According to them, the CRZ policy is quite stringent as compared to other states like Goa and Kerala and itneeds to be relaxed for the local communities to promote tourism in the area more efficiently. The perception about the CRZ norms is that the norms are interrupting their livelihoods as no construction or any development activity is allowed near the shore. Their argument is that every tourist, when coming to a coastal area demands a sea facing apartment and/or at least basic infrastructure near the shore, however, it is not possible due to the new CRZ mandates. In the wake of the situation, evaluating the potential options which provide alternate revenue generation pathways such as mangrove nursery, apiculture, crab culture, and other integrated mangrove-aquaculture farming systems, will help change the perception of mangroves as an intrusive species.

Similarly, there seems to be the conflict of interest in terms of developing Khar bunds to control saltwater intrusion to make available water for irrigation as well as controlling the mangrove spread along the creek fringes. After Independence, in 1947, the Government's attention was drawn towards the 'protection' of Khar lands (cultivable tidal lands) and this resulted in the enforcement of the Bombay Khar Land Act 1948. Clause 3 of the Act states the establishment of the Khar Land Board in 1949. More recently, as per the Coastal Regulation Zone (CRZ) notification in 1991, a detailed review of proposed Khar land development schemes was undertaken. Block wise maps were prepared for Sindhudurg district. The emphasis was laid on the restriction of seawater intrusion into agricultural land or settlements at many places. However, it was noticed that none of the villages are practicing the cultivation of salt tolerant varieties on this Khajan land, as a result, there is an increase in Khar land which farmers usually abandon for a long time. This empty land in turn then gets converted into a preferred site for breeding of mangroves. This is hugely affecting the overall economics.

CONCLUSIONS

The overall results of the study show that mangroves are perceived in different ways by the people engaged in agriculture and fishery. While the fishermen do not necessarily favor mangroves, they are aware of the significance of mangroves as the breeding site of several commercial fishes. Most of the farmers especially those practicing tourism along with the agriculture have considered mangroves as intrusive owing to their high fecundity. (A.E, 1998)The observations suggest that mangroves influence the subject area ecologically and therefore economically. The study, therefore, warrants an economic approach to inculcate interest in the locals associated with mangroves for its conservation and sustainable use. Compared to other coastal zones with the high density of mangrove forests, the mangroves of Malvan and Devgad are small and scattered with few exceptions; however, the interactions and interdependence of the locals are significant and equally important. It was realized that there is no consensual aversion to mangroves here and the people regard mangroves for its status as protected species. However, the negative perceptions discussed in this paper can only be resolved by providing factual information by increasing the awareness amongst the communities. This could be done with the help of government machinery and also the local NGOs. The perception of locals needs to change in order to better conserve the mangroves since Sindhudurg, which largely remains unexplored. More importantly apart from these negative observation, one can't ignore the fact that the locals are also dependent on mangroves, either fully or partially, for livelihood purposes.

The Malvan and Devgad blocks have a few villages with high potential for edible oyster, clam, mussel and cage fish culture in creeks. The fishermen expressed the desire for cage culture of high-value brackish water fish such as Indian whiting, mangrove red snapper and shellfish cultures such as oyster, clams, and mussels to complement their annual income. Fishermen in the creek area also expressed the need for assigning the definite creek area per family for shellfish

culture to avoid conflict of interests. Additional livelihood opportunities pertaining to mangroves like a piculture and mangrove boardwalk for bird watching to increase tourism also needs to be promoted.

The scenario with respect to agriculture must be treated separately and differently than that related to fisheries. It is crucial to address this issue based on whether it is an infrastructure gap leading to saltwater intrusion; anthropogenic impacts such as siltation due to heavy soil erosion upstream or the result of rising water-level. The potential for alternative livelihood options for farmers facing saltwater intrusion and mangrove propagation are poorly understood. On the other hand, changing the temperament of farmers to get acclimatized to a new livelihood option or shift to an additional livelihood option which is entirely different and or not related to agriculture is a slow and tedious process. There is an urgent need to undertake studies on the impact of the construction of bunds on mangroves in Khar lands in Maharashtra (Nammalwar. P, 2013). This will help in developing common consensus for effective mangrove conservation as well as minimizing impacts on the livelihood of local communities. There is an immediate need for developing and implementing Integrated Coastal Zone Management Plan (Odisha, 2010) for the state following the states of West Bengal and Odisha which are effectively managing the conflict amongst conservation and livelihood.(Bengal, 2010).

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APPENDIX-1.1

Dominant Estuarine Edible Fish, Shellfish & Crustacean Species along Estuaries in Malvan and Devgad

No.	Common Name	Local Name	Scientific Name	Preferred Habitat	Breeding Site	IUCN Status
1	Indian white prawn	Kolambi	Penaeusindicus	Freshwater	Estuarine	Not assessed
2	Tiger Prawns	Vaghol	Penaeusmonodon	Sea	Shallow estuaries, lagoons, and mangrove areas	Not assessed
3	Jew fish Black spotted croaker	Ghol	Protonibeadiacanthus	Sea, Brackish	Sea	Not assessed
4	Rock fish/ Reef Cod	Gobra	Epinephelusmalabaricus	Lagoons, mangroves	Estuarine	Near threatened
5	Gizzard shad	Jibra	Dorosomacepedianum	Fresh water reservoirs/rivers	Fresh water reservoirs /rivers	Least concern
6	Pearl spot/ Green Chromide	Kalunder	Etroplussuratensis	Brackish water/freshwater	Brackish water /freshwater	Least concern
7	Orange fin ponyfish	Velli	Photopectoralisbindus	Sea	Sea	Not assessed
8	Green mussel	Shinane /Kakai	Pernaviridis	Estuarine	Sea	Not assessed
9	Silver bar Fish	Karli	Chirocentrusdorab	Sea, brackish	Sea, brackish	Not assessed
10	Mangrove/mud Crab	Kurle, Khekde	Scylla serrata	Estuarine	Mangroves	Not assessed
			Portunussanguinolentus Three-spot swimming crab	Intertidal zone Brackish water	Brackish water	Not assessed
			Portunuspelagicus Blue swimmer crab	Estuarine	Estuarine	Not assessed
			Charybdis feriatus (C. cruciata) Crucifix crab	Rocks, stones, Sandy and Muddy substratum	Rocks, stones, Muddy substratum	Not assessed
11	Squid	Mhakul	Loligoduvauceli	Sea	Sea	Not assessed
12	Indian goat fish	Rane	Parupeneusindicus	Sea, brackish	Sea, mangroves	Not assessed
13	Indian salmon	Rawas	Eleutheronematetradactylum	Sea	Estuarine	Not assessed
14	Spotted sea cat fish	Khaapi	Arius maculatus	Freshwater, migration from river to streams	Inshore waters and estuaries	Not assessed
15	Mangrove Red Snapper	Tamboshi	Lutjanusargentimaculatus	Estuarine, mangroves	Sea	Not assessed
16	Sardines	Pedwa	Sardinellasp.	Sea	Sea	Least concern
17	Clams	Tisre	Paphiamalabarica	Estuarine		Not assessed
18	Clam species Black clam	Kale Mule/Karmale	Villoritacyprinoides	Freshwater; Marine	Estuarine backwater	Least concern
19	Clam species	Laal mule	Meretrixcasta	Estuarine backwaters	Estuarine backwaters	Not assessed
20	Mud clam	Mharai	Polymedos erosa	Intertidal zone, mangroves,brackish	Estuarine	Not assessed
21	Ray fish	Waghale	Rhinopterasp.	Sea	Sea	Endangered/Near threatened
22	Malabar Anchovy	Sonam	Thryssamalabarica	Sea, brackishwater	Sea, brackishwater	Not assessed
23	Indian Whiting	Sule	Sillagoindica	Sea	Sea	Data deficient
24	Indian Oil Sardine	Tarli	Sardinellalongiceps	Sea	Sea	Least concern
25	Freshwater Needle fish	Tol	Xenentodoncancila	Freshwater	Freshwater	Least concern
26	Spotted scat fish	Wada	Scatophagusargus	Estuarine, mangrove	Estuarine, mangrove	Least concern
27	Eel	Wam	Congresoxtalabonoides	Sea, brackish	Sea, brackish	Not assessed
28	Indian Pompano	NA	Trachinotusmookalee	Sea	Sea	Not assessed
29	Target fish	-	Crescent perch/ Theraponjaruba	Sea, estuaries, freshwater	Sea, estuaries, freshwater	Least concern
30	Edible Oyster	Bud Kalva	Crassostrea cattuckensis	Sea	Sea	
31	Edible Oyster	Kalva	Saccostreacuculata Crassosteracuculata	Sea	Sea	Not assessed
32	Whip fin majarra	Shetaki	Gerreslongirostris	Sea	Sea	Least concern
33	Croaker Dodyaro	Dhoma	Otolithessp.	Sea, Estuarine	Sea	Not assessed
34	Glassy big eye	Rani masa	Heteropriacanthuscruentatus	Sea	Sea	Not assessed
35	Spotted sickle fish	NA	Drepane punctate	Sea, brackish water	Sea, brackish water	Not assessed
36	Mullet	Boi	Mugilcephalus	Migrate between freshwater and the sea	Sea	Least concern
37	DiphosSanguin Sunset shell/	Todai	Solletelinadiphos	Estuarine	Estuarine	Not assessed
38	Indian Shad	Palu	Tenualosailisha	marine; freshwater; brackish; pelagic-neritic; anadromous	Freshwater	Not assessed
39	Snapper	Damb	Lutjanussp.	Sea	Sea	Least concern
40	Indian oil sardine	Tarli	Sardinellalongiceps	Oceanodromous	Sea	Least concern

41	Silver Carplet	NA	Amblypharyngodon melettinus	Freshwater	Freshwater	Least concern
42	Bald glassy pearchlet	NA	Ambasisgymnocephulus	Marine, freshwater, brackish	Estuaries	Least concern
43	Grouper	Hekru	Epinephassp.	Estuarine, mangrove	Estuaries, mangrove	Not assessed
44	Other Caragnids	Kokri	NA	Marine	Marine, brackish and few even freshwater	Few are in Vulnerable
45	Prawns	Jawala	Acetesindicus	Sea, brackish	Sea, brackish	Not assessed
46	Indian Mackerel	Bangada	Rastrelligerkanagurta	Sea	Sea	Data deficient
47	Full beak gar fish	Tol	Strongylura sp.	Sea, brackish	Sea, brackish	Not assessed
48	Indo-Pacific tarpon	Chirai	Megalops spp. Megalopscyprinoides	Sea, coral reefs, mangroves	Mangroves	Data deficient
49	Cat fish	Chandaga	Mystussp.	Freshwater, Brackish	Freshwater, Brackish	Least Concern
50	Blacktip Sea Catfish	Shingati	Plicofollisdussumieri	Sea, estuarine, Mangrooves	Freshwater	Least Concern
51	Spotted Barb fish	Khavli	Puntius spp.	Freshwater	Freshwater	Not assessed
52	Large tooth flounder	Lep	Cynoglossus sp.	Sea, brackish	Sea	Not assessed
53	Flat head fish	Mench	Platycephalus spp.	Sea	Estuarine	Data deficient

Blank: *No information available*