International Journal of Entomology Research
ISSN: 2455-4758
Impact Factor: RJIF 5.24
www.entomologyjournals.com
Volume 2; Issue 5; September 2017; Page No. 55-59

Status and conservation issues of Odonates in Bathi Lake, Doddabathi Village, Davanagere District, Karnataka, India

[*1] MN Harisha, [2] BB Hosetti

[1] Department of Post Graduate Studies and Research in Wildlife & Management, Kuvempu University, Jnana Sahyadri, Shankaraghatta, Shivamogga, Karnataka, India

[2] Department of Post Graduate Studies and Research in Applied Zoology, Kuvempu University, Jnana Sahyadri, Shankaraghatta, Shivamogga, Karnataka, India

Abstract
The study was conducted from November 2014 to October 2015 at Bathi Lake, Davanagere District of Karnataka. During the study period, a total of 28 species of Odonates belonging to 5 families have been recorded. Among them order-Anisoptera (Dragonflies) was predominant with 21species, followed by the Zygoptera (damselflies) with 7 species. Among the order-Anisoptera, the family Libellulidae was widely distributed and dominated with high percentage composition, followed by the Coenagrionidae among order-Zygoptera. The status based on the frequency of occurrence shown that 43% were common, 21% were occasional, 18% were very common, 11% were rare and 7% were very rare**.** The study highlights the importance of Odonates and threats in their habitat due to different anthropogenic activities and also provides the baseline data of Odonate diversity of Davanagere District of Karnataka state for research on their biology and the conservation.

Keywords: diversity, dragonflies, damselflies, Zygoptera, Anisoptera, Odonata

1. Introduction
The Order Odonata, comprising the damselflies (suborder: Zygoptera) and dragonflies (suborder: Anisoptera), are one of the dominant groups of aquatic and terrestrial insects [1]. Because of their amphibious life history, relatively short generation time, high trophic position, and diversity, they are considered as an important component of freshwater ecosystems as well as good indicators of ecosystem health [2, 3].

Globally 5,740 species of Odonates are known of this 470 species in 139 genera and 19 families exist in India [4]. Odonata, being one of the most widely studied insect groups, are survive in a wide range of aquatic habitats and are most susceptible to habitat alterations induced by human activities [5]. Dragonflies have been proposed as indicators to assess the ecosystem health of freshwater wetlands [6]. Assemblage of Odonates might vary depending upon habitat quality [7, 8] thereby serve as an umbrella species in biodiversity conservation [9, 10] and represent specific biotic wetlands.

Odonates as important indicators of health of both aquatic and terrestrial ecosystem play a vital role as prey and predator to maintain the balance of tropic levels of food chain [11]. Their prey consists mostly of the harmful insects of crops, orchards and forest and thus has a regulatory impact on agro-forestry [12].

A pioneer study was conduct as a preliminary survey to evaluate the odonate species assemblages, community structure, status and their diversity in Bathi Lake, Doddabathi village, Davanagere District.

2. Materials and Methods
2.1 Study Area
Bathi Lake is a small irrigation tank located between 14°28'27" N latitude and 75°52′13″ E longitude. It lies at an elevation of 598 mt above mean sea level (MSL) in Davanagere Taluk of Davanagere District in Karnataka. This lake is situated adjacent Harihar- Davanagere state highway road. This wetland provides water for fishing activities or aquaculture practice as well as irrigation to surrounding agricultural lands of Doddabathi village. The lake is approximately 7 km distance from Davanagere city and 7 km from Harihar Taluk. The lake has little recreational and more ecological significance as an attracting sight for many wetland dependent resident as well as few migratory birds.

2.2 Sampling method
The odonates of Bathi Lake were surveyed from November 2014 to October 2015. The sampling of adult odonates was done by direct counts on hourly basis. The data collection was carried out between 09:00 am and 01:00 pm when insects were most active (i.e., during low wind, warm and sunny weather). The collected odonates were identified using identification keys [4, 5]. The taxonomic and nomenclature used is as per Subramanian [13]. Based on the frequency of sighting and their abundance, the odonates were categorized into five groups such as, very common (80-100%), common (60-80%), occasional (40-60%), rare (20-40%) and very rare (below 20%).

3. Results and Discussion

A total of 28 species of Odonates belonging to five families under two orders have been recorded. During the present investigation, the order -Anisoptera which includes dragonflies was the predominant with 21 species belonging to three families and contributed 75% of total odonates recorded, followed by the order -Zygoptera which includes damselflies with seven species belonging to two families comprising 28% of total odonates recorded (Table 1, Figure 1).

Among the order -Anisoptera, the family Libellulidae was widely distributed with high percentage composition i.e., 86% (n=18) followed by the Gomphidae and Aeshnidae i.e., 9% (n=2) and 5% (n=1) respectively (Table 1, Figure 2). Whereas, among the order -Zygoptera, the family Coenagrionidae had the highest percentage composition i.e., 71% (n=5), followed by the Platycnemididae with 29% (n=2) (Table 1, Figure 3).

The status based on the frequency of occurrence of odonates shows that 43% (n=12) were common, 21% (n=6) were occasional, 18% (n=5) were very common, 11% (n=3) were rare and 7% (n=2) were very rare (Table 1, Figure 4).

The present study revealed that the order -Anisoptera (dragonflies) was the most abundant; this may be due to their high dispersal ability and adaptability in wide range of habitats [14, 15]. The lower abundance of order -Zygoptera (damselflies), may be due to their limited dispersal ability and lower adoptability [14, 16] and partial or absence of shade cover afforded by the temporary water bodies [3].

The abundance of Libellulidae (Anisoptera) and Coenagrionidae (Zygoptera) in the study area might be due to their shorter life cycle and widespread distribution and ability to tolerate wide range of habitats [17, 18, 19].

The less abundance of Odonate in Bathi Lake might be due to their smaller size. The size of the water bodies also becomes an important factor to determine the species richness and diversity of Odonate [14, 20, 21]. The odonates in addition to their role as good environmental indicators of wetlands are also important bio-control agents of insect pests in agro-ecosystems. During the study it has been found that, the odonates in the study area are under threat due to intensive anthropogenic activities, like, movement of heavy vehicles around the habitat, habitat alterations such as construction of roads, use of pesticides in and around the agricultural plots, pollution, and eutrophication etc., not only affecting the assemblage of odonates population but also cause local extinctions [17, 22, 23].

The present study may give valuable information about odonates of Bathi Lake as a baseline data for assessing the changes of environmental conditions in the area, thereby helping in formulating future conservation measures to preserve the wetland habitats and to maintain the ecosystem health.

Table 1: Systematic list of Odonates along with their status at Bathi Lake, Doddabathi Village, Davanager District, Karnataka.

Sl. No	Common name	Scientific name	Status
	Order: Anisoptera (Dragonflies)		
	1. Family: Aeshnidae		
1	Blue-tailed Green Darner	*Anax guttatus*	O
	2. Family: Gomphidae		
2	Common Clubtail	*Ictinogomphus rapax*	VC
3	Common Oartail or Hooktails	*Paragomphus lineatus*	O
	3. Family: Libellulidae		
4	Trumpet Tail	*Acisoma panorpoides*	C
5	Little Blue Marsh Hawk	*Brachydiplax sobrina*	C
6	Ditch Jewel	*Brachythemis contaminatae*	VC
7	Ruddy Marsh Skimmer	*Crocothemis servilia*	C
8	Scarlet Marsh Hawk	*Aethriamanta brevipennis*	C
9	Granite Ghost	*Bradinopyga geminate*	VC
10	Ground Skimmer	*Diplacodes trivialis*	VC
11	Pied Paddy Skimmer	*Neurothemis tullia*	O
12	Brown-backed Red Marsh Hawk	*Orthetrum chrysis*	VR
13	Blue Marsh Hawk	*Orthetrum glaucum*	O
14	Crimson-tailed Marsh Hawk	*Orthetrum pruinosum*	C
15	Green Marsh Hawk	*Orthetrum sabina*	VC
16	Wandering Glider	*Pantala flavescens*	C
17	Common Picture Wing	*Rhyothemis variegate*	O
18	Crimson Marsh Glider	*Trithemis aurora*	C
19	Black Stream Skimmer	*Trithemis festiva*	C
20	Black Marsh Trotter	*Tramea limbata*	C
21	Red Marsh Trotter	*Tramea basilaris*	VR
	Order: Zygoptera (Damselflies)		
	4. Family: Coenagrionidae		

22	Pigmy Dartlet	*Agriocnemis pygmaea*	O
23	Coromandel Marsh Dart	*Ceriagrion coromandelianum*	C
24	Golden Dartlet	*Ischnura aurora*	C
25	Elegant Sprite	*Pseudagrion decorum*	R
26	Blue Grass Dartlet	*Pseudagrion microcephalum*	C
	5. Family: Platycnemididae		
27	Blue Bush Dart	*Copera vittata*	R
28	Yellow Bush Dart	*Copera marginipes*	R

VC-Very common; C-Common; O-Occasional, VR-Very Rare and R-Rare

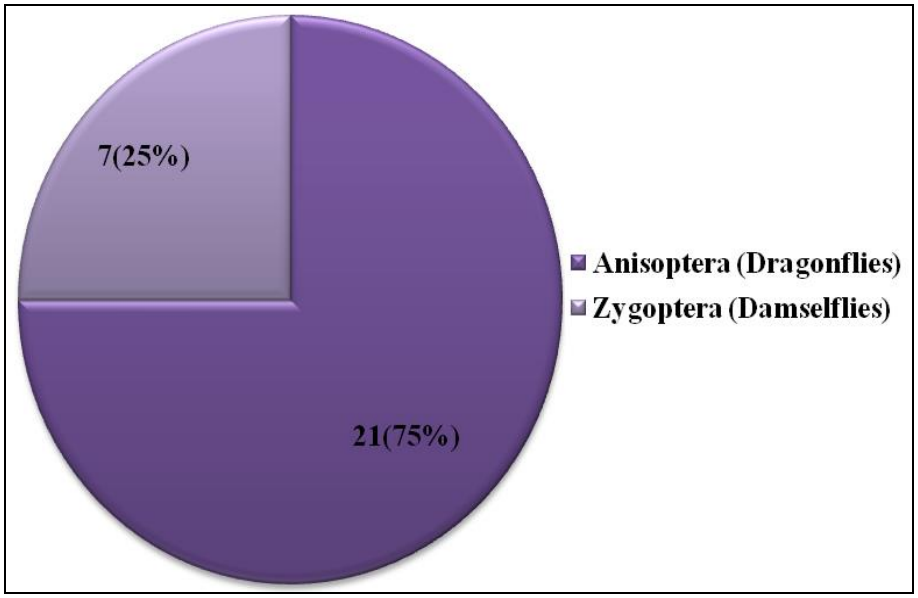

Fig 1: Overall percentage composition of odonates (Anisoptera-Dragonflies and Zygoptera-Damselflies) at Bathi Lake.

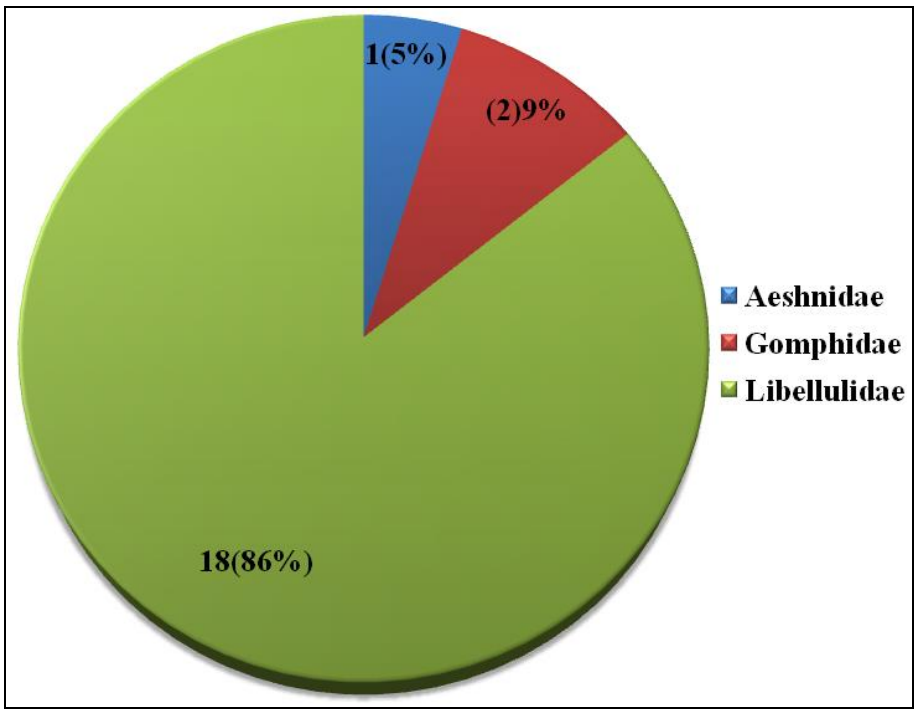

Fig 2: Family wise distribution and percentage composition of Dragonflies (Order: Anisoptera) at Bathi Lake.

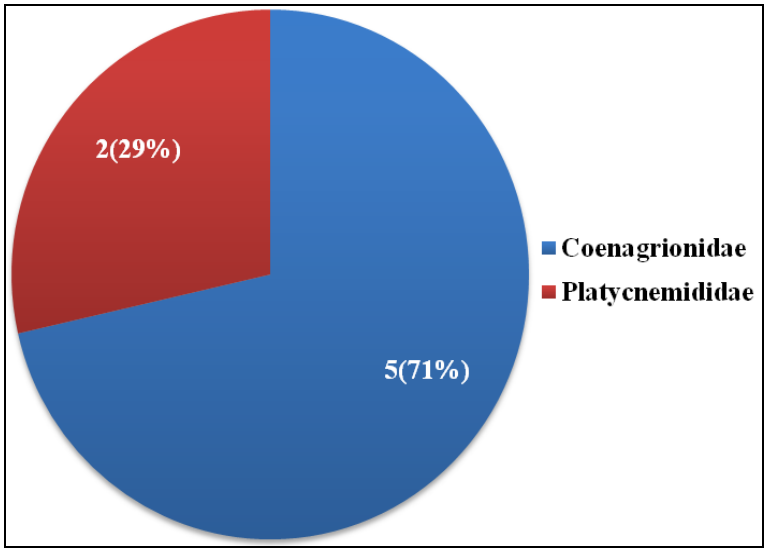

Fig 3: Family wise distribution and percentage composition of Damselflies (Order: Zygoptera) at Bathi Lake.

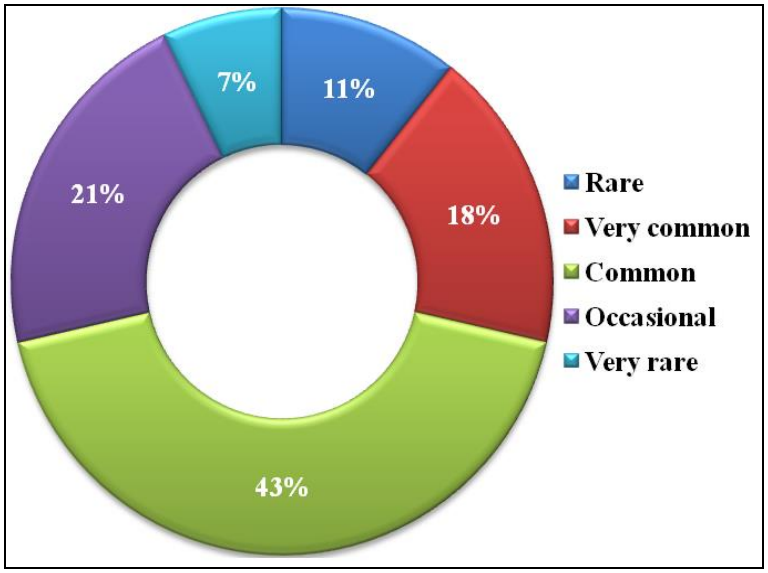

Fig 4: Status of odonates based on species frequency of occurrence at Bathi Lake, Davanagere.

4. Acknowledgements

I take this opportunity to thank villagers from the Doddabathi village, Davanagere District for their support. MNH is also thankful to authorities of Dept. of Wildlife and Management, Kuvempu University for support.

5. References

1. Prasad M, Varshney RK. A checklist of the Odonata of India including data on larval studies. Oriental Insects, 1995; 29:385-428.
2. Corbet P. Are Odonata useful as bioindicators? Libellula. 1993; 12(3-4):91-102.
3. Clark TE, Samways MJ. Dragonflies Odonata as indicators of biotope quality in the Kruger National Park, South Africa. Journal of Applied Ecology, 1996; 33:1001-1012.
4. Subramanian KA. Dragonflies of India- A Field Guide. Vigyan Prasar, Department of Science and Technology, New Delhi, 2009, 118.
5. Subramanian KA. Dragonflies and Damselflies of Peninsular India- A Field Guide. Series Edn 1. Madhav Gadgil. Published under the Project Lifescape Series. Indian Academy of Sciences, Banglore, India, 2005, 118.
6. Suhling F, Sahlen G, Martens A, Marais E, Schutte C. Dragonfly assemblages in arid tropical environments: a case study from western Namibia. Arthropod Diversity and Conservation. Topics in Biodiversity and Conservation. 2006**;** (1):297-318.
7. Dijkstra KDB, Lempert J. Odonata assemblages of running waters in the upper Guinean forest. Archiv fur Hydrobiologie, 2003; 157:397-412.
8. Schindler M, Fesl C, Chovanec A. Dragonfly associations Insecta: Odonata in relation to habitat variables: A multivariate approach. Hydrobiologia, 2003; 497:169-180.
9. Noss RF. Indicators of monitoring biodiversity: A hierarchical approach. Conservation Biology, 1990; 4:355-364.
10. Lambeck RJ. Focal species: A multispecies umbrella for nature conservation. Conservation Biology, 1997;

11(4):849-856.
11. Brown KJS. Conservation of Neotropical Environments: Insects as indicators. In: Collins NM, Thomas JA eds. The Conservation of insects and their Habitats. Academic Press, New York, 1991, 349-404.
12. Mitra TR. Geographical Distribution of Odonata Insecta of Eastern India. Memories of the Zoological Survey of India. 2002; 19(1):17.
13. Subramanian KA. A Checklist of Odonata of India. Zoological Survey of India, Kolkata, 2014, 31.
14. Kadoya T, Suda S, Washitani I. Dragonfly species richness on man-made ponds: effects of pond size and pond age on newly established assemblages. Ecological Research, 2004; 19:461-467.
15. Suhling F, Schenk K, Padeffke T, Martens A. A field study of larval development in a dragonfly assemblage in African desert ponds Odonata. Hydrobiologia 2004; 528:75-85.
16. Williams DD. Temporary ponds and their invertebrate communities. Aquatic Conservation: Marine and Freshwater Ecosystems, 1997; 7:105-117.
17. Norma-Rashid Y, Mohd-Sofian A, Zakaria-Ismail M. Diversity and distribution of Odonata Dragonflies and Damselflies in the fresh water swamp lake, Tasek Bera, Malaysia. Hydrobiologia, 2001; 459:135-146.
18. Gentry JB, Garten CT, Howell FG, Smith MH. Thermal ecology of dragonflies in habitats receiving reactor effluent. In: Environmental Effect of Cooling Systems at Nuclear Power Plants. International Atomic Energy Agency, Vienna, 1975; 563-574.
19. Samways MJ. Taxon turnover in odonata across a 3000 m altitudinal gradient in Southern Africa. Odonatology, 1989; 18:263-274.
20. Carchini G, Solimni AG, Ruggiero A. Habitat characteristics and odonate diversity in mountain ponds of central Italy. Aquatic Conservation: Marine and Freshwater Ecosystems, 2005; 15:573-581.
21. Suh AN, Samways MJ. Significance of temporal changes when designing a reservoir for conservation of dragonfly diversity. Biodiversity and Conservation, 2005; 14:165-178.
22. Clausnitzer V. Dragonfly communities in coastal habitats of Kenya: Indication of biotope quality and the need of conservation measures. Biodiversity and Conservation, 2003; 12:333-356.
23. Krishna Prasad K, Ramakrishna B, Srinivasulu C, Srinivasulu B. Odonate Diversity of Manjeera Wildlife Sanctuary with notes on Female Polymorphism of *Neurothemis tullia* Drury, 1773 Odonata: Libellulidae and Some Species Hitherto Unreported from Andhra Pradesh, India. Journal of Entomology and Zoology Studies, 2013; 1(4):99-104.