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Study on Population Status of Mangrove Clam *Geloina proxima* (Prime, 1864) Along Dapoli Coast of Ratnagiri, Maharashtra, India

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Abstract: Population status of mangrove clam *Geloina proxima* from Dapoli coast of Ratnagiri, Maharashtra, India was carried out during May 2017 to September 2018. Data of occurrence of *Geloina proxima* were recorded by frequent visits from 12 selected divisions that has mangrove vegetation and harbor the clam *Geloina proxima*. The availability of this clam in pre-monsoon, monsoon and post-monsoon season was recorded with their size. It is observed that the clam *Geloina proxima* found in all three seasons i.e. pre-monsoon, monsoon and post monsoon season along Dapoli coast. The clam size range between 30 mm - 100 mm. It has random but patchy dispersal in the intertidal mud flat and around the mangrove roots. Most of the localities of Dapoli coast favours the growth and population size of this clam. It's presence throughout the year in very large number in the size groups 30 mm to 100 mm confirms that it is one of the indigenous and dominant bivalves of Dapoli Coast and may support very good clam fishery in Ratnagiri district throughout the year.

Keywords: Mangrove, Clam, Mollusc, Bivalve, Population, Dapoli, *Geloina proxima*

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Introduction

Marine environment supports a vast assemblage of various forms of life, as it provides 300 times more inhabitable space than that provided by land and freshwater combined. Almost all groups of animals are found adapted here, except Myriapoda and Onychophora. Molluscs are the diverse group of animals varying in shell structure and coloration having notable adaptability in this environment.

Bivalvia class of phylum mollusca is considered as economically most important class. It includes oysters, clams, mussels, scallops, ark shells and cockles that occur abundantly in the shallow coastal waters and most of them are used as food (Bal and Rao, 1990; Khan and Liu, 2019; Chakraborty and Joy, 2020; Orita *et al*., 2021). In India oysters, mussels, clams and giant clams are exploited extensively from marine regions. However, the molluscan fishery is not well organized along the Indian coast. They are exploited in large quantities by traditional methods and sold live and dried conditions in the market for human consumption (Venkataraman and Wafar, 2005; Chatterji *et al*., 2002). Molluscs,

especially clams, are abundant in South Kanara district, Karnataka and are harvested by traditional methods during non-monsoon period (James *et al*., 1975). In India, oysters, clams, mussels, scallops, ark shells and cockles form the major constituents of food of the coastal people. The literature survey of bivalves suggests that some bivalves, besides their regular occurrence are left unattended, especially those occurring in the mangrove vegetation. These bivalves usually occur in shallow coastal waters and estuaries, especially in intertidal zone. Hence, they are largely influenced by the environmental changes such as fluctuations in water salinity, temperature, pH, tidal amplitude and the blooms of algae and phytoplankton (Nair and Thumpy, 1980).

The coastal people harvest these bivalves regularly and sold them in local markets only. These bivalves usually sold as an intact animal by a measuring pot locally called 'sher'. Cost of the single 'sher' ranges between Rs. 20-30. The fishing of bivalves usually done by the traditional methods, without using specific gear.

Mangrove bivalves are least well known, because of very scanty information is available about them. However, they, form an important food for human consumption, especially for the coastal people (Kale, 1997).

The *Polymesoda* genus is the characteristic of the two major mangrove systems, namely the Caribbean and the Indo-Pacific. The subgenus *Geloina* from the Indo-pacific seas has been given separate status of the genus and hence, it is now separated from the genus *Polymesoda* (Morton, 1976). This genus is mainly found in high-zoned mangroves (Castaing *et al.*, 1980). The clam *G. proxima* belongs to family Corbiculidae. There are four genera of family Corbiculidae namely -- *Geloina, Villorita, Batissa* and *Corbicula* that are distributed along South America, Africa, Asia and Australia.

The species of *Geloina* from Thailand described are *G. coaxans, G. bengalensis and G. proxima* (Brandt, 1974). *G. proxima* is more elongate, particularly posteriorly and does not possess flexure. Shells are equivalved, trigonal-ovate in outline, inequilateral, distinctly expanded posteriorly. The periostracum is yellow in young individuals. The periostracum darkens with the age. Outside of the shell appears chalky white. Interior appears chalky or porcelaneous white. The *G. proxima* has synonymy as *G. expansa. G. bengalensis* is largely restricted to Indian oceans (Morton, 1976). The shell is immediately recognizable by the distinct subtrigonal shape. Maximum shell length is 10 cm but usually it is 7 cm.

Dapoli tehsil of Ratnagiri district is located at 17^0 North latitude and 73^0 East longitudes, having an elevation of 230 meters above mean sea level. This tehsil has about 54 km long coastal belt covered by mangrove vegetation that shelters variety of bivalves including the clam - *G. proxima.* The current study was undertaken to study the diversity of the mangrove clam *G. proxima* (Prime, 1864) with a special emphasis on the population status in the mangrove vegetation.

Materials and Methods

For diversity study frequent field visits were undertaken to 12 mangrove vegetation sites of Dapoli Coast as indicated in Figures 1 and 2. Five quadrates of nylon rope (each 1 m^2), was prepared randomly at each locality just over the bed once in each month during the study period (May 2017 to September 2018). Live clams were collected by handpicking with the help of knife (locally called Vila) during the low tides. Collection usually done during the low tides, when sufficiently large intertidal region was exposed off as shown in Figure 3.

The clams were washed carefully with the estuarine water and brought to the laboratory where they were again brushed to clean and arranged in groups for measurement of size. Then they were preserved with 70% alcohol for taxonomical identification. Mangrove twigs also brought in to the laboratory for identification. The

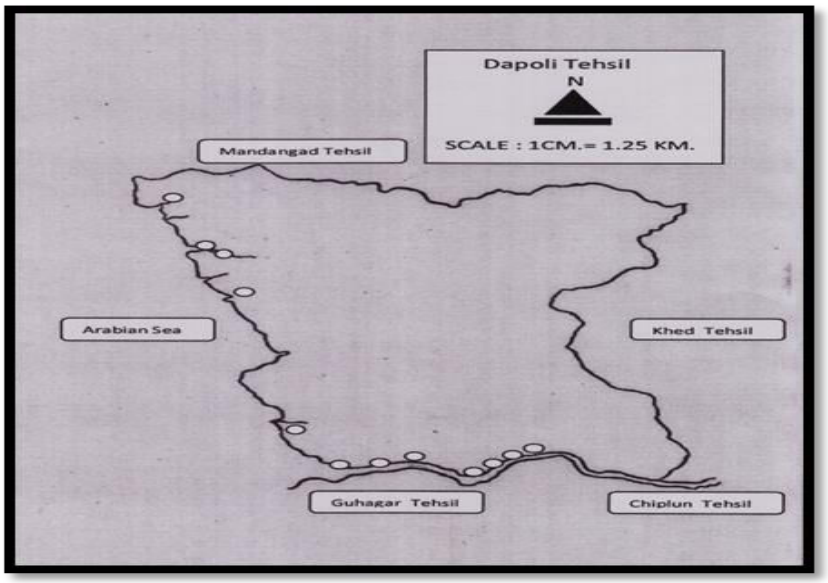
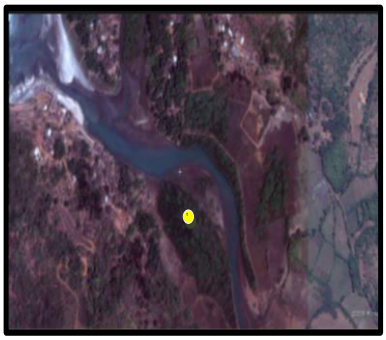
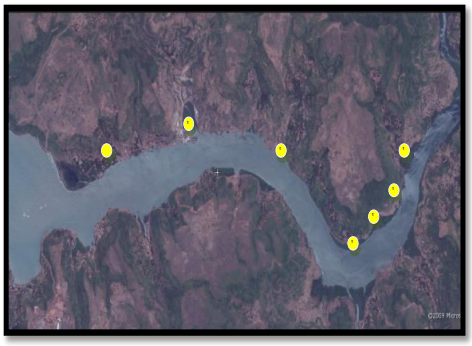


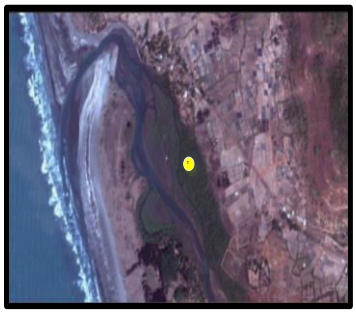
Fig. 1: Map of the 12 mangrove vegetation areas (indicated as 'white circles') of the Dapoli coast.



Panchnadi



Dabhol, Usgaon, Onanavase, umbarghar,Panderi,Bhopan,Bhadavale



Saldure

Anjarle,Paj-pandhari

Kelashi

Fig. 2: Mangrove vegetation sites of Dapoli coast that harbors clam *G. proxima.*

Exposed on the mud flats. A separate clam

Fig. 3: *G. proxima* on the mud flats.

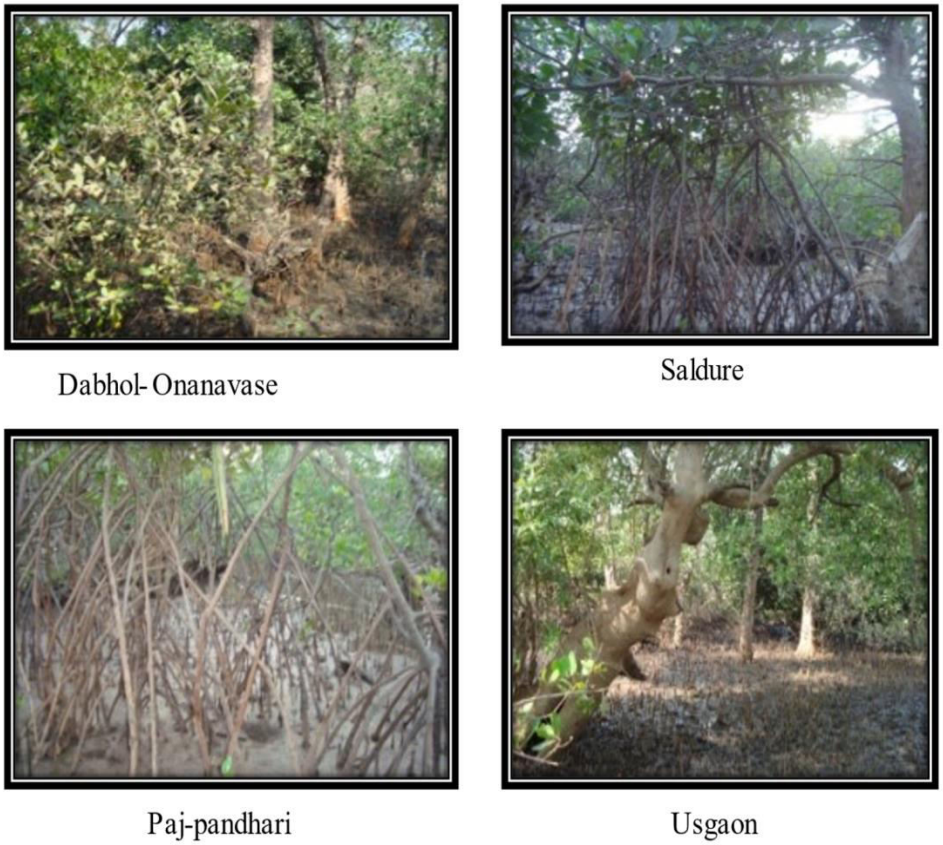


Fig. 4: Mangrove vegetation of Dapoli Coast.

clams were identified by Zoological Survey of India, (Western Regional Centre), Akurdi, Pune, India. The authentication certificate was obtained from the Zoological Survey of India.

Results

The mangrove vegetation in Dapoli Coast covers villages such as Dabhol, Ona-navase, Usgaon, Bhadavale, Umbarghar, Panderi, Bhopan, Kolthare-Panchanadi, Saldure, Anjarle, Paj-pandhari and Kelashi as indicated in Figure 4.

Seven mangrove species, which include *Clerodendrum inerme, Lumnitzera racemosa wild,*

Rhizophora mucronata, Acanthus ilicifolius, Aegiceras corniculata, Sonneratia apetala and Ceriops tagal were seen very commonly along the 12 locations under study.

Total 355 clams (*Geloina proxima*) were collected from 12 divisions of Dapoli coasts. The collected clams were of various size groups ranging from 30-100 mm as shown in Figure 5. The check list of *Geloina proxima* along 12 collection sites of Dapoli coast are given in the Table 1 and month-wise population data of collected clam specimens with their average length is given in the Table 2.

Table1: Check list of *Geloina proxima* (Prime, 1864) along 12 sites of Dapoli coast

	Collection Site	**Population of *G. proxima***
1.	Dabhol	Present
2.	Ona-navase	Present
3.	Usgaon	Present
4.	Umbarghar	Present
5.	Panderi	Present
6.	Bhopan	Present
7.	Bhadavale	Present
8.	Panchanadi	Present
9.	Saldure	Present
10.	Anjarle	Present
11.	Paj-pandhari	Present
12.	Kelashi	Present

Discussion

The diversity of mangrove clam *Geloina proxima* was recorded from 12 sites of mangrove vegetation to know its population status along Dapoli coast. The monthly data of population status were recorded with clam size. The clams of average size range of 30 mm - 100 mm were recorded in pre-monsoon, monsoon and post-monsoon seasons. It is noted that the clam *G. proxima* was found dispersed randomly in the intertidal mud flat and around the mangrove roots throughout the year. This could be probably due to the existence of wide mangroves and muddy area in this region that provides the suitable habitats for this bivalve. Habitat dependent viability during the post-settlement phase could be the best explanation for the non-random, patchy distribution of *P. erosa* in the high tidal area of the mangrove forests (Clemente and Ingole, 2011). The average size of *G. proxima* found varying in the month of June to May. The small sized clam were found in large number in the month of June while large sized clams were found in the month of May. The average small sized animal (length wise) found was 31.45 mm found in the month of June. However, the largest sized clam was observed in the month of May with 96.3 mm in length. It is interesting to note that in *G. proxima*, irrespective of the sex, there is a coordination between the length and weight relationship. It means that as the length of the animal increases, the weight is also gained by the animal (Kale, 1997). During the survey of the *G. proxima* it is observed that these clams gain access to oxygenated seawater through a ventilation burrow or tube. By locating the opening of this burrow, collectors can detect the presence of a buried clam and harvest it nondestructively with a knife or with bare hands. Various bivalve species were fished in this region but most of them utilized for local consumption. *G. proxima* is of great interest due to its year-round availability. Its good population density along Dapoli Coast is indicative of a unique and unpolluted ecological habitat of mangroves. Present status of *G. proxima* fishery in Ratnagiri district, suggests that it has excellent attributes for mariculture (James *et* al., 1975). This species is also of special interest to zoologists because it is able to tolerate a wide range of salinities by isolating themselves by closing the valves (Kale, 1997; Kale and Pawar, 2002). This dominant bivalve species of these localities could be the potential source of antioxidant (Pachaiyappan *et*

Table 2: Month-wise population of *Geloina proxima* (Prime,1864) with average length in mm

Month and Year	Length Group (mm)	Number of Specimen Collected	Avg. Total length (mm)
May 2017	90-100	15	97.23
June 2017	30-40	31	33.52
July 2017	40-45	18	43.08
August 2017	45-50	25	48.11
September 2017	50-55	26	54.7
October 2017	55-60	28	58.2
November 2017	60-65	27	63.5
December 2017	65-70	24	67.04
January 2018	70-75	24	72.6
February 2018	75-80	25	78.9
March 2018	80-85	17	83.1
April 2018	85-90	12	87.6
May 2018	90- 100	09	98.85
June 2018	30-40	16	36.20
July 2018	40-45	20	42.16
August 2018	45-50	16	47.32
September 2018	45 -50	22	51.87
Total Clams Collected		**355**	

Fig. 5: *G. proxima* of various size groups ranging from 30 to 100 mm.

al., 2014) and antiviral drugs (Chatterji *et al*., 2002; Dang *et al*., 2015; Yap, 2020).

Conclusion

Dapoli coast provides the suitable habitat to support good population of clam *G. proxima.* Hence, it is the dominant and indigenous species of Dapoli coast. In view of the commercial importance of this species, the information of mangrove vegetation, has implications for the selection of suitable sites for cultivation of this species. It's year-round availability confirms that it is an indigenous clam of Dapoli coast. It is therefore claimed that this mangrove clam *Geloina proxima* may support clam fishery in Ratnagiri district throughout the year and would also be helpful to meet the daily need of food along the coastal region of Dapoli.

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