Preliminary study on mangrove diversity in Irakkandy lagoon, Trincomalee

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Introduction

The term 'mangrove' describes both the ecosystem and the plant families that have developed specialized adaptations to live in the tidal environment (Tomlinson, 1986). Preliminary study on diversity of the mangrove stands at Irakkandy lagoon (Trincomalee) was investigated to document the status of the mangrove forest and the mangrove distribution in relation to the soil salinity variation. Due to the past two decades war dilemma and present developmental activities increase the pressure on mangrove ecosystem at an alarming rate Eastern region of Sri Lanka. In addition, Tsunami has collectively contributed to the destruction of mangroves at large in the Eastern province. In this backdrop, this research aims to analyse the diversity of mangrove in the Irakkandy lagoon which further attempts to provide some suggestions to protect mangrove and its ecosystem.

Methodology

Fifteen transect lines were laid perpendicular to the shore in different sites of the lagoon and sampling was conducted from May 2014 to July 2014 at selected locations. The precise locations were determined by portable GPS unit (ETREX 10) and hydro physico-chemical parameters of each site were recorded over high tide and low tide. Whilemeasuring the mangrove diversity, Temperature and pH were checked using Multiple Test Kit (Thermo scientific) and turbidity was measured using Turbidity meter (Hach model (2100q)) in Nephelometric Turbidity Units (NTU). Salinity was measured using a Refrectrometer (Erma Hand Refractometer, Salinity: 0-100) in units parts per thousand (ppt). Data on floristic composition was identified using standard identification keys. Moreover height of the species was measured by Suunto Clinometer. Three soil samples were collected along the transect line of each site from the edge of the lagoon to end of the mangrove existence. Soil salinity was calculated according to Gibbs, 2000. Shannon-Wiener diversity index and Pielou's eveness index incorporated in the Primer software version 6.1.2 and Minitab ver.16 used for data analysis and statistical analysis.

Results and Discussion

Five different true mangrove species and nine mangrove associate plants were identified from the study site. *Avicennia marina* was the dominant species with Height (H) of 1.39□□2.54m followed by *Lumnitzera racemosa* (3.13□1.92m), *Excoecaria agallocha* (3.28□2.662 m), *Rhizophora apiculata* (3.28 □4.79m) and *Heritiera littoralis* was found as rare species with Height of (5.27 □2.21m) respectively.

Figure 1 describes the calculation of Shannon –Wiener index obtained for each transect which express the number of different species in a particular area.

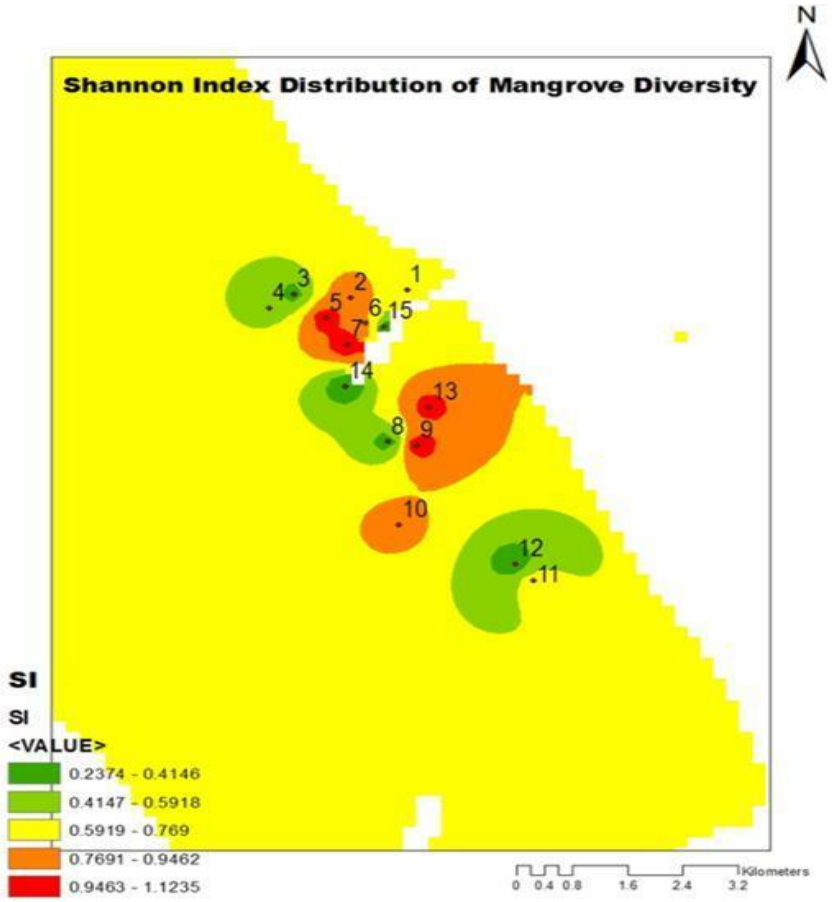

Figure 1: Shannon-Wiener Index of different Transects

The highest values (1.16) of Shannon - Wiener index shows high diversity representing diverse and equally distributed community in transect 7 while lowest value (0.22) of Shannon - Wiener index in transect 14 represents less diverse mangrove community. Transect 11 could be described as being-richer-insofar as most species present are more evenly represented by numbers of individuals since the species evenness (e) value is larger (1). Transect 14 where some species are represented by many individuals, and other species are represented by very few individuals has a low species evenness (0.16).

The wide salinity tolerance range (1-16 ppt) was observed in *Avicennia marina*. Pinto (1982) has indicated that the presence of a *Rhizophora* border on the shore may be due to its morphological adaptations in resisting water currents with the help of prop roots. Presence of a *Rhizophora* border instead of an *Avicennia* border in transect 2 may be due to the depth and slope as well as due to the lack of sandy soil and poor aeration.

The water salinity increases in high tide due to the sea water inclusion towards the lagoon and low in low tide as sea water extrude towards the sea. There is a positive moderate linear relationship between mangrove species and distance from the shore (ANOVA, $P<0.05$). In Irakkandy Lagoon, mangrove forest experiencing total diurnal inundation is dominated by *Avicennia marina* while *Excoecaria*

agallocha dominated sites that are not completely inundated. Amarasinghe *et al.* (2013) has found that *Avicennia marina* do not grow in fresh water and may be obligate halophytes. Also *Excoecaria agallocha,* survives well in fresh water and may not have obligatory requirement for salt beyond trace amount.

There is a significant difference between soil salinity and distance from the shore (ANOVA, $P<0.05$). Low frequency and duration of tidal inundation can be cited as the probable reason for low soil salinity at the landward sites (Joshi and Ghose, 2003). As indicated by the results, decreasing salinity with increasing distance is not observed in some places. The reason can be the evaporation occurred when the temperature is raised. In contrast, frequent inundation permanently saturates the soil with seawater salt content.

There is a negative weak linear relationship between soil salinity and height of the mangrove tree (ANOVA, $P<0.05$) since low-saline mangrove forests usually show a more luxuriant growth than the high-saline ones (De Silva and de Silva, 1998). There is a negative moderate linear relationship between soil salinity and mangrove species (correlations, $P<0.05$).

Conclusion

The results of the study indicate Irakkandy lagoon consists of low biological diversity of mangroves compared to Negombo, Chilaw and Puttalam lagoons but is extremely valuable as a living mangrove forest due to its extent.

References

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