CHAPTER 6:
ANTHROPOGENIC ACTIVITIES:
POTENTIAL THREATS
TO ECOLOGY OF NARARA REEF

Introduction

Methodology

Results

6.1 INTRODUCTION:

The mankind has always been dependant on nature and natural resources for its livelihood and comfort.

All his activities not only have adverse effects on the ecology of the area but is also found to have indirect effects. An attempt was made to enlist any such anthropogenic activities on Narara reef during the study.

6.2 METHODOLOGY:

During the field visits made to record biodiversity and to cover other aspects of present study, observations were made for the human activities on the Narara reef area. This included present day activities and activities carried out in past which has had their effects on the current status of the reef. The observations made were visual or casual information collected from local inhabitants.

6.3 RESULTS:

The anthropogenic activities on Narara reef were categorized into two broad categories i.e. exploitation of biodiversity and habitat degradation (Dave, 2010). Activities falling under both the categories have direct and/or indirect adverse effects on reef environment (Fig. 6.1). Detailed description of each kind of activity is given as follow.

Table 6.1: Preferred sub-sites for various kinds of anthropogenic activities.

Activities	Sub-sites				
	S1	S2	S3	S4	S5
Traditional fishing	✓	✓	✓	✓	✓
Fishnet deploying		✓		✓	✓
Rock-lines				✓	✓
Anchoring of large vessels	✓				
Boat landing and Anchoring		✓		✓	

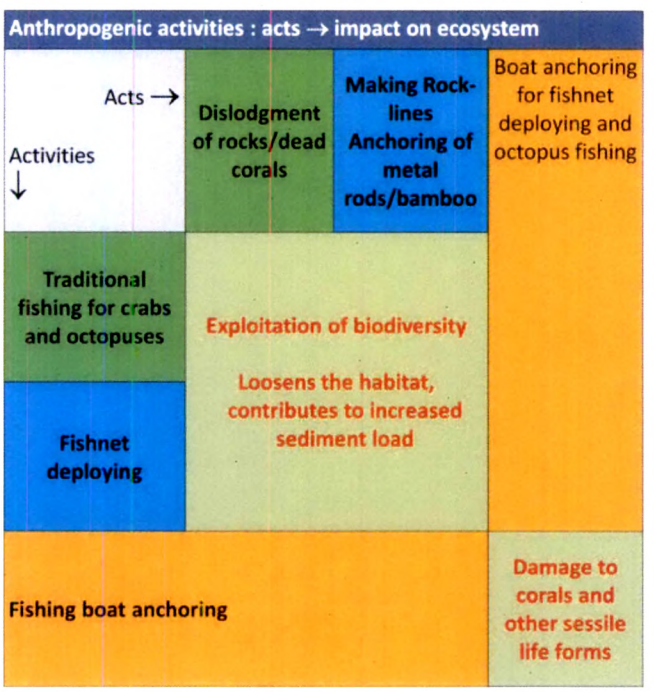


Fig. 6.1: Graphical presentation of anthropogenic activities observed on Narara reef and their effects in reef environment (in red).

6.3.1 BIODIVERSITY EXPLOITATION:

The main anthropogenic activity at Narara reef is artisan (traditional) fishery by fishermen of nearby villages. Of the total families of Vadinar village, 100 families are engaged in fishing, out of them about 80-85 families comprising of about 200 active fishermen (pagadia) practice artisan fishery in Narara reef area and harvest 80% of their fish catch from Narara only (Dixit *et al.*, 2010). The fishermen explore the intertidal area during low tides on feet to collect crabs and octopuses (Plate: 6.1 a, b and c). Here in GoK, the octopuses are exploited for using as fish baits and not for food. Fishermen visit nearby reef area for octopus collection before going off shore for fishing. On an average, 40-50 octopuses and same number of crabs per fisherman was observed to be collected from sub-sites S1, S2, S3 and S4 on every instance. If such indiscriminate exploitation of the organisms continues, it is likely that one day it will be hard to find good number of octopuses moving on the reef area.

Plate: 6.1

(a, b, c) fishermen searching for crabs and octopuses, **(d, e, f)** crabs and fishes used as bait.

6.3.2 HABITAT DEGRADATION:

6.3.2.1 DISLODGEMENT OF ROCKS AND BOULDERS:

The crabs and octopuses are cryptic in nature and take shelter when threatened. Therefore, fishermen dislodge rocks/dead coral boulders (sometimes live coral colonies are also dislodged) to reveal the hidden fishable organisms. They also deploy fishing nets on the reef flat and reef edge areas of Narara. They move small to moderate sized rocks from one place to another to make rock-lines (arrangement of rocks in a line on the intertidal area to tug the lower end of fishing nets, this is also known as WADA fishery in local). The area near to LTL was preferred by fishermen to erect fishing net with help of metal rod/bamboo involving digging into the coralline areas (Plate: 6.2 a-e).

As stated earlier Narara reef is one of the tourist attractions in MNP & S. Many tourists visit the reef area and enjoy "coral walk". However, it was observed that many times the rocks overturned by tourist in sheer enthusiasm to find marine life were kept as such rather than placing them properly as they were before.

All these activities involve dislodgement of rocks from the habitat which disturbs sediments in both source area and target area (in case of movement of rocks). The disturbed sediments flow with the currents and are likely to settle on live patches of corals. These displaced rocks most of the times are not placed as they were before and they remain overturned. This brings the underneath biotic community in to contact with direct sunlight and make them more vulnerable to the solar irradiation.

6.3.2.2 ANCHORAGE AND BOAT LANDING ON CORAL REEF AREA:

Another kind of anthropogenic activity is related to fishing and port in vicinity. Studies on anchoring on coral reefs suggested significant degradation of coral community structures on reefs affected by anchorage (Dinsdale and Harriott, 2004; Saphier and Hoffmann, 2005). During the study sub-site S1 was found to be affected severely by direct anchoring of barges and other vessels on the reef area (Plate: 6.3 b). Close observations revealed presence of live coral colonies entangled and uprooted in the anchor (Plate: 6.3 d).

Plate: 6.2

(a) fishermen uprooting the rocks, **(b)** fishermen arranging rocks in a line, **(c)** fishing net erected with wooden sticks, **(d)** rock-lines (pointer), **(e)** group of fishermen digging coralline area to setup fishing net.

Plate: 6.3

(a) anchor of a small fishing boat, **(b)** a barge anchored on coralline area, sub-site S1, **(c)** trench made due to anchorage (habitat damage), **(d)** presence of live corals (pointers), **(e, f)** landing of fishing boats on reef flat.

Such anchorage by large sized vessels damage the substratum on the large scale (Plate: 6.3 c). However, in other sub-sites also anchoring of smaller fishing boats is done.

Fishermen in groups of 15-20 people were observed to visit Narara reef in boats. Generally they land their mechanized fishing boats on the outer reef flat, reef edge or inner reef flat (Plate: 6.3 e, f). This was found to crush coral colonies present under the landed boat. Three to four boats landed on reef area was a common sight during study period.

6.3.2.3 LYING OF PIPELINES ACROSS THE NARARA REEF:

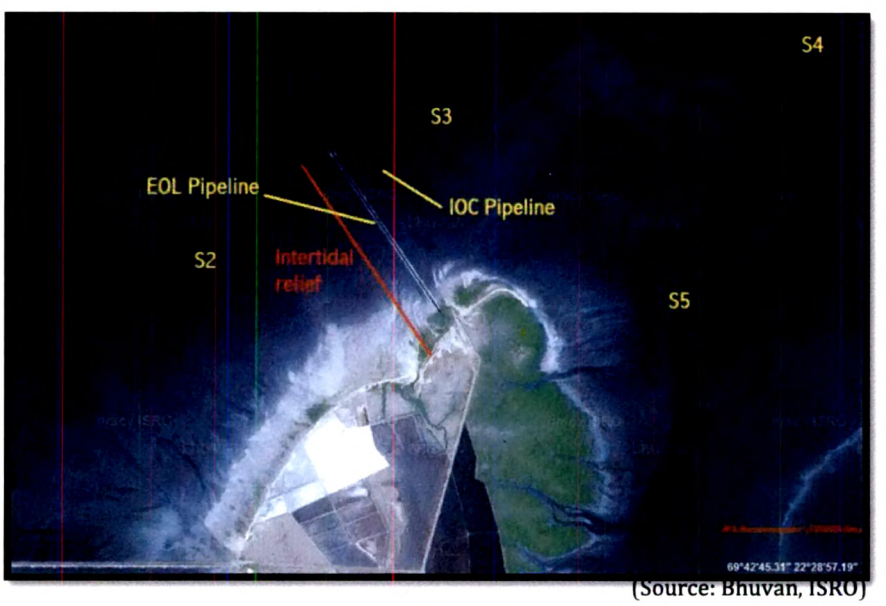
No pipeline lying was observed to be carried out during study period. However, in past, two pipelines were laid to transport oil cargo to fulfill the needs of oil industry and refinery near by the reef. Out of the two pipelines one belongs to IOC which was laid in around 1970's. Currently the substratum of the sight is characterized by sandy belt, permanently inundated during low tides/waters. The sandy belt was recorded with presence of sparse cover of sea grass (only in year 2008).

Another pipeline on the right to the IOC pipeline is recently laid by EOL (Fig. 6.2). The figures in table 6.2 give an idea about the pipeline. Based on the figures it is apparent that 9.84 ha (98400 m^2) of area was degraded at the first instance. Further, the tidal currents might have carried the debris over the healthy coral patches of Narara reef.

Table 6.2: Details of the EOL pipeline laid across intertidal area of Narara reef.

Quick figures of EOL pipeline	
Total duration	2 years, January 2005 to December 2006
Starting point near LFT (Land fall point)	Lat. 22°28'11.30"N Long. 69°43'19.10"E
End point	Lat. 22°29'17.46"N Long. 69°42'34.24"E
Length	2.4 km
Breadth	11 m
Buffer on both side	15 m
Depth	1 m at starting point, 8m at end point

(Source: Personal communication with Mr. M. I. Patel)



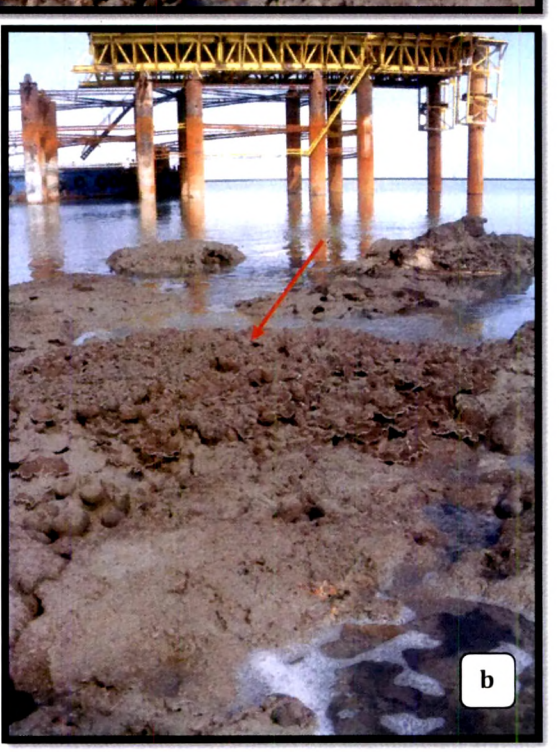
(Source: Bhuvan, ISRO)

Fig. 6.2: Position of EOL and IOC Pipelines across the intertidal area of Narara reef.

6.3.4 PORTS/JETTIES:

A fully operational port managed by Kandla Port Trust, Vadinar is situated on the western limits of Narara reef near sub-site S1. The casual threat from a port in vicinity to coral reef is increase in sediment load due to heavy traffic of large vessels and periodic dredging. In Narara, the vessels visiting KPT complex berth very near to the healthy coral patches (Plate: 6.4). This poses potential threat of grounding of ships during cyclones and unfavorable weather condition which cause physical damage to the reef ecosystem beyond the recovery.

Plate: 6.4



(a) berthing of vessels near the coral reef area at sub-site S1,

(b) live corals in vicinity to port structure.