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ORIGINAL ARTICLE

Habitat ecology of Burrowing crab *Barytelphusa cunicularis* in the tributaries of Godavari river Nanded (MS), India

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ABSTRACT
The burrowing crab Barytelphusa cunicularis is most abundant in Godavari river and its tributaries. This crab excavates and maintains large semi-permanent open burrows with funnel shaped entrances whereas the tunnel shaped burrows internally curved as a wave with short distance (2-4 Ft.). Present study was carried out during year 2016-2017 and total number of burrows recorded in river Asna and Lendi the tributaries of Godavari River in Nanded region, Maharashtra. Mean frequency of burrows of size category (5.0 to 9.0) was 9.35 ± 0.40 and 6.92 ± 0.41 respectively in the tributaries of Godavari river.
Keywords *- B. cunicularis, Habitat ecology, Burrows, Godavari River.*

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INTRODUCTION

Freshwater crabs are semi-terrestrial crustaceans. They construct their burrows actively along riverside in muddy areas. Burrows are important to freshwater crabs for a number of functions such as allowing them to adapt to a semi-terrestrial existence, avoid environmental stresses and protection from predators. Crab excavate burrows in the mud to avoid wave action of water in their habitat. Crabs excavate tunnel like burrows by dragging up of soil using trailing movement of walking legs and bulldozing it far from the mouth of the tunnel/burrows with the main cheliped [1]. The crab species excavate burrows of various size and shape (Y, S, J, L, U, V), with more complex architecture [2].There is strong correlation between burrow size and carapace length of crabs. Each species shows different morphological characteristics [3]. It depends on species and its various purpose [4]. The animal those create habitat, that directly or indirectly modulate the availability of resources are considered as "ecosystem engineers" [5]. Present investigation was planned to estimate population density, size and shape of burrow of the crab species. It developed as an important database for suggesting crab-culture model for the fisher community under ex-situ conditions, for the backyard crab culture of the species.

MATERIAL AND METHODS

Study area

The present study was conducted at two study sites namely Asna river (19◦14'0.5424''N, 77◦16'9.2496''E) and Lendi river (18◦28'16.9716''N,77◦16'50.2464''E) during year 2016-2017. These are tributaries of Godavari River situated 5.0 km north east to the Nanded city of Maharashtra state in India.

Field Study

Field study were carried out during year 2016-2017 for crab burrow counting manually were carried out in 1 M^2 area. Two sites were characterised by main river bed, river bank with trees, agricultural field, and boulders & rocks (Table 1 & 2).

Abundance of crab burrows

At both study sites 14 plots were marked each of 1.0 M^2 in rectangular pattern randomly as per availability of burrows in the area (Table.1&2). Burrows were recorded according to habitat condition used by this crab species. The burrow count was carried out in main river bed, in river bank with trees, in river bank near agricultural field and burrows in boulders and rocks with the help of labours the area was searched and marked for this study.

RESULTS AND DISCUSSIONS

Crabs are ecologically important creature in an aquatic ecosystem for nutrient mixing during burrow preparation in a habitat [6]. The survey conducted in fifteen different station in backwater area of Cochin, Kerala, India and observed that the crab species *Varuna litterata* construct burrows along the embankments or sides of pools, creeks and shallow banks [7]. Whereas, *B.cunicularis* in present construct majority of burrows in the river bed (57& 40 number of burrows respectively in Asna and Lendi river. Muddy and rocky area with boulders was preferred second area for preparation of burrows (43 &30 burrows respectively).

Distribution and abundance of freshwater crab *Potamonautes odhneri* from natural vegetation forest site in rivers of Kenya was examine by [8]. The adults of this species were found in the river bed, they observed 40% invertebrates reproduced in the open agricultural sites and reported that it is a part of recruitment of young crabs; in the present study we found (24 &15 burrows) in agricultural fields, along the two rivers at the study sites.

A correlation found between burrow architecture and size class, sex of the fiddler crab *Uca rosea in* Sundarbans of west Bengal in India [9], similar results we obtained to get an idea from burrow size about the size class of this crab species.

The crab carapace width showed significant correlation with the diameter of burrow opening. Burrow volume and total length of burrows [10]. In their study it was observed that crabs utilize deep burrows with large diameter located on the upper part of sandy shore. In the present study on crab burrow carried out in two rivers in 14 different plots of $1M^2$ area, according to habitat condition used by crabs (Table 1 and 2).

Crab burrowing in salt marshes can mix surface and deeper soil over a period of years [11], accelerating litter decomposition and promoting the efficient reuse of nutrients by plants. Variation in the burrow architecture with crab age appears to be related to the crab's behaviour [12].Whereas in the present study the size of burrow tunnel (diameter in cm) directly represent the size group of the crab species in different microhabitat of study area.

Table 1. - The number burrows/M^2 of *B.cunicularis* recorded during year 2016-2017, in Asna river near Nanded, Maharashtra

Habitat conditions used for burrow preparation	Burrows/ 1.0 M^2 Counted in 14 plots														Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Burrows in main river bed	06	05	03	04	06	01	01	-	06	-	08	08	07	02	**57**
Burrows in river bank with trees	-	-	01	-	-	-	01	-	-	-	-	04	-	01	**07**
Burrows in river bank near agricultural field	03	05	03	04	-	-	-	-	02	-	-	01	03	03	**24**
Burrows in river bank with boulders & rocks	03	-	03	02	06	01	01	01	06	-	06	04	07	03	**43**
Total	12	10	10	10	12	02	03	01	14	-	14	17	17	09	**131**

Behaviour study and ecology two crab species *Sesarma meinerti* and *Cardisoma carnifex* in mangrove were having same foraging activity but differ in burrowing activity, one was diurnal and another was

nocturnal [13]. *B. cunicularis* found in present study having nocturnal habit to construct the burrows in different microhabitats (Fig. 2. a-f) and diurnal habit to hide in the burrow. It also prefers night time for foraging (6.00 p. m. to 6.00 a. m.). Characteristics study of habitat of freshwater crabs in Singapore's tropical rainforest, to conserve a range of habitat for the survival of four crab species[14].

[15], compared nine crab burrow dimensions and differentiated the crab size class. The fiddler crab burrows were with steeper decent slope in sandy habitat than muddy habitat. In the present study also burrow size class and their abundance (Frequency) in a particular plot of $1M^2$ area was recorded (Fig.1- A and B) in both the tributaries (Table 3.).

Table 2. -The number of burrows/ M^2 of *B. cunicularis* recorded during year 2016- 2017, in Lendi river, Nanded, Maharashtra.

Habitat conditions used for burrow preparation	Burrows/ 1.0 M^2 Counted in 14 plots														Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Burrows in main river bed	12	03	02	01	01	-	02	02	04	01	02	04	01	05	40
Burrows in river bank with trees	02	-	01	01	-	-	01	02	01	01	01	-	01	01	12
Burrows in river bank near agricultural field	06	02	-	-	-	-	01	-	01	01	01	-	01	02	15
Burrows in river bank with boulders & rocks	06	02	04	01	-	04	01	02	01	01	01	02	04	01	30
Total	26	07	07	03	01	04	05	06	07	04	05	06	07	09	**97**

Table 3- Burrow size category and frequency of occurrence in both rivers.

Asna river		Lendi river	
Burrow size class (tunnel diameter in cm)	Frequency in %	Burrow size class (tunnel diameter in cm)	Frequency in %
5.0-5.5	19.0	5.0-5.5	12.3
5.5 - 6.0	19.8	5.5-6.0	15.4
6.5-7.0	39.6	6.5 -7.0	18.5
7.5-8.0	12.9	7.5-8.0	22.6
8.5-9.0	8.39	8.5-9.0	30.9
Mean ± SE 9.35 ± 0.40		Mean ± SE 6.92 ± 0.41	

Fig. A

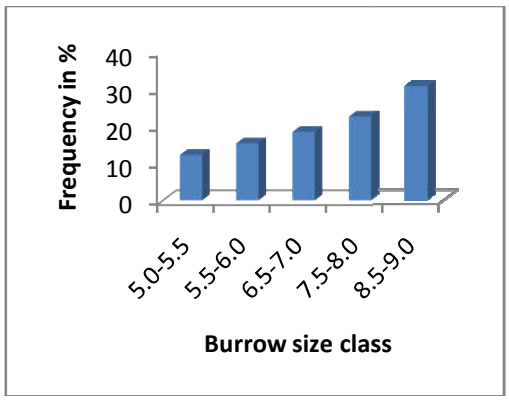

Fig. B

Fig. 1. A) & B). The % Frequency and burrow size (tunnel diameter in Cm) category in Asna and Lendi River respectively.

Fig. 2. (a-f). Type of micro-habitat conditions selected for construction of burrows by *Barytelphusa cunicularis* in Asna and Lendi Rivers, the tributaries Godavari River.

CONCLUSION

Burrows of crab *Barytelphusa cunicularis* were mostly found in main river bed where a small pool with boulders and rocks were available. Frequency of occurrence of crab burrows occurrence in 1.0 M^2 area was varied in two river basins. Average 9.35 ± 0.40 and 6.92 ± 0.41 burrows were recorded during six month field visits in year 2016-2017 during late winter to summer season (December to May).

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COMPETING INTERESTS
Authors have no competing interests.

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