Land-use Projection for Meeting Rice Demand in Indonesia and Its Implication on GHG Emission

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Introduction

Accessibility on food, in particular rice paddy, with sufficient amount and affordable price has continually turned-out to be the central priority of the national development of Indonesia. To ensure that the level of rice production meet the future demand, Government of Indonesia plans to expand the rice agriculture land up to 15 million ha. Currently the total area of rice paddy field reached about 9 million ha. Thus the future demand for land for rice paddy field would reach about 6 million ha. The expansion of rice field to some extend may be met through forest conversion and this will lead to high emission. Thus, this may affect national GHG mitigation policies.

Objectives

To evaluate the impact of low carbon land-use plan on maintaining Indonesian capacity to meet its future rice demand.

Methodology

In this work we utilize AFOLU-A and AFOLU-B models to assess reliability of goals achievement. AFOLU-A is a static model to project activity level of agriculture, forestry and other land-use sectors based on given future assumption, other socio-economic activity level, and related parameters. While AFOLU-B model is a bottom-up type model for calculating GHG mitigation potentials in the sector based on detailed information of specific mitigation measures. Scenarios on deforestation rate being evaluated in this analysis were the following:

1. Scenario A: Future deforestation will follow historical deforestation rate from 2000-2006, i.e., 606,000 hectares per year.
2. Scenario B: Future deforestation will follow historical deforestation rate from 2006-2011, i.e., 447,000 hectares per year.

Results

It is shown that the national rice demand increases from 54 million tons in the base year 2005 to 63 million tons in the target year 2020. Scenario A which assumes a deforestation rate of 606,000 ha/year implies a larger conversion rate to crop land (rice field), thus under this scenario the national demand on rice is fulfilled. When a smaller deforestation rate is applied, i.e., 447,000 ha/year, an excess demand is happen in the period of 2005-2012, and after that there is a production surplus up to 2 million tons in 2020.

Under both scenarios, in the agriculture sector, it is provided that N2O from soils occupation contributes the highest emission followed by CH4 from rice cultivation. From the mitigation potential point of view, it seems that the application of hi-efficient fertilizer, midseason drainage on rice paddy, water management in peatland (WM) and forest protection (FP) provide significant contributions.