

APPENDIX - 1

Meetings and Public hearings along West coast

1. MEETING OF THE ECOREGION WORKING GROUP (WEST COAST) HELD AT DEPARTMENT OF BIOSCIENCES, MANGALORE UNIVERSITY ON 26/08/2000

Members Present

1. **Ms. Norma Alvarez**, Goa Foundation, Goa
2. **Mr. Ranjan Rao**, Nagarika Seva Trust, Bangalore
3. **Prof. Mohan Joseph**, College of Fisheries, Mangalore
4. **Mr. Haribabu**, Equations, Bangalore
5. **Mr. V.K. Shetty**, Department of Fisheries, Mangalore
6. **Mr. B. V. Zakaria**, CMFRI Centre, Mangalore
7. **Mr. Thomas Kocherry**, National Fish Worker Forum
8. **Dr. G. N. Kulkarni**, College of Fisheries, Ratnagiri
9. **Prof. Damodaran**, Department of Marine Sciences, Cochin University
10. **Prof. D. J. Bhat**, Department of Botany, Goa University.

The meeting started with a welcome note from the Co-ordinator. The subject was introduced by the Co-ordinator. Dr. Wafar, Member, TPCG explained in details the genesis and objectives and expected functioning of the eco-regional group.

Agenda

1. Statement of the issues or problems;
2. Identification of ongoing plans, programmes and initiatives regarding these issues;
3. Identification of key actors involved;
4. Identification of major gaps in coverage;
5. Delineation of steps needed to plug gaps and enhance the effectiveness of ongoing plans, programmes and initiatives
6. List of measures and strategies needed to implement these steps in the short, medium and long term;
7. Prioritisation of these measures in terms of their importance and urgency;
8. Identification of key elements needed for implementation: institutional structures, funds expertise/human resources, policy/legal measures, monitoring, and others;
9. Specific proposals (prioritised according to importance and urgency);
10. Time frame for implementation;

Mr. Ranjan Rao and Mr. Thomas K., raised the issue to know the current policy of Biodiversity bill and how the contradictory nature of the bill and WTO, patent acts and CPZ etc. Ms. Norma Alvarez also supported their views.

Many members have not seen the biodiversity bill. If the Government is transparent, place before us the various bills before we suggest action plan, as many of these bills are interactive.

There was a discussion on the area of coastal zone, features of coastal zone, CRZ etc. with reference to different eco-regions of west coast. Protection of mangroves, construction of seawalls, construction free 100metre zone etc. was suggested by different members. Discussions

on 'Natural Capital' of (Natural resource) – water, land and forest was taken up and absence of law to protect the communities who are dependent on the common property rights was discussed.

Mr. V.K. Shetty explained regularization of the improved traditional technology aquaculture within CRZ area. Mr. Haribabu suggested improved and strict EIA procedures. It was found that no uniformity in the existing ones at different states so far as CRZ is concerned. The laws are not applied strictly. Prof. D.J. Bhat raised the issues of human pressure on the coast, the important significance of microorganisms, lack of basic civic amenities etc. Ms. Norma mentioned about the high-level ecosensitive zone committee about which she promised to send more details.

Sand dunes, their importance and biodiversity were discussed. Similarly the backwaters, estuarine ecosystems, their role in the coastal biodiversity issues were considered. Mr. V.K. Shetty agreed to provide details of the resources

2. MINUTES OF THE NBSAP- WEST COAST ECOREGION MEETING HELD AT CENTRAL INSTITUTE OF FISHERIES EDUCATION, MUMBAI ON 30.9.2000

Members Present

Dr. M. Zingde, NIO Regional Centre, Mumbai.

Dr. J. R. Jaiswar - do-

Dr. B. F. Chhapgar, BNHS, Mumbai.

Dr. A. A. Karande, Naval Research Lab., Mumbai

Rtd. Dr. V. D. Deshmukh, CMFRI Substation, Mumbai

Dr. B. G. Kulkarni, Dept. of Zoology, Institute of Sciences, Mumbai.

Dr. Rajendra Nayak, K.J. Somaiya College, Mumbai.

Prof. H. C. Dube, Dept. of Life sciences, Bhavnagar.

The Co-ordinator welcomed the members and briefed the outline of the NBSAP programme. The minutes of the first meeting held at Mangalore was circulated so that the discussion could start taking a clue from the earlier discussions. Dr. Zingde appreciated the current effort and suggested that the manpower and expertise that can specifically identify each group has declined and there is an urgent need to bring the available experts to train new generation in the biosystematics. Almost all the members agreed to with his suggestion. The coordinator suggested that this item come in the 8th agenda to be discussed later in our effort.

Status report of the work by different agencies: The regional centre of CMFRI gave information about the ongoing projects. The fish stock assessment from the fishing zones from Ratnagiri on south and Veraval on north, about 25,000 sq. kms. Area being surveyed. The pelagic fish like, Bombay duck, pomfrets and clupids stocks were assessed. And demersal fishes have affected by trawling, total catch remains the same but the species composition varies. The by-catch is mostly non-edible biota such as echinoderms, *sipunculids* etc. There is a distinct community structure shift. Place like Vashist estuary huge catch of puffer fish. The conflict of traditional fishing and trawl fishing was also discussed. CMFRS representative was requested to compile the ongoing work and send it to the co-coordinator. It is decided to consult Dr. Somawanshi FSI for further information.

Dr. Kulkarni, (Institute of Science) has carried out observations along the Mumbai coast especially on molluscan biota. He informed that there is no decline in the species composition along different area he observed and the species have adapted to the changing environmental conditions.

The ethno zoological aspects, such as use of sea anemone for cure of piles after frying and eating, the ear ossicles of fish, *Polydactylus indicus* for some medicine was mentioned by Dr. Chhapgar. It is worthwhile to explore such ethno biological use of marine organisms. The use of holothurians and nematodes for neurological, anticancerous, antihypertension work by TIFR scientists need to be collected. (Dr. M.M.Jauri to be consulted).

Dr. Karande explained the pollution studies of Bombay harbour by biofoulers and bacteria and other benthic biota studies carried out by Naval Research laboratory. Dr. Pradeep Kumar, Biology Division to be contacted for more details. Dr. Karande is requested to collect the details and put it to the coordinator.

NIO Regional office at Mumbai gave a detailed account of the program they are undertaking. Apart from the DOD project of pollution monitoring from Okha to Ratnagiri, they are carrying consultancy work for various industries such as Reliance, ONGC, RCF, NCL, IPCC etc. According to them more than 10 spots are highly polluted. Details to be provided by Dr. Jaiswar.

Dr. Chhapgar gave a detailed account of the biota of the coastal region as he has a wide experience. He also suggested taking coastal birds and migratory birds into account, which are in plenty during certain seasons. It is decided to contact Ms Supriya Jhunjhunwala to get more details, as she is keenly interested to pursue this information. The proposal of Marine Park at Malvan by the state government was also mentioned.

Prof. Dube explained about the ship breaking activities along Alang and its impact on the economic and ecological implications and the impact on the ecosystem studies on the marine microbes, microbial biofouling, Dr. S.K.Patel on crustacean and molluscs of gulf of Kutch (DOD project) Dr. Raghathan on algal Biodiversity at Surat (S.Gujarat Univ.) Aquatic birds by Dr. Bhatt, Dr. D.C. Bhat on mangroves of Gulf of Kutchh the seaweed and sea- grass fauna by Dr. S.K.Mehta etc. are some of the ongoing studies. Dr. Dube has promised to give the details. The socio-economic aspect of Alang ship-breaking yard is being carried out by an UNESCO project. It is decided to discuss Gujarat ecological society and GE. Commission when the coordinator visits Bhavnagar. It may be beneficial to discuss with the Govt. Fishery centre, Okha; Fisheries collage Veraval for more information and action. The coordinator thanked the members for their valuable inputs and requested for further cooperation and support.

3. STATE LEVEL NBSAP WORKSHOP ORGANISED BY GOVT. OF KARNATAKA AT BANGALORE, FROM 28-29TH NOVEMBER 2000

A state level workshop was organized by the Ministry of Environment and Forests, GOK, Bangalore at Indian Institute of science campus. It was a gathering of about 200 participants including administrators, policy makers, implementers, scientists and NGO's. While on the first day Biodiversity bill and details are discussed, during the second day Prof. Gadgil explained about the Biodiversity – state level aspects, co-coordinator of west coast eco-region, Prof. Madhyastha, explained details of west coast biodiversity aspects and needed action to be suggested. Some general type of discussion was initiated during this meeting.

4. MEETING HELD AT DEPARTMENT OF BIOSCIENCES, MANGALORE UNIVERSITY MANGALORE DURING 16TH, DECEMBER 2000.

One-day workshop on Biodiversity with special reference to Coastal and Western Ghats was held on 16th December 2000 at the Department of Biosciences, Mangalore University. Professor T.N. Ananthakrishnan, Former Director, Zoological Survey of India, and Director, Entomological Research Institute, Chennai was kind enough to initiate the discussion with an overview of the current position of the Biodiversity. About 200 participants (Average age group - 35 years) from different parts were present. Prof. Ananthakrishnan in his opening remarks highlighted the wealth of biota along the Western Ghats and called upon the younger scientists and students to give priority in understanding the intricate diversity of life in relation to the environmental situations.

Prof. G. Padmanabhan, Former Director, Institute of Science, Bangalore, Emeritus Scientist, UNESCO Biotechnology Chair, highlighted the intricate relationship between Biodiversity and Biotechnology with an emphasis on utility of gene pool of native species for specific positive activities. Dr. Padmanabhan stressed the need for bioprospecting the species along the west coast and Western Ghats, which has not been taken seriously and implemented properly. Unless the attempts are made to fully record and if necessary patent certain species which have the suitable bioactive components global biodiversity with regional emphasis on the coastal and Western Ghat Biodiversity.

The need to use molecular techniques in identifying the species is emphasized by Prof. Padmanabhan in view of the shortage or lack of expertise in systematic for all the groups. Further, he emphasized the innumerable microbial diversity still to be explored from the coast and Western Ghats. Microbial biodiversity needs to be explored using these recent techniques so as to cover many species from our environment. Like Human Genome Project, Biodiversity project need to be taken with use of latest available molecular techniques to cover more species and from wider area. Then only the serious attention needed to this important project will get.

5. DISTRICT COMMITTEE ON SCIENCE AND TECHNOLOGY, DAKSHINA KANNADA (DCST). Meeting held on 2.1.01 at Deputy Commissioner's Chamber.

A meeting of the District committee on Science and Technology was held on 2.1.01 at D.C's office at 5.00 to appraise the members about various scientific aspects including pollution and hazardous waste management. There are official representatives from administration, agricultural and forest departments, nominated members and scientists

The coordinator of NBSAP west coast eco-region is also a member and took this opportunity to explain the details of National Biodiversity Strategy and Action Plan and the requested all support for the mission of NBSAP. It is proposed to have some people's participation program during May.

6. REGIONAL LEVEL BRAIN STORM SESSION FOR THE KARNATAKA REGION WITH FISHERMEN LEADERS, SCIENTISTS, STAKEHOLDERS AND ADMINISTRATORS. On 24th March, 2001 at the CENTRAL MARINE FISHERIES, RESEARCH INSTITUTE (CMFRI) SUB CENTRE, MANGALORE

A brainstorm session was held on 24th March 2001 at the Central marine Fisheries, Research Institute (CMFRI) Sub Centre, Mangalore. The following members were present.

1. Sri D.M. Abdul Hameed, Director of Fisheries, Govt. of Karnataka, Bangalore.
2. Sri V.K. Shetty, Deputy Director, Dept. of Fisheries, Govt. of Karnataka, Mangalore.
3. Prof. S.L. Shanbhogue, Director of Instructions, College of Fisheries, Mangalore.
4. Prof. P.K. Salian, Director of Instruction, College of Fisheries, Mangalore.
5. Prof. Dr. T.J. Varghese, Former Director, College of Fisheries, Mangalore.
6. Sri R.P. Kotekar, Fisherman, Someshwar, Mangalore.
7. Sri Shivappa Kanchan, President, Malpe Fishermen Association, Malpe, Udupi.
8. Sri Janardhana Kanchan, Secretary, Malpe Fishermen Association, Malpe,
9. Sri M. Seetharama Suvarna, President, Mangalore Trawl Boat Owners Associations and President, Trawl Boat Union, South Warf, Mangalore.
10. Sri H.S. Siddaraju, Hatchery Manager, B.F.D.A., Kumta, Uttara Kannada.
11. Sri B.M. Rajagopal, Asst. Director of Fisheries, Mangalore Fishing Harbour.
12. Sri P. Parshwanath, Assistant Director of Fisheries (II), Mangalore.
13. Sri Madhava Shriyan, President, Karnataka Purse seine Fishermen's Association, South Warf, Bunder, Mangalore.
14. Sri T.V. Kanchan, President, Country Boat Owner's Association, Panambur, Mangalore.
15. Sri Kariappa Kanchan, President, Deep Sea Fishermen's Association, Malpe.
16. Sri K. M. Kotian, President, Malpe Mechanised Boat Owner's Co-Operative Society.
17. Dr. V.S. Kakati, Senior Scientist & Officer In-charge, KRC of CMFRI, Karwar.
18. Dr. C. Muthaiah, Senior Scientist & Officer In-charge, CMFRI, Mangalore.
19. Dr. P.K. Krishnakumar, Scientist (Senior Scale), MRC of CMFRI, Mangalore.
20. Sri P.U. Zacharia, Scientist (Senior Scale), MRC of CMFRI, Mangalore.

Prof. Madhyastha briefed the importance of NBSAP with the fishermen associations. Most of the fishermen leaders gave the following opinion:

1. Overexploitation of fishery resources by the existing multi day crafts in the near shore region and increase in the fishing crafts every year leads to diminishing catch.
2. Deep sea trawlers both of Indian and foreign origin sweep the entire sea bottom by continuous trawling operations resulting in severe damage to the ecosystem and many times this results in non-availability of harvestable fish resources to the local fishermen.
3. During monsoon season large boat seines which sometimes called as '*indigenous gears*' are operated with outboard engine of the capacity of up to 45 HP along the near shore waters within 10-25m. Of depth. They also express the fear that this way results in destruction of brooders, juveniles and young fishes that shelter in the near shore areas during monsoon months.
4. Pollution caused by effluent discharge by the mega industries, the fishermen community are of the opinion that effluents are not properly treated or discharged into the sea resulting in destruction of the ecosystem and the fishery in the vicinity.
5. The suggestions came from the fishermen leaders are:
 - a. Continuous monitoring of coastal waters for preventing pollution.
 - b. Ban of operation of foreign trawlers within EEZ complete ban on fishing by all kinds of mechanized motorised boats during monsoon months (June to August).

- c. However the President of Country Boat Owners' Association objected on total ban claiming that this will prevent the livelihood of more than 2 lakh fishermen from Mangalore region itself who are dependent on this type of fishing during monsoon.
- d. One of the fishermen entrepreneurs, Sri Kotekar expressed that fishing during monsoon should be done only by line fishing and boats without any kind of mechanisation to safeguard the interest of such group of fishermen.
- e. An effective implementation of monsoon ban has found full support during brainstorm.

7. THE REGIONAL COASTAL BIODIVERSITY MEETING On 28.04.2001 At
CENTRAL MARINE FISHERIES RESEARCH INSTITUTE, KOCHI

Members Present

1. Prof. M.N. Madhyastha, Co ordinator, NBSAP
2. Dr. Mohan Joseph Modayil, Director, CMFRI, Kochi
3. Dr. R. Damodaran, Dean, Faculty of Marine Sciences, CUSAT, Kochi.
4. V. Sivaji, Scientist, Fishery Survey of India, Kochangady, Cochin – 5.
5. Dr. K.V. Lalitha, Sr. Scientist, CIFT, Cochin – 29.
6. Dr. K.V. Jayachandran, Associate Professor, College of Fisheries, Kerala Agricultural University, Panangad P.O., Cochin – 682 506.
7. Dr. P.S. Easa, Scientist, Kerala Forest Research Institute, Peechi-680 653.
8. Dr. R. Satyadas, Principal Scientist, SEETED, CMFRI, Cochin – 682 014.
9. Dr. K.K.C. Nair, Scientist In-charge, N.I.O., Kochi – 14.
10. Dr. D.M. Thampy, Dean, College of Fisheries, Panangad, Cochin – 682 506.
11. K. Prasadachandran Pillai, Joint Director, Fisheries (Central Zone), Cochin – 36.
12. K.M. Lethy, Deputy Director, O/O Joint Director of fisheries, FRMS
13. Dr. R. Paul Raj, Head, PNP, CMFRI, Kochi
14. Dr. V. Kripa, Senior Scientist, MFD, CMFRI, Kochi.

Agenda

1. Statement of the issues/problems.
2. Identification of ongoing initiatives/programs.
3. Identification of stakeholders involved.
4. Identification of major gaps involved.
5. Delineation of actions needed to plug the gaps and strengthen the ongoing programmes.
6. Measures and strategies needed to implement these actions.
7. Prioritization of the strategies.

Specific proposal/suggestions that contribute towards conservation and sustainable use of biodiversity.

Other topics discussed

- Code of conduct for responsible fisheries?
- Priority for Kerala State in particular & West coast in general.
- How Kerala State coastal diversity differs from the rest?
- Can we think of any intervention/alteration in the existing practice of coastal use?
- How best we can take to confidence the stakeholders?
- CRZ & Aquaculture – with reference to Kerala.

- Fishermen's strike & demand – Any hint for NBSAP?
- Wetland ecosystem
- Mangrove ecosystem
- Wedge Bank ecosystem
- Mudbank ecosystem
- Secondary influence on bioresources
- Pokali field ecosystem
- Coastal erosion – sea wall – impact on coastal biodiversity.

Prof. Mohan Joseph welcomed the participants. Prof. Madhyastha introduced the subject and Dr. Damodaran who is a member of ecoregional group explained about the earlier discussions we had regarding the subject. Prof. D.M. Thampy, Dean, Kerala Fisheries College, KAU emphasized the importance of coastal wetland ecosystem especially along Kerala State. Areas of Trichur, Alleppy and Cochin region have plenty of these ecosystems harbouring extensive biodiversity. He also emphasised the mangrove ecosystems of Kerala.

An important event to note is the restoration of Mangrove ecosystem by Kerala Panchayth Raj Institutions. People actively involve in restoration of mangroves (This may be extended to other coastal states as well) by persuasion and awareness. An important problem along Kerala Coast is Ranching program of Carp's, which is detrimental to the biodiversity. Indigenous fishes are at threat due to introduced species like *Clarias garipenes* which is a voracious carnivore. Even though this carnivore is barred, plenty of this species is being cultivated.

Another aspect came to light during discussion is aquaculture practice though may call it as traditional aquaculture actually proceed is intensive fish culture. The impact of this aquaculture on the down stream coastal area is evident. Along Quilon district Panchayath level Committee meeting attempt is going on conservation of mangrove biodiversity. But gravid *Macrobrachium*. Shrimps are caught claiming for hatchery, but they are exported without collecting the blood. People need to be educated about the damage they are causing. In the biodiversity conservation action plan, attentions need to be paid towards this.

Dr. P.S. Easa, Scientist, Kerala Forest Research Institution, Peechi suggested for documentation of the coastal knowledge base. KFRI, Director being the State level coordinator, we decided to interact during the meeting they are planning. He also inferred that Kannur district Panchayath is taking interest in protecting and restoration of mangroves about that area.

Demersal Zone Protection was discussed at length. Trawling practiced in demersal area is wiping out the natural habitats of corals, Holothurians, sponges and Gorgonian. Many species are vanishing due to habitat destruction. In the wedge bank area which very sensitive suitable fishing methods need to be encouraged (barring the bottom trawlers) like Line fishing etc.

Dr. K.K.C. Nair, N.I.O., Regional Centre pointed out the information available an ocean resources zone which gives the details of resources in some of the coastal area along Thiruvanthapuram, Kochi and Calicut. This document will be looked into. Also there is another document – Marine Biodiversity prepared by Swaminathan Research Foundation, Chennai which has been already requested will be taken note off.

The problem of fish catch was discussed. Many trawlers are getting the catch and sometimes 90% are discarded (The range being 20 to 90%). This results in large-scale destruction of benthic area & biota. There is an indication that non-edible part of the biota is increased in the catch. Is it due

to mesh size? Or fishing method? or Increased fishing boat/effort area. Needs attention and intervention at various stages. Dr. K.V. Lalitha, Scientist, CIFT, Kochi spoke about the pathogenic microbes along the coast. The aquaculture practice and the associated pathogens, which may affect the biodiversity of the coast.

Mr. K.P. Pillai, Jt. Director, Coastal Fisheries, Kerala State discussed about the socio-economic aspects of fishermen and fishermen are always concerned about the fish catch. A lot of juveniles of sardine are caught and suitable interventions are needed.

The report of MS Foundation, Chennai coastal biodiversity will be looked into. DBT has launched a programme on Bioresources of the coastal area, which N.I.O. is currently undertaking? We need to examine – methods of eradication of the unwanted species during aquaculture practice. Which many times affect other biota nearby? Commercial utilization of waste catch which sometimes goes to 90% (20 to 90%), is it a loss of biodiversity? Can we use better methods or use this catch for better use?

Another unique ecosystem in the coastal area is Pokkali – Rice cum Prawn /fish culture. Ernakulam, Kottayam & Trichur districts have this unique practice of growing rice and fish together, which is fast disappearing and replaced by intensive aquaculture. Attention need to be given to conserve this practice and preserve germplasm of the special rice variety and the fish species used. A lot of initiatives have been advocated. Pokkali Development Agency under the Chairmanship of collector of Ernakulam with suitable measures like – organic farming in these Pokkali fields acclaiming as organically grown rice, prawn, subsidies for seeds and such other promotional ideas needed and encouraged. Another important areas to be discussed is River delta and its biodiversity need to be given some thought.

Mud bank - Mud bank phenomenon is unique along Kerala coast during monsoon. The biodiversity of this mud bank is such that there is congregation of communities in this calm area. Unfortunately fishing activities are encountered in this area during monsoon. This may affect the biodiversity.

Tourism department and other developmental programmes, aqua cultural authority agricultural departments and such others - lack of co-ordination in policy framing and implanting various programmes. Further central & state government's programme to be implemented with much more co-ordination towards various policies.

Coastal erosion and mitigation along Kerala was discussed. The sea wall erected along the coastal disturbed the sea turtle and also coastal biodiversity is affected. E.g.: Earlier brown mussel was not found near Kochi. But after the erection of sea wall, a lot of them have appeared.

Another interesting aspect discussed is about the construction of many bunds and reclaimed. Land on seaward side. There is no record of this. GIS – for information of coastal expansion along west coast can be collected. The meeting concluded with extending work of thanks for the participants.

As the elections are fast approaching the NGO representation was not there. Dr. Thomas Kochery expressed his inability to attend, as he will be at Mumbai. A separate meeting with NGO's may be planned.

At 2.00 pm a **field visit** was arranged to interact with local fishermen communities of Elamkunnappuzha, Vypin. There is a co-operative society where in each member has to buy share of the society. Interactive discussion was held on 28.04.2001 at the SC/ST Co-operative Society,

Elamkunnappuzha, Vypin. The list of farmers who had addressed interactive discussion held on 28th April 2001 at the SC/ST co-operative Society, Elamkunnappuzha, Vypin.

- E.K. Raghavan, Ettummel, Prabham, Nikathuthara, Kesavan, Kalathara, P.C. Krishnan, Padathara, Prabhakaran, Kalarikkal, Dinesha, Komoth, Tatabalu, Thaimodothil,
- Thankaraj, Kalathara Narayanan, Pulikkathara Puthuvyppu (P.O.), Vypin, Ernakulam
- Chathan, Karipurathu M.I. Narayanan Ayyappan, Mannuchirayil.

Fish Drying Unit

- Sathi Radhakrishnan, Aghikkal, Belbow Jn.
- Mani Chandrababu, Munayathu, Vypin
- Gracy Sebastin, Kunizhunkal, Vypin
- Saradha, Puthenneetil, Vypin
- Radhagopalakrishnan, Puthenveetil, Vypin

Staff from CMFRI

- Sheela Imanual, Scientist, SEETTD
- K.P. Shalini, (FII-3), SEETTD
- K.N. Pashkaran (TI-3), SEETTD
- N.K. Harshan (T-2), SEETTD

Dr. Jayachandran Nair, Asst. Professor, Panangadu assisted in translating English information to Malayalam language and also interacted with the group.

After briefing them about the bio-diversity we learnt that these communities are well aware of the food and feeding habits, food chain and food web relations and how it can affect the fishes which they want to catch. The water quality and its relation were also known to them. They have alternate profession apart from the fish culture practice, which they are doing in a conventional and traditional way. The problem of some of the developmental activities and silting of the waterways, which bring in natural fish and prawn seeds into their culture fields were narrated by them. This result in poor seed density (accumulation) stocking in their ponds.

During other seasons they grow vegetables along the bank of culture ponds (additional source of income). Women folks collect certain quality of fish. After salting and sundry them which will fetch them comfortable income. There is good market for such type of fish. A video recording of the visit is available.

8. DISCUSSION ON THE STATUS OF AVIAN BIODIVERSITY ALONG MAHARASTRA COAST On 8th September 2001 at BNHS, Mumbai.

Members present

1. Prof. M N Madhyastha, coordinator
2. Prof. Karande A.A. (Rtd Scientist Naval Laboratory, Mumbai)
3. Dr. Chhapgar, BNHS Mumbai
4. Ms. Supriya Junjunwala, BNHS Mumbai
5. Ms. Rekha P.D. Researcher, Mangalore University.

The one day meeting at BNHS was focused mainly on the Coastal birds. Initial discussions were on the necessity of the details as well as about the NBSAP themes. After the initial discussions Dr. Chhapgar directed Ms. Supriya Junjunwala, working for the IBA project for India, to provide the details on the available works on the Coastal birds, both sea birds and water birds. The coastal birds associated with mangroves were to be listed from the available literature.

IBA, is interested in the NBSAP process and is involved itself with the project at different levels, extended the details. The Final write up will be provided soon and Dr. Chhapgar being the member of the working group was very informative regarding the other aspects of the coastal biodiversity.

A part of the discussions were also focused on the ballistic species in the West coast. Dr. Karande the retired scientist from the Naval research laboratory Bombay gave details about the possibility of Polish water species *Limnoria platycauda* from Karvar waters must have invaded by the ballistic waters, as they cannot survive temperatures more than 15°C which is further said to be a worst kind of wood borer, might have come from Australian region. But related species have been reported from Andaman Island.

8. PARTICIPATED IN WORKSHOP ON ENVIRONMENTAL LAW FOR ACADEMICIANS AT SDM LAW COLLEGE MANGALORE

On 8 & 9th September 2001

The workshop highlights.

The objective was to generate awareness about the existing the laws and policies on the environment for the academicians. This gave an overview on CRZ regulation act. There was a brainstorming discussion on the agitation regarding the developmental activities (Thannirbavi Barge mounted power plant) along the Thannirbavi area (M'lore) of the west coast.

The project has been started since two years and the project is completed now. The problem for the Local include that the small hamlet of fishermen community is very dependent on this area. The Fishermen have the problem of rehabilitation as their livelihood dependence on their traditional profession. This project has imposed problems on the local area – Tourism at Thannirbavi is hindered (since the project authority have made it private area). The project is directed to use the water from the sea and to release the thermal effluent into the sea. But public complain about the misuse of the adjoining Gurgur river for the above said purposes.

The public have the doubt still how it is not included under Coastal Regulation zone act and on the violation of pollution control board norms for the discharge of the waste. The concerned Government bodies should interfere to clear the doubts of the local as they are very much linked sentimentally to the natural resources and the preserving the pristine environments.

The other topics of concern were on the awareness on CRZ rules and costal ecosystem management.

An interesting case study on the environmental impact analysis of Honnavar coast (River Aghanashini river estuary) for the Proposed Tadadi port was discussed. The impact analysis shows that he richest biodiversity of this area on the west coast will be at danger. The coastal inhabitants are much worried on their direct livelihood dependency.

Suggestion emerged were,

Karvar is very nearby and having the large Sea bird project and a port too. As an alternate to the Tadadi port, the expansion of the Karvar port can be suggested as for the local biodiversity is concerned. The economic and the ecosystem values should be evaluated for the benefit of the biodiversity

10. PUBLIC HEARING WITH THE FISHER WOMEN AND FISHING COMMUNITY OF MALPE on 28th July 2001

A public hearing at Malpe Fisher women's Co-operative Society Ltd. was organised to explore the professional diversity and the resource utilisation pattern among the fisher women and their role in conservation of the natural coastal resources. The society consists of nearly 1000 members, with the objectives being self-help and learning about the modernization of fishing techniques. The members are being benefited by the government loans, through the society.

The women's role in fishery is a secondary one and they are involved in the passive fishing activities (as they deal with the fish after the landing to the shore).

The meeting was followed by a survey of the fisher women's livelihood status was undertaken by interviewing 80 families at Malpe and Mattu. It was revealed that the women are aware of the different professions within the fishing industry, but the majority are engaged in fish drying and selling. A few of the women are also engaged in other aspects of fish trade like auctioning, whilst, others involved with the labour works of the fishery industry. Most of the women interviewed had a single job without an alternative job for off-season. Some of the women have the responsibility of the family's income and are involved in the decision-making. The fisher women have their own culture and beliefs. They believe in the natural fish resources, which is their sole livelihood and they are not willing to take an alternative job. The youth of the Mattu village opined that although they are educated, wanted to continue the fish trade.

The women have strong institution of nature conservation and for some extent believe with the nature's self-purification capacity. Industrialization along the coast makes them feel nostalgic about it. They have traditional knowledge of fishing, like predicting the catch and keeping away from fishing during the breeding season. The commercialization of the industry and the sophisticated trawlers though help them in increasing their income, however they are still not satisfied with the current developments. One of their main concerns is the uncontrolled exploitation of the deep-sea fishes by foreign trawlers, which occurs during the off-season as well as other seasons and threatens their income.

9. NATIONAL SEMINAR ON COASTAL EROSION on 7 & 8th September 2001

Participated in the two-day National seminar on Coastal erosion was held in KREC (present NITK) Surathkal on 7th & 8th September 2001, which aimed at discussions to evolve a strategy for preventing the sea erosion along the Indian coast, mainly on the Karnataka and Kerala Coast of India. It is evident that maximum sea erosion was found along these stretches of the Indian coast during the Monsoon. The participants representing different levels - Academicians, Engineers, Civil contractors, NGOs, Local inhabitants (Public) as well as Government bodies.

The causes of erosion identified are -

- | | |
|---|---|
| a. Early onset of monsoon in west coast | g. Lack of littoral supply |
| b. Steep foreshore | h. Uncontrolled river outlets |
| c. Geological factors | i. Construction of breakwaters |
| d. Raising sea level | j. Sediment carried down by the rivers |
| e. Low backshore level | k. Laterite cliff erosion |
| f. Mud banks | l. Reaction of beaches to protection works. |

Identifying the prioritised eroded area for construction of sea walls based on

- a. Human habitation
- b. Agricultural land
- c. Constructions (Roads and Buildings)
- d. Magnitude of Coastal erosion

Role of rivers and estuaries on coastal erosion problems

It was discussed that the construction breakwaters for the easy movements of fishing boats into the sea causes the severe erosion in the adjoining coast. Failures of seawall, due to seepage, quick sand movement and poor construction and maintenance/monitoring was highlighted. Strict invigilation of implementation of CRZ rules in the vulnerable regions along the coast. EIA studies were recommended prior to the construction of sea wall.

Noval methods proposed were:

Need for the alternative natural methods were proposed.

The adaptability of successful method implemented in the other countries were discussed in view with Indian coast.

The discussion on engineers' problems posed during the construction of he sea wall.

Insisting the case studies on socio-economic status of the coastal inhabitants due to coastal erosion and seawall construction

The recommendations elucidated from the meeting for the immediate implementation include

- ✓ Creation of R&D infrastructure for studying causes and prevention of coastal erosion.
- ✓ Prioritised area should be pointed to be set up the immediate actions.
- ✓ Suitable design & standardisation of sea wall to fulfill the requirements of the severity of erosion at that location.
- ✓ Incorporation of filters to control sand movement.
- ✓ Field studies need to be undertaken so as to check the performance of the wall.
- ✓ Sea wall monitoring/ supervision by independent authority.
- ✓ Regular trainings on the construction guidelines to the constructors and labours
- ✓ Public awareness for the coastal zone acts and violations.
- ✓ Setting of the information centre for the public.
- ✓ EIA studies were recommended prior to the construction of sea wall
- ✓ Incorporating the vegetation covers, wherever possible.
- ✓ Set up of a work group for emergency. (Sand bags)
- ✓ Allocation of funds for maintenance and reconstruction.
- ✓ Preparation of coastal land use maps
- ✓ Beach nourishment (dumping the right type of dredged sediment from mining industry, with prior EIA studies.
- ✓ Formulation of coast conservation committee - coordination with academic and business commodities and public participation.

12. PUBLIC HEARING AT MALPE WOMEN'S CO-OPERATIVE SOCIETY

On 18.08.2001 at Malpe Fisher women's Co-operative Society Ltd. Malpe, Udupi

Meeting was started with the introduction of the members. The women community were enthusiastic and sharing their opinion in a positive attitude. More than 100 members of the society were present.

The formal introduction of the society and the objectives were explained by the president of the Society. The opinion of the members were asked regarding the functioning of the society. Many women opined that the society initiated for them involve independently, in fishing activities, problems and even to their economic status. Interesting discussions on how the basic livelihood dependence on the fishery resources has changed into the profit based interests. A few of the women were having traditional knowledge on the coastal activities.

A few members explained about the use of different types of traditional fishing nets (*Pattebale, Ramponi, Matebale etc.*). They opined that earlier they had a good fish catch even with traditional fishing. But nowadays good catch of mackerel and sardines were more only during September-October and November. The decline in the fish catch is due to many problems like over fishing by the mechanised trawlers, industrial activities along the coast etc., These women stressed their way of fishing is very sustainable one as they are oriented only on the livelihood. The near shore fishery resources are dwindling as because of the modern day trawlers and foreign boats and unlimited numbers of these boats. The women suggested not to give fishing visa for foreign trawlers to fish in the Indian waters. Because of the exploitation of the commercially important fishes by the foreign trawlers (efficient units) their fishermen should return with only the oil sardines and mackerels (the small scale fishermen).

One of the members explained about the professional diversity, the women folk who are involved in including auctioning, sun drying, salt drying, head loading, fish trading, transport from boat to storage house, head loaders, door to door selling (exchange for paddy grains in some remote villages).

The women and men have demarked their working/profession in fishing industry. Men never interfere with the women's works (after fish landing works). The value of fish (depending on kind) has changed mainly due to foreign and the wide market. According to one, prawns were the most expensive variety and the exploitation of the prawns is being carried out extensively at present. Regarding the offshore fishing one said, it sometimes ends up in unwanted/ not economically rich varieties. But the modern nets can be advantageous in selecting specific kinds of fishes.

It was suggested by the coordinator that the unwanted fishes might also be sorted, dried and made compost with the chick or pig waste or any other value added product. Regarding the medicinal values from sea products, many of the women are quite aware of the uses of different resources for the different benefits (nutritional/medicinal). The fisher men and women do perform different types of prayers (once in a year with all community of fisher folk, without any caste limits) for more productivity, wealth and to safe guard them (their ancestors considered sea as the celestial vessel).

The fisher folk community irrespective of the gender strongly believes in hard work. They had no time limits for working for years and since a year the members of the society have resolved the problem of over working by self imposing the work timing from 6 am to 6 pm for women. When asked about the management plans for the coastal resources, they were quite enthusiastic about the idea and wanted to green the shoreline and keeping the coastal area and water clean. This

discussion with the women was quite useful for framing how one can involve these women in the management practices. A little training and awareness will give wonderful returns.

13. PUBLIC HEARING AT MATTU VILLAGE (AN ADJOINING VILLAGE OF MALPE) on 28th July 2001

A public hearing at Mattu village on traditional fishing was conducted on 28th July. The participants were the traditional fishermen. The interesting aspect was they were not fishing between June 22nd to August 15th, which they practiced traditionally since ages.

The fishermen of this area are generally going in small boats for fishing with the use nearly 25 people each forming a group. The head of the troop gives the idea about the identification of specific fishes for catching especially those of prawns and mackerels. The different types of nets they were using includes the *pattebale*, *disco* etc., and they used to go to a depth of maximum 75 ft and collect a varied number of fishes (10,000- 50,000/day). Their livelihood is purely depends upon the fish catch. Their fish catch depends on season and they do get prawns generally in the month of August (for only 15 days). During rainy season they do fish in river for their consumption. Sometimes the fish catch can even very high but were not interested in the large catches beyond their needs.

They strongly objecting the use of large mechanised boats which reduces their fish catch and thereby their economy too.

14. PUBLIC HEARING AT SNEHA KUNJA, KUMTA On 19th August 2001

A meeting at Kumta (Uttar Kannada) was held on 19th August 2001 at Sneha Kunja. The meeting was attended by nearly 50 members (representing the government (Director, CMFRS) NGOs, local fishermen (of mechanized and traditional), fisher women and other local coastal inhabitants, members of NGO (Sneha Kunja). The discussions started with a formal introduction by Mr. M.R. Hegde, the local organizer of the meeting. He initiated the discussions giving a geographical account of the area and the importance of coastal zone and the biodiversity followed by a briefing by Mr. Subhash Chandra, Kumta. The surroundings of Kumta have a few small islands, which the residents use as religious centres. Some of the islands found in this area are Basavaraja Durga island (with thick forest), Nethrani island. According to them these islands are rich in fishery resources like ladyfishes (which is one of the important fishes of this area), ribbonfish, etc. The discussions were diverted to the local coastal biodiversity including river Aghanashini, CRZ act, fishermen problems with respect to traditional and intensive fishing (mechanised boats), Traditional knowledge. The fishermen members present explained the available fish catch, the vanishing varieties of fish. The ignorance about the CRZ rule among the fishermen was the main reason for unsatisfactory attitude Government polices. And they think the Govt. is more biased with the industrialists. According to an experienced fisherman, Mr. Subraya Naik, in the traditional fishing practice also they were following the fishing holidays during the breeding season for the better returns. The traditional fishermen are well aware of the limitations of fish catch and the importance of fishing resources. Though they expect to get a catch of Rs.15,000/- they never catch more than Rs.2,000/-. The fishermen explained the change in the composition change of the fish catch. Which according to them are mainly due to the invasion of fishing holidays the boats of neighbouring states, posing a problem for the local fishermen. The coast guard should regulate the inter-territorial activities and strict enforcement of illegal fishing activities across the borders by

concerned authority was suggested by the group. Further the members explained that the geographical location or the geography of coastal Karwar is very good for fishing as it supports a few islands. When asked about the fishing holidays, they explained that 65 days of fishing holidays are practiced by these fishermen.

Near Goa in the Ratnagiri region in a remote island where there is a good fishery resource and the Karnataka fishermen go illegally to catch fish. Similarly the Nethrani Island also show higher fish resources. Which further emphasizes that the island areas support rich biotic resources, including fish. The fishermen relate this to the sheltering of fish in these areas for breeding.

Mangroves: Kali, Sharavathi, Aghanashini Rivers supports a good mangrove vegetation. Afforestation works are going in North Canara. The fishermen opine that the mangroves are more beneficial to the fishes of river mouth rather than the offshore fishes.

Kali, Sharavathi and Aghanashini rich fish diversity due to rich mangroves, which, are partially destroyed presently. In this Total area 5,000-10,000 families are solely dependent on shell- fish removal from the Aghanashini estuary. Due to the extensive shell- fish removal, the mangroves are destroyed. (The Government gives license for 20 yrs. In spite of the protest the license has been further 20 years). The proposed Tadri project – International port will include 1,800 acres of area is too vast; according to the fishermen, it will affect the rich biodiversity of this coast. The fishermen caste diversity: Those are different communities involved in fishing along this area.

- Naik, Harijan
- Kharvi, Mogera
- Noikuda, Gabitha, Ambiga, Bovi

Shellfish mining: Mainly by Mogera, Bovi, Naik, Halakki, Bhandary, Harijan, Girijan etc. (Shell fishing has been carried out by almost all coastal communities).

Marginal farmers: 80% non-fishermen are marginal farmers. They do not depend on the sea. They utilize only the coastal areas and are practicing '*Gazani*' (paddy farm). Now these *Gajanis* have given on lease for aquaculture practices. Both traditional and intensive aquaculture is being practiced. Since 20 years they are practicing aquaculture. *Gazani* forming is being practiced. The landowners have given their fields in lease. In Kumta Tq. 7000-8000 acre land was under farming is under aquaculture. The fishermen are aware of the impact of aquaculture practices on the coastal diversity.

15. REGIONAL MEETING AT GOA ON 15TH OCTOBER 2001

Members Present

Dr. Mohan R. Girap. SSCST, Saligar, Goa

Mrs. Brenda Fernanders. Goa State Council for Science and Technology

Dr. Z. A. Ausari. NIO

Dr. Y. Modassir. Dhepe College of Arts and Science, Panjim

Dr. C. T. Achunthanikutty. NIO

N. V. Verrlekar. Department of Fisheries, Panjim

Snt. Shamila Monteiro. Supdt of Fisheries (H.Q). Department of Fisheries, Panjim

Dr. Baban Ingole. NIO

Dr. S. Nazareth. Goa University.

Dr. S. Bhole. Goa University

Dr. R. Jeyabhaskaram. NIO
Nirmal U. Kulkarni. The Green Cross, H.W.W, Bardez
Rajendra P. Kerkar. Vivekanand Environment Awareness Brigade, Keri
Dr. V. S. Kakati. Principal Scientist, CMFRI, Karwar
Dr. A. B. Shanbhag. Department of Zoology, Goa University
Ashish Kothari. Kalpavriksh. Technical and Policy Core Group, NBSAP, Pune
Dr. Kasturi N. Desai. P.E.S College of Art and Science
Dr. Manoj R. Borkar. Biodiversity Research Cell, Carmel College
Shri Ramakant Borkar. Dipali 303 H, Chicalim
Shri Raju Pachangrai and Smt Manju Pachangrai. Nomadic Fishing Tribals of Mysore
Manju S. Raju. TWGC. Livelihoods, Life-styles and Biodiversity. Bangalore
Commandant V.S.R Murthy. Coast Guard, Goa
M. V. M Wafar. Senior scientist, NIO, Goa.
Harvey D'Sowra. Southern Birdwing, Goa
Vidyadhar Gadgil. Goa Foundations
Claude Alvares. Goa Foundations
Suvarna Fonseca-Antao. Kalpavriksh, Carmel H.S.S, Goa
Dr. Shyam. Department of Zoology, Goa University.
Ms. Rekha P. D. Mangalore University
Ms. Laura Morley, Mangalore University

Topics discussed include

- ♦ How Goa state Coastal diversity differs from the rest?
- ♦ Priority for Goa state in particular and West coast in general
- ♦ How best we can take to confidence the stakeholders?
- ♦ CRZ & Beach tourism with reference to Goa
- ♦ Tourism and Biodiversity - The economy vs. Biodiversity conservation.
- ♦ Code of conduct for responsible fisheries?
- ♦ By-catch change in qualitative composition, loss of biodiversity and economic value.
- ♦ Destructive and over fishing gears
- ♦ Coastal erosion - seawall construction and inter tidal biodiversity?
- ♦ Uniform monsoon trawl ban -(interstate fishing boundaries?)
- ♦ Implementation of the improved traditional fish farming
- ♦ Conflicts in ongoing programs.
- ♦ Assessment of impact of trawling on biodiversity
- ♦ Breeding grounds of certain species? (Stock preservation)
- ♦ Endemic species?
- ♦ Estuaries and mangroves?
- ♦ Secondary influences on bioresources?
- ♦ Need for prioritising the areas to declare as Marine/coastal protected areas (sanctuaries) for the conservation
- ♦ Records of alien species from Ballistic water
- ♦ Commercial aquaculture in Goa - issues of biodiversity
- ♦ Sustainability of fishery industry.
- ♦ Issues of Gender/equity.

General aspects

The EEZ constitutes of 60% of India's land areas. Conservation of the Biodiversity and setting the action plan for the EEZ Continental shelf will be taken care of by the National level

thematic groups. Continental shelf act/ rules include protection of Marine resources. The national level thematic group Local level organisations should work for the conserved. Common stand is that Biodiversity should not be purely scientific and ecological issue but should include the interests of the common. Anything that has impact on Biodiversity should be given importance for conservation. Globalisation of the economy has a bad effect on natural resources. What are the implications for Goa? Issues get marginalized. Cannot have an action plan. Law of sea etc/. should be taken into seen strictly.

Fisheries Resource management

Can we work out system of licensing for controlling the resources? Coastal fishermen should form a union along the west coast, for fighting the common problems. (Entire coastal *okkutas* etc should be formed by the fishermen itself for the sustainable fishery to avoid conflicts).

One should have a management plan, i.e.- Sustainable Fishery management Plan. One should not separate management plan for different States but common issues can be settled with one body.

Common questions for fishing, with conservation and resource management are the following:
What should be the sustainable Yield? Which can be a sustainable catch? What could be caught?
Can one predict the resources? Which are the eco friendly methods of catch?
How can one have a catch limit? What will be the sustainable fisheries?

Suggestion: Functioning of the marine food chain should be considered while fishing.

Converting into value added product could solve wasteful by-catch problem of the small fishermen. What should be the policy for the scattered islands of the west coast?

Many Virgin Islands of the west coast have rich Biodiversity and are pristine areas. It is needed to preserve from the impacts of tourism. Biodiversity rich and pristine areas are the heritages, the islands like Malpe, Pigeon Islands and many more of the West coast. What should be the policies for Coral reefs?

Protecting the three islands off Goa was proposed. The recommendations may not be fit, but the recommendations include the SUSTAINABILITY of the developmental projects. The discussions were followed interestingly with the involvement of all the members.

The beaches of Goa are exploited for the tourist activities. The monetary interest of entrepreneurs cannot be balanced with the resource conservation interest groups. The CRZ rules are being violated for every inch of the shoreline of Goa is the remark of one of the member present

Sand Dune ecosystem

One of the components of the **Inter tidal belt** is the Sand Dune ecosystem_(vegetation). The Goa coast has rich Sand dune vegetation, but has been destroyed because of the tourism development. The natural dunes have been disturbed and are not given any importance. The chartered tourism has not taken enough care of the natural habitats of the beaches. The artificial landscaping gives false satellite images and taken wrongly for the coastal vegetation. Virgin vegetation belt is found from the North and South Goa. As high as 56 species of Sand dune vegetation is represented in some of the beaches of Goa while others have mostly one or two species.

One of the *recommendations* given for the conservation is the setting up of **Nurseries** for the sand dune vegetations by the forest department.

Natural cliffs with ancient flora:

Vagha cliff, Miding cliff etc., where wind blown vegetations are present, and caves, which are geologically important. Substantial regulation basis on the beaches is recommended for preserving these interesting areas. Archaeological conservation of the species is recommended. The Radiation levels in the Goa waters should be monitored and check the health of these ecosystems. (can seek help from the BARC). Biological stabilisation of the beaches is recommended.

Notified FISHING villages:

There are 67 notified fishing villages, with 27,000 traditional fishermen and what kind of policies should be extended for the conservation? Does other states of the west coast have similar policies?

Villages of Canakona, Salcet etc, are prioritised based on the Anthropological characteristics. And they have their own eco-theology, the type of fishing gears etc.,

Their cultural knowledge should be conserve, through proper interventions.

Red marking the coastal constituencies should be done, so that coastal community become interests of minority and the more political support will be gained.

Community property rights, which will have scope for the individual interests.

Privatisation of beaches: The coast land of West Coast should be declared as the commons property but not for the private the people have the traditional approach towards the shoreline, and will face the problem, if they are denied from access. The pressure for the privatisation should not be encouraged along any of the coastal area of India. (for heritage conservation). Sindhurg will be having the immediate problem of privatisation.

The property right issues of the beaches should impose the private hotel industries to extend an area for the public interest. No fencing till 200 m. and at least 3 m of the hotel in the beach has to be kept open to the public. Public access to beach though is a resolved part of Law, there are some violations.

Turtle breeding centres Two stations, Mulchi and Algibad are marked for protection. Policy for the Marine Mammals and amphibians should be set up. Their habitat types should be identified, and then the protection can be suggested to that, areas with priority.

Estuarine mud banks 5-6 lakh metric tones of sediment will be deposited in Mandovi-Zuari estuary. Oil & Grease and petroleum products are the main contaminants.

Untreated sewage disposal has threatened the Impact assessments should be till 300 km upstream should be incorporated. Inland activities should be taken care of. Integrated land use management along with the coastal.

Major concern is solid waste generated by the tourist industry, industries: -DEPA (District Environmental Protection Agency) in Mangalore takes actions for all kinds of waste management. Similar kind organisations are suggested to Goa and other states.

The global warming will lead to the sea level increase, because of the impact on the land use pattern. Before it becomes catastrophic actions should be taken. Disaster management plan for the worst -case scenario is suggested. Increasing the height of the outer bund to higher level and which will take care of the sea level increase. Encroachment of rivers and estuaries - leads to the manmade flood. Estuarine flood plains merge into the coastal belts. Rivers and the estuaries, should be conserved against encroachments, hence manmade floods can be managed. Supreme Court decision, for the wetland conservation, for the economic conservation can be extended.

Traditional salt- pan industries

Out of 37 villages of traditional saltpan industry only 6-8 villages, which are close to sea have these practices. These are in the prime lands and reclamations for various activities are going on.

16. MEETING AT CENTRAL MARINE SALT INSTITUTE BHAVNAGAR

ON 6th November 2001

Members Present

Scientists from the Central Salt Marine Research Institute, Bhavnagar, Gujarat

Dr. P. K. Grosh	R. B. Thorat.
Shri. A. Tewari	M. T. Sheh.
Dr. H. V. Joshi	M. R. Rajhaguru
Dr. K. H. Mody	Ravi Prakesh.
Dr. C. R. K. Reddy	Arune R. Prakesh.
Dr. S. H. Zaidi	Mrs. Roopa Abedi
Dr. Sandhya Mishra	Dr. V. D. Chauhan. Former CSMCRI scientist
Mr. Vaibhav Mantri	Dr. R. M. Oza. Former CSMCRI scientist
Dr. O. S. Kotiwar	Dr. Jayalalram M. Jaiswar. NIO, Mumbai
Dr. C. Raghunathan	Mr. A. V. Mandalia. R.C. NIO, Mumbai
Dr. M. Palanisamy	Dr. S. K. Patel. Professor of Zoology. Dept. of Life sciences, Bhavnagar Univ.
Mr. S. K. Mandal	Dr. D. C. Bhatt, Marine Sciences. Dept. of Marine Sciences, Bhavnagar University
Mr. J. B. Pandya	Rupa Desai ABD. Bhavnager Univ.
Mr. J. S. Patolia	Prof. B. R. Pandrit. Prof. Dept of Life Sciences. Bhavnagar Univ.
Dr. M. P. Reddy	Mr. Riten V. Baichayar. Fisheries Officer, BHN
Dr. Aruna Prakash	
Mr. Ravi Prakash	
Dr. A. K. Siddharta.	
V. G. Sravan Kumar.	

Agenda

- ☞ How Gujarat's Coastal diversity differs from the rest?
- ☞ Priority problems of biodiversity of the state in particular and West coast in general
- ☞ Different Types of stakeholders along the Gujarat coast?
- ☞ Natural wealth of the Coast.
- ☞ Status of CORALS and coral Islands.
- ☞ Oil rig operations- spills and leakages –effects on ecosystem
- ☞ Marine mammals and birds
- ☞ Coastal erosion and inter tidal biodiversity
- ☞ Marine salt works.

- ☞ Status of Sea weeds
- ☞ Disposal of wastes (toxic, radioactive etc.)
- ☞ Fishery Industry and mode of operations? Problems and Sustainability of the activities?
- ☞ Destructive and over fishing gears
- ☞ By-catch change in qualitative composition, loss of biodiversity and economic value.
- ☞ Uniform monsoon trawl ban
- ☞ Aquaculture and coastal Biodiversity
- ☞ Implementation of the improved traditional fish farming
- ☞ Assessment of impact of trawling on biodiversity
- ☞ Breeding grounds of certain species? (Stock preservation)
- ☞ Endemic species?
- ☞ Estuaries, salt marshes and mangroves?
- ☞ Need for prioritising the areas to declare as Marine/coastal protected areas (sanctuaries) for the conservation
- ☞ Records of alien species from Ballistic water
- ☞ Issues of Gender/equity.
- ☞ The threats of economy on Biodiversity conservation.

The Director CSMCRI initiated the discussions on the agenda and he opined that the Lack of Background material, Primary Data etc., would be the constraint for the discussions. He remarked on the following issues for further discussions: -

1. Salt production – and biodiversity erosion
2. Depletion of Mangrove areas, byproduct discharge can be controlled by production of alternatives like manures
3. Seaweeds – large scale cultivation of seaweed can be taken up as to provide employment for the coastal p[population].
4. Issues of Biotechnology and biodiversity. Tools of biodiversity can be made use of for the economic proposition
5. Medicinal values of aquatic plants for the treatment for Filarial and Tuberculosis where the CMSRI is involved.

Dr. Tiwari gave details about the seaweed species richness of the Gujarat coast, which he observed to be increase by 3-4 species. The effect of pollution is expressed on species diversity in a small area (maximum of 1-2 km). Species diversity of benthos from coastal and intertidal belt has been decreased over the years. Dr. Rohit Oja provided information on the available documents on taxonomy of seaweeds.

Over a course of time it was observed that the flora is changing. 1974 the flora was very rich in density and diversity. Okha near Dwarka was the best region in the world for the rich biodiversity but now the number is dwindling. E.g. 1962-1965, brown algae, Tubularia was rare, but which is frequently found now. Certain species due to the release of chemical wastes is eroded.

Suggestion: *Taxonomy of the seaweeds should be encouraged.*

Dr. Rupa Desai ABDI, NGO proposed the following suggestions

1. Establishment of *Databank* for indigenous salt tolerant crop and fodder species of the coast and on the coastal practices (traditional and indigenous), information on communities and indigenous low cost methods for preventing salinity ingress.
2. For the Industrial exploitation of the coast, whether the Government policies are adequate in controlling?

Dr. Tiwari remarked that the institutes like NIO and CMSRI have industry-sponsored projects, and the reports are many times biased.

Suggestion: - the report should be made through Ministry of Environment and Forests.

Dr. J.B. Pandya opined that the biodiversity that exists is due to the dynamic things along the coast. The rich halophytic species diversity needs a wide attention throughout the coast.

Regarding the diversity of Phytoplankton with the insufficient data it is always doubted that how much / which species? From 1992 onwards, it was observed that Gujarat's phytoplankton levels have increased. These should be documented in the suitable form, which can be made from phytoplankton and write code numbers and any can refer to them.

Suggestion: *Systematic for the biota is one of the major suggestions in this regard. And which can be attained by capacity building in this aspect.*

(Ministry of Fisheries has shown an interest into capacity building)

The Kachchh area is packed with industries and new additions will alter the ecosystem balance.

Suggestion: As the industries are the major stakeholders of the coast, sufficient amount of regulations should be imposed.

(The term carrying capacity should be made clear for the biodiversity studies. Many a times due to misuse of the term "carrying capacity" many of the discussions are misleading).

In Gujarat the fishing act is not followed strictly. Regulation of mesh size- is not followed. The monsoon-fishing ban cannot be implemented successfully because of local celebrations. Suggestion – Uniform monsoon ban is encouraged throughout the west coast for solving the inter boundary problems and issues. It is suggested to contact Dr. M. I Patel, Dep. Dir. of Fisheries, Gandhinagar for details on corals and coral islands

Historical data on the sediment and water quality should be considered for modeling works. The hot spots like Mahim, Versova, and Thane Creek etc that are highly polluted by toxicants should be identified.

Marine Salt works: Dr. Tiwari – irradiation of the salt beds that violates the CRZ act. The mangrove areas have been destroyed for salt works to some extent. Many times the mangroves of Gujarat area as considered as waste and sometimes as weed.

The mining of coral beds for cement production is observed in some regions, and sometimes pearl oysters and edible oysters are affected. In many areas the sand lifting is very common. The coast guard is inefficient in his duties, like the monitoring of illegal sand lifting, shell mining, coral bed destructions etc. The legal framework is so inefficient in managing the Marine National Park at Gujarat, which was affected by severe oil pollution.

Dr. A. M. Bhatt. Opined that the traditional saltpan works are taken up by a large number of families. 65% of salt produced in India is made in Gujarat, that's the equivalent of 50,000 tones of salt. This requires 250 laborers. There are 4 categories:

1. Below 10 acres - who are responsible for 25% of the salt production?
2. 10-100 acres
3. Above 100 acres
4. Mega salt producers

Effects of salt production on biodiversity are siltation. No biodiversity loss is manipulated from the saltpans, to some extent these saltpans may not allow plants to grow because of the penetration of salt water. A shift in flora and fauna is always observed. *Salvadora* species are growing in the vicinity of saltpans. The outer bund of saltpans should be treated with caution as it can reduce 90% encroachment of salt water.

Regarding aquaculture practices, it is suggested to contact Mr. K.K Joe, CMFRI, Veraval.

Oil pollution is mainly due to oilrig washing. Kandla, Veraval etc. have observed a higher concentration of oil. Marine protected areas and national parks – concerned authorities should vigil the national parks and MPA. No data is available on the status of MPA biodiversities.

The microbial diversity also shows fragmented details. Not much details are available on halophilic bacteria, fungi etc.

Sub tidal biodiversity – it was suggested to document the germplasm, at the regional levels. Training the people at various levels for the conservation of germplasm is also recommended. Training on preparation of herbarium, soil analysis. It is suggested that the integrated approach to ecosystems should be taught in schools.

Suggestions: Sand dune vegetation along the west coast should be introduced for shore stabilization. Identification of institutes for expertise works of biodiversity

Target orientated training programmes for all the stakeholders. The institutes like CEE, Central Salt Institute, University of Gujarat, Agricultural Institute etc should take initiatives. There should be intra and inter institutional links for promoting conservational works.

Remote sensing data should be used for assessing fisheries.

Tourism in Gujarat doesn't have implications on the coastal biodiversity.

17. DISCUSSION MEETING ON NBSAP- WEST COAST ECOREGION -FOR FINALISING THE ACTION PLAN On 23rd and 24th February 2002 at CMFRI, Kochi

Members Present

Prof. M. N. Madhyastha,

Prof. R. Damodaran, Dean, Faculty of Science, Cochin university, Kochi

Prof. M. Mohan Joseph, Directo, CMFRI, Kochi

Dr. Rekha P.D. Mangalore University

Main Agenda of the meeting was organized to discuss and finalise the Strategies and Action Plan for the west coast ecoregion. The draft document for west coast was considered for modifications and the suggestions from the working group members were also analysed.

The discussions on the coastal agriculture, mud banks, revealed that, the agricultural practices within the defined coastal area are limited. This extends in small patches in the form of coconut plantations along Kerala, Karnataka, Goa and the traditional Pokali fields along south of Kerala, and patches of the same are represented along North Karnataka coast, called as *Khazanas* and in Goa the *Ghazani* lands. The extent of the rice cultivation utilizes mostly the salt tolerant indigenous varieties. Problems of low yield, low market prices are the major reasons for the dwindling of this practice.

The interesting phenomena of mud banks along the Kerala coast, especially along Quilon coast. They are temporary to semi-permanent formations resulting in the increased productivity of the coast. The major threats for the degradation of the coastal diversity identified to be due to the increased population, increased dependency on the coastal resources, commercialization of fisheries and amenities of the coast for being the suitable flat form for the industrial developments.

The meeting was closed for that day after analyzing the existing state of biodiversity. On 24th the discussions were focused on finalizing the actions. Initially the major areas of concern were identified and following to that the actions was developed. The prioritisation of these actions was made only after the opinions from the members.

18. DISCUSSION MEETING ON NBSAP- WEST COAST ECOREGION FOR FINALISING THE ACTION PLAN - On 18th and 19th April 2002 at NIO, Goa

Members Present

Prof. M. N. Madhyastha, Co-ordinator, West Coast ecoregion, Mangalore University
Dr. M. V. M. Wafar, Senior Scientist, NIO, Goa
Dr. Rekha P.D. Mangalore University

Based on the opinions and suggestions from the concerned people, coastal stakeholders, experts, working group members the committee met at NIO, Goa to finalise the west coast action plan. And the strategies and actions were reviewed.

19. GUJARAT COAST MEETING on 9th - 11th August 2002

Gujarat coast has its own unique biodiversity characteristics spread along three subdivisions namely,

- Gulf of Kachchh
- Gulf of Kambhat
- Sourashtra coast

And southern to Surat is the Konkan coast.

The coastal communities along Bet Dwarka Okha and Poshitra were met in public hearing organised by the co-ordinator separately along these three coastal villages. About 50-100 coastal inhabitants actively participated sharing their views on biodiversity conservation and problems related to fishery resources. And the information gathered during the meeting is briefly presented here.

- India's largest saltpans are located along the Gujarat coast.
- In addition to salt production the brine is transported to other industries for the selective extraction of Bromine etc. (e.g. Tata Salt, Mithapur)
- Due to the collective efforts, the mangrove cover along the coast has increased. Mostly the species from southern West coast were used for mangrove revegetation (afforestation)
- Each of the oil tanker ship is checked before entering the Reliance Mangrove Park at marine National Park area
- Precaution is taken to avoid ballast species invasion by de-ballasting the tank before entering the Indian territorial waters.
- The coral reefs are illegally extracted for construction materials and the habitat of corals are being destructed severely.

Status of the Fishing industry along the coast

Since five years there is a drastic decline in the fish catch and many of the fisherfolk are looking towards alternate income. 90% of the boats are purchased through moneylenders. Because of the lack of funds in the existing co-operative societies, they cannot support the fisherfolk

Discussion with one of coastal resident, Shri Hemba Vagher, Ex Sarpanch revealed about the livelihood pattern of the traditional fishermen. According to him the small-scale fishermen are strict in obeying the fishery regulations such as fishing holidays etc., whereas the trawlers follow more destructive fishery. Hence the outlook of the livelihood depends (small scale fishing) and the profit-oriented trawlers towards natural resources are entirely different. Along the coast earlier he used to observe a zonation in the fish distribution (Sharks, Seer fish) around bet Dwarka, whereas this pattern is disturbed presently.

Awareness camps for the enforcement of rules and regulations for the fishermen communities though organised with concern, the foreign trawlers (outside boats) do not follow these and continue destructive fishing. Among the fishermen only 10% own boats (100 boats - all mechanised) There are a few fisherfolk involved in pearl oyster harvesting. Crabs, conches etc., are professionally harvested for marketing. Fisher women are engaged in selling and house keeping and looking after the family. These women get subsidy during the non-fishing season by the cooperative fisher women society

Following recommendations were suggested in the meeting

- Awareness program for fishing period
- Mesh size regulation
- Enforcement of fishing holidays
- Intervention of coast guard with traditional fishermen
- Problem solving for use of chemicals
- Constant income of 100-500/day
- Checking the industrial effluent discharges into coast.
- Mangrove afforestation to protect the shoreline.

20. LAKSHADWEEP VISIT on 20th - 21st October 2002

Lakshadweep is a unique group of islands with magnificent coral reefs and ornamental coral fishes. Though information on the status of Lakshadweep islands had been collected from various sources, the co-ordinator arranged a field visit to islands of Lakshadweep on 19th, 20th and 21st of October, at Kavaratti Island with the help of Dr. M. V. M. Wafar (TPCG member) for interaction with the community, government officials and NGOs.

Interaction with Government officials:

Discussion with Shri Pukh Raj Bumb, Secretary (Environment and Forests Dept.), Dr. M.S. Sayed Ismail Koya, Dr. Pukoya and Dr. K. Sayed Ali on the biodiversity aspects of Lakshadweep group of Islands. It is revealed during the discussion that though Bitra Island has been declared as bird sanctuary but not treated as protected area in any report.

Asst. Director of Fisheries Dr. C. G. Koya stated that regulation of poaching is difficult due to the lack of infra structure such as Speed boats. Alternate livelihood such as seaweed harvesting is uneconomical. Local communities are highly concerned about the resource conservation.

Interaction with fisherfolk:

Two types of fishing are practiced, - Lagoon fishing and open water fishing. In addition ecofriendly traditional practices such as pole and line methods are practiced and are not destructive to the habitat. In general, the traditional fishing operations are not similar to that of the mainland. The catch composition is diverse between each of the islands indicating highly diverse fishery resources. Lack of marketing facilities affects the livelihood of these fisherfolk. 60% of the Island population is occupied with fishing as main profession and the rest depend on agriculture (coconut plantation). Only very limited number of (~125) fishing boats in the lagoon and are mechanised. Poaching by mainlander fishers and Sri Lankan vessels are common. Meeting with traditional fisherfolk, which exposed various aspects of the coastal environment. Mr. Mohammad Hanifa (a traditional fisherman) opined that fish catch composition has changed in the lagoon and the catch also depends on the tidal patterns. Other participants included the president of Fisherfolk welfare association who informed that there is no registration of the fishing boats and felt necessary by them. The fishing holidays are followed from May 15th to September 15th, in addition every Friday and during Holy Ramzan month also no fishing operations were made.

Interaction with NGOs:

Meeting also extended to discuss with members from Ixora and Northern Brothers Club (both NGOs), Members from the Northern brothers club revealed that due to lack of technological introduction the yellow fin tuna could not be successfully utilised. They also opined that traditional activities such as food practices, folklore etc., need to be promoted with due concern for attracting more tourists. Formulation of Tourism perspective plan for 5 years has made without consulting the communities.

**21. REVIEW MEETING ON THE WEST COAST FINAL REPORT HELD AT
N.I.O. GOA on 26th – 27th October 2002**

The working group members reviewed the final report at N.I.O. Goa in a discussion session held for the purpose. Prof. R. Damodaran (Dean of Science Faculty, Cochin University, Kochi), Prof. Mohan Joseph (Director, CMFRI), Dr. H. V. Joshi (CSMCRI, Bhavnagar), Dr. G. N. Kulkarni (College of Fisheries, Ratnagiri, Maharashtra), Dr. Prasanna Yennavar (GEER Foundation Gujarat), Dr. M. V. M. Wafar (N.I.O., Goa), Prof. M. N. Madhyastha and Dr. Rekha P. D. (Dept. Biosciences, Mangalore Univ.) were present. The comments and suggestions on the final draft report have been incorporated in the Final report.

APPENDIX - II

Some of the Geologically important sites along West coast

Malpe Islands- Are group of Islands lying about 6km off the west coast of Karnataka near Malpe. (13°N lat, 74° 42'E long)

- Coconut Island
- North Island
- Darya Bahadurgah Island
- South Island.

The important occurrence of volcanic rocks in these islands lies in the fact that it occurs nearly 300km south of nearest outcrop of Deccan lavas. The main land close to these islands does not show any exposures of volcanic rocks. Petrographically, the rocks exposed in the islands are not basalt, but are a series of acidic rocks, dacite, rhyolite and granophyres. These columnar jointed areas are particularly well seen in the coconut island. This spot has been declared as a ***NATIONAL GEOLOGICAL MONUMENT***.

The dykes in coastal Karnataka, run parallel with the west coast, they appear to be connected with the rifting event that gave rise to the Arabian Sea. In the tertiary Era, sedimentary formation belonging to the ecocene and upwards occurred. Although covering large parts of the region they are very poorly represented in the peninsular. They are mainly found along the coastal regions of Kuala and Konkan. The Karnataka coast on shore is however devoid of any appear able thickness of tertiary sediment.

Recent sediment along the west coast

Rich deltas found along the east coast are not developed in the west coast, since most of the west flowing rivers have a short course and there is little sediment load for them to build significant deltas on their own. Headlands, bays and lagoons modify the somewhat straight coastline along the west coast at regular intervals. These are evidence of frequent oscillations in levels due to neotectonics as to changes in sea level. The coastal belt is a plain and marine denudation covered by thick sheets of detrital and residual laterite.

The coastline is rocky in parts and often has long structures and bars of sand that line the backwaters and lagoons. The coastal belt is covered by either beach sands close to the coast as by laterite.

The occurrence of unusual coast – parallel bunds in some of the rivers of D K are ascribed to the existence of longitudinal faults. Such areas also appear to be areas of concentrated sea erosion. Drilling carried out at the excavation of the New Mangalore Port revealed layers of black coloured mud overlain by yellowish brown clay. The black clay was saline, with the yellowish brown clay occurring more frequently and is found all along the banks of rivers and backwaters. This clay is extensively used for making tiles, for which Mangalore is famous.

In the intervening depressions sedimentation was initiated with the accumulation of sediment since the Upper Paleocene. The maximum thickness attained was as much as 3500-4000m of tertiary sediment. Kori-Comorin Ridge and Laxmi-Laccadive Ridge.

Further North in Bombay region, the mid-ecocene carbonate sediments have acted as significant reservoirs for hydrocarbons. The geographical features of the western offshore region and west of Karwar and Mangalore is yet to be worked out in detail.

Neotectonic changes onshore

A line connecting Mulki on the west coast and Pulicat Lake on the east coast close to 13°N constitutes a major drainage divide. The nearly East-West trending ridge is characterised by high gravity, relatively thinner crust and is subjected to minor earthquake shocks. The coast line particularly on the west coast is highly dissected forming a series of beach ridges indicating recent uplift of land.

Changes in the sea level

St Mary's Island off Malpe has wave-cut platforms at different elevations, the highest being at 10 m above present day sea level. The other terraces are approximately at 6m, 3m and 1.5m indicating a relative fall in sea level or rise in land.

Peat deposition in the inner shelf off Karwar:

Recently a deposit of peat covering area of more than 139km² indicated with sediments has come to light located at the inner shelf off Karwar-Kumta. Peat occurs at a water depth of 24m, these peat layers indicate the presence of abundant plant life, obtained from the mangroves. The present wave dominated high energy environment does not indicate favourable conditions for mangrove development. Future studies are likely to give more light on this interesting occurrence of peat off Karwar.

Ancient and rare rock formations which need protection include the following

1. The Trondhjemitic Gneiss belt on Goa-Karnataka border near Anmod village, in the central Western Ghats. A specimen is displayed at geology Museum of Goa University. Rubidium-Strontium isotopic dating method has determined the age of the rock to be 3.6 billion years making this THE OLDEST ROCKS IN THE INDIAN SUB-CONTINENT. Before quarrying destroys this belt it has to be demarcated and preserved because these rocks represent the heart of the Super continent Pangea.

2. The Canacona granites - These are typical 2600 million old rocks found in Canacona and well exposed at Palolem beach.

3. The Benaulim feldspathic gneiss -At Benaulim-Salcete there is a small exposed rocky outcrop, which looks like a rocky island surrounded by paddy fields all around them. Locally these rocks (covering about 5000 sq.mts.) are known as "Pandavanchem Tolop" or the "Rocks of Pandavas".

4. The massive granite cliffs at Baga-Bardez -This is a peculiar cliff eroded by wave action below the retreat of Jesuit fathers near the famous Baga Beach. There is a deep canyon formed due to vertical split in the rock-this canyon is locally known as -"**Chora-baim**" (well of the thieves/sea-pirates) because the legend says that the pirates used to hide their booty in this trench.

5. The windblown cliffs -These are found at Vagator, Aguada, Cabo-Donapula, Saint Jacinto Island, Betul, Canaguinim, Khola. These have stressed habitats and peculiar wind blown "**bonsai**" vegetation.

6. Seaside arch and caves -Notable are-the majestic rock arch near Keribeach-Pernem taluka and the cavern below the arch, the cave near Baga, the cave behind Siridao-Tiswadi's Jesus Nazareth chapel.

Compiled by Dr. Rekha P.D.

APPENDIX - IV

Short Note on The Coastal Regulation Zone Notification

The notification came in to force with effect from 19.2.1991

Under Sec. 3(1) and section 3(2)(V) of E(P) Act 1986 and rule 5(3)(d) of E(P) Rules 1986

The notification declares Coastal Stretches as Coastal regulation Zone (CRZ) and regulates activities in CRZ area.

What is CRZ?

It is 1. Coastal stretches of seas, Bays Estuaries, creeks, Rivers and Back waters which are influenced by tidal action (in the landward side) upto 500m from HTL

2. The land between high tide line and low tide line
3. The distance upto which the tidal effect of sea is experienced in rivers, creeks and backwaters

The HTL is the line on the land upto, which the highest water line is reached during spring tides

In case of rivers, creeks and backwaters, the distance from high tide line applies on both sides and shall not be less than 100m in case the width of river, creeks and backwaters is more than 100m. If the width of rivers, creeks and backwaters is less than 100m, then the distance from HTL on either side is limited to the width of the river, creek and backwaters under consideration.

Coastal regulation Zone is classified as CRZ-1, CRZ-II, CRZ -III and CRZ - IV for the purpose of regulation developmental activities.

CRZ-I

CRZ – I areas are of two types.

- i. Areas are ecologically sensitive and important, such as national parks/marine parks, sanctuaries, reserve forests, wildlife habitats, mangroves, corals/coral reefs, areas close to breeding and spawning grounds of fish and other marine life, areas of outstanding natural beauty/historically/heritage areas, areas rich in genetic diversity, areas likely to be declared by the central government or the concerned authorities at the State/Union Territory level from time to time.
- ii. Areas between Low tide Line and High tide Line
CRZ - I (i) – No new construction is permitted within 500m of HTL. (ii) – No construction activity except facilities for carrying treated effluents and waste water discharges into the sea and for carrying sea water

CRZ – 1 (i) – No new construction is permitted within 500m HTL. (ii) – No construction activity except facilities for carrying treated effluents and waste water discharges into the sea and for carrying sea water, for cooling purposes, oil gas and similar pipelines and facilities essential for permitted activities in the area between High Tide line and Low tide Line

CRZ - II

CRZ II areas include those areas that have already been developed up to or close to the shorelines. For this purpose “developed area” is referred to as that area within the municipal limits or on other legally designated urban areas which is already substantially built up and which has been provided with drainage, approach roads, water supply, sewerage mains.

The Substantially built up area means area, which is 50%, built up and has 50% buildable plots.

In the CRZ- II areas buildings are permitted only on the landward side of the existing roads or proposed roads approved in CZMP or on the landward side of the existing authorised structures and subjected to local town and country planning regulations and existing norms of FSI (Floor Sloping Index) and FAR (Floor Area Ratio)

No permission shall be given on the landward side of any new roads, which are constructed on the seaward side of the existing roads unless the road is approved by CZMP

Reconstruction of authorised buildings is permitted subject to existing FSI and FAR and design and construction of building shall be consistent with the surrounding landscape and local architectural style

CRZ - III

CRZ –III areas that are relatively undisturbed and those, which do not belong to either Category - I or II. These will include coastal zone in the rural area (developed and undeveloped) and also areas within Municipal; limits in other legally designated urban area, which are not substantially built up.

In CRZ - III - area upto 200 m from HTL on landward side is earmarked as 'No development zone' No construction will be permitted in this zone except repairs of existing authorised structures. Construction of facilities for water supply, drainage and sewerage for requirements of local inhabitants is permitted. Agriculture, horticulture, gardens, pastures, parks, play fields, forestry and salt manufacture from seawater are permitted.

Development of hotels, beach resorts between 200m and 500m of HTL is permitted.

Construction/reconstruction of dwelling units between 200m and 500m of HTL is permitted so long as it is within the ambit of traditional rights and customary uses such as existing fishing villages and gaothans.

Construction/reconstruction not more than twice the number of existing units is permitted.
Total area covered on all the floors shall not exceed 33% of the plot size.

Overall height of the construction shall not exceed 9m and only two floors (Ground and first) are permitted.

CRZ -IV

This includes coastal stretches of Andaman and Nicobar Islands, Lakshadweep and small islands, except those designated as CRZ -I, CRZ - II or CRZ - III.

For permitting construction of buildings, the distance from the High Tide Line shall be decided depending on the size of the islands. This shall be laid down for each island, in consultation with the experts and with approval of the Ministry of Environment and Forests keeping in view the land use requirements for specific purposes vis-à-vis local conditions including hydrological aspects, erosion and ecological sensitivity.

If buildings are permitted within 500m of HTL these shall not have more than 2 floors. The total covered area on all the floors shall not be more than 50% of the plot size. The height of the construction shall not exceed 9m. Designs and construction of the buildings shall be consistent with local style and architecture and surrounding landscape.

Corals and sand from beaches and coastal waters shall not be used for construction and other purposes.

Dredging and under water blasting in and around coral formations shall not be permitted. In some of the islands coastal stretches may be classified into the CRZ - I, II, and III with prior approval of Ministry of Environment and Forests and in such designated stretches the appropriate regulations given for the respective categories shall apply.

CRZ notification prohibits the following activities

1. Setting up of new industries and expansion of existing industries
2. Manufacture or handling or storage or disposal of hazardous substances
3. Setting up of fish processing units
4. Setting up of effluent treatment plants

5. Discharge of untreated effluents
6. Dumping of city waste
7. Dumping of ash and other wastes from thermal power stations
8. Land reclamation, bunding disturbing the natural course of seawater other than for those activities listed in the notification
9. Mining of minerals other than rare minerals
10. Harvesting of ground water within 200 meters of HTL
11. Construction in CRZ – I (i) area and CRZ – I (ii) other than specified
12. Altering sand dunes

The following are permitted activities

1. Foreshore requiring essential facilities such as ports, harbours etc.
2. Intake and discharge of seawater and transport mechanism for thermal power stations.
3. The following are the activities, which require no permission but are permitted in CRZ – III areas such as agriculture, horticulture, gardens, pastures, parks, play fields, forestry, salt manufacturing.
4. Hotels and tourism projects can be developed as per the guidelines laid in the notification

APPENDIX – VII

Some of the Ongoing Biodiversity related Projects

Research projects, pertaining to west coast of India, conducted by National Environmental Engineering Research Institute since 1987

Completed Projects

SN	Title of the Projects	Sponsor
1	Environmental Impact Assessment of Proposed Developments at Gandhar Oil Field, Gandhar, Gujarat	ONGC, MRBC, Mumbai
2	Environmental Impact Assessment of Proposed Mangalore Refinery and Petrochemicals Limited	MRPL, Mangalore
3	Wastewater Management for Oil and Natural Gas Commission's Balol/Lenwa Oil Fields for Produced Water at Mehsana, Gujarat	ONGC, MRBC, Mumbai
4	Environmental Impact Assessment incorporating quantification of pollution loads due to existing and proposed third gasification unit at GNFC, Gujarat	GNFC, Gujarat
5	Environmental Impact Assessment of Proposed Developments of Bombay High Oil gas Fields of ONGC in Bombay Offshore Basin	ONGC, MRBC, Mumbai
6	Environmental Impact Assessment of Proposed developments of (Phase I & II) at Gandhar Oil Field, Gujarat	ONGC, MRBC, Mumbai
7	Environmental Impact Assessment of proposed developments of Heera-Ratna oil/gas field in West Coast offshore area	ONGC, MRBC, Mumbai
8	Environmental Impact Assessment of proposed developments of Tapti oil/gas field in West Coast offshore area	ONGC, MRBC, Mumbai
9	Environmental Impact Assessment of NGL Fractionation and Dearomatisation Units at Gas Processing Complex, Hazira, Surat, Gujarat	GSPC, Gujarat
10	Wastewater management for produced water from Santhal oil field of ONGC, Mehsana, Gujarat	ONGC, MRBC, Mumbai
11	Wastewater management for produced water from Sobhasan oil field of ONGC, Mehsana, Gujarat	ONGC, MRBC, Mumbai
12	Environmental Impact Assessment of phase III developments at Gas processing complex, Hazira, Surat, Gujarat	GSPC, Gujarat
13	Environmental Impact Assessment of additional facilities of Bombay refinery of BPCL, Bombay	BPCL, Gujarat
14	Environmental Impact Assessment of proposed Desalting plant at Navagam, Gujarat	ONGC, MRBC, Mumbai
15	Preparation of environmental appraisal reports for development of S-1 sand and R-15 fields of ONGC, BRBC, Bombay	ONGC, MRBC, Mumbai

16	Environmental Impact Assessment of proposed grass-root refinery near Bina and Crude oil terminal near Jamnagar	BPCL, Mumbai
17	Environmental Impact Assessment of proposed west coast refinery of HOPCL at Deoghar, Ratnagiri, Maharashtra	HOPCL, Mumbai
18	Rapid and Comprehensive EIA studies for ESSAR refinery at Vadinar, Gujarat	ESSAR, Mumbai
19	Environmental Impact Assessment of lube base stock augmentation facilities at Bombay refinery of HPCL	HPCL, Mumbai
20	Environmental Impact Assessment of <i>in situ</i> combustion plant at Balol and Lenwa fields in Mehsana, Gujarat	ONGC, MRBC, Mumbai
21	Rapid Environmental Impact Assessment for Pipavav Port Terminal, Bhavnagar, Gujarat	Gujarat Pipavav LNG company Ltd.
22	Selection of outfall location in sea for the discharge of wastewater generated, for Ankleshwar, Panoli and Jhagadia Industrial Estate, Gujarat	GIDC, Ankleshwar, Gujarat
23	Rapid and Comprehensive EIA studies for development of Hazira gas field GSPC, Gujarat	GSPC, Gujarat
24	Environmental monitoring around booster stations along cross-country pipeline for transportation of crude oil from Vadinar COT to Bina refinery	BPCL, Mumbai
25	Environmental Impact Assessment for expansion of refinery capacity at Mangalore refinery	Mangalore refinery Ltd., Mangalore
26	Preparation of Environmental Impact Assessment report for Gandhar Petrochemical Complex of IPCL, Dahej	IPCL, Vadodara, Gujarat
27	REIA for crude oil handling facilities on Shiyalbet near Pipavav Port of GPPL, Mumbai	GPPL, Mumbai
28	REIA/CEIRA for the Proposed expansion of Bromine plant at Khavda near Rann of Kachchh, Gujarat	Ballarpur Paper Mill, Mumbai
29	Evaluation of process wastewater treatment plant and floor wash treatment plant of HPCL, Mumbai	HPCL, Mumbai
30	IEE for proposed landfill point, pipeline and processing facilities for Natural gas at Hazira	GSPL, Hazira
31	Development of Assimilative Capacity Based Standards for discharge of Treated wastewaters in Amala Khadi	GPCB, Gujarat
32	EIA for proposed Port and LNG import terminal at Hazira	Shell India Ltd., Mumbai
33	EIA for Pipeline Modification in Bombay High Fields by ONGC, Mumbai	ONGC, MRBC, Mumbai
34	EIA incorporating quantification of pollution levels due to existing and proposed increase in the capacity of paints manufacturing plants at Ankleshwar, Gujarat	Asian Paints, Ankleshwar, Gujarat
35	EIA studies for proposed Transportation Corridor and other related facilities between ESSAR plant site and Hazira Port	ESSAR, Mumbai
36	Oceanographic water quality and modeling studies at west coast of Mumbai	Municipal Corporation of Greater Bombay, Mumbai
37	Environmental Impact Assessment studies for West Coast Refinery	Hindustan Oman Petroleum Co. Ltd., Mumbai
38	Risk assessment studies of proposed West Coast refinery of HPCL at Deoghar	Hindustan Petroleum Corporation Ltd., Mumbai
39	Integrated EIA for development of ONGC's oil/gas fields in west coast offshore area	ONGC, MRBC, Mumbai

40	Impact of aquatic farming and remedial measures in ecologically fragile coast areas in the state of Gujarat	Brackish Water Fish Farmers Development Agency, Valsad (Through Honb'le Supreme Court)
41	Impact of aquaculture farming and remedial measure in ecologically fragile coastal areas in the State of Kerala	Agency for Development of Aquaculture, Thiruananthapuram (Through Honb'le Supreme Court)
42	Risk Assessment of MOT Berth, Storage facility and Submarine pipeline of Mumbai Port Trust, Mumbai	Mumbai Port Trust, Mumbai
43	EIA incorporating pollution levels due to existing and proposed increase in the capacity of Acetic acid manufacturing plant at GNFC, Bharuch, Gujarat	GNFC, Bharuch, Gujarat
44	Determination of existing water quality status along west coast, beaches and seafronts of Mumbai	Municipal Corporation of Greater Bombay, Mumbai
45	Inspection of Aquaculture Farming and Remedial Measure in Ecologically Fragile Coastal Areas in the State of Karnataka	Department of Forests Ecology and Environment, Bangalore (Through Honb'le Supreme Court)
46	Inspection of Aquaculture Farming and Remedial Measure in Ecologically Fragile Coastal Areas in the State of Maharashtra	Department of Fisheries, Government of Maharashtra, Mumbai (Through Honb'le Supreme Court)
47	Studies on Aquaculture Farms in the Ecologically Fragile Coastal Areas in the State of Goa	Government of Goa, Panaji (Through Honb'le Supreme Court)
48	Rapid Environmental Impact Assessment of Proposed Exploratory Drilling at Deep Water Locations in Kerala-Konkan Basin of West Coast Offshore Region	ONGC, MRBC, Mumbai
49	Air quality monitoring studies in and around Cochin Port Trust Area	Cochin Port Trust, Cochin
50	Assessment of Spillage and other dust emission from ship unloader Cochin	FACT, Udyogmandal, Kochi
51	EIA due to proposed increase in the capacity of caustic chlorine plant of Search Chem Industries Ltd. at Jhagadia, Gujarat	United Phosphorus Ltd., Ankleswar
52	EIA incorporating quantification of pollution loads due to existing and proposed manufacture of an alternate product Devrinol in the existing Quinalphos (Technical) plant at Ankleshwar, Gujarat	United Phosphorus Ltd., Ankleshwar
53	Environmental Appraisal regarding Construction of Aerated Lagoons at four sites, viz. Versova, Malad, Bhandup and Ghatkopar in Mumbai	Municipal Corporation of Greater Bombay, Mumbai
54	Comprehensive EIA for Cochin Refineries Ltd., Cochin	Cochin Refineries Ltd., Kochi
55	Aquatic baseline study for thermal power station near Dahanu	Bombay Sub-urban Electricity Supply Ltd., Mumbai
56	Rapid EIRA for the Dyes Complex of M/s BASF India Ltd., Mangalore	BASF India Ltd., Mangalore
57	Integrated rapid EIRA for Mangalore Refinery and Petrochemicals and LPG import facilities at Mangalore	Hindustan Petroleum Corporation Ltd., Mumbai
58	Carrying Capacity Study of Tapti Estuary	Ministry of Environment & Forests, New Delhi
59	Rapid EIA for Grasim's Petrochemical Plant at Mangalore	Indian Rayon & Industries Ltd., Mumbai

60	Critical Evaluation of Master Plan for Dahanu Area from Environmental Angle in the context of Notifications of GOI dated 19 th February and 20 th June 1991	Government of Maharashtra, Mumbai (through Honb'le Supreme Court)
61	Environmental Impact and Risk Assessment for the proposed Expansion of the Dyes Complex of BASF India Limited, Mangalore	BASF India Limited, Mangalore
62	Rapid EIA for Expansion Plans (22 MMTPA Refinery) of MRPL at Mangalore	Mangalore Refinery & Petrochemical Ltd., (MRPL), Mangalore
63	Study on water quality problem of Lakshadweep	Ministry of Rural Development, New Delhi
64	Preparation of EMP based on REIA for the two islands (Kavaratti & Minicoy) at Lakshadweep	Lakshadweep Harbor Works, Calicut
65	Studies on Air, water and Noise pollution at Agathi island (Lakshadweep)	Union Territory of Lakshadweep, Kavaratti
66	REIA for the Proposed Breakwater Construction on Eastern Side of Kavaratti Island at Lakshadweep	Lakshadweep Harbor Works, Kavaratti
67	REIA of the Proposed Embarkation on Eastern Side of Agathi Island at Lakshadweep	Lakshadweep Harbor Works, Kavaratti
68	Process Package for Treatment & disposal of Hazardous waste Sludge at Kerala Minerals and Metals Ltd. (KMML), Kollam, Kerala	Kerala Minerals and Metals Ltd. (KMML), Kollam, Kerala
69	Environmental Impact Assessment of Goshree Project, Kerala	Government of Kerala, Thiruvananthapuram (Through Honb'le Supreme Court)
70	Environmental viability of 1000 MW Coal based Thermal Power Plant of Mangalore Power Company (with Cojentrix as lead partner) at Nandikur, Karnataka.	Govt. of Karnataka, Bangalore (Through Honb'le Supreme Court)
71	Environmental viability of Bandra-Kurla Complex, Maharashtra.	Govt. of Maharashtra (Through Honb'le Supreme Court)
72	Environmental viability of Sanghi Jetty/Cement Project, Kutch, Gujarat.	Govt. of Gujarat (Through Honb'le Supreme Court)
73	EIA for redevelopment proposed in Mumbai High North for optimal exploitation of hydrocarbons from L III reserves in West coast offshore region	ONGC, MRBC, Mumbai
74	EIA for pipeline modification proposed by ONGC in west coast offshore region	ONGC, MRBC, Mumbai
75	EIA for proposed ship breaking yard at Pipavav port, Gujarat	Pipavav Ship Dismantling & Engineering Ltd.
76	EIA for proposed pipeline & landfall station for transportation of regassified LNG from Pipavav port terminal to Hazira region	British Gas Holdings Ltd., UK
77	Carrying capacity based developmental planning of Greater Kochi Region	MoEF, New Delhi
78	Rapid EIA for proposed expansion of Methylamine and Dimethyl formamide project of RCF at Thal	RCF Ltd., Mumbai
79	Comprehensive risk assessment of LPG storage facility of RCF Ltd. at Pir Pau, Mumbai	RCF Ltd., Mumbai
80	Comprehensive Risk Assessment of 5000 MT ammonium storage facility at Zuari Industries Ltd., Goa	Zuari Industries Ltd., Goa

81	EIA for proposed expansion plan at Jhanov-Gandhar Gas Power Project, Stage II (650 MW)	NTPC, Jhanov
82	Evaluation of water quality at Bandra influent pumping station	Municipal Corporation of Greater Mumbai, Mumbai
83	Grit analysis for design of outfall at Worli and Bandra	Municipal Corporation of Greater Mumbai, Mumbai
84	BSDP Stage II sewage sampling programme for city area	Municipal Corporation of Greater Mumbai, Mumbai
85	Toxicity testing for EDC-11-95 and drilling mud-Tapi oil well	Enron Oil and Natural Gas Ltd.
86	Determination of post commissioning water quality status of west coast, beaches and seafronts around Worli Outfall	Municipal Corporation of Greater Mumbai, Mumbai

I. Ongoing Projects

SN	Title of the Projects	Sponsor
1	State environmental action programme: Coastal and Marine Environmental, Gujarat	Gujarat Ecology Commission, Vadodara
2	Calibration and validation of initial dilution model used for long sea outfalls for sewage disposal using radiotracers and predication of its movement in the coastal region of Mumbai	Department of Atomic Energy, Mumbai
3	Thane creek water quality related study for assimilative capacity in modeling	Municipal Corporation of Greater Mumbai, Mumbai
4	EIA for Seismic survey and exploratory drilling in transition zone along coastal stretch of CB/OS-2 block in Gulf of Khambhat	Cairn Energy India Pvt. Ltd., Chennai
5	EIA for 5 NELP Blocks in East Coast and 2 NELP Blocks in the West Coast Offshore Areas of India	ONGC, MRBC, Mumbai
6	Environmental impact assessment for Proposed 3D Seismic Survey in Saurashtra Offshore and Cauvery	Oil India Ltd., Rajkot
7	EIA for hydrocarbon exploration in CB/OS-2 block along the coastal stretch in Surat District	Cairn Energy India Pvt. Ltd., Chennai
8	EIA for proposed development in Bombay High and Neelam Oil Fields in Western Offshore region of India	ONGC, MRBC, Mumbai
9	EIA and preparation of Environment Management Plan for 14 NELP Blocks	ONGC, MRBC, Mumbai
10	EIRA for petroleum products pipelines from Jamnagar to Bhopal, and Goa to Hyderabad	Gas Transportation & Infrastructure Ltd., Mumbai
11	EIRA of proposed expansion Paras Thermal Power Station of MSEB	MSEB, Mumbai
12	EIRA of proposed 3D Seismic survey in Saurashtra	Oil India Ltd., Rajkot

	Offshore and Cauvery Basin	
13	EIA and EMP for Seismic programme and drilling operations for exploration of Block no. CB-ONN-2000/2(Surat Block)	NIKO Resources Ltd., Vadodara
14	EIRA for existing and proposed projects in refinery complex at Motikhavdi, near Jamnagar, Gujarat	Reliance Petroleum Ltd., Jamnagar
15	EIRA for proposed Mumbai Refinery Modernization project	HPCL, Mumbai
16	EIRA for proposed transportation corridor & other related facilities between ESSAR plant site & Hazira port	ESSAR Industries Ltd., Mumbai
17	EIRA for proposed gas grid in Gujarat State	Gujarat State Petronet Ltd., Gandhinagar
18	Running of DIVAST Model for marine outfalls-20 runs	Municipal Corporation of Greater Mumbai, Mumbai
19 & 20	Proposed International Symposium on Fish for Nutritional Security. Proposed Training Programme in Coastal Bioresource Development and Management.	Indian Fisheries Association, CIFE, Mumbai