

Mapping Small Island Natural Resource Balance and Economic Valuation

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Key words: Mapping, Small Island, Natural Resource Balance, Economic Valuation

SUMMARY

This research used the economic principles for quantifying the economic value of small island natural resource, using remote sensing image and geographic information system to analyze and visualize spatial values. To evaluate the value of small island ecosystem we derived from Landsat and ALOS image with a long range period and classify them respectively, Landsat as initial data and ALOS as end data. The classification of the images than convert to shapefile and processed with GIS to make the change/balance map. The economic value of the small island natural resource derived from economic valuation study or survey, include economic values of the land and the sea. The economic values than connected with the balance map and become small island economic value balance map. This map is important for the government not only visualize the economic values but also as a decision support tool.

SUMMARY (optional summary in Indonesian language)

Penelitian ini menggunakan prinsip-prinsip ekonomi untuk mengkuantitaskan nilai ekonomi sumber daya pulau kecil menggunakan citra penginderaan jauh dan sistem informasi geografi untuk menganalisa dan menampilkan secara keruangan nilai. Untuk mencari nilai ekonomi ekosistem pulau kecil diturunkan dari citra Landsat dan ALOS yang mempunyai perbedaan waktu yang panjang dan masing-masing citra dikelaskan. Hasil klasifikasi kemudian dikonversi dalam format shapefile dan diolah dengan program SIG untuk menghasilkan peta perubahan atau neraca. Nilai ekonomi sumberdaya alam pulau kecil didapatkan dari penelitian atau survei valuasi ekonomi, termasuk nilai ekonomi daratan dan lautan. Nilai-nilai ekonomi dihubungkan dengan peta neraca dan menjadi peta nilai ekonomi pulau kecil. Peta ini sangat berguna bagi pemerintah, tidak hanya menampilkan nilai ekonomi akan tetapi juga sebagai alat bantu pembuat keputusan.

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1. INTRODUCTION

As an archipelago, Indonesia has thousands of small islands. Small island which is defined as the island has a land area smaller than 1000 km² and a population of more than 100,000 inhabitants (Brookfield, 1990 in Dahuri, 2003). According to the Law of Republic Indonesia number 27 year 2007 small island is an island with an area less than or equal to 2000 km² and its unity of ecosystems. Management of small islands are required to be integrated by taking into account the main parameters that are limiting in the management of small islands such as the availability of fresh water resources and vulnerability to external influences. Therefore prudence principle concern should be done in the management of resources of small islands. Economic value or economic valuation of resources is needed in managing resources sustainable.

Small island ecosystems become attractive because of the strength of marine ecosystems that affect land habitats. Vegetation on the small island which usually has a simple structure with a small number of species. The small island is very high value because many of biota that are dependent on its existence. Some birds often utilize small island as a place to nest. Particular island is also used as a sea turtle eggs.

The island is a source of biological diversity. Occurrence of prolonged isolation of natural selection causing organisms that can live in the area. Therefore, the island is very interesting for scientists to study the various roles of this small island to human life and ultimately make the economic valuation of it.

The small island is one of the coastal and marine resources that have a variety of ecological and economic functions. The functions provide benefits to local communities as a source of life and their livelihood. The existence of these small islands resources should be kept to provide economic benefits and development of island communities, in addition to the continuity maintained. Therefore important to note clearly the characteristics of small island resources and ecosystems associated with it. Characteristics of small island resources is especially important to assess the resources, both ecological and economic assessment of small island resources.

2. OBJECTIVE

To evaluate small island natural resources balance and its economic valuation trough remote sensing and geographic information system and mapping them.

3. STUDY AREA

Pangkajene dan Kepulauan district known as Pangkep District consists of 898.29 km² land area and the sea area is 11,464.44 Km² (based on 4 miles from the coastline district border) with 112 islands, while 47 islands are uninhabited. The sea area consist of three sub district, e.i. Liukang Kalmas, Liukang Tangaya and Liukang Tupabiring, but as study area only Liukang Kalmas and Liukang Tangaya. The location of the study are is almost the center of Indonesia (Figure 1).



Figure 1. Study Area

4. METHODOLOGY

4.1 Material

The materials used in this study are:

- Indonesia Coastal Map (Peta Lingkungan Pantai Indonesia/LPI) scale of 1:50,000 as a basic map
- Landsat satellite imagery recorded in 1999. Landsat image used as initial data source. It is also used ALOS image AVNIR-1B in 2007 which is used as a source of end data.
- Statistical data time series (time series), including fisheries statistics Pangkep District (data fishing, fish production data, price data of fish, etc.). General statistic District Pangkep from local statistic office.
- Socio-economic data obtained from direct respondents (fishermen who take reef fish species) are: cost data (ships / boats, fishing equipment, maintenance, operations) and data revenues (production of fish and fish prices). Other supporting data is a characteristic of fishermen (age, gender, education, family dependents, etc.).

4.2 Software

- Image processing software ER Mapper 7.0
- GIS software ArcView 3.3
- Field work software ArcPad 6.0.3

4.3 Small Island Balance Map

Small island balance map derived from the GIS analysis of the Landsat (initial state) and ALOS (end state) result interpretation. There are two kind of interpretation for those images, first is Lyzenga Transformation with the result of sea natural resources classes, e.i: coral reef, seagrass, sand and the second is land classification with the result is land cover e.i. mangrove, plantation, open land, dry land forest. All of the classification result then converted into vector files (shape files). Union geoprocessing of ArcView 3.3 software proceed the shapefiles and the result is the balance maps (Neraca) of the small island.

4.4 Economic Valuation Methods

- primary data, ie data obtained from direct observations in the field, with in-depth interview method to the respondent based on a questionnaire which has been prepared in accordance with the purposes of analysis and research purposes.
- secondary data, ie data collected support from local government, Fisheries and Marine Pangkep District, State Statistic Agency and institutions associated with research materials, and that came from publications and research ever undertaken. The data collected in the form of data population issues, and marketing of fishery production, the existing infrastructure, government policies, economic activities in the research locations.

All of the process of the study described in the Figure 2 below.

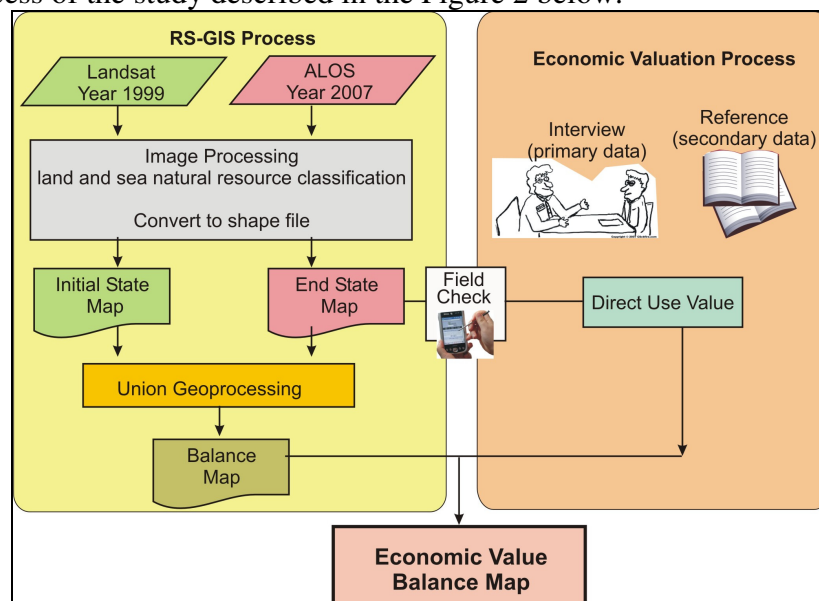


Figure 2. Flow Chart of the Study

6. CONCLUSIONS

- It takes a real effort to maintain the condition of small island natural resources that are still good through the awareness to all stakeholders (communities, fishermen, businessmen, etc.), And to rebuild coral reef, mangroves and land that have been damaged in various ways by involving various sectors (local communities, agencies related, universities, NGOs, etc.).
- The potential small island resources in the study area need to be developed for marine tourism, this is in addition to creating new job opportunities can also increase local revenues.
- Combination of RS-GIS and Economic Valuation Method could help us to analyze and visualize value of small island natural resource.

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BIOGRAPHICAL NOTES

Graduated from Faculty of Geography Gadjah Mada University, surveyor of coastal resources (coral reef, mangrove, seagrass) since 2005

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