



Comparison Of Mollusc Fauna Of Devikundsagar Bikaner (Raj) with Kotdam Jhunjhunu (Raj), India

1. SARITA KUMARI 2. ANAND KUMAR KHATRI

1. Research scholar, 2. Professor of Zoology

P.G. Laboratory of Environmental Biology, Govt. Dungar College, Bikaner, Rajasthan (India)

Abstract - Freshwater reservoir are inhabited by diverse benthic fauna of which annelida, arthropoda and mollusca holds a great ecological importance. The desert region of Bikaner is known for arid climate and harsh environmental condition. Despite sparse water resources and challenging environmental conditions, this region supports enough macrobenthic fauna of freshwater including mollusc population. The Kotdam is situated in the village Kot (75°13' E 27°28' N) which is about 40 km from Jhunjhunu. It is also popularly known as Sarju Sagar Bandh. It was built in the year 1924 for the purpose of irrigation and water storage. Molluscs are crucial component of aquatic ecosystem as they add productivity and decay organic matter of aquatic ecosystem. This study aims to give an overview of the diversity of molluscs species of different water bodies of Bikaner. Freshwater molluscs such as snails and bivalves have been widely used as bioindicators to assess pollution in freshwater ecosystems. With the increasing concern over contamination in aquatic environments, especially due to metal pollutants, the use of molluscs in biomonitoring studies has gained significant importance. These organisms are particularly suitable for this purpose because of their large body size, limited movement, and widespread distribution in different freshwater habitats. Molluscs of class gastropoda of different families were observed during study.

Keywords- Aquatic ecosystem, molluscs, diversity, bioindicators, gastropoda.

INTRODUCTION

Molluscs are soft bodied animals, the second largest invertebrate animal phylum next to arthropoda, with over 100000 species. Well known animals of this phylum are snails, octopuses, squids, clams and mussels in freshwater as well as on land. During the course of evolution, they have shown high adaptability and live in almost all available habitats (Ponder and Lindberg, 2008.) Molluscs are bilaterally symmetrical and their tissue covering body wall is known as mantle /pallium (Brusca and Brusca, 2003). This mantle helps to secrete calcium carbonate shell. Their body is divided into three different functional region- head, foot, and

visceral mass. The diverse group of mollusca is distributed in three major categories: gastropods (Stomach footed) having snails, slugs and limpets, bivalves (oysters, mussels, clams) and cephalopods (head footed) octopuses, squids, and nautilus (Haszprunar 2000). Conventional malacofaunal study was started by W.H Benson (British Naturalist) in 19th century and a detailed work on land and fresh water snail was published by Godwin –Austen (1897-1914). Researchers like (Abbot 1989, Seddon 2000, Lydeard et al.2004; Strong et al 2008) estimated 30,000 fresh water mollusc species from which 23-24000 are terrestrial and 7000 are fresh water species. In India 1140 land species and 217 species of fresh water molluscs have been suggested by (Ramakrishna and Dey 2007). According to literature Preston (1915) is regarded as revolutionary scientist for documenting freshwater molluscs in India for the first time. He acknowledged 370 species of freshwater gastropods and pelecypods from the Indo-Burma region. Molluscs add productivity in aquatic ecosystem with their abundance (Padghane et al.2017) and Vaughn (2004). Systematic freshwater malacofaunal study in desert region is done by Subba Rao (1996), Kumar et al (1998), Khatri (2008), Khanam and Singh (2012).

STUDY AREA

To conduct comparative malacofaunal study devikundsagar water bodies of Bikaner district and kotdam of Jhunjhunu were selected. Both are favourite spots of bird lovers. Many migratory birds can be seen here during winter season. Birds like cormorant and egrets are permanent resident here. Additionally fishes, molluscs, insects and other organisms can be observed easily.



Figure 1- Devikundsagar

Devikundsgar- This pond is situated 7 km east of Bikaner city. On three sides brick-wall surrounds the pond while southern part acts as a catchment for the tank. The pond is utilised by village people for the purpose of washing and bathing. A number of tankers or bullock and camel carts are filled and transported from here. The clay of pond bottom is used for brick making on the bank sides. The colour of pond water is sandy and no macrophytes are present. some birds including dab chicks and black-winged stilts are seen.

Near the pond royal crematorium with several ornamental cenotaphs or 'chhatris' built in the memory of the Bika dynasty rulers is situated which is very important from tourist point of view.



Figure 2- Kotdam

Kotdam- The Kotdam (Plate1) is situated in the village Kot ($75^{\circ}13'$ E $27^{\circ}28'$ N) which is about 40 km from Jhunjhunu. It is also popularly known as Sarju Sagar Bandh. It was built in the year 1924 for the purpose of irrigation and water storage. The height of Kot dam is 7.6 m. The dam has Sakambhari temple on its bank, which is revered in the region. The dam was built by Raja Bhoop who ruled the region. The average annual rainfall in the area is 50.8 cm of which average monsoon rainfall alone is 45.72 cm. This rainfall contributes 2.82 mcm water in the dam. This volume of water is derived from a gross catchment area of 11.65 km². The surface water spread of the dam, when full, is 14 km². While the maximum water level of the dam is 39.31 m, the full tank level is 38.10 m from MSL. The gross command area of the dam is 52 hectares in which crops of wheat, gram and mustard are generally raised.

METHODOLOGY

Investigation was conducted in mentioned water bodies (Gajner, Darbari, Harsholav, Kodamdesar) during different seasons for a period of 12 months from April 2022 to march 2023. To collect the molluscs, some specimens were handpicked from littoral zone and other specimens were collected by using quadrat method. In this method mud sample from the pond site were collected by using quadrat of known size 20cm x 25cm. These mud samples then transferred to labelled poly bags and carried to laboratory for further investigation. Mud sample was poured in enamel tray and separated by adding water in it. individual specimen was put in petri dish and viewed under stereomicroscope and bull lens. Specimen identification was done by using standard key. (Ray and Mukherjee (1963) and (Tonapi, 1980).

RESULT AND DISCUSSION

In present study total 6 mollusc species were found out of which two species present in both waterbody as compare to other molluscs. The study on molluscan fauna has been carried out by number of workers, in different region of India and Rajasthan. Earlier Pooja and Khatri (2014), also reported these species from the same region of the Rajasthan. Both water bodies receive rainy water from its catchment area, which run off during the rainy season, and carry several nutrients for the enrichment of aquatic ecosystem, these nutrients are necessary for the growth of molluscan fauna. Molluscs are the benthos as well as bioindicators and they play a very important role in maintaining aquatic ecosystem by recycling nutrients and serving as nutrition for certain aquatic organisms. Molluscs also play a major role for household animal husbandry, as it works as an intermediate host for the cercaria larvae, and affects the population of cattle (sheep). Molluscs inhabiting bottom part of the lake and plays an important role in converting organic matter together with the benthos in to a biomass. This in turn consumed by fishes, thus helps in the secondary productivity and forms an important component of the food web of aquatic ecosystem. Present study shows *Bellamya*, *Lymnaea*, *Thiara*, *Indoplanorbis*, *Gabbia*, and *Digoniostoma* are chiefly present in both water bodies.

Among Molluscs, *Lymnaea acuminata* was the dominant species and it contributed major part of total Molluscan fauna collected from the study area. Molluscan population was observed higher in the summer and monsoon season, which may be due to soft and organically rich bottom and silt matter are known to support thriving populations of benthos, Shyam and Khatri (2018).

During the whole study period, *Digoniostoma pulchella* and *Thiara (Melanoides) tuberculata* were noticed in devikundsagar waterbody while absent in kotdam. *Gabbia orcula* and *Indoplanorbis exustus* were noted in both waterbody devikundsagar as well as kotdam. *Bellamya* was present only in Gajner and Darbari village pond. *Thiara tuberculata* species are common among waters in the Aravalli range making fringe in the south-east of the India desert (Sharma, 2007). Dermott (1985) reported scarce gastropod population on sandy substrate in some lakes of Turkey. Siegfried (1984) observed that the presence of macrophyte beds and high dissolved oxygen concentrations in the littoral zone provided more favourable and diverse habitats for macroinvertebrates including gastropods. The discontinuous distribution of the gastropod species among these desert waters does not seem to be controlled by local ecology since almost same kind of biotopic conditions are offered by these waters. It mostly seems to have been dependent upon occasional introduction and subsequent survival success and propagation of the species in a given body of water. Within a body of water, littorals with hard stony substrates and rich macrophytes growth were found to be better populated by gastropod species.

Table -1. Molluscan Fauna of Devkundsagar

Gastropods	2022 Oct.	2022 Nov	2023 Dec	2023 Jan	2023 Feb	2023 Mar	2023 Apr	2023 May	2023 June	2023 July	2023 Aug	2023 Sept	2023 Oct	2023 Nov	2023 Dec.
<i>Lymnaea acuminata</i> Lamarck	120	110	0	0	120	120	130	120	120	260	240	118	80	310	0
<i>Indoplanorbis exustus</i> (Deshayes)	15	10	10	09	11	16	29	26	20	20	30	40	40	10	09
<i>Thiara (Melanoides) tuberculata crebra</i> Lea	78	62	50	18	10	20	22	25	25	140	680	300	180	150	50
<i>Digoniostoma pulchella</i> (Benson)	07	10	20	30	26	11	10	11	17	40	30	10	10	10	12
<i>Gabbia orcula</i> Frauenfeld	02	05	06	04	10	22	16	19	17	60	120	30	05	05	06
TOTAL :	222	197	86	61	177	189	207	191	199	520	1100	1560	1035	485	77

Table -2. Molluscan Fauna of Kotdam

Gastropods	2022 Aug.	2022 Sep.	2022 Oct.	2022 Nov	2023 Dec	2023 Jan	2023 Feb	2023 Mar	2023 Apr	2023 May	2023 June	2023 July	2023 Aug	2023	2023. Oct	2023 Nov	2023 Dec.	2024 Jan
Bellamya Bengalensis	-	18	29	34	41	43	44	31	45	38	33	18	-	-	7	11	21	26
Incloplanorbis Exustus	-	-	-	-	-	4	6	7	12	8	5	9	-	-	-	-	-	-
Lymonea Acuminata	8	24	27	32	17	19	29	18	37	42	48	23	6	14	22	35	45	49
Gabbia Orcula	-	-	-	-	-	-	-	-	3	6	7	9	-	-	-	-	-	-
Thiara Melanoide s	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	8	42	56	66	58	66	79	56	97	94	93	59	6	14	29	46	66	75

REFERENCES

1. Abbott, R.T. 1989. Compendium of Landshells: a color guide to more than 2,000 of the world's terrestrial shells. Amer Malacologists, Inc, Melbourne, Florida. Vii +240 pp.
2. Godwin-Austen, H.H. 1901. On the anatomy of the *Helix ampulla* of Benson, and its generic position in the Ariophantinae. Proc. Malac. Soc. Lond., 4(5): 187–190
3. Godwin-Austen, H.H. 1918. Zoological results of the Abor Expedition 1911–12. 49, Mollusca, 9. Rec. Ind. Mus., 8: 601–621.
4. Dermott, R.M. 1985. Benthic fauna in a series of lakes displaying a gradient of pH. *Hydrobiologia*, 128: 31-38
5. Haszprunar, G.2000 Is the Aplacophora monophyletic? A cladistic point of view. American malacological bulletin 15:115-130.
6. Khatri, A.K. 2008. A study on gastropod fauna of some waters in the arid region of Rajasthan with special reference to trematode infection and its seasonal trends. Ph.D. Thesis, Maharaja Ganga Singh University, Bikaner. 114 pp.
7. Khanam, Y. and Singh, Y. 2012. A study on the density of prosobranch snail in a pond near Bikaner, Rajasthan. Bionotes, 14(3):91.
8. Kumar, Seema and Ahmed, S.I. 1998. New distributional record of *Lymanea acuminata* f. *typica* (Lamark) (Mollusca: Gastropoda: Lymnaeidae) from the Thar Desert (Rajasthan). Indian Forester, 124(1): 77- 78

9. Lydeard, C., Cowie, R.H., Ponder, W.F., Bogan, A.E., Bouchet, P., Clark, S.A., Cummings, K.S., Frest, T.J., Gargominy, O., Herbert, D.G. and Hershler, R. 2004. global decline of nonmarine mollusks. *BioScience*, 54(4):321-330.
10. Padghane S., Chavan S., Dudhmal D., Walke D. 2017. Mollusc diversity and its role as food for crab and water birds in Godavari river basin nanded (ms), *ijastr India*. Vol.2, issue 7, pp 149-161.
11. Ponder W.F. and David R. Lindberg, 2008. *Phylogeny and evolution of the mollusca*. Univ of California prees, Berkeley. pp 469
12. Pooja maru and Khatri A.K. 2014. Comparison Of Mollusc Fauna Of Desert Area Bikaner (Rajasthan), *ijcrt*, vol.12, issue 8, pp-h431-437.
13. Preston H.B. (1915). *The fauna of British India: Mollusca (freshwater Gastropoda and Pelecypoda)*. London: Taylor and Francis.
14. Ramakrishna and Dey, A. 2007. *Handbook on Indian Freshwater Molluscs* 1–399. (Published by the Director, Zool. Surv. India, Kolkata).
15. Ray HC and Mukherjee I. 1963. fauna of Rajasthan, India. *Rec Zool Sur Ind* 61:403-436
16. Richard C Brusca & Gary J. Brusca (2003). *Invertebrates* (2nd ed.) Sunderland, Massachusetts: Sinauer Associates .ISBN978-0-87893-097-5.
17. Seddon, M. 2000. Molluscan biodiversity and the impact of large dams. *Dams, ecosystem functions and environmental Restoration, Review II*, 1, 1–42 pp Ariophantinae. *Proc. Malac. Soc. Lond.*, 4(5): 187–190.
18. Sharma, Pooja. 2007. *A study on malacofauna and its ecology in some waters in the Aravalli range*. Ph.D. Thesis, University of Bikaner, Bikaner. pp. 133.
19. Shyam sunder and Khatri A.K. 2018. Seasonal Variations of Benthic Fauna of Ottu Reservoir, Sirsa (Haryana), India. *Ijcrt*, vol. 6, issue 1, pp-1464-1468.
20. Siegfried, C.A. 1984. The benthos of a eutrophic mountain reservoir : influence of reservoir level on community composition, abundance and production. *Calif Fish and Game*, 70 (1):39-52.
21. Strong, E.E., Gargominy, O., Ponder, W.F. and Bouchet, P. 2008. Global diversity of gastropods (Gastropoda; Mollusca) In freshwater. *Hydrobiologia*, 595: 149–166.
22. Subba Rao, N.V. 1996. Mollusca in the Thar Desert, In: Ghosh, A.K., Baquri, Q.H. and Prakash. 1. (Eds.), *Faunal diversity In the Thar Desert: Gaps in Research*, Jodhpur, India: Scientific Publ. pp. 277-283.
23. Tonapi GT. 1980. fresh water animals of India. Oxford and I.B. Parasit 2:119-120. H. Publishing Company, New Delhi, India.
24. Vaughn CC, Gido KB, Spooner DE (2004) Ecosystem processes performed by unionid mussels in stream Mesocosms: species roles and effects of abundance. *Hydrobiologia*, 527: 35-47 Venkataraman K, Wafar M. Coastal and marine biodiversity of India. *Ind. J. Mar. Sci.* 2005;34 (1):57-75.