

Irena Tri Widiastutik. NPM 21.03.4.1.1.00006. Pemodelan Prediksi Perubahan Tutupan Lahan *Urban Coastal Area* Menggunakan Model *Cellular Automata – Artificial Neural Network* (CA-ANN). Dibawah bimbingan **Prof. Dr. Zainul Hidayah, S.Pi., M.App,Sc.**

ABSTRAK

Perubahan tutupan lahan di Kota Semarang mengalami dinamika yang signifikan seiring dengan pertumbuhan penduduk dan urbanisasi yang pesat. Penelitian ini bertujuan menganalisis perubahan tutupan lahan pada tahun 2015, 2020 dan 2025 serta memodelkan prediksi perubahan tutupan lahan pada tahun 2030 menggunakan *Cellular Automata – Artificial Neural Network* (CA-ANN) melalui plugin *MOLUSCE* pada perangkat lunak QGIS. Data yang digunakan meliputi citra Sentinel-2 yang diklasifikasikan menggunakan algoritma *Random Forest* di Google Earth Engine (GEE), serta variabel faktor pendorong berupa jarak ke jalan, jarak ke sungai, jarak ke permukiman dan kemiringan lereng. Hasil klasifikasi menunjukkan akurasi yang cukup tinggi dengan nilai *Overall Accuracy* mencapai 90,47% pada tahun 2025. Hasil prediksi menunjukkan adanya peningkatan luas area permukiman dan badan air, serta penurunan signifikan pada vegetasi non mangrove dan mangrove. Penurunan mangrove diduga turut memperluas wilayah terdampak banjir rob di pesisir utara Semarang.

Kata Kunci : *Perubahan tutupan lahan, CA-ANN, Google Earth Engine, MOLUSCE, Semarang, Sentinel-2.*

Irena Tri Widiastutik. NPM 21.03.4.1.1.00006. Modeling Prediction of Urban Coastal Area Land Cover Changes Using Cellular Automata – Artificial Neural Network (CA-ANN) Model. Under the guidance of **Prof. Dr. Zainul Hidayah, S.Pi., M.App,Sc.**

ABSTRACT

Land cover changes in Semarang City have experienced significant dynamics in line with rapid population growth and urbanization. This study aims to analyze land cover changes in 2015, 2020, and 2025 and model land cover change predictions in 2030 using Cellular Automata – Artificial Neural Network (CA-ANN) through the MOLUSCE plugin in QGIS software. The data used include Sentinel-2 imagery classified using the Random Forest algorithm in Google Earth Engine (GEE), as well as driving factor variables such as distance to roads, distance to rivers, distance to settlements, and slope gradient. The classification results show quite high accuracy with an Overall Accuracy value reaching 90.47% in 2025. The prediction results show an increase in the area of settlement areas and water bodies, as well as a significant decrease in non-mangrove and mangrove vegetation. The decline in mangroves is thought to have contributed to expanding the area affected by tidal flooding on the north coast of Semarang.

Keywords: *Land cover change, CA-ANN, Google Earth Engine, MOLUSCE, Semarang, Sentinel-2.*