



AQUATIC INSECT AND THEIR ECOLOGICAL ROLE IN VASANT SAGAR RESERVOIR. PUSAD. DIST. YAVATAMAL MAHARASHTRA (MS)

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Abstracts:

Upper Pus Reservoir was Constructed on The Pus River This project comes under watershed area of Pus project, which is in Godavari Valley on 20°1'41"N and 77°27'4"E. The Official Designation of the Project is " Pusad . Locally this is also known as "Pus Dharan / Vasant Sagar, " or "Upper Pus Lake". Project was constructed as part of irrigation projects by the Government of Maharashtra in the year 1971. It is fresh water body. The dam impounds on Pus River . Nearest city to dam is Pusad and it is situated in Yavatmal District of Maharashtra . The insect diversity of Upper Pus Reservoir was studied at four sampling stations during July. 2020 To Jan. 2022. The water body sustains heavy insect's biomass throughout the period of research. Water is the one among the prime necessities of life required for growth and other activity of all living being. The different types of insects present in water bodies. These are called aquatic insects. Study of insect is called entomology. They are not seen very easy. There are many kinds of aquatic insects found in or on the surface or at the bottom (benthic) of water. They act as good indicator of water pollution. Some of the aquatic insects are essential while some are not essential to human being. aquatic insect are used for assessing water quality and providing knowledge for the environmental manager. Some aquatic insects are very colourful, such as dragonfly belong to order odonata,. The insect belonging to different groups were identified from the reservoir.

Key word: Insects abundance, Upper Pus (Pus) Reservoir. TQ. Pusad. Dist. Yavatamal

INTRODUCTION:

The Dam is an Earth-fill Gravity Dam. Purpose of the Project is for irrigation and drinking purpose. Length of the dam is 744 m (2441.0 Feet). While the height of the dam above lowest foundation is 42 m (137.8 Feet) . Project Spillways is other type. Spillway length is 261 m (856.2 feet). Spillway is ungated . Catchment area of Upper Pus Reservoir is 59.6 Thousand Hectors. Maximum / Gross storage capacity of Upper Pus Reservoir is 113.92 MCM . Live storage capacity is 91.26 MCM. Now a day's almost all the water bodies make for good picnic spots Upper Pus Reservoir / lake is also a popular Tourist attraction for its scenic beauty.

During recent years there has been increasingly greater concern for inland fresh water resources, which are affected in different ways by all kinds of human activities. It is the manmade lakes and one such example of water resources, which form a part of a still larger system, the watersheds. Any human activity in the whole of the watershed is bound to influence the water in the reservoir and downstream. Deforestation, grazing and otherwise removal of vegetal in the watershed generally results in accelerated silting of the reservoir. The agricultural practices in the catchments area not only help increased silting but also responsible for addition of large quantities of nutrients, pesticides and organic matter, brought to the reservoir by the runoff through the stream. Not only the water quality in the reservoir is affected but its impact can also be left in the change in the biota, soil properties and physico-chemical status. In India, the water resources are under great stress from a plethora of human activities. Though the need for increased agricultural production, increased resource utilization, very little is known about the quality of water resources and impact of these activities thereupon. In the recent years environmental monitoring through regular assessment of water quality has become a crucial factor in the exploitation or conservation of aquatic resources. Zooplankton is abundant in the shallow areas of water body. The zooplanktons unlike phytoplankton are particularly distributed horizontally and vertically in an ecosystem. The zooplanktons forms an important group as it occupies an intermediate position in the food web, many of them feeding on algae and bacteria and in turn being eaten up on by fishes. They also indicate the trophic status of a water body, their abundance increase in eutrophic water. They are also sensitive to pollution and many species are recognized as Indicators of pollution. Water from Upper Pus Reservoir is being used for drinking, agriculture purpose and fishery activities. On the other hand, due to increasing human and animal activities in it, the water is becoming polluted. Hence, the basic information and data on the aquatic ecosystem thought to be worked out in order to evolve effective and appropriate strategies for the management of the reservoir. The study of the reservoir in respect to Insect availability is not worked out earlier. Similarly, no studies are carried out on the water quality of the lake and therefore, it was thought to study Insects in different parts of the lake, so that it would help in future planning for the reclamation of such lake and its utilization for intensive fish culture.. In this study, Families Hydrophilidae, Notonectidae, Gerridae And Nepidae From Hemiptera order were identified 45.9%, 26.9%, 25.0 %, 2.2% respectively, these result lead to the conclusion that the Hemiptera fauna is relatively rich in Kushan

REVIEW OF LITERATURE: Aquatic insect are the important role as model organism in analyzing the structure and function of freshwater ecosystem and aquatic insect imaging system to automate insect classification studied by **Sarpola, Passch, Mortensen, Dietterich, Lytle, Moldenke, and Shapiro(2008)**, Biodiversity of aquatic insect studied by **Choudhary and Janak (2015)**. Calcium sequestration in the hypo-osmotic freshwater surrounding is the imperative in maintain calcium homeostasis in the aquatic organism of freshwater studied by **Poteat And Buchwalter (2014)** , Adequate knowledge of the identification, economic important, life cycle, biodiversity, role and taxonomic order of aquatic insect facilitated sustainable culture fisheries management and their practice are studied by **Abowei And Ukoroije (2012)**, Low-flow disturbance are predict to increase in frequency and intensity because of change in whether and large human water withdrawal studid by **Waltes (2011)** and Diversity of water beetle studied by **Temunovic(2007)** ., water strider (Hemiptera: Gerridae) have been considered as a potential sentinel for mercury concentration of freshwater ecosystem studied by **Jardine, Kidd, Cunjakand Arp (2009)**., He concluded that the water beetle are prefer more permanent pond with longer hydro periods for such pools constitute more constant environment. Determination of biting bug of Hemiptera families present in the country of Kashan studied by **Dehghani, Atharizadch, Moghadem and Hadei (2016)**

Aquatic insect are important as a fish food, bio-indicator and bio control agent and functioning processing and cycling nutrients belong to many specialising feeding group studies by **Dalal and Gupta (2016)**. Bio-diversity of aquatic insect population in 3 permanent pond of Guwahati, Assam , India studies by **Hasan, Haloi, Chetri And Begum (2016)**. He concluded that 25 different species belonging to 6 order and 13 family. In the study order Hemiptera is most divers and abundant in pond.

Aquatic insect for bio monitoring fresh water eco system studies by **Solanki and shukla (2015)**. In this study he concluded that the aquatic insect considered model organism for analysing structure and function of fresh water ecosystem. In this the insect are biological indicator. Aquatic insect and risk studied by **Nayar, Morac, Marshal (2015)**. He concluded that the role of the insect in food web, bio-monitoring, fishing controlling weed. Aquatic insect indicate terrestrial habitat degradation changes in taxonomical structure and functional diversity of dragonflies in tropical rain forest of east kalimantal studied by **Dolny, Harabis, Barta, Lhota and Drozd (2012)**. He concluded that Odonate not only ecological indicator but also satiable and sensitive indicator of human induced changes in topical forest. Diversity and distribution in stream of the mae klong watershed western Thailand studied by **Maneechan and Prommi (2015)**. He concluded that of aquatic insect collected from three strem the order Trichoptera was most abundant followed by Ephemeroptera, Hemiptera , odenta, coleopteran, diaptera, placoptera, melanoptera, lipidoptera.

MATERIAL AND METHODS:

SITE DESCRIPTION: Upper Pus Reservoir is a man made reservoir located near Pusad District – Yavatmal. This project comes under watershed area of Pus project, which is in Godavari Valley on 20°1'41"N and: 77°27'4"E. It was constructed on The Pus River

The region of aquatic insect collection from four sites of the reservoir. The period of collection of aquatic insect is the monsoon and winter season i.e. July to October and winter period is November to January. In this period the aquatic insect is largely seen

Collection of aquatic insect is requiring patience and determination. Some aquatic insect is very small and some are large. The small aquatic insect is very movable and that is why they can be collect very carefully and neatly. The insect can be collect by insect net. These insect net can be moving in water for collecting the insect. these collecting insect is transfer in to the beaker or glass jar or glass bottle.

We also used another method to collect aquatic insect, ie hand collection method. Those insect can move on the upper surface of water, these are easy to collect by hand collection method. then transfer it in to glass bottle fill with 70% alcohol for preservation.

The equipment used for the collection of aquatic insect is simple and inexpensive .it includes insect net, aquatic net. Sweeping net etc. and for preservation purpose glass jar, transparent bottle, beaker, forceps, good quality camera and 70% alcohol. Etc. the net made up of nylon wire, which have looped about 60 cm diameters. Over the nylon net the muslin cloth bags were hanging. The loops of net were attached to the stick of one meter length. By continue netting in water, the collected insect immediately transfer in to glass bottle containing already 70% alcohol., after few hours it get die.

The collected sample of aquatic insect were carried out for photography by using good quality camera. The collected specimen was identified by special identification key on Facebook insect India and other web link on the internet. While some species are identified by using photograph available on the internet and some are identified using literature.

GEOGRAPHY AND DEMOGRAPHICS

Pusad is located at 19.9104°N 77.5686°E. Its average elevation is 315 meters (1033 feet). it is mostly surrounded by hills. According to the 2011 Indian census, Pusad had a population of 73,046. Pusad climate is extreme, with the temperatures reaching as high as 49 degrees Celsius (120 degrees F°) during the summer and as low as 5 degrees Celsius (41 degrees F°) during the winter. Experts believe this is the result of the "Basket Effect" (i.e. high-altitude hillside effect) since Pusad is surrounded by hills. Two of Maharashtra's Chief Ministers, Vasantrao Naik, and Sudhakar Rao Naik, were from Pusad.

GEOGRAPHY :

Upper Pus Major Irrigation Project (Taluka: Pusad, District: Yavatmal)

S.No	Description	Data
1	Name of Project	Pus Project
2	Location	Taluka Pusad, District Yavatmal
3	Basin	Godavari
4	Sub Basin	Pus
5	Name of River / Nala	Pus river
6 (a)	Catchment Area (Sq.Km.)	596
6 (b)	Free Catchment area (excluding the C.A. of all U/S storages)	596
7	Type [Major / Medium / Minor / Minor (LS)]	Major
8	Year of completion	1970-71
9	Type of dam	Earthen Dam
10	Gross storage (Mm3)	113.91
11	Live Storage (Mm3)	91.26
12	Dead storage (Mm3)	22.65
13	Maximum dam height (m)	41.75

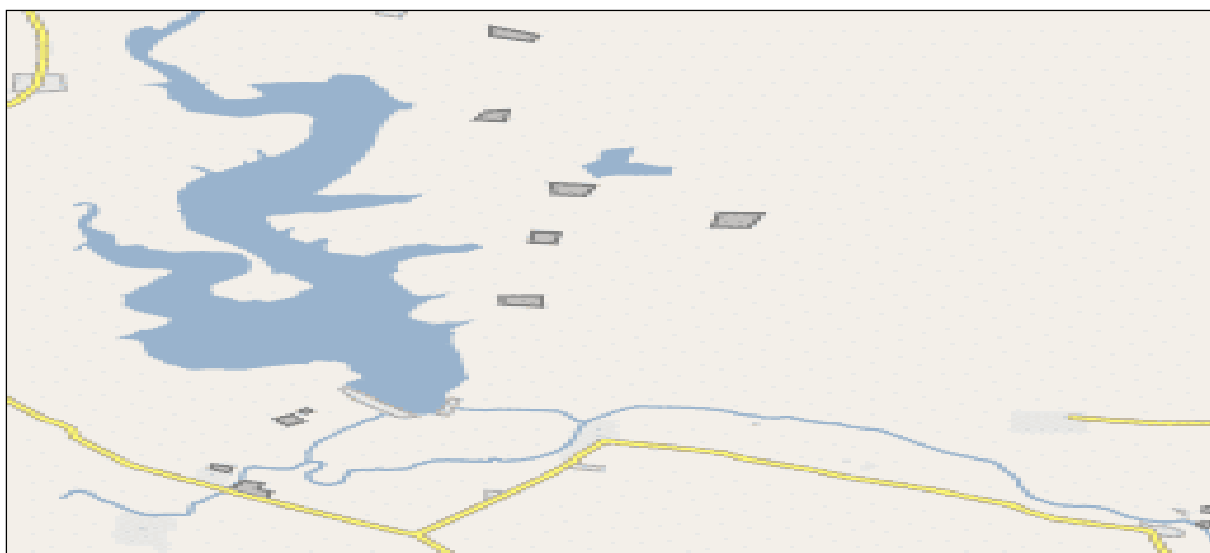


Fig. Map of the Reservoir

RESULT AND DISCUSSSSSSSION

The present work carried out on aquatic insect and their ecological role in pus reservoir, Pusad. Maharashtra. The aquatic environments are the specific habitat for aquatic insect. The insect observed in the reservoir are presented in the form of photos.

The study of Aquatic insect and their ecological role was carried out for the period of 7 months i.e. July 2021 to January 2022 (2021-22). Total seven species were found in the preliminary study which belongs to phylum Arthropoda and class insect having different order Hemiptera, Coleopteran and Odonata etc. And six families these are Dytiscidae, Aeshnidae, Notonectidae, Nepidae, Hydrophilidae and Gerridae etc. *Acilius sulcatus*, *Anax imperator*, *Notonecta enithras*, *Nepa cinerea*, *Ranatra linearis*, *Tropisternus lateralis*, *Geris incurvatus*. Etc. species were observed during the present study of aquatic insect.

Jana et.al. (2009) carried out their research on diversity and community structure of aquatic insect in which 20species of aquatic insect were recorded during the study. These belong to 3 Order Coleopteran, Odonata and Hemiptera. Order Hemiptera had 7 species; Coleopteran had 10 species and 3 species of Odonata. Aquatic insect are probably best known for their ability to indicate about water quality in particular environment studied by **Hansan, Haloi, Chetri and Begum (2016)**

Sr. No	Class	Order	Family	Genus	Species	Common name
1	Insecta	coleoptera	Dytiscidae	Acilius	A. Sulcatus	Water beetle
2	Insecta	odonata	Aeshnidae	Anax	A. Imperator	Dragonfly
3	Insecta	hemiptera	Notonectidae	Notonecta	N. Enithras	Black swimmer
4	Insecta	hemiptera	Nepidae	Nepa	N. Cinerea	Water scorpion
5	Insecta	hemiptera	Nepidae	Ranatra	R. Linearis	Ranatra
6	Insecta	coleoptera	Hydrophilidae	Tropisternus	T. Lateralis	Water beetle
7	Insecta	hemiptera	Gerridae	Gerris	G. Incurvatus	Water strider

Table : shows taxonomic classification of different aquatic insect

FIG: PHOTOCOPY OF AQUATIC INSECT



ACILIUS SULCATUS



ANAX IMPERATOR



NOTONECTA ENITHRAS



NEPA CINEREA



RANATRA LINEARIS



TROPISTERNUS LATERALIS



GERRIS INCURVATUS

SUMMARY AND CONCLUSION

The present study of aquatic insect and their ecological role in Upper Pus Reservoir, Pusad, Maharashtra, the present study gives detail idea about the structure and role of aquatic insect. In this study the shape, size and their metamorphosis is different from different aquatic insect. I observed 7 types of aquatic insect which belong to 6 family, Dytiscidae, Aeshnidae, Notonectidae, Neptidae, Hydrophilidae, Gerridae and three orders which is Coleoptera, Odonata and Hemiptera. This aquatic insect which is essential for ecology that is the presence of insect in water bodies is a good indicator for health of living environment of that water bodies. They play important role in protecting and restoring the aquatic ecosystem. The aquatic insect play major role in ecosystem. The present study of the aquatic insect concluded that the aquatic insect more important for the aquatic environment and keep the maintenance of water balance. Aquatic insect also keep the water temperature, humidity. Their role is important for some species is major role in environmental friendly bio-control device. Also other species is use for major ecological role in some way. Aquatic insect biodiversity is of considerable interest to society because these are so important in the diet of different types of fish species including species that are commonly consumed by humans for food that is insects are important role in fishing.

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