

## THE COMMUNITY STRUCTURE OF SEAGRASS IN ENGGANO ISLANDS, BENGKULU

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### ABSTRACT

The community structure of seagrass in Enggano Islands has been studied in August 2004. The aim of the study was to assess the seagrass community including species composition, density, and distribution pattern. The study was executed using transect quadrat methods, where seagrasses were counted in quadrats of 50cm<sup>2</sup>. The result showed that the Enggano Islands seagrasses consist of seven species *Enhalus acoroides*, *Halophila ovalis*, *Thalassia hemprichii*, *Cymodocea rotundata*, *Cymodocea serrulata*, *Halodule uninervis*, and *Syringodium isoetifolium*. The highest density occurred in Dua Island dominated by *Thalassia hemprichii* (363.3 shoots m<sup>-2</sup>), while the lowest density occurred in Merbau Island dominated by *Enhalus acoroides* (0.4 shoot m<sup>-2</sup>). The highest diversity index (HB) occurred in Kiape Bay (1.446) and the lowest in Merbau Island (0.634). In general, seagrass community in Enggano Islands was dominated by *Thalassia hemprichii*. All species has clumped distribution pattern ( $Id > 1$ ).

**Keywords:** Enggano, Seagrass, Community, Density

### INTRODUCTION

Seagrasses are the only group of flowering plant which adapted to live submerged in the sea (Fortes, 1989). In many places, seagrasses cover extensive area and called as seagrass bed. Seagrass bed is the main source of primary productivity in marine shallow waters in the world (Nybakken, 1992) and also as a habitat for many marine organism (Nienhuis *et al.*, 1989).

At least 60 species of seagrasses are found in the world (Short *et al.*, 2001). Twelve species are in Indonesian waters (Kuriandewa *et al.*, 2003). Seagrass bed may consist of monospecific or mixed vegetation (Tomascik *et al.*, 1997).

Enggano Islands are located in Indian Ocean, west of Sumatera, Indonesia. Information about seagrass species in Enggano islands was still limited, only *Enhalus acoroides* (L.f) Royle ever stated in publication (Tomascik *et al.*, 1997).

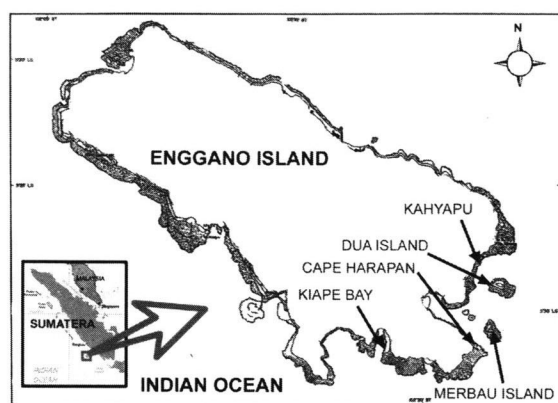
Seagrass bed could be lost due to natural and human impacts (Fortes, 1989). The aim of this

study was to assess the community structure of seagrass in Enggano Islands including species composition, density and distribution pattern.

### MATERIALS AND METHODS

Enggano Islands consist of Enggano Island as mainland, and a few small islands. Located on west side of Sumatera Island, Enggano Islands are surrounded by the Indian ocean. The data was taken on August 2004. Five sites were chosen namely Kahyapu, Harapan Cape, Kiape Bay, Dua Island, and Merbau Island (Fig.1). Preliminary surveys of the sites were done by snorkeling to determine sampling method.

In every site, 3 x 50 m transect were done, positioned perpendicular to the shore and located 25 m apart. Transects run parallel each other (McKenzie and Campbell, 2002). The data were taken using 50 cm<sup>2</sup> quadrat, which is divided into a 10 cm x 10 cm grid (English *et al.*, 1994). At each transect, 10 quadrats with 5 m interval ( $n = 30$  per



**Figure 1.** Five study sites in Enggano Islands, Indonesia

site) were taken. All seagrass species inside the quadrat were identified and surface substrate was recorded. Data were taken at low tide.

Density of each seagrass species counted as shoots.m<sup>-2</sup> (Cox 1976). Diversity index were computed using Brillouin index (HB) (Magurran, 1988)

and Morisita index (Id) for distribution pattern (Brower *et al.*, 1990).

## RESULTS

Seven species under six genera were found in Enggano islands (Table 1). They were *Cymodocea rotundata* Ehrenberg and Hemprich ex Ascherson, *Cymodocea serrulata* (R. Brown) Ascherson, *Halodule uninervis* (Forsskål) Ascherson, *Syringodium isoetifolium* (Ascherson) Dandy, *Enhalus acoroides* (L.f.) Royle, *Thalassia hemprichii* (Ehrenberg) Ascherson, *Halophila ovalis* (R. Brown) Hooker f.

The mean species density range from 0.4 shoots.m<sup>-2</sup> (*Enhalus acoroides*) to 363.3 shoots.m<sup>-2</sup> (*Thalassia hemprichii*). All seagrasses distribution patterns were clumped (Id>1) (Table 1). Diversity indexes (HB) in every site were in the range 0.636-1.446.

**Table 1.** Seagrass average density (D), diversity index (HB), and Morisita index (Id) in Enggano islands. *Thalassia hemprichii* (Th); *Enhalus acoroides* (Ea); *Cymodocea rotundata* (Cr); *Cymodocea serrulata* (Cs); *Halophila ovalis* (Ho); *Halodule univervis* (Hun); *Syringodium isoetifolium* (Si)

Site	HB	Species	Mean density (shoots.m <sup>-2</sup> )	Id	Substrate
Kahyapu	1.372	Th	100	5.59	muddy
		Ea	41.33	2.51	
		Cr	50.83	8.77	
		Cs	12.1	10.39	
		Ho	144.17	7.38	
Kiape Bay	1.446	Ea	39.6	1.96	muddy
		Cr	50.83	5.09	
		Cs	4.17	30	
		Ho	31.4	14.17	
		Hun	49.17	15.35	
Cape Harapan	1.184	Th	235	4.99	sand with living coral
		Ea	5.6	3.48	
		Cr	279.66	2.14	
		Cs	51.2	9.39	
		Hun	36.67	30	
		Si	4.17	30	
Dua Island	1.032	Th	363.3	2.53	sand with living coral
		Ea	0.4	30	
		Cr	55	5.4	
		Cs	107.57	5.9	
		Ho	45	30	
Merbau Island	0.634	Th	211.6	2.04	sand with living coral
		Cr	6.67	30	
		Cs	62.5	7.36	

## DISCUSSION

### Species composition

There were seven species of seagrass found in Enggano islands. Almost in every research site in Indonesia has different amount of species. Kiswara (1992) found four species of seagrass in Pari Island, Jakarta. Azkab (2002), found nine species in North Sulawesi. Meanwhile, in Gerupuk Bay, Lombok, Kiswara and Winardi (1999) found eleven species. Compared to the twelve species of seagrasses in Indonesian waters (Kuriandewa *et al.*, 2003), it seems likely that seagrasses in Enggano islands were common species.

Seagrass composition in each site was also different. *Cymodocea rotundata* and *Cymodocea serrulata* were found in all sites. *Enhalus acoroides* were found in all sites, except in Merbau Island. *Thalassia hemprichii* was also observed in all sites, except in Kiape Bay. *Halodule uninervis* only occurred in Kiape bay and Harapan Cape. *Halophila ovalis* was only found in Kahyapu, Kiape Bay and Dua island, meanwhile *Syringodium isoetifolium* was only in Harapan Cape. That differences could happen because their substrate were different. Kahyapu and Kiape Bay has muddy substrate, while the others are sandy with living coral (Table 1). Temperature, light, depth, current, salinity, substrate, nutrient, and human factors could affect the seagrass composition (Short *et al.*, 2001; Greve and Binzer, 2004).

### Density

Each site has different seagrass density (Table 1). The highest density was *T. hemprichii* in Dua Island (363.3 shoot.m<sup>-2</sup>). *T. hemprichii* occurred almost in all sites, except in Kiape Bay with high density (100-363.3 shoot.m<sup>-2</sup>) (Table 1). It is shown that seagrass community in Enggano Islands was dominated by *T. hemprichii*. Highest density for *T. hemprichii* may be because it could live in many kinds of substrate from sand to rubble (Tomascik *et al.*, 1997). Not every species of seagrass could live in many substrates. The other species in Dua Island has lower density (Table 1). It could be that *T. hemprichii* has tough rhizome and roots, so it could grow extensively in that area. Rhizome and roots of *T. hemprichii* could grow in the substrate to 15-20 cm deep (Tomascik *et*

*al.*, 1997). *T. hemprichii* was also has ability to grow in many substrates (Tomascik *et al.*, 1997) and sometimes more dominant than other species in intertidal area (Waycott *et al.*, 2004).

Among the other *E. acoroides* has the lowest density (0.4 shoots m<sup>-2</sup>). It is easy to realize this fact since it has the large form compared to the others. It has high density in muddy substrate Kahyapu and Kiape Bay (Table 1). *E. acoroides* is commonly found in muddy substrate, but could also be found in mid-sand to rough sand substrate (Tomascik *et al.*, 1997).

Density of seagrass depend on the species. Small size seagrass usually has higher density than large size seagrass (Nienhuis *et al.*, 1989). The mean density of *T. hemprichii* in Dua Island (363.3 shoot m<sup>-2</sup>) were higher than the density of the same species of the Sunda Strait (30-315 shoot m<sup>-2</sup>), but not higher than in Banten Bay (220-464 shoot m<sup>-2</sup>), Jakarta Bay (68-560 shoot m<sup>-2</sup>, Flores Sea (160-1820 shoot m<sup>-2</sup>) and Lombok (200-865 shoot m<sup>-2</sup>) (Kuriandewa *et al.*, 2003).

### Diversity

Briloin diversity index in each site were different. Kiape Bay has the highest diversity index (HB = 1,446), while the lowest happened in Merbau (HB = 0,636) (Table 1). Index diversity in seagrass bed is low because the highest amount of seagrass in seagrass bed is only 12 species (Duarte, 2000).

### Distribution pattern

All species of seagrasses in Enggano Islands were clumped (Id > 1) (Table 1). It is seen that each species tend to form group and distribute not in random or uniform manner at each site. The clumped pattern occurred because the seagrass vegetative reproduction was more dominant than the generative reproduction (Lacap *et al.*, 2002). If there were any fragment of viable rhizome and root released from its substrate, and moved to another area, it could grow and form new group (Waycott *et al.*, 2004).

Competition of species also could affect their growth and distribution (Greve and Binzer, 2004). Competition could happen because seagrass in Enggano were not in monospecific but in mix vegetation, so there were probably some competition between species in one site. Competition could happen because of the need to get nutrient and light (Greve and Binzer, 2004).

Seagrass in Enggano Islands are mixed vegetation with six species in Cape Harapan, three species in Merbau Island, and five species each in Kahyapu, Kiape Bay, and Dua Island (Table 1). Mixed vegetation pattern of seagrass are general in Indonesia (Tomascik *et al.*, 1997).

There is a need to do more research work in this area before any change or loss will occurred. Monitoring are also needed to ensure the continuous presence of seagrass in Enggano Islands.

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