

Mangrove Mapping and Conservation

1. Background:

Mangroves are plant communities of tropical and subtropical inter tidal coastal zone. Mangroves are found in 123 countries and territories of tropics and subtropics and a cover a total of the 152, 360 km² (Spalding *et .al*, 2010). Mangroves are ecologically and functionally referred as 'silent green sentinels' of the coasts. They are found only in the tropical and subtropical regions, mainly between 30⁰N and 30⁰S. They are growing along the land-sea interface in bays, estuaries, lagoons and backwaters. Mangroves are variety of plant species with several adaptations to flooding and saline environment. Globally, there are 60 mangrove species in 27 genera and 20 families. Considering the importance of the mangrove ecosystem there was need to create the baseline data for conservation measures and practices especially to know the mangrove cover throughout the district. With the assistance of Maharashtra Remote Sensing Applications Centre (MRSAC) under GoI UNDP GEF Sindhudurg Project mangrove cover of District was mapped with the help of remote sensing data. Study also included baseline data generation for propagation of rare, endangered and threatened species and restoration of degraded mangrove habitats on the basis of data generated.

Sindhudurg coast is the richest in terms of mangrove species diversity in Maharashtra covering area of around 6940Ha. Some of these species are so rare that they are represented only by a few trees. However, there is a gap in the existing baseline data of mangrove forest cover. Considering the invaluable service that the mangrove ecosystem provides in terms of protection to the coastline as well as acting as a nursery ground for marine species, there is an urgent need to conserve mangrove species especially rare, endangered and threatened (RET) mangrove species. Mangrove habitats are thus degrading very fast. All kind of pressures on estuarine ecosystem lead to severe losses of mangrove species. With the technical assistance of Shivaji University, mangrove genebank was establishment under GoI UNDP GEF Sindhudurg Project. Considering the current destruction rate of mangrove habitat, the present work was initiated to conserve the habitats as well as important sites of rare, endangered mangrove species. Establishment of field gene bank is an urgent step. Main objectives of the project were

- a) Regeneration and conservation of RET mangrove Species (*Cynometra iripa* Kostel, *Rhizophora apiculata* Lamk, *Kandelia candel* L. Druce, *Heriteria littolaris*, *Xylocarpus granatum* Koeing, *Bruguirea gymnorhiza* L. etc) and associated species (*Cerbera odollum*, *Callophyllum inophyllum*, *Eugenia* sp., ect..) in Sindhudurg District.
- b) Standardisation of nursery techniques through field trials and establishment of shade house.
- c) Capacity Building of the forest department and local communities in conservation of these species.

With the help of Mangrove Cell, Maharashtra Forest Department plantation was also carried out within the degraded areas.

2. Technical parameters:

With the help of remote sensing satellite data mangroves and creeks were mapped.

The project has primarily focused upon to deliver knowledge at all levels of localities and forest staff (Guard and RFOs) to strengthen the knowledge base. The project is a combination of social, natural science and methodology which aims at gaining insights into ecosystem development. Field gene bank is a method of establishing plants for the conservation of genes. It is a major component of a complimentary strategy for the conservation of genetic resources. It is an *ex-situ* method where genetic variation is maintained away from its site/habitat. *Ex-situ* conservation can be achieved by various methods such as, seed banks, field gene banks, seedling banks.

First step is to collect and conserve the Germplasm of rare, endangered and threatened species. Conservation of Germplasm can be achieved by *In-situ* and *Ex-situ* methods. *In-situ* method of conservation of Germplasm involves its conservation at natural localities by establishing the Biosphere reserve/Natural parks or Gene sanctuaries. *Ex-situ* conservation involves the conservation of Germplasm away from their natural habitat. This can be achieved by establishing the seed or seed banks/gene banks/plant banks/shoot tip banks/cell or organ banks/DNA banks.

In second step of the project both *Ex-situ* and *In-situ* trials were attempted at various localities viz. Achara, Mithbav sites for *In-situ* experiments and Botanical garden of Shivaji University Kolhapur as well as Parwadi, Achara site of Sindhudurg district.

After collection of germplasm various storage and propagation techniques were attempted for better results. For RET mangrove species both *In situ* and *Ex situ* trials were performed.

Mangrove Cell, Maharashtra Forest Department had also developed nursery and carried out plantation in the degraded areas.

3. Impact:

Mangrove areas were mapped on village level depending upon the species and distribution like dense mangroves, sparse mangroves, mudflats, salt pans, waterbody, creek, etc...

Capacity Building programs were conducted for Forest Department staff and locals to make them understand the importance of RET species, conservation practices for RET Species, nursery development, etc...

1st training course was organized in the month of July (22nd and 24th July 2014) for 14 Forest Department staff participated and the topic was Identification of rare, endangered and threatened mangrove species

2nd training course was organized on 19th and 20th September 2014 on Nursery techniques for 15 Forest staff were trained.

3rd training course was organized in Achara on 15th Nov 2014 wherein 12 forest staff participated and 6 sites were visited and mangrove species and associates were studied thoroughly.

4th training was conducted in Vengurla with the topic Mangrove and Fishery for local fishing community.

5th training program was conducted for Navanagar, Ratnagiri it was about awareness generation about mangrove species and 20 participants took active participation.

6th program was conducted in Botany Department of Shivaji University Kolhapur on 16th to 17th Oct 2015 on Mangrove Plantation techniques

7th training program was conducted in Devgad on Mangrove ecosystem- Coastal lifeline wherein local fishing community and students participated in the training.

Germination techniques were standardized for RET mangrove species viz., *Xylocarpus granatum*, *Heritiera littoralis*, *Cynometra iripa* etc. and different techniques by using culture media were suitable for *Bruguiera gymnorrhiza*, *Rhizophora apiculata*, *Cerbera odollum* etc..

Total 98,000 saplings were prepared out of 23 species and 15000 saplings were transplanted in the mangrove degraded areas.

Publication of a procedural manual (Bilingual English and Marathi) on the protocol for raising saplings of each of the mangrove and associated species. This will include efficacy of different techniques (quantitative & qualitative) and unit price, based on the field trial results.

- a) Mangroves of Maharashtra: 500 nos.
- b) Mangrove associates along the west coast of Maharashtra: 500 nos.
- c) Mangroves and bioresources along the west coast of Maharashtra: 2000nos.
- d) Booklet published on Regeneration techniques in Mangroves: 500 nos.

Mangrove Cell carried out plantation in the area more than 17Ha during September to December 2013. Around 75000 number of sapling planted which included species viz., *Rhizophora mucronata*, *Rhizophora apiculata*, *Ceriops tagal*, *Bruguiera gymnorrhiza*, *Avicennia marina*.

4. **Potential for replication:**

Conservation of Mangrove ecosystem is important to balance is environment. Now a days mangroves are degrading because of pollution, urbanization, destruction of mangroves, etc...

So conservation of germplasm of RET species and plantation of mangroves species in degraded areas will surely help in restoration of mangrove areas.

5. **Lessons learnt:**

Availability of suitable mangroves plantation areas were less more precisely government land availability was less as. In case of few species saplings were raised in fresh water in Kolhapur District immediate after planting in coastal district mortality was found. So sapling should be raised in nearby area or in the natural habitat.