MALACOFAUNA DIVERSITY IN GODAVARI RIVER, KAYGON TOKA, DISTRICT AURANGABAD (MS), INDIA

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ABSTRACT

In all 2520 specimens of molluscan species were collected from the four sampling stations of Godavari river at Kaygon toka, the collected species belonging to 6 families 11 genera and total 14 species were recorded, which was 11 species of gastropods and 3 species of bivalves. The identified gastropod species were i.e *Bellamya bengalensis*, *B. dissimilis*, *Lymnaea acuminata*, *L.luteola*, *Tarebia lineata*, *Melanoids tuberculata*, *Melania scabra*, *Indoplanorbis exustus*, *Planorbis planorb*, *Physa acuta*, *Gyraulus convexiculus*, and Bivalve species *Lamellidens marginalis*, *L. corrianus*, and *Indonaia caeruleus*. In a few gastropods highly dominant species was *Bellamya*, *Lymnaea acuminata,* and Bivalve was *Lamellidens marginalis*. Diversity indices Simpson index (D), Shannon-Weiner index (H), Evenness (E), Richness (S) and Berger-Parker Index (DBP) of gastropod species were studied. As per Simpson index (0.138) and Shannon index (2.143) high diversity population was observed at Kaygontoka.In addition, water quality parameters were also studied such as water temperature, pH, Dissolved Oxygen, Total Hardness, Alkalinity, Turbidity and Nitrate content. The results were expressed as mean and Standard deviation for each water parameters.

Key words: Diversity, Mollusca, Physico-chemical parameters, Godavari River, Aurangabad.

INTRODUCTION

The phylum Molluscan comprises the soft bodies' animals with or without calcareous shell adapted to almost all habitats with varied ecology. The gastropods are an extremely diverse group, potentially making classification a difficult undertaking. They are divided into three major subclasses: Prosobranchia, Opisthobranchia, and Pulmonates. The two freshwater groups Gastropod and Pelecypoda, the former are divided further into two subclasses: Prosobranchia having gills for water respiration and the other Pulmonates posses' lungs for that use aerial respiration. The estimated number of mollusc varies from 80,000 species to 1, 35,000 species and the total diversity possibly as high as 2, 00,000. They are second only phylum to arthropods in species richness (Strong et al 2008) 5070 species of molluscs are reported from India. The global freshwater gastropod fauna is estimated at approximately 4,000 species described, however, the total number of species is probably 8,000

(Strong et al 2008) with 213 species was reported from India (Subba Rao 1989). The surveys have shown easily available that species in more abundantly to find out now in their habitats (Subba Rao 1989). There are many causes for the decline in freshwater gastropods biodiversity, (Dudgeon et al 2006) also snail species belonging to diverse aquatic habitat have been reported (Ray and Mukharjee 1963, Choubisa, Sharma 1982, 1986, Rathore and Bohra 1987).

Many molluscans species are also used as bio-indicators for the pale environments as well as water quality or pollution control on the basis of their power tolerance against the extremes condition on physic-chemical parameters of water quality (Harmon 1974, Edmondson et al 2010 and Druat et al 2011).

Some workers have also reported that certain gastropods species Pelecypoda for the different regions tropic stages (Eutrophic, Mesotrophic and Oligotrophic) as well as lotic and lentic environments (Clarke 1979 and Choubisa 1992). Some gastropods are of great importance for being intermediate hosts of infectious trematodes and other parasites of animals and human beings (Brown 1994). They feed on algae, zooplankton and organic wastes and provide food for many types of fish, birds and human beings. Freshwater snail plays an important role in freshwater ecosystem and intermediate host for serious diseases to humans and animals like *Schistomiasis* (Snail fever) *Flat worm, Swimmer's Itch Fascioliasis/ Fasciola hepatica, S.indicus, S. eduardiensis and S.hippopotomus*.etc. Lot of research has been done in molluscans gastropods particularly freshwater species and very less attention has been paid on garden snail & slugs also studied from Maharashtra. (Chavhan 2011, Pawar 2011, Jadhao 2015).

Therefore, humans are bound to monitor the impact of this activity and natural freshwaters continuously. In India, various several freshwater snails species have been reported from different geographical areas. Provenance, Subba Rao and Mitra (1979) made a survey on land and freshwater molluscs of Pune district (Maharashtra) and collected a total of about 130 species of snails belonging to/varieties falling into 22 families and 51 genera from Pune district (Maharashtra).

Thus for a proper understanding of freshwater reservoir ecosystem and its production potential it is necessary to study the inter relationship among Physico-chemical and biological factors of the given environment (Sreenvisasulu et al 2014) are very scarce; especially no research work has been undertaken on molluscan, gastropod fauna of kaygontoka village previously. Thus our present studies mostly concentrated on species composition, population diversity and its percentage, physico-chemical parameters and ecology of gastropods of freshwater mollusc fauna from Godavari River at kaygontoka village, Aurangabad was undertaken.

MATERIALS AND METHODS

Maps and Sampling sites

(A)

(B)

Fig.1.(A) shows map of GPS Godavari River Kaygontoka-Village (GPS-19°37'38.19''N, 75°01'46.82''E), (B) Shows Actual sample collection site

- **Collections, Identification and Maintained of gastropods:**

Sampling sites were selected based on their distribution, extent of shoal habitat with depth less than one meter, and accessibility. Specific sampling localities were recorded by latitude and longitude using a hand held Global Positioning System (GPS), (Fig.1 A&B) gastropods species were collected by sight and touch (In order to compare the gastropods diversity with the rest of the river, four stations were selected by using Quadrate method.

Gastropod samples were collected from Godavari river at Kaygaon toka village monthly during June 2016 to May 2017. The specimens were collected by hand picking and brought to the laboratory with wearing hand gloves from the dry areas and where water was shallow scoop net was used. The gastropods were counted washed with tap water, and maintained a plastic trough with aerators in under laboratory conditions, photograph and identified following (Subba Rao et al 1979, 1989).

To understand a particular biotic community it is very important to work out certain indices with formulas.

➢ **Simpson index(D),**

$$D = N(N-1)/\Sigma n_i(n_i-1)$$

Where,

D=Simpson's index

n_i= Total number(n) of ith species in a community

N= Total population of all species in a community

➢ **Shannon Weiner's index(H)**

$$H = \Sigma p_i(\ln p_i),$$

Where,

H= Shannon-Weiner index

S= Number of individual of each species

n_i= Total population of ith species in community

n= total population of all species.

➢ **Marglef's Species Richens(S)**

$$S = N-1/\ln(n)$$

Where,

S=Richness index

N=Total no. of species in a community

➢ **Pielou's Species Evenness(E)**
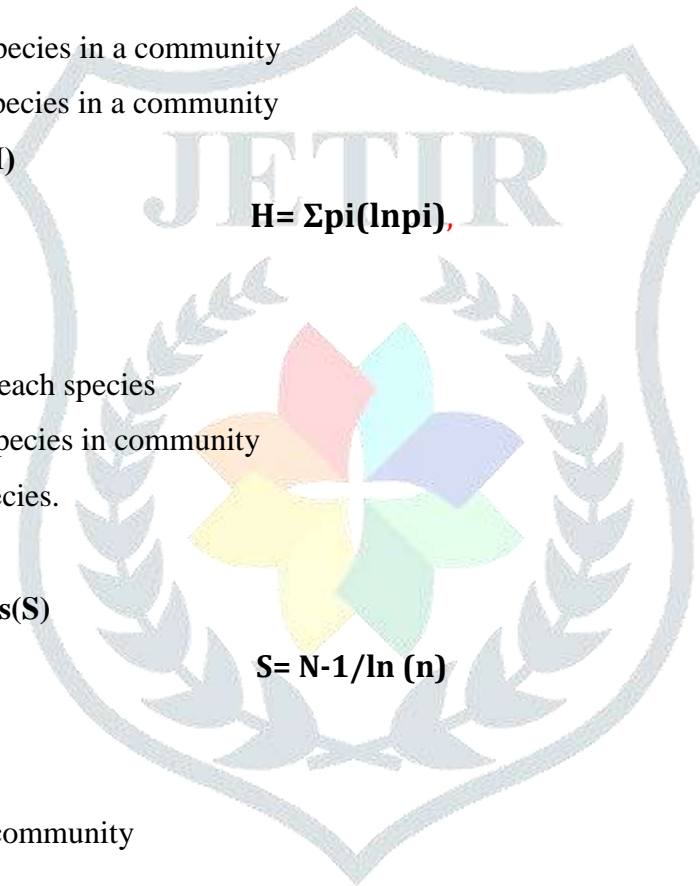
$$E = H/\ln(S)$$

Where,

E=Evenness index

H=Shannon-Weiner index

S=Number of individual of each species

➤ **Species dominance Berger parker Index(DBP)**

$$D= \frac{Nmax}{S.}$$

Where,

Nmax = the number of individual of most abundant species

S = the total number of observed species.

- **Analysis of water**

Physico-chemical parameters of water samples at the selected collection centers were determined carried out using standard methods (Tirvedi & Goel, APHA 1992 2005). As Water Temperature, pH, Dissolved Oxygen, Total Hardness, Alkalinity etc. The Dissolved oxygen was fixed on the field by Winkler's A & B solution (Winkler's Azide method). All parameters were determined under the laboratory condition. Statistical analysis the calculation done was Mean and SD, Population density and total percentage, Diversity indices, correlation coefficient by using MS-Excel & Minitab Software V.14.

RESULTS AND DISCUSSION

In all 2520 specimens were collected from the four sampling stations belonging to of Godavari River at Kaygontoka. Including 6 families and 11 genera and 14 species of molluscan gastropods were recorded and identified by the expert ZSI Pune. (See the Plate 1, 2 & Table-1). The molluscan gastropod species population was dominated by the Genus *Bellamya,* in which *B. dissimilis* (85.8%) and *B. bengalensis* (51.1%) were abundantly found at all stations. Maximum molluscan gastropods were observed in the month of June and while lowest number in the month of April and May. (Table 1, Plates 1 and 2). Specie *Lymnaea acuminata* (37.7%), species *Tarebia lineate,* (36.9%)), *Melanoids tuberculata,* (36.8%),*Melania scabra*, (3.6%), *Lymnaea luteola* (26.9%), *Lamellidens marginalis* (24.3%), *Lamellidens corrianus* (18.8%), *Indoplanorbis exustus* (17.4%), *Indonaia caeruleus* (16.3%), *Planorbis planorbis* (8.58%), *Physaacuta*(5.75%) and *Gyraulus convexiculus* (4.9%) see the Fig-2,in which species *Bellamya dissimilis & B. bengalensis* was first dominant species as compared to another species. Second dominance was species *Lymnaea acuminata*, *Tarebia lineata* & *Melanoids tuberculata* in terms of population density. Species *Melania scabra*, *L.luteola*, *Lamellidens marginalis* was third dominant species among in terms of Population density. Fourth position species *L. corrianus, I. exustus, I. carelueus* in dominance. Fifth position of dominance species is *P. planorbis, P. acuta*and *G. convexicaulus* were found in very less numbers as compared to another species.

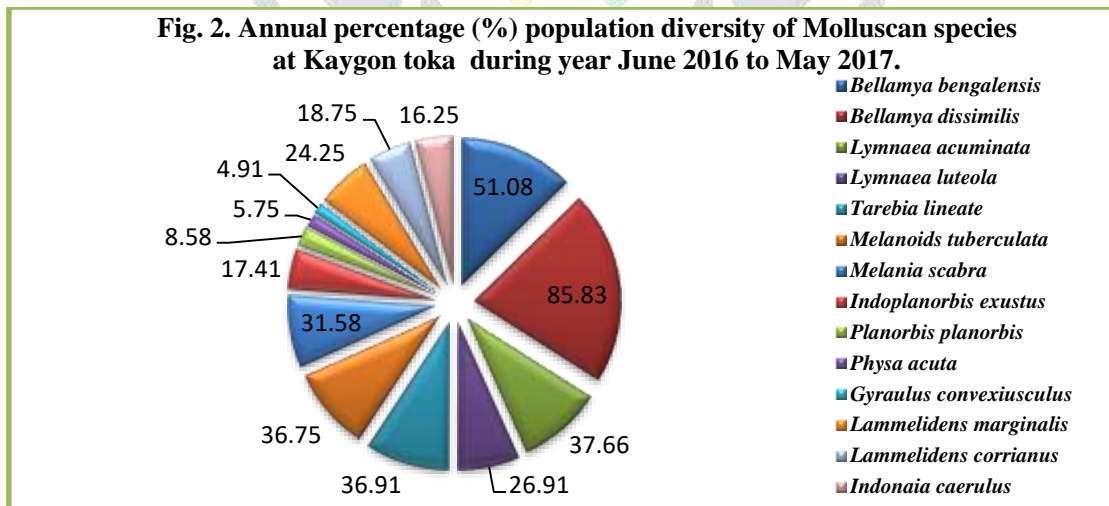**Table 1.List of Molluscan gastropod species and their average annual diversity contribution (%)**

S. No	NAME OF SPECIES	Sampling Station				Mean ± S.D	Percentage %
		I	II	III	IV		
1.	*Bellamya dissimilis (*Muller 1774)	37.66	41.33	61.33	65	46.77±3.82	51.08%
2.	*Bellamya bengalensis* (Lamarck-18822)	7.66	68	95	109	56.88±44.8	85.83%

3.	*Tarebia lineate* (Gray-1828	34	37	40.66	39	37.22±2.86	37.66%
4.	*Melanoids tuberculata* (Muller-1774)	22	29.68	34.66	21.33	28.78±4.42	26.91%
5.	*Melanias cabra* (Muller-1774)	25	31.66	46.66	44.33	34.44±10.3	36.91%
6.	*Lymnaea acuminata* (Lamarck-1822)	36.33	26.33	43.66	46.66	35.44±9.05	36.75%
7.	*Lymnaea luteola* (Lamarck-1822)	25.66	25.66	39.66	35.33	30.32±7.05	31.58%
8.	*Indoplanorbis exustus* (Deshayes-1834)	8.33	17.66	18	15.66	14.66±4.50	17.41%
9.	*Planorbis planorbis* (Linnaeus-1758)	9.33	11.33	11	2.66	10.55±4.04	8.58%
10	*Physa acuta* (Draparnaud-1801)	8.33	8	4.66	2	6.99±2.99	5.75%
11	*Gyraulus convexiusculus* (Hutton, 1849)	6.33	6.33	4.66	2.33	5.77±1.893	4.91%
12	*Lamellidens marginalis(Lamarck-1891)*	16.66	19.66	26.66	34	19.44±8.91	24.25%
13	*Lamellidens corrianus(Leanneus)*	11	15	21	28	15±7.809	18.75%
14	*Indonaia caeruleus* (Prashad, 1918)	9	13	17.33	25.66	13.16±8.33	16.25%

The molluscan gastropods population size fluctuated markedly during the study period. The molluscan gastropod population showed higher number from July to December and lower number from February to May (Fig.2). Diversity indices in Simpson index (D), Shannon-Weiner index (H), Evenness (E), Richness (S) and Berger-Parker Index (DBP) of gastropod species were studied.

As per Simpson index (D) (0.138) and Shannon index (H) (2.143) showed high diversity of population was observed at Kaygontoka. That means the low Simpson (D) index values indicated high population diversity and high Simpson index values indicated the low population diversity of the species.(Fig.3) Similarly Shannon wiener's index(H), Richness (S), Evenness (E) and Berger parker (DBP)index indicated high value means high population diversity and low value indicated low population diversity.(fig.3.)

Fig. 2. Annual percentage (%) population diversity of Molluscan species at Kaygon toka during year June 2016 to May 2017.

Fig.3. Average of diversity indices of kayon toka during June 2016 to May 2017.
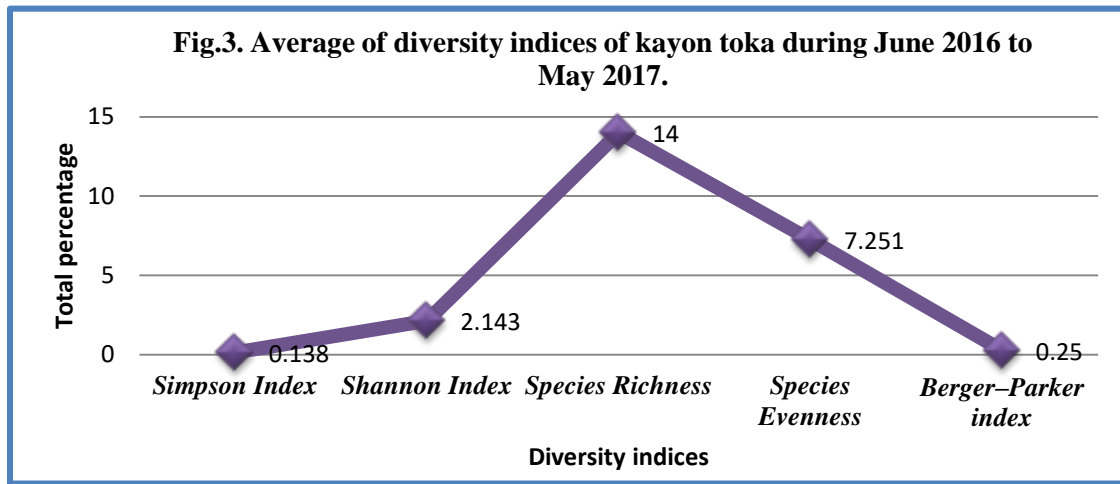
- **Physico-chemical parameters:** The results were expressed as monthly observation, mean and Standard deviation for each water parameters. The Water temperature (°C) shows maximum in month of May and minimum in month of October and mean was (22.96 ± 4.5), pH values recorded maximum in May and minimum in month of June, the mean was (7.91 ± 0.622), Dissolved Oxygen (D.O), the monthly high values record month of May and low value recorded month of February and mean was (0.966±0.96 mg/l), Total Hardness (TH), mean was (541.3±104.84 mg/l), Alkalinity also mean was (108.58 ± 27.15mg/l), the total hardenss and Alkalinity values recorded highest in Month of May and lowest in month of June, Turbidity mean was (3.45±1.173 NTU) and Nitrate mean was (1.075±0.522 mg/l).The turbidity and Nitrate recorded maximum value in June and minimum value April, (Table. 2).

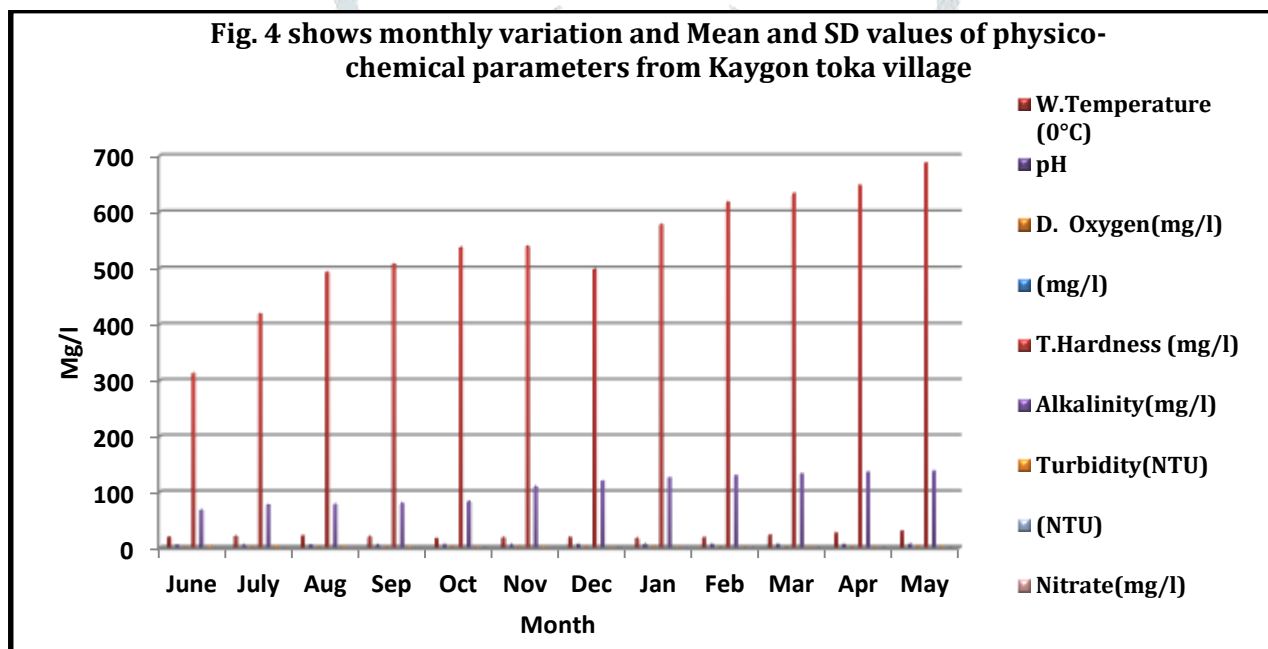- C**orrelation coefficient of gastropod species and physico-chemical water parameters**:

The correlation coefficient gives an idea about particularly which physico-chemical parameters supported the snail population and growth at Kaygaon toka has been narrated in (Table 3) for study years 2016-17. The positive correlation is represented by positive values and negative correlation by negative values at ($p<0.01\%$ and $p<0.05\%$ level.

The snail diversity and snail population was moderate. pH, alkalinity and turbidity of water helped the snail population growth at this spot.

Table 2.Showed monthly variation and Mean and SD values of physico-chemical parameters from Kaygaon toka village.

Parameters	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Mean ± SD
W. Temperature	21	23	24	22	19	20	21	19	20	25	29	32	22.9 ±4.5
pH	6.9	7.0	7.2	7.5	7.8	8.0	8.3	8.5	8.4	8.3	8.5	8.6	7.91 ±0.62
D. Oxygen (mg/l)	3.11	3.13	3.20	3.31	4.20	4.32	4.45	4.50	2.14	2.19	2.31	4.85	0.966 ±0.96
T. Hardness (mg/l)	315	421	495	510	539	541	500	580	620	635	650	690	541.3 ±104.8
Alkalinity (mg/l)	70	79	80	82	85	112	122	128	132	135	138	140	108.5 ±27.1
Turbidity (NTU)	5.1	6.0	4.1	3.9	2.5	3.7	3.4	2.8	2.1	2.8	2.4	2.7	3.45 ±.173
Nitrate (mg/l)	1.85	1.80	1.92	1.45	0.74	0.92	0.80	0.85	0.76	0.62	0.60	0.60	1.07 ±.522

Fig. 4 shows monthly variation and Mean and SD values of physico-chemical parameters from Kaygon toka village

Table 3. The relationship between monthly gastropod snail species abundance and variations in physico-chemical parameters, expressed as correlation coefficient for Kaygaon toka during June 2015 to May 2016.

Abbreviation: ****=** positive Significant 'r' value at (p<0.01%), ***=** positive Significant 'r' value at (p<0.05%) and   **(- indicate**

PARAMETERS	pH	W.T	T.A.	D.O	T.H	TURB	NITR	B. b	B. d	L. a	L. l	T. l	M. t	M. s	I. e	P. p	P. a	G. c
pH	0.00	0.357	0.852**	-0.146	0.869**	-0.844**	-0.862**	0.658*	0.521	0.630*	-0.005	0.670*	0.477	0.461	-0.025	-0.432	-0.206	-0.289
W. T (0°C)		0.000	0.346	-0.793**	0.550	-0.213	-0.202	0.497	0.646*	-0.046	-0.769**	0.422	0.633*	0.290	-0.630*	-0.776**	-0.646	-0.703
T. A. (mg/l)			0.000	-0.162	0.938**	-0.824**	-0.893**	0.832**	0.695*	0.699*	0.139	0.827**	0.666*	0.640*	-0.061	-0.297	-0.482	-0.452
D.O. (mg/l)				0.000	-0.344	0.129	0.036	-0.382	-0.449	0.370	0.754**	-0.456	-0.600*	-0.398	0.657*	0.797**	0.764	0.754
T.H. (mg/l)					0.000	-0.825**	-0.869**	0.806**	0.741**	0.635*	-0.103	0.806**	0.692*	0.552	-0.181	-0.480	-0.571	-0.533
TURB (NTU)						0.000	0.886**	-0.680*	-0.507	-0.534	-0.125	-0.725**	-0.582*	-0.606*	-0.121	0.254	0.381	0.333
NIT (mg/l)							0.000	-0.752**	-0.695*	-0.662*	-0.300	-0.737**	-0.590*	-0.571*	-0.112	0.144	0.370	0.360
B. bengalensis								0.000	0.884**	0.437	-0.009	0.864**	0.902**	0.865**	-0.214	-0.403	-0.674	-0.602
B. dissimilis									0.000	0.287	-0.110	0.691*	0.875**	0.662*	-0.335	-0.381	-0.717	-0.733
L. acuminata										0.000	0.440	0.437	0.157	0.251	0.479	0.018	-0.040	0.242
L. luteola											0.000	0.043	-0.234	0.077	0.692*	0.786**	0.304	0.464
T. lineate												0.000	0.803**	0.842**	-0.101	-0.353	-0.720	-0.505
M. tuberculata													0.000	0.872**	-0.294	-0.499	-0.821	-0.714
M. scabra														0.000	0.017	-0.338	-0.679	-0.436
I. exustus															0.000	0.472	0.318	0.774
P. planorbis																0.000	0.513	0.509
P. acuta																	0.000	0.731
G.convexicus																		0.000

negative correlation), **W. Temp:** Water Temperature, **pH:** Potential Hydrogen, **T. A:** Total Alkalinity, **D.O:** Dissolved Oxygen, **T H:** Total Hardness, **Turb**: Turbidity, **Nit:** Nitrate.

PLATE-1

Fig.(A)*Bellamya bengalensis*   Fig.(B) *Bellamay dissimilis*

Fig.(C) *Lymnaea acuminata*   Fig.(D) *Lymnaea luteola*

Fig.(E) *Tarebia lineata*   Fig.(F) *Melanoids tuberculata*

PLATE-2

Fig.(G) *Melania scabra*

Fig.(H) *Indoplanorbis exustus*

Fig.(I) *Planorbis planorbis*

Fig.(J) *Gyraulus convexiculus*

Fig.(K) *Physa acuta*

Fig.(L) *Lamellidens marginalis*

Fig.(M) *Lamellidens corrianus*   **Fig. (N)** *Indonaia caeruleus*

DISCUSSION

The distribution and abundances of freshwater mollusks in Godavari river stream may be attributed to the availability of food, shelter and ovipositor sites. Water bodies rich in organic and silt matter are known to

support thriving populations of macro invertebrates because of reduction in water current and as such the substratum tends to make mollusks indistinguishable from their typical lentic habitat (Whitton 1975).

Mollusca are represented in freshwater bodies by classes Gastropoda and Pelecypoda and are a group of most diverse and dominant benthic water bodies. Molluscs were found abundant in Godavari stream particular the marginal areas. Their abundance might be attributed to the presence of vegetation in the shallow depth, which emerged when the stream was dry during the post monsoon period and formed a good feed leading ton their multiplication as has also been observed by earlier workers (Gupta 1976) and (Manoharan et al 2006). Molluscan species richness and molluscan abundance patterns. The impounded estuary had the highest species richness probably due to hard waters. This factor most likely contributes to its high species richness because hard waters are ideal for the development of freshwater molluscs (Okland 1982). The canal had the highest molluscan abundance probably due to high pH and hard waters. Molluscs mature and reproduce faster due tolarger amounts of calcium available for shell growth.

A total of 14 (Fourteen) taxa were recorded from Godavari river kaygontoka (MS) India, during the period of study from June2016 to May 2017. The molluscan community was represented by two classes, viz., Bivalvia and Gastropoda of which 11 species are gastropods and 3 species are Bivalve. Class gastropods were reported by 5 families; 9 genera and 11 species and Bivalve was reported by 1 family 2 genera and 3 species. A similar study was conducted on molluscan community of the Bharathpuzha River in Kerala and thirteen species of molluscs belonging to five orders, eight families and ten genera were reported (Bijukumaret.al. 2001). Farida (1988) recorded 59 species from Layaririver. Among them, 31 species belong to class Gastropoda, 27 species belong to Bivalvia and the class Scaphopda contains only one species.

Amanullah and Hameed (1996) studied Kaveririver and reported 13 species of molluscs of which 8 species were gastropods and 5 species bivalves. The gastropod species were grouped under 5 different families (Viviparidae, Thiridae, Pillidae, Lymneidae and Planorbidae) and family Thiridae was the most dominant group representing 50% of the total gastropod population. Five species of bivalve molluscs were classed under 2 different families namely Uniondale and Corbiculidae. Durga Prasad et.al.,(2001) recorded 48 species of molluscs from Gosthani estuary of which 27 species were gastropods and 21 species were Pelecypoda. Dahegaonkaret.al. (2011) studied mollusc from Wardha and Zarpat river and shown their dominance by contributing, six species from the Gastropods and two from Pelecypoda.Suryawanshiet.al. (2012) studied biodiversity of molluscs from river Godavari, reservoir and pond, reported 24 species of fresh water molluscs. Maximum species were collected from Derla tank while minimum species were collected from Godavari River. Total 14 species of molluscs were identified from river & it indicates that productivity is rich. The species inhabiting at the bottom play an important role in converting organic matter together with the meiobenthos in to biomass which in turn is consumed by the fishes. Thus the molluscs help in the secondary productivity and form an important component in the food chain & web of the river ecosystem. The present study shows water temperature range is maximum and minimum (32°C to 21°C) in kaygontoka, Aurangabad (M.S). Similarly

results recorded by (Salve and Hiware, 2006) reported Water temperature range between (21°C) to (31.1°C) where minimum temperature was recorded in winter season and maximum temperature was recorded in summer season from Nagapur near ParliVaijnath, Beed district. (Mane and Pawar. 2007) reported similar results from Manar river Nanded district. Water temperature was minimum in winter season and maximum in summer season during study period June -2015 to May 2016.This change in temperature may be related to photoperiod. Muley and Patil (2006) reported pH range minimum 7.0 in July and maximum was 8.3 in March from Pauna river, Puna district. The present study pH range minimum in 6.9 in June and maximum in 8.5 May during study period june-2016 to May 2017. Similar results finding have been reported (Korai et al.,(2008); Salve and Hiware (2006); Singh (2000); Mishra *et al.,* (1989). Jhingran,(1982); Sakhare and Joshi (2002); Surve et al.,(2005).

In present study shows dissolved oxygen range varied from maximum and minimum is (4.85mg/l to 2.14mg/l) in Godavari river kaygontoka (MS). Similarly results recorded by Kharadkhele et al., *(*2008) observed D.O range (5.9mg/l to 3.0mg/l) in Nana Nani Park, Latur (M.S). Solanki, (2006) studies on Pandu Lake of Bodhan, (A.P) and reported range (6.60mg/l to 1.70mg/l). Yeole and Patil.(2005).D.O recorded range (7.5mg/l to 6.0mg/l) in Yedshi lake.

During study period from June 2016 to may 2017 the Total alkalinity range was recorded maximum and minimum is (7mg/l to 140 mg/l) in Godavari river kaygontoka (M.S). Similarly results shows (Reddy et.al., 2009) observed total alkalinity range maximum and minimum was(96m/l to 174mg/l) in Pakhal lake Warangal(A.P). Narayana*et.al* (2008) observed total alkalinity range (38.56mg/l to 61.45mg/l) in Anjanapura reservoir, Karnataka. In present study shows Turbidity range (6.0/NTU to 2.1/NTU) in Godavari river Kaygontoka, Aurangabad (M.S).Similarly results recorded by Muhammad-Barzani*et.al.,(*2007) observed turbidity range(28.67/NTU to 4.67/NTU) in Tasik Chinis Feeder River, Pahang, Malaysia. In present study shows Nitrate range (0.92mg/l to 0.60mg/l) In Godavari river Kaygontoka, Aurangabad (M.S).Similarly results shows recorded by Reddy *et.al.,(*2009) observed Nitrate range(0.89mg/l to 0.24mg/l) in mangur dam, Jalgaon(M.S). The Nitrate observed range (1.8mg/l to 0.9mg/l) by Rajashekhar*et.al*, 2007).

CONCLUSION

In our survey, the gastropods and bivalves representing the species collected are mentioned here: *Lymnaea acuminata, Lymnaea luteola, Indoplanorbis exustus, Planorbis planorbis, Gyraulus convexiusculus,* and *Physa acuta*, *Tarebia lineate, Melanoids tuberculata, Melania scabra* and *Bellamya bengalensis* and *Bellamya dissimilis* and Bivalve species *Lamellidens marginalis*, *L. corrianus*, and *Indonaia caeruleus*. The following objectives were pursued using eleven snail species and two bivale species .

Here also *Bellamya dissimilis* dominated the whole snail population and next dominating species was *B. bengalensis.* Two species staged were *Lymnaea acuminata* and *Melanoids tuberculata* respectively. *Tarebia lineate* almost coincide , *Melania scabra* and *Lymnaea luteola* occupied the third position, *Indoplanorbis exustus,*

Planorbis planorbis, *Physa acuta and Gyraulus convexiculus* represented very low percentage. The snail diversity and snail population was moderate. pH, alkalinity and turbidity of water helped the snail population growth at this spot.

AKNOWLEGEMENTS

REFERENCES

1. APHA, (1992). *"Standard methods for the examination of water and waste water".*Amer. Public Health Assoc. Washington D.C. Approx. P. 1500.

2. Subba Rao, N.V. &and Mitra, S.C. (1979). On land and freshwater molluscs of Pune and adjacent districts. *Newsl. Zool. Surv. India,* 1(4) :77-99.

3. Subba-Rao, N. V. (1989). Freshwater Molluscs of India. In:*"Recent Advances in Freshwater Biology".*Roa K.S. (Ed.). New Delhi. Animal Publication, 2: 187-202.

4. A.B. Chavhan, S. S. Pawar and R.G. Jadhao (2015).Study of Biodiversity of terrestrial Snail in selected locality of Amravati City, Cental India. International Journal of Applied research.ISSN-2249-555X, volume:5.

5. Amanullah B. and P.S. Hammed (1996): Studies on molluscan diversity in Kaveri river system (Tiruchirappalli, India) with special reference to vector snails of trematode parasites. Current Science, Vol. 71(6): 473-475p.

6. ArvindChavhan and Pawar (2011).Distribution and diversity of Ant species (Hymenoptera: formicate) in and around Amravati city of Maharashtra, India .World Journal of Zoology 6(4):395-400.

7. Bijukumar A., S. Sushama and T. Biswas (2001): Molluscs collected from the Bharathpuzha River, Kerala, J. Inland Fish. Soc. India; 33, 2, 68-69p.

8. Brown D. S. (1994). *Freshwater snails of Africa and their medical importance*. London: Taylor & Francis. 207-208.

9. Brown, D.S (1994). Freshwater Snails of Africa and Their Medical Importance, 2nd edition. Taylor and Francis, London.

10. Brown, D.S. and T.K Kristensen (1989). A Field Guide to African Freshwater Snails, Southern African species. Danish Bilharzias is Laboratory Publication No. 383..

11. Choubisa S L (1986). The biology of certain larval trematodes infection freshwater Snails of lakes of Udaipur .ph.D thesis, M L Sukhadia University, Udaipur, Rajasthan, india.

12. Choubisa S L (1992).Mollusks of bio-indicator for the trophic stages of lake and lotic environments.*Bulletin of pure and Applied Science 11A(1-2)35-40*.

13. Clarke A H (1979a). Gastropods as indicators of trophic lake stages.The nautilus 94(4) 138-142.

14. Dahegaonkar N.R., Telkahnde P.M., Rohankar I.H. and Bhandarkar W.R. (2011): Studies on diversity of benthic macro invertebrates in two lotic ecosystems near Chandrapur, Maharashtra, India. Golden Research Thoughts, Vol. 1(IV): 4p.

15. Druat C, Millet M and Scheifler R et.al(2011).Snails as indicators of pesticide drift, deposit, transfer and effect in the vineyard. Science and Total Environment 409(20)42804288.

16. Dudgeon, D., A. H. Arthington, M. O. Gessner, Z. -I. Kawabata, D. J. Knowler, C. Leveque, R. J. Naiman, A.-H. Prieur-Richard, D. Soto, M. L. J. Stiassny& C. A. Sullivan, (2006). Freshwater biodiversity: importance, threats, status and conservation challenges. Biological Reviews 81: 163–182.

17. Durga Prasad N.H.K., D.V. Rama Sarma and L.M. Rao (2001): Molluscan fauna of Gosthani Estuary-A Systematic survey. Journal of Aquatic Biology, Vol. 16(1): 15-17p.

18. Edmonson JL, Carroll JA, Price E A and Capron S J (2010).Bio-indicator of nitrogen pollution in heather moorland. Science and Total Environment 408(24)6202-6209.

19. Farida Begum (1988): Study of Invertebrate Macrofauna of Layari River in Karachi with special reference to Molluscan Fauna. Ph.D. Thesis submitted to University of Karachi, 281p.

20. Gupta, S. D. (1976.)Macrobenthic Fauna of LoniReservoir. J. Inland Fish. Soc.India. 8: 49-59.

21. Harmon W N(1974). Snails (Mollusca: Gastropodsa).in: Pollution Ecology of Freshwater Invertebrates, hart CW Jr Fuller SLH(Academic Press. New York).

22. Karadkhele,S.V.Lokhande ,M.V., Rathod,D.S., Shembekar,V.S and Patil,S.M(2008): Studies on physico-chemical characteristics of recreational water body in Nana Nani Park,Latur, (M.S.) J.Aqua. Biol.,Vol 23(1)55-58.

23. Korai A.L.(2008) Biodiversity in relation to Physico-chemical properties of Keenjhar Lake (District, Thatta), Sindh and Pakistan. Turkish Journal of fisheries and aquatic science 8:259-268.

24. Mane A.M. and Pawar S.K(2007) Some physiochemical properties of of Manar river of Nanded district. Maharashtra J. Aquatic Biol. Vol.22(2):88-152.

25. Manoharan, S., Murugesan, V. K. and Palaniswamy, R. (2006).Numerical abundance of benthic macro invertebrates in selected reservoirs of Tamil Nadu. J. Inland Fish. Soc. India. 38(1): 54-59.

26. Mishra P.C. (1989) Effect of municipal waste water quality and ecology of Burla Lake near Hirakud dam reservoir. Poll. Res. Vol. 8(3):145-152.

27. Muhammad-Bazani ismail,B.S., Sahibin Abd., Sujaul-Islam Mir and Tan C.C.(2007): Hydrobiological and water quality assement of Tasik Chini's Feeder, River, Pahang, Malaysia. Am-Euras. J. Agri. And Environment.Sci.,2(1):39-47.

28. Muley D.V. and Patil I.M (2006) A study of water quality and fish diversity of Pauna River Maharashtra, J. Aqua Biol.Vol.21 (1):68-75.

29. Narayana. Puttaiah,E.T. and Basavaraja, D. (2008):Water quality characteristics of anjanapura reservoir near Shikaripur, Dist. Shimoga, Karnataka, J. Aqua. Biol., Vol 23(1)2008:59-63.

30. Okland, J (1983). Factors regulating the distribution of freshwater snails (Gastropoda) in Norway.Malacologia 24, 277–288

31. Rathore N S and BohraP(1987).Molluscan fauna of lakeKailana (Jodhpur), India, Oikoassay4(1)11-20.

32. Ray and Mukherjee I (1963).Fauna of Rajasthan, India. Part 3, Mollusca. Recordings of Zoological Survey of India 61(1&4)403-436.

33. Reddy Vasumathiy, K., Laxmi Prasad,K., Swamy M. and Ravinder Reddy T,(2009):Physico-chemical parameters of Pakhal Lake of Warangal district (A.P)India J.Aquatic.Biol.,Vol 24(1):77-80.

34. Sakhare V.B and Joshi P.K (2002) Ecology of Palas-Nilegon reservoir in Osmanabad district, Maharashtra. J of Aquatic Biologist,18 (2):17-22.

35. Salve S.B and Hiware C.J.(2006) Study of Physico-chemical Nature of Wanparakalpa Reservoir , Nagapur, Near Parli-Vaijinath Dist. Beed, Maharashtra region. National Journal of Life science,3(3)327-331).

36. Snail in selected locality of Amravati City, Cental India. International Journal of Applied research.ISSN-2249-555X, volume:5

37. Solanki, V.R(2006): Ecological studies on Bellal and Pandu Lakes of Bodhan (A.P),India Ph.D.Thesis submitted, Osmania University Hyderabad.

38. Strong, E. E., O. Gargominy, W. F. Ponder, and P. Bouchet (2008). Global diversity of gastropods (Gastropoda; Mollusca)in freshwater. Hydrobiologia 595 (1): 149-166.

39. Strong, E., Gargominy, O., Ponder, W., and Bouchet, P. (2008). Global diversity of gastropods (Gastropoda; Mollusca) in freshwater.Hydrobiological, 595: 149-166.

40. Supian, Z., and A. M. Ikhwanuddin (2002). Population dynamics of freshwater molluscs (Gastropod: Melanoids tuberculata) in Crocker Range Park, Sabah. ASEAN Review of Biodiversity and Environmental Conservation (ARBEC).

41. Surve D.R: (2005) Correlation coefficient of some Physico-chemical characteristics of Baral dam water, District Nanded (M.S) India poll. Res. 24(3):653-656.

42. Suryawanshi A.V., C.S. Bhowate and A.N. Kulkarni (2012): Freshwater Molluscs from Nanded, Maharashtra, India. Bioinfolet, Vol. 9(4B): 732-733p.

43. Whitton, B. A. (1975).Zooplanktons and Macro invertebrates. In: Whitton. B.A. (Ed.). Studies in River Ecology. 2: Baker Publisher Limited London.Pages 87-118.

44. Yeole, S.M. and Patil G.P (2005):Physico-chemical studies of Yedshi Lake in relation to water pollution, J.Aqua.Biol.Vol.20 (1):41-44