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## Study of distribution and slope aspect approach to increase public green open space on Special Capital Region of Jakarta using high resolution imagery

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### Abstract

Urbanization has made Jakarta's land use changed rapidly for urban development, which resulted on Green Open Space (GOS) marginalization. This study uses GIS and remote sensing integration to produce the distribution Public GOS map and give alternative ecological approach to support government commitment of providing 20% GOS. The result shows Public GOS is 5.44% with highest percentage on Central Jakarta. The study also shows that East Jakarta is the most potential area for GOS expansion to more than 2,890.22 ha and final Public GOS can reach by 14.50% from total mainland area.

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## 1. Introduction

Jakarta as part of largest concentration of urban population in Indonesia (Firman, 2007), has problem in providing enough GOS area. Land demand for urban use and other form of urban development in fringe, convert and change of agricultural lands resulting loss of green open space (Malaque et al., 2007). Urbanization replaces vegetated surfaces with impervious built surfaces (Gill et al., 2007). Jakarta has less green open space as a result of less restrained urban development (Rosalina, 2013). Jakarta has been lost green open space for 23% during 1972-1997 period (Zain, 2002).

However, urban greenspaces provide areas within the built environment where such processes of shading, evaporative cooling, and rainwater interception, storage and infiltration functions can take place (Whitford et al., 2001). In a changing climate, the functionality provided by urban greenspace becomes more important (Gill et al., 2007). Jakarta as one of the most vulnerable coastal city to climate change in Southeast Asia (Firman et al, 2011), needs more GOS to mitigate the climate change effect. Because improving urban green space provides valuable ecosystem services, reduce disaster risks, conserve urban biodiversity, and help in climate adaptation and mitigation (Govindarajulu, 2014). Jakarta needs to increase GOS to keep its carrying capacity to accommodate 12,5 million inhabitants by end of 2030 (DKI, 2012).

Act 26/2007 set the target 30% GOS for city region, which is by ownership typology divided as Public and Private, and government obligated to provide 20% Public GOS. Public GOS is owned and managed by municipality or city government and be used for social interest, while the Private is personal or private belonging. The enhancement of Public GOS area in Jakarta has been implemented by local government. Two of most responsible institution of Jakarta Government that is City Park and Cemetery Office and Marine, Agriculture and Food security Office were recorded around 156.67 ha new area for GOS purposes has been acquisitioned since 2001. So far, the policy of Public GOS land acquisition not satisfied enough to ensure the achievement of the target in accordance with GOS target stipulated in Perda No. 1/ 2012 about Spatial Plan Jakarta Province 2030 (DKI, 2012). In fiscal year 2014 budgeted land acquisition was Rp1.9 trillion with total realization only 21% of it (Fitriani, 2015), with area of about 2-4 ha (Bappeda, 2014). Most problems were due to the price discrepancy between the requested land owners (Rosana, 2015), also the absence of a master plan RTH Jakarta became drawbacks (DPP, 2013).

Masterplan plays important role in realizing GOS target, because planning is a process to achieve the goal. Developing the availability of GOS, it is necessary to analyse current situation that deals with the physical, quality, functional, ecological and environmental as well as the economic aspects of green spaces in the city (GK 2008). The most important thing in the physical aspect is the quantity of GOS that can be shaped as spatial data. Thus in this study, we consider the importance to conduct spatial data study of current Public GOS. And also we propose an ecological aspects approach put forward in the form of slope as a potential alternative to the addition of Public GOS. The result is expected can enrich considerations for policymaker towards Public GOS target.

To obtain GOS spatial data within area coverage can be used remotely techniques (Remote Sensing / RS). Remote sensing offers broad scale, readily repeated measures of vegetation and particularly suited to change detection (Lawley, 2015). With the integration of RS and GIS (Geographic Information System) can improve output efficiency and accuracy of mapping as an input in the planning and management of the area (Danoedoro, 2012). Integration of RS and GIS has been widely used for environmental and urban resources studies (Weng, 2010). Taking into account the conditions of highly heterogeneous land use of Jakarta, in this study we use high resolution satellite imagery to facilitate the identification process of GOS.

## 2. Methodes

### 2.1 Study Site Description

This study is in Special Capital Region of Jakarta, located at 106.22'42" - 106.58'18" E and 5.19'12" - 6.23'54" S. Administratively bordered on the western by Tangerang City (Banten Province), the southern part by Bogor Municipality (West Java Province), the eastern part by Bekasi City (West Java Province), in the northern part by Java Sea. Jakarta has total area 7,659.02 km<sup>2</sup>, divided into 6 municipalities consist of 662.33 km<sup>2</sup> land area including 110 islands in Kepulauan Seribu municipality. This study site only covered land area 645.80 km<sup>2</sup> without Kepulauan Seribu. Jakarta has hot tropical climate with humidity between 75-99 per cent. Jakarta called as delta city with 13

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