Condition of Seagrass at Prawean Beach, Jepara, Based on the Seagrass Ecological Quality Index (SEQI)

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Abstract

This study aims to investigate the bioecology of seagrass at Prawean Beach, Jepara, through analysis of species composition, the Seagrass Ecological Quality Index (SEQI), environmental water parameters, as well as the connection between environmental variables and seagrass cover. Data collection was carried out in September at two stations using the method transect-quadratic, while the physical-chemical parameters water were measured in situ and analyzed in a way statistically. Research results show that *Thalassia hemprichii* is the dominant species with the highest coverage in all point observations, while *Enhalus acoroides*, *Cymodocea rotundata*, and *Halodule uninervis* have lower cover more low. The SEQI value is in the range of 45–50% which indicates a quality ecosystem in category medium. Analysis Spearman correlation reveals that brightness influential significant to cover seagrass (r = 0.82; p = 0.048), whereas salinity, temperature, DO, pH, nitrate, and phosphate show no significant connection. Findings This indicates that disturbance of the physical coast potential becomes factor main influencing factor health field of seagrass at Prawean Beach.

Keywords: brightness, cover seagrass, field seagrass, Thalassia hemprichii, SEQI, quality ecosystem

INTRODUCTION

Seagrass is plant sea flowering (Angiospermae) which form expanse field seagrass in coastal zones shallow and instrumental important in guard stability ecosystem coast . The existence of seagrass give various function ecological , including as a habitat, a place enlargement (nursery ground), and place look for feeding ground for various biota such as fish, mollusks and crustaceans (Unsworth et al., 2019) . In addition , seagrass play a role in stabilize sediment , increasing water clarity , as well as keep carbon in amount big so that categorized as blue carbon ecosystem (Arias-Ortiz et al., 2018) ; (Serrano et al., 2021; Wahyudi et al., 2020) . With Thus , the condition health field seagrass become indicator important in evaluate sustainability ecosystem coast (Unsworth et al., 2018) .

However , the field seagrass in various coastal areas of Indonesia is experiencing pressure consequence activity anthropogenic like tourism , mooring boat , disposal waste domestic , as well as over function land coastal area . Pressure the can trigger improvement turbidity and sedimentation which have an impact on the decline cover and density seagrass (Pérez et al., 2020) . Prawean Beach in Jepara is one of the coastal areas that has potential field seagrass , but on the other hand this beach also faces pressure activity coast community . Information scientific about condition bioecology seagrass in the area This Still limited , so that Still required further study deep required .

Based on matter said , research focused For study condition bioecology seagrass at Prawean Beach through evaluation structure community seagrass , condition quality waters , as well as connection between variables physical-chemical waters with cover seagrass . Formulation question study includes : (1) how condition coverage and composition species seagrass at Prawean Beach ; (2) how environmental parameter characteristics waters at the location and (3) how connection between environmental parameters with health ecosystem seagrass . Research This expected become base scientific in support effort management and conservation field seagrass in the coastal area of Jepara.

The hypothesis proposed is that (H1) environmental parameter variations like temperature , salinity , brightness , and concentration nitrate and phosphate influential significant to cover seagrass , and (H2) grassland seagrass at Prawean Beach is at in condition ecology currently until depressed , reflecting influence activity anthropogenic in the area coastal areas . Research results This expected can become base scientific in planning conservation and management field seagrass in the Jepara area .

METHOD

Study carried out in the area field Prawean Beach seagrass , Bandengan Village Regency Jepara, Central Java, in the intertidal zone to waters shallow . Selection location done in a way purposive based on existence field seagrass that is still can observed as well as existence pressure activity anthropogenic in the surrounding area area coastal research carried out in tidal conditions so that facilitate the process of observation and taking field samples .

Seagrass data collection done use method quadratic transect . Three transect lines withdrawn upright straight coastline with 100 m long on each location , with distance between 50 m transect . At each transect , quadrat measuring 50 × 50 cm placed at intervals of every 10 m. The parameters observed covering type seagrass , percentage cover leaves , cover epiphytes and cover macroalgae . Percentage cover leaf estimated based on category later visual closure converted to mark index health ecosystem seagrass using the Seagrass Ecological Quality Index (Rahmawati et al., 2019)

Environmental parameters waters measured in situ, including temperature , pH, salinity , oxygen dissolved (DO), speed current and brightness using a water quality tester and a Secchi

disc . Water samples for analysis nutrients (nitrate and phosphate) are taken in bottle polyethylene , stored in cold condition, and analyzed in the laboratory use method spectrophotometry according to APHA (2017). As supporting data bioecology, structure substrate base observed in a way descriptive.

Data analyzed in a way descriptive quantitative For describe condition bioecology seagrass . Closure and SEQI values are displayed in form tables and graphs For determine level health ecosystem seagrass . Furthermore , the relationship between environmental parameters with condition seagrass analyzed use Pearson or Spearman correlation depending data distribution . If connection intervariable show influence significant ($p < 0.05$), then done analysis multiple linear regression For identify variables the most dominant environment influence condition seagrass at Prawean Beach . All analysis statistics done use device R Studio software .

RESULT
Composition and Coverage Seagrass

Five species seagrass recorded at the location research , namely *Thalassia hemprichii* , *Enhalus acoroides* , *Cymodocea rotundata* , *Halophila ovalis* , and *Halodule uninervis* . Species with highest average coverage is *Thalassia hemprichii ,* which was found dominate in both station with mark cover more big compared to other species . While that , *Cymodocea rotundata* and *Halodule uninervis* own cover low and the distribution is of a nature sporadic .

Table 1. Average value closing seagrass type

Station	Average value closing seagrass type				
	Ea	*Th*	*Hu*	*Os*	*Cr*
1	2.95	18.32	0.28	8.05	1.99
2	0.95	15.72	0.47	4.55	2.18

Information
Ea : *Enhalus acoroides*
Th : *Thalassia hemprichii*
Hu : *Halodule uninervis*
OS : *Oceanus serrulata*
Cr ; *Cymodoce rotundata*

Index Quality Ecosystem Seagrass (SEQI)

Table 2. SEQI parameter values

Parameter	Station 1		Station 2	
	%	Score	%	Score
Cover seagrass	18.32	1	23.9	1
diversity species	4	3	3	3
Closure epiphytes	34.09	1	26.52	2
Cover macroalgae	12.88	3	18.18	3
Brightness	1	1	0.86	1
Total	45	9	50	10

The SEQI value indicates category **on** both station observation :

- PR1 Station = **45% (Medium)**
- PR2 Station = **50% (Medium)**

Condition This indicates that ecosystem seagrass is at in condition depressed , but Not yet enter category damaged .

Quality Waters

Normality test show that part large parameters have normal distribution , except a number of values on salinity and brightness . Different tests between station show that No there is difference significant on the parameters of temperature , DO, pH, nitrate , and phosphate ($p > 0.05$), so that quality waters assessed relatively homogeneous on both station .

Environmental Parameter Relationship with Cover Seagrass

Table 3. Results of analysis test Spearman correlation

Parameter	r	p-value	Interpretation
Brightness	0.82	0.048	The relationship is very strong and significant ($p < 0.05$)
Salinity	0.79	0.059	Connection strong (significant at $\alpha=0.10$)
Temperature	-0.45	0.37	Correlation weak , no significant
DO	0.44	0.38	Correlation weak , no significant
pH	-0.09	0.86	Not correlated
Nitrate	-0.09	0.86	Not correlated
Phosphate	0.08–0.10	~0.85	Not correlated

Brightness become the only parameter that has an influence significant to cover seagrass ($p < 0.05$).

DISCUSSION

Dominance *Thalassia hemprichii* on location study show that structure community seagrass at Prawean Beach tend mono dominant , which is common appear in habitats with sediment stable and level disturbance physique currently (Unsworth et al., 2018) . Species this is also known own good tolerance to dynamics water movement so that capable endure more Good compared to species leafy small like *Halodule uninervis* and *Cymodocea rotundata* which tends to sensitive to change condition substrate and turbidity .

SEQI values in categories **currently** indicates that field seagrass experience pressure ecological . However , the pressure the No especially originate from quality chemistry waters , because temperature , DO, pH, and concentration nutrients is at in range tolerance seagrass and not show difference significant between station . The results of the Spearman correlation statistical test show that water quality is not factor differentiator main condition seagrass at the location research , on the other hand , brightness proven become factor significant influence cover seagrass ($r = 0.82$; $p = 0.048$).

Brightness level control intensity light received by the leaves seagrass for the process of photosynthesis ; when turbidity increased efficiency photosynthesis decreased and caused slowdown growth seagrass (Pérez et al., 2020; Ralph et al., 2007) . This matter in accordance with phenomenon decline cover seagrass in the area coastline that is experiencing disturbance activity boats , recreation beach , and resuspension sediment (Macreadie et al., 2019) . With thus , the pressure anthropogenic allegedly as factor dominant influencing health field seagrass at Prawean Beach , while the water quality parameters are only play a role as factor supporters condition ecosystem .

CONCLUSION

Study This show that field seagrass at Prawean Beach dominated by Thalassia hemprichii with SEQI value is in the category moderate , indicating condition ecosystem in condition depressed . Brightness is factor the most influential environment significant to cover seagrass , whereas salinity influential in a way ecological However No significant at the $\alpha = 0.05$ level . Environmental parameters other No show influence significant . With Thus , management ecosystem seagrass at Prawean Beach need focused on control activity anthropogenic influences brightness waters , such as resuspension sediment consequence boats and disturbances physical on the surface seagrass .

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