Composition and Distribution Patterns of Seagrass in the Gulf of Tomini

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Abstract

This study aims to determine the composition and distribution patterns of seagrass species in the Gulf of Tomini, Tabulo Selatan Village and Keramat Village, Mananggu District, Boalemo Regency. This research was conducted for 3 months starting from June 2017 until August 2017. The method used was the line transect method at 2 village locations, each with 3 stations. The results showed that the composition of seagrass species at the study site consisted of seagrass *Cymodocea serrulata*, *Cymodocea rotundata*, *Enhalus acoroides*, *Syringodium isoetifolium*, *Thalassia hemprichii* and *Halophila ovalis*. Seagrass distribution patterns are included in the random and cluster categories.

Keywords: seagrass; composition; distribution.

Introduction

Indonesia's coastal region, has three distinctive ecosystems that are interrelated, namely coral reefs, mangroves and seagrass beds. These three ecosystems are in the same area, so the seagrass is in the middle between the mangrove ecosystem associated with the mainland and the coral reef ecosystem associated with the deep sea. Like mangroves and coral reefs, seagrass beds are also important ecosystems for life at sea and on land (Kordi, 2011).

According to Nontji in Hasanuddin (2013) seagrass beds have the role of providing shelter and a place to attach various animals and algae plants. In addition, seagrass beds can also function as nurseries and foraging areas for various species of herbivorous fish and reef fish. Dense seagrass leaves will reduce the movement of water caused by currents and waves, so that the surrounding waters become calm. In addition, rhizomes and seagrass roots can hold and bind sediments, so they can strengthen and stabilize the sea bed.

There are about 50 species of seagrass found in the world that grow in shallow sea waters based on mud and sand. In Indonesia, only 12 species of seagrass have been identified, namely: *Enhalus acoroides*, *Thalassia hemprichii*, *Cymodocea rotundata*, *Cymodocea serrulata*, *Thalassodendron ciliatum*, *Halinerule uninervis*, *Halodule pinifolia*, *Halophila decipiens*, *Halophila ovalis*, *Halophila cucosa*, *Halophila islucillus*, *Halophila islima* (Amethystilila 1999).

Information on the distribution of seagrasses in Tomini Gulf waters has been reported, especially in Boalemo District. As reported by Ibrahim (2015) that there are 2 types of seagrass distribution, namely *Enhalus acroides* and *Cymodocea rotundata* in Pentadu Timur Village, Tilamuta District, Boalemo Regency.

The purpose of this study was to determine the composition and distribution patterns of seagrass species in the Gulf of Tomini, Tabulo Selatan Village and Keramat Village, Mananggu District, Boalemo Regency.

Research Methodology

The research activities carried out for 3 months starting from June 2017 until August 2017 took place in the Gulf of Tomini, South Tabulo Village and Keramat Village, Mananggu District, Boalemo Regency.

The method used is the line transect method (Fachrul in Mulyaningsih, 2015). Observation and sampling of seagrass is done when the tide is low. Each station is divided into 2 (two) substations with the distance between substations adjusted to the presence of seagrass in the observation location.

Sampling at each station is done by installing a transect line from land to the sea in the seagrass ecosystem. Each transect is placed in a quadrant measuring 1 x 1 meter alternately with a total of 4 quadrants or more (adjusted for the distribution of seagrass at the observation location) and the distance between quadrants is 1 meter. To facilitate observation, the quadrant is divided into 16 plots with a size of 25 x 25 cm. Seagrass found in identification using identification guidelines refers to Azkab (1999).

Environmental parameters measured at the time of the study were measurements of temperature, salinity, pH, brightness, depth and substrate observation. Measurements and observations are carried out directly in the field together with seagrass observations.

Data obtained during subsequent studies were analyzed to determine the level of seagrass composition and distribution patterns. The composition of seagrass species was calculated using the formula (English et al. in Sakaruddin, 2011). According to Odum in Hardiyanti et al. (2012) species distribution patterns were determined by calculating the Morisita Dispersion Index. The pattern of seagrass dispersion is determined by using criteria that is Id <1 is a uniform distribution pattern, Id = 1 is said to be a random distribution pattern, while Id> 1 then the distribution pattern is clustered.

Results and Discussion

Seagrass species

The number of seagrass species found during the study were 6 species belonging to two families namely Potamogetonaceae and Hydrocharitaceae, as presented in Table 1.

Table 1. Species of seagrass found on site

Species	Stations					
	1	2	3	4	5	6
Cymodocea rotundata	x	x	x	-	x	x
Cymodocea serrulate	-	-	-	x	-	x
Syringodium Isoetifolium	-	-	-	-	x	-
Enhalus acoroides	x	x	x	-	-	x
Halophila ovalis	-	x	x	-	x	x
Thalassia hemprichii	x	x	x	-	-	x

Source: primary data (2017)

Remarks: (x) = sea grass exist
(-) = no sea grass

Table 1 shows that there are differences in the distribution of species in the two villages with the highest number of species found in Keramat Village. There is a pattern of species emergence at each station. The highest pattern of appearance or frequency of presence of seagrass species in all observation stations namely *Thalassia hemprichii*, *Enhalus acoroides*, *Cymodocea rotundata*, these three types of seagrass have the ability to adapt to live in a variety of habitats and substrates well so that it is spread almost in all observation stations as stated by den Hartog in Nurzahraeni (2014) that Magnozosterid seagrass species (seagrass with long leaf shape and resembling ribbons with leaves that are not too wide) can be found in various habitats, this seagrass species is often found in shallow to exposed areas when the sea water recedes. Of the three types of seagrasses, two of them (*Thalassia hemprichii*, and *Cymodocea rotundata*) are species that are included in the type of Magnozosterid.

At Stations 2 and 3 in Tabulo Selatan Village the frequency of attendance is uniformly different from Station 1 which can be said to vary because not all seagrass types are found at that station. Keramat Village initially had a greater number of species encountered, but its appearance at each station was said to be diverse or varied. The highest appearance or frequency of presence of almost all seagrass species is found in locations near mangrove ecosystems.

Seagrass Composition

According to Brower et al. in Fauziyah (2004) the composition of seagrass is the percentage of the number of individuals of a type to the total number of individuals. This calculation is used to determine the type or species of an organism and the percentage of its type in an area of research. The composition of seagrass species at the study site had different values at each observation station. Composition value of seagrass species found at the research location can be seen in Table 2.

Table 2. Composition of seagrass at stations

Species	Stations					
	1	2	3	4	5	6
Cymodocea rotundata	10	87,8	60,9	-	59,4	27,7
Cymodocea serrulata	-	-	-	100	-	15
Syringodium isoetifolium	-	-	-	-	39,5	-
Enhalus acoroides	50,8	5,6	33,2	-	-	43,5
Halophila ovalis	-	3,1	2,7	-	1,1	0,1

Thalassia hemprichii	39,2	3,6	3,1	-	-	13,7

Source: primary data (2017)

Table 2 shows the composition value has a pattern that tends to vary. The seagrass that dominates and is almost evenly distributed at each observation station is *Cymodocea rotundata*, this type can adjust to the characteristics of the habitat at the study site. According to Brouns and Heijs in Nurzahraeni (2014) that *Cymodocea rotundata* likes sun-exposed waters, a cosmopolitan seagrass, which can grow in almost all habitat categories.

The condition of seagrass vegetation in Station 4 of Keramat Village tends to be single (dominated by one type of seagrass), namely *Cymodocea serrulata*. The high value of this composition may be influenced by substrate and environmental conditions suitable for its growth. Growth characteristics of *C. serrulata* are classified as Magnozosterid type which has high tolerance to environmental variations (Azkab, 2000). This species also usually lives in a single vegetation, as stated by Dahuri in Nainggolan (2011) seagrass grows to form a single vegetation to form dense fields.

The lowest composition value is at Station 6 for seagrass *Halophila ovalis*. The low value of the composition of species of seagrass *Halophila ovalis* allegedly occurred interspecific competition that is competition between individuals of different seagrass species. Begon et al. in Tasabaramo (2016) states that competition between individuals can affect growth and reproduction.

The difference in composition values that occur at the study site, may be due to the different depth of the substrate, so that seagrass grow in separate groups. The condition of the substrate in the two villages is still said to be suitable for the growth and development of seagrass, with different types of substrate depth (sediment). As stated by Berwick in Putri (2004) that the suitability of the most important substrates for seagrass growth and development is characterized by sufficient sediment content. The thinner the water substrate will cause unstable seagrass life, conversely if the thicker the substrate, the seagrass will flourish, this condition will directly affect the number of individuals and the dominance of seagrass in the waters.

Distribution pattern

According to Odum in Hardiyanti et al. (2012) that the distribution pattern is a qualitative parameter that describes the existence of organism in a horizontal space. By calculating the distribution value it can determine the distribution pattern, that is, random distribution, uniform and clustered. The distribution patterns can be seen in Table 3.

Table 3 Morisita Index *(Id)* for each species

Species	Stations					
	1	2	3	4	5	6
Cymodocea rotundata	1	2,42	1,59	-	1,13	1,26
Cymodocea serrulata	-	-	-	1,08	-	1,23
Syringodium Isoetifolium	-	-	-	-	1,60	-
Enhalus acoroides	1,15	1,43	1,13	-	-	1,43
Halophila ovalis	-	1,12	1,10	-	1	1
Thalassia hemprichii	1,04	2,13	1,13	-	-	1,64

Source: primary data (2017)
Remarks: $Id < 1$ Uniform
$Id = 1$ Random
$Id > 1$ Clustered

Morisita index for all species is in the range of 1 - 2.13. This shows that the pattern of seagrass distribution at the study site has 2 patterns, random and clustered.

Specifically, at Station 1 for seagrass *Cymodocea rotundata* and Stations 5 and 6 for seagrass *Halophila ovalis* showed a pattern of random spread. This random distribution may be due to disruption of human activities such as passing and entering the boat and used as a place for boat moorings that can reduce the number of stands and number of species and make seagrass leaves cut or pulled. Nontji in Muhaimin (2013) states that seagrass damage caused by physical and environmental disturbance both by nature and humans can affect the number of stands, density, and distribution patterns. Soegianto in Hardiyanti et al. (2012) added that random distribution patterns occur when the availability of resources needed among individuals in the population is relatively evenly distributed.

In addition to the random distribution pattern of the two species mentioned at certain stations above, the most dominant distribution pattern is clustered. The grouping that occurs is thought to be due to the habitat environment that is suitable for the growth needs of the six seagrass species. Putri in Mulyaningsih (2015) states that the clustered distribution is influenced by substrate and environmental conditions. Manginsela et al. in Hardiyanti et al. (2012) added, clustering patterns are caused by the presence of a habitat environment that is in accordance with the growth needs of the species such as substrate, pH, and other parameters as well as responses to weather changes.

Judging from the distribution values in Table 3 there are differences in the grouping values of each observation station, this is because the nature of growth of each species is different. Fauziyah (2004) said the grouping was driven by the nature of the growth process of seagrass using rhizoma roots and differences in the content of basic substrate nutrients.

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