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Open green space development priority based on distribution of air temperature change in capital city of Indonesia, Jakarta

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Abstract

One of the main cause of environmental degradation in Jakarta is caused by quality degradation of open green space. Urban forest as a form of open green space has an important role in microclimate amelioration. Urban forest can reduce surface temperature, which have a close relation to land cover and air temperature. Urban forests as a heat absorbent reduce air temperature by transpiration. During 2001-2014 trees in Jakarta is decrease around 5.1% while built-up area is increase around 13%. That was causing surface temperature is increase around 2-4°C, meanwhile air temperature is increase about 2-3°C during 2001-2014. Priority of urban forest development to reduce high temperature in Jakarta not only should take a place in public area, but also in private.

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Keywords: air temperature; surface temperature; urban forest.

1. Introduction

Jakarta as a capital city of Indonesia possesses various problems related with environment. One of the environmental problems faced by Jakarta is degradation in quality and quantity of open green space (OGS) which results in the occurrence of urban heat island (UHI) phenomenon. Murayama *et al.* [1] described that during period of 2001-2014, Jakarta Metropolitan City exhibited increase in built-up are, up to 80.67%, followed by decrease in

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vegetated land and water bodies. The same phenomenon was also described by Lestari *et al.* [2] where the built-up area in Jakarta progressively increase with average of 548 ha/year during period of 1997-2012.

Open green space (OGS) is known as one of the indicators being used for assessing the convenience level of an urban area. OGS play some roles, mainly in absorbing the negative results of urban activities. OGS creates benefits toward environmental components in the form among others of absorbing heat, reducing noise level and air pollution level, and acts as carbon sink through oxygenation process. Through its role in amelioration of micro climate, OGS could reduce surface temperature which influences directly the distribution of air temperature [3] [4] [5].

The decrease of OGS in urban areas has an impact in the form of increase in surface and air temperature. Lestari *et al.* [2] explains that surface temperature in Jakarta increased on the average at the rate of 0.02°C/year during period of 1997-2012. One of the efforts which could be conducted to suppress the increase of air temperature in urban areas is development of OGS. The objective of this research is mapping the change of air temperature distribution in Jakarta in the years 2001 and 2014, and also mapping the priority for OGS development based on distribution of air temperature change in Jakarta.

2. Method

This research was conducted in five territories of Administrative City of Jakarta. Data collection was conducted for 3 months, between July-September 2014. Research location could be seen in Fig. 1.

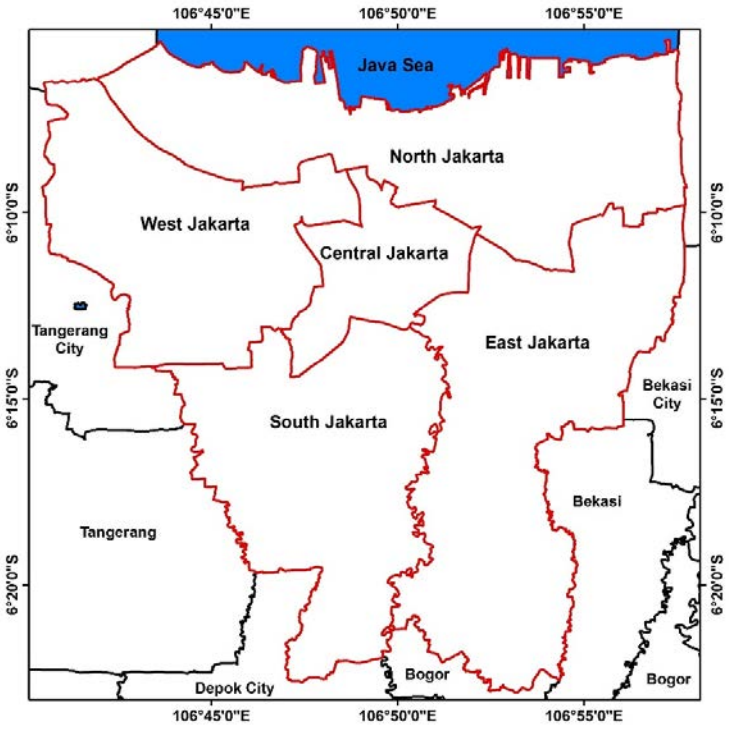

Fig. 1. Map of research location

The collected data comprise primary data and secondary data. The collected primary data were ground truth points using hand-held GPS receiver for assessing classification accuracy of land cover mapping. Secondary data were obtained through literature study. Data processing was conducted by processing landsat imagery of year 2001 and 2014 using software e-Cognition, Erdas, and ArcGis. Data processing consist of land cover and land cover change mapping, surface and air temperature mapping and afterwards analyzed to learn the priority of OGS development.