

1. TITLE OF PROJECT

FORCASTING CARBON STOCKS OF LAND USES USING INVEST MODEL

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3. ABSTRACT

3.1. Objectives

- Estimating carbon stocks of current and future land-use scenarios using INVEST model in Tam Dao National Park Region.
- Proposing soil carbon stock service payment for land users in support of sustainable land use scenario in the region.

3.2. Methods

In this study, carbon stocks of land uses in the region is estimated using Landsat TM, soil survey data and GIS based INVEST model. The INVEST model is selected because it requires a limited dataset that is suitable to developing countries like Vietnam. The model is used to estimate spatial distribution of carbon stock of existing land-use scenario and re-calculate with conservation oriented future land-use scenario. .

3.3 Results

In case of estimating carbon stocks of land uses, Landsat TM data is proved to be suitable for delineating the boundaries of major existing land uses in the region. The determination of the boundaries of land-use types need a combination of visual interpretation techniques, pre-treatment to determine suitable classification keys. In general, Landsat TM data allows us to distinguish the main types of land use in the region; however, some bordering areas between annual crop and forest are particularly difficult to define. Topographic map should be used to distinguish forests and croplands in the study area.

Our research result indicates that aboveground biomass carbon stock of natural forest is stored at the highest amount (114.87 ton ha⁻¹), followed by regenerated forest (65.80 ton ha⁻¹), fine forest (59.72 ton ha⁻¹), acacia forest (19.68 ton ha⁻¹), paddy rice (3.9 ton ha⁻¹). Similarly, natural forest soil is capable of storing the highest amount (43.96 ton ha⁻¹), followed by regenerated forest soil (42.37 ton ha⁻¹), paddy rice soil (43.29 ton ha⁻¹), acacia forest soil (37.90 ton ha⁻¹), pine forest soil (36.12 ton ha⁻¹), and other crop soils (21.65 ton ha⁻¹).

The existing land-use map of the study area is forecasted to store an amount of about 15,477,517 tons of carbon. The conservation oriented land-use plan scenario is forecasted to increase carbon stocks over 16,333,389 tons of carbon in the region. In general, natural forest, regenerated forest, pine forest and acacia forest have larger carbon stocks than agricultural land-uses. Thus, strict conservation of forests have a major role in carbon stocks, contributing to absorb greenhouse gases. In contrast, the conversion of land use from forest to agricultural land will reduce carbon stocks in the region.

3.4 Applications

INVEST model is a useful tool to forecast carbon stocks of different types of land-use at varying scales. INVEST model can be applied to assess environmental impacts of land-

use plans at the district and provincial level in Vietnam. In addition, greenhouse emissions inventory projects from agriculture and forestry sector can be applied the approach in the study. The Management Board of the Tam Dao National Park and households in the study area can use the estimation results of land-use carbon stocks to request relevant institutions to pay for carbon sequestration service.