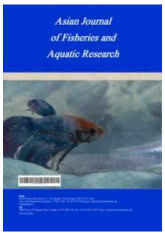

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# Structure of Seagrass Community in the Karapyak Beach, Pangandaran Regency, West Java

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***Authors' contributions***

*This work was carried out in collaboration among all authors. Author AAPS designed the study, conducted field visits, wrote the first draft of the manuscript, conducted data analysis and wrote the final manuscript. Author H. Hamdani provided guidance on literature search and data collection techniques. Author H. Herawati provides guidance in writing the manuscript. Author MRI is the total supervisor and ensures its accuracy of results. All authors read and approved the final manuscript.*

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## ABSTRACT

Karapyak Beach is one of the beaches that has a variety of abundant marine ecosystems. One of the marine ecosystems is seagrass. This study aims to identify the structure of seagrass communities in Karapyak waters based on seagrass species, species density, species frequency, diversity, and uniformity. This research was conducted in February – April 2021. The method used is a survey method with direct observation at each predetermined station using a square transect measuring 1 x 1 $m^2$. While the determination of stations and observation points is done by purposive sampling method. The research location is divided into three stations, each station is divided into five substations (plots), and a 50 m transect line is made perpendicular to the shoreline. Furthermore, the results showed four types of seagrass found in the waters of Karapyak Beach, namely *Cymodocea rotundata, Thalassia hemprichii, Halodule pinifolia, Halodule uninervis*. The density of seagrass at station I was in the medium category, namely 125 individuals/m2, with a

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cover percentage of 86%. Then the lowest seagrass density was found at the second station, which was 104 individuals/m2 including the unhealthy category with a cover percentage of 58%. While the highest density score was shown at the third station, namely 144 individuals/m2 with a closing percentage of 94%.

*Keywords: Community structure; seagrass; Karapyak Beach.*

## 1. INTRODUCTION

Seagrass is one of the shallow marine ecosystems which play an important role in the life of marine organisms as they provide nursery areas for several species and contain important stocks of bleu carbon (Heck K, Hays G, Orth RJ. 2003), and is one of the most productive marine ecosystems, so as to support the high resource potential [1]. Among the ecological functions of seagrass ecosystems is as a primary producer, stabilizer of the seafloor with a root system that can capture sediment (trapping sediment), a source of food for aquatic biota (feeding ground), a shelter for marine biota from predator attacks.

Environmental factors such as temperature, current, salinity, light transparency, nitrate phosphate, substrate, and human activities in the form of excessive waste disposal have a major influence on community structure, growth, morphometry, and distribution patterns of seagrass. Therefore, it is necessary to protect and study seagrass beds so that their functions can be maintained; it is important to determine the structure of the seagrass communities [2].

Karapyak Beach is located in Bagolo Village, Kalipucang District, Pangandaran Regency, West Java, or about 20 km from Pangandaran Beach with coordinates 07°41′31.6″LS 108°45′11.9″E. Karapyak Beach is a type of rocky and sandy beach that has a high diversity of biota [3]. According to Nana [4] the presence of seagrass on the Karapyak beach in previous years seagrass meadows were still found almost throughout the area, but recently it has been observed that the population of seagrass is decreasing. This is presumably due to the pollution arriving through river flows that carry various organic materials that pass to the seagrass ecosystem and also due to a large number of tourism activities in this zone.

Seagrass resources have a close dependence on water quality and are very vulnerable to environmental changes caused by human activities including: the impact of destructive fishing, domestic and industrial waste disposal, [5]. The presence of seagrass ecosystems on the Karapyak coast has not been widely reported andstudied, so we propose to analyze data regarding the structure of the seagrass community based on the species of seagrass, determining species density, species frequency, diversity and uniformity in order to increase knowledge about the role and function of these ecosystems in shallow coastal areas.

## 2. METHODOLOGY

### 2.1 Research Sites

This research was conducted in February – April 2021 in Karapyak Coastal Waters, Kalipucang District, Pangandaran Regency, West Java Province.

Samples were taken at three stations, one station had clear water conditions, sediment texture correspond to rocky sand and there are abundant macrobenthic organisms attached to the rocks, station 2 has less clear water conditions because there is a flow of waste waters from the nearby community, while station 3 has very clear water conditions because there are no activities carried out on that area.

### 2.2 Materials and Methods

To measure physic and chemical parameters we used the following equipment: a mercury thermometer, Secchi disk, current meter, pH-meter, refractometer, DO meter, spectrophotometer, hand counter, quadratic transect, roll-meter (Global Positioning System GPS), camera, stationery, cool box, sample bottles, Seagrass Monitoring Guidebook by CPREMA CTI, LIPI. The materials collected were samples of seawater and seagrass.

### 2.3 Methods and Data Analysis

The research method used is a survey method. This method is the basis for taking data for research. The descriptive exploratory method was using to describe the condition of seagrass in the study area [6], and the purposive sampling method used to obtain samples and make the location randomly based on the representation of different characteristics in the research location [7].

The data obtained were analyzed quantitatively, using a comparative descriptive method, comparing each value of the physical, chemical parameters, and from the results of the calculation of cover, frequency, species density, diversity and uniformity of seagrass with quality standard criteria for seagrass damage Shannon-Wiener diversity index, evenness of Pielou and (Kepmen LH No. 200 of 2004).

### 2.3.1 Seagrass data collection seagrass

Data collection at each location was carried out using the line transect method by drawing a line parallel to the coastline towards the sea (perpendicular to the coastline along the seagrass zone) using a transect plot of 50 meters, each transect in each sub-plot has a transect distance of 10 meters. The transect plot placement was carried out at each substation that has been determined and is expected to represent the condition of seagrass beds at each observation station that is on a line drawn through the seagrass ecosystem area [8]. The plot used is a transect with a size of 1m$^2$ made of PVC pipe.

### 2.3.2 Parameters observation of seagrass

*2.3.2.1 Seagrass cover*

Seagrass cover are the area covered by an i-type. Species cover was calculated using the Odum formula [9] in Fachrul [8]:

$$Ci = \frac{ai}{A}$$

Information:

Ci = Covered
Ai = Number of species-i
A = Total sampling area

*2.3.2.2 Relative cover*

Cover Relative cover is the ratio between individual cover types to- i with the total number of closures of all types. Species relative cover is calculated using the formula [8]:

Description:

$$Rci = \frac{Ci}{\sum C} x\ 100$$

Rci =relative cover
Ci = Species cover area
∑C =Total cover area for all species

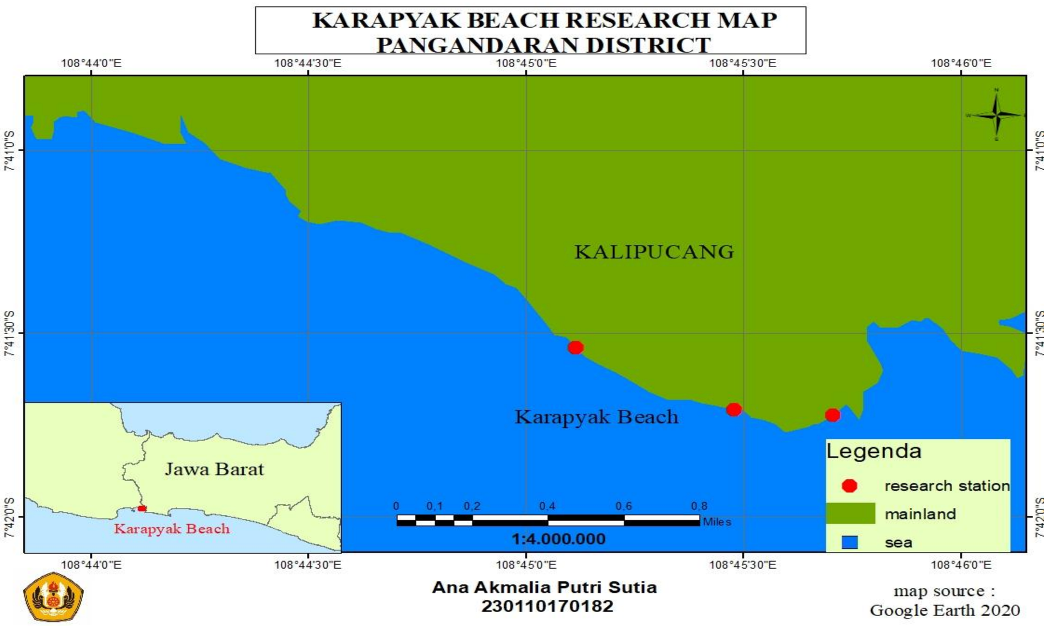


**Fig. 1. Map of research locations**

Seagrass cover area based on Kepmen LH no. 200 of 2004 can be seen in Table 1.

**Table 1. Seagrass condition closure category**

| Closing percentage | Seagrass condition |
|---|---|
| >60% | Very good |
| 50% | Good |
| 25-49% | Currently |
| <25% | Bad |

### 2.3.3 Seagrass frequency

Frequency is the probability of a species being found. The frequency of Species is calculated by the formula Odum [9] in Fachrul [8]:

$$Fi = \frac{Pi}{\sum P}$$

Information:

Fi = Frequency of the ith
Pi = Number of sample plots where species are found -i
Σp = Total number of sample plots observed

### 2.3.4 Frequency relative

Relative frequency is the ratio between the frequencies species (Fi) with the sum of the frequencies of all species (ΣFi) with the formula Odum [9] in Fachrul [8]:

$$RFi = \frac{Fi}{\sum F}\ x\ 100$$

Information:

RFi = Relative Frequency
Fi = Frequency of species-i
ΣF = The sum of the frequencies of all species Species

### 2.3.5 Density

To calculate the density of species, take samples in the field and count the number of stands. Calculation of density using the formula Odum [9] in Fachrul [8]:

$$Di = \frac{Ni}{A}$$

Information:

Di = Density of species (number of individuals/m$^2$);
Ni = Number of individual stands of the ith species
A = Area of sampling area (m$^2$)

### 2.3.6 Density relative

Density is the ratio between the number of individual species and the total number of individuals of all species using the formula Odum [9] in Fachrul [8]:

$$Di = \frac{ni}{\sum n}\ x\ 100$$

Information:

Rdi = Relative density
Ni = Total number of stands of species-i (stands)
Σn = Total number of individuals of all species

### 2.3.7 Important value important

Index value is used to calculate the overall role of seagrass species in a community. The formula used to calculate the significant value index is Odum [9] in Fachrul [8]:

INP = FR + KR + PR

Information:

INP = Importance value index
FR = Relative frequency
KR = Relative density
PR = Relative cover

### 2.3.8 Diversity

Diversity value is determined based on the Shannon-Wiener diversity index using the formula Odum [9] in Fachrul [8]: Shannon-Weaver

$$H' = -\sum_{i-1}^{s} p_{i\,Log_2\,p_i}$$

Information:

H' =diversity index Weiner
$p_i$ = $\frac{ni}{N}$ = The ratio of the number of individuals of a species to the whole species
$n_i$ = Number of individuals of the ith species
N = Total number of individuals of all species

The range of the diversity index (Shannon-Weiner, 1949) is categorized according to the values in the following Table 2:

**Table 2. Categories of Diversity I**

| No | Diversity Index | Criteria |
|---|---|---|
| 1 | >3 | High diversity |
| 2 | 1-3 | Medium diversity |
| 3 | <1 | Low diversity |

#### 2.3.9 Evenness

The uniformity index value is used to determine how much similarity is the distribution of the number of individuals of each species by comparing the diversity index with its maximum value, with the formula Odum [9] in Fachrul [8]:

$$E = \frac{H'}{H\ maks}$$

Information:

E = Evenness index
H' = Diversity index
H'max = Maximum diversity index = ln S
S = Total species

The uniformity index [10] and Pielou evenness were categorized based on the following values (Table 3):

**Table 3. Categories of evenness index values**

| No | Index Values | Criteria |
|---|---|---|
| 1 | >0,6 | Stable |
| 2 | 0,4-0,6 | Less stable |
| 3 | <0,4 | Stressed |

## 3. RESULTS AND DISCUSSION

### 3.1 Physical and Chemical Conditions in Karapyak Costal Waters

#### 3.1.1 Temperature

Temperature is a very important parameter for the survival of biota or organisms in the waters, aquatic organisms have different tolerances for temperature. The temperature obtained from the measurement results at three Karapyak coastal water stations ranged from 29-31ºC. The temperature needed by seagrass plants for photosynthesis is between 28-35ºC while for seagrass growth requires an optimal temperature between 28-30ºC. (Kepmen LH No. 51 of 2004). According to Hutomo and Azkab [11] the normal temperature for seagrass growth in tropical waters ranges from 24-35ºC. So, the temperature conditions in the waters of Karapyak Beach are still suitable for the life of seagrass ecosystems.

#### 3.1.2 Salinity

Salinity is one of the parameters of water quality that affects the growth of seagrass. The results of salinity measurements at the three research stations showed a uniform salinity range of 31-32 ppt. Salinity measurements were carried out during the day when the seawater was high, the salinity obtained at the time of measurement was still in the optimal range for seagrass growth, because the salinity of seawater is generally 30-35 ppt. So, the salinity obtained in the waters of Karapyak Beach is classified as good for the growth of seagrass and other organisms. This is in accordance with the statement put forward [12] that type Seagrass plants have tolerance to different salinities in the range of 10-40 ppt, with the optimum value of tolerance for seawater salinity that is good for seagrass growth is 35 ppt.

#### 3.1.3 Brightness

Brightness at each station in Karapyak coastal waters is 100%, the brightness condition is high because the seagrass ecosystem is still visible to the bottom of the waters and can make it easier for sunlight to penetrate the sea surface so that seagrass plants can photosynthesize well because the water depth ranges from 0-100 cm. Based on data from observations in the field, it can be seen that the waters of Karapyak Beach are clear shallow waters, these conditions affect the growth of seagrass and the capacity of seagrass to produce as the main producers in the waters, good sun penetration will make it easier for seagrass to grow [13]. This brightness condition shows that the waters of Karapyak Beach are still supportive for the growth of seagrass and other marine organisms.

#### 3.1.4 Current velocity current

Velocity greatly determines the growth of aquatic plants, either floating or anchored to the bottom of the water, when the current velocity is about 0.5 m/s seagrass plants have the maximum ability to grow [14]. The results of current velocity measurements in the Karapyak Coastal Waters during observations ranged from 0.03-0.06 m/s, overall the current condition of the waters was included in moderate speed conditions, very high current speeds could result in an increase in suspended solids which could reduce the brightness in the water, these conditions can cause the low rate of production of seagrass plants [15].

The growth and life of seagrass beds are also influenced by the speed of currents in the waters. The flow and movement of water is very important because it is related to the supply of nutrients, the availability of dissolved gases and dispelling the remnants of metabolism or waste water [16]. In addition, the movement of water also causes the leaves to bow so as to reduce light penetration, this can cause the photosynthesis of seagrass to decrease due to the reduced amount of light hitting the seagrass [17].

### 3.1.5 Dissolved oxygen (DO)

Dissolved oxygen (DO) has a very important function. important for the life of marine organisms as well as being one of the limiting factors for the life of organisms. The solubility of oxygen allows it to decrease due to rising water temperatures and increasing salinity. The DO measurement results in the waters of Karapyak Beach ranged from 6.9 to 7.5 mg/L These conditions are included in the good category for seagrass plants. According to Kepmen LH No. 51 of 2004, optimum seagrass species grow in waters with DO >5 mg/L. These conditions can support the life of seagrass and other marine organisms [18].

### 3.1.6 The acidity (pH)

The pH value shows the degree of acidity of a waters, the degree of acidity (pH) is an important factor to control the activity and distribution of organisms that live in a waters so that it can be used as a guide to state the good or bad of a waters [19]. The results of the measurement of the degree of acidity (pH) obtained in the waters of the Karapyak Beach ranged from 7.4-7.6 the pH value in the waters of the Karapyak Beach was still fairly normal or had not exceeded the quality standard for seagrass growth. Based on the Minister of Environment Decree number 51 of 2004 concerning the pH quality standard for seagrass growth, it ranges from 7-8.5, because when the pH conditions are in that range, the bicarbonate ion needed by seagrass for photosynthesis is abundant [19].

### 3.1.7 Nitrate

Based on the results of the average measurement of the nitrate content in the waters of Karapyak Beach when compared with the quality standard of Kepmen LH No. 51 of 2004, the nitrate value obtained is in the range of 0.033-0.095 mg/L, which is above the quality standard of 0.0008 mg/L. If the nitrate content is >3.5, it will result in water enrichment (eutrophication), which in turn stimulates the growth of algae and aquatic plants [20,2]. So the nitrate content in the waters of Karapyak Beach does not harm the waters or other organisms and can support the growth of seagrass.

### 3.1.8 Phosphate

Phosphate is a nutrient that is needed by plants to grow and has an effect on the biomass content and growth of seagrass. The average results of measurements of phosphate content in the waters of Karapyak Beach at each research station ranged from 0.072 to 0.154. The measured phosphate content in Karapyak coastal waters is already above the quality standard for seagrass according to Kepmen LH No. 51 of 2004, which is 0.015 mg/L. The high level of phosphate in the waters of Karapyak Beach is caused by the mixing of fresh water mass produced by community waste from land in the form of domestic waste mixed with sea water and accumulated in the substrate. In addition, high levels of phosphate are also caused by the diffusion of phosphate from the substrate, because the substrate is the main storage place for phosphate in the waters [21].

### 3.1.9 Composition of seagrass species

Four species of seagrass were found in the waters of Karapyak Beach, namely *Cymodocea rotundata, Thalassia hemprichii, Halodule pinifolia, and Halodule uninervis.* Seagrass species *Cymodocea rotundata, Thalassia hemprichii*, and *Halodule uninervis* are large seagrass species that are commonly found at every observation station compared to seagrass types *Halodule pinifolia.* The dominant seagrass species in Karapyak coastal waters are *Cymodocea rotundata* and *Thalassia hemprichii*.

**Table 4. Types of seagrass plants found in Karapyak Coastal Water**

| No | Jenis Lamun | Stations | | |
|---|---|---|---|---|
| | | 1 | 2 | 3 |
| 1 | *Thallassia hemprichii* | √ | √ | √ |
| 2 | *Cymodocea rotundata* | √ | √ | √ |
| 3 | *Halodule pinifolia* | √ | √ | √ |
| 4 | *Halodule Uninervis* | √ | √ | √ |

Many species of seagrass Cymodocea rotundata are found in the waters of Karapyak Beach, the number of species of seagrass *Cymodocea rotundata* indicates that the seagrass can adapt to the characteristics of the waters of Karapyak Beach which has optimal temperature, salinity and has a substrate type of rocky sand and muddy sand which is in accordance with the type of seagrass. the. *Cymodocea rotundata* is one of the most common types of seagrass found and is easily recognizable because it has jagged leaf edges and completely closed leaf sheaths, The seagrass species.

Halodule pinifolia is found in the waters of Karapyak Beach, the seagrass can also grow in shallow waters with sandy substrates (Sahami 2013), is a seagrass species that has relatively small size, long flat leaves and has smooth rhizomes with black leaf marks, this seagrass species.

Thalassia hemprichii has a characteristic curved leaf shape, dark green and segmented with the number of strands in one stand of 2-5 leaves and small black spots, *Thalassia hemprichii* can be found in interdal areas along the Indo-Pacific coast [22].

While the halodule uninervis species is a seagrass species that has characteristics of small size, long flat leaves, smooth rhizomes with blackened leaves and leaf tip shape resembling a trident (Kepmen LH No. 200 of 2004).

## 3.2 Species Density

Based on the results of seagrass density data, it can be seen in (Fig. 2) that the density value of seagrass species is different at each observation station. The highest seagrass density value was at station 3 which had a total stand value of 144 ind/m$^2$ and the lowest seagrass density was found at station 2 which had a total stand value of 104 individuals/m$^2$ (28% less than station 3). Because at station 2 there was a flow domestic waste and anthropogenic activity, while at stations 1 and 3 no anthropogenic activity was that can damage the seagrass ecosystem.

According to Gosari and Haris [23] for the condition of seagrass beds that have a number of stands or a density value of >175 (very dense), the number of stands is 125-175 (dense), the number of stands is 75-125 (slightly dense), the number of stands 25-75 (seldom), and the number <25 (very seldom). Judging from this information, the density of seagrass in the waters of Karapyak Beach is classified as a meeting category.

At Station 3 *Cymodocea rotundata* has the highest density value than other seagrass species, this is because Cymodocea rotundata has good adaptation to environmental conditions and has roots that spread and strengthen on aquatic substrates so that it has a wider area of distribution. The lowest density is found in Halodule pinifolia species, this is because *Halodule pinifolia* is a type of seagrass that is small and has smooth and thin roots [24].

## 3.3 Percentage of Seagrass Cover

Percentage of cover of seagrass can describe how extensive the plants occupy the seafloor. Based on (Fig. 3) it shows that each station has different seagrass cover, judging from the percentage value of seagrass cover found at station 2 has disturbances originating from human activities such as domestic waste disposal so that it has the smallest percentage of closure, and the percentage value of closure the lowest.

It can be obtained that the results of data collection percentage of seagrass cover using the quad rant transect method with a size of 1 × 1 m$^2$ at Karapyak Beach, at station 1 get the percentage value of seagrass cover 86%, At station 2, the proportion of seagrass cover obtained 58%, Percentage of seagrass cover at station 3 was 94% (Fig. 3).

The percentage value of seagrass cover at stations 1 and 3 was included in the healthy category, in contrast to the value of seagrass cover at station 2 which was included in the less healthy category. Seagrass cover at stations 1 and 3 were found to have more stands/individuals of seagrass because human activities were rarely found around seagrass plants, compared to station 2 with a total of 58 ind/m$^2$.

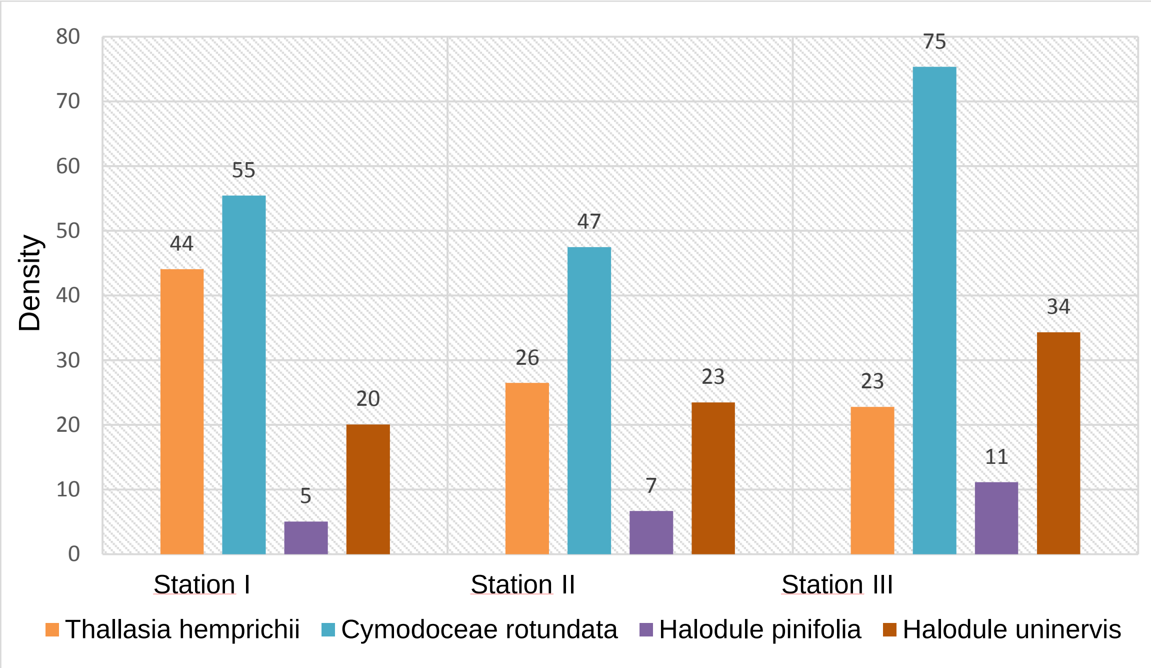


**Fig. 2. Density of seagrass species**

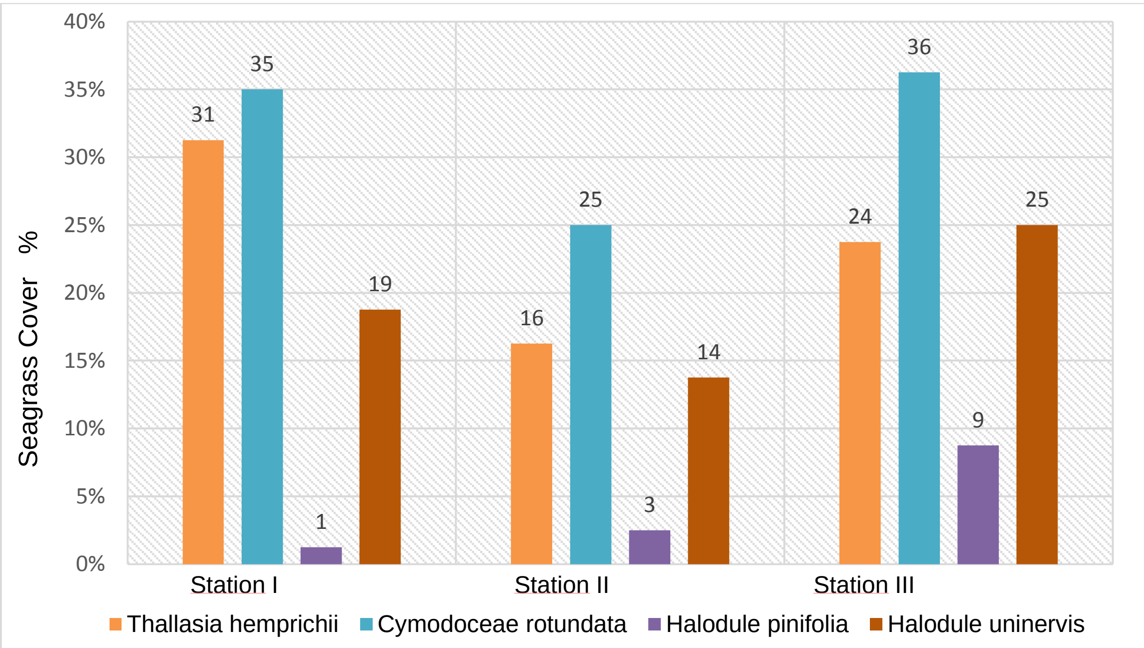


**Fig. 3. Percentage of seagrass cover**

Unhealthy seagrass cover at station 2 was influenced by surrounding activities. such as the presence of tourists swimming around seagrass plants and the flow of domestic wastewater from inns and shops around the beach, this is in accordance with the statement of Septian [25] that the decline in health conditions in seagrass plants can be seen from the low value of area cover, the biggest influence comes from the existence of anthropogenic activities originating from human activities.

The results showed that all observation stations for Cymodocea rontundata had higher cover, this was due to suitable environmental conditions, namely sandy substrate conditions, suitable depth and adequate nutrition, so that Cymodocea rotundata growth was higher than other seagrass species. For the type of seagrass that has a very low cover value is the type of seagrass Halodule pinifolia [26].

The morphological conditions of seagrass greatly determine the closure of a type of seagrass, namely the known type of seagrass Cymodocea rotundata which has a long leaf structure and wide cover while for the type of seagrass Halodule pinifolia is a small species with a very small size. leaf size. According to Hasanuddin [27] in general the level of seagrass cover depends on the morphometric size, the greater the morphometric size of a particular Seagrass species, the greater the cover of that type of seagrass.

## 3.4 Seagrass Frequency

The frequency value describes the probability of the presence of seagrass species in the sampling area which is presented using a percentage value. If the frequency obtained is greater, then the probability of the presence of this species in each plot will be greater Judging from (Fig. 4) at stations 1 and 3 the species of seagrass Cymodocea rotundata has a type frequency value of 0.9, this shows that the type of seagrass Cymodocea rotundata is always found and it can be said that the distribution of seagrass species is evenly distributed at stations 1 and 3. The type of seagrass Thalassia hemprichii has a value of the frequency of the species was 0.8 at station 1, 0.4 at station 2 and 0.5 at station 3, this type of seagrass was found at each station and the distribution was fairly even. For seagrass Halodule pinifolia species at stations 1 and 2 have low species frequency values, namely 0.2 and 0.3 at station 3, this type of seagrass Halodule pinifolia is very rarely found in the research location, while for Halodule uninervis species it is found in every station, but the distribution is very uneven, namely 0.3 at station 1, 0.4 at station 2 and 0.7 at station 3. Seagrass species that are very dominant in the waters of Karapyak Beach are Cymodocea rotundata and Thalassia hemprichii which are large. According to Hogharth [28], Thalassia hemprichi will dominate the waters if the physical factors are relatively constant.

## 3.5 Important Value Index

Value index represents the role of a seagrass species against other species in a community. The significant value index has a range between 0-3. The range of the important value index shows that certain species have a large, medium, or low role. The following are the results of the important value index in the waters of Karapyak Beach (Fig. 5).

Based on observations, it is shown that the average important value index value ranges from 0.2 to 1.3. Cyodocea rotundata has the highest important value index of other seagrass species, which is 1.3 and belongs to the medium category. This is evidenced by the presence of Cymodocea rotundata which is found in almost all stations and has a high density of seagrass. If the seagrass species Cymodocea rotundata is disturbed, there will be changes and disruption of the seagrass ecosystem in the waters of Karapyak Beach, this is reinforced by Fachrul [8] that the Important Value Index is an index of importance that describes the importance of the role of a vegetation type in its ecosystem, if the important value index of a species is seagrass has high value, then this species greatly affects the stability of the ecosystem. The lowest important value index is found in the Halodule pinifolia seagrass, which is 0.2 and is classified as low, which means Halodule pinifolia species have no effect on other seagrass community.

## 3.6 Diversity Index

Diversity of seagrass species (Fig. 6) found at station 1 is 1.66, station 2 is 1.76, and station 3 has a diversity value of 1.69. The seagrass diversity index values at each station are included in the moderate diversity category, this is included in the statement of Odum [29] that seagrass plants have a moderate diversity index of <3.00, moderate diversity shows the distribution of the number of individuals of each species is moderate, community stability is moderate and moderate productivity of diversity.

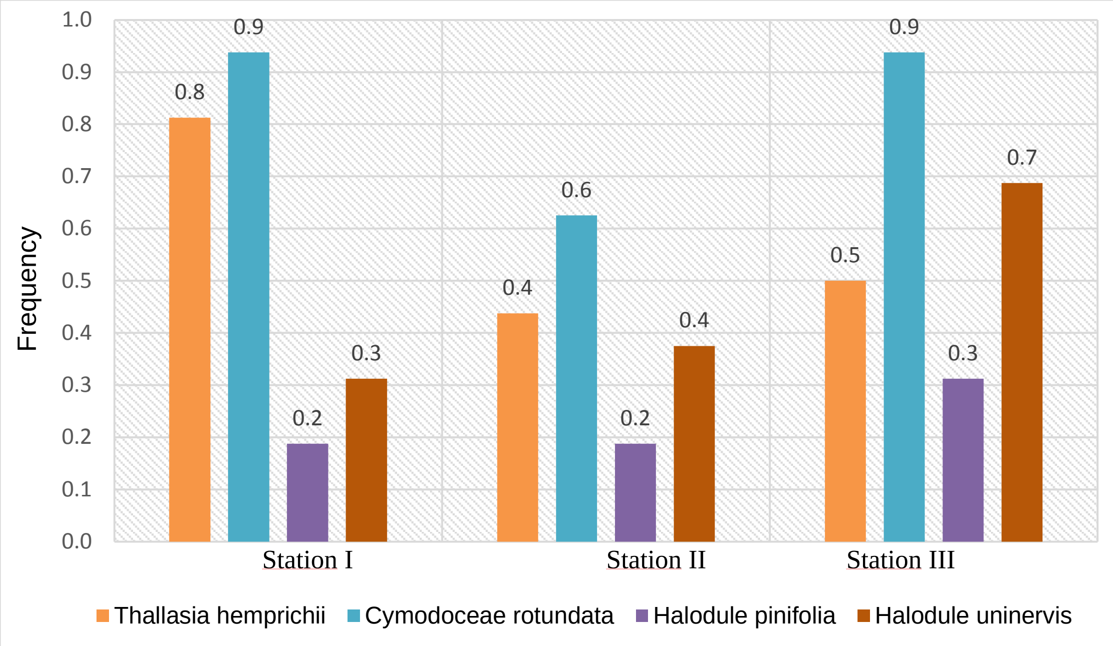


**Fig 4. Seagrass species frequency**

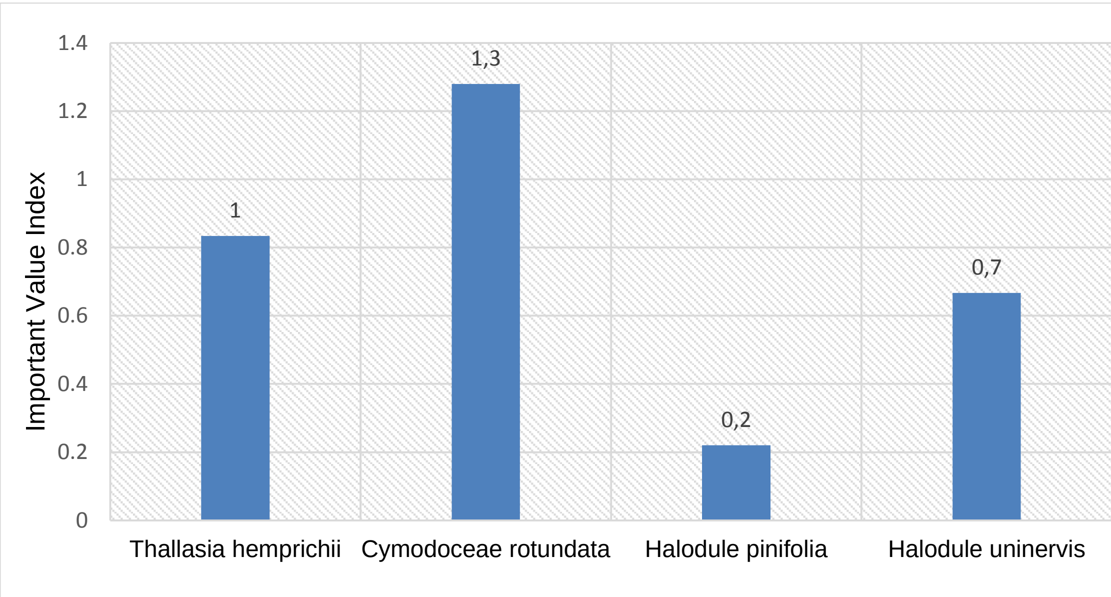


**Fig. 5. Important value index of seagrass**

According to Minarni [30], the high and low value of the species diversity index can be caused by various factors, including types or individuals obtained and the presence of several species found in more abundant quantities than other types. According to Odum [29] diversity is not only synonymous with the number of species, but also a trait that is determined by the number of species and the evenness of individuals in each species.

### 3.7 Evenness Index

The evenness index describes the distribution of the number of seagrass species in a community, the higher the evenness index indicates the distribution of species increases evenly (Odum, 1971 in Herliandi, 2011). The results of the calculation of the Seagrass Species Diversity Index at the three research stations can be seen in (Fig. 7) that the three stations have a high evenness index value. That The Evenness Index (uniformity) ranges from 0-1. If the evenness index is less than 0.4 then the ecosystem is in a depressed condition and has low evenness. The evenness index at station I was 0.82, station II was 0.88 and station III was 0.84. The high seagrass evenness index value is caused by the low seagrass diversity index, where a community is said to have high diversity if there are abundant species.

The stability community can be described by the Pielou (J) evenness index value. Evenness index between 0.00 and 1.00. If the value is 1.00 or closer to 1.00 then in the community the distribution of species or groups is relatively even; or it can be said that the higher the value of the species diversity index, the more evenly the population will be. Based on (Fig. 7) shows that the evenness index value of seagrass in the coastal waters of Karapyak is classified as 'High' because the evenness value is more than 0.60 [31].

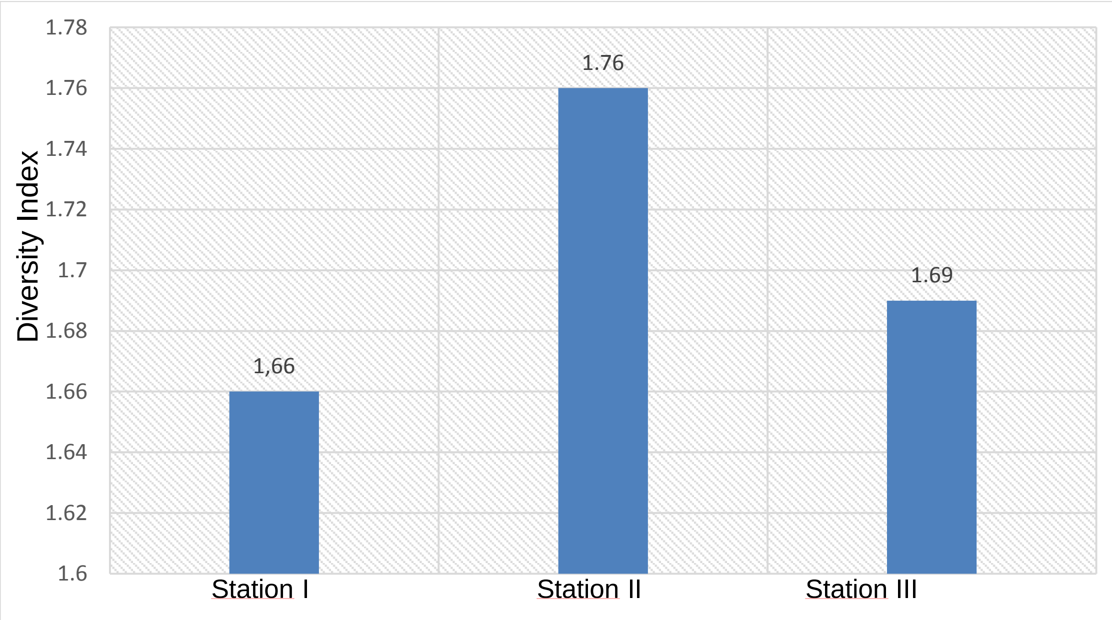


**Fig. 6. Diversity values**

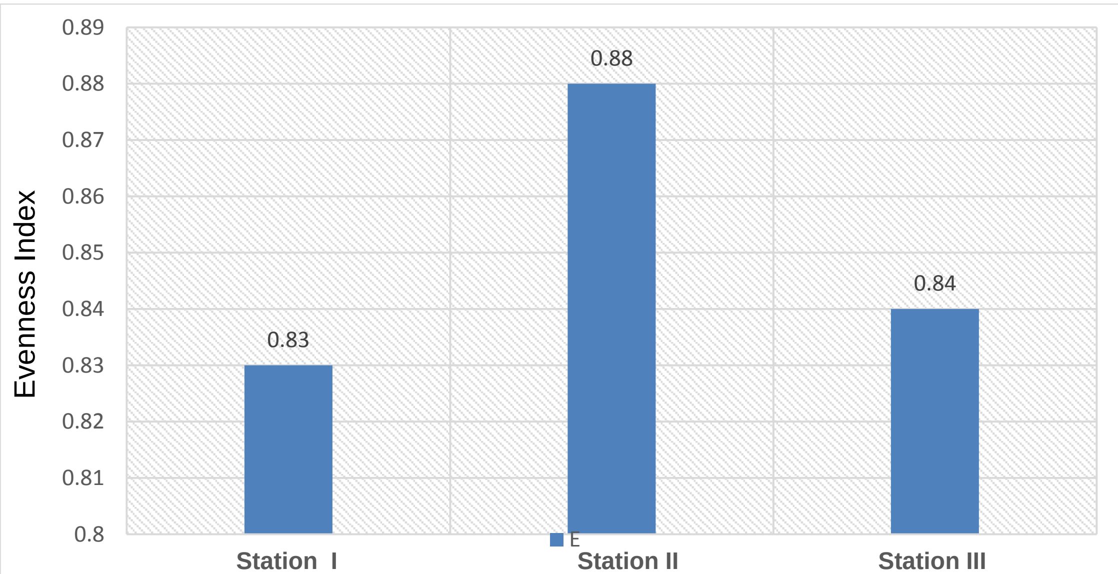


**Fig. 7. Evenness index**

## 4. CONCLUSION

This research focuses on identifying Types of seagrass, density of seagrass and percentage of seagrass cover in karapyak beach, kalipucang district, pangandaran regency, found 4 types of seagrass that spread and grow evenly on the same substrate, ranging from muddy to sandy substrate. Four species of seagrass were found, namely *Cymodocea rotundata, Thalassia hemprichii, Halodule pinifolia,* and *Halodula uninervis.* The highest density of seagrass is found at station 3 with a total stand value of 144 ind/m2 and the lowest density is found at station 2 with a total stand value of 104 ind/m2, this is influenced by high temperatures and the presence of water pollution in the aquatic environment of station 2. Frequency or probability the most common seagrass found were *Cymodocea rotundata* and *Thalassia hemprichii* because they could be found at every observation station. Cymodocea rotundata and *Thalassia hemprichii* had higher average coverage than other species, while Halodule pinifolia and Halodule uninervis had lower cover percentages, Cymodocea rotundata was very much different from other seagrass species and had a very important role in the waters of Karapyak coast. The diversity of seagrass species in the waters of los island is in the medium category, while the evenness index of seagrass species in the waters of Karapyak beach can be categorized in the high group, because at each observation station each seagrass can be found. Evenly distributed at each station. The pattern of distribution in the waters of Karapyak beach can be said to be uniform at each station because it can be seen from the types of seagrass found at each station of almost the same type and live evenly spread around the waters of Karapyak Beach.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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