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Survey and conservation of some useful aquatic insects of Betul District of Madhya Pradesh, India

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Abstract

In India, freshwater ecosystems are most threatened by the man made reservoirs, loss of seasonally flooded forests, polluted wetlands and deforestation of surrounding watersheds. Specific actions are needed for conservation of the water valuable insects through detailed scientific studies. A study has been carried out in the Sapna Dam of Betul District, Madhya Pradesh. Field surveys have been carried out to prepare geographical coordinates. Water depth, water quality and biotic characteristics at different locations were measured with the help of limnological equipments. Results of these studies are presented in this paper.

Keywords: *Conservation, Reservoir, Aquatic pollution, Odonata, Aquatic insects*

Introduction

There are many wetlands available in different parts of the country. The wetlands are highly productive areas with rich biodiversity. They serve as a spawning and nursery ground for fishes, birds *etc*. and hence can be used as a excellent area for conservation of rare and endangered species (Rao, 2002).

In Madhya Pradesh, there are many freshwater wetland areas in the form of lakes and man-made reservoirs. The reservoirs are constructed primarily for flood control, conservation of rainwater, irrigation, power generation and water supply to cities and industries. Fishing development in these water bodies is considered as a secondary activity. Our present knowledge on various aspects of reservoirs in central Madhya Pradesh is inadequate. Few studies on Tighra reservoir have been conducted (Sharma, 1991; Singh, 2003).

Wetlands are used for extensive aquaculture operations (Sugunan, 1995). Wetlands play a role in wastewater treatment and function as natural filter systems (Anon, 1989). Development of water resources has affected fish and wildlife resources in many wetlands (Rao, 2002).

Many wetlands have been constantly used for dumping of garbage, sewage disposals, tanneries disposal *etc*. An increased level of water quality deterioration has been observed year by year. Some species in the water bodies are likely to become extinct in the near future (Anon, 1989). The changes in the characteristics of the wetlands in the form of water quality pollution and water development projects also have greatly altered habitat conditions for aquatic animals. The habitat loss has caused concern for the welfare of the aquatic animals that live in different water bodies. As it is clear that some aquatic insects are very much useful for the fishes growth, eradication of harmful mosquitoes larvae and aquatic plant growth. Present paper deals with the conservation of these useful aquatic insects for maintaining the ecosystem and aquatic environment.

Materials and Method

The study was carried out of Sapna reservoir. It is located approx. 12 kms south of Betul city of Madhya Pradesh. It is a large man-made reservoir. The water from the reservoir is being supplied to the city of Betul, Betul -bazar and surrounding places in addition to irrigation and fisheries use. Sampling in the reservoir at different points was made by moving on a hired boat. Insects werecollected regularly from the reservoir and the collected insects were brought to the laboratory and sorted out seperately in glass aquarium. Different nymphal instars were maintained regularly for the duration of research. The insect of following

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families were identified and maintained for the study. Identification of insects was done by using different entomological reference books. Physico chemical analyses were done by using standard method APHA (1998).

Results and Discussion

A total of twenty-one species belonging to four different families were identified. *Anisogomphus occipitalis*,*Burmogomphus sivalikensis*, *Mesogomphus lineatus*, *Macromia moorei*, *Orthetrum taeniolatum*, *Trithemis aurora*, *Trithemis festiva* and *Tholymis tillarga* were found abundantly. *Anisopteran nymphs* were found in shallow running water having a considerably sandy bottom and an abundance of vegetation they were studied in relation to certain ecological conditions *Brachythemis contaminata*, *Macromia* sp. and *Orthetrum* sp. were observed in water body at lower altitude where *Zyxomma petiolatum* found which preferred decaying plant debris. These nymphal communities were found in a great variety of habitats and in association with an abundance of algae and macrophytes. *Orthetrum taeniolatum*, *Tholymis tillarga* are found in shallow water and *Orthetrum* sp., *Macromia* sp., *Brachythemis contaminata* found in deep water. *Macromia moorei*, however preferred sandy bottom. *Anax guttatus*, *Potomarcha* sp. were found in organically polluted water bodies where effluents mixed with reservoir. *Orthetrum taeniolatum* and *Tholymis tillarga* are indicators of highly alkaline water where industrial effluents occur. Odonata, dragonflies and damsel flies larve were also found. These insects constitute a small, well known order of insects that are widely distributed all over the world (Tillyard, 1917). They are denizens of many aquatic ecosystems and their distribution covers a great deal of continum from temporary to permanent water bodies (Corbet,1999; Johansson and Suhling, 2004). Earlier 54 species of Odonata: Anisoptera (33) and Zygoptera (21) inhabitating temporary water bodies were recorded from different parts of India (Fraser, 1933, 1934, 1936; Kumar, 1973 a,b; Singh and Prasad, 1976). Odonata were collected from water body of Sapna reservoir which were present during all the season. Only adult Odonata was collected with the help of a sweep net (35 cm dia. and 70 cm ht.) by slowly walking around the water bodies. Anisoptera and Zygoptera were found in equal proportion), both were represented by two families each *viz*., Gomphidae, Libellulidae (Anisoptera) and Coenagrionidae and Lestidae (Zygoptera). Less abundance of damselflies were found, it is probably due to their limited dispersal ability, absence of shade over the habitat from the trees present around the water bodies and due to the absence of aquatic vegetation. This is in confirmation with the findings of Fraser (1933) and Subramanian (2005) who revealed that shade and aquatic vegetation could favour Zygoptera more than Anisoptera. The size of the water body determines the species richness and diversity of Odonata (Lounibos *et al*. 1990; Clark and Samways, 1996; Stewart and Samways 1998; Schindler *et al*. 2003; Kadoya *et al*., 2004; Carchini *et al*. 2005; Suh and Samways, 2005). The maximum Odonata diversity in the dam was due to their larger size. Factors affecting Odonata species assemblage were due to human disturbances (modification of habitat structure) (Moore, 1982; Brown, 1991; Stewart and Samways, 1998; Norma-Rashid *et al*., 2001; Timm *et al*., 2001; Clausnitzer 2003; Oppel, 2005a, b), contamination of water bodies (Watson *et al*., 1982) and the presence of predators (Williams, 1987; Blaustein, 1992). Minimum diversity of species were found due to the discharge of sewage water into the reservoir and presence of insectivorous fish. The abundance of Libellulidae (Anisoptera) and Coenagrionidae (Zygoptera) in the present study might be due to their shorter life cycle and widespread distribution (Norma-Rashid *et al*., 2001) and tolerant to wide range of habitats (Gentry *et al*., 1975; Samways, 1989).

Recommendations

Trees present around the water bodies provide shade over the habitat. Aquatic vegetations need microclimate for their proliferation, so small trees should be planted near the reservoir. Due to mixing of pesticides through water run off from the agriculture fields to reservoir, infected the fishes as well as aquatic insects, it should be checked. Overexploitation, conversion of habitats, destructive land-use practices and pollution are greatest threats for normal animal and plant life, therefore, specific actions are needed for conservation of Sapna reservoir in Betul district, Madhya Pradesh, India.

References

Anon, 1989. *Conservation of Wetlands in India* Govt. of India, MOEF, New Delhi. pp. 67

Blaustein, L., 1992. Larvivorus fishes fail to control mosquitoes in experimental rice plots. ***Hydrobiologia*** 232: 219-232.

Brown, K.S.J., 1991. *Conservation of neotropical environments: insects as indicators*, pp.349-404. In: Collins, N.M. & J.A. Thomas (eds.). The Conservation of Insects and their Habitats. Academic Press, New York.

Carchini, G., Solimni , A.G. and Ruggiero, A., 2005. Habitat characteristics and odonate diversity in mountain ponds of central Italy. *Aquatic Conservation: Marine and Freshwater Ecosystems* 15: 573-581.

Clark, T.E. and Samways , M. J., 1996. Dragonflies (Odonata) as indicators of biotope quality in the Kruger National Park, South Africa. *Journal of Applied Ecology* 33: 1001-1012.

Clausnitzer, V., 2003. Dragonfly communities in coastal habitats of Kenya: indication of biotope quality and the need of conservation measures. *Biodiversity and Conservation* 12: 333-356.

Corbet, P.S., 1999. *Dragonfly: Behaviour and Ecology of Odonata*. Cornell University Press, New York, 829pp.

Fraser, F.C., 1933, 1934, 1936. *The Fauna of British India, Including Ceylon and Burma. Odonata*. Vols. 1-3. Taylor and Francis, London.

Gentry, J.B., Garten , C.T., Howell , F.G., and Smith , M.H. ,1975. *Thermal ecology of dragonflies in habitats receiving reactor effluent*, pp.563-574. In: Environmental Effect of Cooling Systems at Nuclear Power Plants. International Atomic Energy Agency, Vienna.

Johansson, F. and Suhling , F., 2004. Behaviour and growth of dragonfly larvae along a permanent to temporary water habitat gradient. ***Ecological Entomology*** 29: 196-202.

Kadoya, T., Suda , S. and Washitani, I., 2004. Dragonfly species richness on man-made ponds: effects of pond size and pond age on newly established assemblages. ***Ecological Research*** 19: 461-467.

Kumar, A., 1973a. Description of the last instar larvae of Odonata from Dehra Dun Valley with notes on biology. I. Suborder Zygoptera. ***Oriental Insects*** 7: 83-118.

Kumar, A., 1973b. Description of the last instar larvae of Odonata from Dehra Dun Valley (India) with notes on biology. II. Suborder Anisoptera. ***Oriental Insects*** 7: 291-331.

Lounibos, L.P., Escher , R.L., Dewald , L.B., Nishimura , N. and Larson , V.L., 1990. Odonata associated with water lettuce (Pistia stratiotes). ***Odonatologica*** 19: 359-366.

Moore, N.W., 1982. Conservation of odonata - first step towards a world strategy. ***Advances in Odonatology*** 1: 205-211.

Norma-Rashid, Y., Mohd-Sofian , A. and Zakaria-Ismail , M., 2001. Diversity and distribution of odonata (dragonflies and damselflies) in the fresh water swamp lake, Tasek Bera, Malaysia. ***Hydrobiologia*** 459: 135-146.

Oppel, S., 2005a. Habitat associations of an odonata community in a lower montane rain forest in Papua New Guinea. ***International Journal of Odonatology*** 8: 243-257.

Oppel, S., 2005b. Comparison of two Odonata communities from a natural and a modified rainforest in Pupua New Guinea. ***International Journal of Odonatology*** 9: 89-102.

Rao, R.J., 2002. *Inventory of wetlands in Madhya Pradesh and Chattisgarh*. Study report. SACON, Mimeo p57

Sharma, H.D., 1991. *Limnological studies of aquatic ecosystems in Gwalior region with special reference to crocodile habitats*. M.Phil thesis, Jiwaji Univ. Gwalior.

Samways, M.J., 1989. Taxon turnover in odonata across a 3000 m altitudinal gradient in Southern Africa. ***Odonatologica*** 18: 263-274.

Schindler, M., Fesl , C. and Chovanec, A., 2003. Dragonfly associations (Insecta: Odonata) in relation to habitat variables: a multivariate approach. ***Hydrobiologia*** 497: 169-180.

Singh B.D., 2003 *Studies on Fish Resources, Marketing and Management in Gwalior (M.P.), with special reference to Tighra Reservoir*, M.Phil. thesis, Jiwaji University, Gwalior.

Sugunan, V. , 1995. Reservoir fisheries of India. FAO Fisheries Technical paper, 345:1-423. Simpson, E.H. 1949. Measurement of diversity. ***Nature*** 163: 688.

Singh, A. and Prasad , M., 1976. *Odonata of Doon Valley, 1. Anisoptera*. Records of Zoological Survey of India 70: 21-38.

Stewart, D.A.B. and Samways , M.J., 1998. Conserving dragonfly (Odonata) assemblages relative to river dynamics in an African Savanna game reserve. ***Conservation Biology*** 12: 683-692.

Subramanian, K.A., 2005. *Dragonflies and Damselflies of Peninsular India: A Field Guide. Project Lifescape,* Indian Academy of Science, Bangalore, India, 118pp.

Suh, A.N. and Samways , M.J., 2005. Significance of temporal changes when designing a reservoir for conservation of dragonfly diversity. ***Biodiversity and Conservation*** 14: 165-178.

Tillyard, R.J., 1917. *The Biology of Dragonflies*. Cambridge University Press, Cambridge, 396pp.

Timm, H., Ivask , M. and Mols , T., 2001. Response of macro invertebrates and water quality to long-term decrease in organic pollution in some Estonian streams during 1990-1998. ***Hydrobiologia*** 464: 153-164.

Watson, J.A.L., Arthington, A.H. and Conrick , D.L., 1982. Effect of sewage effluent on dragonflies (Odonata) of Bulimba Creek, Brisbane. ***Australian Journal of Marine and Freshwater Research*** 33: 517-528.

Williams, D.D., 1987. *The Ecology of Temporary Waters*. Croom Helm, London, 193pp.