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Macrobenthic Molluscan & Its Correlation with Physicochemical Parameter of River Daha

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Abstract: The present paper focused diversity of molluscs and physico. Chemical characteristics of water in river Daha (Siwan). Among the collected 25 species 5 order and 10 families. Quantitative differences have been observed in molluscs (gastropods and bivalve) during different seasons. Summer and winter favored the mollusccs fauna while monsoon witnessed less and the least molluscs in the water body. The various parameters, pH, tubidity, total solids, DO, BOD, COD, chloride, sulphate, etc. were studied. The water was slightly alkaline. Significant seasonal variations were observed throughout the study period. The overall level of various parameters suggests that the river not much polluted.

Keyword: Molluscs, physico – chemical, River Daha, Gastropods, Bivalve.

INTRODUCTION

Freshwater molluscs are one of the most widely distributed group of aquatic marcro -invertebrates, considered on emerging wealth of freshwater bodies (Elder as Collins 1991; Maltchik *et al.* 2010) and play a pivotal role in the health of the aquatic ecosystems (Fenchel & kofoed 1976; Bertness 1984; Peters on & Block 1987; key 1995 Stewart *et al.*, 1998; Strayer *et al.* 1999; Gutierrez *et al.* 2003; Vaughan *et al.* 2004; Lydeard *et al.* 2004; Budha *et al.* 2010) Freshwater mollusks (Gastropoda and Bivalvia) are distributed in the freshwater bodies throughout the globe except Antarctica (Schiaparelli *et al.*, 2014) Apart from their role in the ecosystem, people across the globe exploit species of freshwater molluscs as food, medicine, ornament, and in the craft industry (wood & wells 1995; sonowal & kardong 2020). Molluscs are mostly macrobenthic organism. They also found attached with floating vegetation in fresh water bodies. Macrobenthic generally cannot move fast, has large body size that make it easy to be identified and are animal that spend some or all of their life in the bottom of water, either sessile, crawlingor digging holes. Benthic animals have an important role in the process of decomposition and mineralization of organic material in the water, as well as occupying several trophic levels in the food chains. (odum EP 1993, putro SP 2014). Their abundance and diversity are highly depended on changes in water quality and substrate tolerance and also their activities and sensitivity to environmental change. Tolerance range of Macrobenthic mollluscs in the environment is different one to each other (Marsaulina 1994). They Provide an advantages as biological indicators because of its Characteristics, as they are ubiquitous animals, able to provide response spectrum to environmental Stress, live a sedentary life in the habitat of that may explain the spatial change and also has longer life cycle that can explain temporal Changes.

Molluscs species become Prime model assessment of biological resources to obtain the system in as Population indices the fresh water ecosystem. In India-highlight a rich diversity of molluscs, representing 212. Species belonging to 21 families of these 164 species were recorded from diffrent river and Stream. (Subba Rao,. N.V. Rao 1993a). The Presence of thriving molluscans

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Population indicates the land is not acidic, Beyond pH 5-6. Biological monitoring of river using macro-invertebrates is accepted as useful for the assessment of water quality.

MATERIAL & METHODS

Study location - The district Siwan is locate in the north western part of Bihar in inter fluvial region of river Ghaghara and Gandak. This district extends from 25° 22′ N to 26° 22′ latitude and 84° E to 84° 47′ E longitudes. It has got a maximum length of 85 km from east and width of 52 from north to south.

Sampling of water samples: Sampling of water was done during January 2019 to December 2020. High grade thoroughly cleaned plastics bottles of 2-litre capacity were used. Prior to filing they were rinsed with the water being sampled. Monthly collections were done.

Analysis of water: The chemical analysis of water was done using standard procedures (APHA 1995), and biological analysis by Trivedy & Goel (1984).

The parameters like pH, TDS and DO of water samples were measured immediately at the time of sample collection.

SAMPLING METHODS

A field. Survey Conducted for was two 2 year from Jan. 2019 to Dec. 2020 mollusec were collected bi-monthly. The methods that was implemented for the collection of Samples were hand picking methods, digging the Substratum and Collection of living sample with the help of a net fitted. worth the equipment used in this project were net, polythene bag, gloves, Collection bottle, forceps and a DSLR Camera. Sample were hand -picked from the muddy areas during the low tide period. There, after the collected specimens were thoroughly washed withe brackish water to study there morphological characteristic. The specimens were preserved and fixed in 95% alcohol Washed specimens were preserved in a bottle with its respected identification tag. each Collected specimen was photographed before Preservation. The preserved organisms were identified with standard key to Subba Rao and Ramakrishna and Day, 2007) and the specimens of molluscs identified by Zoological Survey of India, Patna.

RESULT AND DISCUSSION

Table 1: Physico-chemical characteristics of the Daha River in 2019

	Jan.	*Feb.*	*March.*	*Apr.*	*May*	*June*	*July*	*Aug*	*Sep*	*Oct*	*Nov.*	*Dec.*
Temp.,°C	15.0	19.2	23.5	28.9	36.2	38.5	35.9	34.8	32.3	23.6	22.9	20.5
pH	7.5	8.1	7.9	7.7	8.2	7.1	7.9	8.5	7.8	8.1	8.2	8.2
DO, mg/L	7.6	8.11	8.0	7.6	6.5	7.53	5.9	6.24	5.12	7.75	2.16	8.8
BOD, mg/L	3.76	1.52	1.66	1.4	1.56	1.33	2.23	2.24	2.44	1.99	8.12	1.33
COD,mg/L	4.25	6.1	6.0	7.23	8.1	15.23	22.13	18.65	6.23	5.53	50.0	4.83
T.Hardness, mg/L	179	177.6	182	179.5	172.5	415	200	195	180	175	195	236
Calcium, mg/L	45.56	45.45	46.32	47.8	48.5	53.79	55.3	52.1	49.5	45.2	50.1	54.9
Magnesium, mg/L	15.7	15.4	14.13	17.5	17.8	14.82	15.3	13.9	17.5	14.6	14.8	14.9
Phosphate, mg/L	0.037	0.129	0.023	0.035	0.036	0.059	0.058	0.059	0.029	0.056	0.021	0.018
Sulphate, mg/L	34.19	3.78	20.83	26.9	26.01	29.94	28.25	26.15	24.4	22.56	21.83	19.98
Nitrate, mg/L	0.234	0.856	0.191	0.275	0.038	0.291	0.28	0.018	0.026	0.025	0.019	0.016
Chloride, mg/L	8.86	7.89	8.36	8.89	11.9	6.12	6.01	5.98	6.05	6.25	8.12	13.2

In the present study considerable charges in molluscan diversity was observed in the different sites of Siwan Daha river. The impact of Physiochemical Parameters on the diversity was observed. Total is 25 species of molluscan belonging to class Gastropoda and Bivalve are recorded during the study period. The collected 25 molluscans are belonging to 5 order, 1- family.

Water samples from these sites were collected and analysed for physio-chemical factor along with its Biotic fauna specially malacofauna. The Physio-chemical factor studied were Temp, pH, Turbidity, Conductivity, Total dissolved Solid (TDS), DO, BOD, COD, Total hardness, Ca^{++}, Mg^{++}, PO_4^{-2} and NO_3^- and Cl^- the Sample were collected and analysed each month for two years

which revealed seasonal and Site specific trends in respect to each.

The temp remained low at site II, IV and V and slightly high at site I and III. Decrease in temperature was observed immediately after rain. This temperature however rose considerably after the rain Period was over due to dust free atmosphere TDS, Turbidity and Conductivity Changes according to the type of pollutant, sewage dischange, they Show seasonal variation on all the five study site.

DO levels at site II, IV and site V were found to be high and low at site I and III but again increased as the water current moved away from Polluting sources, there by establishing that self-purification occurs. DO level decrease during summer increased during winter and during the rain.

The pH values were found to be Consistent at all the sites, thus suggesting that the water Present at all the sites were well buffered.

Site II, IV, V Show low value of COD due to Pollution free nature where as COD were high at site I and III. COD value increase by increase the pollutant.

Site II, IV,V had low value of total hardness while site I and III had high value of total hardness. The hardness of water at this site due to sewage and at all the sites due to Presence of bicarbonats, seasonal impact on total hardness could be observed at all the site.

Level of calcium, Magnesium, Sulphate, Chloride and Nitrate were found to be low at Pollution free site II,IV,V and high at polluted site I and III. Site V it became again low due to being away from the Polluted discharge. Pollution free site I and III showed low Nitrate and Phosphate. These value were increased during summer and decreased during rain due to dilution of water.

The Physio-Chemical Characteristic has been designed to assess the extent of Pollution at each site, both quality and the quantity of water has been determined in terms of its unpolluted slightly polluted and moderately Polluted and excessive polluted. The result of this study have revealed that the water at site II,IV,V remained acceptable, at site, I and III is slightly to moderately polluted.

There was a considerable difference within the study localities. High species richness probably due to the maximum number of species and also due to positively Co-relation between Physiochemical Parameter, for growth and development at all sites (Shown Fig – 1 to 5): Mollusea were considered to be affected by physiochemical Parameters : (Garg R.K, Rao R.J. and Saksena 2009). The physicochemical Parameters has showed alterations in their normal range which has affected the population and growth of species as an indicator of pollution . The molluscan population is good indicator of a localized condition such as water quality. They play an Important roles in the ecosystem Structure and biodiversity : (Kumar A, Vyas V. 2012) . There is correlation between molluscan diversity and physiochemical parameter such as the site where low pollution and low anthropogenic activity have high species diversities & where the sewage release have high pollution and low diversity. Finally the co-rrelation shows high pollution low species diversity and low pollution high species diversity.

Table 2: Molluscs Species found in different study size

Species	*Mirganj (Site – I)*	*Tarwa (Site -II)*	*Pul-waghat (Site – III)*	*Terighat (Site – IV)*	*Saraiyan (Site – V)*
Bellamya bengalensis (Lamarck, 1822)	+	++	+	++	++
Bellamya crassa (Benson, 1836)	-	+	-	+	+
Pila globosa (Swainson, 1822)	-	+	-	+	+
Digoniostoma pulchella (Benson, 1836)	-	+	-	++	++
Bithynia cerameopoma (Benson, 1836)	-	+	-	++	++
Melanoides tuberculata (O.F. Muller, 1774)	+	+	+	++	++
Thiara scabra (O.F. Muller, 1774)	+	+	+	+	+

Species	Mirganj (Site – I)	Tarwa (Site -II)	Pul-waghat (Site – III)	Terighat (Site – IV)	Saraiyan (Site – V)
Thiara granifera (Lamarck, 1822)	+	+	+	++	+
Thiara lineata (Gray, 1828)	-	++	-	+	+
Brotia costula (Rafinesque, 1833)	+	++	+	+	++
Radix ovalis (Gray, 1822)	-	++	+	+	+
Lymnae accminata (Lamarck, 1822)	+	++	-	++	++
Gyraulus convexiusculus (Hutton ,1849)	+	++	-	+	++
Indoplanorbis exustus (Deshayes, 1834)	+	+	+	++	++
Corbicula bensoni (Deshayes, 1854)	+	+	-	+	+
Corbucula striatella (Deshayes, 1854)	-	+	-	+	-
Lamellidens consobrinus (Lea, 1859)	+	+	-	+	+

Species	Mirganj (Site – I)	Tarwa (Site -II)	Pul-waghat (Site – III)	Terighat (Site – IV)	Saraiyan (Site – V)
Lamellidens corrianus (Lea, 1834)	+	+	+	+	+
Lamellidens maginalis (Lamarck. 1819)	+	+	+	++	++
Lamellidens narainporensis (Preston, 1912)	-	+	-	+	+
Radiatula caerulea (Lea 1831)	-	+	-	+	+
Parreysia favidens (Benson , 1862)	+	+	+	+	+
Radiatulla olivaria (Lea, 1831)	+	-	-	+	+
Radiatulla occata (Lea, 1860)	-	+	-	+	+
Parreysia sikkimensis (Lea, 1859)	+	+	-	+	+

(++ Dominant Species + Rare Species – Absent)

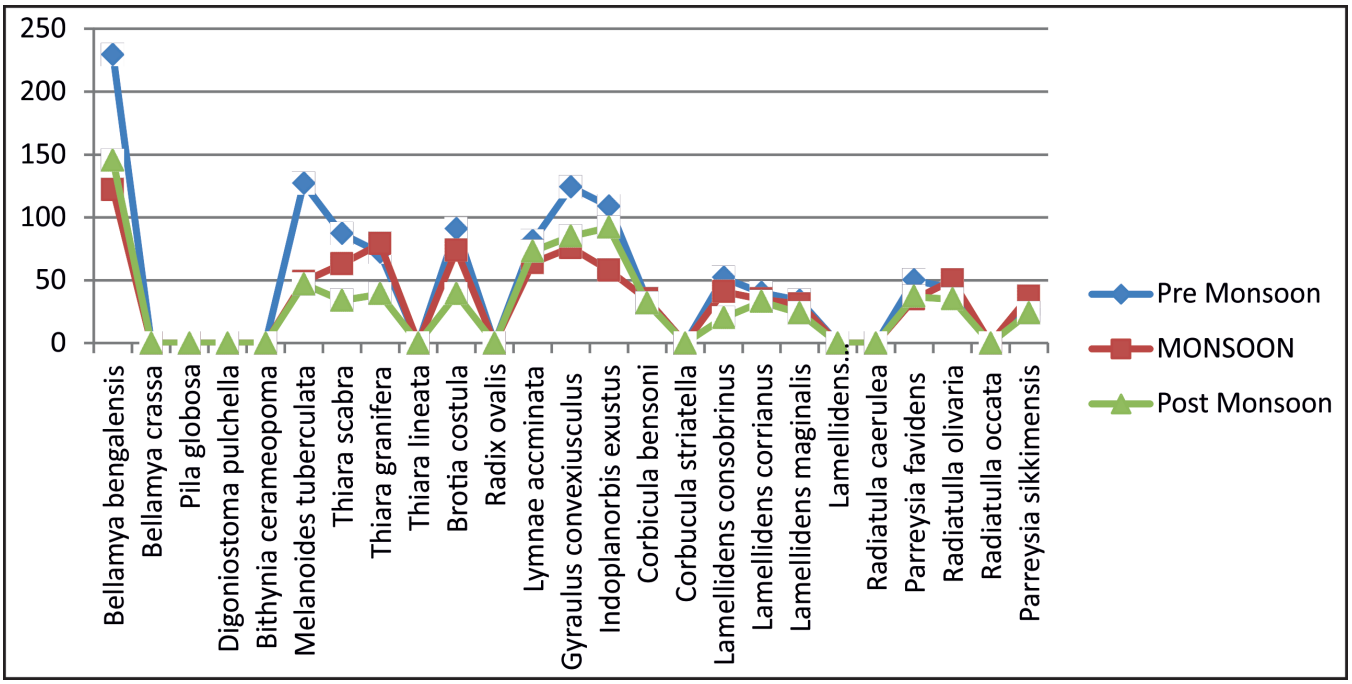

Fig. 1: Graphical representation of mollucsc diversity (site-1)

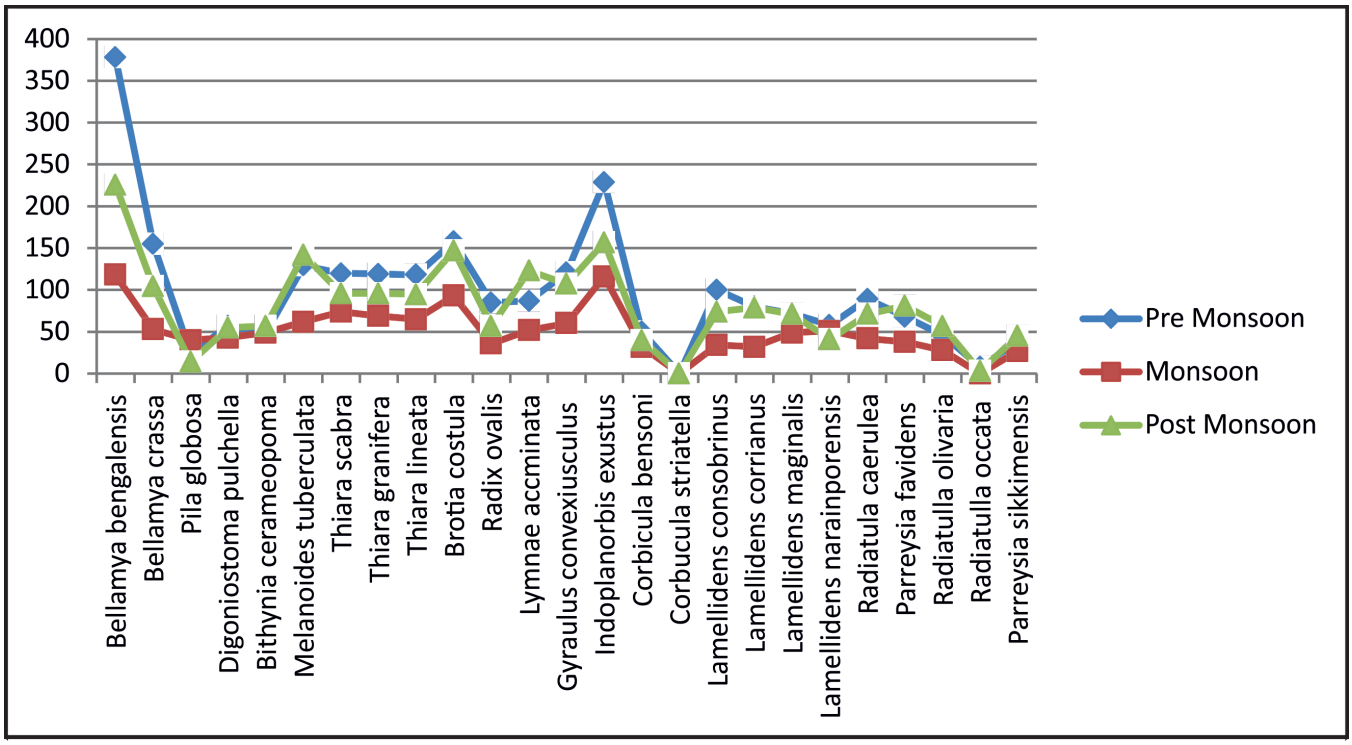

Fig. 2: Graphical representation of mollucsc diversity (site-2)

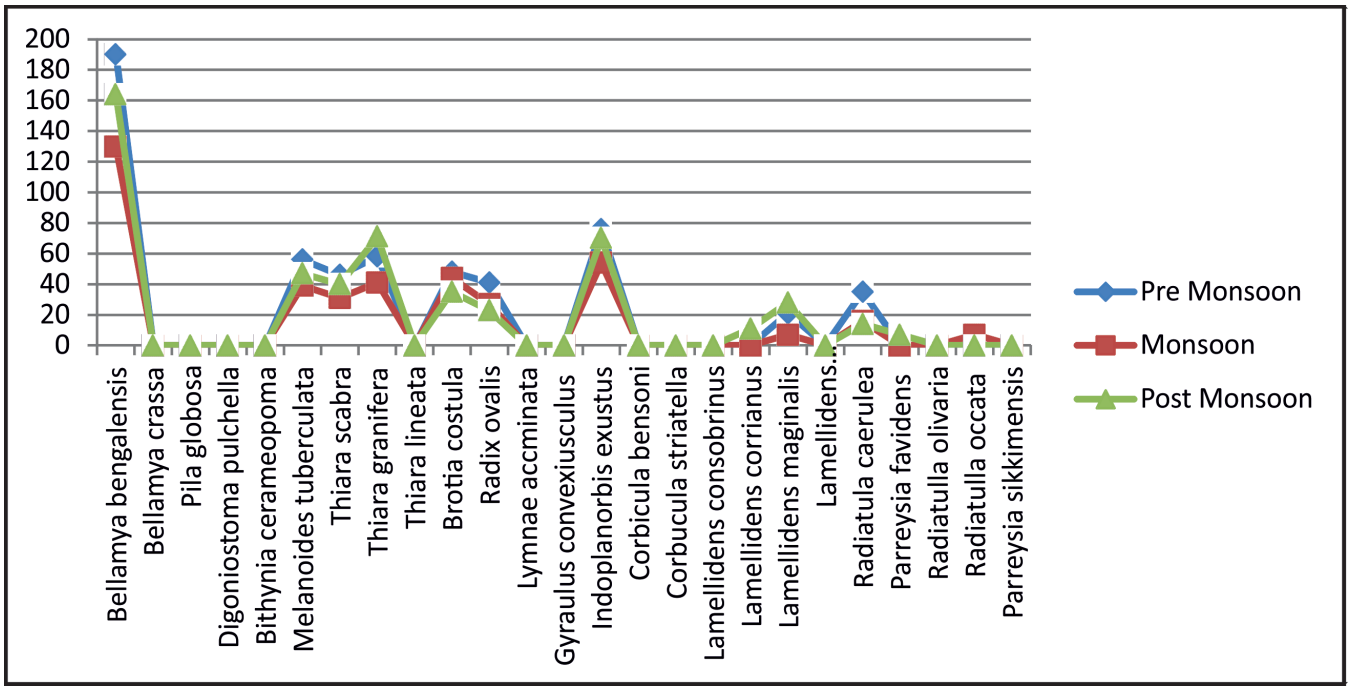

Fig. 3: Graphical representation of mollucsc diversity (site-3)

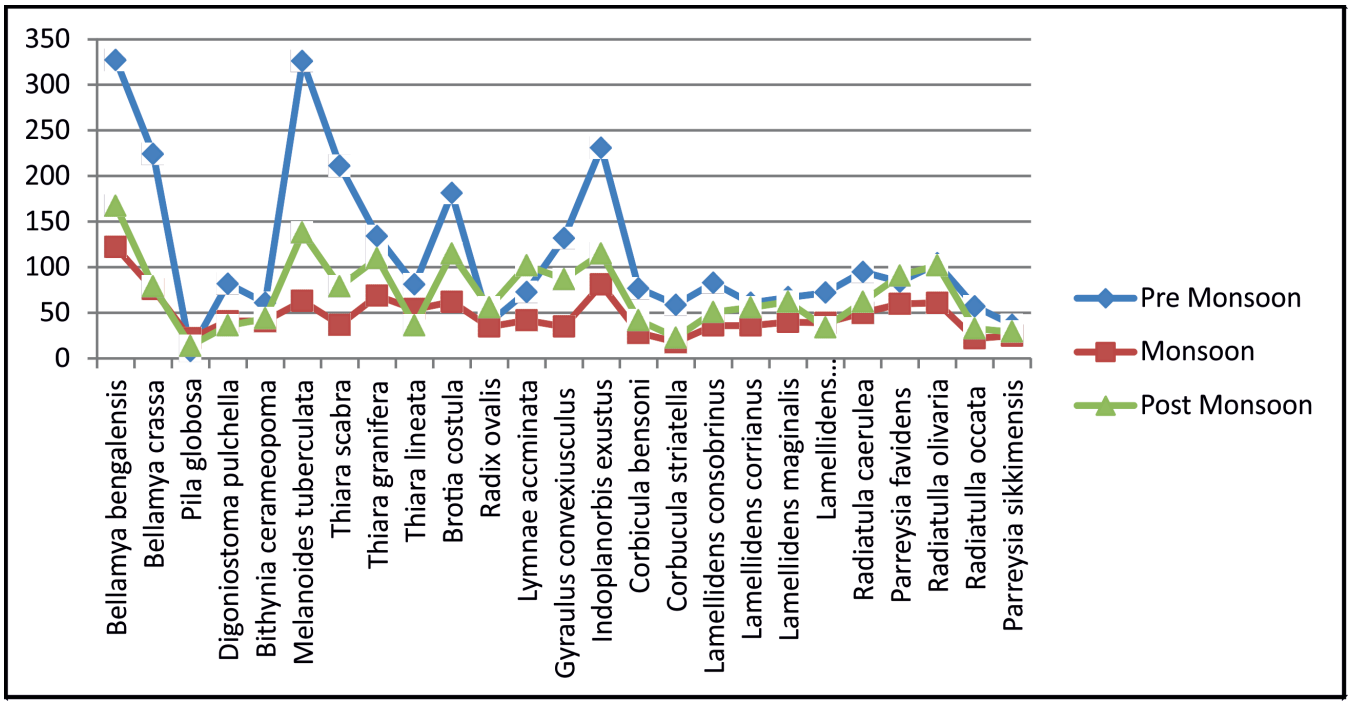

Fig. 4: Graphical representation of mollucsc diversity (site-4)

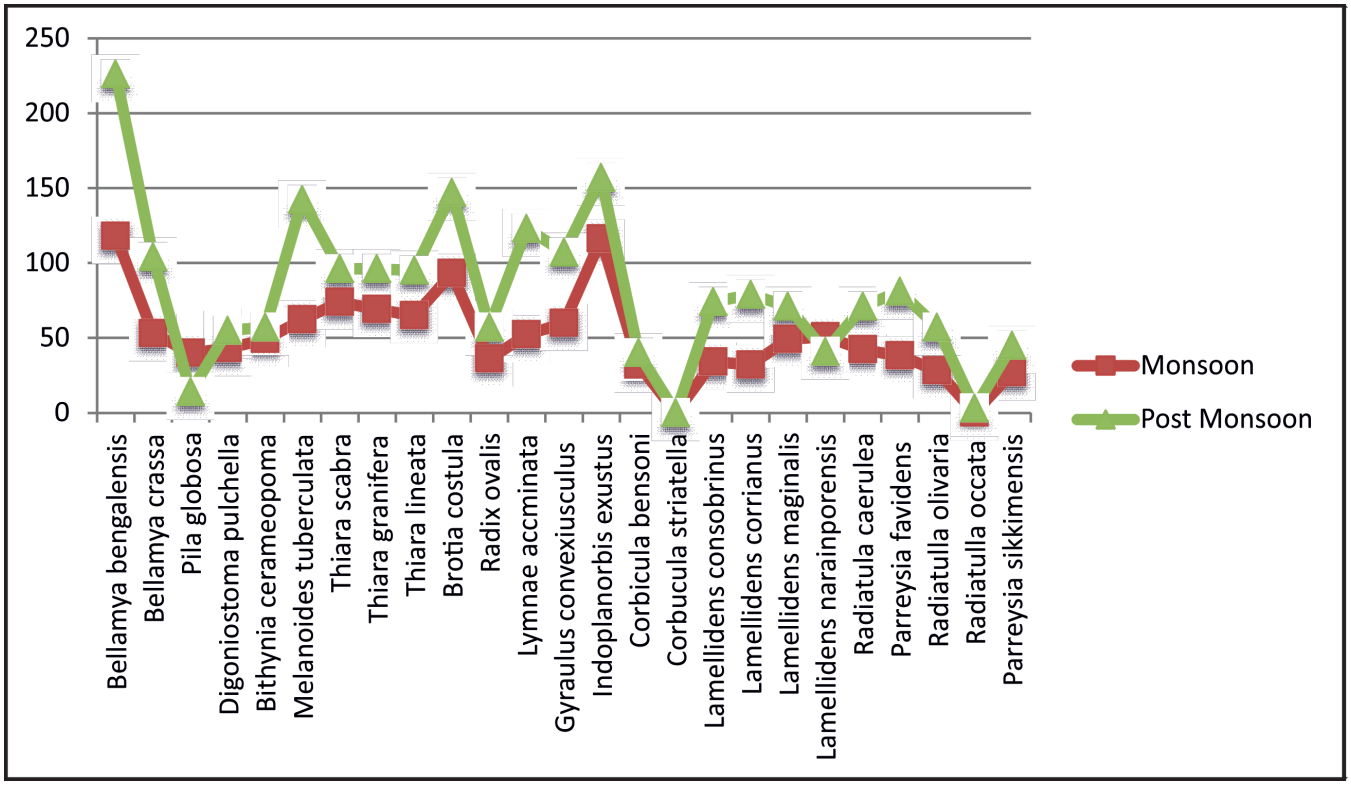

Fig. 5: Graphical representation of molluscs diversity (site-5)

CONCLUSION

The result from this study is indicated that the seasonal variation of fresh water mollusce depends upon the quality of water. Variation in season i.e pre monsoon, monsoon and post monsoon the physio-chemical status of water that can positively support the population diversity of molluscs. Finally the co- rrelation show high pollution low species diversity and low pollution high species diversity.

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