ABSTRACT

WIKANTI ASRININGRUM. Geomorphological Based Small Island and Its Ecosystems Classification in Indonesia. Under the direction of BUDY WIRYAWAN, DOMU SIMBOLON, IWAN GUNAWAN, and DANIEL R. MONINTJA.

Fishing in Indonesia remains as open access. As the largest archipelagic country in the world mostly comprising of small islands, Indonesia's big shallow water area around small islands has an important role as fishing ground area ecosystem, thus need bordering to control access of fishery. Small islands and its marine ecosystems have high variety of biogeophysical characteristic which made it difficult to obtain information from. The use of satellite imagery to identify small island and marine ecosystem is still constrained by the availability of the proper image processing technique for the variety of characteristics.

This research aims at selecting remote sensing data processing techniques in order to analyze the geomorphology of small islands and its marine ecosystems, classifying island type, designing identification of marine ecosystem and also designing small islands classification based on geomorphological characteristics for fishery planning. Study areas selected at small islands of Kota Batam, Kabupaten Sikka, and Kabupaten Sitaro. Several islands are selected to represent tectonic, volcanic, and reef type and to represent the main marine ecosystems such as mangrove, coral reef and sea grass. Landsat, SPOT and QuickBird images, along with Geological map, Topographic map, Navigation map and field survey are used to find out geomorphologic data of small islands. Steps on image processing composed of multispectral fusion, enhancement and multispatial fusion techniques. Small islands geomorphological analysis method consists of morphology, morphogenesis, morphochronology, and morpho-arrangement aspects which are conducted by landforms identification by landscape approach. Correlation between small island and shore fishery is analyzed by the number of fish species on seven locations with 3 and 10 meters depth using diversity, uniformity, and dominancy indexes.

The first result shows three remote sensing data processing procedures for three types of island (tectonic, volcanic, and reef) and three for three marine ecosystems (mangrove, coral reef, and sea grass). Those six procedures use multispectral fusion, enhancement and certain characteristics where multispatial function only used on small island. The second research result is morphogenesis-based small island type classification to ten island classes: fold tectonic, fault tectonic, intrusive volcanic, extrusive volcanic, stack, monadnock, hummock, alluvial, reef, and atol. Each class is completed along with differentiated morphography for hills and low lands to illustrate ecosystem potential. The third research result is island type-based identification of marine ecosystem through visual and digital interpretation. Here, biogeophysical characteristic of small island and its ecosystem has been proven to be correlated with shore fishery. The fourth research result is classification of small island, designed through two phases, applicative phase and explorative phase. In applicative phase, small islands are classified into small island and group of small islands based on 12 miles radius. Further classification through explorative phase is needed if the radius factor is not sufficient to classify. Based on geobiophysical characteristics, small islands and its ecosystem will be classified into three categories: small islands, group of small islands and small island, and small islands.

Keywords: small island, marine ecosystem, geomorphology, island type, landforms, remote sensing, classification and identification.