



Diversity of common Anisopterans of Khumari Dam Spillway and reservoir, Maharashtra, India

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Abstract-

Khumari Dam Spillway and reservoir was constructed on Khumari River as part of irrigation projects by Government of Maharashtra in the year 1993. Its geographical location is 21.320706N 78.852644E. It provides a good habitat for biodiversity of Anisopterans. Odonates are an important part of ecosystem and an important indicator of environmental quality. Odonate recording and watching has been done in each line transect during a week. Observations are made through walking each transects of 0.4 km to 0.7 km length with 2m to 5 m on either side with the aid of binocular and digital cameras. Total 26 common species of dragonflies are recorded belonging to 20 genera and 4 families. Libellulidae family is consisting of maximum number of genera and species followed by Aeshnidae, Gomphidae and Macromiidae. The present study encourages the conservation of a wide range of dragonfly species in this area.

Keywords- Dragonfly, Anisoptera, Odonata, insects, Khumari Dam, Diversity

Introduction-

Dragonflies and damselflies are among the most attractive creatures on earth belonging to the most popular insect order- Odonata. The order Odonata is divided into three groups, viz. damselflies (Zygoptera), Anisozygoptera and dragonflies (Anisoptera). The suborder Anisozygoptera is a living fossil with two species. Anisopterans have broad head with confluent separated eyes. Wings are dissimilar; hind-wings are broadly dilated at base and differ in venation from fore-limbs. These are observed near the ponds, lakes, rivers, ditches and all over the marshy places.

Silby (2001) described about 6000 species of dragonflies in all over the world. The number of Odonata species known from UAE (Giles, 1998) and islands of the Sicilian Channel (Corso *et al.*, 2012) till date are very little in respect to Bhutan (31) (Mitra, 2006); Sri Lanka (117) of which 53 are endemic (De Fonseca, 2000); Bangladesh (114) and Nepal (172) (Prasad and Varshney 1995) and North America (462) (Paulson and Dunkle, 2012). In India, 470 species of Odonates are recorded belonging to 139 genera and 19 families; while in Maharashtra state 267 species of 87 genera and 8 families are reported (Subramanian, 2009).

Khumari Dam Irrigation Project is popular named as "Khumari Lake/ Khumari Talav" (Figure- 1). Khumari Dam was constructed on the Khumari River as part of irrigation projects by Government of Maharashtra in the year 1993. The Length of Earth fill dam and spillway is 955.7 m. and 106.7 m respectively. The catchment area of dam is approx. 2.688 Thousand Hectors with Maximum / Gross

storage capacity 5.071 Million Cubic Meters. This dam supplies potable water to Khumari village.

In spite of its own significance, studies of dragonfly diversity of Khumari Dam Spillway and reservoir have not been undertaken. Since, the main objective of this study has been to conduct preliminary observation of dragonflies and carry out the checklist, occurrence and richness inhibiting the Khumari Dam Spillway and reservoir.

Material and Methods-

The present study is based on 4 line transects to study the dragonfly population. Observations are made through walking transects of 0.4 km to 0.7 km length with 2m to 5 m on either side with the aid of binocular and digital cameras. The study has been carried out during Sunday and holidays in such a way that there should be at least one visit in each line transect during a week. The sites are visited in morning, noon and evening hours to note maximum possible species of dragonflies and record its activities. Dragonfly watching and recording has been done for a period of two years from March 2015 to February 2017. The recorded species of Khumari Dam Spillway and reservoir (Figure- 1) are identified with the help of photographs by using publications and reference books.

Results-

In the present report, 26 species of dragonflies belonging to 20 genera and 4 families (Gomphidae, Aeshnidae, Libellulidae and Macromiidae) have been recorded (Figure- 2 and Table- 2). Gomphids or Clubtails are medium to large-sized dragonflies with transparent wings. The last abdominal segment appears bulbous to club shape. They inhabit in flowing water like

rivers and streams. These are identified by conspicuous black and yellow coloration with well separated eyes. In the present observation, 2 genera and species (*Ictinogomphus rapax* and *Paragomphus lineatus*) belonging to family- Gomphidae (Figure- 2 and Table- 1 and 2).

Aeshnids or Damers are medium to large sized dragonflies with fuse eyes along their dorsal margins. It has long anal appendages and abdomen is longer than the wings. These are found near stagnant water with very less flow. The body colors of Damers are nonmetallic green, brown or blue. 3 genera and 4 species (*Anax guttatus*, *Anaximaculifrons*, *Gynacantha bayadera* and *Hemianax ephippiger*) are reported from family- Aeshnidae (Figure- 2 and Table- 1 and 2).

Libellulids or Skimmers are small, medium to large sized with nonmetallic colors. The wings are varying in size, shape, and width; eyes are broadly confluent and joined on top. These are observed near standing and slow flowing waters. The maximum 19 species (*Acisoma panorpoides*, *Brachydiplax sobrina*, *Brachythemis contaminata*, *Bradynopyga geminata*, *Crocothemis servilia*, *Diplacodes trivialis*, *Neurothemis stillia*, *Orthetrum chrysis*, *Orthetrum glaucum*, *Orthetrum pruinosum*, *Orthetrum Sabina*, *Pantala flavescens*, *Potamarcha congener*, *Rhyothemis variegata*, *Tholymistilla*, *Tramea basilaris*, *Trithemis aurora*, *Trithemis festiva* and *Trithemis pallidinervis*) belongs to 14 genera are monitored from the family- Libellulidae (Figure- 2 and Table- 1 and 2).

Macromiidae are brown colored large dragonflies with yellowish stripes on abdomen. In male wings are transparent having infumated edges but in female wings having amber tint along costal and cubital sides. Single species *Epophthalmia vittata* is observed from family- Macromiidae in the plains and lakeside.

Discussion-

Total 26 species of dragonflies belonging to 20 genera and 4 families (Gomphidae, Aeshnidae, Libellulidae and Macromiidae) have been reported in the present study. The family Libellulidae is consisting of maximum number of genera and species followed by Aeshnidae, Gomphidae and Macromiidae.

Subramanian (2009) reported 11 dragonfly families, of which Libellulidae (972) and Gomphidae (958) are major families containing maximum species throughout the world followed by Aeshnidae (436), Corduliidae (249) and Macromiidae (123). In India, out of 7

families, Libellulidae and Gomphidae are major families consisting of 85 species each. These are followed by Aeshnidae (45), Macromiidae (17), and Corduliidae (16). A very least number of species are reported in family- Chlorogomphidae (10) and Cordulegastriidae (9). In Indian peninsula, major species are studied under family- Libellulidae (50) followed by Gomphidae (27) Macromiidae (17) and Aeshnidae (8). Sharma, *et al.*, (2009) collected 147 species of dragonflies belongs to 5 families in Indian Agricultural Research Institute, New Delhi, India; of which 74, 36, 19, 16 and only 2 species are belongs to family- Libellulidae, Gomphidae, Aeshnidae, Corduliidae and Cordulegastriidae respectively.

In Orissa and Eastern India, Nair (2011) recorded 45, 9, 8 and 3 species belongs to family- Libellulidae, Gomphidae, Aeshnidae and Cordulegastriidae. Manwaret *et al.*, (2012) in Chatra Lake Region, in Pohara-Malkhed Reserve Forest, Amravati, Maharashtra (India) recorded 22 species of dragonflies and damselflies of 4 families and 17 genera; of which 50% species are of family Libellulidae followed by Coenagrionidae (36%), Gomphidae (9%) and Platycnemididae (5%). In Western Ghats, the Anisoptera has 53 genera, 107 species with 31 endemics. The families Libellulidae (49 species), Gomphidae (26 species) and Corduliidae (22 species) are the most species-rich, followed by Aeshnidae (8 species) Cordulegastriidae and (2 species) (Subramanian *et al.*, 2011). Tijare and Patil (2012) were observed 21 species of dragonflies in and around Gorewada National Park, Nagpur; of which 15 species belonging to Family- Libellulidae, 4 species from Aeshnidae and 2 species from Gomphidae.

During 2013, Shende and Patil were recorded 34 species of dragonflies belonging to 24 genera and 4 families in Gorewada International Bio-Park, Nagpur. Out of total dragonfly species examined, 26 (76.47%) are common and 8 (23.53%) are occasional. Libellulidae family is consisting of maximum number of genera and species followed by Aeshnidae, Gomphidae and Macromiidae. A total of 31 species of odonata are found belonging to the families Platycnemididae, Coenagrionidae, Leptidae, Aeshnidae, Gomphidae and Libellulidae nearby Vena Dam, Nagpur. The largest number of species belonging to the families Coenagrionidae and Libellulidae are observed by Durugkar *et al.*, (2013). The odonate of Mahurzari wetland recorded 38 species belonging to 26 genera and 6 families have been recorded viz., Gomphidae (Genera- 02, Species- 2); Aeshnidae (Genera- 01, Species- 2);

Libellulidae (Genera- 14, Species- 21); Coenagrionidae (Genera- 07, Species- 10); Platycnemididae (Species- 01) and Lestidae (Genera- 01, Species- 2). Amongst the species examined; 17 are common, 18 are occasional and 03 are rare (Patil *et al.*, 2014). The above observations are similar to the present observations where family- Libellulidae is the largest family carrying maximum number of species and dragonflies are amphibiotic insects found all kind of freshwater bodies.

Conclusion-

The result of the present study revealed that Khumari Dam and its surrounding area were rich in dragonfly population. Presence or absence of dragonfly species indicates the state of health of wetland. Hence, protection measures were necessary for these valuable creatures. The current data would be helpful to provide a base line literature for the future Entomologist.

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Table 1. Anisopterans species of Khumari Dam Spillway and reservoir.

S.N.	Species	Common Name	Status
Family: Gomphidae (Genera- 02, Species- 02)			
1	<i>Ictinogomphus rapax</i> (Rambur, 1842)	Common Clubtail	C
2	<i>Paragomphus lineatus</i> (Selys, 1850)	Common Hooktail	C
Family: Aeshnidae (Genera- 03, Species-04)			
3	<i>Anax guttatus</i> (Selys, 1839)	Blue-Tailed Green Darner	C
4	<i>Anax immaculifrons</i> (Rambur, 1842)	Blue Darner	C
5	<i>Gynacantha bayadera</i> (Selys, 1891)	Parakeet Darter	C
6	<i>Hemianax ephippiger</i> (Burmeister, 1839)	Ochre tailed Brown Darter	C
Family: Libellulidae (Genera- 14, Species-19)			
7	<i>Acisoma panorpoides</i> (Rambur, 1842)	Trumpet Tail	C
8	<i>Brachydiplaxo brina</i> (Rambur, 1842)	Blue Tailed Black Marsh Skimmer	C
9	<i>Brachythemis contaminata</i> (Fabricius, 1793)	Ditch Jewel	C
10	<i>Brachinopyga geminata</i> (Rambur, 1842)	Granite Ghost	C
11	<i>Crocothemis servilia</i> (Drury, 1770)	Ruddy Marsh Skimmer	C
12	<i>Diplacodes trivialis</i> (Rambur, 1842)	Ground Skimmer	C
13	<i>Neurothemistulia</i> (Drury, 1773)	Pied Paddy Skimmer	C
14	<i>Orthetrum chrysis</i> (Selys, 1892)	Brown-Backed Red Marsh Hawk	C
15	<i>Orthetrum glaucum</i> (Brauer, 1865)	Blue Marsh Hawk	C
16	<i>Orthetrum pruinosum</i> (Rambur, 1842)	Crimson Tailed Marsh Hawk	C
17	<i>Orthetrum sabina</i> (Drury, 1770)	Green Marsh Hawk	C
18	<i>Pantala flavescens</i> (Fabricius, 1798)	Wandering Glider	C
19	<i>Potamarcha congener</i> (Rambur, 1842)	Yellow Tailed Ashy Skimmer	C
20	<i>Rhyothemis variegata</i> (Linnaeus, 1763)	Common Picture Wing	C
21	<i>Tholymistilla</i> (Fabricius, 1798)	Coral Tailed Cloud Wing	C
22	<i>Tramea basilaris</i> (Kirby, 1889)	Red Marsh Trotter	C
23	<i>Trithemis aurora</i> (Burmeister, 1839)	Crimson Marsh Skimmer	C
24	<i>Trithemis festiva</i> (Rambur, 1842)	Black Stream Glider	C
25	<i>Trithemis pallidinervis</i> (Kirby, 1889)	Long-Legged Marsh Skimmer	C
Family: Macromiidae (Genera- 01, Species-01)			
26	<i>Epophthalmia vittata</i> (Burmeister, 1839)	Common Torrent Hawk	C
Families-04; Genera-20; Species- 26			

Abbreviations- C- Common

Table 2. Distribution of genera and species of Anisopterans in respective families.

S.N.	Family	No. of Genera	No. of Species
1.	Gomphidae	02	02
2.	Aeshnidae	03	04
3.	Libellulidae	14	19
4.	Macromiidae	01	01
	04	20	26



Figure. 1 Line transects along the Khumari Dam Spillway and reservoir. (Courtesy- Google Map).

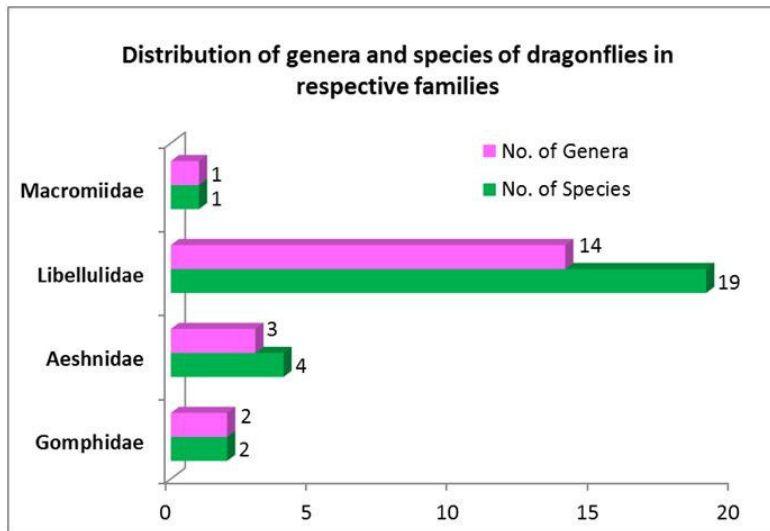


Figure 2. To show distribution of genera and species of dragonflies in respective families.

