The Effective Ecological Factors and Vegetation at Koh Chang Island, Trat Province, Thailand

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Received October 3rd, 2012; revised November 7th, 2012; accepted November 20th, 2012

This study aims to characterize the tropical rain forest present in the Chang Island, Trat Province, Thailand, and to analyze the environmental factors to determine its composition and structure. Thirty one plots were sampled, plant cover was measured in 20 × 40 m² plots, and the importance value index was calculated. A total of 78 species belonging to 32 families were identified. Twenty soil samples were analyzed, and cluster analysis was employed to classify the vegetation communities. Floristic and environmental data were evaluated and ordered using canonical correspondence analysis. The results showed that the vegetation communities could be divided into 4 types and were significantly (p < 0.05) controlled by a secondary distribution according to elevation and the topographic wetness index (TWI). Mixed plant communities were more likely to distribute in regions with moderate to low levels of TWI, which were divided by levels of elevation into lowland multi-aged stands (Type 1) or a Calophyllum thorelii Pierre community (Type 2). The Dipterocarpus (Hopea pierrei Heim) community (Type 3) was more likely to occur in regions with moderate to high levels of TWI, but the result from cluster analysis showed that some of the plot samples from the Dipterocarpus community were separated by characteristic importance value index (IVI) values. There was also evidence that the area was impacted by an old disturbance created by a rubber plantation. This impact was referred to as a secondary succession community (Type 4).

Keywords: Chang Island; Vegetation Community; Canonical Correspondence Analysis; Ecological Factors

Introduction

Chang Island is one of only a few islands where a tropical rain forest is distributed over 70% of the inland area, which has been preserved in its present form (Environmental Research Institute, 2007). The island covers an area of 212.947 sq km and is a major island of the Mu Koh Chang National park in the Gulf of Thailand, which became Thailand’s 45th National Park in 1982. During the Pleistocene epoch (Tougard, 2001; Esselstyn et al., 2009), large sea level fluctuations caused the sea level to fall by 50 - 150 m, creating land bridge connections. After this period, the sea level rose and the low-lying regions were covered with water forming many islands separated from the mainland. Various fossils have confirmed these events during this period (Bird et al.,2005). The research of Chamchumroon and Puff provides evidence to support this theory. It is remarkable that although a large proportion of rubiaceous taxa show disjunction between Koh Chang and peninsular Thailand, 20% of all rubiaceae taxa recorded from Koh Chang have been found to be distributed in peninsular Thailand (Chamchumroon et al., 2003). This indicates that biological species found on the mainland may also be found on the Chang islands with a greater diversity. The tropical rain forest of Chang island has important roles in storing bioelements and water for local communities and acts as a carbon bank that impacts a large global area. Since 1902, the records of Schmidt (1900) have shown that all of the hills of Koh Chang are entirely covered with the densest jungle. In addition, the Siamese and Chinese populations scattered along the coasts where the river debouches have had little influence on the forest cover of the hills. Over the past century, tropical rain forest areas around the world and in Thailand now face loss due to human activities (Royal Forest Department, 1997, 2005). Chang Island is also facing the same problem as other forest resources and is in danger of losing forest cover by people focused on acquiring forest land for their settlements, farms, and plantations. Recently, land use change caused by tourism has led to construction on the island, including business buildings, luxury accommodations, roads, and harbors. This type of land use changes the ecological system of Chang Island. Although the Mu Ko Chang National Park was established at the end of 1982, negative human impact on the vegetation had already occurred in the more accessible coastal areas because the settled area of the old communities before the establishment of the National Park were not included in the preservation. Therefore, some species have become extinct, such as Ixoradoli chophylla, Lasianthuso ligoneuron and L. schmidtii, which according to the reports of Schmidt and Kerr (Chamchumroon et al., 2003; Schmidt, 1900), come from the Klong Nonsi area, a populated area near the Koh Chang District Office that has no traces of natural vegetation left. None of these species have ever been identified anywhere else in the Island. The effect of climate change is another problem because the area, size, and isolation of Chang Island make it less resilient to such change.

This study aimed to classify the vegetation communities on Chang Island and determine environmental factors that influence their composition and structure. Knowledge of these relationships may be critically important for planning appropriate adaptations to climate changes and disturbances due to human activities.