## CHAPTER-5
## PROBLEMS RELATING TO COASTAL AND MARINE BIODIVERSITY

The Arabian Sea and the Uttara Kannada coast belong to the "Indo-Australian Marine Biogeographic Region" considered to be the richest in the world for biodiversity. The coastal backwaters/estuaries/river-mouths were well known for their productivity- some of them, like the Aghanashini backwaters, are even today so. The rivers from the Western Ghats carry great quantity of forest organic matter and deposit the same in the coastal waters including the sea, accounting for such productivity.

The Uttara Kannada coast has over 80,000 people belonging to various fishing communities whose livelihoods are tied up with the waves and tides of the Arabian Sea and the backwaters. Even today, despite heavy pressure from mechanized fishing crafts, these fishing communities operate about 15,000 traditional boats, and use traditional nets. Fish and various invertebrates such as prawns, shell-fish, crabs, oysters etc. contribute substantially to the nutrition of lakhs of people within the district and outside.

The palm-fringed sandy beaches, green hills protruding into the sea, blue lagoons and verdure fields, with the backdrop of Sahyadris, make coastal Uttara Kannada captivatingly beautiful. Here, the Sahyadris meet the Arabian Sea. About 160 species of birds are associated with the coastal ecosystems, many of them migrating from far off lands such as Siberia, Mongolia, Tibet etc. The historical and cultural antiquity of the district, the sacred groves, the wildlife, and substantially pristine nature, if thoughtfully used, can give prime place for Uttara Kannada in the tourism maps of the world. Development without destruction without destruction should be very much possible here.

Unfortunately, over the last few decades, the coastal and marine ecosystems are put to severe strains. Developmental pressures, over-exploitation, pollution, destruction of mangroves and beach vegetation and serious interference in the estuaries are threatening the ecology and livelihoods of the inhabitants.

The decline of fish catch in Uttara Kannada and the west coast in general is in tune with global trends. The global marine fisheries showed negligible growth in early 1990's, and picked up in 1994-97. This was mainly due to increased landings of pelagic fishes (of the open waters) which were twice the landings of demersal (of deeper waters). In 1950's pelagic fish landings were only 30% more than demersal fishes. In 1990's the pelagic landings rose to twice the landings of demersal. This increasing dependency on pelagic fish stocks (such as Anchvites, Mackerels, Sardines etc.) is considered symptomatic of a major crisis in global marine fisheries. In general demersal fishes are more valuable per unit weight than pelagic fishes. The increased exploitation of pelagic fishes over the last forty years is indicative of the growing exploitation of fisheries stocks worldwide. Since more valuable demersal fishes are depleted attention has been turned to the economically less valuable pelagic stocks (UNEP-WCMC, 2000).Recent analysis by FAO (1999) confirms the global picture of widespread overexploitation. Of the 200 major **marine** fishery resources, in 1993-94 35% were classified as senescent (showing declining yields).

## 5.1 Too many boats and too little fish

**Table – 5.1 Growth of mechanized fishing and decline of total fish in Uttara Kannada**

| Sno | Year | Fish catch (tonnes) | Trawlers | Purse-seiners | Gill-netters | Others | Total |
|---|---|---|---|---|---|---|---|
| 1 | 1956-57 | 10050.00 | | | | | |
| 2 | 1957-58 | 19630.00 | | | | | |
| 3 | 1958-59 | 24000.00 | | | | | |
| 4 | 1959-60 | 16800.00 | | | | | |
| 5 | 1960-61 | 27200.00 | | | | | |
| 6 | 1961-62 | 9538.70 | 3 | | | | 3 |
| 7 | 1962-63 | 60230.50 | 17 | | | | 17 |
| 8 | 1963-64 | 63517.50 | 24 | | | | 24 |
| 9 | 1964-65 | 48749.10 | 44 | | | | 44 |
| 10 | 1965-66 | 42650.50 | 62 | | | | 62 |
| 11 | 1966-67 | 45762.50 | 100 | | | | 100 |
| 12 | 1967-68 | 32739.20 | 141 | | | | 141 |
| 13 | 1968-69 | 36563.00 | 192 | | | | 192 |
| 14 | 1969-70 | 48398.00 | 244 | | | | 244 |
| 15 | 1970-71 | 60720.00 | 308 | | | | 308 |
| 16 | 1971-72 | 56110.00 | 315 | | | | 315 |
| 17 | 1972-73 | 16371.00 | 317 | | | | 317 |
| 18 | 1973-74 | 21165.00 | 336 | | | | 336 |
| 19 | 1974-75 | 14408.00 | 341 | | | | 341 |
| 20 | 1975-76 | 30628.00 | 369 | 2 | | | 371 |
| 21 | 1976-77 | 21663.00 | 377 | 12 | | | 389 |
| 22 | 1977-78 | 49315.70 | 418 | 15 | | | 433 |
| 23 | 1978-79 | 39310.00 | 484 | 40 | | | 524 |
| 24 | 1979-80 | 46045.50 | 492 | 55 | | | 547 |
| 25 | 1980-81 | 34278.20 | 538 | 64 | 66 | | 668 |
| 26 | 1981-82 | 30871.60 | 558 | 91 | 266 | | 915 |
| 27 | 1982-83 | 30783.10 | 652 | 100 | 377 | | 1129 |
| 28 | 1983-84 | 35381.70 | 737 | 114 | 400 | | 1251 |
| 29 | 1984-85 | 39426.30 | 751 | 114 | 410 | | 1275 |
| 30 | 1985-86 | 85798.40 | 751 | 114 | 468 | | 1333 |
| 31 | 1986-87 | 35510.40 | 752 | 114 | 474 | | 1340 |
| 32 | 1987-88 | 43533.60 | 712 | 115 | 505 | | 1332 |
| 33 | 1988-89 | 48912.10 | 712 | 115 | 529 | | 1356 |
| 34 | 1989-90 | 59507.10 | 678 | 118 | 519 | 57 | 1372 |
| 35 | 1990-91 | 37564.31 | 706 | 122 | 526 | 60 | 1414 |
| 36 | 1991-92 | 34014.50 | 721 | 123 | 557 | 73 | 1474 |
| 37 | 1992-93 | 34863.40 | 722 | 127 | 543 | 108 | 1500 |
| 38 | 1993-94 | 34193.00 | | | | | 1500 |
| 39 | 1994-95 | 36471.00 | | | | | 1516 |
| 40 | 1995-96 | 53611.70 | | | | | 1592 |
| 41 | 1996-97 | 71796.50 | | | | | 1824 |
| 42 | 1997-98 | 46991.40 | | | | | 1762 |
| 43 | 1998-99 | 47818.10 | | | | | 1854 |
| 44 | 1999-00 | 30667.73 | | | | | 2297 |

Before 1960's the entire fishing was by traditional methods. Mechanized crafts were introduced in unregulated manner from 1960's. The total number mechanized crafts (purse-seines, trawlers and gill-netters) in 1975-76 was 371; it shot upto 1333 in 1985-86, 1592 in 1995-96 and 2300 in 1999-2000. With the increased entry of mechanized crafts, several of them owned by people from traditional non-fishing sectors, today about 85% of the catches are with the mechanized sector, thereby depriving the traditional fishermen of their age old source of sustenance (figure 5.2).

The fish catch before mechanization was need based and choice species such as shark, kingfish (Ison), pomfret, mackerel (bangde) and prawns were plentiful and of larger size. Overuse of mechanized crafts saw steep decline in fish catches from mid 1980's. Decline was severe in choice species. Sustainable upper limit of fish catch of about 40,000 tonnes, was already reached in late 1970's (figures 5.3-5.11). A leader of the fishermen (also a political figure) stated that fishing has no future in Uttara Kannada, and the livelihoods of the fishermen face a grim scenario. Fishes locally known as *Bignisali, Doddasali, Saliya* etc. have vanished forever.

However, as the financial institutions and the Government continued to promote mechanization of fisheries sharp fall was observed in fish production. The mechanized boats made fishing highly energy intensive with increasing pollution of the sea.

**5.2 Ominous shift in peak catch**

Of late, marine fish catch begins to taper off from November onwards along the south Indian west coast. A study of Mackerel catch in Malabar area shows that in 1931-37 fishing was active during October-March period with peak catch in December-January. But in 1994-96 mackerel fishery was active in July-September, when smaller size groups dominated the catch. Whereas maturity size of mackerels is above 20 cm, the monsoon fishing does not allow large portion of the new recruits to grow beyond 16 cm, In 1931-37 during the peak catch months were December-January, and mean length was 20.5 cm. In 1994-96, the peak catch was in the monsoon months of July-August, when the Mackerel mean size was just 16.2 cm. Whereas the mesh size in 1994-96 for Mackerel catch was 35 mm, in 1994-94 the mesh size declined to 18-20 mm, not even allowing the smaller fish to escape (Yohannan and Abdulrahiman, 1998).

The Karnataka data shows that whereas in 1968 only 6.67% of the total fish catch was in July-September period,15.61% was caught in the same months during 1998 (Ramachandra Bhat, personal communication). This indicates more landings of young undersized fishes. Our fishing efficiency today has reached such a point that fish are caught faster before they attain their normal natural size. (However, during the current year of 2001-02, the ban on fishing by the mechanized boats during the June-August months was imposed with more seriousness).

## 5.3 Collapse of artisanal fishery

Stiff competition from commercial fisheries forced lots of traditional fishermen to go for mechanised crafts through bank loans or to work as labourers in such crafts. Overfishing in the off-shore areas closer to the shore caused great hardships to the artisanal fishermen. These fishermen use non-mechanised crafts such as *doni* (plank built boats), *pandi* (boat that carries the *rampani* or shore-seine net) *pattebale* units, *pathi* (dugout canoe used by a single person) and many other types of crafts. Totally there were 16,153 traditional boats in coastal Uttara Kannada, during the year 1999-2000 according to the Deputy Director of Fisheries, Karwar. Several thousand traditional families are dependent on these boats for their livelihoods. They use a variety of nets as *rampani* (shore-seine- used in sheltered bays by community efforts) cast nets, *goru-bale* (scoop nets) and many other types of nets in addition to hooks.

*Rampani* used to be the most spectacular kind of fishing net in operation along the Karnataka coast. It is of four or five kinds ranging from gigantic ones of over one km long, operated by the cooperative efforts of about 50 to 150 fishermen down to much smaller ones, called *kairampani* handled by fewer people. Even in 1976-77, well after the introduction of 1407 trawlers and 31 purse-seiners in Karnataka, about 150 *rampanis* contributed 80.4% of the traditional and 47.7% of the total fish catches. By 1986-87, with over 3000 mechanised crafts in operation, the *rampani's* output plummeted to just about 5.6% of the total marine fish catches. The present status of *rampani* fishing in Uttara Kannada is shown in figure 5.12.

## 5.3 Granting of permission to foreign crafts/joint ventures for deep sea fishing in our territorial waters

The fishing community and the scientists view this as one of the major causes for fish famine. On the destructive nature of bottom trawling in the EEZ by the high tech vessels the *Seafood Export Journal* (November, 1994) cautions:

"…there is no effective machinery or means to monitor the fishing activities of these trawlers to ensure that they do not fish in the shallow waters of our EEZ which are the operational area of our traditional fishermen…In the trawlnet the meshes of the cord- end are open and small fishes pass through, but once the meshes are clustered with large fishes the net loses its selectivity and will catch anything that comes its way. It is estimated that out of the total fish catch, juveniles and trash fish represent 25 to 30% and these are invariably thrown overboard…Besides, the use of very heavy fishing gear used by these trawlers cause irreparable ecological damage to the sea bottom if used in shallow waters – which apparently seems to be happening…"

## 5.4 No uniformity in the fishing regulations of the coastal states

The fishing regulations imposed by the Karantaka State may not be observed by fishermen from neighboring states. This is because there is no Central Government agency to oversee fishing and implement uniform regulations.

### 5.5 Over-commercialization of fishing sector

Fishing sector was expanded unmindful of the sustainability limits. At one time there was lot of financing for purchase of mechanized crafts. A flush of investors from traditional non-fishing sectors, including the upper castes, entered into fishing, fish processing and transporting, thereby depleting fish and affecting the livelihood security of the traditional fishermen.

According to UNEP World conservation Monitoring Centre (2000) there are three major reasons for decline in world fish landings. These are: 1. Most fisheries have traditionally been regarded as an 'open access' resource, so that, in essence, it pays any one fisher to harvest as much as possible at any given time because if they do not, somebody else will. 2. Technological innovations have made fishing much more efficient. 3. Extreme over-capitalisation of the world's commercial fishing fleet.

### 5.6 Unemployment among fishing communities and their seasonal migration

With diminishing catches the unemployment and underemployment increased among the fishermen, forcing many of them to move out of Uttara Kannada into other places in search of seasonal employment.

### 5.7 The effect of fish famine on the financial security of fisher-women

The fish famine and trade monopoly in fish by the business sector adversely affected the traditional occupation of fisher-women, who are traditional fish sellers and producers of dried fish.

### 5.8 Ever-increasing threats to the estuaries of Uttara Kannada

Estuaries of Uttara Kannada were once top-ranking centres of food production. The Aghanashini backwaters produced both salt tolerant Kagga rice, which was exported out of the region, as well as fish, prawns, crabs, shell-fish etc. in huge quantities. The backwaters were rich in mangrove forests which increased their productivity and also sheltered rich bird fauna. The network of 'kodi' tidal channels passing through the gajni rice fields was shared between fishing families who practiced sustainable fishing.

However, beginning in 1960's, when permanent bunds were built in the gajnis by the Government, the destruction of the mangroves started. Fishing contractor entered the scene and the traditional fishermen were thrown out of the system.

Way back in 1970's the State Government acquired about 1800 acres of estuarine lands of Aghanashini River, in the Hiregutti-Madnagiri villages of Kumta, and handed over the same for salt production to the Ballarpur Industries Ltd., Binaga (Karwar taluk). These lands were mostly estuarine rice fields (gajnis) and mangrove areas which contributed substantially to the nutrient cycling and productivity of the coastal ecosystems.

Subsequently the Ballarpur Industries Ltd. abandoned salt production in these lands. The lands continue to remain fallow to this day.

The building of dams in the Sharavati and Kali rivers can be correlated to the decline of forest nutrient input into the estuaries and coastal waters, with serious implications on fisheries.

The industrialisation of Dandeli saw Kali river becoming a dumping ground for pollutants. Mining in the catchment areas of Kali, conversion of natural forests into monoculture plantations in the catchment areas of all the rivers saw increased silt load and decline in nutrient input. The impact of Kaiga Atomic Plant on the Kali backwaters also needs monitoring.

### 5.9 Intensive aquaculture: an onslaught on the estuarine ecosystem

Over the last 15 years the arrival of intensive aquaculture saw the destruction of the last stands of mangroves, cutting up of the *gajnis* into prawn farms and considerable use of chemicals and factory feeds polluting the backwaters, causing prawn disease and total damage to the ecosystems.

The conversion of mangrove ecosystems to shrimp ponds may have obtained short-term profit at the expense of long-term productivity (Parks and Bonifaz, 1995). Despite the fact that global aquaculture production increased from 10 million tonnes in 1984 to 25.5 million tonnes in 1994, and is one of the fastest growing food production activities of the world, there are widespread apprehensions in India about its impact. The traditional shrimp culture is practiced in low-lying coastal areas mainly in Kerala and to a smaller extent in Bengal, Goa and Karnataka. The traditional aquaculture was based on alternating crops of paddy and shrimp. The wild shrimp and other fish seed are brought in by the high tide. Farmers impound these waters by simple means and allow the shrimp seed to grow naturally without devoting any special attention. Four to six months later the earthen bunds are broken, the water drained through a net and the shrimp and fish harvested (Vivekanandan and Kurien, 1998).

The modern shrimp aquaculture is based on the construction of ponds, stocking the ponds with shrimp seeds and artificially feeding the shrimp, and subsequently harvesting. The stocking density of shrimps range from 20,000 per hectare in the extensive method to 350,000 per hectare in the intensive culture. All higher stocking meant more pumping of water into the ponds and releases of water contaminated with feed residues and other organic wastes. Increases in stocking intensity also bring with it heightened risk of disease and hence the use of drugs and chemicals to combat the problem. In view of the foreign exchange that it could bring to the country Marine Products Export Development Authority (MPEDA), which is under the Ministry of Commerce, banks and financial institutions came forward to support aquaculture industry. Small and big enterpreneurs, farmers and even some fishermen entered into the fray (-*ibid*-)

Estuarine villages of Uttara Kannada are densely populated because of their high productivity. Conversion of the shallow part of estuaries in the past into human habitations, rice fields and horticultural areas was inevitable. Considerable areas of tidal lowlands were brought under rice cultivation, by building earthen dams to protect them from salt water inundation during that rise in the river and its numerous channels or *kodis* which form a network through the estuarine areas. The estuarine or *gajni* agriculturists, until late1960's had the practice of raising mangrove vegetation alongside the earthen dams to fortify them. The Patgar community of Kumta has a repository of knowledge regarding building and repairs of embankments, control of water flow and planting of mangroves. The estuarine fishermen were free to fish in the *kodis*. During the early 1970's, under the Kharland Developmnt Scheme of the Karnataka Government, a series of permanent dams were built of stone, to protect the *gajni* fields permanently from salt water inundation. The construction of the bunds also led to socio-economic and ecological changes in the gajni villages.

Area under aquaculture began to grow in unregulated fashion. The technology packages adopted ranged from the simple farm pond to the sophisticated integrated units with farms, feed mills and processing plants. The heavy investments did not, however, cover effluent treatment. The result was a viral attack which began to spread since 1994 wiping out most of the crop throwing the whole industry into shambles. The environmental and socio-economic impact of modern shrimp farming also included land alienation, conversion of paddy lands, salinisation of ground water and agricultural lands, contamination of ground and surface waters with effluent from shrimp farms, destruction of mangroves, loss of mudflats etc. In December 1996 the Supreme Court ordered the closure of shrimp farms in the Coastal Regulation Zone and called for tough regulations outside the CRZ (-*ibid*-)

### 5.10 Improper drainage in the gajnis

The newly built *gajni* bunds of Aghanashini estuarine areas of Kumta, unlike the earlier earthen bunds enclosing smaller sized *gajnis,* enclosed several fields, sometimes forming expanses of over 100-200 ha. These dams were fitted with sluice gates in fewer places causing perennial stagnation in many parts of the *gajnis.* These ill-drained areas became unfit for cultivation of rice. Let us take the "Bridge *gajni*" of Aghanashini backwaters for instance. This *gajni* is the result of the merger of 60 ha of Halkar village, with the *gajnis* of Hegde, Narebole, Masur and Maduguni villages, covering a total area of 275 ha. Water flows in and out of this large rice field through a single large drainage channel (*kodi*) fitted with sluice gates. Since this is not an effective mechanism to drain the entire *gajni* hardly 100 ha of the total 275 ha is today under rice cultivation. A rare local variety of salinity tolerant rice *kagga* has been thereby affected as inundated areas of the *gajni* are not suitable for its germination.

**5.11 Impact of permanent dams on livelihoods:** The permanent dykes in the Aghanshini river estuaries were originally built to protect the *gajni* rice fields from salt water ingress. But soon outside forces, in the form of fishing contractors and canning industries, entered the arena of backwaters with tumultuous effect on the ecosystem,

economy and social harmony that had prevailed though ages. The *gajnis* have traditionally collective farming system. Under the persuasion of the fishing contractors, the farmers started storing the tidal waters in the *gajnis*, after the harvest of the rainy season rice crop. The impounded water was used for natural culturing of fish during the rest of the year, until the onset of the monsoon rains from early June. Ever since the permanent bunds were built the *gajni* farmers began to auction the fishing rights to contractors, on year to year basis.

The traditional fishermen of the backwaters became the victims of this new development. They were no more allowed to fish in the *gajnis*, except for few weeks after the expiry of the fishing contract period, in June, just prior to prepare the *gajni* for the next crop. Although the High Court of Karnataka upheld the rights of the traditional fishermen to fish in the *gajnis*, especially in the *kodis* (network of tidal channels through the *gajnis*), the physical might of the more organized farmers prevented the implementation of the Court order. These developments seriously affected the livelihoods of the estuarine fishing community. Some stated the *gajni* bund system resulted in the decline of fish in the backwaters, to the extent of 75%. Men from most fishing families of the estuaries these days work as labourers in the sea-faring fishing boats of Karnataka coast and neighbouring states. In the village of Halkar, where we made a case study, 12 of the 64 families Harikantra community altogether left their fishing profession and of the rest most male members joined the sea-going mechanized crafts as workers.

### 5.12 Travails of the fisher-women

With the entry of contract system in the Aghanshini backwaters of Kumta coast, the plight of the fisher-women of the *gajni* villages became serious. In the past, customarily three to four families of fishing community would fish in a kodi or tidal channel through the gajni. Even the women folk used hand-held scooping nets called gorubale. Fish of many kinds and of larger sizes were available in greater quantities. The women used to sell the fish in the nearby villages as well as in the Kumta town and enjoyed greater financial independence and played major roles in running the families. Today, with fishing rights in most of the backwaters alienated to the contractors, these women are greatly distressed. They are more dependent on the small amounts of money, which their men bring, often working in far-away places. However women of most fishing families who live closer to the river gather the molluscs (shell fish) for sale and for use in their own families. Today, due to various activities incompatible with estuarine ecology, even the shell fish availability might diminish.

### 5.13 Shell mining in the coastal rivers

Experts state that mining of estuarine beds for molluscan shells can have serious adverse effects on biodiversity and productivity. Most notable is the large-scale shell mining in the Aghanashini estuary. The adverse effects stated include:

- Severe irreversible damages to the benthic (bottom dwelling) organisms including the shell-fish.

- Adverse effects on prawns, crabs and fish. The estuarine bed which act as nursery ground for many commercial species get permanently affected.
- Impact of shell-mining could as well affect the productivity of coastal sea, as the estuaries, normally rich in food are nursery grounds for several marine fish and prawns.

The people's version says when the bottom of the rivers and backwaters become pits the shell-fish are no more available. This affects the subsistence of not only fishing communities but also various other communities of the estuarine areas such as Namadharis, Halakkivokkals, Patgars, Harijans, Bhandaris etc.

**5.14 Unregulated sand mining in rivers**

Sand mining in Uttara Kannada rivers in large scale creates deep pits and destroys the biodiversity. CRZ regulations do not cover activities in the river bed. The sand removal from river beds is reported to choke the respiratory passages of the bottom dwelling clams (shell-fish).

**5.15 Difficulty in determining stocking levels in aqua-farms:** The Supreme Court in a judgement of 1996, prohibited intensive and semi-intensive culturing of prawns in CRZ areas. But the main problem is how can farms be monitored for compliance with stocking levels, and who is going to do it?

**5.16 Absence of participatory management in fisheries**

The present management of coastal and marine fisheries almost totally ignores the vast store of traditional knowledge among the fishing communities.

**5.17 The value of sea beaches as ecosystems ignored**

Due to human pressures and neglect most sea beaches are with scanty vegetation. This causes severe erosion of the beaches. The erosion is followed by building of sea walls which destroys the beach ecosystems, causes subsidence of beaches as well as mars their beauty.

**5.18 Pollution of coastal waters goes unchecked and unreported**

The coastal rivers and backwaters are used as dumping grounds for all kinds of waste and effluents. Such pollution is hazardous to both animals and humans. The waste may also include the powder from stone quarries, tile pieces from tile factories, municipal wastes etc. The likelihood of radioactive pollution of from Kaiga Atomic Plant also need to be monitored. Pollution of waters from pesticides are not monitored at all. Marine pollution is on the increase too.

Most shrimp farmers do not follow the norms laid down by the Aquaculture Authority of India in the design, water supply and discharge of waste-water into independent drains. The pollutants are carried back into the river by the low tides. Circulation of such

polluted waters is alleged to be the cause of bacterial, fungal and viral infections of shrimps, leading to heavy losses.

### 5.19 Impact of large developmental projects on the coast

The Project Seabird Naval Base took away 12,500 hectares of coastal lands of Karwar taluk causing displacement of 16,100 people. These people, majority of them fisher-folks, are resettled in some large colonies along the coast. They have lost their traditional fishing waters and are bound to carry out over-fishing in rest of the marine areas.

The proposed expansion of the present Tadri fishing harbour at the mouth of the river Aghanashini in Kumta into a major harbour is feared to have serious environmental impact on coastal/marine ecology and on coastal livelihoods. The fears raised by the people, if the proposed port become a reality are: 1. Deepening of the river for the passage of ships transporting millions of tonnes of cargo annually, will destroy the shell-fish, prawn and other fish population. 2. The destruction of mangroves and mud-flats will also have adverse consequences on estuarine ecology affecting their livelihoods. 3. The siltation due to dredging will adversely affect the productivity of the estuary and the coastal sea. 4. The salt pans on the banks of Aghanashini, the only ones along the south-west India will be destroyed. 5. Oil slicks and spills of other pollutants such as coal and iron ore will result in increased turbidity and siltation thereby affecting production of fishes, prawns, mussels and bivalves. 6. The dumping of organic pollutants from the port settlements into, possibly, the river will adversely affect the ecosystems and biodiversity.

### 5.20 Defense Department not associated with environmental protection in the district

The arrival of the Project Sea Bird has caused considerable modification of coastal and marine habitats in the district. The impact on biodiversity of these activities has not been monitored. It has been reported that the biodiversity rich islands of Uttara Kannada coast such as Netrani, a haven for sea birds, corals and fish breeding are getting destroyed in military exercises.

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