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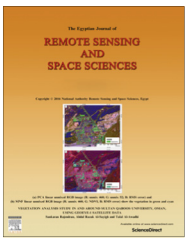

RESEARCH PAPER

Land cover change and the CO_2 stock in the Palembang City, Indonesia: A study using remote sensing, GIS technique and LUMENs

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Abstract A study of the land cover change and the CO_2 stock in the Palembang City, Indonesia was conducted by using remote sensing and GIS data and processed by the LUMENS software. The study has successfully compared the land transformation during period of 1989–2000 and 2000–2013. It reveals that the settlement area increased much faster during 2000–2013 compared to that of 1989–2000 with the former raised to 4368 ha and the latter to about 2531 ha. During 2000–2013, a rapid development of the Palembang City after hosting the National Olympic Games in 2004 has a significant impact on the land cover change mainly from the plantation area into the settlement area. In addition, the rate of CO_2 emission per unit-area during the 2000–2013 periods is also higher than that of the 1989–2000 period by about 0.3 ton CO_2eq per ha in a year due to the increase of transformation of plantation into settlement.
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1. Introduction

Palembang City is the capital city of the South Sumatra Province, Indonesia. It is the second largest city in the Sumatra Island. The city is located between 104°36′38.479″E, 104°51′5 0.753″E and 2°52′4.159″S, 3°5′26.534″S with an area of about 400.61 km^2 (Putra et al., 2011). The location of the study area is shown in Fig. 1.

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Located in the tropical zone, the Palembang City's climate has only two seasons, namely: the rainy and dry seasons. The hydrology of the Palembang is characterized by the Musi River that divides the Palembang City into two major areas; the Palembang Ulu (upstream) and the Palembang Ilir (downstream). Note that the Musi River is one of the biggest rivers in Indonesia. In addition, most of the Palembang area is low land. Therefore, flood is a major problem of the Palembang City during the rainy season. This requires an integrated management of the city to avoid those impacts in the future development plans.

The research is designed to provide the detailed information about the land cover change in the Palembang City that can be used for the management and future development plan of the city. We approach the goal through two research objectives:

a. To assess what extent the land cover change is seen in the Palembang City, in particular for period from 1989 to 2000 and from 2000 to 2013.
b. Quantity of CO_2 emission is determined during two time periods: 1989–2000, and 2000–2013.
c. Evaluation of how the land cover change (e.g. vegetation change) influences the CO_2 emission change.

Based on the research of Ministry of Forestry of the Republic Indonesia, the component of "land cover" in Palembang City includes secondary forest, grassland, open area (bare soil), water body, plantation, settlement, shrub and swamp.

The study of using remote sensing technique to monitor land use changes which plays a vital role in urban development

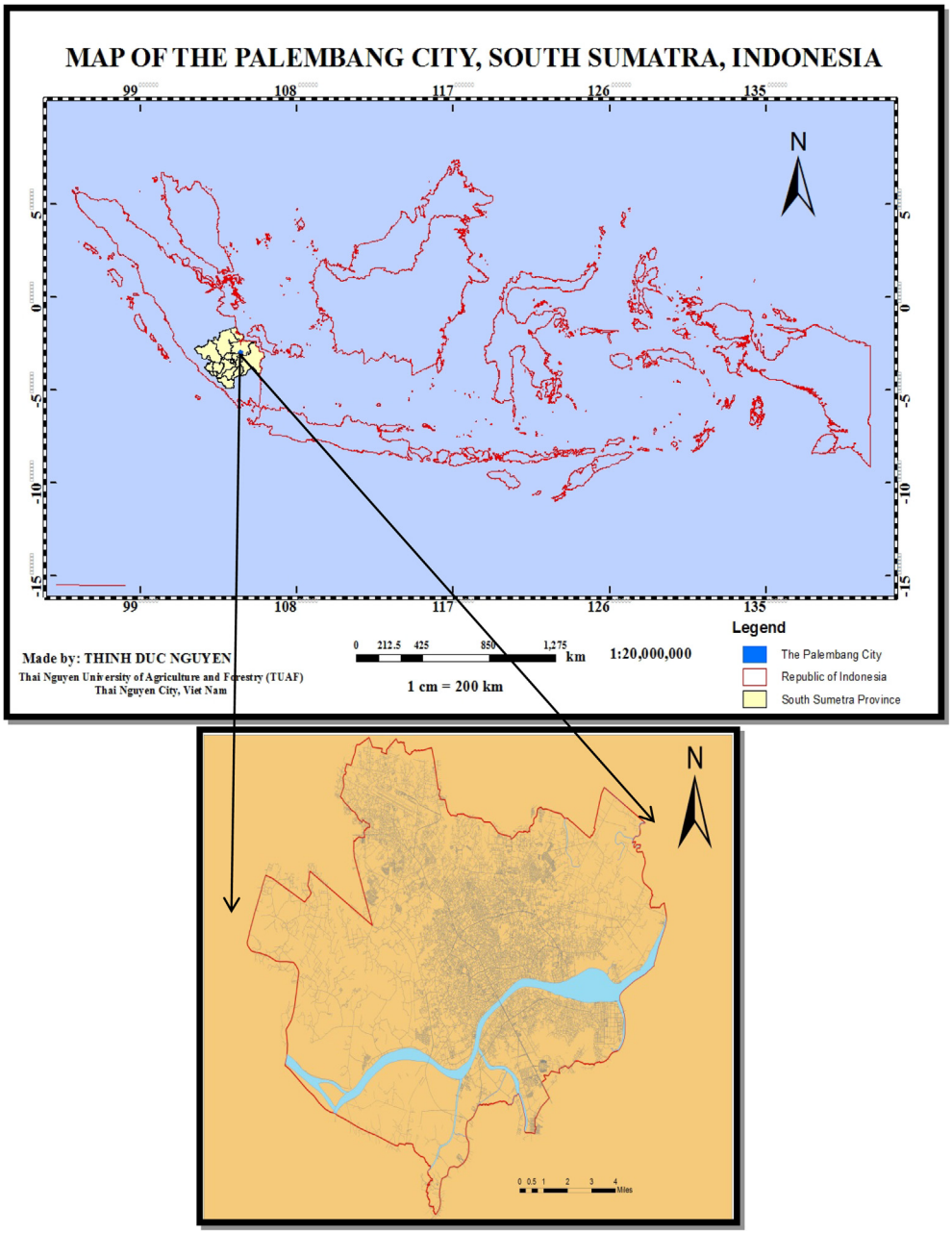

Figure 1 The map of the study area, the Palembang City, Indonesia.

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