CHAPTER VII

SUMMARY
CHAPTER VII
SUMMARY

Coastal ecosystems such as mangroves, seaweeds, seagrasses, sanddunes, coral reefs etc are critically important because of their uniqueness, rich biodiversity, productivity and ecological as well as economic importance. In the International arena” Critical Habitat” is a term used in the Endangered species Act referring to the specific areas that contain physical or biological features essential to the conservation of a threatened or endangered species. However, these ecosystems are complex, ecologically sensitive and exceedingly valuable areas that are under enormous threats.

Marine critical habitats, which include both non-living and living components, is a fragile balanced pattern easily affected by its neighbouring watershed landward and open or high sea, seaward. The coastal marine ecosystems are disturbed and threatened encountering several problems like pollution, erosion, storm surges, siltation and anthropogenic pressures.

There are constantly increasing human pressure of various kinds to exploit these critical habitats/ ecologically sensitive ecosystems and their resources for multiple economic activities. Critical habitats which have been found to be essential for the conservation of the biota and which may require special management consideration or protection. Even though some of the areas are
undisturbed, hence there is urgent need to protect, conserve and manage both the disturbed and undisturbed areas for their sustainable uses. A number of coastal areas along the central west coast of India are rich in biodiversity and have uniqueness with regards to the flora and fauna that needs to be preserved as live natural heritage. These sites can serve as centers for education and research, recreation, eco-tourism etc. The economically important flora and fauna can be maintained as "germplasm" for conservation purpose. The sensitive ecosystems were classified in the present study based on the following criteria:

- Naturalness
- Biological importance
- Ecological importance
- Socio-Economic importance

Altogether 37 stations were surveyed along the Maharashtra coast, 26 along the Goa coast and 21 along the Karnataka coast for the presence of absence of coastal ecosystems.

The results obtained and inferences drawn on the study carried out forms the major theme of this thesis and are addressed in different chapters as follows.

The Chapter I of the thesis is introductory in nature. It describes the ecosystems such as mangroves, corals, sanddunes, marine algae, seagrasses etc and their interaction. It further gives the description on biodiversity, socio-economic
studies, Conservation and management. The scientific rationale and the major objective behind the study are highlighted at the end of the chapter.

Due to various ecological and economic pressures on the coastal resources some of the disturbed as well as undisturbed areas have become ecologically sensitive. Hence there is urgent need for protecting and conserving these sensitive ecosystems through proper management.

The Chapter II of the thesis discusses the review of literature for the present study. It gives the account of physico-chemical parameters such as pH, water temperature, salinity, dissolved oxygen, Nutrients (nitrate, nitrite, phosphate, silicate), biological parameters such as phytoplankton, zooplanktons, benthic fauna etc, grain size. Further it gives the review on Biodiversity and different coastal ecosystems such as mangroves, corals, marine algae, sand dune and seagrass.

The Chapter III of the thesis deals with the general description, methodology and the results of the surveyed areas along the Maharashtra, Goa and Karnataka coast. In order to achieve the objectives, a total of 37 sites were surveyed along Maharashtra coast, 26 sites along Goa coast and 21 sites along the Karnataka coast. Out of these sites 7 sites were selected from Maharashtra coast, 6 sites along the Goa coast and 4 sites along the Karnataka coast were further studied for their ecological sensitivity.
The mangrove forests of Maharashtra coast comprises of 17 species along with some associated land plant species. Good patches of mangroves were observed along Achra, Deogadh, Vijaydurg, Ratnagiri, Kundalika, Vikroli and Mumba-Diva. *Avicennia marina* was most common species. The mangrove forest is also known to be a sanctuary for various local or migratory birds. Vikroli is mentioned, as a well-preserved mangrove forest managed by private management should be encouraged. Ecological status of different important sites along the Maharashtra, Goa and Karnataka coast are given in the form of tables. Different selected sites are described here along these three coasts for the flora and fauna. Along the Goa coast 16 mangrove species were reported. The dominant species recorded were *Rhizophora mucronata*, *Sonneratia alba* and *Avicennia officinalis*. The mangrove vegetation along the estuaries of Goa coast like Terekhol, Chapora were very poor. Chorao Island along the Mandovi estuary is one of the important areas for mangrove flora and fauna. Coondapur mangrove areas along the Karnataka coast have good assemblage of mangrove despite heavy anthropogenic pressure. Mangroves were dominated along the Maharashtra cost as compared to the Goa and Karnataka coast.

It further discusses the algal distribution along the above three coasts. Altogether 91 species were recorded from Maharashtra coast, 61 along Goa coast and 63 along Karnataka coast. The changes that took place in species composition of marine algae along some sites from 1935-1998 are recorded. Along all the three coasts *Rhodophyta* members were dominating. Due to various pressures like
pollution from various sources, human disturbances etc the algal growth is reducing. Hence it is advisable to carry out cultivation of marine algae. Along the sites studied along the central west coast of India corals were found in Malvan, Vengurla and Colaba. The list of corals reported from Malvan is given in Chapter IV. Sand dune vegetation reported along the study area is discussed further followed by the seagrass vegetation. There was no report of seagrass species during the present study. It further highlights the distribution of other fauna present.

In general Mumbra and Diva along Maharashtra coast can go preservation aspects as it is monospecific. Malvan displayed a maximum number of species. Benthic fauna was dominated by polychaeta. Corals were recorded at few stations only.

The Chapter IV of the thesis presents the case study at Malvan. In general it described the area, its location, brief history, physical features, topography. It further described the materials and methods used for the analysis in this chapter. Results include data for physical-chemical and biological parameters. Statistical analysis such as ANOVA (Two way) and correlation coefficient was carried out. The data is presented in the form of figures and tables in the thesis.

Among the hydrological parameters, salinity was found to fluctuate widely showing its maximum during summer and minimum during monsoon.
Significant correlation observed between dissolved oxygen and salinity. No significant fluctuation in pH could be observed. During monsoon, nutrients, organic carbon showed maximum variation. Subsequently during post-monsoon, phytoplankton and zooplankton population was high. Benthic macrofauna was found to be more in summer and less during monsoon.

In Chapter V of the thesis describes the socio-economic and sustainable utilization of the resources. It gives a general introduction followed by methodology used. The analysis of the context and the livelihood systems of the fishermen community in the study area present some useful insights into the interdependency of the people on the marine ecosystems. A management plan to protect the marine resources should address to the needs of livelihood security of the marine dependent people on the one hand and to the regenerative capacity of the marine ecosystems on the other.

An understanding of the relationship between livelihood and biodiversity is essential in planning conservation strategies, which are socially and ecologically sustainable. The socio-economic study will entail assessment of the extent and nature of dependency of various classes of people on diverse marine resources and will help to assess carrying capacity of the study area.

Chapter V is on the preservation, conservation and management aspects of the ecologically sensitive coastal ecosystems which is of worldwide concern. Good
resource planning decisions often require present status information at all levels. In any situation a wide range of environmental, social and economic factors, conditions the appropriate management response. Need for conservation and management is strongly felt primarily due to increasing human population. Conservation of sensitive ecosystems is needed for maintaining healthy environment. This chapter deals with the conservation efforts for different ecosystems, discussion on biosphere reserve and Marine National Park. It further deals with the management aspects such as management strategy and approach, steps to be taken for management, recommendations for management of different ecosystems along Central west coast of India, law and regulations for management of coastal ecosystems.

In preservation, absolute protection is provided to the area and do not interfere at all with the natural problems. Conservation ensures maintenance, restoration, development and sustainable utilization of the identified sensitive ecosystems.

The coastal ecosystem if managed properly, they can be of great economic and ecological values. It is necessary to maintain population of various communities at optimal level for genetic exchange and that the varieties of breeding populations are maintained to sustain the genetic diversity. Participation of the local people in the biodiversity conservation is very important. It is important to create awareness amongst the coastal inhabitants about the sustainable biodiversity in day-to-day life.