

Species Composition and Relative Abundance of Some Odonate Species in Ingapu Township, Ayeyawady Region

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Abstract

Species composition of some odonate in Ingapu Township was observed from January to August 2022. A total of 1,376 individuals in 15 species belonging to 11 genera under two families under one order were recorded. The highest species composition was found in family Libellulidae (80%), followed by Aeshnidae (20%). Two species of odonate from Ingapu Township was found more widely distributed dragonflies species, such as *Crocothemis servilia* and *Neurothemis tullia*. The highest species of odonate was collected from grassland and wateredge (10 species) and the lowest number (eight species) in agriculture land. Among the 15 species, eight species were recorded as uncommon, two species as common and four species as very common in Site I. A total of six species were recorded as uncommon, two species as common and five species as very common in Site II. Two species were recorded as uncommon, two species as common and three species as very common in Site III.

Keywords: dragonflies, odonate species composition, relative abundance

Introduction

Odonates are beneficial insects and play an important role in pest management both as nymphs and adults (Trueman and Rowe, 2009; Ilahi *et al.*, 2019). Anisoptera (dragonflies) and Zygoptera (damselflies) represent a diverse group of insects having 5740 described species worldwide (Johari and Jain, 2021).

Odonata (dragonflies and damselflies) constitutes a small, well-known order of insects that are widely distributed all over the world (Tillyard, 1917). They are relatively well studied taxonomically and the adults are easy to identify. They are good ecological indicators for an assessment of the aquatic environment, especially for wetland and stream quality as they occupy both aquatic and terrestrial ecosystems and are highly sensitive to environmental changes (Carvalho *et al.*, 2013; Monteiro-Junior *et al.*, 2013; Oliveira-Junior *et al.*, 2015).

The local distribution of dragonflies is very seasonal, this again applying especially to the more uncommon forms, which are usually single-brooded and appear for but a short space of a few weeks. The best months for collecting are May, June and September to the first half of November, that is, during the months which precede and follow the south-west monsoon. Common species are not only widely distributed, but also occur nearly the whole year round (Fraser, 1933).

Interestingly, most odonate preferred to perch at vegetation including riparian vegetation, overhanging vegetation, and forested section of the stream. Thus, it reveals that vegetation play a role in the regulation of faunal distribution and their assemblage is strongly dependent on the composition and structure of vegetation (Korkeamaki and Suhonen, 2002).

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Odonates are usually the most conspicuous insect group near any body of water, although migrating or non-breeding adults often travel great distances from water. They are found near ponds, lakes, rivers, streams, bogs, swamps and marshes.

As a group of freshwater invertebrates, dragonflies are considered indicators of environmental health and quality of habitat for freshwater ecosystems.

Therefore, the present study was conducted with the following objectives:

- to identify species composition of some odonate in the study sites
- to observe the habitat type and abundance of some odonate species

Materials and Methods

Study sites

The present study was conducted in Ingapu Township, Ayeyawady Region. Three study sites were chosen in the study area. Shan Gaung Byea village (Site I) is located about (3.5 miles) from Ingapu Township at latitude 17°49'31"N and longitude 95°16'55"E. Out Ywa Gyi village (Site II) is located about (1.5 miles) from Ingapu Township at latitude 17°47'17"N and longitude 95°15'46"E. Wetthay village (Site III) is located about (2.5 miles) from Ingapu Township at latitude 17°48'32"N and longitude 95°17'40"E (Figure 1).

Study period

The study period lasted from January 2022 to August 2022.

Classification of habitat type

Four habitat types were observed. Grassland, Shrub, Wateredge and Agriculture land were selected as specific habitat types.

Collection of specimens

Some odonates were collected twice per month from each site by using hand net. The length of the handle is about 80-120 cm long and opening about 50-75 cm wide. Collection was mainly conducted in the study area within 7:00 AM to 10:00 AM and 4:00 PM to 5:30 PM. The collected specimens were preserved in plastic boxes with alcohol-soaked cotton. Collected specimens were taken photographs and measured.

Preservation of the specimens

The collected specimens were kept into the transplant plastic container through the lab of the Department of Zoology for further identification. In an effort to prevent and reduce deterioration of colors and brilliance from the spread specimens, they were exposed to sunlight soon after spreading till they get dried.

Identification of the specimens

Identification of the specimens was made following that Fraser (1936), Nair (2011) and Samways (2008).

Data analysis

Species composition and relative abundance

Species composition, relative abundance and average relative abundance were analyzed following after Bisht *et al.* (2004).

$$\text{Species composition} = \frac{\text{No. of individual species}}{\text{Total No. of all species in particular site}} \times 100$$

$$\text{Relative abundance} = \frac{\text{No. of individual species}}{\text{Total No. of all species in particular site}}$$

uC = Uncommon (having relative abundance less than 0.01)

C = Common (having relative abundance of 0.01 and less than 0.05)

vC = Very common (having relative abundance of 0.05 and above)

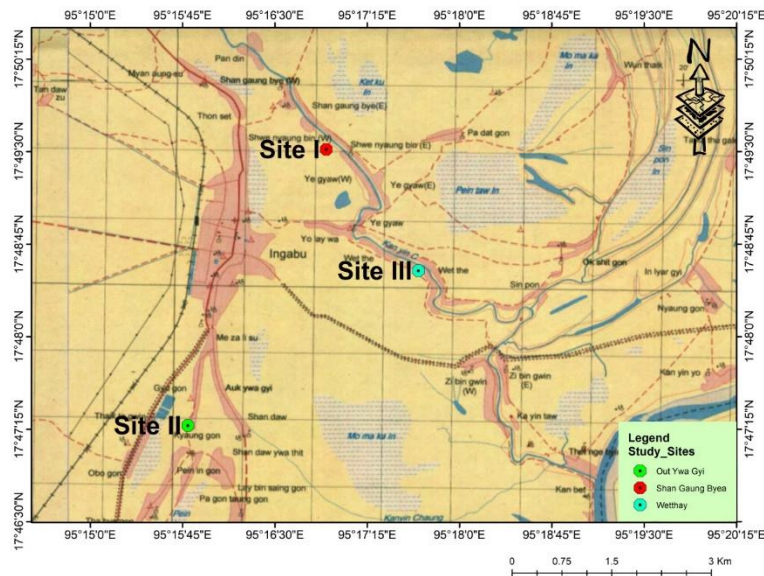


Figure 1. Location Map of the study area

Results

A total of 1,376 individuals of 15 species, 11 genera of family Aeshnidae and Libellulidae, belonging to order Odonata were collected from the three study sites. A total of 14 species confined to two families were collected from site I, 13 species confined to two families were collected from site II and 7 species confined to two families were collected from site III (Table 1 and 2) and (Plate 1).

Table 1. Species composition of odonate in the study sites

No	Order	Suborder	Family	Scientific name	Common name
1	Odonata	Anisoptera	Aeshnidae	<i>Gynacantha dobsoni</i>	Lesser duckhawker
2				<i>Gynacantha saltatrix</i>	Little Dusk Hawker
3				<i>Gynacantha subinterrupta</i>	Dingy Dusk Hawker
4			Libellulidae	<i>Acisoma panorpoides</i>	Trumpet tail
5				<i>Aethriamanta brevipennis</i>	Scarlet marsh hawk
6				<i>Brachydiplax chalybea</i>	Blue dasher
7				<i>Brachythemis contaminata</i>	Ditch jewel
8				<i>Bradinopyga geminata</i>	Granite ghost
9				<i>Crocothemis servilia</i>	Ruddy marsh skimmer
10				<i>Diplacodes nebulosa</i>	Charcoal-winged percher
11				<i>Diplacodes trivialis</i>	Chalky percher
12				<i>Neurothemis fulvia</i>	Fulvous foret skimmer
13				<i>Neurothemis tullia</i>	Pied paddy skimmer
14				<i>Orthetrum sabina</i>	Slender skimmer
15				<i>Potamarcha congener</i>	YellowtailedAshy skimmer

Table 2. Species encountered in three study sites

No	Species	Site I	Site II	Site III
1	<i>Gynacantha dobsoni</i>	√	√	√
2	<i>Gynacantha saltatrix</i>	√	√	-
3	<i>Gynacantha subinterrupta</i>	√	√	-
4	<i>Acisoma panorpoides</i>	√	√	√
5	<i>Aethriamanta brevipennis</i>	√	√	-
6	<i>Brachydiplax chalybea</i>	√	-	-
7	<i>Brachythemis contaminata</i>	√	√	√
8	<i>Bradinopyga geminata</i>	√	√	-
9	<i>Crocothemis servilia</i>	√	√	√
10	<i>Diplacodes nebulosa</i>	-	√	-
11	<i>Diplacodes trivialis</i>	√	√	√
12	<i>Neurothemis fulvia</i>	√	√	√
13	<i>Neurothemis tullia</i>	√	√	√
14	<i>Orthetrum sabina</i>	√	√	-
15	<i>Potamarcha congener</i>	√	-	-
	Total	14	13	7

√ = Encountered

- = Not encountered

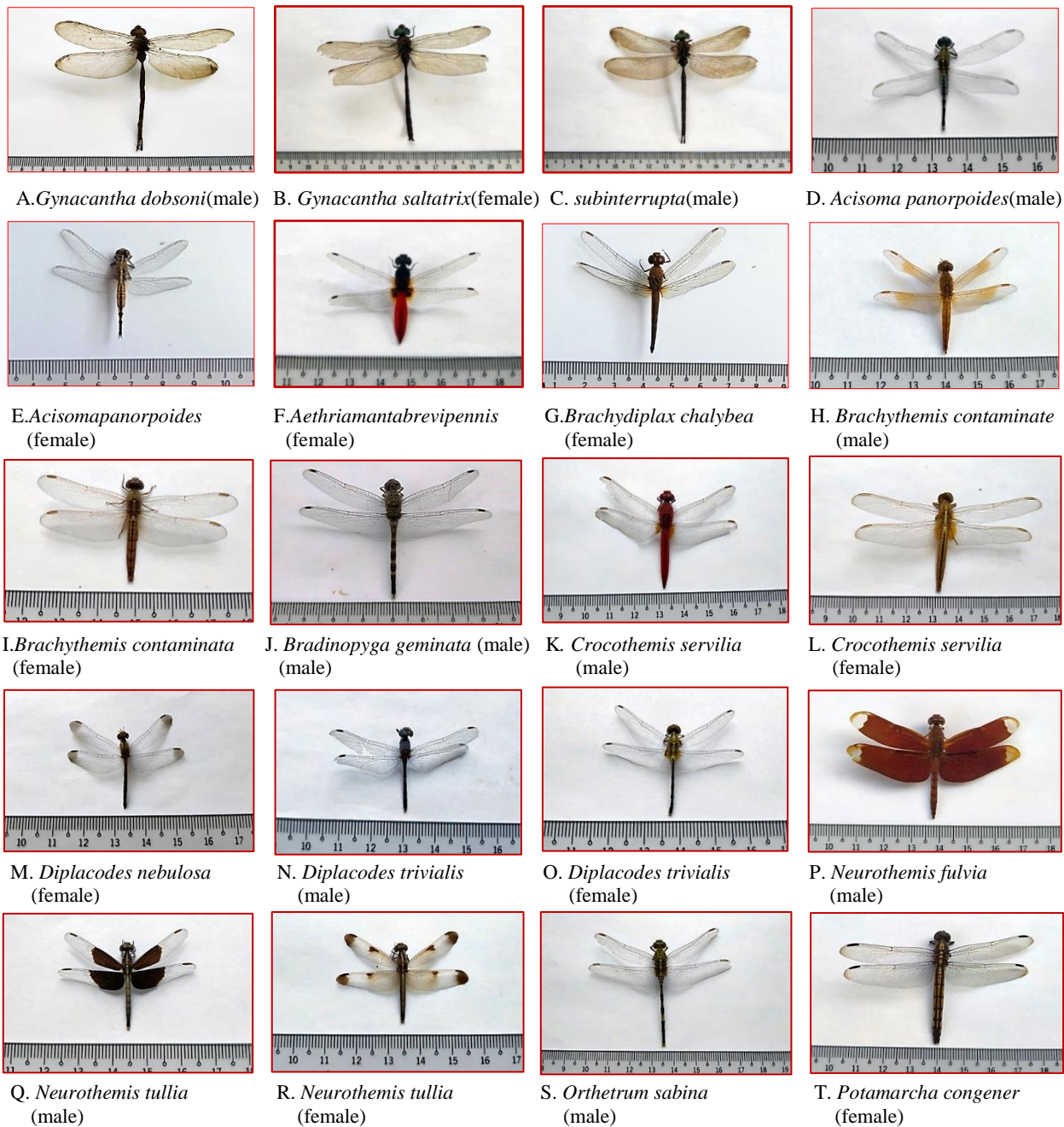


Plate 1. Dragonfly species recorded in study area

Odonate species in study area

A total of 15 species, 11 genera belonging to two families under order Odonata were recorded in Ingapu Township, Ayeyawady Region. Among the three study sites, total number of (569), (583) and (224) individuals were collected from Site I, Site II and Site III respectively. One genus of family Aeshnidae, 10 genera of family Libellulidae were observed. The highest species composition was found in the family Libellulidae (80%), followed by the family Aeshnidae (20%).

In Site I, the highest percentage (78.57%) was studied in family of Libellulidae, followed by (21.43%) in family of Aeshnidae. In Site II, the highest percentage (76.92%) was observed in family of Libellulidae, followed by (23.08%) in family of Aeshnidae. In Site III,

the highest percentage (85.71%) was studied in family of Libellulidae, followed by (14.29%) in family of Aeshnidae (Table 3).

Table 3. Number and percentage of species composition in the study sites

Sr. No	Family	No. of species and percentage		
		Site I	Site II	Site III
1	Aeshnidae	3 (21.43%)	3 (23.08%)	1 (14.29%)
2	Libellulidae	11 (78.57%)	10 (76.92%)	6 (85.71%)
		14 (100%)	13 (100%)	7 (100%)

Table 4. Distribution of recorded odonate species in different habitat types

No	Species	Grassland			Shrub			Wateredge			Agriculture land		
		I	II	III	I	II	III	I	II	III	I	II	III
1	<i>Gynacantha dobsoni</i>	-	√	√	-	-	-	√	√	√	-	-	-
2	<i>Gynacantha saltatrix</i>	-	√	-	-	-	-	-	-	-	-	-	-
3	<i>Gynacantha subinterrupta</i>	-	√	-	-	-	-	-	-	-	-	-	-
4	<i>Acisoma panorpoides</i>	√	√	-	√	√	-	√	√	-	√	√	√
5	<i>Aethriamanta brevipennis</i>	-	-	-	-	-	-	-	√	-	-	-	-
6	<i>Brachydiplax chalybea</i>	-	-	-	√	-	-	-	-	-	-	-	-
7	<i>Brachythemis contaminata</i>	√	√	√	√	√	√	√	√	√	√	√	√
8	<i>Bradinopyga geminata</i>	-	-	-	-	-	-	-	-	√	√	√	√
9	<i>Crocothemis servilia</i>	√	√	-	√	√	-	√	√	√	√	√	√
10	<i>Diplacodes nebulosa</i>	-	-	-	-	-	-	-	-	-	-	√	-
11	<i>Diplacodes trivialis</i>	√	√	-	√	√	√	√	√	√	√	√	√
12	<i>Neurothemis fulvia</i>	√	√	-	-	-	√	-	√	-	-	-	-
13	<i>Neurothemis tullia</i>	-	√	√	-	√	-	√	√	√	√	√	√
14	<i>Orthetrum sabina</i>	√	√	-	√	√	-	√	√	-	√	√	-
15	<i>Potamarcha congener</i>	-	-	-	√	-	-	-	-	-	-	-	-
	Total	6	10	3	7	6	3	7	9	6	7	8	6

√ = Present

- = Absent

Distribution of recorded odonate species in different habitat types

In the present study, a total of 15 species were recorded in all designated four different habitat types. Among them, 10 species were observed in the grassland, nine species were recorded in the shrub and 10 species were occurred in wateredge and eight species were recorded from agriculture land (Table 4 and Figure 2).

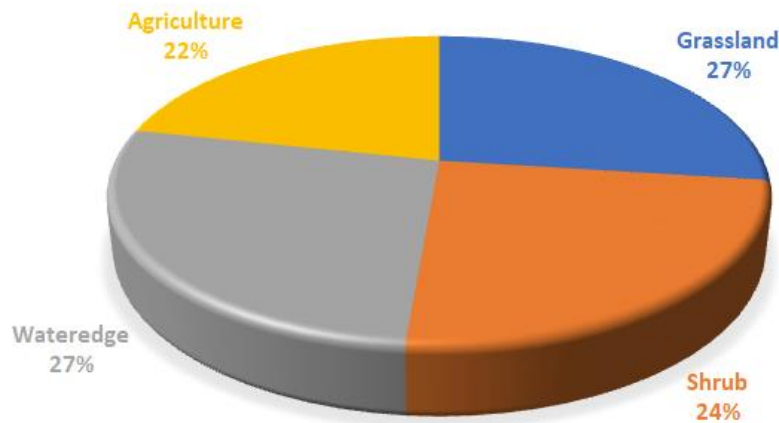


Figure 2. Percentage of different habitat types of recorded odonate species

Relative abundance of some odonate species

The relative abundance of specimens between three study sites revealed that eight species as uncommon, two species as common and four species as very common in Site I, while six species as uncommon, two species as common and five species as very common were recorded in Site II. In Site III were collected two species as uncommon, two species as common and three species as very common (Table 5, 6 and 7).

Table 5. Status of abundance of species from Site I

Scientific Name	Total number of individuals						Total	Relative abundance	Status
	Site I								
	Jan	Feb	Mar	Apr	May	Jun			
<i>Gynacantha dobsoni</i>	-	-	-	-	-	2	2	0.0035	uC
<i>G. saltatrix</i>	-	-	-	-	-	1	1	0.0018	uC
<i>G. subinterrupta</i>	-	-	-	-	-	1	1	0.0018	uC
<i>Acisoma panorpoides</i>	1	2	3	-	5	16	27	0.0474	C
<i>Aethriamanta brevipennis</i>	-	-	-	-	-	3	3	0.0053	uC
<i>Brachydiplax chalybea</i>	-	1	-	-	-	-	1	0.0018	uC
<i>Brachythemis contaminata</i>	7	16	14	-	9	14	60	0.1054	vC
<i>Bradinopyga geminata</i>	-	-	1	-	-	-	1	0.0018	uC
<i>Crocothemis servilia</i>	2	3	26	35	68	134	268	0.4710	vC
<i>Diplacodes nebulosa</i>	-	-	-	-	-	-	-	-	-
<i>D. trivialis</i>	-	4	19	7	8	7	45	0.0791	vC
<i>Neurothemis fulvia</i>	1	1	-	-	-	-	2	0.0035	uC
<i>N. tullia</i>	1	2	4	8	13	100	128	0.2249	vC
<i>Orthetrum sabina</i>	-	-	2	2	6	18	28	0.0492	C
<i>Potamarcha congener</i>	-	-	-	1	1	-	2	0.0035	uC

uC = Uncommon C = Common vC = Very common

Table 6. Status of abundance of species from Site II

Scientific Name	Total number of individuals						Total	Relative abundance	Status
	Site II								
	Jan	Feb	Mar	Apr	May	Jun			
<i>Gynacantha dobsoni</i>	-	-	-	1	5	2	8	0.0137	C
<i>G. saltatrix</i>	-	-	-	-	-	1	1	0.0017	uC
<i>G. subinterrupta</i>	-	-	-	-	-	1	1	0.0017	uC
<i>Acisoma panorpoides</i>	1	-	-	3	7	75	86	0.1475	vC
<i>Aethriamanta brevipennis</i>	-	-	-	-	-	3	3	0.0051	uC
<i>Brachydiplax chalybea</i>	-	-	-	-	-	-	-	-	-
<i>Brachythemis contaminata</i>	1	7	6	9	39	27	89	0.1527	vC
<i>Bradinyopyga geminata</i>	-	-	-	-	1	-	1	0.0017	uC
<i>Crocothemis servilia</i>	1	-	6	35	41	37	120	0.2058	vC
<i>Diplacodes nebulosa</i>	-	-	1	-	2	-	3	0.0051	uC
<i>D. trivialis</i>	1	3	16	33	8	39	100	0.1715	vC
<i>Neurothemis fulvia</i>	-	1	1	-	3	-	5	0.0086	uC
<i>N. tullia</i>	1	-	36	76	4	27	144	0.2470	vC
<i>Orthetrum sabina</i>	-	1	-	8	8	5	22	0.0377	C
<i>Potamarcha congener</i>	-	-	-	-	-	-	-	-	-

uC = Uncommon C = Common vC = Very common

Table 7. Status of abundance of species from Site III

Scientific Name	Total number of individuals						Total	Relative abundance	Status
	Site III								
	Jan	Feb	Mar	Apr	May	Jun			
<i>Gynacantha dobsoni</i>	-	-	-	1	4	5	10	0.0446	C
<i>G. saltatrix</i>	-	-	-	-	-	-	-	-	-
<i>G. subinterrupta</i>	-	-	-	-	-	-	-	-	-
<i>Acisoma panorpoides</i>	-	-	-	1	1	-	2	0.0089	uC
<i>Aethriamanta brevipennis</i>	-	-	-	-	-	-	-	-	-
<i>Brachydiplax chalybea</i>	-	-	-	-	-	-	-	-	-
<i>Brachythemis contaminata</i>	3	9	9	-	7	22	50	0.2232	vC
<i>Bradinyopyga geminata</i>	-	-	-	-	-	-	-	-	-
<i>Crocothemis servilia</i>	-	-	3	-	23	65	91	0.4063	vC
<i>Diplacodes nebulosa</i>	-	-	-	-	-	-	-	-	-
<i>D. trivialis</i>	-	-	15	18	17	10	60	0.2679	vC
<i>Neurothemis fulvia</i>	1	-	-	1	-	-	2	0.0089	uC
<i>N. tullia</i>	-	5	-	-	1	3	9	0.0402	C
<i>Orthetrum sabina</i>	-	-	-	-	-	-	-	-	-
<i>Potamarcha congener</i>	-	-	-	-	-	-	-	-	-

uC = Uncommon C = Common vC = Very common

Discussion

In the present study, a total of 1,376 individuals of 15 species belonging to 11 genera under two families; namely Aeshnidae and Libellulidae were recorded during the study period. The highest species composition of some odonate belonging to families Libellulidae (80%)

were recorded and followed by Aeshnidae (20%) in the present study. Species number of family Libellulidae was more dominated in different study sites.

As in many other studies, Libellulidae is also widely represented in surveys elsewhere locally and globally (Che Salmah and Wahizatual Afzan, 2004 and Asia Dragonfly net, 2010). Family Libellulidae is extensively distributed worldwide and in local areas (Norma-Rashid *et al.*, 2001) as it is the largest dragonfly family in the world (Last and Whitman 1999-2000). This finding is agreed with Nay Yee Lin Htet Thu (2019) stated the same occurrence in Patheingyi University environs. Thus, Libellulidae may be assumed common family.

In the study site I, 14 species were collected, 13 species in site II and 7 species in site III. Thus, site I and site II are more diverse the species. These sites have more vegetation and lake. So, least odonate species were found in site III and it may be due to the vegetation was unhealthy and human stress disturbance.

In the present study area, some odonate species were habituated in four habitats namely grassland, shrub, wateredge and agriculture land. According to the habitat types, the highest number of odonate was recorded from wateredge and grassland (10 species), followed by shrub (9 species) and followed by (8 species) in agriculture land. It may be more favourable environs having the suitable food sources, habitats, fewer predators for odonate species. As of habitat types, most of the recorded odonate species were prominently found in wateredge and grassland.

Most species of dragonflies were found in wetland and grassland because water is birth place for them and larvae can survive only in water. Grassland may feed ground for them. Odonates contribute value to the ecosystem and to humans. Ecologically, dragonflies and damselflies are integral to food chains in both aquatic and terrestrial ecosystems. The aquatic larvae consume aquatic insects, invertebrates, and even tadpoles and small fish. They are also indicators of freshwater quality (Grzimek, 2004). Subramanian (2005) reported that the main part of odonate's life cycle takes place in the water from eggs to nymph and then depart from water.

According to the abundance categories, the present study area of site I was recorded 14 odonate species. Among the 14 species, eight species were recorded as uncommon, two species were recorded as common and four species were recorded as very common in site I. The present study area of site II recorded 13 odonate species were categorized into three categories. In site II, six species were recorded as uncommon, two species were recorded as common and another five species were recorded as very common.

In the present study, site III recorded 7 odonate species were categorized into three categories. Two species were recorded as uncommon, two species were recorded as common and another three species were recorded as very common in site III. In site II, populations of some odonate species were more abundant due to health environmental condition. Good environmental conditions are indicated by the pattern of Odonata distribution.

Conclusion

As a conclusion, a total number of 15 species of odonates were recorded in the collection period. *Crocothemis servilia* was more abundant in site. Grassland and wateredge were more abundant in study site. Ingapu Township seemed to have a good ecosystem quality because of the high abundance of some odonates as indicators of environmental status.

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