

Checklist of coral reef fish species composition at Bama Coastal Waters, Situbondo, East Java, Indonesia: A preliminary study

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ABSTRACT

Preliminary research was conducted to monitor the diversity of reef fish in Bama Coastal Water, Situbondo, East Java, Indonesia from January 2017 and January 2019. Reef fish samples were observed at three stations taken randomly using the Underwater Visual Census (UVC) method. Twenty species of reef fish have been observed in this study. From this study, fish species from the Pomacentridae family are the most dominant species found in Bama coastal waters. This study shows that the index value of coral fish diversity in Bama coastal waters is classified as very high in 2019.

Key word : Reef fish, Diversity, Marine, Bama coastal water

Introduction

Coral fish is one of the aquatic biotas in a coral reef ecosystem whose survival is highly dependent on the condition and health of the coral reef (Nugraha *et al.*, 2020). Ecologically, the coral reef acts as a place for feeding ground, nursery ground and spawning ground for fish resources and other supporting organisms that live in the coral reef ecosystem (Prajoko, 2010; Sawayama *et al.*, 2012; Harahap *et al.*, 2019). Reef fish is also a leading commodity in the fisheries and diving tourism sector in Indonesia, so efforts are needed to monitor coral fish stocks to observe coral ecosystems annually (Fadhilah *et al.*, 2019; Sibero *et al.*, 2018).

Bama beach is one of the waters in the Baluran

National Park, East Java. This beach is also known as an ecotourism object for natural activities such as diving, traveling and others (Ulkhag *et al.*, 2016). Coral reef ecosystems can be used as habitat to support the life cycle of fish and other marine life in the Bama Coast.

The high diversity of coral fish caused by variations in their habitat on coral reefs (Putra *et al.*, 2018). However, reef fish communities in several regions in Indonesia including on the Bama coast have experienced a decline in population due to damage to coral reefs (Madduppa *et al.*, 2013). Therefore, this study was aimed to analyze and monitor the presence of reef fish in the Bama coast, Situbondo, East Java, Indonesia.

Materials and Methods

Study Area

Bama Beach was located in Situbondo Regency, East Java, Indonesia. The area was located at 07°29' – 07°55' South Latitude and 114°17' – 114°28' East Longitude. In the north, it bordered the Madura Strait, in the east, south, and west with the Bali Strait, Bajulmati River, and Klokoran River, Respectively (Figure 1). The average annual temperature in Bama coastal waters was 28°C with salinity ranging from 30-35 ppt and primary productivity was 20,683 ± 12,055 mg/C/m²/day.

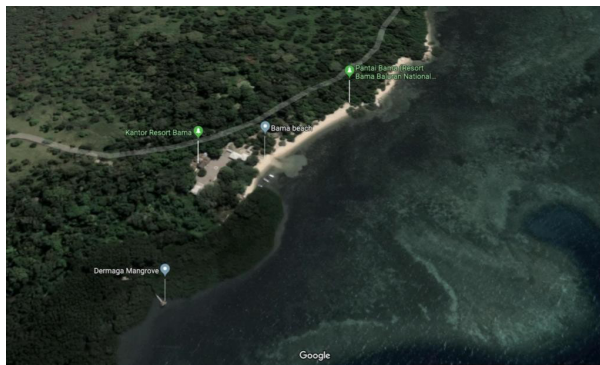


Fig. 1. Study Area

Fish Sample Collection

Fish samples collected from three different stations. Identification of reef fish biodiversity used the underwater visual census (UVC) method. Descriptions of fish species were in the 100×5×5 m transects (Labrosse *et al.*, 2002).

Reef fish collection began a few minutes after the installation of transects. The abundance of reef fish was calculated with a 2.5 distance monitoring distance from the left and right sides of the transect (Figure 2) (Labrosse *et al.*, 2002).

Data analysis

This research was quantitative descriptive. Reef fish

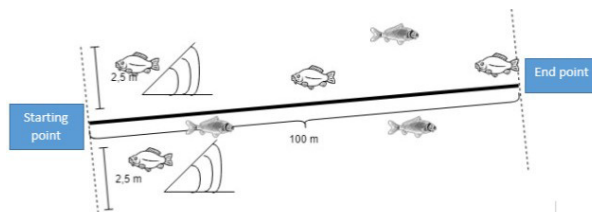


Fig. 2. Reef fish monitoring method used an underwater visual census (UVC).

analysis was done by making a dominance index (C), the diversity index (H) and uniformity index (E).

Results and Discussion

Reef fish composition

The results showed that 20 species of reef fish from 8 families were found in from all stations (Table 1). *Pomacentrus moluccensis* was the most dominant species of reef fish found at all stations and was followed by *Pomacentrus coelestis* and *Abudefduf sexfasciatus* of the Pomacentridae family. Broadly speaking, there were around 411 species of fish included in the Pomacentridae family (Arndt and Fricke, 2019). Generally, fish in this family were known as damselfishes and include anemone or clownfish (Cooper and Santini, 2016). Fish distribution in the Pomacentridae family was widespread in all tropical and sub-tropical seas (Opel *et al.*, 2016). The high distribution of the Pomacentridae reef fish family found in this study was due to the carrying capacity of the abundant aquatic environment in Bama Beach. This was consistent with the statements of Frédéric and Parmentier (2016) and Rawe *et al.* (2019) that Damselfish occupied shallow, sandy, and rich seagrass environments and was mostly found in tropical coral reef ecosystems.

Coral fish index values

The dominance index value (C) in 2017 and 2019 showed a low category. The value of each year was 0.299 and 0.107. In addition, the value of the diversity index (H) in 2019 showed results of 2,267 and in 2017 of 1,530. Compound fish distribution in coral reef ecosystems triggers natural selection in survival. In addition, most reef fish are also very dependent on the substrate as a shelter and find food. The Uniformity Index (E) (Table 2) value showed the difference in two years of observation. Observation activities in 2019 obtained a value of 0.680, whereas in 2017 it showed a value of 0.529.

Coral reefs play an important role in supporting the value of diversity from a reef fish ecosystem. Healthy coral reef ecosystems can contain a diversity of reef fish ranging from 6,000 to 8,000 species (Pinheiro *et al.*, 2019). They also have a role in supporting tourism commodities (Lelloltery *et al.*, 2018). Decreased in coral fish diversity caused by climate change (Hoegh-Guldberg, 2011; Lürig *et al.*, 2015),

Table 1. Checklist of reef fish species recorded during research in Bama Coastal Waters, Situbondo, East Java

Family	Species	English Name	2017	2019
Pomacentridae	<i>Pomacentrus moluccensis</i>	Lemon damsel	+	+
	<i>Pomacentrus vaiuli</i>	Princess damsel	+	-
	<i>Pomacentrus coelestis</i>	Neon damselfish	+	+
	<i>Dascyllus trimaculatus</i>	Threespot dascyllus	-	+
	<i>Abudefduf sexfasciatus</i>	Scissortail sergeant	+	+
	<i>Amblyglyphidodon aureus</i>	Golden Damselfish	+	-
	<i>Neopomacentrus azysron</i>	Yellowtail demoiselle	+	-
Chaetodontidae	<i>Chaetodon auriga</i>	Kepe auriga	-	+
	<i>Heniochus diphreutes</i>	Bannerfish	-	+
Zanclidae	<i>Zanclus cornutus</i>	Moorish idol	-	+
Apogonidae	<i>Cheilodipterus intermedius</i>	Intermediate cardinalfish	-	+
	<i>Zoramia leptacantha</i>	Threadfin cardinalfish	-	+
Labridae	<i>Halichoeres chrysus</i>	Canary wrasse	-	+
	<i>Hemigymnus melapterus</i>	The Blackeye thicklip wrasse	+	-
	<i>Anampses caeruleuncinatus</i>	Blue-spotted wrasse	+	-
	<i>Coris julis</i>	Mediterranean rainbow wrasse	+	-
	<i>Coris schroederi</i>	The dapple coris	+	-
Caesionidae	<i>Caesio xanthonota</i>	Yellowback fusilier	+	-
Diodontidae	<i>Diodon hystrix</i>	Spot-fin porcupinefish	+	-
Acanthuridae	<i>Ctenoacetus striatus</i>	Striated surgeonfish	+	-

Note : + = present; - = absent

Table 2. Ecological Index Value of Coral Fish in Bama Coastal Water, Situbondo, East Java

Year	Index	Value	Category
2017	Domination (C)	0.299	Low
	Diversity (H')	1.530	Medium
	Uniformity (E)	0.529	Medium
2019	Domination (C)	0.107	Medium
	Diversity (H')	2.267	Very High
	Uniformity (E)	0.680	High

overfishing and human exploitation (Morais *et al.*, 2020), invasive species (Green *et al.*, 2012) and pollution environment (Negri *et al.*, 2011).

Conclusion

Bama Beach still has some very high species of reef fish in 2019. The results of this study can show the quality of Bama Beach in good condition, still requires further research on health research such as corals, seagrasses, and mangroves in the Bama Coast region. The government and the Department of the Environment must restore and restore the Bama Coast ecosystem to ensure the sustainability of this area other than as an ecotourism area.

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