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Field Investigation on Anthropogenic Impacted Lowland Riparian Zones

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ABSTRACT

A functioning riparian zone is very beneficial to the environment. However, most of the riparian zones have been disturbed by man-made implications these days. Public awareness about the issues of environmental conservation including riparian zones is needed by providing information on critical areas. Therefore, a novel framework is presented here to reveal how well a riparian zone adopts to changes. This paper highlights the field investigation of an altered riparian system along Maong River in Kuching, Sarawak. Investigation of the general riparian health is followed by the studies of its contributing attributes—vegetation cover, human activities and groundwater level, have been carried out. The methods are practicable in harnessing understanding and knowledge of riparian conditions. For a disturbed riparian zone, the findings indicate that 50% - 60% of the study areas are categorized as healthy or functioning riparian systems, at the same time, correlate the influences of the three afore-mentioned attributes.

Keywords: Groundwater; Maong River; Measurement; Rapid Assessment; Urban; Vegetation

1. Introduction

Anthropogenic endeavours have long influenced the riparian zones. However, living organisms adapt to disturbance regime over broad spatial-temporal scales [1]. Therefore, an understanding of the mentioned adaptation reflects the pulses of riparian zones and rivers due to changes in anthropogenic activities [2]. This has called for an exploration of an altered riparian system in a Maong River in Kuching, Sarawak.

Maong River is a tributary of and tidally influenced by its main-stem Sarawak River. Naturally, the river was a nipah-fringed river (see **Figure 1**), where nipah palms (*Nypa fruticans*) were the dominant vegetation. Nipah is found upstream of mangrove, which strives in freshwater-brackish reaches of a river [4]. However, human settlements were erected along this river over the past 100 years, reducing the nipah system to merely grasses and bushes.

2. Case Study

Nipah system is unique on its own because the plants need both freshwater and salt water to survive. The presence of salt disables other freshwater species to take over its establishment, at the same time, the constant flows of freshwater in the form of high groundwater table maintains its vitality [5-7]. When human removes the nipah for physical development, this process alters the freshwater flows. For the denudation of the water-retaining nipah system reduces the water holding ability of the soil and eventually causes the groundwater level to drop [8,9].

The remnants of riparian zones along Maong River are taking over by secondary growth extending 50 - 100 m from the river banks (see **Figure 2(b)**). For comparison, the 100-year old painting in **Figure 2(a)** is showing the primary growth of tall nipah palms. Apparently, in the late 1880s where human settlement of colonial era was significant, grasses appeared in the painting after human clearing of lands.

Because of such a drastic change, it is the intension of this paper to explore the current conditions of riparian zones along Maong River. By understanding and knowing riparian health or function, it allows communities to identify concerns and to proactively address specific land use issues [10].

3. Methods

Stretches of Maong River beside the Wee and Wee Garden is chosen, for its upper and lower boundaries are easily identifiable and findable for repeat assessments. Areas of concern are designated into polygons of 100 ×

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