



MARINE SCIENCES

## BIODIVERSITY OF CRABS IN KARWAR MANGROVE ENVIRONMENT WEST COAST OF INDIA

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### Abstract

In this study, the distribution of crabs in Karwar was recorded from October 2007 to July 2008. At monthly intervals. The species present on the sub tram and on the vegetation area were recorded in quadrant each measuring 1meter square. There are about 15 crabs species are distributed in karwar mangrove environment. Crabs belonging to the family Grapsidae and Ocypodidae are most dominant forms. Substrate suitability, effects of tidal inundation and distribution of mangrove plants were the possible factors that could influence zonaztion and abundance of the crabs in the karwar mangroves.

**Keywords:** Mangroves, Karwar, Grapsidae, Ocypodidae, Kali estuary, Avicenna, Rhizophora and sesarma

### Introduction

Mangroves are unique inter-tidal ecosystem of tropics and sub-tropics which supports genetically diverse groups of aquatic and terrestrial organisms. The mangrove ecosystems are of great ecological and economic significance in coastal protection enrichment of water quality and in production of fishery resources (Kathiresan and Bingham, 2001; Kathiresan 2003). Crabs among the most predominant species in many mangrove forest. They constitute about 80% of the macro-faunal biomass and can reach densities of 80-90meter square.

The crabs depend directly on mangrove areas for survival, by feeding on leaves and litter. They have a significant role in detritus formation, nutrient recycling and dynamics of the ecosystem, together with numerous annelids and nematodes living in the sediment. The digging behavior by crabs enhance aeration and facilitates drainage of mangrove soils. They are adapted to the sediment conditions, tidal fluctuations and varying salinities found in the mangroves.

Distribution and zonation studies of crabs in Indian mangrove are scant. Joel et al (1985) studied the distribution and zonation of 29 crab species in the Pulicate lake while Chakarabarty and Choudhary (1992) observed 18 species in the virgin mangrove island of Sunderbans. The present study was concentrated on the distribution of crabs in karwar mangrove environment.

### Materials and Methods

#### Description of Karwar Mangroves

The Karwar mangrove forest (74.18767° N, 14.88362° E) is located between the Kali estuary. The

depth in the estuary ranges from 2 - 4 meters at the mouth and about 2 - 3 meters towards the river. The river mouth opens into Arabian Sea through a narrow mouth and tidal limit extends up to 29 kms zone during low tide (Nagaraj and Neelakanthan, 1982). The tides are of semidiurnal nature and the time and range between two floods and two ebbs show marked variations.

**Hydrographically Kali estuary can be divided in to four zones viz.**

1. The euhaline zone around the estuarine mouth extending inwards (1- 2 kms)
2. The ployhaline zone or the proper estuarine zone extending up to about 10 kms from the river mouth.
3. Mesohaline zone from beyond 10 kms
4. Oligohaline zone, which is influenced by freshwater influx and supporting scanty mangrove population, grass land ecosystem and mud flats (Bhat, 1984 and Gunaga, 1989).

From Kali estuary the backwater zone extends both northwards and southwards. This backwater zone is about 3 kms from where tidal zone extends to 15 kms with remaining being fresh water. From estuary, the backwater region extends, to around Sunkerri to Kanasgiri having extensive mudflats inhabited by mangroves. The backwater extends to fresh water zone where almost the salinity is 0.1 ppm, with negligible mudflats and mangroves.

**1. Kodibag:** The Kodibag lies on the southern bank of estuarine mouth extending up to 1 - 2 kms. This station is characterized by high saline water. The nature of the bottom is admixture of sand and mud with depth varying from 1-3 meters during low tide.

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**2. Mavinahole creeks** Location: 14°50'39"N, 74°07'44"E. The Mavinahole creek is situated towards the northeastern part of the river mouth. This creek is rich in mangrove vegetation and diverse group of mangrove and associates

**3. Devbag mangrove forest** Location: 14°50'41"N, 70°07'18" E The study site is a part of riverine bank along the back waters of the river Kali nadi; under tidal influence. The area is located at Devbag villag

**4. Nandangadda** Location: 14°15'12" N, 74° 09'08" E. The Nandangadda is located approximately 3 kms from the estuarine mouth, towards the southeastern side. Some mangrove vegetation can be seen here. There is a small island that guards currents

**5. Sunkeri mangrove forest:** Location: 14° 50'18" N, 74°10'03" E. The study site is a swamp under tidal influence. This is about 5kms from the river mouth on the south bank. It is in the broadest back water of the river (about 1km. wide) running south to a distance of about 3kms. There is a bund built across the back water with gates. The soil is clayey loam in texture under the vegetal cover.

The field study was carried out in the swamps of karwar mangroves from October 2007 to July 2008 at monthly intervals. The study was under taken in both creek and fringe mangroves. The species present on the substratum and on the vegetation area were recorded in quadrant each measuring 1meter square. Crab burrow density was recorded in five randomly

placed one square meter quadrates as per Jones (1984). Crabs were collected at low tide and preserved in 70% alcohol. The species were identified following the description of Williams (1984) and Sethuramalingam and Ajmalkhan (1991).

**Results and Discussion**

**Habitat Preference of Crabs in Karwar Mangroves**

In the present study 13 species recorded in karwar environment (Table1).crabs belonging to the family Grapsidae and Ocypodidae were the most dominant forms, which play a vital role in recycling the nutrients enhancing the role of decay of plant materials and litter processing crab population was high during monsoon and post monsoon months in Karwar mangroves. Factors such as low salinity possible physical changes in the substrate composition and availability of maximum organic carbon during monsoon and post monsoon seasons may be attributed for greater abundance. Based on the distribution of crabs the mangrove areas divided into 5-zones. For instance, in Sesarma zone, sesarma crab species were dominant as other zones also had their specific crabs zonation of karwar mangrove environment based on crab distribution (Table 2.)

Among all the zones the dominant representatives were Sesarmid group of crabs. It includes 5 species. The dominant species of Sesarma zones were *Sesarma quadratum*. The other crabs species recorded from these zones were *Metapograpssus latifrons*, *Metapograpssus messor*, *Grapsus albolineatus*.

Table 1: Crabs of Karwar Mangrove

Family	Crab species
Grapsidae (Dana)	<i>Grapsus albolineatus</i> <i>Metapograpssus maculates</i> <i>Metapograpssus messor</i> <i>Sesarma quadratum</i>
Ocypodidae (Ortmann)	<i>Metapograpssus latifrons</i> <i>Ocypodidae cordimonas</i> <i>Ocypoda ceratophthalmus</i> <i>Uca annulipes</i> <i>Uca vocans</i> <i>Dotilla myctiroides</i>
Portunidae (Ranfinasque)	<i>Scylla serrata</i> <i>Thalamita crenata</i>
Calappidae (Alcock)	<i>Matuta lunaris</i>

Table2.Listed mangrove species around Mangrove patches

Sl No	Family
1	Rhizophoraceae - <i>R.mucronata</i> , <i>R. apiculata</i> , <i>Bruguiera cylindrica</i> , <i>Bruguiera gymnorrhiza</i> , <i>Candelia candel</i>
2	Sonnertiaceae - <i>S.alba</i> , <i>S.caseolaris</i>
3	Avecenniaceae - <i>A. marina</i> , <i>A.alba</i> , <i>A. officianalis</i> .
4	Acanthaceae – <i>A. illicifolius</i>
5	Lytraceae – <i>Lumnitzera racemosa</i>
6	Euphorbiceae- <i>Excoecarea agallocha</i>
7	Myrsinaceae – <i>Agiceras corniculatum</i>

Table 3. Zonation of crabs

Name of the zone	No. of species	Species present
Searma zone	5	<i>Sesarma quadratum</i> , <i>Metapograpsus latifrons</i>
Ocypoda zone	3	<i>Ocypoda ceratophthalmus</i> , <i>Dotilla myctiroides</i> , <i>O. cordimanus</i> .
Uca zone	3	<i>Uca annulepis</i> , <i>Uca vocans</i> , <i>Dotilla myctiroides</i>
Mixed zone	6	<i>Scylla serrata</i> , <i>Thalamita crenata</i> , <i>portunus</i> <i>Sanguinolentus</i> , <i>Uca</i> , <i>Dotilla</i> , <i>Ocypoda</i> .

#### Habitat preference of crabs in Karwar mangroves

Karwar mangrove was found to be sandy along its vertical transect, with patches of mangrove vegetation. Table 3 shows that each species of mangrove crabs have its characteristics patterns of abundance and habitat preference.

#### Distribution of Crabs in various vegetative zones of Karwar Mangroves

Based on the distribution of plants of Karwar mangrove environment was divided into Rhizophora zone, *Avicennia* zone, back mangrove and non-saline zones. These crabs are distributed into different vegetative zones (Tables4.) Maximum number of crabs was distributed in *Avicennia* and *Rhizophora* zones. *Sesarma quadratum* and other crabs were present along te high water of neap tides and found to be sheltered amidst *Avicennia marina*. This is attributed due to the presence of rich nutrients in the *Avicennia* leaves when compared to other mangrove leaves (Rajendra, 1997).

Most of the juveniles and females of smaller crabs were distributed along the lower shore regions. The females and juveniles of *Uca annulipes*, *Uca vocans* were distributed close to the water edge along with

their neighbors. The sand dominated substrata were suitable for *Portunus sanguinolentus* and *Thalamita crenata*. From the study, it was confirming that substrate suitability; effects of tidal inundation and distribution of mangrove plants were the possible factors that could influence zonation and abundance of the crabs in the Karwar mangroves.

#### Reason for Depletion of Crabs

The population of commercially important mangrove crabs. Viz. *Scylla serrata*, *S. tranquebarica*, *portunus pelagicus*, *P. sanguinolentus* are declining day by day due to indiscriminate fishing of berried females and also fishing of under sized crabs. Invariably the crab samples of mangrove contain the compounds more than the other species of aquatic animals collected from nearby areas. In recent years mangrove areas have been converted to shrimp ponds. The discharged effluents from the shrimp forms are also causes serious threat to crab population. So increase in pollution around mangrove ecosystem by man made chemicals due to aquaculture practices is now adding pressure on crab population (Subramanian, 2000) hence conservation of mangrove crabs is important.

Table 4: Crabs, their abundance and habitat

Sl.No	Species	Abundance	Characteristic Habitat
1	<i>Sesarma quadratum</i>	abundant	In between the prop roots of <i>Rhizophora</i> Plants
2	<i>Metopograpsus messor</i> , <i>M. latifrons</i>	common	In between the roots of <i>A. marina</i> , <i>R. apiculata</i> <i>R. mucronata</i>
3	<i>Grapsus albolinatus</i>	rarely taken	In between the <i>Avicennia marina</i>
4	<i>Ocypoda cordimanus</i>	common	Sandy substratum
5	<i>O. ceratophthalmus</i>	common	Sandy substratum
6	<i>Uca annulipes</i>	abundant	All along the intertidal zone
7	<i>Uca vocans</i>	abundant	All along the intertidal zone
8	<i>Dotilla myctiroides</i>	abundant	Banks of channels and creeks
9	<i>Thalamita crenata</i>	rarely taken	Banks of channels and creeks
10	<i>Scylla serrata</i>	common	In burrows made at muddy banks of channels, creeks Puddles and with in thickets of mangroves from low to High water marks
11	<i>Portunus sanguinolentus</i>	common	Muddy , sandy banks of channels

Table 5: Distribution of crabs in different vegetation zones

Sl.No	Name of the zone	Crab species
1	Rhizophora zone	<i>Sesarma quadratum</i> , <i>M.latifrons</i> , <i>Metapograpsus messor</i> , <i>Scylla Serrata</i> , <i>grapsus albolinatus</i> , <i>Thalamita crenata</i>
2	Avecinia zone	<i>Sesarma quadratum</i> , <i>Grapsus albolinatus</i> , <i>Ocypoda ceratophthalmus</i> <i>O. cordimanus</i> , <i>Scylla serrata</i> <i>Uca vocans</i> , <i>Uca annuleppis</i>
3	Back mangrove zone	<i>Metapograpsus messor</i> , <i>Ocypoda species</i>
4	Non-saline zone	<i>Dotilla myctiroides</i>

### Conservation Measurers

1. A single female crab can produce up to eight million eggs in one mating season, so try to minimize their capture
2. Berried crabs should be released back if at all they are caught in the nest
3. Juveniles and undersized crab should not be caught
4. Fishing of crabs should be strictly banned during their peak breeding season
5. Awareness should be created among the local people and fisherman regarding the depletion of the crab
6. Extension programmes of crab conservation should be carried out through media
7. Waste water released into this complex area should be treated well before its release into the natural waters
8. To maintain the population, sea ranching commercially important crab species should be practiced

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