CHAPTER 2

STUDY AREA

Study Area

Study Localities

Mundra

Mandvi

Sanghi

Study Period

2.1 STUDY AREA:

The Indian coastline is about 7500 km long, 200 nautical mile wide Exclusive Economic Zone (EEZ), the Bay Island of Andaman and Nicobar, and the atoll Island group of Lakshadweep, India harbors a vast extent of coastal and marine habitats. The coastline comprises of headlands, promontories, rocky shores, sandy spits, barrier beaches, bays, marshy land and offshore Islands. According to the naval hydrographic chart, the Indian mainland consist nearly 43% sandy beaches, 11% rocky coast and 46% mud flats and marshy coast. The Indian coastline supports almost 30% of its human population being dependent on the rich exploitable coastal and marine resources.

Among the eight maritime state of India, Gujarat, situated on the western coast of India, has longest coastline of 1650 km which comprises about 22% coastal stretch of the total coastline of India. The coastal zone of Gujarat is characterized by a variety of geomorphic forms and geological features. According to habitat structure, Gujarat's coastline is characterized by 28% sandy beach, 21% rocky coast, 29% mud flats and 22% marshy coast. Gujarat coast could be broadly described in to four regions viz., the Gulf of Kachchh, the Saurashtra Coast, the Gulf of Khambhat and the South Gujarat Coast.

Gulf of Kachchh is about 170km long and 75km wide at the mouth and further east ward the width decreasing gently over most of its length. Physical conditions of the Gulf of Kachchh are

an east west oriented indentation, north of Saurashtra Peninsula and south of Kachchh. It lies between 20°15′ to 23°35′ N and 60°05′ to 70°22′ E and opens north east into Arabian Sea. It encompasses a long shoreline covering an area of 7350 sq km (ICMAM, 2002). Coastal stretch of whole Kachchh district extends for about 405 km constituting the whole northern coast of Gulf of Kachchh (GoK).

The northern shore of Gulf of Kachchh is predominantly characterized by sandy shore, mudflats and mangroves habitats (Nair, 2002). Mudflats and Mangroves occupies about 2500 and 940 km^2 respectively in Kachchh coast along with other diverse habitats and a network of creek systems (Nair, 2002).

The present study was carried out on northern Gulf of Kachchh at three stations, namely Mundra, Mandavi and Kharo creek near Sanghi (now termed as Sanghi) along a coastal stretch of about 125 km. It was selected due to their varied environmental settings (Fig. 2.1).

Due to its semi-arid nature, annual rainfall in the northern coast where the all the three study stations are located, is poor ranging from 250-350 mm which is often irregular. Mean rainfall (1932 to 2001) was highest at Mundra (407 mm) while Mandvi and Sanghi recorded a mean rainfall of 387 and 378 mm respectively, for this period. Rain during monsoon is confined to only 15-20 days and occurs as an instant downpour. Freshwater input into the near coastal waters is quite meager and appears to have least influence on the

ambient coastal water quality except during monsoon months when flash floods are discharged in the near coastal waters. Winter and summer temperatures range from 7-48^{0}C. As a characteristic of arid zone, annual temperature fluctuation in the district is extreme, ranging from 4^{0}C to 48.5 ^{0}C. Abdasa taluka, where one of the study stations, Sanghi is located experienced the lowest temperature of 1.3^{0}C during January, 2007.

Tides in GoK are mixed, predominantly semidiurnal type with Mean High Water Spring (MHWS) of 6.66 m and Mean High Water Neap (MHWN) of 5.17 m. The phase difference is not uniform for successive tides in the Gulf and it varies as per tidal conditions (ICMAM, 2002).

Fig 2.1Northern coast of Gulf of Kachchh

2.2 Study localities:

Before the selection of study sites, locations of the sampling sites were selected according to a preliminary study of the coastline in view of habitat structure. Now a day's especially Gulf of Kachchh coast is being hot-spot for various mega industries, fishery related opportunities and further more tourism is also one of the related problems on the coastal zone of Gulf of Kachchh. For present investigations, three different sites were selected in northern Gulf of Kachchh, viz. Mundra, Mandvi and Sanghi (Fig 2.1). Each of these sites was chosen because they are accessible easily and having different coastal characteristics. The selected location was surveyed extensively to monitor the coast characteristics, from both physical and biological approach.

2.2.1 Study site:

Mundra (Fig. 2.2)

Northern coastal stretch from Kandla to Mundra in the interior Gulf region is marked by narrow beaches and wide mudflats with predominantly muddy alluvial substrate. This coastal stretch of Mundra is dissected with creek systems forming extensive mudflats. Minor seasonal streams emptying freshwater run-off during monsoon months also characterize this coastal belt. Major creeks are Mundra, Bocha, Abhan and Baradimatha which ramify further into several minor creek systems at its tail end forming a network of creeks and tidal incursions. Mangrove extent of this location is about 19.1 km^2 distributed mostly along the creek systems. Koilivali creek, where the Mundra

sampling site (22^{0}46′ 03.82″ N, 69^{0}37′ 03.56″ E) is located is luxuriantly lined with mangroves stands of *Avicennia marina*.

Fig 2.2 Mundra site

It is a bifurcation of Baradimatha creek and confluences with the Gulf system at one end. A major port (Mundra Port and Special Economic Zone Ltd.-MPSEZ) is located at about 3 km from its mouth towards eastern extension. Coastal habitats at Mundra includes Sandy beaches, mudflats and mangroves which could be seen in close proximity to each other, producing rich habitats and faunal diversity.

Mandvi (Fig 2.3)

The second study station (22°50'13.31" N 69°12' 54.45"E) is located in the coastal village of Nana Liza at about 15 km west of the coastal town of Mandvi and 40 km west of Mundra, here termed as Mandvi. Unlike Mundra, Mandvi is an open coast characterized by sandy beaches, sand dunes and partially rocky outcomes. Mudflats and mangroves, which are prominent habitats in Mundra, are very limited in Mandvi coastal stretch due to its open and sandy nature. Mangrove formations, confined to few minor creeks extend to about 10 km^2 in Mandvi. The sandy intertidal belt is marked by sedimentary rocky outcroppings providing a rich microhabitat to rocky intertidal fauna.

Fig-2.3 Mandvi site

Sanghi (Fig. 2.4)

The next study station, Sanghi (23^0 23′ 17.68 – N, 68^0 33′ 27.29″- E) is located around 20 km northeast of Jakhau jetty in the northwestern part of Kachchh. Kharo creek is one of the biggest creek systems in the north-western coast of Kachchh, running parallel to Godia creek in the south. It tends in NE-SW direction 13-15 km from its mouth at Arabian Sea to a private jetty. In its course it ramifies further into 4 major and many minor creek systems. Mangrove formations are confined towards the tail end of the creek while the creek is devoid of any vegetation towards its mouth which is characterized by sandy coastal stretch, sand dunes and mudflats. At its tail end, the creek further bifurcates into two minor creeks namely Padala and Hakti creeks. While pelagic and water quality sampling was carried out at the Padala-Hakti bifurcation, intertidal sampling was carried out at the mudflats adjoining mangroves along the Kharo creek

Fig-2.4 Sanghi site

2.3 Study period:

The study is carried out during June 2007 to May 2008. During this period; each site was visited at monthly interval for phytoplankton, zooplankton, benthos, intertidal biodiversity and water quality analysis. The monthly surveys were summed up to three seasons viz., winter (November to February), summer (March to June) and monsoon (July to October).