DIPONEGORO UNIVERSITY

ASSESSMENT OF SPATIAL PLAN OF SEMARANG METROPOLITAN COASTAL AREA THROUGH OBIA-BASED SPATIAL PATTERN MODELING

BACHELOR'S THESIS

Submitted in partial fulfillment of the requirements for the degree Bachelor in Urban and Regional Planning

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ASSESSMENT OF SPATIAL PLAN OF SEMARANG METROPOLITAN COASTAL AREA THROUGH OBIA-BASED SPATIAL PATTERN MODELING

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ABSTRACT

The land dynamics has consequences to the area in the form of coastal ecological hazard. Hence, the regional spatial plan (Rencana Tata Ruang Wilayah/RTRW) exists to minimize the disadvantages from the land dynamics. The suitability of the regional spatial plan needs to be examined to determine the effectiveness of its implementation. The evaluation of the regional spatial plan's effectiveness requires a method for analyzing satellite imagery to produce land cover models. However, the object-based image analysis method is rarely used in research on regional spatial plan assessment. Therefore, this research employs the OBIA method to add the number of research that employs this method in the regional spatial plan context. This research aims to analyze the land dynamics rate of the Semarang Metropolitan coastal area and to conduct assessment of the regional spatial plan through an OBIA method's application.

This research uses a Sentinel-2A satellite imagery (tile number T49MCN) for years 2015 and 2020 as its primary data (and 2019 data for cloud masking of 2020 data). Google Satellite Imagery and observation photographs are used as supporting data in preparing the train set and test set. The data is processed with QGIS 3.10.6 and QGIS 2.18.20 software, also in Orfeo ToolBox (OTB) 7.1.0 and MOLUSCE plugin. This research utilizes MNDWI-NDTI-NDVIre multi-index imagery and SVM RBF (Support Vector Machine with Radial Basis Function kernel type) learning algorithm to produce the land cover models in 2015 and 2020. Both land cover models then become the basis for land cover prediction in 2025 and 2030. Finally, the assessment of the spatial plan is analyzed to measure the discrepancy between the land cover trends and the spatial pattern plan.

This research concludes that Semarang City is the most significant contributor to the rapid land dynamics in Semarang Metropolitan coastal area. The area surrounding the toll gates is predicted to trigger intensification and extensification of the built-up area. Meanwhile, the reclamation location is predicted to be partly converted as waterbody. There is no change in the multiple nuclei spatial structure and octopus-shaped spatial pattern in the study area. The wide of the land cover in 2020, which is incompatible to the spatial pattern plan, is about 10,947.06 ha (or 28.97% of the study area). The incompatibility itself is predicted to increase by 1,241.81 ha (or 3.29% of the study area) within 2020-2030. Such an incompatibility is caused by the built-up and paddy field/bare land plan that are predicted to be converted to waterbody. An ineffective Semarang City's spatial pattern plan is indicated by the decrease of paddy field/bare land that this contradicts the plan: the waterbody does not convert to paddy field/bare land, but it is converted to built-up in the reclamation area.

Keywords: *Coastal Land Dynamics; Spatial Pattern Modeling; OBIA; Regional Spatial Plan (RTRW) Assessment.*

FOREWORD

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Author acknowledges weaknesses in this thesis, so advices from readers are needed for the improvement of future research. Author expects this bachelor's thesis can provide benefits for the discipline of urban and regional planning.

Semarang, July 7, 2020
Author,

Abdurrahman Zaki

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