

Diversity and Conservation Status of Dragonflies (Odonata: Anisoptera) of Badi Lake (Udaipur, Rajasthan)

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Abstract

Current study focuses on assessment of diversity and conservation status of dragonflies of Badi lake. Eight species of dragonflies under single family Libellulidae were reported from Badi lake. Conservation status of all dragonfly species were found Least Concern (LC) category of IUCN.

Keywords: IUCN, LC, Anisoptera, Libellulidae, Badi Lake

Introduction

Dragonflies are ancient insects under order Odonata and suborder Anisoptera. Their evolutionary history dates back over 300 million years ago. *Meganeuropsis Permiana* was the largest insect with wingspan of almost 70 cm [1]. Dragonflies exhibit a remarkable diversity that spans approximately 3,000 species worldwide, each adapted to specific habitats and ecological niches. Their distribution ranges from tropical rainforests to temperate meadows, with some species thriving in desert oases and others inhabiting high-altitude mountain lakes. This global presence reflects their exceptional adaptability and the success of their fundamental body plan across varied environments. They have fascinated humans for centuries because of their vibrant coloration and remarkable flying manoeuvrability [2]. They found near almost all freshwater habitats and play a crucial ecological role as both prey and predators. They are voracious carnivores. They have hemimetabolous life cycle which includes aquatic larval stage that can last several months to years before metamorphosis and adult has life span of one to eight weeks. Dragonflies are also considered as important bioindicators reflecting the health of the ecosystem they inhabit. They can achieve speed of 60 to 90 kmh [3]. They have large compound eyes consist of about 30000 ommatidia providing almost 360° view. Many dragonflies species exhibit territorial behavior. The life cycle of dragonflies encompasses a fascinating metamorphosis that bridges aquatic and terrestrial worlds. Females deposit eggs directly into water or plant tissue near water sources, where they develop into nymphs that may spend months to several years underwater depending on the species. These aquatic juveniles are formidable predators in their own right, equipped with extendable labiums that shoot out to capture prey. The transformation from aquatic nymph to aerial adult involves a dramatic emergence process where the insect literally crawls out of its underwater skin to reveal wings and assume its final form [4]. To achieve copulation female bends her abdomen forward to bring her genitalia into contact with his penis. This forms a closed circle with their bodies, this posture is known as wheel formation. The primary threats to dragonfly population are habitat destruction, pollution and climate change. Dragonflies are considered as natural sentinels of freshwater resources. Culturally, dragonflies have captured human imagination across civilizations. In Japanese culture, they symbolize courage, strength, and victory, while many Native American traditions associate them with transformation and adaptability. Their appearance in art, literature, and folklore reflects humanity's long-standing fascination with these creatures that seem to embody both delicacy and power [5]&[6].

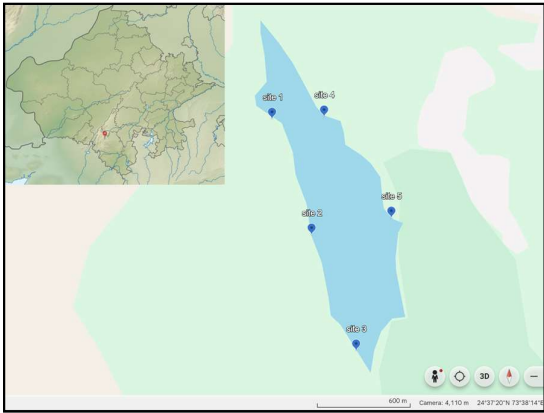
Materials and Methods

Adult dragonflies were collected from five random sampling sites. Samples were collected with insect net. Photographs were taken using Nikon p1000 digital camera. All samples were taxonomically identified using field guide and keys. Damselflies are ignored in studies for eliminating bias. Conservation status of dragonflies was determined using IUCN website database [7],[8],[9]&[10].

Study Area

Badi Lake is an artificial lake (24.616105°N; 73.622127°E). Surface area of the Lake is 0.8 km². This lake was built by Maharaja Raj Singh I in 1652 to 1680 to counteract famine. Bahubali hills is the famous tourist spot of Badi Lake.

Figure 1. Map of Badi Lake



locating sampling sites.

Results and Discussion

All reported species of Libellulidae. This data very rich in diversity of dragonflies. Its freshwater habitat has potential of robust freshwater ecosystem. Mahaseer (*Tor putitora*) is major fish found in this lake. Dragonflies larvae and fish fry and fingerlings may closely associated with each other. Dragonfly larvae may be limiting factor for the fish population of the Badi Lake and vice-versa. Some species are also previously reported from this lake [11] out of which some species are found absent in current study. All species were listed under Least Concern (LC) category of IUCN red list. A comprehensive action plan must be proposed to promote dragonfly conservation. This action plan must includes following points viz., expanding and enhancing assessment and monitoring; including dragonflies in environmental toxicological risk assessments; learning from dragonflies to improve landscape conservation; ensuring integration with other conservation initiatives; promoting dragonflies in environment education.

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Table 1. Data of Reported Dragonflies with Conservation Status.

Family	Species	Red List Category
Libellulidae	<i>Brachythemis contaminata</i> Fabricius, 1793	LC [12]
	<i>Brachydiplax sobrina</i> Rambur, 1842	LC [13]
	<i>Bradinooyga geminata</i> Rambur, 1842	LC [14]
	<i>Crocothemis erythraea</i> Brulle, 1832	LC [15]
	<i>Crocothemis servilia</i> Drury, 1770	LC [16]
	<i>Orthetrum sabina</i> Drury, 1770	LC [17]
	<i>Trithemis kirbyi</i> Selys, 1891	LC [18]
	<i>Trithemis pallidinervis</i> Kirby, 1889	LC [19]

Conclusion

Eight species of dragonflies reported were found under single family Libellulidae. Dragonfly population and fish population both are limiting each other population and maintaining balance in this lake ecosystem. However conservation status was found LC but it does not mitigate their importance. Current conservation efforts must include promoting sustainable land use practices to reduce human exploitation of wetlands, undertaking habitat restoration, managing invasive alien species, developing sustainable drainage system in urban areas to enhance ecological resilience, building local expertise, updating regional species list, developing field guides are vital for conservation of dragonflies.

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