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A NOTE ON SNAIL DIVERSITY IN SELECTED AREAS OF "KIRALA KELE" ECO-TOURING ZONE IN SOUTHERN SRI LANKA

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Abstract: "Kirala Kele" [ecotouring zone] is a wetland and a sanctuary located in southern Sri Lanka. Moullscan species inhabiting this habitat have never been documented. Present study focused on the distribution and abundance of snail diversity in selected localities of western area of "Kirala Kele". Snails were collected along 100 m line transect at each sampling site for a period of three months. Soil samples were obtained at each study site for the analysis of soil moisture, soil organic matter, soil texture and soil pH. Collected snail specimens were identified using standard taxonomic keys and pictorial guides. *Glessula ceylanica and Succinea ceylanica* were the land snails recorded and *Pomacea canaliculata, Pomaceca diffusa*, *Melanoides tuberculata*, *Melanoides torulosa* and *Indoplanorobis exustus* were the aquatic snails recorded. *Pomacea canaliculata, Pomaceca diffusa*, *Succinea ceylanica, Melanoides tuberculata*, *Melanoides torulosa* and *Indoplanorobis exustus* were recorded only at sites where silt soil and neutral pH occurred. *Glessula ceylanica* and *Succinea ceylanica* were the two endemic species recorded in this study. Soil characters especially the texture and pH might be key factors in determining species distribution and abundance of land snails. These results indicate the restricted distribution of land snails in this ecosystem and their specific habitat requirements.
Keywords: Kirala Kele, Eco-touring zone, Snails, Soil characters.

Introduction

Sri Lanka boasts a rich diversity and endemism of molluscans. In that snails are an important component. Out of 247 species of land snails recorded in Sri Lanka, 83% are known to be endemic to the region (Bambaradeniya, 2006; Raheem et al., 2009). Snails are highly sensitive to habitat changes and alterations since they are highly localized in their distribution as compared with other taxa. Habitat fragmentation, habitat loss and transformation of tropical rainforest into plantations of fast growing exotics coupled with the introduction of alien species have resulted most of the current wave of global land molluscan extinctions (Raheem et al., 2009, Naggs & Ebenso et al, 2005; Raheem 2005). In this scenario protected areas serve immensely to conserve biodiversity of snails. It is therefore vitally important to assess the biodiversity of the protected areas in order to understand the

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present day conservation status of taxonomic groups and subsequent implementation of conservation measures are also required.

"Kirala Kele" is a natural wetland and Eco-touring zone in Matara. Nilwala River flows adjacent to this wetland (Figure 1). "Kirala Kele" had been declared as a conserved wetland under Sri Lanka- picturesque sites program in 2003 by special gazette notification after recognition of its importance to conserve biodiversity. Therefore it is imperative to protect this habitat to support and conserve biodiversity. The malacofauna of "Kirala Kele" wetland area was not studied so far. Therefore, objective of the present study was to study the snail diversity in selected localities of "Kirala Kele" wetland with reference to the habitat characters.

Materials and Methods

Five sampling sites were selected covering all the different habitats available in the western area of "Kirala Kele" sanctuary. Six sampling locations were randomly selected at each sampling site (Figure 2). Land snails were collected weekly along a 100m line transect in both sides of each sampling site for a period of three months. Soil samples were taken for the analysis of soil moisture, soil organic matter, soil inorganic matter, soil texture and soil pH at randomly selected locations at each study site. All the soil parameters were analyzed according to the standard methods **(**ISO 11465. 1993; ISO 11464. 1994; IUSS Working Group WRB. 2006**).** Morphological characters of collected land snails were recorded and specimens were photographed. Samples were later fixed in 4 % formalin and stored for latter studies. Standard taxonomic keys were used to identify the specimens (Nuggs and Raheem, 2000; Nuggs et al., 2006; Facon et al., 2005; Ingrida, 2005). Snail diversity of each sampling site was calculated by using Shannon Weiner Diversity Index as described by Chakrabarty & Das (2006). Results were statistically analyzed by using SPSS version 16. Data were analyzed by Kruskal-Wallis Test and Post Hoc Test (Turkey test). Species richness and evenness were calculated by Margalef indices for each sampling sites.

Results

During the study period seven species of snails namely *Glessula ceylanica* (Pfeiffer, 1845), *Pomacea canaliculata* (Lamarck, 1819)*, Pomaceca diffusa* (Blume, 1957), *Succinea ceylanica* (Pfeiffer, 1854), *Melanoides tuberculata* (Müller, 1774), *Melanoides torulosa* (Bruguiere, 1789)*,* and *Indoplanorobis exustu* (Deshayes,1834) were recorded in northern edge of the study transect (sampling site 5) (Table 1 and Figure 3). Maximum density of the

each snail species recorded during the study period at sampling site 5 is given in table 1. Shannon's Diversity Index (H^1) calculated for land snail diversity at sampling site 5 was 1.53.

Soil moisture gradually increased from site 1 to site 5 (Figure 4, A). Soil organic matter percentages slightly differed at each site (Figure 4, B). There was no notable variation of soil inorganic matter at sampling sites 3 to 5 while it was low at site 1 and 2 (Figure 4, C). Nevertheless soil texture significantly varied among sampling sites (Non-parametric test, Kruskal Wallis Test, P=0.000) (Figure 4, D). According to soil textural classes, sampling sites 1 and 2 were clay soil and silt-clay respectively. Soil textural class at sampling site 3 and 4 were silt-loam while it was silt soil at sampling site 5. Soil pH was slightly acidic at sites 1 to 4 while it was neutral at site 5 (Figure 4, E). As indicated by the statistical analysis soil pH significantly varied among sampling sites (p=0.000).

Discussion

Succinea ceylanica and *Pomaceca diffusa* were the most abundant species recorded during the study period. Among the recorded species there were two endemic land snail species (*Succinea ceylanica*, *Glessula ceylanica*), three parasitic vector snail species (*Melanoides tuberculata, Melanoides torulosa* and *Indoplanorobis exustus*) two invasive agricultural snail pests (*Pomacea canaliculata*, *Pomaceca diffusa*).

Our results indicate the influence of soil characters on diversity and abundance of land snails at the study locations. Snails were only recorded in habitats where silty neutral soil was available. Determinants of the snail diversity and requirement of microhabitat characters for the snail distribution patterns have been discussed elsewhere (Schilthuizen et al, 2003; Sturm et al, 2006; Liew et al, 2009). Soil texture and pH might be important in creating micro -ecological patterns required for the snail distribution in "Kirala Kele". At other sampling sites soil conditions might have been changed by prolonged tilling and application of fertilizer for agricultural activities. These data indicate the importance of conserving micro-ecological features of the habitats to conserve land snail species. Being an endemic species high abundance of *Succinea ceylanica* should be noted carefully in conservation view point.

Regular monitoring is required to control pest and vector species and to conserve endemic species. Key snail assemblages specific to the present conditions will be useful as reference data in future studies.

Acknowledgement

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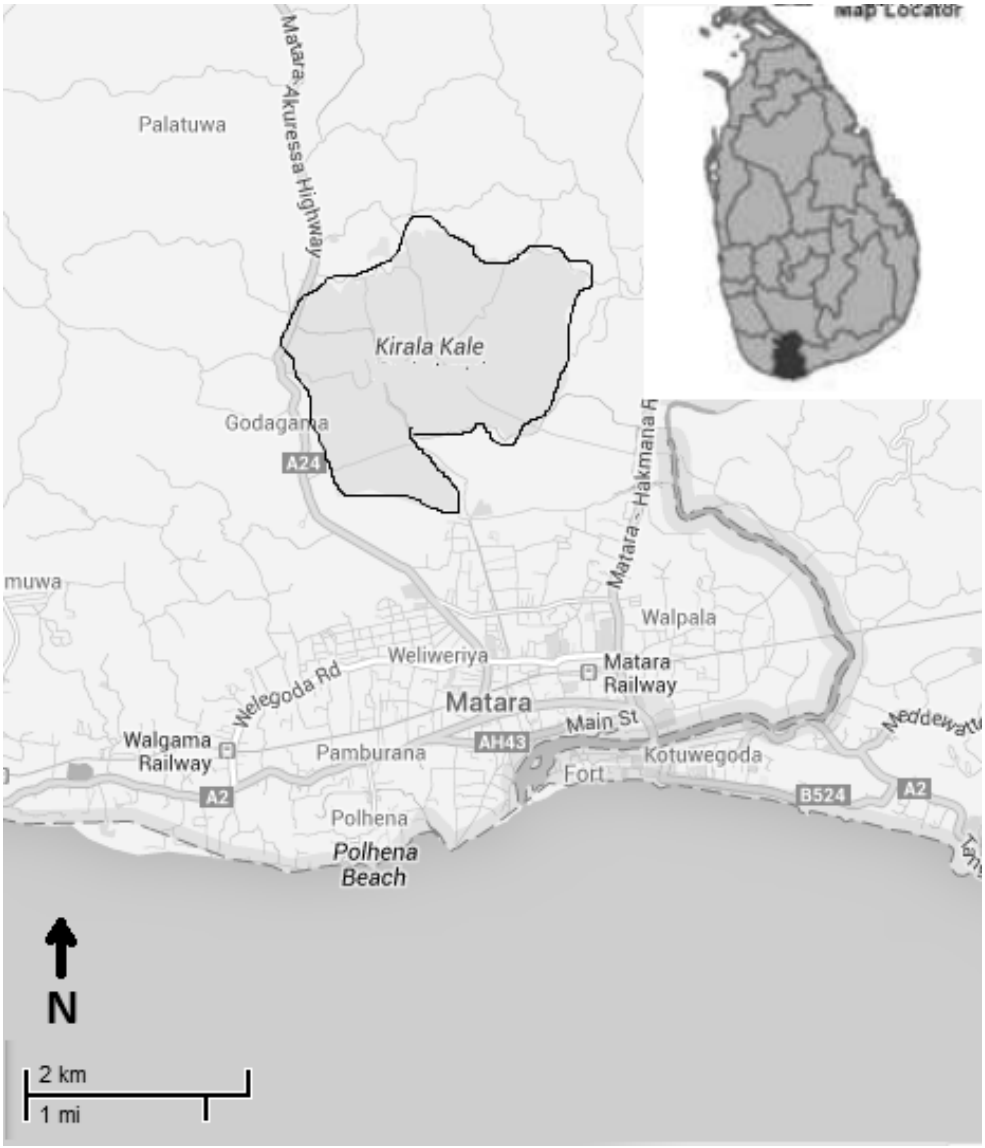


Figure 1: Location of Kirala kele (A eco touring wetland)

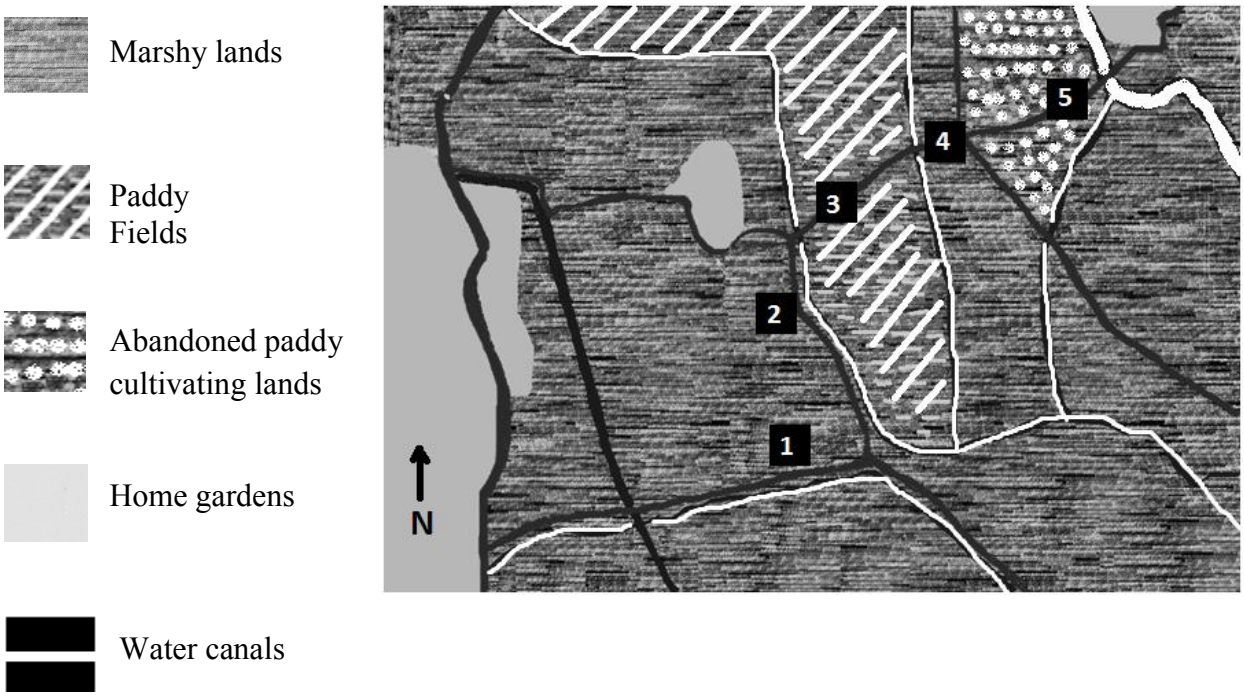
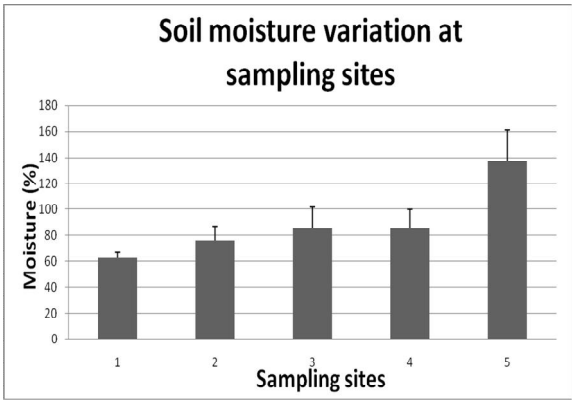


Figure 2: Selected five sampling sites along the trail in western area of "Kirala Kele"

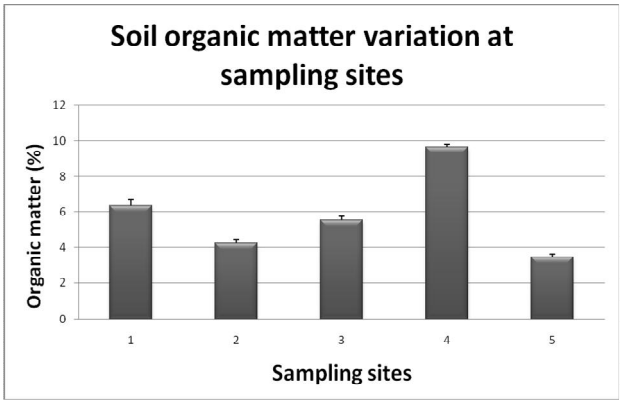
Table 1: Maximum density of the recorded snail species

Name of the species	**Maximum density recorded per 1 m^2**	**Status**
Glessula ceylanica (Pfeiffer, 1845)	6 ± 3.2	Endemic
Pomacea canaliculata (Lamarck, 1819)	9 ± 3.7	Invasive Pest
Succinea ceylanica (Pfeiffer, 1854)	68 ± 5.4	Endemic
Melanoides tuberculata (Müller, 1774)	8 ± 2.5	Vector
Melanoides torulosa (Bruguiere, 1789)	9 ± 2.6	Vector
Pomaceca diffusa (Blume, 1957)	40 ± 4.0	Invasive Pest
*Indoplanorobis exustu*s (Deshayes,1834)	6 ± 2.5	Vector

Figure. 3: Snail species recorded at sampling sites during the study. (*1: Glessula ceylanica, 2* :*Pomacea canaliculata,* 3: *Pomaceca diffusa*, 4: *Succinea ceylanica,* 5: *Melanoides tuberculata* , *6: Melanoides torulosa,* 7: *Indoplanorobis exustus*)



A



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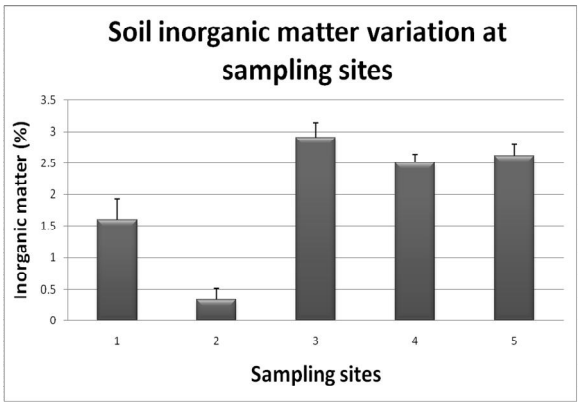

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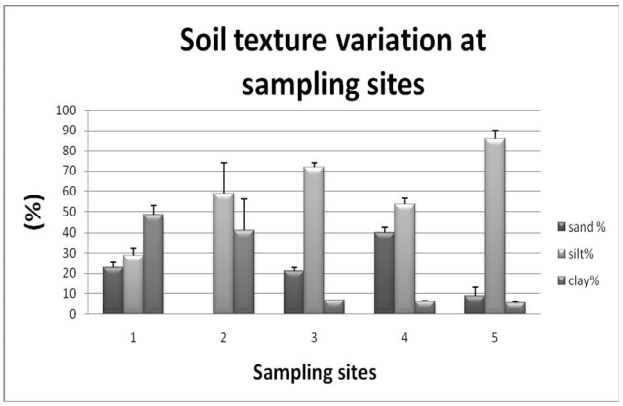

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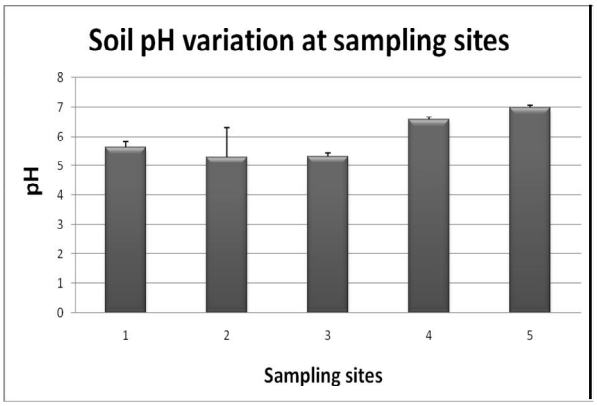

E

Figure. 4: Variation of Soil moisture (A), Organic matter percentage (B), Inorganic matter percentage (C), Percentage of sand, silt and clay (D), and Soil pH (E) of the six sampling sites in "Kirala Kele".