Baseline Survey of Invertebrate Diversity at Ormara, Balochistan

Report submitted by

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to

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INTRODUCTION

Pakistan has considerable maritime zone, influenced by atmospheric forcing and reversing monsoons resulting in the strong seasonal variability in its oceanographic conditions and thus Pakistan's coastal waters appear to be an ideal place to understand the link between climatic oscillations and community structure of highly diverse marine flora and fauna. A multidisciplinary research approach is required to explore the natural resources of the Arabian Sea.

Placed in the northwestern part of Indian Subcontinent, Pakistan borders the Arabian Sea with a sizeable coastline running for approximately 990 km in the east-west direction. Nearly 320 km of this seashore falls in the province of Sindh whereas the rest of 670 km constitute the Makran coast. The Exclusive Economic Zone, that stretches 200 nautical miles seaward from the coast, provides 240,000 km^2 area of the Arabian Sea for exploitation of the renewable and non-renewable resources, on which coastal population of the Sindh and Balochistan provinces largely depend for their livelihood. The coastline of Pakistan exhibits a number of wetland areas supporting biodiversity and has direct or indirect impact on marine life and coastal communities. Life inhabiting coastal wetlands includes endangered, endemic, threatened and commercially important forms.

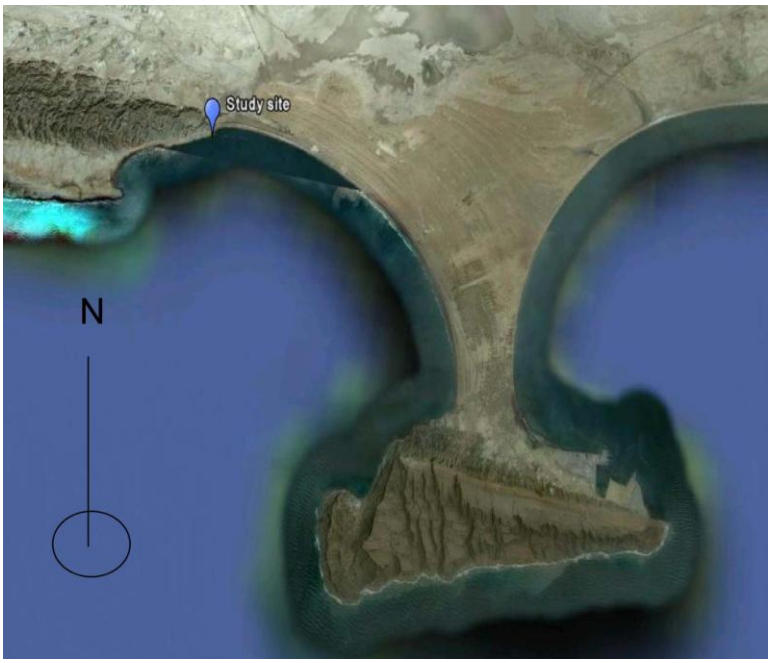
The present study was undertaken with an objective to record the distribution and abundance of invertebrate communities at Ormara. This study also assesses biodiversity with respect to its ecological and economic prospective.

Marine invertebrates are widly distributed in intertidal and submerged areas. Intertidal areas have rich biodiversity and serve as a food resourse for many species such as birds, fish and decapods. Many factors effect the distributional pattern of organisms in the coastal environment, such as, arial extension of tidal flats, sediment stability and composition, frquency and length of low tidal exposure and geomorphology (Reise 1985). According to Peterson (1991), the turbulance in sediment and the settlement pattern of larva, predation and competion for space and food are factors that effect the spatial macrofauna distribution in intertidal area.

Study Methods

Area Description

Figure 1 shows the general view of Ormara which has a total area of about 2400 ha. and located at 25^{o} 12’38’’ N, 064^{o} 37’56’’ E. Ormara has very beautiful topography having sandy beaches and rocky shores. This area has diversified fauna and flora. Above 15 km away from main city Taq or Qalatu bay provides an interesting site for turtle nesting. This area is ornamented with rocky and sandy beaches and clear sea water. Marine mammals, turtle, sea birds, migratory birds, sea snakes marine algae and a variety of fish are found in these waters. Fisheries are the main source of income for people of Ormara. This area is also a Ramsar site. Tidal pools are beautifully ornamented by marine algae, small fish, gastropods and other organisms.



F**igure 1** Map of the Taq Bay (Ormara) showing study sites

The present baseline study was undertaken with an objective to record the relative abundance and distribution of invertebrate communities from a rocky shore at Taq Bay and also to assess their economic and ecological role.

Sampling Procedure

The study site for invertebrate collection is shown in Figure 2. Samples were collected during low tide. Number of species and their abundance were studied at low, mid and high tidal marks. Molluscs and crabs were randomly picked by hand. molluscs and crabs were preserved in field using 5% formalin in plastic bottles. To avoid limb-shedding, live crabs were narcotized with an addition of a few drops of chloroform prior to fixation. Sea anemones and barnacles were photographed in the field using a digital camera, and digital images were used for identification. The samples are archived at the Centre of Excellence in Marine Biology, University of Karachi for future reference.

The literature used for identification includes Peter Dance (1974), Siddiqui and Ahmad (2002), Tirmizi and Zehra (1982) for Mollusks, Mustaqeem and Rabbani (1976), Tirmizi and Ghani (1988) for crabs, Coleman (1991), England (1987) for sea anemones, Southward (1976), Jones (1986) for barnacles and Mustaqeem (1997) for Polychaete worms. Invertebrate communities were recorded semi-quantitatively, using DACFOR Scale. (D= Dominant: up to 500 individuals, A =Abundant: up to 400 individuals, C = Common: up to 300 individuals, F = Frequent: up to 100 individuals, O =Occasional: up to 50 individuals, R = Rare: up to 20 individual).

Result & Discussion

The site was located at 25° 16' 101" N, 64° 30' 242" E about 15 km from main town of Ormara towards west (Figure 1). The area was rocky (gently sloped) and consisted of frequently distributed tide pools. The fauna mostly consisted of molluscs, among them, the gastropods were dominant. The crabs (*Charybdis* sp.) belonging to family Portunidae was also dominant while the barnacles were limited to mid high and high tidal marks. Seaweeds of different types were mostly limited to tide pools.

In present study 9 species of molluscs belong to 9 families, 2 species of arthropods belong to 1 familiy and 2 species of annelids in families Sabellariidae and Neridae were recorded from the area (Table 1). Among 9 species of molluscs, 7 species belong to class gastropoda and 1 species (*Perna viridis*) to class bivalvia and 1 species (*Doris* sp.) belong to class gastropoda. Two species of arthropods belong to single class crustacea and to families Portunidae and Balanidae while 2 species of annelid belong to class polychaeta and families Sabellariida and Neridae. Macrofaunal communities (crustacean, molluscs) were widely distributed in mid high and low intertidal rocky

habitat and are distinctly different. This relates to prevailing different environmental conditions with different periods of tidal cover. The lower shore is frequently covered by tides, while the upper shore is covered by occasional high tides. At low and mid tidal area the diversity was high as compare to high tidal area.

Table I. Distribution and relative abundance of invertebrate communities at rocky shore, Taq bay, Ormara.

S.#	PHYLUM	SPECIES NAME	STATUS
Mollusca			
1	Family: Neritidea	*Nerita* sp.	Frequent
2	Family: Trochidae	*Monodonta* sp	Occasional
3	Family: Muricidae	*Thais* sp	Occasional
4	Family: Patellidae	*Cellana* sp	Common
5	Family: Cypraedae	*Cyprea* sp	Rare
6	Family: Nassariidae	*Nassarius* sp	Common
7	Family: Veneridae	*Mercenaria* sp	Common
8	Family: Doridiidae	*Doris* sp	Common
9	Family: Mytilidae	*Perna viridis*	Common
	Arthropoda		
1	Family: Portunidae	*Charybdis* sp	Abundant
2	Family: Balanidae	*Chelonibia patula* (Barnacles)	Abundant
	Annelida		
1	Family: Sabellariidae	*Sabellaria* sp	Rare
2	Family: Neridae	*Perinereis* sp	Rare

Variations in physiochemical conditions strongly affect the distribution of benthic fauna at intertidal level (Reise 1985, Wilson 1991). As a result, there is decline in species richness from sub tidal bottom towards the high tidal level due to physical regime imposed by the tides (Mc Intyre and Elefitherious 1968, Johnson, 1970). The distribution of organisms in these environments is also affected by biological and physical conditions (Rios 1974).

The spatial distribution of molluscs is also affected by their feeding habitats. The gastropods whether they are carnivores, predators or herbivores is directly conditioned by the pattern of food belt which explain the preferential distribution of some of the species in the lower belt. This is because of greater submersion time and carriage of detritus from higher tidal level. The availability of food at low level is higher than upper level. Due to this reason carnivores species such as *Natica*, *Thais*, *Nassarius*, etc. (Rhoads and Young 1970). With respect to predation, sluggish predatory invertebrates such as predatory gastropods exert greater pressure lower on the shore where they predate small mollusks including recruits where they specifically predate small mollusk. The preferential settlement on upper intertidal levels probably contributes to the successful settling of some molluscs (limpets) (Peterson 1991).

Ecological importance

Intertidal zone serve as a natural laboratory to study the basic ecological questions that how physical and biological factors determine the vertical distribution limits. Many gastropods in intertidal area through competition or provision of secondary space exert strong control over the abundance of other species. Shore crabs have significant role in

detritus formation, nutrient recycling and dynamics of the ecosystems, together with numerous annelids and nematodes living in the sediment. The crabs on rocky shores are mostly scavengers and thus keep the intertidal ecosystem in balance. Echinoderms like sea urchins living in intertidal pools play an important role in keeping the algal growth in control due to their grazing habit. They also serve as a source of food for other animals.

Economical importance

The molluscs especially *Perna viridis* is an important source of protein. *Perna viridis* harvested in many parts of the world including Pakistan. However it harbour toxin due to the presence of dinoflagellates that it feeds up on. Gastropods shells reported from the area are important as they used for making ornament.

The crustacean fauna in the area mostly comprised on, Grapsid. These crabs however not used as food but they play an important role in keeping the mangrove system in steady state. Sesarmid crabs reduce competition between mangrove plant species through selective predation on seedlings.

Threats and recommendations

Currently no anthropogenic threats to invertebrate communities were observed. However to check the long term threats it is recommended that surveys in the area should be conducted regularly or even seasonally. This gives information about the whole intertidal community structure of the area and also helps in detecting possible threats.

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