CHAPTER VII

CONSERVATION AND PROTECTION OF CORAL REEF ECOSYSTEM

7.1 INTRODUCTION

Coral reef system, as also the ecosystem of the tropical rain forest is the most mature marine ecosystem of our planet. They play an important role in global biogeochemical processes and in the production of food resources in the tropical region. They are the foundation, origin and protection of thousands of islands. Coral reefs provide subsistence, security and cultural utility to the inhabitants of communities in all coastal tropical nations. Corals play an important role in sustaining biological diversity, global biogeochemical cycle and economy of many countries. These systems are very sensitive to external impacts, both natural and artificial, which violate their homeostasis (Sorokin 1993).

7.2 DISTURBANCES TO REEFS IN RECENT TIMES

Coral reefs have been subjected to many forms of disturbance operating at different levels. Reef scientists have documented the intensity of the natural and artificial disturbances to the coral reefs. Threats to reefs from human disturbance has escalated in recent times. Leaving the concern about the general balance of life and death of coral reef systems around the world. In considering the fate of reefs in future years, there has been much controversy over whether coral reefs are robust or fragile.

An attempt has been made to focus the physical factors governing the morphology and structure of benthonic community which are essential for the planning and management of coral reefs. The impact of human activities which have damaged or destroyed this environment are discussed.
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7.2.1 Mining of reef materials.

During the last 50 to 60 years mining of stony corals from the reef areas, especially Tuticorin group of islands, for building, industrial and chemical purposes have destabilised the foundation of the reef structures and islands have ultimately reduced coral population in this part of the area. Destruction of the reef material amounted to 15,000 tones of boulders and 10,000 tones of coral debris (Venkatramanujam et al. 1981). The rapid development of lime based industries in and around Tuticorin have accelerated the coral reef exploitation into many fold. The long term exploitation leads to disastrous consequences. More than 500 semi skilled and skilled divers are engaged in the collection of a variety of reef and reef associated shell, chunks and pearl fishing from the reef area. Marine algae are also harvested in the area. Tuticorin is one of the biggest fishing centers leading to the unintentional utilization of various types of fishing techniques like fishing traps, bottom trawls and dynamites have further damaged coral reefs.

7.2.2 Industrialisation

Number of chemical industries like petrochemical and heavy water plants discharge their toxic effluents into the sea, devastating the natural environments in Tuticorin. Added to this the Thermal power plant with a capacity of 1200 MW is located in Tuticorin. This power plant is utilizing sea water for cooling purpose and coolant waste is discharged with 3° to 5°C higher than normal temperature of sea water into the shallow lagoon. Fly ash content from Tuticorin Thermal power plant is directly discharged into open sea. It contains huge amounts of toxic heavy metals. Geochemical studies of the coral reefs from the study area reveal that the concentration of toxic elements are higher than the maximum permissible limit.
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7.2.3 Harbour Site

In the upstream side of the islands, Port of Tuticorin is situated, with the breakwaters of 3 Km in length. Construction of these break waters has changed the current flow pattern and sediment movement along Tuticorin coast. Secondly periodic dredging operation in the entrance of the harbour have increased the amount of silt plume and inturn it provokes the water turbidity which reduces the light intensity in the reef area (Plate XXa,b).

7.3 CONSERVATION

As part of conservational management, surveillance of biological and recorded physical status of reefs and islands of Tuticorin group has been made. Field and laboratory investigations have been carried out to study the significant changes in the reef and island geomorphology, such as shoreline changes, changes in sand volume etc. The sequential changes in size, shape, orientation and migration of the Tuticorin group of islands have been documented in Chapter II. The development of coral islands in the study area depend on various geological factors such as reef types, its size, shape, orientation and exposure to waves and other reefs.

Recent destruction of coral reef have induced the landward drifting of 5m and 10 m isobaths in the study area (Thiruvenkatachari and Rao 1980). Windward occurrence and imbrication of cobbles and pebbles and leeward finer sediments in Van, Koswari and Kariyashuli islands are evidences for the migration of the islands. A landmark build at the southeast corner of the Van island about 30 years ago is now at amidst sea at about 300 m southeast of the present shoreline of the island. This is an added evidence of the migration of Van island.
Siltation seen in coral reefs in the study area
Another important experimental study carried out by Ramanujam et al. (1992) has revealed that the basal portion of the living coral *Acropora cervicornis* and massive corals are highly bored by the internal and external bio eroders. The invasion by the bioeroders such as boring sponges, bivalves and barnacles lead to the loss of live coral tissue and increase the changes of bio-eroder invasion and higher rates of limestone loss. As a result of these, less mechanical force is required for the living coral to be uprooted and toppled by the waves.

The increase of bioerosion may be due to over fishing. Some of the fish population predate on bioeroders and thus control their spreading. Another important cause for mortality of the reef in this part is severe physical damage caused by grounding of the boats and ships. In recent years several pollutants such as sewage, detergent, heavy metals, fertilizers, pesticides and oil may be one such cause for the rapid development of the bioeroders and ultimately reduction of coral cover.

Other harmful causative factors such outbreaks of crown of thorn starfish (*Acanthaster planci*) has not been recorded in this part of the study area. While considering disturbances on coral reef, whether due to human or natural influences, it is found that most of the effects are interlinked. No single stress is found to be uniquely responsible.

### 7.4 PLANNING AND MANAGEMENT

For the sustainable development of the coral reef an integrated coastal planning is needed. Reef management can help halt further degradation, facilitate to recovery of devastated areas, protect breeding stocks, improve recruitment in harbouring areas and maintain the sustainable utilization of reef resources.
Importance of protecting the main coastal environment has been focused for decades (Salm 1975, IUCN 1976, Salm 1981, Kelleher and Kenneigton 1982, Bradbury and Reicheit 1982, IUCN/UNEP 1985, UNESCO 1988, UNEP 1992, Birkeland 1997). As a part of the developmental studies of the coral reef ecosystem in Tuticorin group of islands, the deleterious agencies harming this fragile systems are listed out. Since the study area is close proximity to the industrial belt, the deterioration is more pronounced than the other group of islands in the Gulf of Mannar. Water quality, current pattern, sediment flow and toxic metal are not conducive for coral growth. They act synergistically to reduce live coral cover. Siltation caused by the dredging operation, coral mining and reversal monsoon (Fig. 7.1), winds reduces light intensity in the sea water. The reduction of light intensity in turn affect the photosynthesis, which is an essential part in the calcification processes in the reef environment. Physical damages not only reduce the coral population but also accelerate the island erosion. The removal of the reef material for industrial purpose has more avenue for direct wave attack to the reef system, which is detrimental to the reef system. The pollutant water in Tuticorin region has improved the conditions for multiplication of boring sponges. These sponges infesting the base of the coral colonies, weaken their resistance power to surf and ultimately cause their mortality. (Ramanujam et al. 1992, Sorokin 1993).

It is a known fact that the coral reef is associated with mangroves and seagrass meadows. The destruction of the reef material further threatens the intensity of mangrove and sea grass. Instability and deterioration of the Tuticorin group of islands have also degraded the growth of seagrass and mangroves in this part. Though Government of Tamilnadu and Central Government declared the
Fig. 7.1. Reversal monsoon prevalent in the study area
coral reefs in this part as Marine National Park, we are passively witnessing the 
imperilment of irreparable damage to our natural resources.

This system can be saved only when the local fishermen folk, local people, 
miners and industrialists are made to realise this as a prospective zone of potential 
resource which should be protected for the benefit of mankind. It should be made 
a Point that our future generations should be inheritors of this wonderful unit of 
nature and not merely be survivors in a desert.