A Preliminary Study of Odonate Diversity in Wayanad Wildlife Sanctuary

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Kerala Forests and Wildlife Department, Ferns Nature Conservation Society

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PREFACE

The earth is facing an Ecological Armageddon and already going through the sixth mass extinction, caused by human activities. Mitigating environmental degradation through research and action is the need of the hour. Odonata, which includes dragonflies and damselflies are easy to study insects and can serve as ecological indicators. Despite this, even preliminary studies on odonates are found wanting in many of our Protected Areas.

Ferns Nature Conservation Society, a non-profit conservation organization based in Wayanad has earlier joined hands with the Kerala Forests and Wildlife Department for studies on butterflies, including the study on migration of milkweed butterflies, mapping the spread of the invasive tree *Senna spectabilis* and ecological restoration activities in Wayanad Wildlife Sanctuary. With this study, the collaboration has been extended to the study of odonates, the little flying jewels whose study can help us understand nature better. Technical support offered by Society for Odonate Studies (SOS); an organization founded for the exclusive study of odonates in Kerala has greatly improved this study. Conservation of the natural world, and the survival of humankind in turn, would increasingly rely on such egoless collaborations in the future.

Vinayan P.A. President, Ferns Nature Conservation Society

About Odonata



Dragonflies and damselflies which together form the insect Order Odonata are good indicators of ecological change because of their relatively large size, short life cycles, amphibious life history and moderate diversity. They are ubiquitous organisms of freshwater ecosystems. Their species assemblage and abundance have been found to reflect the water quality of the habitats in which they occur. They also play an important role in the food web as predators of smaller animals and prey for larger ones. Their contribution in controlling agricultural pests and mosquitoes is underappreciated. Numerous studies around the world have made use of odonates for assessing the health of forest ecosystems, but even a preliminary checklist of odonates found in the region are missing for many of India's forest areas. This glaring gap needs to be filled because odonates can act as good measures of biodiversity of a region and they have entered the biodiversity crisis debate already.

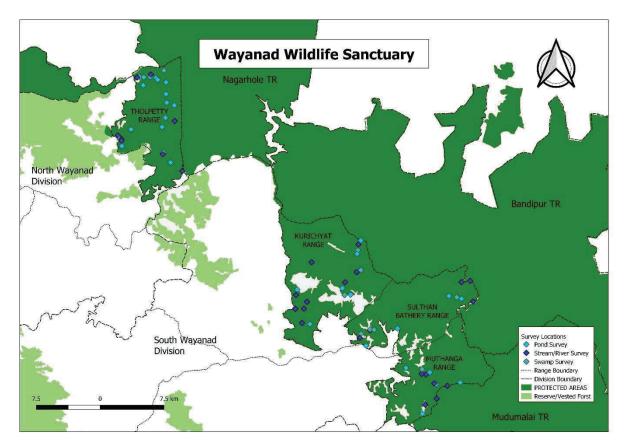
Wayanad Wildlife Sanctuary



Wayanad district is set high on the Western Ghats with altitudes ranging from 300 to 2200 meters. In terms of percentage of forest cover with total geographical area, Wayanad district has the highest forest cover of 41.59% in Kerala. Wayanad Wildlife Sanctuary is a part of the Nilgiri Biosphere Reserve and with an extent of 344.44 Km² across four ranges supports a variety of flora and fauna. The sanctuary is famed for supporting good populations of megafauna including the Asian Elephant and the Royal Bengal Tiger.

In India, the Eastern Himalayas and the Western Ghats are richest in terms of odonate diversity. Dr. F.C. Fraser, the British military officer who gave the first detailed account of odonates of India recognised that the Coorg-Wayanad belt was exceptionally rich in odonate fauna. In a study titled 'Systematic studies on Odonata (Insecta) of Southern Western Ghats' by Dr. K.G. Emiliyamma, Zoological Survey of India, multiple specimens were collected from Wayanad including those of some rare species like *Chlorogomphus campioni* and *Idionyx saffronata*. Three-day surveys with the help of volunteers were held in 2014 and 2016 in Wayanad Wildlife Sanctuary. In these two surveys coordinated by Malabar Natural History Society (MNHS) and Kerala Forests and Wildlife Department, 68 and 75 species of odonates were identified respectively. In an independent study published in 2020 by two researchers, Susanth C and Anooj S.S, 59 species of odonates were reported from various locations of Wayanad district. Having many rivulets and ponds, and being located in a hotspot of biodiversity, the Wayanad Wildlife Sanctuary is expected to host a rich variety of odonate fauna that can only be revealed with dedicated, systematic studies. This study is a pioneering attempt in this direction.

Methodology



Since odonates require freshwater to complete their life cycles, the main odonate habitats in the Sanctuary are streams, swamps and ponds. The study was carried out during the period August-November 2020. This period of the year was chosen because the water bodies are full and odonates are engaged in reproductive activities like territorial defence, patrolling and courtship, increasing their detectability. Also, camps become accessible in these months after the heavy Monsoon showers of June-July. In each of the four forest ranges, streams, swamps and ponds for sampling were pre-determined considering their accessibility. An observer accompanied by a forest watcher visited these water bodies between 9 AM to 3 PM in fine weather. Visual Encounter Survey (VES) was done to record the diversity of odonates in each habitat. For this, the observer walked along the edge of the freshwater habitat for 20 minutes and recorded the species encountered and their numbers. Belt transects conventionally used to document odonate diversity were not suitable as access to most habitats were limited. Time of the survey was fixed as 20 minutes after arriving at a species-accumulation curve (Figure 1). Spending more than 20 minutes in a habitat did not yield in the detection of any additional species. All the species were photographed in the field and identified with the help of field guides (Kiran & Raju 2014; SOS 2020) and taxonomic monographs (Fraser 1933, 1934 & 1936). Additionally, species encountered opportunistically in the Sanctuary were added to the checklist.

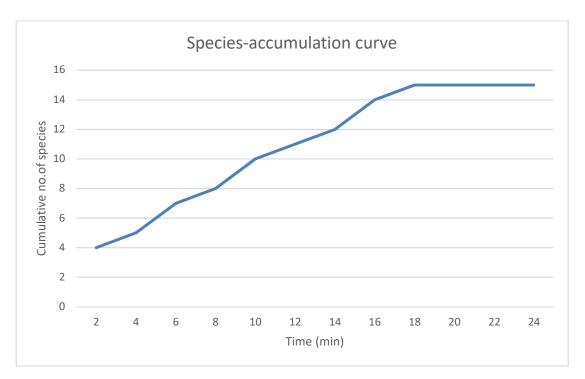
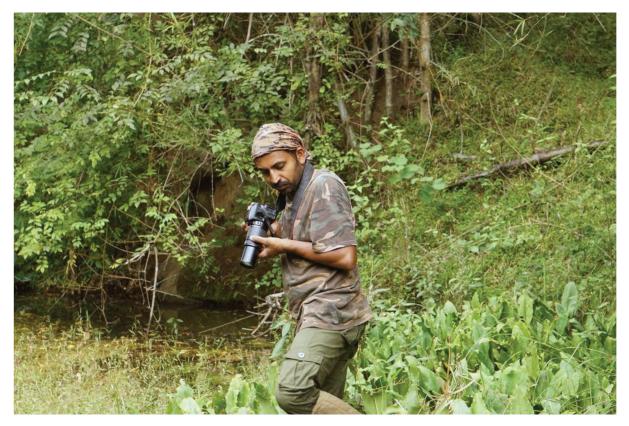


Figure 1: Species-accumulation curve drawn for a pond sampled



Picture- showing an observer doing fieldwork

Results

1. Tholpetty Range



No. of streams sampled= 9 No. of swamps sampled= 4 No. of ponds sampled= 16

A total of 79 species of odonates (34 damselflies and 45 dragonflies) were recorded out of which 13 are endemic to the Western Ghats.



2. Kurichiyat Range

No. of streams sampled= 9 No. of swamps sampled= 4 No. of ponds sampled= 8

A total of 66 species of odonates (26 damselflies and 40 dragonflies) were recorded out of which 6 are endemic to the Western Ghats.

3. Sulthan Bathery Range



No. of streams sampled= 5

No. of swamps sampled= 4

No. of ponds sampled= 5

A total of 68 species of odonates (28 damselflies and 40 dragonflies) were recorded out of which 5 are endemic to the Western Ghats.

4. Muthanga Range



No. of streams sampled= 6 No. of swamps sampled= 3 No. of ponds sampled= 4

A total of 64 species of odonates (28 damselflies and 36 dragonflies) were recorded out of which 5 are endemic to the Western Ghats.

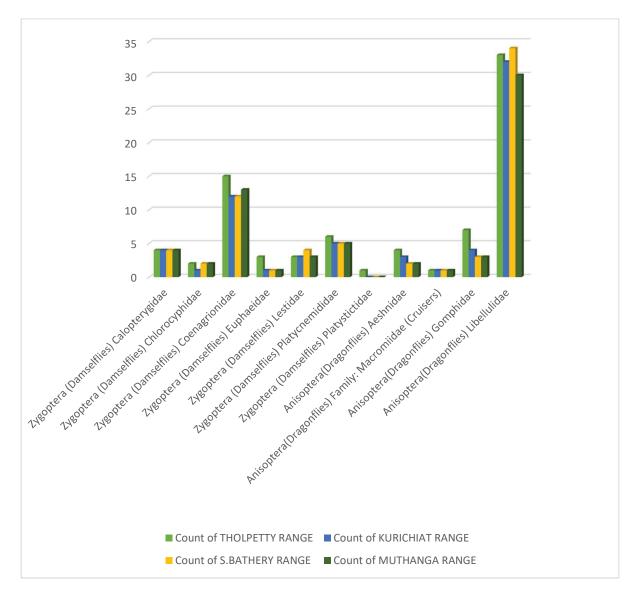


Figure 2: Number of species from each odonate family recorded in the four forest ranges

From the entire sanctuary area, a total of 84 species of odonates (35 damselflies and 47 dragonflies) were recorded out of which 15 are endemic to the Western Ghats. Species richness was highest in ponds (56), followed by streams (46) and swamps (33). However, the number of endemic species was highest in streams (8), followed by swamps (3) and ponds (2). The 'ponds' in the sanctuary are in most cases waterholes dug for larger wild animals. It is clear from the study that odonates have largely benefitted from the presence of these manmade ecosystems. Nonetheless, it must be noted that the number of endemic species supported by this habitat type is proportionally very less. The proportion of Libellulids, which are mostly sun-loving generalist species is remarkably higher in ponds.

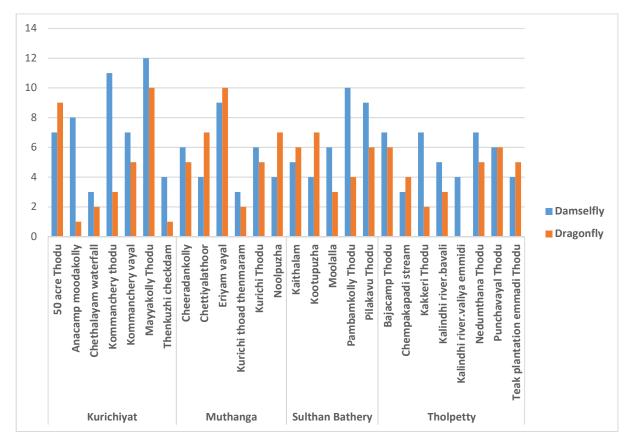


Figure 3: Number of damselfly and dragonfly species recorded from the streams in WWS

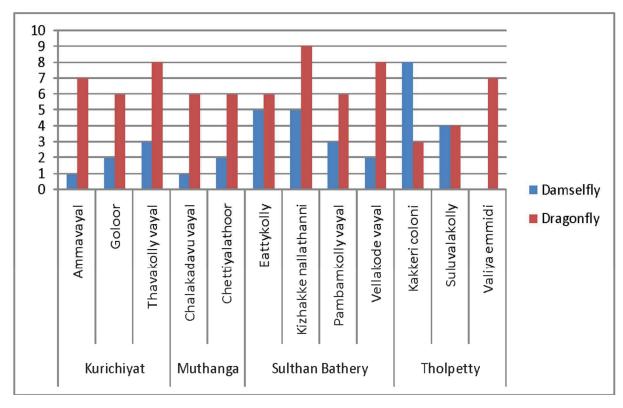


Figure 4: Number of damselfly and dragonfly species recorded from the swamps in WWS

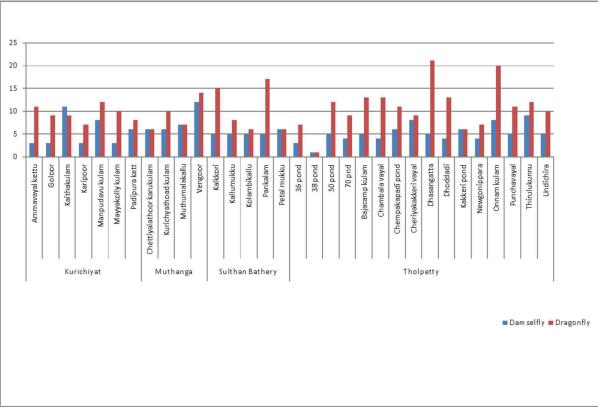


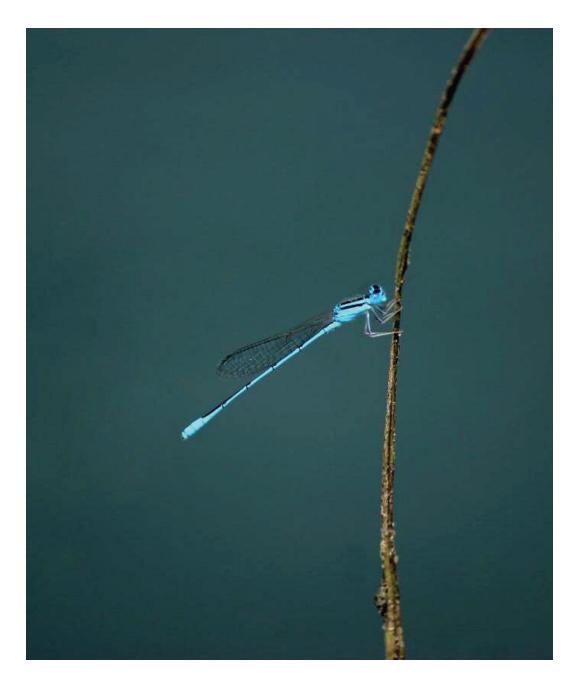
Figure 5: Number of damselfly and dragonfly species recorded from the ponds in WWS

Significant finds:

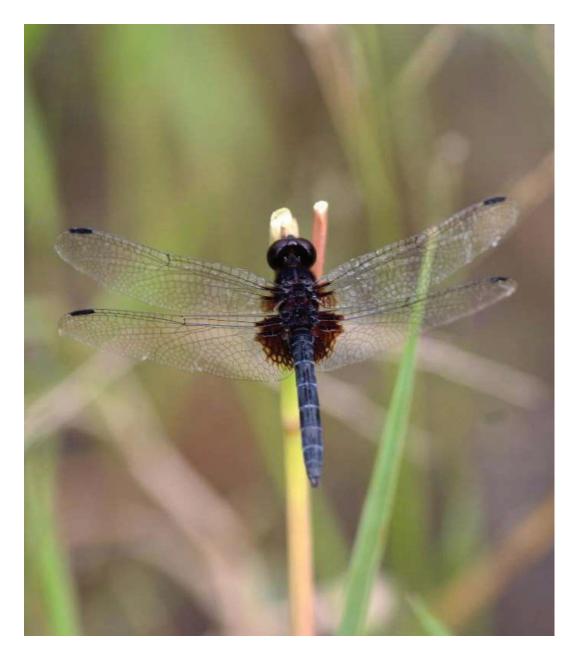
i) Indolestes pulcherrimus (Fraser, 1924) – Commonly called Coorg False Spreadwing, this rare and endemic damselfly was earlier recorded only from Coorg in Karnataka. The discovery of this species from Wayanad Wildlife Sanctuary has increased the tally of odonate species recorded from Kerala to 175. Large colonies of this species were seen in Sulthan Bathery range. Many tenerals (adults just emerged from lavae) were also seen, highlighting the importance of the sanctuary as their breeding area.



ii) Amphiallagma parvum (Selys, 1876) – Although widely distributed in many South Asian countries, this small damselfly with the common name Azure Dartlet is very rare in Kerala and was formerly recorded only from a few locations in Kannur district. It was seen in Vengoor pond of Muthanga range.



iii) Indothemis limbata (Selys, 1891) – A rare dragonfly inhabiting weedy ponds in the western parts of India, the Restless Demon was recorded from all four ranges of the sanctuary. In Kerala, it was earlier reported only from Kasaragod.



Recommendations

- 1. A year-long study should be conducted in the sanctuary to document its odonate diversity completely. Many species, especially Gomphids are highly seasonal and can only be seen on the wing for a brief period of the year. It is likely that the present study has missed many such species.
- 2. Field staff should be trained in identifying odonates. Even though they are insects, most odonates can be readily identified in the field thanks to their relatively large size and distinct colouration. Online resources for identification are available for free and since the field staff spend maximum time in the field, they can detect rare species and do continuous monitoring of odonates in the sanctuary. This will also be a valuable addition to the skillset of the staff and enhance their self-esteem.
- 3. The integrity of water bodies in the sanctuary should be maintained. As this study shows, streams running through the sanctuary support eight species of odonates endemic to the Western Ghats. Activities that interfere with the free flow of water in these streams should be avoided at all costs.

Acknowledgements

We thank the Wildlife Warden, Wayanad Wildlife Sanctuary and all the staff of Kerala Forests and Wildlife Department who facilitated this study. We are grateful to Vinayan P.A, President, Ferns Nature Conservation Society for his help in the execution of fieldwork. We are thankful to Arun Lal and Yadumon for their help in the field. We are indebted to Society for Odonate Studies (SOS) for the technical support rendered throughout the study.

SI No	Speices	THOLPE TTY RANGE	KURICHI AT RANGE	S.BATHE RY RANGE	MUTHAN GA RANGE	Endemis m
	Zygoptera (Damselflies)	34	26	28	28	8
	Lestidae	3	3	4	3	1
1	Indolestes pulcherrimus			x	x	x
2	Lestes dorothea	x	x	x	~	~
3	Lestes elatus	x	x	x	x	
4	Lestes praemorsus	x	x	x	x	
· ·	Platystictidae	1		~		1
5	Protosticta gravelyi	x				x
	Calopterygidae	4	4	4	4	1
6	Neurobasis chinensis	x	X	X	X	-
7	Vestalis apicalis	x	x	x	x	
8	Vestalis gracilis	x	x	x	x	
9	Vestalis submontana	x	x	x	x	x
5	Chlorocyphidae	2	1	2	2	^
10	Libellago indica					
10	Heliocypha bisignata	X	×	X	X	
11	Euphaeidae	x 3	x 1	X 1	x 1	2
12	•		1	1		Z
	Dysphaea ethela	X		X	X	
13	Euphaea dispar	X				X
14	Euphaea fraseri	X	X	-	-	X
45	Platycnemididae	6	5	5	5	2
15	Caconeura ramburi	Х	X	X	Х	X
16	Copera marginipes	Х	X	X	Х	
17	Copera vittata	X	X	X	Х	
18	Melanoneura bilineata	X				Х
19	Onychargia atrocyana	x	X	X	Х	
20	Prodasineura verticalis	х	X	X	X	
	Coenagrionidae	15	12	12	13	1
21	Aciagrion approximans krishna	x	x	x	X	
22	Aciagrion occidentale	x	х	х	х	
23	Agriocnemis pieris	x	x	х	х	
24	Agriocnemis pygmaea	x	x	х	х	
25	Agriocnemis	x	x	x	x	
	splendidissima					
26	Amphiallagma parvum	x			х	
27	Ceriagrion coromandelianum	х	х	х	x	
28	Ceriagrion olivaceum aurantiacum	x				
29	Ceriagrion rubiae	х	x	х	х	
30	Ischnura rubilio	х	х	х	х	
31	Ischnura senegalensis	х	x	х	х	

32	Pseudagrion decorum	x				
33	Pseudagrion indicum	x	x	x	x	x
34	Pseudagrion malabaricum	x	x	x	x	~
35	Pseudagrion rubriceps	x	x	x	x	
	Anisoptera(Dragonflies)	45	40	40	36	7
	Aeshnidae	4	3	2	2	,
36	Anax immaculifrons	x	x	X	x	
37	Anax indicus	x	x	x	x	
38	Gynacantha dravida	x	x	~	<u>л</u>	
39	Gynacantha millardi	x				
35	Gomphidae	7	4	3	3	6
40	Burmagomphus laidlawi	x		5	5	x
41	Gomphidia kodaguensis	x				x
42	Ictinogomphus rapax	x	x	x	x	^
43	Lamelligomphus	^	x	^	^	x
45	nilgiriensis		^			^
44	Melligomphus acinaces	x				х
45	Merogomphus longistigma	x	x	x	x	x
46	Microgomphus souteri	x	^	^	^	x
47	Paragomphus lineatus	x	x	x	x	^
47	Macromiidae	1	1	1	1	
48	Epophthalmia vittata	X	X	X	x	
40	Libellulidae	33	32	34	30	1
49	Acisoma panorpoides	x	X	x	x	1
50	Aethriamanta brevipennis	^	^	x	^	
50	Brachydiplax sobrina	x	x	x	x	
52	Brachythemis contaminata	x	x	x	x	
53	Bradinopyga geminata	x	x	x	x	
54	Cratilla lineata	x	x	x	x	
55	Crocothemis servilia	x	x	x	x	
56	Diplacodes trivialis	x	x	x	x	
57	Epithemis mariae	x	~	~	X	x
58	Hydrobasileus croceus	x	x	x	x	~
59	Hylaeothemis apicalis	x	x	x	x	
60	Indothemis carnatica	x	x	x	x	
61	Indothemis limbata	x	x	x	x	
62	Lathrecista asiatica	x	x	x	x	
63	Neurothemis fulvia	x	x	x	x	
64	Neurothemis tullia	x	x	x	x	
65	Onychothemis testacea	x	x	x	x	
66	Orthetrum chrysis	x	x	x	x	
67	Orthetrum glaucum	x	x	x	x	
68	Orthetrum luzonicum	x	x	x	x	
69	Orthetrum pruinosum	x	x	x	x	
70	Orthetrum sabina	x	x	x	x	
70	Palpopleura sexmaculata	x	x	x	x	
/ 工		^	^	^	^	

72	Pantala flavescens	х	х	х	х	
73	Potamarcha congener	х	х	х	х	
74	Rhodothemis rufa	х	х	х	х	
75	Rhyothemis triangularis	х	x	х		
76	Rhyothemis variegata	х				
77	Tetrathemis platyptera	х	х	х	х	
78	Tholymis tillarga	х	х	х		
79	Tramea limbata	х	х	х	х	
80	Trithemis aurora	х	x	x	х	
81	Trithemis festiva	х	х	х	х	
82	Urothemis signata	х	x	х	х	
83	Zygonyx iris		х	х	х	
84	Zyxomma petiolatum			х		
	Grand Total	79	66	68	64	15
	Total Endemic Sp.	13	6	5	5	15

Table 1: Checklist of Odonata recorded from Wayanad Wildlife Sanctuary

	Stream/River Survey Total				×			×	×	×		×		×		×		×	×		×	×	×
	Tholpetty Total							×	×	×		×		×		×		×	×		×	×	×
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		Gomphidia Lodanioneic	l amelliaomnhus	nilgiriensis	Merogomphus	longistigma	Libellulidae	Brachythemis	contaminata	Bradinopyga	geminata	Cratilla lineata	Crocothemis servilia	Diplacodes trivialis	Hylaeothemis	alis	Lathrecista asiatica	Neurothemis fulvia	Neurothemis tullia	Onychothemis	лсеа	Orthetrum chrysis	Orthetrum glaucum
		Gom		nilgii	Mer	long.	Libel	Brac	cont	Braa	gem.	Crati	Croc	Diplc	Hyla.	apicalis	Lath.	Neur	Neur	Onyc	testacea	Orth.	Orth

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athe	ellelooM				×						×			×				6
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		Orthetrum	luzonicum	Orthetrum	pruinosum	Orthetrum sabina	Palpopleura	sexmaculata	Pantala flavescens	Potamarcha	congener	Tetrathemis	platyptera	Trithemis aurora	Trithemis festiva	Zygonyx iris		Grand Total

		Kuric	hiyat		Μι	uthan	iga		Sulth	an Ba	thery	/		Thol			
													oni			tal	tal
	Ammavayal	Goloor	Thavakolly vayal	Kurichiyat Tota	Chalakadavu vayal	Chettiyalathoor	Muthanga Tota	Eattykolly	Kizhakke nallathanni	Pambamkolly vayal	Vellakode vayal	Sulthan Bathery Total	Kakkeri coloni	Suluvalakolly	Valiya emmidi	Tholpetty Total	Swamp Survey Total
Damselfly									Xi Ki			Sul					- Č
Lestidae													х			х	х
Lestes praemorsus													х			х	х
Calopterygidae																	
Vestalis apicalis								х				х	х			х	х
Vestalis gracilis								x				x					x
Chlorocyphidae								-				-					
Heliocypha bisignata								х				х					х
Euphaeidae																	
Euphaea fraseri								х				х					x
Platycnemididae																	
Caconeura ramburi														x		x	x
Copera vittata		x		х				х				х	х	x		x	x
Melanoneura bilineata		~		~				~				~	x	x		x	x
Onychargia atrocyana			х	х					x			х	x	x		x	x
Coenagrionidae			~	^					^			~	^	^		^	^
Aciagrion approximans																	╞──┦
krishna									x			х	x			x	x
Chlorocyphidae	x	x	х	х	х	х	x		x	x	х	x	x			x	x
Agriocnemis pygmaea						X	x		x	x		x	x			x	x
Ceriagrion						~			~			~				~	~
coromandelianum			x	x					x			х					x
Ischnura rubilio										x	х	х					х
Ischnura senegalensis																	
Dragonfly																	
Aeshnidae																	
Gynacantha dravida														x		x	x
Libellulidae																	
Acisoma panorpoides	x	x	х	х		х	x		х			х					x
Cratilla lineata	-			-	х	-	x				х	x					x
Crocothemis servilia	x			x													x
Diplacodes trivialis			х	x		х	х				х	х			х	x	x
Hydrobasileus croceus																	
Hylaeothemis apicalis								x				х		x		x	x
Neurothemis fulvia															х	x	x
Neurothemis tullia			х	х	х		х		x	x	х	х					x
Orthetrum chrysis								х	x	~		x		x		x	x
Orthetrum glaucum		x		х	х		х	x	x			x				^	x
Orthetrum luzonicum	x	x	х	x	x	х	x	x	x	x	х	x	x		х	x	x
Orthetrum pruinosum	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
Orthetrum sabina	x	^	x	x	^	x	x	^	^	x	x	x	^		x	x	x
Gruneti uni subinu	^	I	^	^		٨	^		I	^	^	~	I	<u> </u>	^	^	^

		Kuric	hiyat		Mu	uthar	nga		Sultha	an Ba	thery	/		Tholp	oetty		
	Ammavayal	Goloor	Thavakolly vayal	Kurichiyat Total	Chalakadavu vayal	Chettiyalathoor	Muthanga Total	Eattykolly	Kizhakke nallathanni	Pambamkolly vayal	Vellakode vayal	Sulthan Bathery Total	Kakkeri coloni	Suluvalakolly	Valiya emmidi	Tholpetty Total	Swamp Survey Total
Palpopleura sexmaculata	x	x	x	х				x		x	х	х			x	х	x
								^							~	×	
Pantala flavescens	х	Х	х	х		х	х			х	х	х					Х
Potamarcha congener					Х		Х		Х			Х			Х	Х	Х
Rhodothemis rufa									х			Х					Х
Tetrathemis platyptera													х	х		х	x
Trithemis aurora									х			х					х
			1	1			1	1	1		1	2	1			2	3
Grand Total	8	8	1	4	7	8	2	1	4	9	0	6	1	8	7	0	3

Table 3: Odonata recorded from the swamps of Wayanad Wildlife Sanctuary

\square	Pond Survey Total			:	×		×	×		×				×	×		×						×	:	×
	Tholpetty Total							х		Х				×	×		×						×	:	×
	eridoibnU									х															
	Thirulukunnu													×	×										
	leyevedonug																×								
	meluy mennO									х													×		_
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	Kakkeri pond														×								×		_
Ę	ibebbord																								-
Tholpetty	Dhasangatta																								_
Tho	Сһегіуакаккегі vayal									x														;	×
	Chempakapadi pond														×		×								×
	leyev eledmed)																								-
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	pud 0Z				+																-				\neg
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	puod 95																								
\square	Sulthan Bathery Total				×		×	×		×							×						×		_
2	Petal mukku				×		×			×				_									~ ×		
Sulthan Bathery	Pankalam				^		^										х								_
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lltha	nyynuniley				~					×															
SL	Kalkkori																						×		
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в	Vengoor							×		×				_									~ ×		×
lang	nllexelemudtuM																х						×		×
Muthang	Kurichyathoad kulam													_			^						×		^ ×
2	Chettiyalathoor karukulam				-		_							_											_
\vdash	Kurichiyat Total						~																×		×
	Padipura kett						×			×					×		×						×		×
	Mundankolly				+										×		×						×		_
	Mayakoliy kulam				+												×								_
/at	meluk uvebudneM				+		×			×											-				_
Kurichiyat	Karipoor				+					×											-		×		×
Kur	k				+																-		×		_
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$\left \right $																					<u> </u>				_
	species	Damselfly	Lestidae	Indolestes	puicnerrimus	Lestes	dorothea	Lestes elatus	Lestes	praemorsus	Platycnemidid	ае	Copera	marginipes	Copera vittata	Onychargia	atrocyana	Prodasineura	verticalis	Coenagrionida e	Aciagrion	approximans	krishna	Aciagrion	occiaentale

	Pond Survey Total	<u>^</u>	;	×	×		х			×			×		×		×		Х		Х		
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han	Kolambikallu									×												L	
Sult	nyynunlley		>	×						×					×							L	
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ga	Vengoor		>	×			×			×					×		×		Х				
Muthanga	Muthumalakallu	×	>	×						×													
Mut	Kurichyathoad kulam	×	;	×		1				×													
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	species	Agriocnemis pieris	Agriocnemis	pygriueu	Chlorocyphida e	Amphiallagma	parvum	Ceriagrion	coromandelian	nm	Ceriagrion	olivaceum	aurantiacum	Ceriagrion	rubiae	Ischnura	rubilio	Ischnura	senegalensis	Pseudagrion	decorum	Pseudagrion	inaicum

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	species	Brachythemis	contaminata	Bradinopyga gaminata		Cratilla lineata	Crocothemis	servilia	Diplacodes	trivialis	Hydrobasileus	croceus	Indothemis	carnatica	Indothemis	limbata	Lathrecista	Neurothemic	fulvio	Neurothemis	tullia	Orthetrum	chrysis	Orthetrum	luzonicum
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Sulthan Bathery	Petal mukku		×							×								×						
Bath	Pankalam		×	×				×				×										×		Х
าลท	kolambikallu		×							Х														х
Sult	nyynmulley			×																		х		×
• /	Kalkkori		×	×								×										×		
	letoT egnedtuM		×	×	:	×		×		х												×		×
g	Vengoor		×	×	:	×		×																×
han	Nuthumalakallu			×	:																			×
Muthanga	Kurichyathoad kulam		×	×				×		х														×
	Chettiyalathoor karukulam			×																		×		×
	Kurichiyat Total		×	×				×		×		×		×		_						×		×
	Padipura kett		×	×	-											_						×		×
	VllohnebnuM		×	×	-			×								_								×
	теілу упояеууеМ		-													_								$\hat{}$
/at	meluk uvebudneM		×					×				×				_						×		
Kurichiyat	Karipoor		×	×	-					×													<u> </u>	×
Kur	Kaithakulam		×	×				×		×													<u> </u>	
			×	×	_									×									<u> </u>	
	Goloor Ammiavayan kere		×	×	_			×															<u> </u>	
	uttey leyevemmA		×	×				×																×
						X					ŝ													
		ш	шr	ш	Palpopleura	sexmaculata		ns	Potamarcha	Ŀ	Rhodothemis		mis	aris	mis	a	Tetrathemis	sra	s				is	
	ies	netru	nost	na	ople	nacı	tala	SCC	ıma	Jene	dotl.		othe	Ingul	othe	egat	athε	vpte	'ymi,	ga	пеа	ata	mət	bra
	species	Orthetrum	pruinosum	Orthetrum sahina	palp	uxəs	Pantala	flavescens	Potc	congener	Rho	rufa	Rhyothemis	triangularis	Rhyothemis	variegata	Tetr	platyptera	Tholymis	tillarga	Tramea	limbata	Trithemis	aurora
	8	-	~			5	~	Ţ	1	ς	-	`	~	-	1	-		~		ţ		1		5

Kuric	Ammavayal kettu Goloor Kaithakulam Karipoor		×	10 12 15 15
Kurichiyat	meluy uvebugan		~	
t	maluy kulam		~	5 ET
	γιιογυερυηΜ			ΟT
	Padipura kett			14
	Kurichiyat Total		×	cc
Mu	Chettiyalathoor karukulam			71
lutha	Kurichyathoad kulam			74 91
Ithanga	Muthumalakallu Vengoor			97
	letoT egnedtuM			30
	Kalkkori		×	
Sult	kallumukku		×	
Sulthan Bathery	ullskidmelok			ττ
Bath	Pankalam		×	57
hery	Petal mukku			77
	Sulthan Bathery Total		~	٤ ٢
	puod 98			ττ
	puod 85			ττ
	puod 05	×		L٢
	pud OC		×	ст
	meluy qmeseje8			ОТ
	leyev eledmed)	×	×	/T
Г	Chempakapadi pond			21 21
holp	Cheriyakakkeri vayal	×	×	
Tholpetty	Dhadania			97
	Dhoddadi Kakkeri pond			71 21
	Mennam kulan Mennam kulan	×	×	
	Punchavayal		×	_
	Thirulukunnu	×		77
	Undichira		×	ST.
	Tholpetty Total	×	×	205
	letoT yəvru2 bnoq	×	×	95

Table 4: Odonata recordd from the ponds of Wayanad Wildlife Sanctuary



Indolestes pulcherrimus

Lestes dorothea



Lestes elatus





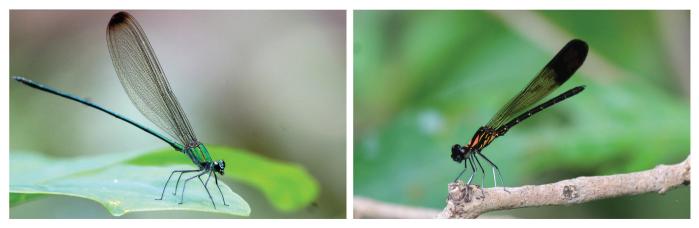
Protosticta gravelyi

Neurobasis chinensis



Vestalis apicalis

Vestalis gracilis



Vestalis submontana

Heliocypha bisignata



Libellago indica

Dysphaea ethela



Euphaea dispar

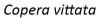
Euphaea fraseri



Caconeura ramburi

Copera marginipes







Melanoneura bilineata



Onychargia atrocyana





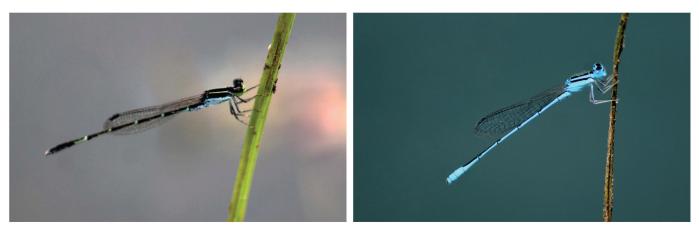
Aciagrion approximans krishna

Aciagrion occidentale



Agriocnemis pieris

Agriocnemis pygmaea



Agriocnemis splendidissima

Amphiallagma parvum



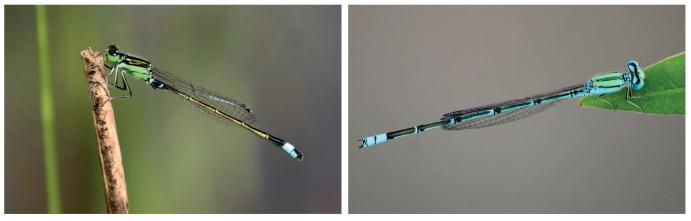
Ceriagrion coromandelianum

Ceriagrion olivaceum aurantiacum



Ceriagrion rubiae

Ischnura rubilio



Ischnura senegalensis

Pseudagrion decorum



Pseudagrion indicum

Pseudagrion malabaricum



Pseudagrion rubriceps

Anax immaculifrons



Anax indicus

Gynacantha dravida



Gynacantha millardi

Burmagomphus laidlawi

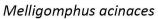


Gomphidia kodaguensis

Ictinogomphus rapax



Lamelligomphus nilgiriensis





Merogomphus longistigma

Microgomphus souteri



Paragomphus lineatus

Epophthalmia vittata



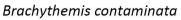
Acisoma panorpoides



Aethriamanta brevipennis



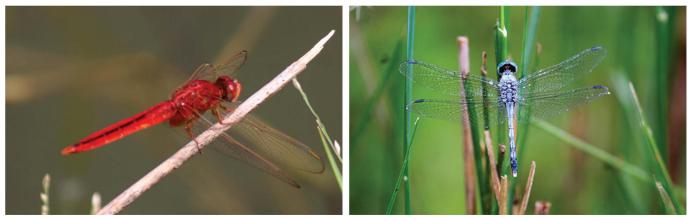
Brachydiplax sobrina





Bradinopyga geminata

Cratilla lineata



Crocothemis servilia

Diplacodes trivialis



Epithemis mariae



Hydrobasileus croceus



Hylaeothemis apicalis

Indothemis carnatica



Indothemis limbata

Lathrecista asiatica



Neurothemis fulvia

Neurothemis tullia



Onychothemis testacea

Orthetrum chrysis



Orthetrum glaucum

Orthetrum luzonicum



Orthetrum pruinosum

Orthetrum sabina



Palpopleura sexmaculata

Pantala flavescens



Potamarcha congener

Rhodothemis rufa



Rhyothemis triangularis

Rhyothemis variegata



Tetrathemis platyptera

Tholymis tillarga



Tramea limbata

Trithemis aurora



Trithemis festiva

Urothemis signata



Zygonyx iris

Zyxomma petiolatum