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A Study and Species Abundance of Freshwater Crabs in Sangli and Kolhapur Districts of Maharashtra

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A B S T R A C T

A study of crabs was conducted at eight different localities in two districts of Maharashtra, during January to December, 2019 with a view to assess the availability and to study taxonomic description of freshwater crabs. The study investigated species diversity which includes their taxonomic description, habitat, distribution and ecological role. The specimens were collected in different times covering the major seasons rounded the year by hand picking method and also collected from market. A total 3 species of freshwater crabs under single family were recorded. The identified 3 species of crabs were *Barytelphusa cunicularis*, *Barytelphusa guerini* and *Oziotelphusa wagrakarowensis* all of these were under family Gecarcinucidae. *Barytelphusa cunicularis* species was the dominant species in Sangli and Kolhapur districts of Maharashtra.

***Key words*:** Freshwater crabs, Diversity, Abundance, Sangli, Kolhapur

Sangli and Kolhapur districts of Maharashtra state are mostly composed of hill ranges of Sahyadri with flat tops and plains. These regions include areas of rivers, lakes, streams, ponds and waterfalls that are excellent ground for biodiversity. Various small and moderate water bodies and tributaries of river in Sangli district have been found as a source of water. Crabs are very ecologically important species. These water bodies contain diversity of crab species that have yet to discover. Freshwater crabs are mostly distributed throughout the tropical and sub-tropical regions of the world. They live in a wide range of water bodies, from fast- flowing rivers to swamps, the majority of species are endemics, occurring only in a small geographical area. This is due to their poor dispersal ability and low fecundity [1] and due to habitat fragmentation caused by the world's human population [2].

Freshwater crabs prefer live or dead animal as food. They are the chief source of food for fishes, birds and mammals. Freshwater crabs also serve as a cheap and important source of protein to human being particularly tribal and poor people. Freshwater crabs are highly endemic due to their limited dispersal ability, low fecundity and selected habitat preferences [3].

In most of decapods, the gonopores (sexual openings) are found on the legs. However, crabs use the first two pairs of pleopods (abdominal appendages) for sperm transfer, these arrangements has changed. As the male abdomen evolved into a narrow shape, the gonopores have moved towards the midline; away from the legs, and onto the sternum [4]. The Freshwater crab fauna of Sangli and Kolhapur districts of Maharashtra state have been broadly surveyed by researchers. It is necessary to know the biodiversity of freshwater crabs in Sangli and Kolhapur districts of Maharashtra state for the conservation purpose. So, the present study was focused to identify the crab species in the study area and also to study the species abundance.

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MATERIALS AND METHODS

The study was conducted in eight selected sites, four sites from Sangli district are Takari, Sagareshwar wildlife Sanctuary, Bhilwadi and Kokrud while other four sites are from Kolhapur district are Panchganga Ghat, Kagal, Amba Ghat and Barki (Fig 1). The study was conducted from January 2019 to December 2019 in the different seasons with four times of crab collection.

Collection and preservation of specimens

Crab specimens were collected from above mentioned areas. After collecting the crabs, were photographed and preserved in plastic container with 70% alcohol. The specimens were permanently preserved in 5-10% formalin. About 120 specimens were collected from all the areas and 25 adult specimens were chosen for morphometric study.

Crab identification

The specimens were identified by using crab identification key by Alcock [5] and Cumberlidge and Sachs [6] (1989). Identified species are confirmed by ZSI Pune.

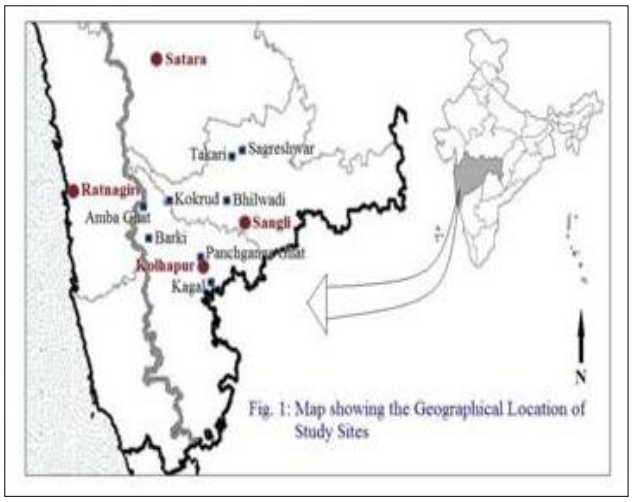

Fig 1 Map showing the geographical location of study sites

Fig 2 *Barytelphusa cunicuilaris*

Fig 2 *Barytelphusa guerini*

Fig 4 *Oziotelphusa wagrakarowensis*

Measurement

Morphometric measurements were taken by using scale, tape and 'Vernier Caliper'. The colour noted in live condition. Body length, width, depth was measured by scale. The unit of measurement was in cm. The selected morphometric or morphological characteristic for identification of specimen were taken from the fresh and preserved specimens.

Statistical analysis

The data were analyzed by estimating the mean value and standard deviation to determine correlation among carapace length (CL) and carapace width (CW). Correlation was calculated by using Pearson Correlation Equation:

$$r = \frac{1}{n-1} \sum \left[\frac{(xi-\bar{x})}{sx} X \frac{(yi-\bar{Y})}{sy} \right]$$

Where, the carapace length x represents the values of independent variable and carapace width y represents the values of dependent variables. X and Y denote the average values.

The value of r ranges between +1 and -1

r > 0 indicates a positive relationship of X and Y; as one gets larger.

r < 0 indicates a negative relationship: as one gets larger the other gets smaller.

r = 0 indicates no relationship

If two variables are positively associated, then positive values of $(xi - \bar{x})$ will match up with positive values $(yi - \bar{Y})$, and negative values with the negative values. The sum of $(xi - \bar{x})$ $(yi - \bar{Y})$ will produce a positive correlation. In a negative relationship, positive values of $(xi - \bar{x})$ with match up with negative values of $(yi - \bar{Y})$ and vice versa. Then the sum of $(xi - \bar{x})$ $(yi - \bar{Y})$ and r, will be negative. If we calculate the Pearson correlation of x with itself, the result will be 1. If there is no association between X and Y, there will be no systemic relationship between $(xi - \bar{x})$ and $(yi - \bar{Y})$. Therefore, the positive value of one match up with positive and negative values of the first variable.

RESULTS AND DISCUSSION

In the present study 3 species of crabs recorded from the selected sites of Sangli and Kolhapur districts. These are *Barytelphusa cunicularis* (Westwood in Sykes 1836), *Barytelphusa guerini* (H. Milne Edwards 1853) and *Oziotelphusa wagrakarowensis* (Rathbun 1904) belongs to family Gecarcinucidae. The percentage of crabs found in Sangli and Kolhapur districts was 48% dominant species *Barytelphusa cunicularis*. The lowest abundance recorded was 12% *Oziotelphusa wagrakarowensis* [7]. Also, the *Barytelphusa guerini* was 40% of the studied specimens (Fig 2-4).

Table 1 Observed crab species in the study areas

Family	Species	Sites of occurrence							
		Sangli				Kolhapur			
		Takari	Sagareshwar	Bhilwadi	Kokrud	Panchaganga Ghat	Kagal	Amba Ghat	Barki
Gecarcinucidae	*B. guerini*	+	+	+	+	+	+	+	+
	B. cunicularis	+	+	+	+	+	+	+	+
	O. wagrakarowensis	-	+	-	-	-	-	+	+

Table 2 Habitat diversity of the study sites

Study sites	GPS coordinator	Habitat
1) Takari	17.119257 N 74.355615 E	Krishna river bank
2) Sagareshwar	17.146927 N 74.367094 E	Wildlife sanctuary, Hill streams
3) Bhilawadi	16.993488 N 74.470617 E	Paddy Field
4) Kokrud	17.008502 N 73.978223 E	Warana river bank
5) Panchaganga Ghat	16.706425 N 74.217491 E	Panchganga river bank
6) Kagal	16.554474 N 74.318877 E	Dudhganga river bank
7) Amba Ghat	17.000743 N 73.777234 E	Hill streams
8) Barki	16.768539 N 73.841161 E	Waterfall and lake

Table 3 Biometric measurements of *Barytelphusa cunicularis*

Measurement	Min cm	Max cm	Mean cm	SD
Carapace length	4.51	6.84	5.58	0.66
Carapace width	2.69	4.13	3.40	0.43
Abdominal length	2.10	3.23	2.63	0.34
Telson length	0.57	0.94	0.75	0.11
Merus length	1.59	2.57	2.07	0.29
Carpel length	1.96	2.92	2.41	0.32
Palm length	0.98	1.69	1.36	0.19

Table 4 Biometric measurements of *Barytelphusa guerini*

Measurement	Min cm	Max cm	Mean cm	SD
Carapace length	3.57	5.32	4.38	0.67
Carapace width	2.45	3.73	2.99	0.45
Abdominal length	1.58	2.43	1.95	0.30
Telson length	0.37	0.61	0.49	0.08
Merus length	1.22	1.91	1.52	0.22
Carpel length	1.19	1.89	1.52	0.23
Palm length	0.97	1.51	1.23	0.20

Table 5 Biometric measurements of *Oziotelphusa wagrakarowensis*

Measurement	Min cm	Max cm	Mean cm	SD
Carapace length	3.29	4.26	3.66	0.52
Carapace width	2.38	3.17	2.70	0.41
Abdominal length	1.52	1.78	1.65	0.13
Telson length	0.52	0.74	0.61	0.11
Merus length	1.12	1.49	1.26	0.20
Carpel length	1.19	1.51	1.31	0.17
Palm length	0.80	1.08	0.91	0.15

Barytelphusa cunicuilaris and *Barytelphusa guerini* are closely related species under the same genus. There are some dissimilarities present in their morphology. *Barytelphusa cunicuilaris* is more robust than *Barytelphusa cunicuilaris guerini* and carapace of *Barytelphusa cunicularis* is slightly convex and gradually sloped posteriorly which is wider and more convex in *Barytelphusa guerini*. The epibranchial tooth is distinct, blunt or sometimes slightly sharp and markedly above the level of postorbital cristae. In *Barytelphusa guerini* sixth male abdominal somite broader nearly equal in length to telson in *B. cunicularis* which is trapezoidal with straight lateral margins broader than long nearly equal in length to telson in *B. guerini*. *Oziotelphusa wagrakarowensis* is clearly remarked by having carapace broader and long, highly convex in frontal view, epibranchial tooth moderate in size, male abdominal somite trapezoidal, wider than long, sub equal in length to telson with distinctly concave lateral margins [8-9].

The study habitats of the crabs are greatly varied. Crab species lives in a wide variety of habitats like mudflats, under stones, in the gravel, in the crevices of rocks and freshwater crabs are found in all important habitats types, including flood plans, swamps, lakes, streams, constructed burrows, tunnel like burrows in river bed, river bank with trees, river bank near agricultural field (Table 1-2).

In the biometrical study carapace length and width, abdominal length, merus length, carpal length and palm length of 3 studies crabs were measured [10]. Correlation of carapace length and carapace width were measured (Table 2-5). The

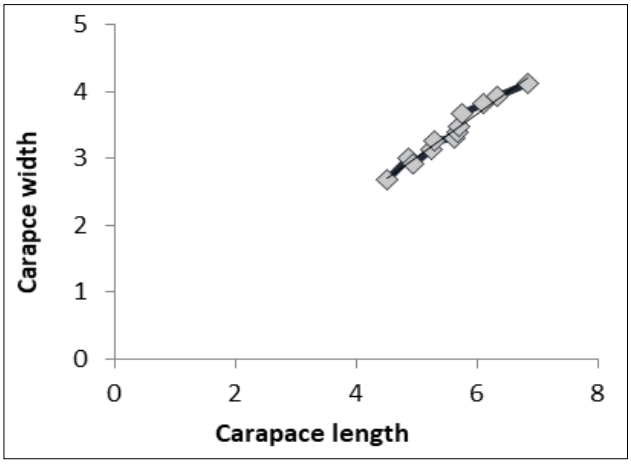

Fig 6 *Barytelphusa cunicularis*

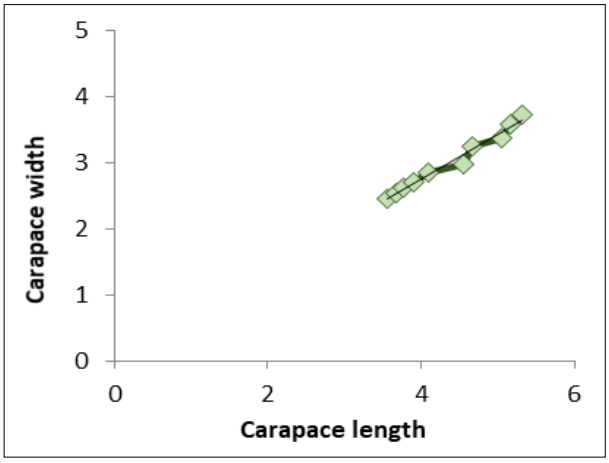

Fig 7 *Barytelphusa guerini*

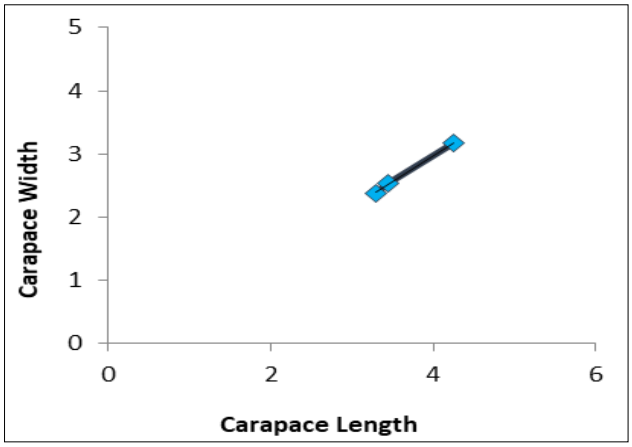

Fig 8 *Oziotelphusa wagrakarowensis*

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value of correlation coefficient (r) is 0.965 For *Barytelphusa cunicularis*, 0.972 for *Barytelphusa guerini* and 0.997 for *Oziothelphusa wagrakarowensis* which implies that there is strong positive linear association between the variables carapace length and carapace width (Fig 6-8).

CONCLUSION

Previous information of freshwater crabs was not adequate in Sangli and Kolhapur districts of Maharashtra, and thus the comparison of the present findings with previous one was not possible. Total 3 species of crabs found in this study. Among the three species and this species is under data deficiency conservation rank. The present study mainly focused on morphological characteristic and habitats of crab species. The study area is regarded as hot spot of biodiversity and crabs have enhanced this biodiversity. Tribal peoples of study area depend on crabs for food. The present study signals that the study area contains a rich biodiversity which is usually less known and it strongly suggests the further extensive survey of these districts by long term basis.

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