



ORIGINAL RESEARCH PAPER

Zoology

MORNA RIVER: WATER QUALITY ASSESSMENT AND DIVERSITYCAL SURVEY IN RELATION WITH VECTOR SNAILS FROM AKOLA CITY. (M.S.)

KEY WORDS:

physicochemical parameter, Morna river, vector snail.

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ABSTRACT

Freshwater snails play an important role in the freshwater ecosystem, and some transmit serious diseases to human, animals and fishes (Salem Al et al. 1993, Yousif F et al 1993a). Due to disease transmission, snail population becomes an essential point of study. The Morna River represents a river of Western India. It is one of the chief tributaries of Purna River and empties in it at Andura Village (N20.89083E76.86386) in Akola District, Maharashtra. Morna is the primary water source for Patur region of Akola district. It rises in the southern Barshitakli tehsil (20.21645E76.94407N) Maharashtra state, and flows northwards, draining Maharashtras Vidarbha region before merging with the Purna river. This survey made to recognise the current status of the river water and its diversitical variation in concern with snails from Akola. The key objective was to encourage the ecosystem awareness and check the risk of vector snails.

INTRODUCTION

River systems represent the zone of Earth's most significant biological diversity and also of our most intense human activity. Out of the five major rivers in India, three flow through the state of Maharashtra, the Godawari, Krishna and Tapi. The Purna River represents a river of Western India. It is one of the chief tributaries of the Tapi river and empties into it at Changdev in Jalgaon, Maharashtra. Morna river consider as main tributary of Purna river. This watershed lies mostly in eastern Vidarbha region of Maharashtra state towards the northern and southern part of Akola district and parts of Washim district, forming near 190 to 200 m thick lava flows enclosing an area of 941.39 sq km. This study is conducted from Akola City which is a district place and showing signs of continuous development and progress. While flowing through the city, Morna becomes an integral part of it. It occupies its status in the life of people and highlights its existence during flood. Rest of the time the mob on its bank unknowingly engage in to pollute it and ruin it. Continuous unacceptable stand of human being gradually destroyed its beauty and biodiversity too. Snail's shows its abundance in water which is polluted and containing lot of organic matter in it. The dreadful diseases spread get into new area depends on the possible establishment of vector snails. The selected study area from Akola city and sampling stations were Nimwadi, Harihar Peth and Gadanki road.

MATERIALS AND METHODS

During study time sampling was done in the morning from 6.00-9.00 am. Wearing hand gloves, the empty shell of the mollusc were collected by hand picking method. As empty shells availability suggest the presence of a particular snail. The algae collected with water sample in a beaker. Other flora collected by the simple cutting its 5 cm. twig with scissor and kept a side in separate plastic bags. For collection of water sample, sample bottles use at each sample site. Firstly sample bottle rinse 2 - 3 times with the water from selected place. Then holding bottle inverse and keeping its mouth closed by one hand deep approximately 6 inches into the water source. Slowly remove a hand from its mouth so as water enter into it. These techniques assure you the proper collection of sample water without contamination of air particles. As the bottle feels with water, with another hand, close its mouth by the bottle cap. Next took it out from water source. The water samples then asses for its quality.

During this collection, data also recorded for dwelling of human and other animals, from the study area. Some snails brought alive to the laboratory and kept in the separate trough. All the collected flora and fauna in preservatives like formalin. The entire flora, snails shell were preserved in 10% formalin.

OBSERVATION AND RESULTS:

The water quality check for various parameters are summarised in following table I-

Sr. No.	Parameters	Results		
		Sample 1 Nimwadi	Sample 2 Harihar peth	Sample 3 Gadanki Road
1	pH	7.16	7.36	7.28
2	TDS (Total Dissolved Solid)	743 ppm	762 ppm	819 ppm
3	TSS (Total Suspended Solid)	41 ppm	14 ppm	29 ppm
4	TS (Total Solid)	784 ppm	776 ppm	848 ppm
5	Electrical Conductivity	1108µs/cm	1137µs/cm	1222µs/cm
6	Total Alkalinity	360 ppm	320 ppm	410 ppm
7	Total Hardness	410 ppm	430 ppm	486 ppm
8	Chlorides	217 ppm	206 ppm	232 ppm
9	COD	16.3 ppm	19.4 ppm	26.9 ppm
10	DO	3.6 ppm	2.1 ppm	2.4 ppm
11	Turbidity	28 NTU	46 NTU	32 NTU
12	Free CO ₂	Absent	Absent	Absent

Basically, the pH value is a good indicator of whether water is hard or soft. The pH of pure water is 7. Drinking water must have a pH value of 6.5-8.5 to fall within Environmental Protection Agency standard (EPA 2017). Here sample from all three stations shows reading 7.16, 7.36, and 7.28 respectively indicate that according to pH we can consider this is as drinking water.

Second parameter is TDS; the total dissolve solid (TDS) is the term to describe the inorganic salts and small amounts of organic matter present in solution in water. As per WHO, all sampling station water falls under fair category as it comes between 600 and 900 mg/litre, means unfit for drinking. (Water Research Center. N.D.)

Third parameter is TSS, Total Suspended Solids (TSS), solids which are not dissolved in water, and that can be separated by a filter. It includes a wide variety of material, like silt, decaying plant and animal matter, industrial wastes and sewage. Its high concentrations can cause many problems of health to the aquatic flora and fauna. This suspended solid shows 41, 14 and 29 reading in ppm from our sampling site. Here we can say that water from Harihar Peth is clearer than remaining two.

Forth is total solid (TS) it is the sum of the total dissolved solid and total suspended solid. From reading we can say that sample three (Gadanki road) shows higher percentage of TS than remaining two sites.

Fifth is electric conductivity, this is the capacity of water to pass electric current. This shows concentration of dissolve electrolyte ions in the water. Here there is no any identification of any specific ion. However significant increase in conductivity shows water pollution. Higher conductivity will result from the presence of various ions. Freshwater streams ideally should have conductivity between 150 to 500 µs/cm to support diverse aquatic life. But data from sampling sites shows 1108, 1137 and 1222 µs/cm conductivity respectively confirm there is tremendous pollution in water and it cannot support properly to the aquatic life. In other word aquatic life is not flourishing in this situation.

Total Alkalinity is the capacity of water to resist changes in pH that would make the water more acidic. Alkalinity is the strength of a buffer solution composed of weak acids and their conjugate bases. The normal range of drinkable water is 20-200ml/lit. Our sampling station shows values 360, 320, 410 ml/lit respectively which is far away from drinking range. Means this water is not suitable for drinking.

Total Hardness is most commonly expressed as milligrams of calcium carbonate equivalent per litre. Water containing calcium carbonate at concentrations below 60 mg/lit is generally considered as soft; 60–120 mg/lit, moderately hard; 120–180 mg/lit, hard; and more than 180 mg/lit, very hard (McGowan W (2000)). Here our value shows 410, 430, 486 ppm respectively means water quality is very hard.

Chloride concentrations of between 1 and 100 ppm (parts per million) are normal in freshwater. Here our readings from all three locations shows 216,206,232 ppm respectively chlorides that is higher than normal range.

According to environmental chemistry concern the Chemical Oxygen Demand (COD) is an indicative measure of the amount of oxygen that can be consumed by reactions in a solution. A COD test can be used to check amount of oxygen require to oxidise organic matter in water to check its quality. There is no particular limit range for COD but in Switzerland industrial water have to maintain its water discharge in 200 - 1000mg/lit range before return it into the environment. Here our sample from all sites comes under this range, so it is good in concern with COD from all sites.

DO is stand for dissolved oxygen. According to global water sampling project, 9-10ppm DO is consider as good water, here waters DO values comes as 3.6, 2.1, and 2.4 ppm respectively, which is less than require amount.

Turbidity is the cloudiness or haziness of a fluid caused by large numbers of individual particles that are generally invisible to the naked eye, similar to smoke in air. The measurement of turbidity is a key test of water quality. The World Health Organisation has set the safe turbidity level of drinking water as not more than 5 NTU (Nephelometric Turbidity Units). Here in our study area this amount shows reading 28, 46, 32 NTU respectively. Means it is far away from drinking point of view.

Last point is of free CO₂, Carbon dioxide (CO₂) is present in water supplies in the form of a dissolved gas. Typically, surface waters contain less than 10 ppm free carbon dioxide while ground waters may have much higher concentration. Dissolved in water, CO₂ forms carbonic acid which lowers pH. Here from all sites we found CO₂, is absent.

Table ii- showing snail and floral diversity from sampling sites

Sr. No	Snail Species	Nimwadi	Harihar Peth	Gadanki Road
1	<i>Lymnaea acuminata</i>	√	√	√
2	<i>Gyraulus convexiusculus</i>	√	√	√
3	<i>Melanooides tuberculata</i>	√	√	√
4	<i>Biomphalaria glabrata</i>	√	√	√
	Floral Species			
1	<i>Eichhornia crassipes</i>	√	--	√
2	<i>Lemna perpusilla</i>	√	√	√
3	<i>Amaranthus spinosus</i>	√	√	--
4	<i>Creeping jenny</i>	√	√	√
5	<i>Alternanthera sessilis</i>	√	√	--
6	<i>Acalypha ciliate</i>	√	√	√
7	<i>Bacopa monnieri</i>	√	--	√
8	<i>Brassica juncea</i>	√	√	√
9	<i>Cyanodon dactylon</i>	√	√	√
10	<i>Commelina benghalensis</i>	--	√	√
11	<i>Ipomoea carnea</i>	--	--	√
12	<i>Limnobiium laevigatum</i>	√	√	√

DISCUSSION

In our culture we consider a river as a goddess. It has mythological importance in our life. But still in the name of worship and many beliefs we are continuously polluting the river. Our activities to satisfy our belief, chock the throat of many rivers. In front of our wishes, we ignore the proper health of rivers and in returns clear the path of our health damage. Morna River flow from the Akola city and becomes an uncut part of it. But the human activity from the shore of river and other side slowly destroy its existence. All three sites are different from physicochemical property. Water analysis from all three sites shows disappointing results. During sampling it was come to know that the water is unsafe for drinking. The scenario was worst, more than river it appears as a nala. Because the public toilet is there on the shore at Harihar peth itself clearly tells the story of pollution at this site. Some sign of bricks producing factories are also observed at the shore. While collecting sample it comes to know that water from MIDC get pour in the river, which considered as next major source of water pollution.

Many workers worked on water quality assessment, Noori, R. et al. (2010) said surface water pollution remains a major problem worldwide, caused by both natural processes and anthropogenic activities. Evaluation of surface water quality in drinking water sources is important as they can be one of the main pathways for the dissemination of toxic chemicals and pathogenic microorganisms explained by Lodder, W.J. et. al (2010) and Ouyang, Y (2005). Carroll, S.P (2006), Identifying the source(s) of contamination and developing appropriate management strategies is essential to minimizing potential public health risks.

It is generally assumed that the aquatic vegetation offers a favourable habitat to the snails El Gindy, (1960), Dazoo ,B.C et al; (1996), & Mitchell, D.S. (1977). Abdel (1958) and Watson (14) both concluded that snail can live and reproduce without aquatic vegetation. According to Abdel (1958) and El Gindy, H. I. (1962) the soft parts of microphytes and the periphyton

growing on them are the favourable food source for snails. The snails are not strictly herbivorous (Baker F.C. (1945). In this respect the snails are not directly dependent on aquatic plants, but they may prefer a habitat with aquatic vegetation.

Nagare and Dummalod (2012) studied Kham River from Aurangabad for its aquatic flora and fauna regarding *Lymnaea* snail and predict the chances of trematode infection from that sites. Here also from all three sites species of *Lymnaea acuminata*, *Gyraulus convexiusculus*, *Melanooides tuberculata*. and *Biomphalaria glabrata* snails show their existence. Means all sites are under the threat of trematode infection. Some mammals like pigs, cow, goats and humans are found to be dwell with this location regularly and have risk of infection. It is well known fact that cows, goats and many grazing animals serves as final host in the life cycle of trematodes like *Fasciola hepatica*. Some birds feed on aquatic insects and snails also observed which having the chance of infection. Gadanki road side area is somewhat separate from crowds but many grazing animals and birds shows this place is also important from their point of view as this area serve for them as feeding ground. Researchers like Sisodiya *et al* (2018) work on relation of physicochemical nature of water and fish diversity. Review by Pawara R. H. *et al* (2014) explains briefly about the work regarding fish faunal diversity in many concern. Here the water depth is not that much and the waste stuff on the shore catches more attention. So it seems prime important to check the water quality and snails diversity and document the data regarding this.

CONCLUSION

Now a days scheme like 'Namami Gange' shows our changing view regarding rivers but after observing rivers from our home towns it comes to know that we make partiality with that. At one side we look seriously towards the selected rivers and other side we neglect our nearer one. The water analysis supports the reason of snail's existence, and the availability of floral fauna in the area provide plenty of places for snails reproduction and eggs clutches. There are some ways to avoid this bad condition, peoples from the bank of river need to be more conscious about it. School – colleges plan to make aware people through gathering like programs and attract the concentration of people towards rivers in positive way. Just from the bottom of heart make effort and serve to return the past glory and beauty to the river.

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