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The species richness and abundance of macro-invertebrates in Bilawali Talab, Indore (M.P.), India

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Abstract
The present study involved sampling, pre-identification and identification of macro-invertebrates during 2013-14 and computing the % occurrence of families of various taxonomic groups. Macro-invertebrates were identified up to family level, and bio assessment at various locations has been done. 38 species of Benthic macro-invertebrates were identified 12 species of *Annelides*,13 species of *Molluscans* and 13 species of *Arthropoda* have been found in different depth composition inhabiting the Bilawali Talab. The present study deals with the population density and species diversity of aquatic macro invertebrate fauna.

Keywords: Bilawali Talab, benthic macro-invertebrates, abundance, bio-assessment

1. Introduction
Macro-invertebrates are most frequently used in bio-monitoring studies because the responses of macro-invertebrates to organic and inorganic pollution have been extensively documented (Thorne., Williams., 1997 [71]; Kazanci., Dugal., 2000 [32]). They have sensitive life stages that respond to stress and integrate effects of both short-term and long-term environmental stressors (EPA., 1998) and they are important areas for maintaining biodiversity (Meyer *et al*., 2007 [37]; Richardson., Danehy., 2007 [57]).
The study of benthic macro-invertebrates provides a method to determine the water quality of a stream based on collection and identification of stream-bottom (benthic) macro-invertebrates. This study has been done to find out the diversity of benthic macro-invertebrates.
Benthic study in Malwa region of Madhya Pradesh is scare except that of Varshney., Govindan., Kashinathan., Desai., 1976 [19]; Rao *et al*., 1985 [52]; Sunny., Diwan., 1991[69]; Sharma S., 2003 [61]; Sharma *et al*., 2007 [64].

2. Materials and Methods
Indore is the largest city of Madhya Pradesh in Central India. It is situated between 22°20" N latitude and 75°25" E to 75°15" E longitude. Bilawali Talab is situated in the southwest direction of Indore at Khandwa road. It is situated 6 km. away from Indore in Madhya Pradesh. The catchment area of Talab is 117 ha. This Talab was completely made in 1914 by Maharaja Tukoji Rao Holkar under the supervision of Sri Gaddes. After its completion, the Talab was connected to pipliyapala Talab by means of a canal near the Limbodi village. It is based on the plan of the contemporary resident Shri Bhojket in 1905. The Talab used to provide water to the textile industries in the past. Now-a-days the Talab caters to the need of a particular area for its various uses like drinking, fish culture etc.
Sampling Stations -The present study was conducted for the period of one year from September 2013 to August 2014. Biological samples were collected from the selected sampling stations in the Bilawali Talab. Different methods were employed to sample aquatic insects from the target habitats. The samples were collected with various types of nets, Surber sampler at shallow profundal zone, Ekman grab at deeper profundal zone and by random sampling. Supportive qualitative sampling was done by a hand net, D-net and by handpicking the zoobenthos from different substrata in similar habitats. The substrate was disturbed in front of the D-net to collect the benthos. The samples were preserved in 75% alcohol solution and transported to the laboratory for further investigation. In the laboratory,

the samples were rinsed thoroughly with pure water to remove preservative through a sieve (100 µm mesh size). Collected samples were examined under a standard microscope and identified using standard taxonomic literature. Samples were assigned to a family or genus using taxonomic keys like APHA (2002) [1], Willium & Feltmate (1992) [80], Pennak (1989) [49], Tonapi (1980) [73], Needham & Needham (1969) [41], Dudgeon (1999) [12], Barbour *et al*., (1999) [4] etc.

3. Results and Discussion

Benthic macro invertebrates are best indicators for Bio-assessment. The abiotic environment of the water body directly affect in the distribution, population density and diversity of the macro benthic community. Benthic fauna are especially of great significance for fisheries that they themselves act as food of bottom feeder fishes. In the present study, 38 species of Benthic macroinvertebrates were identified 12 species of Phylum Annelida Class- Oligochaeta (*Tubifex tubifex*, *Chaetogaster* species, Nais simplex, Aeolosoma *bengalensis*, *Dero limnosa*, *Branchiura sowerbyi*, *Stylaria fossularis*, *Dero* digitata, *Srachiondrilus semperi*, *Branchiodrilus semperi*) and Class- Hirudinea (*Helobdella* species, *Glossiphonia* species); 13 species of Phylum Mollusca Class- Gastropoda (*Planorbis* species, *Limnaea auricularia*, *Limnaea acumainata*, *Limnaea* species, *Vivipara bengalenis*, *Vivipera Oxytropsis*, B *bellamya* species, *Pisidium clarkeanum*, *Digoniostoma pulchella*, *Melanoides tuberculatus*, *Melanoides lineatus*) and Class- Pelecypoda (*Lamellidens marginalis*, *Lamellidens consobrinus*); 13 species of Phylum Arthropoda Class-Insecta (Chironomus *phumosus*, *Strictochironomous* species, *Baetis* species, *Corixa* species, *Berosus* species, *Hydaticus* species) and Class-Crustacea (*Apus* (Tadpole shrimp), *Daphnia* (Water fly), *Daphnia cercinata*, *Dephnia magna*, *Cyclopes*, *Nauplius*, *Cypris*).

Average quantitative percentage composition of Macro-invertebrates of Bilawali Talab (Year 2013-14) Four stations (Per Cm² of Sediment)

3.1 Annelida

During the study period, 12 species named *Tubifex tubifex, Chaetogaster species, Nais simplex, Aeolosoma bengalensis, Dero limnosa, Branchiura sowerbyi, Stylaria fossularis, Dero digitata, Srachiondrilus semperi, Branchiodrilus semperi, Helobdella species, Glossiphonia* species were recorded.

During the study period (2013-14) *Tubifex tubifex, Branchiura sowerbyi, Stylaria fossularis, Dero digitata, Srachiondrilus semperi, Branchiodrilus semperi* were regular and abundant at 0.2 m., 0.5m., 1m. &1.5m. depth. *Nais simplex* found Irregular in following depths but *Aeolosoma bengalensis* was irregular in 0.2m. - 1m. depth and in 1.5m it was not recorded. *Chaetogaster* species was irregular at 0.2m.- 1m. depth but in 1.5 m it was recorded as single. *Dero limnosa* was irregular in 0.2m. & 0.5m. depth but at 1m. &1.5m. depth it is recorded as regular and abundant. *Helobdella* species, *Glossiphonia* species were recorded irregular at 0.2m. & 0.5m. depth but not recorded at depth of 1m. & 1.5m.

Gupta et al., 2010 [20]; Oommachan., 1985 [37]; Rao *et al*., 1985 [52] have also supported these observations. Ranson., Dorris., 1972 have reported an increase in macrobenthic diversity during winter months. The greater diversity was also found during winter at Lal Sagar reservoir (Mehrotra., 1988).

3.2 Mollusca

During the study period, 13 species named *Planorbis* species, *Limnaea auricularia, Limnaea acumainata, Limnaea* species, *Vivipara bengalenis, Vivipera oxytropsis, Bellamya bengalensis, Pisidium clarkeanum, Digoniostoma pulchella, Melanoides tuberculatus, Melanoides lineatus, Lamellidens marginalis, Lamellidens consobrinus* were recorded.

During the study period (2013-14) *Melanoides lineatus* was recorded as regular and abundant at 0.2m., 0.5m., 1m. & 1.5m. depth. *Limnaea* species as found irregular from 0.2m. – 1.5 m. depth. *Limnaea auricularia* and *Limnaea acumainata* were recorded regular and abundant from 0.2m. – 0.5m. depth, and in 1m. Depth they recorded as single species but at 1.5m. depth they were not recorded. *Vivipara bengalenis* and *Vivipera Oxytropis* were found regular & abundant from 0.2m. – 1m. but at 1.5m. depth they were irregular & less abundant. *Bellamya bengalensis* was regular & abundant at 0.2m., 1m., 1.5m. depth but at 0.5m. depth they was irregular & less abundant. *Digoniostoma pulchella* was recorded regular and abundant from 0.2m. – 1m. deth but at 1.5m. it was recorded as single species. From the depth of 0.2m. – 1m., *Melanoides tuberculatus* & *Melanoides lineatus* species were regular and abundant but at 1.5m they were not recorded. *Lamellidens marginalis* & *Lamellidens consobrinus* were irregular and less abundant from 0.2m. – 0.5m. but not recorded from 1m. – 1.5m. Jakher *et al*., (2003) [27] has reported three Gastropods (*Viviparus bengalensis, Lymnaea acuminata* and *Gyraulus convexiusculus*) from lake Balsamand.

Mehrotra., (1988) has found seven species of Gastropoda including *Ballamya bengalensis* in Lal Sagar reservoir. Chakraborty., (1987) has reported that *Ballamya. bengalenis* was dominant among Gastropods of sewage fed fishpond at Rahara, West Bengal.

3.3 Arthropoda

During the study period, 13 species named *Chironomus phumosus, Strictochironomous species, Baetis simplex, Corixa species, Berosus species, Hydaticus species, Apus* (Tadpole shrimp), *Daphnia* (Water fly), *Daphnia cercinata, Dephnia magna, Cyclopes, Nauplius, Cypris* were recorded.

During the study period (2013-14) *Chironomus phumosus, Strictochironomous species, Daphnia cercinata* & *Dephnia magna* were recorded as regular & abundant from 0.2m. – 1.5m. depth. *Berosus* species was found as irregular from the depth of 0.2m. – 1.5m. *Baetis simplex* was irregular & less abundant from 0.2m. – 1m. depth but at 1.5m. it was absent. *Corixa* species was found irregular from 0.2m. – 0.5m., at 1m. Depth it was regular & abundant but at 1.5m. it was abent. *Hydaticus* species was observed irregular & less abundant from 0.2m. – 0.5m. but absent at 1m. – 1.5m. depth. *Apus*(Tadpole shrimp), *Daphnia* (Water fly) & *Cyclopes* were recorded irregular and less abundant from 0.2m. – 1.5m. of depth. *Nauplius* was irregular from 0.2m. – 0.5m. depth and not recorded from 1m. – 1.5m. *Cypris* was irregular & less abundant frm 0.2m. – 0.5m. and not recorded from 1m. – 1.5m. of depth.

Adoni., (1985) has also observed the same trend in some lentic system of Sagar Lake. Michael., (1968) [38], Oommachan et al., (1985)[45] and Shrivastava et al., (2001) [65] have also observed arthropods peak in winter and minimum in monsoon because of their dilution or loss of bottom algae. insect showed significant relationship with moisture, total hardness, magnesium and chloride.

4. Conclusion

The natural population of Talab is fast depleting due to industrial and mining pollution. Therefore, it is suggested that research on biodiversity of Benthic macroinvertebrates need to be strengthened to know the current range of distribution and abundance. To generate current information on the Benthic macro-invertebrates biodiversity, intensive survey is required so that better management plans are implemented for conservation of native species.

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