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STUDIES ON SPECIES RICHNESS AND ABUNDANCE OF MACROINVERTEBRATES IN ATARITAL DAM, MAUGANJ (M.P.)

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ABSTRACT :- Aquatic insects and insect larvae offer an excellent way to examine biological aspects of water quality and scientists in many countries are increasingly using water quality criteria based on macro-invertebrates. The present study involved sampling, pre-identification and identification of macro-invertebrates during 2021-22 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. 48 species of Benthic macro-invertebrates were identified total 06 classes, 17 order, 28 families belonging to 3 phylum Arthropoda, Mollusca, Annelida were recorded. Phylum Arthropoda was the most dominating group in year, summer rainy were reported found in different depth composition inhabiting the Atarital dam. The present study deals with the population density and species diversity of aquatic macro invertebrate fauna.

***KEYWORDS*:-** Atarital dam, benthic macro-invertebrates, abundance, bio-assessment.

INTRODUCTION:-

Every aquatic ecosystem face many difficulties and problems to make optimum use of natural aquatic resources or in trying to ameliorate changes already caused by natural or cultural process. Atarital dam water enjoys lentic as well as lotic type of water ecology. A number of animals and plants are known to live the dam water, but the benthos differs from place to place and almost based upon the quantity and quality of water. This dam has given high up water level as a great shelter to human and humanity along with a number of Phytoplanktons, Zooplanktons, Nanoplanktons, Nektons, (Fishes, Insects, Crustaceans, Annelids, Mollusca and other free swimming animals). Benthos (Phyto-benthos and Zoo-benthos), Pedon (bottom fauna) and macro-organisms in dead organic matter such as decomposing bacteria and fungi. The food chain of fish, plankton, pedon, benthos and microphytes as well as the energy flow is also important in this regard as all these are chained together.

Macro-invertebrates are best indicators for Bio-assessment. Macro-invertebrate are living beings without spines, which are visible to the eye without the guide of a magnifying instrument. Aquatic macro- invertebrate live on, under and around rocks and residue on the bottoms of lakes, waterway and streams. Because of their environment choice, macro-invertebrates are frequently viewed as "benthos" which alludes by and large to life forms which live on, in or close to the bottom. There are many different types of macro invertebrates such as dragonfly larvae, mosquito larvae, water fleas, beetles and snails. Organisms required good water quality to survive. They may require high dissolved oxygen levels, or clear, non-turbid water, or they may be predators that require an ample source of prey.

REVIEW OF LITERATURE:-

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 ; Kazanci., Dugal., 2000. 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; Richardson., Danehy., 2007).

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) macroinvertebrates. This study has been done to find out the diversity of benthic macroinvertebrates. Benthic study in Vindhya region of Madhya Pradesh is scare except that of Varshney., Govindan., Kashinathan., Desai., 1976; Rao *et al.*, 1985; Sunny., Diwan., 1991; Sharma S., 2003 ; Sharma *et al*., 2007.

MATERIALS AND METHODS:-

Mauganj is the new district of Madhya Pradesh in Central India. Mauganj, is very unique district of Madhya Pradesh is very rich in its natural resources, beautiful fauna and flora including many rivers, lakes pond dams' pools tanks and water falls. Atrital Dam (stop dam) is an anthropogenic construction on the confluence of two small nallahas Garha and Atari on the right hand side of N.H.7 in Mauganj district at 24 ^{0}43' 13" N and 80^{0}2'53"S. Rewa has 7495 sq. Km of territory and occupies about 2.5% of total geographical area of the state. It stretches about 150 Km from north to south and 83 Km. from east to west. The catchment area of Talab is 14.60 Sq. Miles. Atarital was completely made in 1972. The Talab used to provide water to the Agriculture in the past. Now-a-days the Atarital 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 2021 to 2022. Biological samples were collected from the selected sampling stations in the Atarital dam. 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), Willium & Feltmate (1992), Pennak (1989), Tonapi (1980), Needham & Needham (1969), Dudgeon (1999), Barbour *et al.*, (1999) etc.

RESULTS AND DISCUSSION:-

Benthic macro invertebrates are best indicators for Bioassessment. 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, total 48 genera of Macro-benthos population have been identified during the research period and listed in table no. 1. During the present study 2021-22 of a total 06 classes, 17 order, 28 families belonging to 3 phylum Arthropoda, Mollusca, Annelida were recorded. Phylum Arthropoda was the most dominating group in year, summer rainy were reported shown on table no1. 2 & 3.

Observation of total Macro-invertebrate:-

Quantitative observation of total Macrobenthods:

Macrobenthos mainly belonged to the groups of Annelida, Arthropoda, and Mollusca (Table no.2 & Graph 1). The species identified in this study and their characteristics are as follows:-

Annelida-:

The highest value of total Annelida Macrobenthos in Atarital dam was recorded 75.0 org/l in the month of May 2022, while the lowest value of total Annelida Macro-benthos was recorded 52.2 org/l in the duration of December 2021. Gupta et al., 2010; Oommachan., 1985; Rao et al.,1985 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).

Arthopoda:- The highest value of total Arthropoda Macrobenthos in Atarital dam was recorded 276.40 org/l in the month of August 2021, while the lowest value of total Arthropoda Macro-benthos was recorded 107.0 org/l in the duration of May 2022. Adoni., (1985) has also observed the same trend in some lentic system of Sagar Lake. Michael., (1968), Oommachan et al., (1985) and Shrivastava et al., (2001) 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.

Mollusca:- The highest value of total Mollusca Macro-benthos in Atarital dam was recorded 101.8 org/l in the month of May 2022, while the lowest value of total Mollusca Macro-benthos was recorded 70.20 org/l in the duration of January 2022. 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.

Table: 1 Total number of Macro-invertebrates at Atarital Dam

S. No.	Phylum	Class	Order	Family	Species
1.	Annelida	Oligochaeta	Lumbriculida	Lumbricullidae	***1.*** *Lumbriculus sps*
			Haplotaxida	Tubificidae	***2.*** *Tubifex sps*
					3. *Aulodrilus pleuriseta*
					4. *Branchiura sowerbyi*
				Haplotaxidae	***5.*** *Haplotaxis sps*
		Hirudinea	Rhynchobdellida	Glossiphoniidae	***6.*** *Glossiphonia sps*
			Pharyngobdellida	Erpobdellidae	***7.*** *Erpobdella sps*
			Rhynchobdellida	Glossiphoniidae	***8.*** *Clepsine sp*
2.	Arthropoda	Insecta	Diptera	Chironomidae	***9.*** *Chironomus sps.*
					10. *Polypedilum sp*
					11. *Glyplotendips sp*
					12. *Kiefferulus sp*
					13. *Orthocladius sp*
					14. *Tanypus sp.*
					15. *Procladius sp.*
				Tipulidae	***16.*** *Helius sp*
					17. *Elliptera sp*
					18. *Limnophila sp*
			Coleoptera	Gyrinidae	***19.*** *Gyrimus sp*
					20. *Dineutus sp*
			Odonata	Gomphidae	***21.*** *Aphylla sps.*
					22. *Gomphus sps.*
				Cordulegasteridae	***23.*** *Cordulegaster sps.*
			Megaloptera	Corydalidae	***24.*** *Corydalus sps.*
			Hemiptera	Hydrometridae	***25.*** *Hydrometra sps.*
				Nepidae	***26.*** *Ranatra sps.*

					27. *Nepa sps.*
				Pteronarcidae	***28.*** *Pteronarcella sp*
			Plecoptera	Peltoperlidae	***29.*** *Peltoperia sp*
					30. *Hydropsychae sp.*
				Hydropsychidae	***31.*** *Parapsyehae sp.*
					32. *Arctopsychae sp*
				Psychemyidae	***33.*** *Psychomyia sp*
			Trichoptera		***34.*** *Polycentropus sp*
				Polycentropidae	***35.*** *Platycentropus sp*
				Rhyacophilidae	***36.*** *Rhyacophila sp*
					37. *Palaemonetes sps.*
		Crustacea	Decapoda	Palaemonidae	***38.*** *Syncaris sps.*
					39. *Thiara scabra (Muller)*
				Thiaridae	***40.*** *Thiara rudis (Lea)*
3.	Mollusca				***41.*** *Tarebia lineata (Gray)*
			Mesogastropoda	Viviparidae	***42.*** *Bellamya bengalensis*
				Pilidae	***43.*** *Pila globosa*
		Gastropoda	Basommatophora	Lymnaeidae	***44.*** *Lymnaea accuminata*
				Amblemidae	***45.*** *Parreysia corrugate*
			Trigoinoida	Unionidae	***46.*** *Lamellid*
		Bivalvia			***47.*** *Anodonta dominate*
			Veneroida	Corbiculidae	***48.*** *Corbicula striatella (Deshayes)*

Table No. 2-*The number of genera belonging to different Group.*

Sr. No.	Group	No. of Genera	Percentage
1.	Annelida	08	16.66 %
2.	Arthropoda	30	62.50%
3.	Mollusca	10	20.84%
	Total	48	100 %

Arthropoda> Mollusca > Annelida

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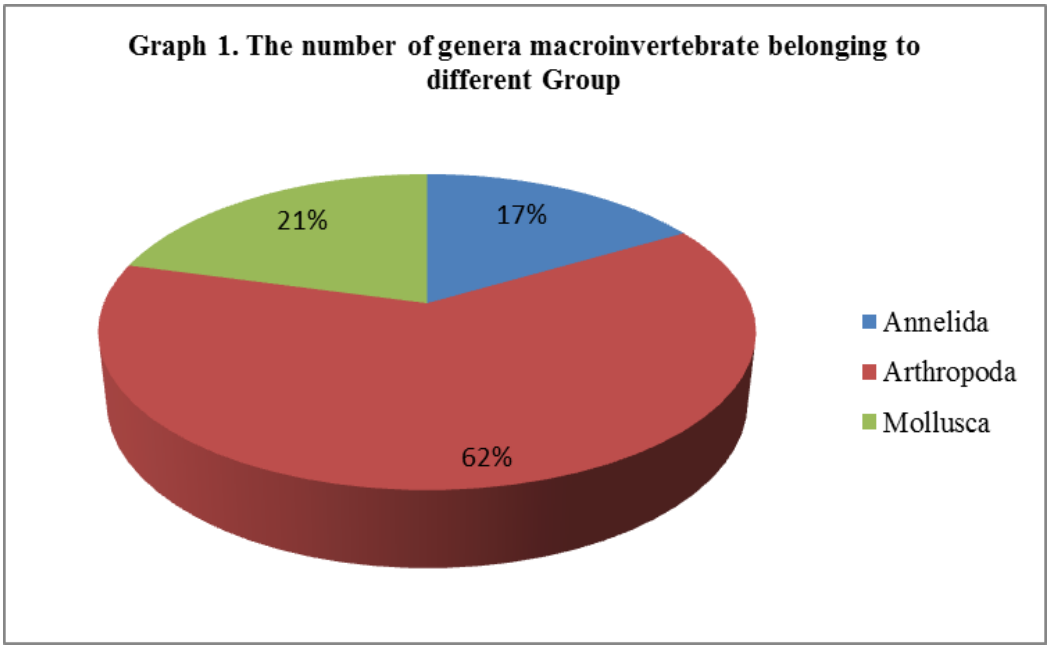
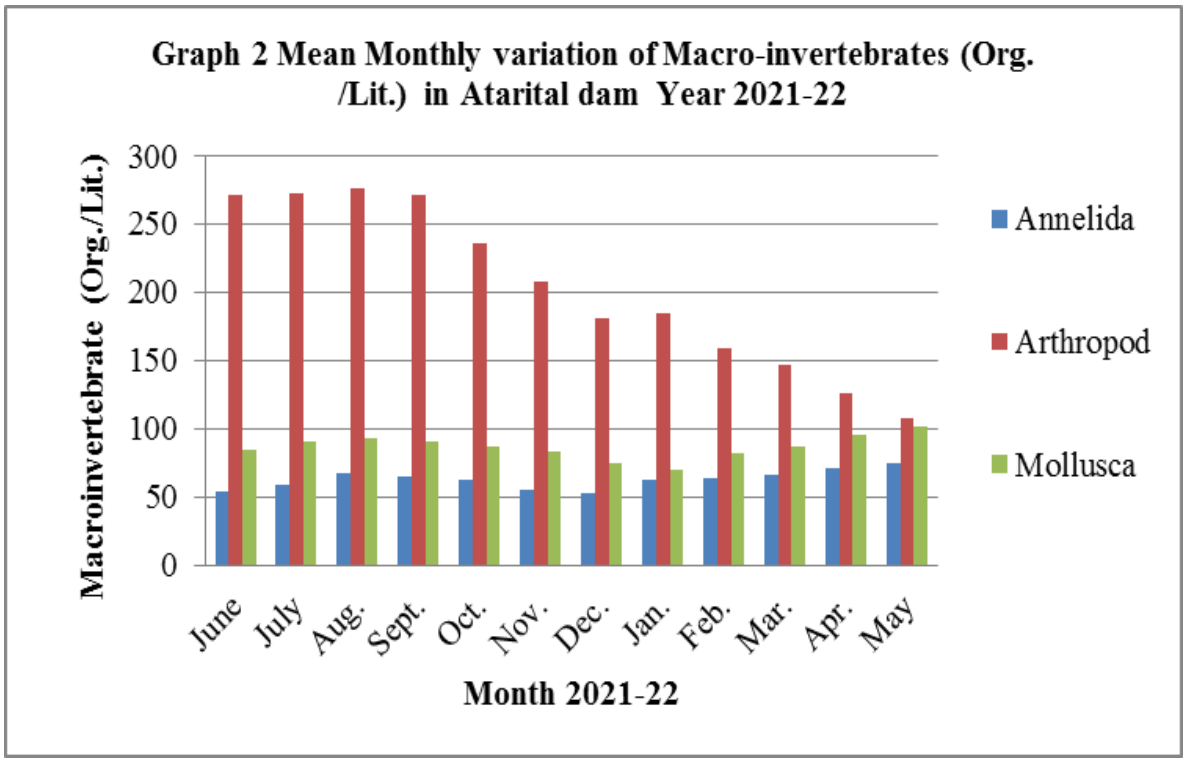


Table No. 3 Average Monthly variation of Macro-invertebrates (Org. /Lit.) at Atarital Dam 2021-22

Months 2021-22	Annelida	Arthropod	Mollusca
June	54.4	271.0	84.8
July	59.2	272.6	90.8
Aug.	67.0	276.4	92.8
Sept.	64.4	271.2	91.2
Oct.	62.4	235.4	87.4
Nov.	55.6	208.2	83.0
Dec.	52.2	180.4	74.6
Jan.	62.6	185.0	70.2
Feb.	63.4	159.4	82.0
Mar.	66.2	146.6	87.4
Apr.	71.2	125.6	95.2
May	75.0	107.6	101.8
Min	**52.2**	**107.0**	**70.2**
Max	**75.0**	**276.4**	**101.8**



CONCLUSION:-

The present study concluded, 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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