THE BEHAVIOURAL RESPONSE OF THE RED WATTLED LAPWING (*Vanellus indicus)* IN DIFFERENT HABITATS

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INTRODUCTION

Urbanization is one of the leading anthropogenic causes of habitat loss (Czech et al., 2000) and produces large number of local extinctions and eliminates a vast majority of native species through the direct replacement of habitats (Marzluff, 2001). Over the past two decades, several major cities in the wet zone of Sri Lanka have shown rapid urbanization (State of Sri Lankan Cities, 2018).

As the urban environment presents a novel habitat for species, they also contain selection pressures that are very different from the natural environment (Fernández-Juricic et al., 2000). Responses of birds to the urban environment has been well documented as urban exploiters, urban avoiders and suburban adaptable (Blair, 1996). Although many studies have been carried out about the effects of urbanization on various species internationally, a limited number of such studies have been carried out in Sri Lanka (Senevirathne et al., 2016).

A model organism, the Red-wattled Lapwing (RWL) was chosen for the study. The RWL is a common wader, and it is widely distributed throughout the island in a variety of habitats. Waders reside in wetlands and usually occupy interphase zones of water bodies. Therefore, the study and conservation of wader's aids in the understanding and conservation of wetlands.

The objective of the study is to evaluate the behavioural response in different habitats; urban, semi-urban and natural.

METHODOLOGY

The study was conducted in three study sites that represent an urban, semi-urban and a natural area. With respect to the above categorization The Open University Nawala premises (OUSL), Polgasowita area and the Anawilundawa Bird Sanctuary were selected as the urban, semi-urban and natural study site respectively. All three habitats had an associated waterbody.

The urban area chosen for this study was defined according to the definition of the United States Bureau of Census; an area having a population density of 1000 people per square mile with a minimum population of 50,000 people (United States Census Bureau, 2000). A semi-urban area chosen for this study was defined as a land area that includes a sufficiently high degree of urban infrastructure, a sufficient degree of green structures; partially or entirely artificial in nature and consists of dynamic land use such as intense road infrastructure development (Meeus & Gulinck, 2008). The natural area chosen for this study was defined according to three criteria for the identification of a natural ecosystem: 1) degree of change expected if humans were removed; 2) amount of cultural energy required to sustain the current state; and 3) native species still present (Anderson, 1991).

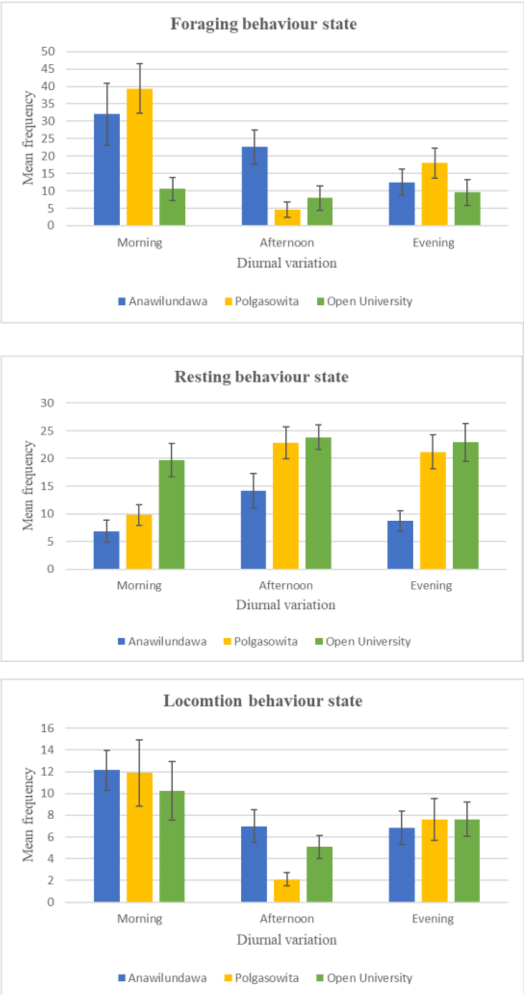
Furthermore, three microhabitats (MH) were selected at each study site. A microhabitat was defined as a subset of a habitat consisting particular environmental conditions including vegetation structure (James, 1971). The focal sampling method was employed to construct ethograms and activity budgets at three study sites. A pair of RWL was ringed at each microhabitat. And the behaviour was observed at each MH at 10-minute intervals at the following times: 6.00am-7.00am; 12.00pm-1.00pm; and 5.00pm-6.00pm. The study was conducted for a duration of thirty-five days in total.

The Data obtained were statistically analyzed using IBM SPSS version 20. A nonparametric test of Kruskal Wallis was performed on the frequency data and time budget of the behaviour states of the three study sites.

RESULTS AND DISCUSSION

Analysis of the frequency of behavioural states of *Vanellus indicus* in the urban, semi-urban and natural habitats, showed a significant difference (P<0.05) in resting behaviour, foraging behaviour and locomotion behaviour in the respective study sites (Table 1.1).

Analysis of the time budget of behavioural states of *Vanellus indicus* in the urban, semi-urban and natural habitats, showed a significant difference (P<0.05) only in the foraging behavioural state.



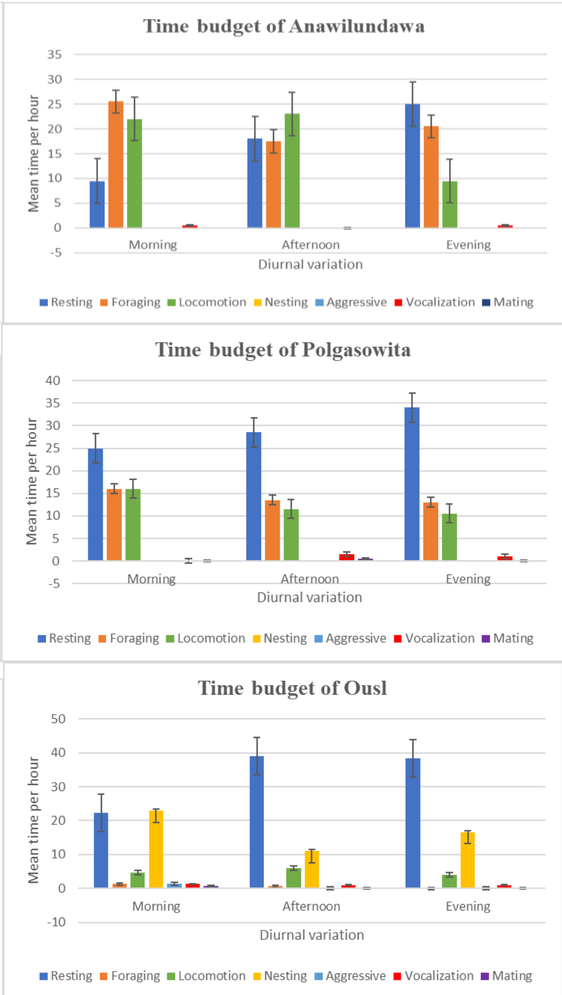


Figure 1: Diurnal variation of behavioural states in each study site.

Figure 2: Time budget with diurnal variation in each study site.

Table 1: Diurnal variation of significant behavioural states in study sites

Behavioural State	Time and Study site	P-value
1) Foraging	Afternoon Polgasowita – morning Polgasowita	0.003
	Afternoon OUSL – morning Polgasowita	0.006
	Evening OUSL - morning Polgasowita	0.028
2) Locomotion	Afternoon Polgasowita – morning Anawilundawa	0.001
	Afternoon Polgasowita – morning Polgasowita	0.004
3) Resting	Morning Anawilundawa – afternoon OUSL	0.008
	Evening Anawilundawa – afternoon OUSL	0.034
	Morning Anawilundawa – afternoon Polgasowita	0.034
	Morning Anawilundawa – evening OUSL	0.030
	Morning Polgasowita – afternoon OUSL	0.030

The sedentary nature of RWL has provided the opportunity for it to constantly defend its territory throughout the year and establish itself in an urban environment, which agrees with several studies (Jokimaki & Suhonen, 1998). The availability of food resources in the urban habitat may have played a key role in the reduction of frequency and time spent on foraging activity in the urban habitat. Studies have shown that arthropods are found more abundantly in urban gardens more than in forest areas (Philpott et al., 2014). In contrast to the urban habitat, the foraging behaviour of the birds in other study sites- semi-urban and natural sites- was high. This confirms the observations that the foraging activity of birds residing in natural and semi-urban environments are similar in nature (Hodgson et al., 2006).

RWL in urban areas showed low locomotion frequency when compared to the semi-urban and natural sites and they showed tolerance to the presence of humans and human-related activities (vehicles passing by). This corresponds to studies which depict that urban birds are found to be more tolerant of humans than their rural conspecifics (Evans et al., 2010).

It has been shown that increased resting behaviour (preening event) was displayed when birds were experimentally infested with ectoparasites (Waite et al., 2012). Therefore, there is a possibility of birds dwelling in urban and semi-urban environments have a higher number of ectoparasitic infestation. Further studies are needed for confirmation.

The construction of a nest on a concrete surface with the use of stone pebbles as substrate in urban habitats may increase the heat generated by the nest, which has been found to reduce incubation time (Hepp et al., 2006). This finding agrees with studies that showed high nest temperature when stone pebbles were used as nest substrate (Seneviratne et al, 2016).

CONCLUSION

The study concludes with an indication of a significant difference in the behaviour patterns of foraging, locomotion and resting between the study sites of OUSL, Polgasowita and Anawilundawa of Sri Lanka. Thereby concluding that the model species of RWL has shown certain adaptations to a continuum of different habitats; urban, semi-urban and natural. It can be recommended that further studies be conducted on the physiology of RWL in different habitats.

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