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Analysis of land use and cover changes in Ciliwung and Cisadane Watershed in three decades

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Abstract

The globalization and the developing of technology cause the increasing of human needs, which impacted to land use and cover change (LUCC), particularly in watershed area. Two watersheds have been investigating, namely Ciliwung and Cisadane watershed. The LUCC in those watersheds still continues since the growth of society and economy are increasing. Therefore, it needs a significance breakthrough to analyze the driving factors of LUCC. The aims of this research are 1) to monitor and analyze the LUCC, and 2) to figure out the driving factor of the LUCC. The outputs are LUCC maps, spider web diagram and the driving factor of a change during three period of time, i.e. 1978, 1995 and 2012. The LUCC and its driving factors were analyzed through Landsat satellite image. The results show the LUCC are always changed during those periods. The LUCC in those watershed following several processes and in the end changed into settlements and dry lands, predominantly.

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Keywords: driving factors; geographic information system; landsat image; logistic regression analysis; watershed management.

1. Introduction

The fulfillment of community needs always grow and demanding. Those impacts the excessive nature exploitations. One of those impacts can be found in Ciliwung and Cisadane Watershed. The land use and cover change (LUCC) impacted the remain forest only left 12.0% in Ciliwung and 36.6% in Cisadane Watershed [1]. The excessive change influences the water quality [2], decreasing ecological condition [3,4], giving negative effect to next generation. One of negative effects of LUCC is increasing carbon emissions because reducing area that serves

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as a regional carbon sequestration [5]. Those negative effects can be minimized by a robust watershed management [6] through geographic information system (GIS) technology. This technology gives information about the occurrence of LUCC remotely of the area to be examined.

This research are planning to achieve goals, i.e. 1) classifying the major changes of LUCC and 2) determining the driving factor impacting on LUCC. The classifying are derived from Landsat image of three periods, i.e.1978, 1995 and 2012. The driving factor are calculating statistically using auto logistic regression [7].

2. Methodology

2.1 Location

This research was carried out in Ciliwung and Cisadane Watershed (Fig. 1). The geography, location and boundaries of those watersheds are presented in Table 1. The data acquisition are shown in Table 2.

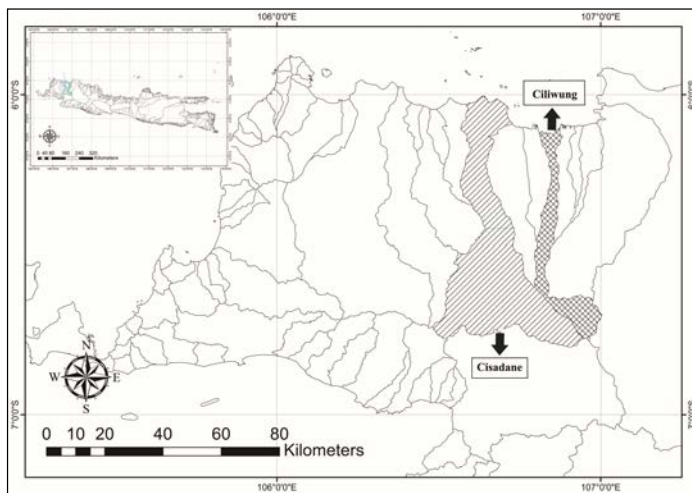


Fig. 1. The Location of Ciliwung and Cisadane Watersheds

Table 1. The general information of Ciliwung and Cisadane Watershed

Name of Watershed	Geography Location	Area (ha)	Administrative Regions
Ciliwung	06° 06' 00" - 6° 46' 12" S and 106° 48' 36" - 107° 00' 00" E	38,610.25	Bogor District, Bogor City, Depok City, and Jakarta Province
Cisadane	06° 37' 48" - 6° 46' 12" S and 106° 49' 48" - 107° 00' 00" E	151,808.00	Bogor District, Bogor City, Tangerang District, and Tangerang City

Table 2. Landsat data acquisition

Landsat Data	Acquisition Date
LANDSAT1 MSS	July 17 th , 1978 Path 131 Row 065
	July 17 th , 1978 Path 130 Row 065
	August 8 th , 1995 Path 122 Row 065
LANDSAT5 TM	July 25 th , 1996 Path 122 Row 065
LANDSAT7 ETM+	May 26 th , 2012 Path 122 Row 065

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