Original article

Perbandingan ikan pada padang lamun buatan dan terumbu karang buatan di Pantai Turun Aban Sungailiat, Kabupaten Bangka

Comparison of Fish between Artificial Seagrass and Artificial Reefs in Turun Aban Beach Sungailiat, Regency of Bangka

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Abstract

TurunAban Beach has fringing reefs along the shoreline, where habitat of reef and fish are associated. A transplantation purpose is for the preservation of coral reef ecosystems so that organisms can live sustainably. This study was conducted on April and May 2015, which aims to find out the diversity of fish on artificial reefs with artificial seagrass and comparing the abundance of fish in artificial reefs with of artificial seagrass. Based on this study, the method used in this study is a casestudy. The fish found along transect lines were observed in term of species and amount. Data diversity, uniformity, and dominance were analyzed descriptively. The result showed the diversity index (H ') on artificial reefs was 1,29, the value can be categorized as being moderately populated. Diversity index on a coral artificial reef greater than in artificial seagrass (1,21) with the category of the population being moderately populated, the abundance of fish found highly in artificial seagrass artificial (38 individue/m^2) fish, while in artificial reefs were found 36 individue /$m^{2.}$

Keywords *: Artificial seagrass, artificial reefs, diversity of fish, fish abundance*

Introduction

Turun Aban beach is located in the Matras Village, Matras District ofSungailiat Bangka. It location within 9,5km from Sungailiat town and 40 km from the city of Pangkalpinang, next after the Parai beach and Matras Beach. As geographically, Turun Aban beach located at position 1° 48 '2.97 " S and 106 ° 7' 31.81" E.

Based on Regulation No. 01 of 2013 regarding Spatial Bangka Regency period 2010/2030, states Matras and surrounding area will be used as a tourism area is certainly the presence of ornamental fish in waters down Aban strongly support the tourism sector.

TurunAban beach has a fringing reef along the coastline, where habitat for reef fish associated. Previous research explained aboutDurnal fish on artificial reefs as one of the techniques of conservation (Rehabilitation) reef, which was degraded. A transplantation purpose is for the preservation of coral reef ecosystems so that organisms can live sustainably.

Therefore, the further research using artificial seagrass transplantation is one of the waysto rehabilitate the degraded seagrass. Seagrass artificial is an important tool in bioecologystudy to know the influence of architectural leaves of seagrass against the sea stream, sedimentation and sea organism interest (Yaqin, 2004).In order to investigate the effectively of artificial reefs and seagrass and compare the diversity of fish species that exist on artificial reefs and seagrass in TurunAban beach. The aims of the study is to know the diversity of fish on reefs and seagrassartificial and to comparethe abundance of fish between artificial reefs and seagrass.

Material and methods

This study conducted during April and May 2015, in TurunAban, of Sungailiat District, Bangka.

The tools used in this study is an underwater camera for monitoring fish, coral reefs and seagrass artificial for collecting fish, GPS for location markers and fish identification book (Kuiter and Debelius 2006).

Sampling Method

Implementation procedures

The method used in this research is a study case. Observations were made using two observation stations, station 1 with an artificial reef, aged 24 months, length 2 m and width 1 meter. Station 2 withartificial seagrass, aged 4 month, size $1\ m^2$ by 4 rectangular arrangement.

Preparation Stage

The preparation stage includes field surveys, creation of artificial reefs and seagrass artificial.Survei field in order to determine the point location to be a research place and give a description of the location. Artificial reef made of a mixture of sand and cement, with shapes of artificial seagrass like a cube. Cement blocks made by plastic material that resembles the leaves of seagrass then arranged rectangular.

Research Stage

The implementation stage of research includes the drowning of coral reefs and seagrassartificial in a predetermined place. Collecting data in this study using visual census, data collection conducted in 6 weeks with an interval of one week and repeat 3 times at 09:00, 12:00 and 15:00 for data validitation.This method has been appliedinprevious study about diurnal fish on artificial reefs (Amri, 2014).

Installation of camera in one data retrieval is done for 20 minutes. The number of cameras used 4 units underwater cameravideo. Fish that looks into the camera, but outside the barrier of observation area do not calculation.

Measurement of Environmental Parameter

Measurement of environmental parameters was conducted in each time of data collection.

a. Total Suspended Solid (TSS)

TSS is the amount of weight in mg / l of dried mud in the waters after a screening process. Water sample is inserted into the bottle and continued the process of analysis in the laboratory. The formula used to analyze the TSS is as follows:

$$\text{TSS} = \frac{(\text{Wt}-\text{Wo})}{\text{Volume Sampel Air}}$$

Information :

TSS = *Total Suspended Solid*

Wo = initial weight of filter paper before the screening process samples

Wt = Weight of filter paper or after the end of the screening process samples

b. Temperature

Water temperature measured using a stem thermometer. The temperature was taking in the bottom of water.

c. Salinity

Salinity was measuring by *hand refraktometer*

d. PH

Hidrohen potential (pH) used obtaining the pH of water by pH meter

e. Brightness mesurement

The tools used for brightness measurement wassecchi disk.

$$C = 0{,}5^{\frac{(m+n)}{z}} \times 100\%$$

Description:
C = Brightness
m = Depth (time limit secchi disc is not visible)
n = Depth (limit when the secchi disk starts to be seen
z = Depth Bodies

f. Current speed

Current speed measurement was using current meter.

Measurement of Biological Indicators

a. Abundance

The number of fish per unit area of observation by the value of the abundance of fish. According to Odum (1998), the abundance of individual fish can be calculated using the formula :

$$N = \frac{ni}{A}$$

Information :
N = abundance of individual fish (fish / m2)
ni = number of individual fish (Ind)
A = area of the observation area (m2)

b.Species composition

Species Composition used for calculating the percentage of fish abundance (Greenberg, 1992)

$$KJ = \frac{\text{ni}}{\text{N}} x\ 100$$

c. Index of diversity (H')

Diversity index (H ') is used to know the population through a number of individuals of each type in a community (Odum in Dhahiyat., 2009), the formula:

$$(H') = -\sum_{i=1}^{s} [pi.\ln pi]$$

Ket:
H' =Diversity index (Shannon – Wiener)
s = Fish species
pi = Comparison between of total coral fish -i (n,) and total fish of Shannon-wiener diversity index :
H'≤ 1: low diversity
1 ≤ H'≤3 :moderate diversity
H'>3 :high diversity

d. Index of uniformity (E)

The uniformity can be said to be a balance, which is a kind of individual compositions contained in a community. The formula (Odum in Dhahyiat., 2009), as follows :

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

Note :

Habitat	IndeksKeane karagaman H '	IndeksKes eragaman C	IndeksD ominansi E
TerumbuKarangBuatan	1.29	0.74	0.36
lamunBuatan	1,21	0.69	0.34

E :Uniformity Index
H' : Diversity Index
H_{maks} : Maxsimum diversity
Uniformity index of species range between 0-1, if:
E>0,6 : High uniformitygy
0,4≤E≤0,6 : Moderate uniformity
E<0,4 : Low Uniformity

e. Index of Dominancy (Hukom, 1998)

The formula for dominance was:

$$C = \Sigma_{i=1}^{s} \left(\frac{ni}{N}\right)^2$$

Description :

C :Dominance index
ni : total species-i
N : total individual species
Dominance index ranged between 0-1 with category:
0<D<0,5 : Low dominance
0,5<D≤0,75 : moderate Dominance
0,75<D≤1,0 : High Dominance

Parameter	Week I	Week II	Week III	Week IV	Week V	Minggu VI	rata-rata	Baku Mutu*
Temperature (°C)	31	30	30	30	30	29	29.9	28 - 30 ^{0}C
Current (m/s)	0.11	0.16	0.14	0.16	0.16	0.21	0.16	0.05m/detik
(%)	63	78	74	91	94	92	81.9	85 - 100%
Salinity (‰)	30	31	31	30	31	31	30.6	29-32 ‰
Acidity (pH)	8	8	8	8	8	8	8	8 - 8.5
TSS (mg/l)	21	21	21	20	20	20	20.6	20 mg/l
Depth (m)	6	6	5	6	5	5	5.39	0

Note:
TKB :reef artificial
LB :Seagrass artificial

Diversity, Uniformity and Dominance Index

The value of diversity, uniformity, dominance on the artificial seagrass danterumbu artificial reefs in Down Aban range is not much different, this is because the factors the presence of species of fish in both the object of observation.

Table 2 Diversity (H'), Uniformity (E), and Dominance (C) in the reef and seagrass artificial

Physical-chemical parameter

The measurement result of physical-chemical parameter can be seen on table 3

Tabel 3. Physical-chemical parameter in Turun Aban beach

Peranan	Family	Species	Komposisi %		Kelimpahankan (ekor/m2)	
			TKB	LB	TKB	LB
Mejor	Labridae	*LeptojulisCyanopleura*	39.91	45.33	14	17
Mejor	Labridae	*HalichoeresPelicieri*	28.17	27.56	10	10
Target	*Carangidae*	*Selaroides/leptolepis*	7.51	16.44	3	6
Major	Pomacentridae	*DichistodusPerpicillatus*	1.88	4.00	1	2
Major	Nemipteridae	*PentapodusNemurus*	7.04	6.67	3	3
Target	Serranidae	*EpinephelusPolyphekadion*	3.29	0	1	0
Target	Siganidae	*Siganuslavus*	12.21	0	4	0
		Jumlah Total			36	38

Result and Discussion

Result

Fish Species Composition on Artificial Reefs and Seagrassin Turun Aban Beach

The species of fish that found in the reef and seagrass artificial at Turunaban Beach were 7 species, as the table :

Tabel 1. The abundance of fish in artificial reef and seagrass at TurunAban Beach

Discussion

Fish Species Diversity on Artificial Reefs and Seagrassin Turun Aban Beach.

Results diversity index (H ') on Artificial Reefs was 1,29, the value can be categorized as average population. The average diversity index indicates that the diversity of coral reefs was quite good (Odum, 1998). Index of diversity on coral reefs artificial greater than in seagrass artificial value of 1,21 moderate category.It was consistent with the opinion of Munasik (2008) that indirectly coral reefs artificial could transform to lively aquatic due to artificial reefs form that form a cave or shelter for the fish. In the artificial seagrass *Epinephelus polyphekadion*was not found, kind of fish that the natural habitats include coral reefs, (Russellet al., 2005). Artificial reefs provide shelter better than artificial seagrass, but not for all types and sizes of fish but only a few types of fish, particularly small and young fish.

Epinephelus polyphekadion seen at II, IV, V VI Week at temperature of 29-30 ° C with 30-31 ppm salinity tolerance.. *Epinephelus polyphekadion* Fish take Zoobenthos in the area of artificial reefs and fish are generally active during the day (diurnal) in the

depth range of 1-46 meters, this criteria was in according to the research sites with an average depth of 5,39, and including the fringing reef area. *Siganus javus*Fish from *Siganidae* family which was also observed in an artificial reef only. It natural habitat was reefs and live at depths between 0-15 meters.In addition, it criteria was in according to the research sites with an average depth of 5,39 and including the fringing reef area generally live solitary and easy to calculate the amount of fish. Usually, the fish was fishing by fisherman for consumption and sale (Hartati and Edrus, 2005).

The dominant species of fish found during data retrieval was *Leptojuliscyanopleura.* It found on coral lagoon, which contained the ruins or the bottom of a rocky and rich in plankton (Randall, 1996). These fish are diurnal or active during the day. In addition, the condition when the fish found were on temperature range of 29-31 ^{O}C, flow range 0.14 to 0.21 m / sec, brightness 74-94%, salinity 30-31%, pH 8 and TSS range of 20-21 mg / liter.*Leptojuliscyanopleura*feed the zooplankton that was live on artificial reefs and seagras, so that the fish associated on those artificial. The black unique line features on the body from mouth to the tail and live in groups (mostly females).

The presence of *Epinephelus polyphekadion* and *Siganus javus* also supported byphysical-chemical conditions of the waters. This is in accordance with the opinion Septiono(2006) that the value of diversity influenced by water conditions. Aquatic organisms including fish (KMNLH, 2004) tolerated physical-chemical parameters on the study site. Fish Diversity closely related to the resources available in artificial reefs. Due to drowning of artificial reef should be done earlier than artificial seagrass so the interactions were differently. In the artificial reefs, there are sticking by algae that serve as food for herbivorefish, which *Epinepheluspolyphekadion* and *Siganusjavus* classified as carnivorous fish feeding the herbivorous fish.

Previous research about association of diurnal fish on artificial reefs in the TurunAban beach (Amri, 2014) obtained a moderate range of fish diversity, as well as this study. Diversity index (H ') on an artificial reef and seagrasswere 1.29 and 1.21 respectively. These values were moderate (1<H '<3), which indicates that the composition of the fish species on artificial reefs and seagrasswere good enough. It was because of physical and chemical conditions of the waters were still able tolerated by aquatic organisms. According Septiono (2006) the value of diversity was influenced by the conditions of the waters, which from the calculation more than 1, indicating the condition of waters in TurunAban still eligible to fish.

Differences in abundance and composition of fish in the Coral Reef and Seagrass Artificial in Turun Aban Beach.

Table 3 was shon the difference in the abundance of artificial sea grass and reefs. The abundance of fishwere higher in artificial seagrass than reef that 38 fish/m2 and 36 fish/m2 respectively. It was not significantly different because of the location quite near about 10 km and chemical-physical waters shown the same value on both observation (Nikolsky, 1963 Anwar, 2008). Differences that can not be ignored that there are differences between the artificial seagrass and artificial reefs, which sets it apart is in the artificial seagrass fish are not settled. Adrim(2007) explained that the types of fish that live in the artificial seagrass was not a permanent organism resident, but only using seagrass as the breeding before moving to another area.

Our study findings that the highest abundance of fish were *Leptojulis cyanopleura* (17 fish/m2), located on an artificial seagrass at weeks VI with temperature 29^{O}C, the current range 0.14 to 0.21 m/sec, brightness range 74-94%, salinity range 30-31% , pH 8 and TSS range of 20-21 mg / liter. These fish are diurnal or active during the day and feed the zooplankton that was live on artificial reefs and seagras.

On artificial reefs, the abundance of fish is not much different from the abundance of fish in artificial seagrass between 36-38 (individuals / m2). Fish on artificial reefs fish are diurnal (daytime activity). Live reef fish associated with forms and types of reefs as shelter, refuge and feeding sites. Besides

the health of reefs, subtract complex and circumstances as diverse as sandy areas, mud, rocks, forming the mainland, cliffs and caves that enriched of fishes (Hutomo, 1986 in Syakur 2000). *Labridae* family was the dominance fish that found, due to zooplankton as their feed. Moreover, this family live in the depth of water ranged of 2 to 20 m with the reached size5-30 cm andlife in shallow habitats, (suharti, 1996). The dominance index was category as low index, with average values 0.36 and 0.34 respectively.Indeks diversity with the average value of 1:25 in the category of low and Uniformity index with an average value of 0.71 in the category of high.

Conclusion and recomendation

Conclusion

1. Diversity index (H ') on an artificial reef is 1.29. These values can be categorized as moderate population. The index results in an artificial reef diversity is greater than in the artificial seagrass with those in the artificial seagrass (1.21) with a moderate population category,

2. The difference in the abundance of the fish contained in the artificial reefs and artificial seagrass showed that the abundance of fish more usually found in the artificial seagrass, in artificial seagrass found 38 fish / m2, in an artificial reef found 36 fish/ m^2.

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