

Rarity and viability value of different type of ecosystem and plants species in tropical forest ecosystem of Bungoh Catchment, Sarawak, Malaysia

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Abstract: Bungoh catchment is located in the southern part of Sarawak, Malaysia and south east of Kuching town and densely covered by tropical forests. A study was conducted to determine the rarity and viability values of plant species and also the rarity and viability values of the four different types of forest ecosystem of Bungoh Catchment. The four major forest ecosystems include the primary forest, old secondary forest, young secondary forest and agroforestry. The numbers of trees were recorded from the entire three different forest ecosystem using single plant method of size 400 square meters (20m X 20m). A total of 373 individual trees representing 148 species were recorded from the four different types of forest ecosystem. Out of 148 species, 22 species were recorded from the primary forest, 72 species were recorded from old secondary forest whereas 37 species were recorded from young secondary and the remaining 17 species were recorded from agroforestry. The rarity and viability value of plants species or ecosystem types is of immediate importance for the biodiversity conservation. The approach is designed for assessment of the rarity and viability values of plants species in the four major forest ecosystems in Bungoh Catchment. The rarity values are measured based on the frequency of certain plants species or ecosystems types are encountered whereas the viability value is assessed by considering three indicators which includes the core area, isolation and disturbances. The results indicate that the rarity value of all the four types of ecosystem namely the primary forest, old secondary forest, young secondary forest and agroforestry were relatively high indicating that the species in the ecosystem are distributed equitably and reflect the commonness of the species. Conversely, the viability value of the entire four ecosystems relatively low indicating that the species are prone to extinction.

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1. Introduction

In its broadest definition ecosystem rarity refers to how frequently an ecosystem type is found within a given area which includes limited geographic distribution and limited population size (Wood, 2002; Geneletti, 2003; and Nageswara Roa, 2012). The phenomenon of rarity in tropical tree communities has been known qualitatively in Western scientific circles at least since the writings of Alfred Russel Wallace (1878). However, not until recently have bio geographers and ecologists systematically quantified diversity, rarity and viability in tropical tree communities (Hubbell, 2013). According to Fiedler (2001) and Nageswara Roa (2012) there are two distinct types of rarity namely natural rarity and anthropogenic rarity. The natural rarity occurs because the species lives in a very limited habitat and those species have always been rare during their evolutionary history whereas the anthropogenic rarity occurs because its habitat has been converted by

humans to other uses agriculture, dams and other form of land development. The conservation of biodiversity focus on the rare species has been further justified by the potential role that rare species may play in maintaining overall ecosystem functionality (Curtis et al. 2007). Being the basic goal of biodiversity conservation to maintain the full richness of life on earth, it appears logical that the actual cover and distribution of an ecosystem type influence its relevance and protection worthiness. As a result, the use of rarity as criteria in biodiversity conservation is due to the fact that the rarer is the feature the higher is its probability of disappearance (Geneletti, 2003 and Flather et al. 2007).

The viability value of the species is affected by the relative increase of the edge length of the habitat fragment (Ryszkowski, 1992; Restrepo et al. 1999; Honnay et. al, 2005). Viability assessment is viewed as an integral part of the on-going forest service and land management as well as decision process, and, in