CONSEQUENCE OF ENVIRONMENT CIRCUMSTANCES ONDIVERSITY OF BIVALVE (GASTROPODA: MOLLUSCA) IN MAHARASHTRA'S KARANJALI REGION

Niranjan Ramesh Giri
Assistant ProfessorDepartment of Zoology
M.J.M.ACS.CollegeKaranjali.Tal.Peth.Dist.Nashik.Maharashtra India.

Abstract

The research was carried out at three separate locations and looked at the environmental factors that influence the biodiversity and conservation status of freshwater mollusk groups.Increased slog on byssus filaments reduces the plummeting rates of young molluscs, allowing them to migrate (Sigurdsson et al. 1976; Sorlin1988).Many advantages of nursery customconsume been identified for M. balthica (Beukema 1993; Hiddink et al., 2002, in press) [1, 2], but only 1 paper (Hiddink and Wolff, in press) [3], has considered the charges of relocation to and from the nursery; many individuals disappeared throughout both the summer and winter relocations.Freshwater mussels (Unionida) are worldwide scarce but achieve vital bionetwork amenities in temperate ecosystems. Their position and part in tropical regions are unwell tacit, subsequent in a closely ample lack of exertion toward their conservation. Understanding mussel purposes in emerging countries is mainly important because expensive interferences to restore habitat functionality are often infeasible.

Introduction

Mollusks are ecological and bio-indicators, and they help to maintain aquatic ecosystems by reusing nutrients as food for some aquatic creatures. Some freshwater mollusks can be eaten and play a key role in the aquatic ecosystem. Other organisms, such as fishes, bird, and mammals, and also humans, rely on them because of sustenance.. It is vital to investigate the current state of various biota at an era of global biodiversity reduction. (Giri et al., 2022)[23].

The Nashik district has a rich freshwater fauna, Godavari is the second longest river next to Ganga River both shows different type of vegetation and divers fauna. There are some small river which increase the biota among them.The region's biggest freshwater basins are undoubtedly, the region having primary evolutionary hotspots, drawing the greatest attention as important biodiversity conservation regions. Medium-sized rivers,whereas increased the statusof such places. We employed freshwater mussels (Unionidae) as a model to evaluate the levels of endemism in the Nashik District, a little-known remote basin in Maharashtra, when compared to the adjacent rivers in this work. We determined that Nashik district is a unique evolutionary hotspot for freshwater mussels.

The Unionidae maximum probableinvented in Southeast and East Asia in the Jurassic, with succeeding growths into other landmasses [4]. In numerouschief Asian river schemes (e.g., Mekong and Yangtze), remarkable intra-basin fallouts of the Unionidae were exposed, which advises that these sinks may be reflectedearliest (long-lived) rivers that have happenedduring the Cenozoic[4], [5]. Though, the freshwater mussel animals of Asia have involved little courtesy

from scientists related with those from Europe and North America[6], [7]. Although the significance of freshwater mussels in tropical environments is still unwell known, they could play an vitalpart as bio filters in contaminated water bodies[8].Numerous species are successful aggressors, and have feastyonder their innatevarietiescomposed with the primer of their swarm fishes and may threaten naturalcommunities [9,10]. Lastly, freshwater mussels are significantmatters for the attractivedomesticatedcraft, pearl cultivation and food markets across Asian countries [11-13].

Key words: -Bivalve, Savatri river, PAST 4.03, Bray Curtis similarity index, Shannon index

Material and Method

The study were conducted in Peth tehsil among 3 different site for examination the bivalve richness and effect of water current and pollution on the different species of bivalve which are commonly observer in fresh water, we also examine the concentration of species in particular area and observed their locomotion, habit and habitat in present circumstances. Site1 Sarasvati River (S1), site2 Gawanpada Dam (S2) and site3 Inambari (S3). The geological location of Sarasvati River (S1) is 20.254128° N, 73.583565° E, Gawanpada dam (S2) 20.264663 º N, 73.577632 ºE and Inambari Dam is 20.262082ºN, 73.602397ºN.

Statistical Analysis:-

For statistical data analysis, we use PAST 4.03 and MS-EXCEL WINDOWS 2010 8.1 software.

Diversity Index

A.Shannon index:-

H' the variety of species was calculated by using the Shannon index which combines the no. of species within a location virtual plenty of individually species [14, 15, 16, 17]. The statistics were studied to understand α & β variety in the Shannon Index, which combines the no.of species within a site with the comparative plenty of individually species.

$$RH' = -\sum piIn\ pii = I$$

Here pi is the proportion of the i^{th}species in the community and their evenness in abundance (or equitability) are the two parameters that define H'.

B. Pielou's Evenness index:-

(Equitability) or J'. The species evenness is the comparative profusion or proportion of individuals among the species. Evenness of species reveals how their relative abundance is distributed in a particular sample or site [18, 19].

$$J' = H'/In\ S$$

Here, S is the number of species present in the site. The value of J' ranges from 0 to 1.

Sørensen's similarity Index: $\beta = 2c / (S1 + S2)$

Where, S1 = the total no. of species noted in the 1st civic, S2 = the total no. of species noted in the 2nd civic, and c = the no. of species common to both communities. Sørensen's index21 is a simple measure of bet diversity, ranging from a value of 0 if no species overlap between the communities to a value of 1 when the same species are initiate in both communities.

The observation and identification were done by used the literature [20, 21, and 22].

1. **Bray Curtis similarity Index**.

Measurable data was rummage-sale to calculate percent resemblance, using Bray Curtis resemblance index [21]. Dendrograms were set to comprehend site-wise trends.

1. **Index of Berger-Parker**:

Berger-Parker index is the most significant method. The grouping of several species in a given area tells the most dominant species proportion.

= [nmax/N] is the procedure for determining the index.

Where nmax indicates the frequency of the dominant species, and N shows the total number of species.

Table 1. Data illustration for Nashik district. Tehsil Peth. Number of species in different sites

Sr.No.	Species	Family	Site		
			Savatri River(S1)	Gawanpada Dam (S2)	Inambari Dam (S3)
1	Thiaralinneata (Grey)	Thiaridae	05	07	03
2	Parreysiafavidens	Uninoidae	08	06	03
3	Pila(Turbinicola) saxea (Reeve)	Pilidae	04	07	07
4	Lymnaealuteola (L)	Lymnaeidae	10	15	08
5	Parreysiacorrugata	Uninoidae	08	07	08
6	Achatinafulica	Achatinidae	14	12	14
7	Melanoides (T) tuberculata (Mueller 1774)	Thiaridae	12	10	09
8	Parreysiakhadkvaslensis	Uninoidae	12	09	07
9	Corbicula anandalei	Corbiculidae	10	08	11
10	Corbicula striatella	Corbiculidae	08	11	09
11	Pila globosa (Swainson)	Pilidae	07	06	12
12	Lamellidensmarginalis (L)	Uninoidae	08	04	11
13	Achatinafulica	Achatinidae (Bowdich, 1822)	10	21	13
14	Achatina immaculate	Achatinidae (Lamarck, 1822)	09	13	07
15	Achatinairedalei	Achatinidae Preston, 1910	09	17	11
Total			134	153	133

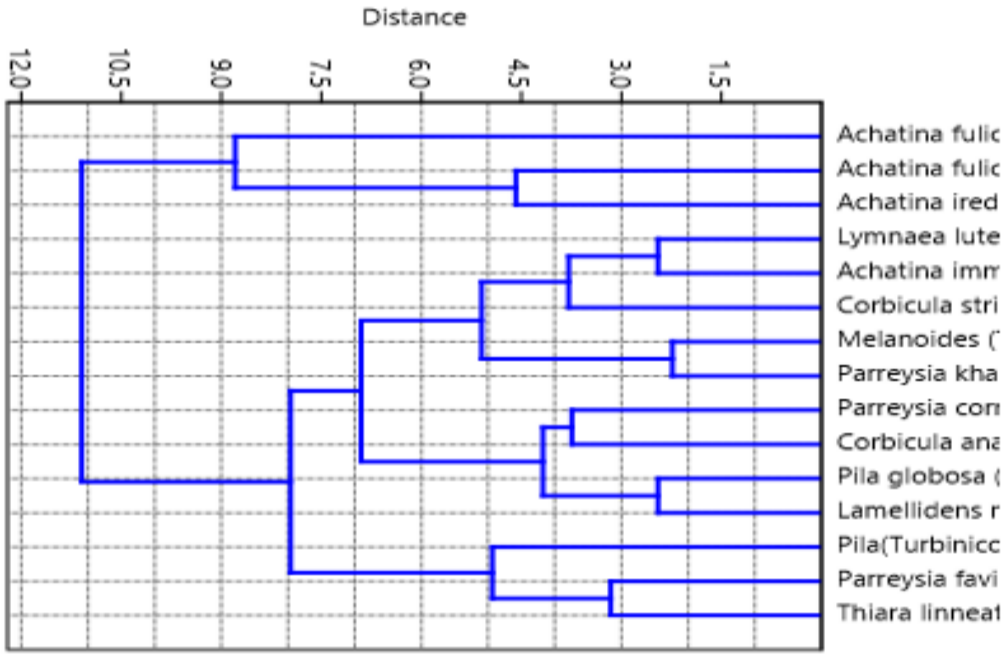

Figure 1:- Bray Curtis similarity index of the year 2019-20 from Nashik district. Tehsil Peth. Number of species in different sites

Table 2. Data illustration for Sahyadri (Savalghat). Peth.Dindori. Number of species in the year 2019 and 2020by using A.Shannon index-, Taxa_S, Dominance_D, Simpson_1-D, Shannon_H, Evenness_e^H/S, Brillouin. Menhinick, Margalef, Equitability_J, Fisher_alpha, Berger-Parker and Chao-1 respectively.

	Savatri River(S1)	Gawanpada Dam (S2)	Inambari Dam (S3)
Taxa_S	15	15	15
Individuals	134	153	133
Dominance_D	0.07195	0.07984	0.07502
Simpson_1-D	0.928	0.9202	0.925
Shannon_H	2.667	2.615	2.638
Evenness_e^H/S	0.9595	0.9109	0.9327
Brillouin	2.468	2.437	2.44
Menhinick	1.296	1.213	1.301
Margalef	2.858	2.783	2.863
Equitability_J	0.9847	0.9655	0.9743
Fisher_alpha	4.33	4.119	4.343
Berger-Parker	0.1045	0.1373	0.1053
Chao-1	15	15	15

Table:-3. Data illustration Bray Curtis similarity and distance indices.

	Thiaralinneata (Grey)	Parreysiafavidens	Pila(Turbinicola) saxea (Reeve)	Lymnaealuteola (L)	Parreysiacorrugata	Achatinafulica	Melanoides (T) tuberculata	Parreysiakhadkvaslensis	Corbicula anandalei	Corbicula striatella	Pila globosa (Swainson)	Lamellidensmarginalis (L)	Achatinafulica	Achatina immaculate	Achatinairedalei
Thiaralinneata (Grey)	1	0.875	0.84848485	0.625	0.78947368	0.54545455	0.65217391	0.69767442	0.68181818	0.69767442	0.7	0.63157895	0.5084745 8	0.6818181 8	0.5769230 8
Parreysiafavidens	0.875	1	0.74285714	0.68	0.85	0.59649123	0.70833333	0.75555556	0.73913043	0.75555556	0.76190476	0.75	0.5573770 5	0.7391304 3	0.6296296 3
Pila(Turbinicola) saxea (Reeve)	0.848484 85	0.74285714	1	0.70588235	0.87804878	0.62068966	0.73469388	0.78260 87	0.76595745	0.78260 87	0.79069767	0.73170732	0.5806451 6	0.7659574 5	0.6545454 5
Lymnaealuteola (L)	0.625	0.68	0.70588235	1	0.82142857	0.82191781	0.875	0.85245902	0.83870968	0.85245902	0.72413793	0.71428571	0.8571 1	0.9354	0.9142857 1

													4286	8387	
Parreysiac orrugata	0.789 4736 8	0.85	0.87 804 878	0. 82 14 28 57	1	0.7 301 587 3	0.85 185 185	0.86 274 51	0.8 846 153 8	0.9 019 607 8	0.875	0.8 695 652 2	0. 68 65 67 16	0. 84 61 53 85	0.7 66 66 66 7
Achatinafu lica	0.5 45 45 45 5	0.5 964 912 3	0.62 068 966	0. 82 19 17 81	0.7 301 587 3	1	0.87 323 944	0.82 352 941	0.8 405 797 1	0.8 235 294 1	0.7 69 23 07 7	0.7 301 587 3	0. 83 33 33 33	0. 81 15 94 2	0.8 31 16 88 3
Melanoide s (T) tuberculata	0.6 52 17 39 1	0.7 083 333 3	0.73 469 388	0. 875	0.8 518 518 5	0.8 732 394 4	1	0.94 915 254	0.9	0.9 152 542 4	0.7 85 71 42 9	0.7 777 777 8	0. 77 33 33 33	0. 86 66 66 67	0.8 23 52 94 1
Parreysiak hadkvasle nsis	0.6 97 67 44 2	0.7 555 555 6	0.78 260 87	0. 85 24 59 02	0.8 627 451	0.8 235 294 1	0.94 915 254	1	0.8 771 929 8	0.8 571 428 6	0.7 54 71 69 8	0.7 450 980 4	0. 72 22 22 22	0. 87 71 92 98	0.7 69 23 07 7
Corbicula anandalei	0.6 81 81 81 8	0.7 391 304 3	0.76 595 745	0. 83 87 09 68	0.8 846 153 8	0.8 405 797 1	0.9	0.87 719 298	1	0.8 771 929 8	0.8 88 88 88 9	0.8 846 153 8	0. 79 45 52	0. 82 75 8	0.8 48 48 48 5

													0 5 5	6 2 1	
Corbicula striatella	0.6 97 67 44 2	0.7 555 555 6	0.78 260 87	0. 88 52 45 9	0.9 019 607 8	0.8 235 294 1	0.91 525 424	0.85 714 286	0.8 771 929 8	1	0.8 30 18 86 8	0.8 235 294 1	0. 7 7 7 7 7 7 7 8	0. 9 1 2 2 8 0 7	0.8 61 53 84 6
Pila globosa (Swainson)	0.7	0.7 619 047 6	0.79 069 767	0. 72 41 37 93	0.8 75	0.7 692 307 7	0.78 571 429	0.75 471 698	0.8 888 888 9	0.8 301 886 8	1	0.9 166 666 7	0. 7 2 4 6 3 7 6 8	0. 7 4 0 7 4 0 7 4	0.7 74 19 35 5
Lamellide nsmargina lis (L)	0.6 31 57 89 5	0.7 5	0.73 170 732	0. 71 42 85 71	0.8 695 652 2	0.7 301 587 3	0.77 777 778	0.74 509 804	0.8 846 153 8	0.8 235 294 1	0.9 16 66 66 7	1	0. 6 8 6 5 6 7 1 6	0. 7 3 0 7 6 9 2 3	0.7 66 66 66 7
Achatinafu lica	0.5 08 47 45 8	0.5 573 770 5	0.58 064 516	0. 85 71 42 86	0.6 865 671 6	0.8 333 333 3	0.77 333 333	0.72 222 222	0.7 945 205 5	0.7 777 777 8	0.7 24 63 76 8	0.6 865 671 6	1	0. 7 9 4 5 2 0 5 5	0.9 13 58 02 5
Achatina immaculat e	0.6 81 81 81 8	0.7 391 304 3	0.76 595 745	0. 93 54 83 87	0.8 461 538 5	0.8 115 942	0.86 666 667	0.87 719 298	0.8 275 862 1	0.9 122 807	0.7 40 74 07 4	0.7 307 692 3	0. 7 9 4 5 2 0	1	0.8 78 78 78 8

													55		
Achatinairedalei	0.576923308	0.6296296 3	0.65454545	0.9142857 1	0.7666666 7	0.8311688 3	0.82352941	0.76923077	0.8484848 5	0.8615384 6	0.774193 55	0.7666666 7	0.913580 25	0.878787 88	1

Result:

The study were conducted in the year 2019 and 2020. We recorded total of 15 species of mollusca in our study area. Most of the snails prefer low temperature i.e. 25º C to 30º C and soil rich in organic carbon.The bivalves inhabit an extensive diversity of environments and, as an importance, diverge extensively from the simple body plan. The shell form is palpable variation to the atmosphere. The adaptations steady of the bivalve in the region and may put heads together around unit of defense in contradiction of pillagers. Such bivalves are slow burrowers.

Finally, founded on the findings, it is determined that the variety of bivalve is described by short-term interactions within a habitat and species of creatures. The social activity and conservational actions can help to treat the wildlife. As a consequence of the dynamic ecological position of the mollusk, it is vital to take measures to preserve its diversity. From the above data, it can be inferred that the density of species in site 1 Savitri River is less than of sites 2, which are relatively studied. Site 1 is a lesser amount of nutritious than site Inambari (S3) but there is human intervention that is present and disturbs the diversity of bivalve, while in S2 site i.e. Gawanapada Dam having higher source of nutritious value than both site i.e. Savatri river (S1) and Inambari site (S3). According to the data, in table 2 the Shannon H result for the sites Savatri River (S1), Gawanpada dam (S2) &Savalghat forest (S3) is 2.667, 2.615 and 2.638respectivel.

TheEvenness_e^H/S shows for Savatri River (S1), Gawanpada dam (S2) &Savalghat forest (S3) is 0.9595, 0.9109 and 0.9327. The Equitability_J shows for the sites Savatri River (S1), Gawanpada dam (S2) &Savalghat forest (S3) is 0.9847, 0.9655 and 0.9743 The Fisher_alpha shows for Savatri River (S1), Gawanpada dam (S2) &Savalghat forest (S3) is 4.33, 4.119 and 4.343 respectively.

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