Article

Dragonflies and damselflies (Odonata: Insecta) of the Seloo city, Wardha, Maharashtra, Central India

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Received 14 October 2021; *Accepted 20 November 2021*; *Published 1 March 2022*

Abstract
Dragonflies and damselflies (Odonata) species diversity was studied in the Seloo city from 2011 to 2021. Its geographical location is 20083'73''N; 78070'70''E; 265 m. A total of 62 species of odonates belonging to 2 suborders and 8 families were recorded. The highest number of odonates belong to the family Libellulidae (30 species) followed by Coenagrionidae (13 species), Aeshnidae (5 species), Gomphidae (4 species), Platycenemididae (3 species) and Lestidae (4 species), Macromiidae (2 species) and Chlorocyphidae (1 species). Of the total, 30 species were abundant or very common, 16 were common, 6 were not rare, 7 rare and 3 very rare. Among all, 3 species were Data Deficient, *Indothemis carnatica* (Fabricius, 1798) are listed as Near Threatened and 57 were least concern in IUCN red-list of threatened species. The observations support the value of the Seloo city area in providing valuable resources for Odonata.

Keywords Odonata; diversity; Seloo city; Wardha; Mahrashtra; India.

Arthropods
ISSN 2224-4255
URL: http://www.iaees.org/publications/journals/arthropods/online-version.asp
RSS: http://www.iaees.org/publications/journals/arthropods/rss.xml
E-mail: arthropods@iaees.org
Editor-in-Chief: WenJun Zhang
Publisher: International Academy of Ecology and Environmental Sciences

1 Introduction

Odonata (damselflies and dragonflies) are very interesting and diverse insects. Odonata are paleopterous, exopterygote aquatic insects, probably more closely related to the Ephemeroptera (mayflies) than any other living insect group. They instantly attract attention with their amazing flight skills and beautiful colours. Odonate is prominent freshwater insects and plays an important role in wetland and terrestrial food chains as predators. The adults are generally predacious insects, while the larvae are carnivores and voracious feeders. They are also actively used in controlling causative agent of malaria and filaria throughout the world (Tiple et al., 2008). Even though species are usually highly specific to a habitat, some have adapted to urbanization and use man-made water bodies. They probably mark the first time that evolution experimented with the ability to hover in air over an object of interest. Being primarily aquatic, their life history is closely linked to specific aquatic habitats. Naturally, these insects become a marker, an indicator of wetland health (Andrew et al., 2008).

Dragonflies mostly occur in the vicinity of different fresh water habitats like rivers, streams, marshes, lakes

and even small pools and rice fields. Odonates are also good indicators of environmental changes as they are sensitive and are directly affected by changes in the habitats, atmospheric temperature and the weather conditions (Dijkstra and Lewington, 2006). They are also Bio-control Agents, many species of odonates inhabiting in agro ecosystems play a crucial role controlling pest populations (Tiple et al., 2013).

Globally 6335 species in 693 genera of odonates have been reported (Schorr and Paulson, 2021), of which 498 species, 27 Subspecies in 154 genera and 18 families are known from India (Subramanian and Babu, 2020; Joshi and Sawant, 2020; Bedjanič et al., 2020; Payra et al., 2020; Payra et al., 2021; Dawn, 2021). After Fraser's seminal work on Odonata of India (Fraser, 1933, 1934, 1936), there was a gap of almost 50 years in Odonata studies across the country. After establishing the Zoological Survey of India (ZSI) in 1916, trained taxonomists started collecting data and publishing lists of Odonata of localities or regions. Researchers from the ZSI and various odonatologists from the academic institutes of India have often surveyed various parts of Maharashtra region. The odonata fauna of the State of Maharashtra is well-documented with 134 species (*reviewed in* Tiple and Koparde, 2015), but few spatial gaps still remain. The eastern part of the State of Maharashtra (Vidarbha) is home to 85 odonates (Tiple et al., 2013; Tiple et al., 2014; Talmale and Tiple, 2013; Tiple, 2015, 2020). The present paper reports detailed survey on the dragonfly and damselfly (Odonata) diversity of Seloo city**.** No published checklist of Odonata species of Seloo city region is known, hence, the present work was initiated.

2 Materials and Methods

2.1 Study area

The Seloo city (20083'73''N; 78070'70''E; 265 m) is situated nearer to Bor Wildlife Sanctuary at the bank of river Bor along with the dense shrub, natural vegetation and tree vegetation which are the major attraction to the Odonata. It has tropical wet and dry climate with dry conditions, an annual rainfall of about 1,205 mm (June to September); temperature raises up to 48.9°C during summer (March-June) and falls up to 10°C to 6.9°C in winter (November-January). Annual relative humidity varies in between 22% to 80% (Tiple, 2018).

2.2 Identification

Odonates were photographed and identified in different regions of the Seloo city 2011 to 2021. Most of the sampling was done between 10 AM to 2 PM, when odonates are most active (Subramanian, 2009; Payra and Tiple, 2019). Odonates were surveyed in lakes, rivers, pond, temporary and permanent flowing or still water bodies and surrounding area, during the monsoon and post monsoon period. A weekly survey was undertaken during the monsoon (July–August) and post monsoon period at all sites. The adult odonates were identified with the help of identification keys provided by Fraser, 1933-1936 and Mitra, 1986. All nomenclature follows Subramanian and Babu (2017). The species were categorized on the basis of their abundance in Seloo city VC Very common (> 100 sightings), C Common (50-100 sightings), NR Not rare (15-50 sightings), R Rare (2-15 sightings), VR Very rare (< 2 sightings) (Tiple et al., 2008).

3 Results and Discussion

A total of 62 species of odonates belonging to 2 Suborders and 08 families were recorded. The highest number of odonates belong to the family Libellulidae (30 species), followed by Coenagrionidae (13 species), Aeshnidae (5 species), Gomphidae (4 species), Platycenemididae (3 species) and Lestidae (4 species), Macromiidae (2 species) and (1 species) Chlorocyphidae (Fig. 1, 2). Of the total, 30 species were abundant or very common, 16 were common, 6 were not rare, 7 rare and 3 very rare.

Among the 62 odonates recorded from Seloo city, 61 species come under the International Union of Conservation for Nature (IUCN) red-list of threatened species. Among them *Indothemis carnatica* come under

Near Threatened. 57 species recorded which come under Least Concern category, the species recorded which come under Data Deficient category (i.e. *Microgomphus torquatus*, *Lestes umbrinus*, *Elattoneura nigerrima*) and 1 was not listed in IUCN red-list of threatened species. The family Gomphidae is also represented by the highest number of Data Deficient species as well as species for which information is not available in the IUCN red list of threatened species (Table 1). The members of this family are fast moving insects and may have crepuscular habits. These insects are difficult to observe or collect. Many Gomphidae are already rare. Therefore, there are high chances of not detecting them during surveys (Tiple and Khoparde, 2015). The list of odonates along with their scientific names and their occurrence status and Threat status is provided in Table 1.

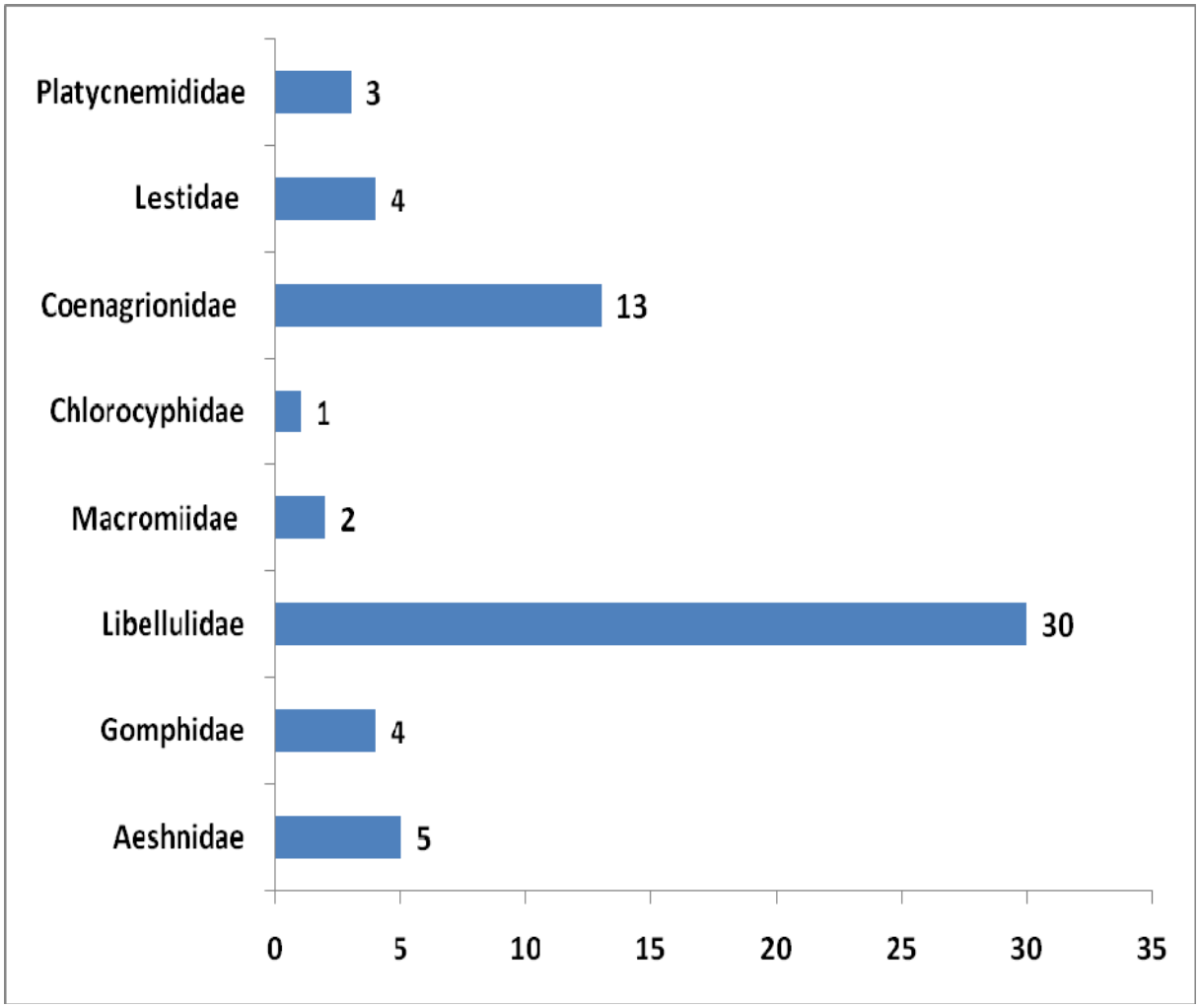
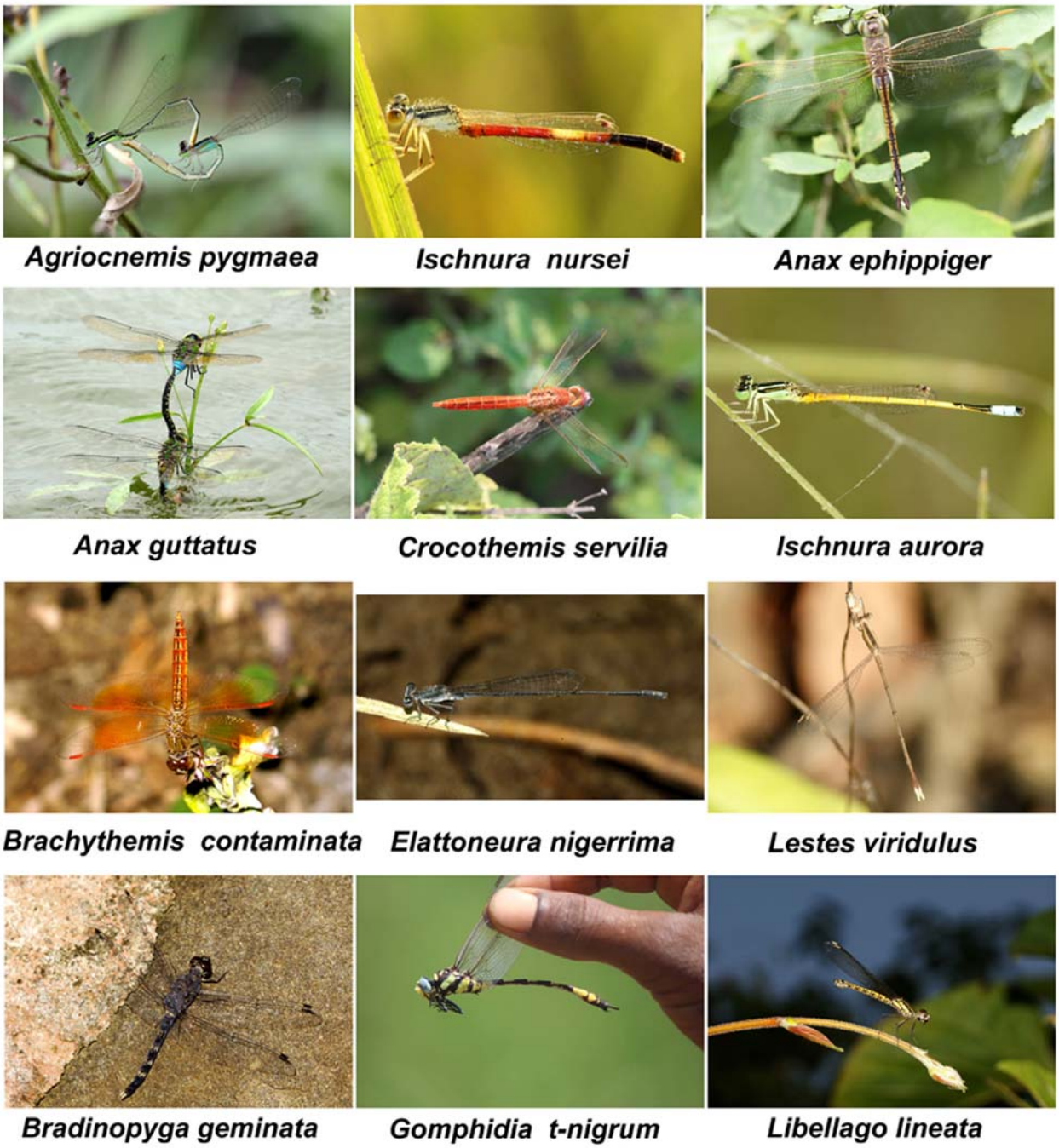


Fig. 1 The number of Odonates species encountered in different families in the Seloo city, Wardha, Maharashtra.


Agriocnemis pygmaea
Ischnura nursei
Anax ephippiger
Anax guttatus
Crocothemis servilia
Ischnura aurora
Brachythemis contaminata
Elattoneura nigerrima
Lestes viridulus
Bradinopyga geminata
Gomphidia t-nigrum
Libellago lineata

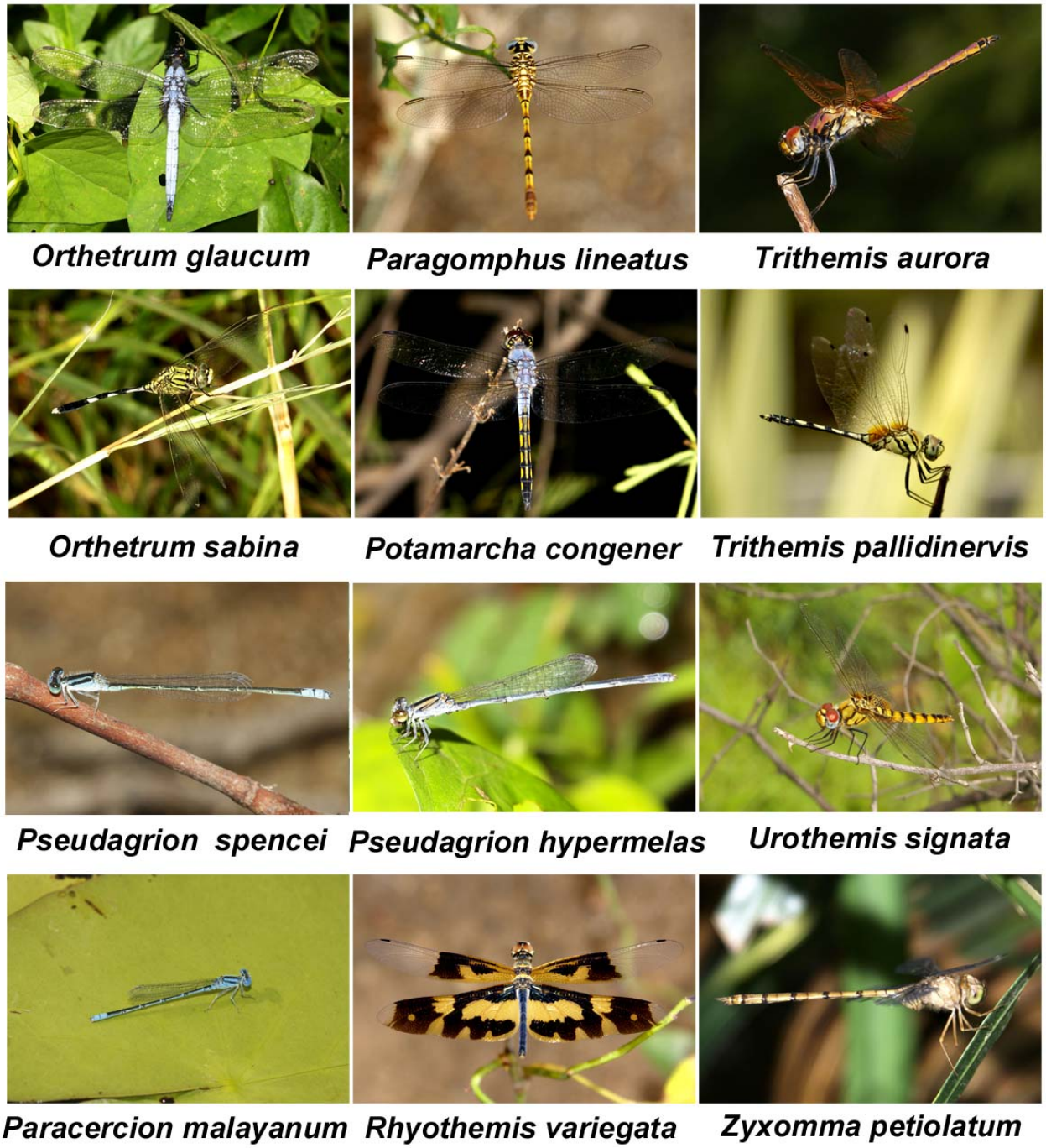


Fig. 2 Some recorded species of Odonata from Seloo city.

Table 1 Checklist of Odonata of **Seloo city**. OS: Occurrence status; TS: Threat status as assigned from IUCN. NA: Not available; LC: Least concern; DD: Data deficient; VU: Vulnerable; NT: Near threatened.

No.	**Scientific name**	**OS**	**TS**
Suborder: Anisoptera (Dragonflies)			
Family: Aeshnidae (05)			
1.	*Anax guttatus* (Burmeister, 1839)	NR	LC
2.	*Anax immaculifrons* (Rambur, 1842)	C	LC
3.	*Anax indicus* Lieftinck, 1942	VC	LC

4.	*Gynacantha bayadera* Selys,1891	C	LC
5.	*Anax ephippiger* (Burmeister, 1839)	NR	LC
Family: Gomphidae (04)			
6.	*Gomphidia t-nigrum* Selys, 1854	VR	LC
7.	*Ictinogomphus rapax* (Rambur, 1842)	VC	LC
8.	*Microgomphus torquatus* Selys, 1854	R	DD
9.	*Paragomphus lineatus* (Selys,1850)	VC	LC
Family:Libellulidae (30)			
10.	*Acisoma panorpoides* Rambur, 1842	C	LC
11.	*Brachydiplax sobrina* (Rambur, 1842)	NR	LC
12.	*Brachythemis contaminata* (Fabricius,1793)	VC	LC
13.	*Bradinopyga geminata* (Rambur, 1842)	VC	LC
14.	*Crocothemis servilia* (Drury, 1770)	VC	LC
15.	*Diplacodes lefebvrii* (Rambur,1842)	R	LC
16.	*Diplacodes nebulosa* (Fabricius, 1793)	R	LC
17.	*Diplacodes trivialis* (Rambur,1842)	VC	LC
18.	*Indothemis carnatica* (Fabricius, 1798)	R	NT
19.	*Lathrecista asiatica* (Fabricius, 1798)	C	LC
20.	*Neurothemis intermedia* (Rambur, 1842)	VC	LC
21.	*Neurothemis tullia* (Drury, 1773)	C	LC
22.	*Orthetrum sabina* (Drury, 1773)	VC	LC
23.	*Orthetrum glaucum* (Brauer, 1865)	C	LC
24.	*Orthetrum luzonicum* (Brauer, 1868)	VC	LC
25.	*Orthetrum pruinosum* (Burmeister, 1839)	VC	LC
26.	*Orthetrum taeniolatum* (Schneider,1845)	C	LC
27.	*Pantala flavescens* (Fabricius, 1798)	VC	LC
28.	*Potamarcha congener* (Rambur, 1842)	VC	LC
29.	*Rhodothemis rufa* (Rambur, 1842)	VR	LC
30.	*Rhyothemis variegata* (Linnaeus, 1763)	VC	LC
31.	*Tholymis tillarga*(Fabricius, 1798)	C	LC
32.	*Tramea basilaris* (Palisot de Beauvois, 1807)	C	LC
33.	*Tramea limbata* (Desjardins, 1832)	C	LC
34.	*Trithemis aurora* (Burmeister, 1839)	VC	LC
35.	*Trithemis festiva* (Rambur, 1842)	VC	LC
36.	*Trithemis kirbyi* Selys, 1891	NR	LC
37.	*Trithemis pallidinervis* (Kirby, 1889)	VC	LC
38.	*Urothemis signata* Rambur, 1842	R	LC
39.	*Zyxomma petiolatum* Rambur, 1842	C	LC
Family: Macromiidae (02)			
40.	*Epophthalmia vittata* Burmeister,1839	C	LC
41.	*Macromia cingulata* Rambur, 1842*	C	LC
Suborder: Zygoptera (Damselflies)			
Family: Chlorocyphidae (01)			

42.	*Libellago lineata* (Burmeister, 1839)	VC	LC
Family: Coenagrionidae (13)			
43.	*Agriocnemis pygmaea* (Rambur, 1842)	VC	LC
44.	*Paracercion calamorum* (Ris, 1916)	C	NA
45.	*Paracercion malayanum* (Selys, 1876)	C	LC
46.	*Ceriagrion coromandelianum*(Fabricius, 1798)	VC	LC
47.	*Enallagma parvum* (Selys,1876)	VC	LC
48.	*Ischnura aurora* (Brauer, 1865)	VC	LC
49.	*Ischnura senegalensis*(Rambur, 1842)	VC	LC
50.	*Pseudagrion spencei* Fraser, 1922	NR	LC
51.	*Pseudagrion decorum*(Rambur, 1842)	VC	LC
52.	*Pseudagrion hypermelas* (Selys,1876)	R	LC
53.	*Pseudagrion microcephalum* (Rambur, 1842)	C	LC
54.	*Pseudagrion rubriceps* (Selys, 1876b)	VC	LC
55.	*Ischnura nursei* (Morton,1907)	VC	LC
	Family: Lestidae (04)		
56.	*Lestes umbrinus* Selys,1891	VC	DD
57.	*Lestes thoracicus* Laidlaw, 1920	R	LC
58.	*Lestes viridulus* Rambur, 1842	VC	LC
59.	*Lestes nodalis* Selys, 1891	VR	LC
	Family: Platycnemididae (03)		
60.	*Copera marginipes* (Rambur, 1842)	VC	LC
61.	*Disparoneura quadrimaculata* (Rambur,1842)	VC	LC
62.	*Elattoneura nigerrima* (Laidlaw, 1917)	NR	DD

Odonates are predatory in nature. They are also a good source of energy to different animals, especially for birds and other insects such as spiders. Being a predator both at larval and adult stage, their role as an important component in wetland. In addition to their significant role in ecosystem function, their value as indicators' of quality of biotope is now being increasingly recognized (Subramanian and Sivaramakrishnan, 2002). The Families Libellulidae (31) and Coenagrionidae (15) are dominant in Seloo city. Earlier studies on the Maharashtra odonates from other region also have reported Libellulidae family in Dragonfly and in Damselfly family Coenagrionidae as a dominant (Tiple et al., 2008; Tiple, 2012; Andrew, 2013; Kulkarni and Subramanian, 2013; Koparde et al., 2014).

The area of Seloo city is highly disturbed. The *Brachythemis contaminate*, *Orthetrum sabina*, *Pantala flavescens*, *Bradinopyga geminate*, *Ceriagrion coromandelianum*, *Agriocnemis pygmaea* was commonly sighted in human settlement areas and its presents clearly indicates the polluted water quality of that area. Human development activity is expected to have a deleterious impact on Odonata populations; it only because of construction of buildings and concretes replaces or reduces the area of natural and semi-natural habitats. The quality of residual habitats may also be adversely affected by various forms of pollutants (Tiple and Chandra, 2013).

Tiple and Koparde (2015) reported 134 species of Odonata from Maharashtra and Tiple et al. (2012) reported 82 species of Odonates from Vidarbha Region of Maharashtra state. The present study on the Odonata of Seloo city revealed the presence of 62 species which account 76% of total species reported in Vidarbha

Region and 46% of species reported in Maharashtra State. The Seloo city seems to be having rich Odonate diversity of 62 varieties of species. Probably due to the presence of rivers, lakes and temporary and permanent flowing or still water bodies with dense shrub and tree vegetation a major attraction to the Odonata species. The observations recorded in the present study may prove valuable as a reference for assessing the changes due to the environmental conditions in the locality, in future.

Acknowledgements

The authors are thankful to the Principal, Vidyabharti College Seloo, Wardha for providing facilities and kind encouragement.

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