Original Research Article

Type, density, and percentage of seagrass covers in the waters of Orwer Village, East Biak District and Ambro-ben Village, Biak Kota District of The Regency of Biak Numfo, Indonesia

ABSTRACT:

The Biodiversity Assessment of Seagrass Ecosystem in Orwer and Ambroben Waters, Biak Numfor Regency, Papua Province is very important for a baseline study of the ecosystem health of seagrass beds. The ecological function of seagrass ecosystems is to stabilize the seabed, provide food and habitat for other marine life, and maintain water quality. The research conducted aims to (1) determine the types of seagrasses, density, and percentage of seagrass cover in Orwer and Ambroben waters, and (2) find out the characteristics of aquatic environmental parameters that play an important role in determining the health status of seagrass meadow ecosystems. Based on the results of the research has been found as many as four types of seagrasses are in Orwer waters, namely *Halodule pinifolia*, *Cymodocea rotundata*, *Thalassia hemprichii*, and *Halophila ovalis*. In Ambroben waters have been found as many as 7 types of seagrass, namely *Halodule pinifolia*, *Halodule uninervis*, *Cymodocea rotundata*, *Syringodium isoetifolium*, *Enhalus acoroides*, *Thalassia hemprichii* and *Halophila ovalis*. The average density per seagrass species in Orwer waters is higher (2101 ind/m^2) compared to Ambroben waters (1553 ind/m^2). The percentage of seagrass ecosystem cover in Orwer is higher (94.44%) than in Ambroben waters (91.53%). The characteristics of aquatic health indicators for seagrass ecosystems in Orwer and Ambroben waters show almost the same range of values, namely temperatures ranging from 29.47-29.97, salinity 33.27-33.97 oo/oo, and pH 7.57-8.46, the dissolved oxygen parameter shows different values between the two waters. Oxygen levels in Orwer waters are 10.47-14.37 mg / L, while Oxygen levels in Ambroben waters are 7.47-11.10 mg / L. Based on these results, it shows that both waters are still included in the category of healthy waters and meet the quality standard criteria for life requirements for seagrass ecosystems.

Keywords: Biodiversity assessment, seagrass ecosystem, Orwer waters, Ambroben waters, Biak Regency, Papua

Introduction

As an important part of the marine ecosystem, seagrass is an underwater flowering plant that can be found in shallow waters such as bays and lagoons, as well as in coastal areas. Seagrasses have high productivity and provide food, habitat, and spawning areas for many vertebrate and invertebrate species that act as important components of marine ecosystems. The vast biodiversity of seagrass communities and their sensitivity to changes in water quality make seagrasses an important species in helping determine the overall health of coastal ecosystems.

Seagrass beds have several ecological functions, including stabilizing the seabed, providing food and habitat for other marine life, maintaining water quality, and supporting the local economy. Seagrass root systems that extend horizontally and vertically can help stabilize the seafloor, reducing the strength of currents on the seafloor that are vulnerable to strong wave action from currents. Seagrasses provide a place to live, breed, and forage for species around fish and other aquatic animals.

The results of a study by the Oceanographic Research Center of the Institute of Indonesian Sciences (2015), the area of seagrass meadows in Indonesia is 25,742 hectares from 29 water locations, and the status of seagrass in Biak Numfor is included in the healthy category with a percentage of cover of 61%. In 2018 the potential area reached 875,967 hectares, but what has been confirmed is true based on the mapping results during field monitoring only covering an area of 293,464 hectares. Based on the results of this study, 15 types of seagrasses were also found along the coast of Indonesian waters, including two tribes and seven genera, but there are generally 12 types, such as *Thalassia hemprichii, Enhalusacoroides, Cymodocea rotundata, Cymodocea serrulate, Halodule pinifolia, Halodule uninervis, Halophila ovalis, Halophila spinulosa, Halophila decipiens, Halophila minor, Syringodium isoetifolium* and *Thalassodendron ciliatum*. In Biak found six types of seagrasses consisting of Thalassia *hemprichii, Cymodocea rotundata, Syringodium isoetifolium, Halodule uninervis, Enhalus acoroides,* and *Halophila ovalis.*

This study aims to determine the type, density, and percentage of the latest seagrass cover in Biak Numfor Regency in the waters of Orwer Village, East Biak District, which represents locations with less human activities, and in the waters of Ambroben Village, Biak Kota District, which represents locations with dense human activities. In addition, this study also aims to determine the parameter characteristics of the aquatic environment that play an important role in determining the health status of seagrass ecosystems.

MATERIALS AND METHODS

Research Materials

This study used seagrass samples in the coastal areas of East Biak, Orwer Village, and the coast of Biak Kota, Ambroben Village, and was carried out for 2 (two) months, from January to February 2023 (Figure 1),

Figure 1a. Location of the sampling sites in Orwer waters

Figur 1b. Location of the sampling sites in Ambroben waters

Research Methods Data Collection of Seagrass Meadow Ecosystems

The sampling method used was purposive sampling at two locations, namely Station 1 in the coastal waters of Orwer, East Biak and Station 2 in Ambroben waters, Biak City. The research location was deliberately chosen to represent or describe the status of seagrass in the waters of the Biak Numfor Patent District as much as possible by observing human activities around it as well as seagrass cover and density.

Line transects and quadrant transects are used to take seagrass samples based on the Seagrass Watch manual. At each station 3 line transects are made, the length is 50 meters perpendicular to the coastline, and between the line transects the distance is adjusted to the length of the coastline in each village, namely on the left side of the village, the middle and right side of the camp. Next, a rectangular frame-shaped transect is placed to the right of the line transect, the position between quadrants is 25 meters apart.

The entire transect spread over one sample collection station consists of 3 line transects and nine quadrant transects. Seagrass observed density, percent cover, and type on a quadrant frame measuring 50 x 50 cm^2 which was modified into four subplots measuring 25 x 25 cm^2.

Data retrieval of aquatic environment parameters

Physical and chemical quality parameters of water are taken in situ including temperature, salinity, pH, and DO of water at station 1 coastal waters of Kampung Orwer, East Biak District, and at station 2 waters of Kampung Ambroben, Biak City District. The measurement location of the physical and chemical parameters of water is assumed to represent the parameters of the aquatic environment at both observation sites.

Data analysis

Data analysis was carried out using a seagrass ecological indicator formula, namely seagrass density calculated by the formula (Khouw, 2009):

$$Di = \frac{\sum ni}{Ai}$$

Where:
Di = Density of type-i (individual/m^2)

Table 1a

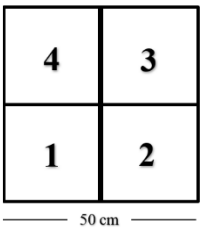

Table 1b

No. Square	Seagrass Covers Value
1	...
2	...
3	...
4	...

Table 1 a, b: Seagrass Closure Assessment in Small Co-stroke Constituent Quadrant 50 x 50 cm2

Table 2. Seagrass Covers Value

Category	**Seagrass Covers Value**
Full Covers	100
¾ Small Grid Covers	75
½ Small Grid Covers	50
¼ Small Grid Covers	25
Empty	0

Source: Seagrass Monitoring Guide

RESULTS AND DISCUSSION

Result

Orwer Village is located in the east of the city of Biak at a distance of ± 20 km from the center of Biak City. Around the coast is a residential area of local residents which is also not too dense, the activities that occur on this coast are only traditional fishing. While Ambroben Village is located south of the city of Biak with a distance of ± 9 Km, this area is a dense area of activity. In addition to being a densely populated residential area, located adjacent to Frans Kaisiepo International Airport, PT. Pertamina DPPU Frans Kaisiepo, hotels and offices.

Seagrass ecosystem biodiversity

The results of observations in Orwer waters show that there are 4 (four) types of seagrasses, namely *Halodule pinifolia*, *Cymodocea rotundata, Thalassia hemprichii*, and *Halophila ovalis*. In each line, the transect found 3 (three) types of seagrass, namely in line 1 transect (TL.1) consisting of *Halodule pinifolia, Cymodocea rotundata* and *Thalassia hemprichii*. In transect line 2 (TL.2) *Cymodocea rotundata, Thalassia hemprichii,* and *Halophila ovalis*. In the line 3 transect (TL.3), seagrass species *Halodule pinifolia, Cymodocea rotundata,* and *Thalassia hemprichii* were obtained. While in Ambroben waters found 7 (seven) species of seagrass consisting of *Halodule pinifolia, Halodule uninervis, Cymodocea rotundata, Syringodium isoetifolium, Enhalus acoroides, Thalassia hemprichii* and *Halophila ovalis*.

In transect line 1 (TL.1) found 4 (four) types of seagrasses consisting of *Halodule pinifolia, Cymodocea rotundata, Thalassia hemprichii,* and *Halophila ovalis*. In transect line 2 (TL.2) found 6 (six) types of seagrasses, namely *Halodule pinifolia, Halodule uninervis, Cymodocea rotundata, Enhalus acoroides, Thalassia hemprichii* and *Halophila ovalis*. In transect line 3 (TL.3) there are 7 (seven) types of seagrasses. While in Ambroben waters found 7 (seven) species of seagrasses consisting of *Halodule pinifolia, Halodule uninervis, Cymodocea rotundata, Syringodium isoetifolium, Enhalus acoroides, Thalassia hemprichii* and *Halophila ovalis*. In transect line 1 (TL.1) there are 4 (four) types of seagrasses consisting of *Halodule pinifolia, Cymodocea rotundata, Thalassia hemprichii,* and *Halophila ovalis.*

In transect line 2 (TL.2) found 6 (six) types of seagrasses, namely *Halodule pinifolia, Halodule uninervis, Cymodocea rotundata, Enhalus acoroides, Thalassia hemprichii* and *Halophila ovalis*. In transect line 3 (TL.3) there are 7 (seven) types of seagrasses.

The types of seagrasses found at observation locations on the coast of Orwer Village and Ambroben Village are in accordance with the findings in the initial study conducted by Supriyadi, I. H. et al (2018) from the Oceanographic Research Center (LIPI) of the Indonesian Institute of Sciences that in Biak 6 types of seagrasses were found consisting of *Thalassia hemprichii, Cymodocea rotundata, Syringodium isoetifolium, Halodule uninervis, Enhalus acoroides,* and *Halophila ovalis*. The types of seagrasses found in Orwer and Ambroben waters can be seen in Table 3 below.

Table 3. Seagrass Types at Observation Stations

No.	Type of Seagrass	Orwer Village (Station 1)			Ambroben Village (Station 2)		
		TL1	TL.2	TL.3	TL.1	TL.2	TL.3
1	*Halodulepinifolia*	+	-	+	+	+	+
2	*Haloduleuninervis*	-	-	-	-	+	+
3	*Cymodocearotundata*	+	+	+	+	+	+
4	*Syringodiumisoetifoliu m*	-	-	-	-	-	+
5	*Enhalusacoroides*	-	-	-	-	+	+
6	*Thalassiahemprichii*	+	+	+	+	+	+
7	*Halophila ovalis*	-	+	-	+	+	+

Table 3 shows that there are 4 (four) species of seagrass present in line transects both at station 1 in Orwer Village and at station 2 in Ambroben Village, namely *Halodule pinifolia*, *Cymodocea rotundata*, *Thalassia hemprichii* and *Halophila ovalis*. Of these four seagrass species that appear to dominate both stations and form a dense seagrass bed are *Cymodocea rotundata* and *Thalassia hemprichii*. Hutomo and Nontji (2014) stated that seagrass communities are usually formed from one or several seagrass species and generally form large expanses.
Duarte (1991) in Viana *et al.* (2020) stated that *Thalassia* sp and *Cymodocea* sp are widely distributed in the Indo-Pacific bioregion. These two species have large blades and slow shoot turnover, especially *Thalassia hemprichii*. They both form persistent mixed or monospecific meadows that sustain food webs, including commercially important species (de la Torre-Castro et al., 2014 in Viana et al., 2020).

Based on observations, the condition of seagrass meadows in Orwer Village and Amroben Village is quite good, but the number of stands is more found in Orwer Village. This can be seen in the number of stands presented in Table 4 and Table 5 below.

Table 4. Number of Seagrass Stands at Observation Station 1 in Orwer Village

The Type of Seagrass	Number of Stands									Total Per Type
	TL.1			TL.2			TL.3			
	K1	K2	K3	K1	K2	K3	K1	K2	K3	
Halodule pinifolia (Hp)	1130	-	436	-	-	-	857	-	-	2423
Halodule uninervis (Hu)	-	-	-	-	-	-	-	-	-	-
Cymodocea rotundata (Cr)	21	84	129	400	524	179	-	159	105	1601
Syringodium isoetifolium (Si)	-	-	-	-	-	-	-	-	-	-
Enhalus acoroides (Ea)	-	-	-	-	-	-	-	-	-	-
Thalassia hemprichii (Th)	-	48	6	-	38	199	-	77	286	654
Halophila ovalis (Ho)	-	-	-	49	-	-	-	-	-	49
Total	**1151**	**132**	**571**	**449**	**562**	**378**	**857**	**236**	**391**	**4727**

The number of seagrass stands in Orwer Village on line 1, 2 and 3 transects per observation quadrant for the seagrass species *Halodule pinifolia* ranged from 1130 – 436 stands,

for *Cymodocea rotundata* ranged from 21 – 524 stands, the seagrass species *Thalassia hemprichii* the number of stands ranged from 6 – 286 stands, and for the seagrass species *Halophila ovalis* only found as many as 49 erect at second line transects (TL.2), first quadrant (K1).
The total number of seagrasses erects found in the observation quadrant transect was 4727.

Table 5. Number of Seagrass stands at Observation Station 2 in Ambroben Village

The Type of Seagrass	**Number of Stands**									**Total Per Type**
	TL.1			**TL.2**			**TL.3**			
	K1	**K2**	**K3**	**K1**	**K2**	**K3**	**K1**	**K2**	**K3**	
Halodulepinifolia (Hp)	47	49	67	-	-	93	531	-	-	787
Haloduleuninervis (Hu)	-	-	-	-	34	19	45	-	-	98
Cymodocearotundata (Cr)	140	353	343	282	78	82	60	54	41	1433
Syringodiumisoetifolium (Si)	-	-	-	-	-	-	-	-	156	156
Enhalusacoroides (Ea)	-	-	-	-	2	-	-	2	4	8
Thalassiahemprichii (Th)	-	48	34	-	187	167	-	123	73	632
Halophila ovalis (Ho)	210	-	-	154	-	-	16	-	-	380
Total	**397**	**450**	**444**	**436**	**301**	**361**	**652**	**179**	**274**	**3494**

While in Ambroben Village, the number of seagrasses stands on line 1, 2, and 3 transects in each observation quadrant for seagrass species *Halodule pinifolia* ranged from 47 – 531 upright, *Halodule uninervis* ranged from 19 – 45 upright, *Cymodocea rotundata* ranged from 41 – 553 upright, *Syringodium isoetifolium* seagrass species were only found as many as 156 upright on the third line transect (TL.3). *Enhalus acoroides* was found in second and third line transects with a range of 2 – 4 upright, *Thalassia hemprichii* found a number of erects ranging from 34 – 187 uprights, and for seagrass species Halophila ovalis found with a range of 16 – 210 uprights. The total number of seagrasses erect found in the observation quadrant transect in Ambroben Village was 3494 stands.

Table 6. Type Density of the Seagrass at Observation Station 1 in Orwer Village

The Type of Seagrass	**Type Density (Ind/m^2)**									**Average of Each Type Density**
	TL.1			**TL.2**			**TL.3**			
	K1	**K2**	**K3**	**K1**	**K2**	**K3**	**K1**	**K2**	**K3**	
Halodulepinifolia (Hp)	4520	-	1744	-	-	-	3428	-	-	1077
Haloduleuninervis (Hu)	-	-	-	-	-	-	-	-	-	-
Cymodocearotundata (Cr)	84	36	516	1600	2096	716	-	636	420	712
Syringodiumisoetifolium (Si)	-	-	-	-	-	-	-	-	-	-
Enhalusacoroides (Ea)	-	-	-	-	-	-	-	-	-	-

The Type of Seagrass	Type Density (Ind/m^2)									Average of Each Type
Thalassiahemprichii (Th)	-	192	24	-	152	796	-	308	1144	291
Halophila ovalis (Ho)	-	-	-	196	-	-	-	-	-	22
Total	**4604**	**528**	**2284**	**1796**	**2248**	**1512**	**3428**	**944**	**1564**	**2101**

Table 7. The Type Density of Seagrass at Observation Station 2 in Ambroben Village

Jenis Lamunke-i	Kepadatan Jenis (Ind/m^2)									Average of Each Type Density
	TL.1			TL.2			TL.3			
	K1	K2	K3	K1	K2	K3	K1	K2	K3	
Halodulepinifolia (Hp)	188	196	268	-	-	372	2.124	-	-	350
Haloduleuninervis (Hu)	-	-	-	-	136	76	180	-	-	44
Cymodocearotundata (Cr)	560	1412	1372	1128	312	328	240	216	164	637
Syringodiumisoetifolium (Si)	-	-	-	-	-	-	-	-	624	69
Enhalusacoroides (Ea)	-	-	-	-	8	-	-	8	16	4
Thalassiahemprichii (Th)	-	192	136	-	748	668	-	492	292	281
Halophila ovalis (Ho)	840	-	-	616	-	-	64	-	-	169
Total	**1588**	**1800**	**1776**	**1744**	**1204**	**1444**	**2608**	**716**	**1096**	**1553**

Seagrass species density at station 1 in Kampung Orwer (Table 6) and station 2 in Kampung Ambroben (Table 7) is directly proportional to the number of stands obtained at each station. In Orwer Village, the highest density was found in the seagrass species Halodulepinifolia with a range of 1744 – 4520 individuals / m2 or an average of 1077 individuals per 0.25 m2 quadrant observation transect.

The lowest density with an average number of 22 individuals per 0.25 m^2 quadrant transect was found in the seagrass-type Halophila ovalis. At Station 2 in Ambroben Village, the highest density was found of the seagrass species *Cymodocea rotundata* with a density range between 164 – 1412 individuals / m^2 where the average per 0.25 m^2 quadrant observation transect was estimated at 637 individuals. The lowest density was found in the seagrass species *Enhalus acoroides* which is an average of four individuals per 0.25 m^2 quadrant transect.

Seagrass cover percentage is a certain area covered by seagrass plants. At the time of field observation, quadrant transects with a size of 50 x 50 cm2 or an area of 0.25 m2 were used. The percentage of seagrass cover obtained in the waters of Orwer Village and Ambroben Village can be seen in Table 8 below.

Table 8. Percentage of Seagrass Cover in the Waters of Orwer Village and Ambroben Village

Quadrant	% Orwer Covers			% Ambroben Covers		
	TL.1	TL.2	TL.3	TL.1	TL.2	TL.3
K.1	98,75	90,00	91,25	55,00	100,00	93,75

Quadrant	% Orwer Covers			% Ambroben Covers		
	TL.1	TL.2	TL.3	TL.1	TL.2	TL.3
K.2	95,00	100,00	100,00	100,00	100,00	90,00
K.3	75,00	100,00	100,00	97,50	100,00	88,00
Average % Covers per Transek Line	89,58	96,67	97,08	84,17	100,00	90,58
Rata2 % Covers per Station	94,44			91,58		

From the table above, it was found that the average percentage of seagrass cover per line transect (TL.1, TL.2, TL.3) in the waters of Orwer Village ranged from 89.58% - 97.08%, and in the waters of Ambroben Village ranged from 84.17% - 100%. When averaged, it is found that the percentage of seagrass cover from each station is 94.44% in the waters of Orwer Village and in Ambroben Village of 91.58%.

The percentage value of seagrass cover in these two waters is included in good condition (rich/healthy) because it has a ≥ 60 percent cover according to the Standard Criteria for Damage and Guidelines for Determining Seagrass Status (KEPMENLH No. 200, 2004).

Characteristics of the parameters of the aquatic environment

As in most plants, seagrass ecosystems are influenced by several factors in the physical and chemical environment of waters, including temperature, salinity, pH, and dissolved oxy-gene (DO) levels. Gunasekara *et al*. (2018) stated that the parameter of physically i.e., temperature, salinity, wave, current velocity depth, substrate and the duration of length of dayh effected of the physiologically of the sea grass. The parameters of chemical physics at observation stations in the waters of Kampung Orwer and Kampung Ambroben and their comparison with the range of seawater quality standards can be seen in Table 9 below.

Table 9. Water Quality Parameters at Observation Stations

PARAMETER	LOCATION						Quality Standard Range *	Description
	ORWER VILLAGE (Station 1)			AMBROBEN VILLAGE (Station 2)				
	TL 1	TL 2	TL 3	TL 1	TL 2	TL 3		
PHYSICS								
Temperature (°C)	29,67	29,47	29,97	29,80	29,90	29,97	28 - 30°C	qualified
Salinity (‰)	33,53	33,27	33,97	33,37	33,63	33,90	33 - 34 ‰	qualified
CHEMISTRY								
pH	7,57	7,87	8,00	8,46	8,13	8,38	7 - 8,5	qualified
DO (mg/L)	14,37	10,47	12,10	11,10	7,47	9,50	> 5 mg/L	qualified

*Note: *Seawater Quality Standards; Attachment VIII PP No. 22 Year 2021 About the Implementation of Environmental Protection & Management*

The results of measuring physical parameters showed that the temperature in the waters of Orwer Village between transect lines 1, 2, and 3 ranged from 29.47 °C – 29.97 °C while in Ambroben Village ranged from 29.80 °C – 29.97 °C. Salinity ranges from 33.27‰ – 33, 97‰ in Kam-pungOrwer waters, and 33.37‰ – 33.90‰ in Ambroben Village waters.

Chemical parameters in Kampung Orwer waters for pH in transects lines 1, 2, and 3 ranged from 7.57 – 8.00 while in Ambroben Village ranged from 8.13 – 8.46. For dissolved oxygen (DO) units, the range of 10.47 mg / L - 14.37 mg / L in the waters of Kampung Orwer, and the range of 7.47 mg / L - 11.10 mg / L in the waters of Kampung Ambroben.

Discussion

At the time of observation, the most types of seagrass were found in the waters of Kam-pungAmbroben (station 2), which was 7 (seven) species compared to the types of seagrass found in the waters of Kampung Orwer (station 2), which was as many as 4 (four) types of seagrass (Table 3). The types of substrates on both coasts are relatively the same, namely muddy sand, water quality parameter including temperature, salinity, pH, and DO has a relatively similar average range and is still suitable for seagrass growth (Table 9). The difference in the number of seagrass species found on these two coasts is estimated to be due to the difference in the length of the coastline in Ambroben Village which is longer than on the coast of Kampung Orwer, making it possible for more seagrass species to be found on the coast of Ambroben Beach.

The coastline in Ambroben Village has a coastline length of ± 1.84 km located at the coordinate point 1°11'35.6"S 136°06'24.6"E to 1°11'46.6"S 136°07'23.1"E. While the coastline of Orwer Village stretches at the coordinate point 1°10'20.3"S 136°12'37.6"E to 1°10'17.2"S 136°13'08.5"E with a length of ± 0.96 km. This difference in the length of the coastline affects the area of seagrass distribution, namely, in Ambroben Village seagrass is spread over an area of ± 365,154.57 m² while in Orwer Village the area of seagrass reaches ± 184,164.25 m².

The highest density was found in the seagrass species Halodulepinifolia in Orwer Village, which was an average of 1077 individuals per observation quadrant transect, with a total number of erects found at the observation station of 2423 individuals. The lowest seagrass density was found in Ambro-ben Village, which was an average of 4 individuals per quadrant observation transect on the Enhalusacoroides seagrass species, with a total number of stands found at the observation station of 8 individuals. The average density per type in Kam-pungOrwer and Ambroben Village can be seen in Figure 2 below:

The Density Average per Type of Seagrass The Density Average per Type of Seagrass

in Orwer Village in Orwer Village

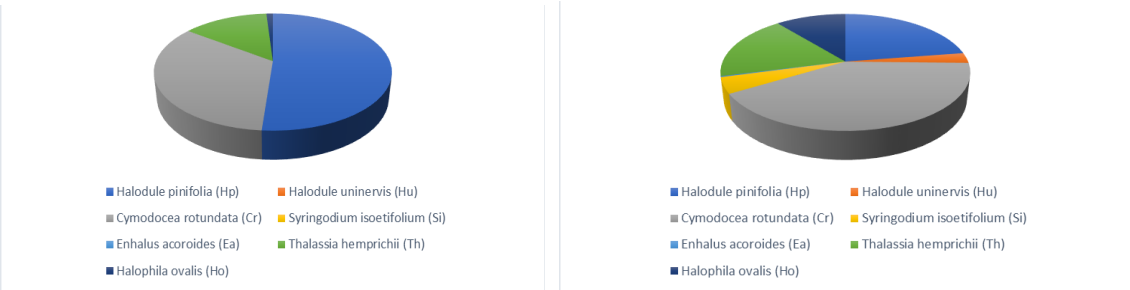

Figure 2. Seagrass Density Per Type in Orwer Village and Ambroben Village

The highest density is found in the seagrass species Halodule pinifolia due to its small body morphological structure so that it can grow denser to occupy the space or area of a body than the type of Enhalus acoroides whose body structure is larger. As stated by Ridho et al. (2018) seagrass species that have a small morphology have a high density or density compared to seagrass types that have a large morphology, and vice versa.

Based on the existence of species, there are 4 (four) types of seagrass in both the waters of OrwerVillage and Ambroben Village, namely *Halodule pinifolia*, *Cymodocea rotundata*, *Thalassia hemprichii* and *Halophila ovalis*. The average density of the four types of seagrasses found in the waters of Orwer Village and Ambroben Village can be seen in Figure 3 of the following diagram:

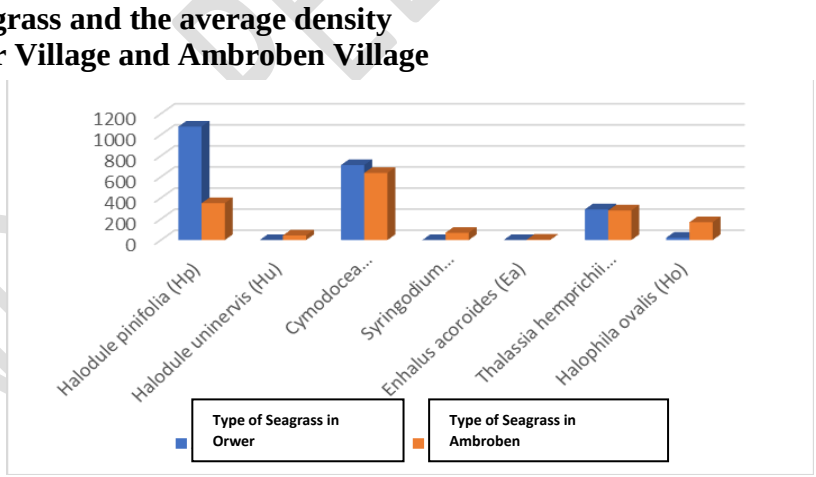

Figure 3. Comparison of Seagrass Density in Orwer Village and Ambroben Village

From the picture above, it appears that the average density is high in Orwer Village for 3 (three) types of seagrasses, namely *Halodule pinifolia*, *Cymodocea rotundata*, and *Thalassia hemprichii*. This seems to be in line with the average percent of cover found in Orwer Village and Ambroben Village, the comparison of the average percentage of seagrass cover in both coastal waters can be seen in Figure 4 of the following diagram:

Percentage of Seagrass Covers
in Orwer Village and Ambroben Village

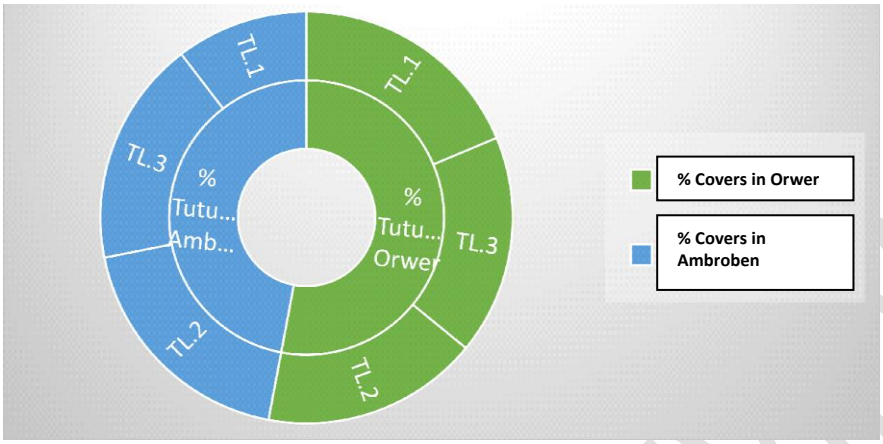

Figure 4. Seagrass Cover Percentage in Orwer Village and Ambroben Village

Figure 4 shows the average percentage of seagrass cover on the coast of Orwer Village reached 94.44% while in Ambroben Village the average percentage of seagrass cover reached 91.58%. This shows that at the time of data collection, the length of the coastline and the distribution of seagrass area did not affect the percentage of seagrass cover.

Evidenced by the percentage of seagrass cover in Orwer Village, which although did not show a significant difference, turned out to have a higher percentage than the percentage of seagrass cover in Ambroben Village, even though the coastline in Orwer Village was shorter than in Ambroben Village.

The difference in the percentage of seagrass cover in the two coasts observed may be due to differences in water quality influenced by human activities between the coastlines of Ambroben Village and Orwer Village. Kampung Ambroben Biak City District has denser activities than activities in Orwer Village, East Biak District because the site is quite close to the city center.

Ambroben Village is a dense settlement located on the coast so the various household activities of Seki-tar residents can more or less affect the quality of water. In Ambro-ben Village, there are also airport, office, and hotel activities. While Orwer Village is located a little far from the city center, there are residential areas in this village but not too dense. The activities that seem to stand out in this village are only traditional fishing activities by fishermen.

Based on observations of the physical and chemical parameters of the waters, it was found that both Orwer Village and Ambroben Village have suitable water quality for seagrass growth (Table 9). However, better water quality is found in Orwer Village than in Ambroben Village. The highest dissolved oxygen (DO) level during the observation was found in Orwer village at 14.37 mg / L while the lowest in Ambroben village was 7.47 mg / L.
Dissolved oxygen is one of the determinants of water quality, the greater the value of dissolved

oxygen, the better the water quality.
Dissolved oxygen levels are affected by temperature, an increase in temperature can cause a decrease in dissolved oxygen concentration, and vice versa. On the coast of Orwer Village, the temperature range is slightly lower, which is between 29.47°C – 29.97°C than in Ambroben Village, which ranges from 29.80°C – 29.97°C.

So it can be concluded that the difference in the percentage of seagrass cover on the two coasts is due to differences in water quality. In this case, the quality of the waters is influenced by human activities that are quite dense on the coast of Ambroben Village compared to Orwer Village.

Collier *et al.* (2021) stated that structur, location and distribution of seagrass community due to the result of the interation of environment complexity. The condition of environment i.e depth, tide, latitude, current velocity, light intncity, the composition of mud in seciment, water temperature, salinity, , salinitas, and wind velocity.

CONCLUSION

From the observations found as many as 4 types of seagrass in Orwer waters, namely *Halodule pinifolia*, *Cymodocea rotundata*, *Thalassia hemprichii*, and *Halophila ovalis*. In Ambroben waters found as many as 7 types of seagrass, namely *Halodule pinifolia*, *Halodule uninervis*, *Cymodocea rotundata*, *Syringodium isoetifolium*, *Enhalus acoroides*, *Thalassia hemprichii* and *Halophila ovalis.*

The average density per seagrass species in Orwer waters is higher (2101 ind/m2) compared to Ambroben waters (1553 ind/m2).
The percentage of seagrass ecosystem cover in Orwer is higher (94.44%) than in Ambroben waters (91.53%).

The characteristics of aquatic health indicators for seagrass ecosystems in Orwer and Ambroben waters show almost the same range of values, namely temperatures ranging from 29.47-29.97, salinity 33.27-33.97 oo/oo, and pH 7.57-8.46, dissolved oxygen parameters show different values between the two waters. Oxygen levels in Orwer waters are 10.47-14.37 mg / L, while Oxygen levels in Ambroben waters are 7.47-11.10 mg / L. Based on These results, show that both waters are still included in the category of healthy waters and meet the quality standard criteria for life requirements for seagrass ecosystems.

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