



Original Research Article

Odonata fauna of Sindhudurg district, Maharashtra, India

D.L. Bharamal^{1*}, Y.J. Koli², D.S. Korgaonkar³ and G.P. Bhawane⁴

^{1,3}Department of Zoology, Shri Panchamkhemraj Mahavidyalaya Savantvadi, MS, India

²Department of Zoology, SantRawoolMaharaj College, Kudal, MS, India

³Department of Zoology, Shivaji University, Kolhapur, MS, India

*Corresponding author

A B S T R A C T

Keywords

Odonata,
Western
Ghats,
Maharashtra,
India

A year-long survey was conducted to assess the Odonata species assemblage in various natural and anthropogenic habitats of Sindhudurg district. Total of 23 species belonging to 13 genera and 4 families were recorded. The family Libellulidae (13 species) was found to be dominant in the study region, followed by families Coenagrionidae, Aeshnidae and Corduliidae represent 3 species each and family Gomphidae represent 1 species.

Introduction

The insect order Odonata includes some of the most ancient and beautiful insect that ever roamed earth (Sharma *et al.*, 2007). Odonata are one of the most dominant and important group, which play an important role in the functioning of water ecosystem worldwide. The structure specificity, taxonomic stability, their pronounced functionality in food web.

In United Kingdom and South Africa, the dragonflies along with other micro invertebrates such as Coleopteran and Mollusca to identify, monitor and conserve freshwater ecosystem. These studies have shown that Odonates are reliable indicator for fresh water ecosystem health (Samway, 1992; Clark and Samway, 1996; Painter, 1999).

There are approximately 5,952 species known worldwide (Subramanian, 2014), India has moderately diverse fauna of Odonate with 474 species in 142 genera and 18 families are known from India (Subramanian, 2014). Out of 474 species 101 species of Odonate are known to occur in Maharashtra (Kulkarni *et al.*, 2012). The Odonate fauna of the Western Ghats diverse with 176 species, 68 of which endemic (Subramanian, 2009; Subramanian *et al.*, 2008, 2011; Kulkarni and Subramanian, 2013). This type of habit specificity of species, it make potentially useful bioindicator for aquatic ecosystem management.

Notable taxonomic work on Odonata from India is the following: Fraser (1933, 34, 36)

published 3 volumes on Fauna of British India. Recently Subramanian (2014) Published checklist of Indian Odonates which includes 474 species. Emiliyamma and Radhakrishnan (2000, 2002); Kulkarni and Prasad (2002); Radhakrishnan and Emiliyamma (2003); Subramanian (2007); Andrew (2008); Rangnekar *et al.*, (2010); Kulkarni *et al.*, (2012); Tiple (2012) Tiple and Chandra (2013); Tiple *et al.*, (2013); Kulkarni and Subramanian (2013) and Koparde *et al.*, (2014).

Study Area: Sindhudurg District

The Sindhudurg district comes under Konkan zone and lies between 15°37' North to 16°40' North latitude and 73°19' East to 74°13' East longitude. The total area of the district is 5087.5 sq. km. The forests in the district cover an area about 409.06 sq.km under the Forest Department, out of which 285.45 sq.km in Savantvadi and Kudal talukas and 12.61 sq.km in remaining talukas.

The district is surrounded by Ratnagiri district in the north Sahyadri hills and beyond Sahyadri, Kolhapur district, the state of Goa in south and Arabian Sea towards the west. Physiographical this area is rugged and complex one. The height of the region varies from sea level up to 1300 m.

Materials and Methods

The survey was conducted in Place like Amboli, Sawantvadi, Vengurla, Kudal during 2009 to 2010 know the distribution of Odonata. The Odonates collections were made two times in a year (post monsoon and presummer seasons) by using sweep net method. The collected specimens were identified with the help of key provided by Fraser (1933, 1934 and 1936).

Results and Discussion

During present study in Sindhudurg district the Odonata is represented by 23 species belonging to 13 genera and 4 families. Among these, family Libellulidae is represented by 13 species and formed to be dominant in study region. The family Coenagrionidae, Aeshnidae and Corduliidae represent 3 species each and family Gomphidae represent one species.

Systematic Account

Order- Odonata

Suborder- Zygoptera

Family- Coenagrionidae

Subfamily- Ischnurinae

1. *Ischnura aurora aurora* Burora

Material examined: 2 male, 1 female, 21.iv. 2010, Amboli forest area, Coll. D. L. Bharamal; 1 male, 7.xi. 2010, Amboli forest area, Coll. D. L. Bharamal.

Distribution: Throughout India: Maharashtra

Elsewhere: Australia; Indonesia; Malaysia; Myanmar; Nepal; New Guinea; Papua; Philippines; Sri Lanka and Sondaic Archipelago.

2. *Ischnura Senegalensis* Rambur

Material examined: 1 male, 13.v. 2010, Managavo area, Coll. D. L. Bharamal.

Distribution: India: Maharashtra, Manipur, Himachal Pradesh, South India and UttarPradesh.

Elsewhere: Australia, New Gunia, Philippines, Samoa and Sondiatic Archipelago.

Subfamily- Pseudagrioninae

3. *Pseudagrion decorum* Rambur

Material examined: 1 male, 1 female, 24.xi. 2010, Kankavli area, Coll. D. L. Bharamal.

Distribution: Throughout continental India.

Elsewhere: Myanmar, Nepal and Sri Lanka.

Family- Aeshnidae

Subfamily- Aeshnidae

4. *Anaxguttatus* Burmeister

Material examined: 2 female, 3.vi. 2010, Amboli forest area, Coll. Y. J. Koli; 1 female, 21.vi. 2010, Savantvadi area, Coll. D. L. Bharamal

Distribution: Throughout India: Maharashtra

Elsewhere: Myanmar, Thailand, Java and Sumatra.

5. *Anaximmaculiferons* Rambur

Material examined: 1 male, 13.v. 2010, Managavo area, Coll. D. L. Bharamal.

Distribution: India: Bihar, Chandigarh, Eastern Ghats, Maharashtra, Sikkim, West Bengal and WesternHimalaya.

Elsewhere: Sri Lanka.

6. *Gynacanthabayadera* Selys

Material examined: 1 male, 3.vi.2010 Amboli forest area; 1 male, 17.vii.2010, Savantvadi area Coll. D. L. Bharamal.

Distribution: India: Karnataka, Maharashtra, Meghalaya, Orissa, Sikkim, and West Bengal.

Elsewhere: Myanmar, Sikkim, Malaysia and Indo China.

Suborder- Anisoptera

Family- Gomphidae

Subfamily- Gomphinae

7. *Burmagomphuspyramidalis* Laidlaw

Material examined: 1 male. 2 female, 7.v. 2009. Vengurla area coll. D. L. Bharamal.

Distribution: India: Western Ghats, Maharashtra.

Subfamily- Libellulinae

8. *Cratillalineatacalverti* Foerster

Material examined: 3 male, 2 female, 3.vi. 2010, Amboli forest area, Coll. D. L. Bharamal; 1 male, 26.vi. 2010, Vengurla area, coll. D. L. Bharamal.

Distribution: India: Maharashtra, Orissa, Uttar Pradesh and Western Ghats.

Elsewhere: Indonesia; Malaysia; Myanmar; New Guinea, Philippines; Sri Lanka and SundaicArchipelago.

Subfamily- Libellulinae

9. *Orthetrumglaucum* Brauer

Material examined: 2 male, 1 female, 23.ii. 2010, Savantvadi area, Coll. D. L. Bharamal

Distribution: India: Arunachal Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, West Coast, and Western Himalaya.

Elsewhere: Sri Lanka, Nepal, Philippines, and Java.

10. *Orthetrum sabinasabina* Drury

Material examined: 1 male, 7.v. 2010, Vengurla area, Coll. D. L. Bharamal

Distribution: India: Bihar, Bilaspur, Himachal Pradesh, Kangra, Maharashtra, Sirmaur, and Uttaranchal.

Elsewhere: Somalia (Somali Land); Iraq; Iran; Nepal; Sri Lanka; Myanmar; Thailand; Micronesia (Oceania); Samoa Island (Pacific Ocean) Indonesia (Java, Sumba, Timor); Papua (New Guinea); Australia; Egypt; Angola and most of African continent.

11. *Orthetrumtaeniolum* Schn

Material examined: 1 male, 1 female, 3.vi. 2010, Amboli forest area, Coll. D. L. Bharamal; 1 female, 26.vi. 2010, vengurla area, coll. D. L. Bharamal.

Distribution: Throughout India, Maharashtra

Elsewhere: Nepal and countries bordering Mediterranean Sea.

12. *Orthetrumtestaceumtestaceum* Burmeister

Material examined: 1 male, 1 female, 23.ii. 2010, Savantvadi area, Coll. D. L. Bharamal; 2 male, 17.iii.2010, Amboli forest area, Coll. D. L. Bharamal.

Distribution: India: Arunachal Pradesh, Maharashtra and Orissa.

Elsewhere: Bangladesh, China, Hong Kong, Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam.

13. *Orthetrumanceps* Schneider

Material examined: 2 female, 26.vi. 2010, Vengurla area, coll. D. L. Bharamal.

Distribution: India: Himachal Pradesh, Maharashtra

Elsewhere: Asia Minor; North African Coast; Pakistan and Persia.

14. *Orthetrumchrysis* Selys

Material examined: 1 male, 1 female, 18.ii.2010, Savantvadi area, Coll. D. L. Bharamal.

Distribution: India: Western Ghats. Nilgiris;

Elsewhere: Borneo; Celebes; Java; Myanmar; Sri Lanka.

Subfamily- Trameinae

15. *Pantalaflavescens* Fabr.

Material examined: 2 male. 2 female, 17.iii. 2010, Amboli forest area, Coll. D. L. Bharamal.

Distribution: Circumtropical and subtropical in distribution (Throughout India).

Elsewhere: China; Indonesia; Malaysia; Micronesia; Morocco; Myanmar; Sri Lanka and Thailand.

Subfamily- Sympetrinae

16. *Sympetrumhypomelas* Selys

Material examined: 1 male, 6.xii. 2010, Amboli forest area, Coll. Y. J. Koli

Distribution: Arunachal Pradesh, Himachal Pradesh, Maharashtra, Sikkim, Uttar Pradesh, West Bengal and Western Ghats.

Subfamily- Trameinae

17. *Trameabasilaris burmeisteri* Kirby

Material examined: 1 female, 18.iii.2010, Amboli forest area, D. L. Bharamal; 1 female 4.iv..2010, Savantvadi area Coll. D. L. Bharamal.

Distribution: India: Himachal Pradesh, Maharashtra, Punjab, Rajasthan, Uttaranachal, And West Bengal.

Elsewhere: Myanmar, Sri Lanka and Malaysia.

Subfamily- Trithemistinae

18. *Trithemisfestiva* Rambur

Material examined: 1 male, 1 female, 6.xii. 2010, Amboli forest area, Coll. Y. J. Koli; 1 male, 21.xii.2010, Vengurla area, D. L. Bharamal.

Distribution: India: Assam; Himachal Pradesh, Maharashtra, Uttaranachal, West Bengal.

Elsewhere: Nepal; Sri Lanka; Myanmar;
West Malaysia: (Penang); Singapore;
Indonesia:(Sulawesi, Java, Lesser Sunda,

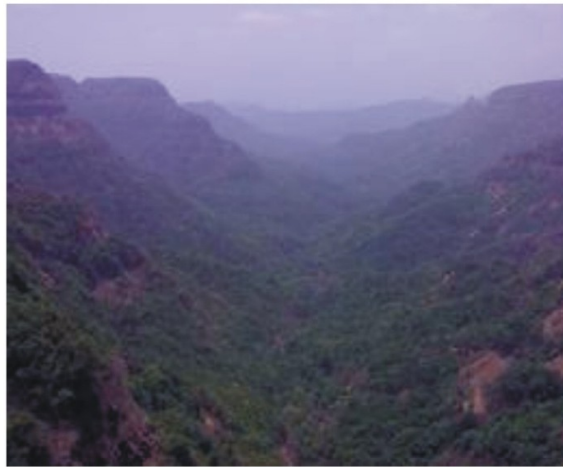
Sumatra); Philippines; Taiwan and Papua
(New Guinea).

Different panoramic views of Study Region

Site: I Sawantwadi



Site: II Amboli



Site: III Vengurla



19. *Trithemis aurora* Burmeister

Material examined: 3 male, 1 female, 3.xi.2010, Savantavadi area, Coll. D. L. Bharamal.

Distribution: Throughout India.

Elsewhere: Pakistan; Nepal; Sri Lanka; Myanmar; West Malaysia: (Penang); Indonesia: (Borneo, Sulawesi, Java, Moluccas, Sumba, Sumatra, Timor) and Philippines.

20. *Trithemispallidinervis* Kirby

Material examined: 2 male, 1 female, 18.ix.2010, Managavo area, Coll. D. L. Bharamal; 1 male, 19.ix.2010, Savantavadi area, Coll. D. L. Bharamal.

Distribution: India: Assam, Bihar, Himachal Pradesh, Maharashtra, Punjab, Uttar Pradesh, And West Bengal.

Elsewhere: Myanmar, Sri Lanka, Formosa and Philippines.

Family- Corduliidae

Subfamily- Cordulinae

21. *Hemicordulia asiatica* Selys

Material examined: 1 male, 6.xii. 2010, Amboli forest area, Coll. Y. J. Koli.

Distribution: India: Assam; Maharashtra, Meghalaya and Western.

Subfamily- Macromiinae

22. *Macromia falvicincta* Selys

Material examined: 1 female, 18.ix.2010, Mangavo area, Coll. D. L. Bharamal; 1 female, 19.ix.2010, Savantavadi area, Coll. D. L. Bharamal.

Distribution: India: Maharashtra.

23. *Macromia cingulata* Rambur

Material examined: 2 male, 19.ix.2010, Savantavadi area, Coll. D. L. Bharamal.

Distribution: Peninsular India:

Maharashtra.

In conclusion, the faunal life produced in this study should provide some baseline data on the Odonata composition of Sindhudurg district for current and future conservation and restoration efforts.

References

- Andrew, R.J., Subramaniam, K.A., Tiple, A.D. (2008). Common Odonates of Central India. In: E-book for "The 18th International Symposium of Odonatology". Hislop College, Nagpur, India, 55 pp.
- Clark, T.E., Samways, M.J. (1996). Dragonflies (Odonata) as indicators of biotope quality in the Kruger National Park, South Africa. *J. Appl. Ecol.*, 33: 1001–1012.
- Emiliyamma, K.G., Radhakrishnan, C. (2000). Odonata (Insecta) of Parambikulam Wildlife Sanctuary, Kerala, India. Records of the Zoological Survey of India 98 (Part-1): 157–167.
- Emiliyamma, K.G. Radhakrishnan, C. (2002). Additions to the Odonata (Insecta) of Thiruvananthapuram District, Kerala. *Zoos' Print J.*, 17(10): 914–917.
- Fraser, F.C. (1933). The Fauna of British India including Ceylon and Burma. Odonata Vol. I. Taylor and Francis Ltd., London, 423 pp.
- Fraser, F.C. (1934). The Fauna of British India including Ceylon and Burma. Odonata Vol. II. Taylor and Francis Ltd., London, 398 pp.
- Fraser, F.C. (1936). The Fauna of British India including Ceylon and Burma. Odonata, Vol. III. Taylor and Francis Ltd., London, 461 pp.
- Koparde, P., Mhaske, P., Patwerdhan, A. (2014). New records of Dragonflies and damselflies (insect: Odonata) from Western Ghats of Maharashtra, India.

- Journal of Threatened taxa. 6(5):5744–5754.
- Kulkarni, A., Subramanian, K.A. (2013). Habitat and seasonal distribution of Odonata (Insecta) of Mula and Mutha river basins, Maharashtra, India. *J. Threatened Taxa*, 5(7): 4084–4095.
- Kulkarni, P.P., Prasad, M. (2002). Fauna of Ujani Wetland (Maharashtra): Insecta: Odonata, pp. 91–104 In: Wetland Ecosystem Series - 3. Zoological Survey of India, Calcutta, India.
- Kulkarni, P.P., Babu, R., Talmale, S., Sinha, C., Mondal, S.B. (2012). Insecta: Odonata. In: Fauna of Maharashtra: State Fauna Series. Zoological Survey of India, Kolkata, India, 20(2): 397–428.
- Painter, D. (1999). Macroinvertebrate distributions and the conservation value of aquatic Coleoptera, Mollusca and Odonata in the ditches of traditionally managed and grazing fen at Wicken Fen, UK. *J. Appl. Ecol.*, 36: 33–48.
- Radhakrishnan, C., Emiliyamma, K.G. (2003). Odonata (Insecta) of Kerala: A systematic database. In: Advancements in Insect Biodiversity. pp. 195–224.
- Rangnekar, P., Borkar, M., Dharwadkar, O. (2010). Additions to the Odonata (Insecta) of Goa. *J. Threatened Taxa*, 2(4): 805–814.
- Samways, M.J. (1992). Dragonfly conservation in South Africa: a biogeographic perspective. *Odonatologica*, 21(2): 165–180.
- Sharma, G., Sundararaj, R., Karibasvaraja, L.R. (2007). Species diversity of Odonata in the selected provenances of Sandal in southern India. *Zoo's Print J.*, 22(7): 2765–2767.
- Subramanian, K.A. (2007). Endemic odonates of the Western Ghats: habitat distribution and conservation. In: Tyagi, B.K. (Ed.). Odonata: Biology of Dragonflies. Scientific Publishers, Jodhpur, India. pp. 257–271.
- Subramanian, K.A. (2009). A Checklist of Odonata (Insecta) of India. Zoological Survey of India, Pune, India, 36 pp.
- Subramanian, K.A. (2014). A Checklist of Odonata of India. Zoological Survey of India, Kolkata, 31 pp.
- Subramanian, K.A., Kakkassery, F., Nair, M.V. (2011). The status and distribution of dragonflies and damselflies of the Western Ghats, pp. 63–72. Molur, S., K.G. Smith, B.A. Daniel & W.R.T. Darwall (comp.). *The Status and Distribution of Freshwater Biodiversity in the Western Ghats, India*. IUCN, Cambridge, UK and Glad, Switzerland and Zoo Outreach Organization, Coimbatore, India.
- Subramanian, K.A., Ali, S., Ramchandra, T.V. (2008). Odonata as indicators of riparian ecosystem health a case study from south western Karnataka, India. *Fraseria (N.S.)*, 7: 83–95.
- Tiple, A., Chandra, K. (2013). Dragonflies and Damselflies (Insecta, Odonata) of Madhya Pradesh and Chhattisgarh States, Central India. *J. Care4Nature*, 1(1): 3–11.
- Tiple, A. (2012). Dragonflies and Damselflies (Insecta-Odonata) from Nagpur city environs in Vidharba, together with other records from Maharashtra, India. *Colemania*, 27: 1–12.
- Tiple, A.D., Andrew, R.J., Subramanian, K.A., Talmale, S.S. (2013). Odonata of Vidarbha region, Maharashtra state, central India. *Odonatologica*, 42(3): 237–245.