

## Soils and Vegetation Condition of Natural Forests and Secondary Fallow Forests within Batang Ai National Park Boundary, Sarawak, Malaysia

Mohd Effendi Wasli<sup>1\*</sup>, Sota Tanaka<sup>2</sup>, Joseph Jawa Kendawang<sup>3</sup>, Arifin Abdu<sup>4</sup>, Jonathan Lat<sup>3</sup>, Yoshinori Morooka<sup>2</sup>, Shabdin Mohd Long<sup>1</sup> and Katsutoshi Sakurai<sup>5</sup>

<sup>1</sup> Faculty of Resource Science & Technology, Universiti Malaysia Sarawak, Kota Samarahan, Sarawak, Malaysia

<sup>2</sup> Graduate School of Kuroshio Science, Kochi University, Nankoku, Kochi, Japan

<sup>3</sup> Forest Department, Sarawak, Kuching, Sarawak, Malaysia

<sup>4</sup> Faculty of Forestry, Universiti Putra Malaysia, Serdang, Selangor, Malaysia

<sup>5</sup> Faculty of Agriculture, Kochi University, Nankoku, Kochi, Japan

### Abstract

Under the current upland farming systems by the Iban of Sarawak, Malaysia, lands with better accessibility are being intensively utilized for various forms of agricultural activities. This has resulted in large patches of fallow lands with difficult accessibility which were later abandoned and remained as old secondary forests. In this study, an investigation on soil and vegetation under various types of forest cover was conducted at the Batang Ai National Park boundary to determine whether the old abandoned secondary forests in the area can recover and reach an ecological status similar to that of natural forests. Investigation was conducted at 3 types of sites: young fallow lands after upland rice cultivation with fallow period of less than 5 years (YF), old secondary forests with fallow period of about 50 years (OF), and natural forests (NF). In these sites, soil surveys were conducted and soil samples were collected at depths of 0-10 cm, 30-40 cm and 60-70 cm for soil physicochemical determination. Vegetation surveys involving plant identification, plant frequency of occurrence and measurements of stem diameter (DBH) were also conducted in these sites. The results showed that irrespective of forest types, all studied soils showed a strongly acidic nature with low nutrient contents. In addition, no clear differences were observed in the soil physicochemical properties among the forest types although soil pH in YF sites were significantly lower than those of OF and NF sites probably due to the land use history of these sites. On the other hand, the results showed that vegetation under NF sites possessed better tree growth, in diameter, than OF and YF sites. Based on these findings, it is suggested that due to the poor soil fertility status in the area, 50 years of fallow period would be insufficient for the land to recover its vegetation condition equivalent to that of natural forests. Taking into account such a situation, forests in the study area should be left undisturbed as their removal would greatly accelerate severe land degradation, and rehabilitation of such a land would be a difficult task.

Key words: Batang Ai, natural forest, secondary forest, soils and vegetation, Sarawak

### 1. Introduction

For centuries, wide forest areas in the humid tropics and subtropics had allowed diverse communities to practice variations of shifting cultivation, which enabled them to coexist in relative harmony with their environments (Cairns *et al.*, 1999). Shifting cultivation is practiced on such a wide range of soils with various types of vegetation and involves the length of cropping and fallowing

periods, and the method of cultivation. The exact figures on the areas under shifting cultivation worldwide do not exist, but there are an estimated 240 million hectares of closed forests and 170 million hectares of open forests of world's arable land under some forms of shifting cultivation (FAO, 2003). Figures for the number of people depending on this system are also uncertain and range from 400 to 500 million (Stocking, 1984; Lanly, 1985; Russell, 1988; Goldammer, 1988; Klienman *et al.*, 1996;

Received 5 March 2011; accepted 12 May 2011.

\*Corresponding author: e-mail wmeffendi@frst.unimas.my