

## Community Structure of Decapod Inhabit Dead Coral *Pocillopora* sp. in Pemuteran, Bali

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**Abstract.** Decapod is one of the cryptic fauna associated with coral reefs, which play an important role and accounts for a major part of the biodiversity in the reef ecosystem. However, this biodiversity is largely overlooked and assessment regarding this biodiversity has not been conducted thoroughly due to lack of resources and the difficulties of sample collection. This research used semi-quantitative sampling methods to assess the community structure of decapod species inhabit dead *Pocillopora* sp. in Pemuteran, Bali. Two dead coral head of *Pocillopora* sp. were used as pilot study and sampled at the 8-12 m depth. All decapod found were collected and identify into family level. The result showed 214 decapods found consisting 12 families, with Xanthidae as the most abundant family. Community Index which consisting diversity, uniformity, and dominancy, indicated medium diversity, stable uniformity, and low dominancy of decapod community. This result also indicated no dominancy between families of decapod. Meanwhile, Species Density Index showed the value of  $84.58 \pm 2.04$  individual per  $m^3$ , with mean diversity of  $7.05 \pm 2.04$  individual per  $m^3$  for each family.

**Keywords :** decapods, dead coral, community, Pemuteran, *Pocillopora* sp.

### 1. Introduction

Decapoda or decapods are an order of crustacean, which is estimated to contain nearly 15.000 species and around 2.700 genus [1]. Known as one of the cryptic organism, the species of decapod are hardly to identify. Its living characteristic by burrowing on coral and the similar body pattern between taxa was the challenge



to identify and measure the diversity of this organism [2-3]. The diversity of decapod is make up of about 66% of all the diversity within coral reef, which make this fauna as one of the best proxy to estimate the biodiversity of the whole organisms on coral reef ecosystems [4]. Decapod also plays an important role in reef ecosystem, including metabolizing and controlling the flow of energy in ecosystems [5-8].

Despite the importance of this organism for the ecosystem, the biodiversity of decapod is largely overlooked and assessment has not been conducted thoroughly due to lack of resources and difficulties of sample collection. In 2014 [9] we manage to conduct the estimation survey on decapod diversity in Karimunjawa using semi-quantitative dead coral head methods and obtained the estimation data of the local biodiversity within Karimunjawa. During this research, we aim to conduct the pilot study to understand the community structure of decapod diversity inhibit dead coral head in Pemuteran, Bali. Pemuteran is known as one of the area in Bali, which located in the center of Coral Triangle [10] - the epicenter of marine biodiversity [11-13]. Escalating threat in marine biodiversity was also risk to affect the diversity in Indonesia's marine biodiversity, due to the global warming and increasing illegal fisheries [14]. Pemuteran is known as one of the famous tourist area in Bali, with its coral reef as one of its main tourist attraction [15]. Although famous for its coral reef area, Pemuteran reef is susceptible with damage due to high intensity, illegal and destructive fishing. Pemuteran also importance for its characteristic of an area that suitable for coral reef, mangrove and seagrass bed ecosystem [16], which is the living habitat for decapod organism and important area to conduct this research.

## 2. Material and Method

The study was conducted in June 2016 at Pemuteran, Bali (Figure 1). Two dead coral from *Pocillopora* sp. were collected from the depth of 8 – 12 m. Dead coral with a size of a head were bagged and gently broken by its base with a hammer and a chisel to separate it from the coral reef, and quickly placed in a 20-liter bucket underwater.



**Figure 1.** Sampling location.

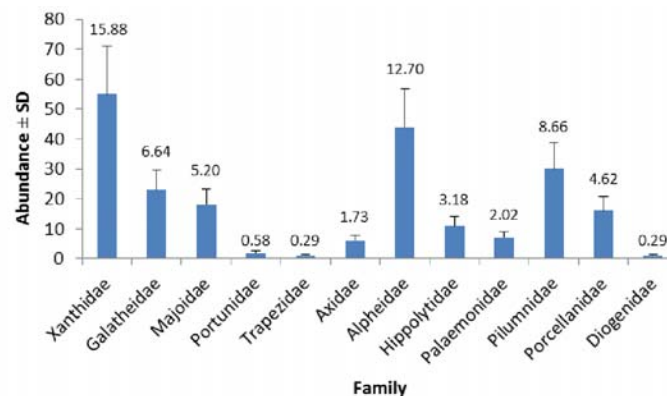
Length, width and height of the coral head were measured, while the volume was measured using water displacement method. Each branch of coral head was detached carefully and examined closely for motile invertebrates. The remaining rubble were examined a second times for remaining creatures, while the seawater in the bucket was also filtered in order to gather the remaining invertebrates left in the bucket. Only decapod specimen were then collected and identified into family level and recorded along with the

abundance of each family. The specimens were then photographed to record its morphological features. This sampling collection and processing is following the method describe in Plaisance *et al.* [3]

Community structure of decapod were analyzed using community index analysis which consisting diversity, uniformity, and dominancy, indicated medium diversity, stable uniformity, and low dominancy of decapod community.

### 3. Result and Discussion

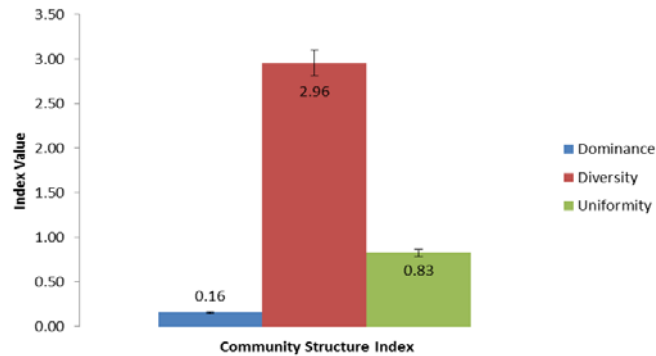
Result from the two dead coral head of *Pocillopora* sp. was managed to obtain 12 families of decapod from 214 total individual. The highest abundance among all was Xanthidae followed by Alpheidae, while the lowest abundance was Trapeziidae and Diogenidae with only 1 individual found (Figure 2). Xanthidae has been known as a common and dominance family of decapod found living in the coral of Pocilloporidae and Acroporidae, while Trapeziidae is usually found living in the live coral [17] and Diogenidae is associate with the availability of the gastropod shell [18].



**Figure 2.** Abundance of each decapod family collected from dead head in Pemuteran, Bali.

Within these results, the community structure of decapod in two dead coral head in Pemuteran, Bali is indicating medium diversity (2.96), stable uniformity (0.83) and low dominancy (0.16). This result also indicated that there is no dominancy between families of decapod. Community structure analyses using Shannon-Wiener diversity indices, index of uniformity and index of dominance indicated as in Figure 3, while the species density was indicated in Table 1.

Diversity index is a mathematical measure of species diversity in a community, which provide the information about the community composition including species richness, rarity and commonness of species in a community [19-20]. Based on Krebs [21], the diversity value of 2,96 was considered as a moderate or medium diversity with the indication of medium environmental pressure. Setyawan *et al.* [22] also stated that the higher the number of diversity indicated a high interaction between species within community, which will also related to the complexity of energy transfer, predation, competition and diversification of the niche.



**Figure 3.** Index of dominance, diversity and uniformity on the decapod structure on dead coral head in Pemuteran, Bali.

Uniformity index is a measure of the similarity or uniform-ness of a community. The uniformity index value of 0.83 in the result is considered as a high uniformity, which indicated a stable community [21]. This uniformity index is inversely proportional with the dominance index. The higher the uniformity, the lower the dominance. This statement was also proven by the result of the dominance index, with the value of 0.16, which considered as a low dominance [21].

Other than those indexes, Species Density Index showed the value of  $84.58 \pm 2.04$  individual per  $m^3$ , with mean diversity of  $7.05 \pm 2.04$  individual per  $m^3$  for each family. The highest species density is within Xanthidae and Galatheididae with the value of  $21.74 \pm 6.28$  and  $9.09 \pm 2.62$ , respectively (Table 1).

**Table 1.** Species density of decapod in Pemuteran, Bali.

Family	Value (Individual per $m^3$ )
Xanthidae	$21.74 \pm 6.28$
Galatheididae	$9.09 \pm 2.62$
Majoidae	$7.11 \pm 2.05$
Portunidae	$0.79 \pm 0.23$
Trapezidae	$0.40 \pm 0.11$
Axidae	$2.37 \pm 0.68$
Alpheidae	$17.39 \pm 5.02$
Hippolytidae	$4.35 \pm 1.26$
Palaemonidae	$2.77 \pm 0.80$
Pilumnidae	$11.86 \pm 3.42$
Porcellanidae	$6.32 \pm 1.83$
Diogenidae	$0.40 \pm 0.11$
Mean value of family density	$7.05 \pm 2.04$
Species density of decapod	$84.58 \pm 2.04$

The mean family density value in Pemuteran, Bali is higher than Pari Island, Seribu Islands ( $0.68 \pm 0.22$  individual/ $m^3$ ) [23]. Species density is affected by the availability of crack and crevices in corals, which then lead to the competition for a place for living, especially in the dead coral where the competition is not limited by its interaction with living corals [24]. Other than the competition for space for living, the species density also affected by the competition for food source [23].

#### 4. Conclusion

In conclusion, the community structure of decapod inhabit dead coral head in Pemuteran, Bali showed 12 families of decapod with the indication of medium diversity, stable uniformity, and low dominancy of decapod community. It is also indicated that there are no dominancy happened between families of decapod. This data provide a basic understanding of the community structure of a reef area in Pemuteran, Bali. However, it still needs more additional data in order to give a better representation of a general community structure of a wider area within the coral reefs.

#### 5. Acknowledgement

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