

THE DIVERSITY AND DISTRIBUTION OF SEAGRASS IN KARANG TIRTA BEACH PADANG CITY, WEST SUMATERA

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ABSTRACT

Diversity and Distribution of Seagrass in Karang Tirta Beach Padang City, West Sumatera was conducted from April to June 2011. This study was intended to analyze the diversity, distribution pattern, coverage, composition and structure community of seagrass in Karang Tirta beach. Measurement of distribution aspect was analyzed with line transect method and sample of seagrass collected by using squares plot 0.5 x 0.5 m. Approximately 12 ha total of seagrass was estimated in various areas, such as: intertidal zone of tourism area, people settlement and mangrove zone. Seagrass distribution pattern was grouping category, and it was found 2 of 13 Species from Family Hydrocharitaceae of Indonesian seagrass exist, they were *Thalassia hemprichii* about 1.59 and *Enhalus acoroides* about 9.95. They were included into poor seagrass category with coverage ranged between 21.11% for *T. hemprichii* and 5.66% for *E. acoroides*. The highest species density was *T. hemprichii* (309.2 ind/m²) with appearance frequency value 100% and important value 252. The lowest species density was *E. acoroides* (7.73 ind/m²) with appearance frequency value 33.33% and important value 48.

Keywords: Diversity, Distribution, Seagrass, Ecology, Coverage.

Introduction

Seagrass is a plant that have the vascular structure and function are the same as plants on land. Seagrass is a plant that all part of it are include: fruit, flower, leaf and roots are growing on the substrate muddy, sand and rock that live submerged in seawater. The presence of seagrass in the marine contained about adjacent tidal areas (intertidal and subtidal) up to a certain depth where sun light can still reach the sea floor (Mann, 2000).

The main function of seagrass ecosystems can provide nutrients to the surrounding waters biota residing. Seagrass ecosystem is a primary produce in the food chain in marine waters with primary productivity ranged from 900-4650gC/m²/year. Growth, morphology, abundance and primary productivity of seagrass in an aquatic are generally determined by the availability of nutrients phosphate, nitrate and ammonium (Green and Short, 2003). Since 1980 until 2008, estimated seagrass in the world has been degraded by 54% (Bjork, et al, 2008).

Karang Tirta Beach is located in District Lubuk Begalung Padang, has a long coastline ± 3 km. On coastal slopes and broad enough in Kota Padang was found seagrass meadows. Generally, this area is a coastal tourist sites and run a traditional fishing boat harbor. The activities of these, either directly or indirectly impact on the balance and sustainability of seagrass ecosystems in the coastal areas. Reviewing some aspects of the ecology of seagrass communities, such as Scatter Pattern, Percent covering, composition and structure community of seagrass and its associated biota will be very helpful in providing information and monitoring the presence of seagrass ecosystem sustainability in the future (Supriyadi, 2010).

Material and Method

This study was conducted from April - June 2011 in Karang Tirta Beach, Padang. This extended in Laboratory Water Environment, Environment Engineering Department, Faculty of Engineering, Andalas University, Padang. Among other tools used Google Earth Map records in 2011, the square 0,5x0,5m. Swimming mask, fin, and snorkel, GPS, thermometer, handsalino refractometer, indicator pH Universal, underwater camera, spectrophotometer, computer, Whatman filter paper No.42, bottles 1 liter, and oven. While the material used is a solution of brucine 2%, H₂SO₄ concentrated solution of BaCl₂-tween.

Acquisition of data distribution pattern, composition and type of seagrass cover is done by line transect method, with data acquisition using the square 0,5x0,5m. Mapping the spread of seagrass survey conducted by in-situ method using GPS (Global Positioning System). Survey results were analyzed with GIS (Geographic Information System) using ArcView 3.3 program.

Results and Discussion

Karang Tirta Beach is better known by the community as Nirwana Beach. This coastal stretch has many environmental zoning. From the results of GIS analysis Karang Tirta coast has a long coastline ± 3 km. This area is divided into three zones ranging from residential zone residents (± 1200 m), tourist zone (± 800 m) and the mangrove zone (± 1000 m). Coral Coast of GIS analysis has predicted Karang Tirta area ± 65.86 ha. The area has a regional grouping of biotas spread pretty obvious. The area is dominated by seagrass, seaweed, mangrove and coral. Reefs in this area are at the limit of the ocean seabluff, it followed by the biota of sea grass and approached the coastline is generally covered by seagrass.

Visually in the residential zone waters are murky and dirty, black sand substrate, but still light penetration to the bottom waters. Formed black sand is thought to be caused by the input of household waste and organic material from small rivers in the surrounding areas. Waters close to population centers Baramah's river is widely used as a mooring boat of various sizes by the surrounding community. Most of the boats are fishing boats, but there are also used for tourism population to cross the sea to the Kasiak Island.

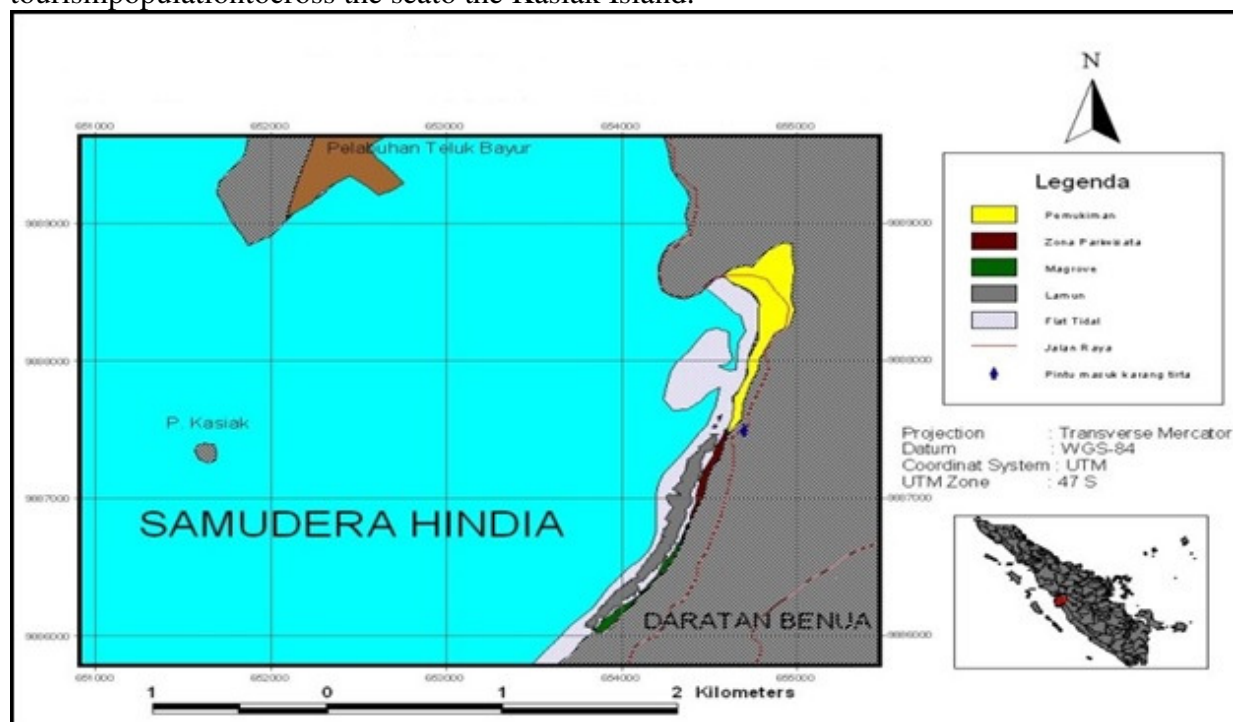


Figure 1. Zonation Map Karang Tirta Beach

In this zone are found trash (bottles, and plastic food wrap). Environmental conditions were very dirty water in this area does not make a lot of seagrass found, but in a residential zone that is close to the direction of the tourism zone began to reveal any seagrass the number and cover very little. Tourism zone is an area that has been covered with seagrass. It has a water substrate consisting of sand, rubble, dead's coral and lives' coral. This area is used by many tourists for swimming and fishing. The condition is not so clean waters, because the coastal dunes are still found garbage strewn.

Mangrove zone is an area that has water that is clean. Few found any waste in this area. This area is often bypassed by tourists, usually visited by several people to fishing. Mangrove forests are found in this region dominated by *Rhizophora* sp. Substrate in these zone is sand, mud and stone as well as a mix between the substrates. Seagrass ecosystem is an ecosystem that can provide a source of food and nutrients for the organisms. Healthy seagrass ecosystem can provide a placeto live, spawning and rearing children for other organisms. The presence of associated biota in seagrass ecosystem can provide an assessment of the ecosystem health (Bjork at all, 1999). Of the three zones are also found some other organisms that live in association with seagrass, some organisms were found in each of these zones is shown in Table 1.

Table 1. Other Biota in Seagrass Meadows Karang Tirta Beach

| No | Biota | Station I | Station II | Station III |
|----|----------------------------------|-----------|------------|-------------|
| 1 | <i>Padina</i> sp. (seaweed) | √ | √ | √ |
| 2 | Pisces (fish) | √ | √ | √ |
| 3 | Molusca (clam) | X | √ | √ |
| 4 | Crustacea (crabs) | X | √ | √ |
| 5 | <i>Spongia</i> sp. (spon) | √ | √ | √ |
| 6 | <i>Holothuridea</i> (sea urchin) | √ | √ | √ |

Where, √ = found and X = not found

Table 2. Physical-Chemical quality in Karang Tirta Beach

| Parameter | Stasiun I | Stasiun II | Stasiun III |
|------------------------|---------------|---------------|----------------------|
| Water Temperature (°C) | 33 | 32 | 33 |
| Salinity (‰) | 32 | 34 | 33 |
| pH | 7 | 7 | 7 |
| Depth (cm) | 8-34 | 13-57 | 18-58 |
| TSS (mg/l) | 12 | 10 | 12 |
| Nitrat (mg/l) | 0.050 | 0.048 | 0.042 |
| Phosphate (mg/l) | 0.035 | 0.045 | 0.050 |
| Substrat | Sand and Rock | Sand and Rock | Sand, Rock and Muddy |

Physical-chemical conditions of quality the water is one of the decisive factors for the growth and survival of seagrass. Growth, morphology, abundance and primary productivity of seagrass in an aquatic are generally determined by the availability of nutrients phosphate, nitrate and ammonium (Green and Short, 2003). The results of measurements of Physical-Chemical factors in shore Karang Tirta can be seen in Table 2.

Seagrass in the coastal waters Karang Tirta scattered at coordinates 1° 01.009 S and 100° 23.345 E until 1° 01.841 E and 100° 22.952 E with broad distribution area ±12ha. The distribution is found in intertidal areas in residential zones,

tourism zones and mangrove zones with distribution pattern of each species including clustered categories, the species is *Thalassia hemprichii* (1.59) and *Enhalus acoroides* (9.95).

The spread of seagrass on tidal flats is at midway between the edges of the shore. This zone is the intertidal zone, whereas the subtidal zone is dominated by *Turbinaria* sp. and *Sargassum* sp. ("Seaweed"). With the morphology and characteristics of shallow waters and has experienced the pressure of human activities. In Karang Tirta Beach was found two species of seagrass, they are *Thalassia hemprichii* and *Enhalus acoroides*. This species is a species that is often found in Indonesian. Previous studies in several regions in Indonesia such as waters in the Gulf waters Riau Bintan Island, Lembah Bitung North Sulawesi, East Kalimantan waters Derawan, Toli-Toli Bay North Sulawesi, also found on these seagrass *Thalassia hemprichii* and *Enhalus acoroides*. Of the 13 species of seagrass found in Indonesia is only two species of existence found in the Karang Tirta Beach.

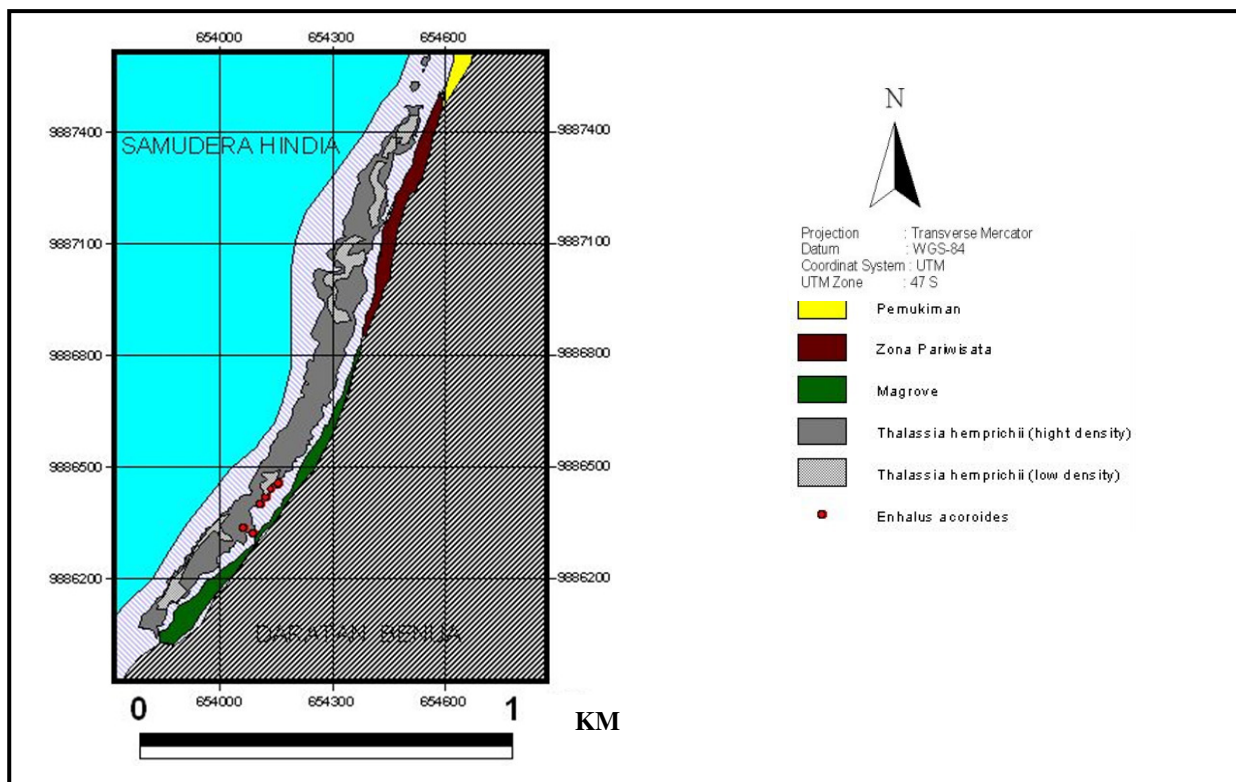


Figure 2. Seagrass Distribution in Karang Tirta Beach

Seagrass conditions in Karang Tirta Beach included in the poor category with an average cover percentage of 26.77%. The percentage of *Thalassia hemprichii* was 21.11% and *Enhalus acoroides* was 5.66%. The highest density is found in *Thalassia hemprichii* (309.20 ind/m²) with a frequency of 100% Attendance and Important Value Type 252. Lowest density is found *Enhalus acoroides* (7.73 ind/m²) with a frequency of 33.33% and the presence of Important Value 48.

Seagrass in Karang Tirta beach showed the importance of each different type. The importance value of *Thalassia hemprichii* is 252, whereas only amounted 48 for *Enhalus acoroides*. This condition shows the importance value of *Thalassia hemprichii* greater than *Enhalus acoroides*. Important magnitude value of *Thalassia hemprichii* this species has greater larger role in seagrass communities in the Karang Tirta beach than *Enhalus acoroides*. According to Odum (1971), the higher the importance value index of a kind to other strains within a community, the higher the type of role in the community.

In general it can be analyzed at least cover *Enhalus acoroides* seawater depth mismatch for growth. The nature of life is completely submerged seagrass in the water is a limiting factor for *Enhalus acoroides* growth. *Enhalus acoroides* leaves can reach about 1m (Kannan and Thangaradjou, 1999), intertidal zone at a depth of Karang Tirta only ranged from 8-58cm (Table 2), because of that makes this species cannot able to live on this area. This is also evidenced by the discovery of this species of fracture leaves decaying due to sunburn, this is because the tide was too low to make the leaves *Enhalus acoroides* no longer fully submerged in water.

Conclusions

Seagrass distribution area on Karang Tirta beach is ± 12 ha, spread the intertidal area in a residential zone, tourism zone and mangrove zone with their dispersal patterns of species including clustered categories. They are *Thalassia hemprichii* (1.59) and *Enhalus acoroides* (9.95). Condition of Seagrass in Karang Tirta Beach is classified as poor by the percentage cover an average of 26.77%. Seagrass in Karang Tirta was found two species they are *Thalassia hemprichii* and *Enhalus acoroides*, falling into the family Hydrocharitaceae. The highest density is *Thalassia hemprichii* (309.20 ind/m²) with a frequency of 100% attendance and Important Values 252. Density of *Enhalus acoroides* is 7.73 ind/m²) with frequency of attendance of 33.33% and 48 Important Values.

References

- Bjork, Uku, Weil, McLeod and Beer. 1999. Photosynthetic tolerances to desiccation of tropical intertidal seagrass. *Marine Ecology Progress Science*, 191 p:121-126.
- Bjork, M., Short, McLeod, dan Beer. 2008. *Managing Seagrasses for Resilience to Climate Change*. IUCN. Gland, Switzerland.
- Green, P. E dan Short, F. T. 2003. *World Atlas of Seagrasses*. Prepared by the UIMEP World Conservation Monitoring Centre. University of California Press, Berkeley, USA.
- Kuriandewa, T. E. and I. H. Supriyadi. 2006. Seagrass Mapping in East Bintan Coastal Area, Riau Archipelago, Indonesia, Indonesia. *Coastal Marine Science* 30 (1) p: 154-161.
- Mann, K. H. 2011. *Ecology of Coastal Water : With Implication for Management*. Blackwell Science, Inc. Massachuseter.
- Odum, E. P. 1971. *Dasar-Dasar Ekologi*. Diterjemahkan Oleh T. Samingan. Gadjah mada University press. Yogyakarta.
- Prahasta, E. 2002. *Sistem Informasi Geografis: Tutorial Arcview*. Informatika, Bandung.
- Supriyadi, I. H and T. E. Kurinadewa. 2008. Seagrass Distribution at Small Island: Derawan Archipelago, East Kalimantan Province, Indonesia. *Oceanologi dan Limnologi di Indonesia*. 34 (1) p: 83-99.
- Supriyadi, I. H. 2008. Pemetaan Padang Lamun di Perairan Indonesia: Kema Minahasa Utara, Sulawesi utara. *P2O-LIPI*, Jakarta.
- Supriyadi, I. H. 2010. Pemetaan Padang Lamun di Perairan Teluk Toli-Toli dan Pulau Sekitarnya Sulawesi Barat. 36 (2) p: 147-164.