



CRAB DIVERSITY IN MANDALIKA AND THEIR COMMERCIAL VALUE

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ABSTRACT

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West Nusa Tenggara, Indonesia, encompasses the western part of the Lesser Sunda Islands with a long coastline that supports a rich biodiversity of coastal biota. Brachyuran crabs constitute one of the most diverse invertebrate groups in the coastal ecosystem. This research aimed to record the biodiversity of brachyuran crabs and their commercial value in the Special Economic Zone (SEZ) of Mandalika in Central Lombok, Indonesia. Data were collected by hand, scoop, and trap using the random sampling method. In the current study, we have compiled, for the first time, a checklist of 402 individual brachyuran crabs belonging to 22 genera, 13 families, and 35 species from Mandalika. The present study revealed that Mandalika has a comparable number of species to those in previous studies from other coastal areas on Lombok Island. The commercial value of the crabs is in line with their edibility. The family Ocypodidae comprised 43% of all the brachyuran crabs reported from Mandalika. The findings emphasise the importance of their habitat in Mandalika and the potency of brachyuran crabs to support government food security programs.

Keywords:

Biodiversity, Crustacea, Food Security, Coastal Area, Taxonomy

INTRODUCTION

Mandalika Special Economic Zone (SEZ) is between two of Indonesia's most well-known tourist destinations: Bali and Komodo Islands. Due to its strategic location on a tourist route, the West Nusa Tenggara Government has selected Mandalika as a priority zone to support the regional economy and ecotourism since 2014 (Adam, 2019). Following that, the local government's rapid infrastructure development has led to massive area conversion, such as Pertamina International Circuit Mandalika, which covers 1,035.67 hectares of area (Birkic et al., 2019; Nisak & Ristawati, 2023).

The area conversion in Mandalika may contribute to high economic growth in Lombok Island. However, there are major problems that result from converting land area for infrastructure, such as decreasing agricultural production, air pollution, and soil erosion (Harini et al., 2017; Wirosoedarmo et al., 2017; Vanaker et al., 2019). Therefore, continually assessing the environment and its biota is necessary to prevent further negative impacts. Mandalika is very famous for its developed coastal areas. Hence, it is important to monitor its coastal environment. One of the fauna that inhabit the coastal area is the brachyuran crab.

Renowned for its pure and magnificent nature scene for years, Mandalika SEZ features a long beach with clear water and exotic white sand that supports high biodiversity (Ardhiati et al., 2021), including brachyuran crabs. Brachyuran crab is a member of the crustaceans, commonly known as a protein source with high economic value for society. Portunidae is a family of brachyuran crabs, and its members are recognized for commercial importance, such as the genus of *Charybdis*, *Portunus*, *Scylla*, and *Thalamitha*. Besides those genera, some members have important potencies, such as edible crab, but are not yet popular among locals (Ng et al., 2008; Stevcic, 2005).

Previous studies have recorded the brachyuran crab species from several areas on Lombok Island. Anggorowati (2014) have recorded 66 species from West Lombok, Murniati (2015) have recorded 10 species of deposit-feeder crab from West and East Lombok, and Murniati (2017) have recorded 35 species of brachyuran crab from eastern part of Lombok Island. However, up to now, information on the brachyuran crab diversity in Mandalika and its commercial value remains limited. Thus, this study aims to present the first species list of brachyuran crabs from Mandalika SEZ and their commercial value. Meanwhile, the sustainable biodiversity observation in the conversion area benefits data that help stakeholders decide on the conservation efforts (Mohanty et al., 2019).

MATERIALS AND METHODS

Samples were collected on 7–13 March 2018 from six sites, i.e., Muara Sungai Tebelo (MST), Mangrove Tanjung Aan (MTA-1), Mangrove Tanjung Aan 2 (MTA-2), Pantai Benjon (PB), Pantai Seger (PS), and Bukit Batu Payung (BBP) (Fig. 1). The brachyuran crabs were collected by hand, using small scoop and trap with bait with random sampling method. Species identification using Crane (1975), Ng (1998), and Rahayu & Setyadi (2009). Species and the number of specimens collected from each sampling site were recorded and deposited at the Museum Zoologicum Bogoriense (MZB), Cibinong, West Java. The edibility of each species and whether they are traded in the local market was recorded based on the local information, Ng (1998), and regulation number 12 of 2020 concerning the management of lobsters, and crabs in the territory of the Republic of Indonesia (The Minister of Maritime Affairs and Fisheries of the Republic of Indonesia, 2020).

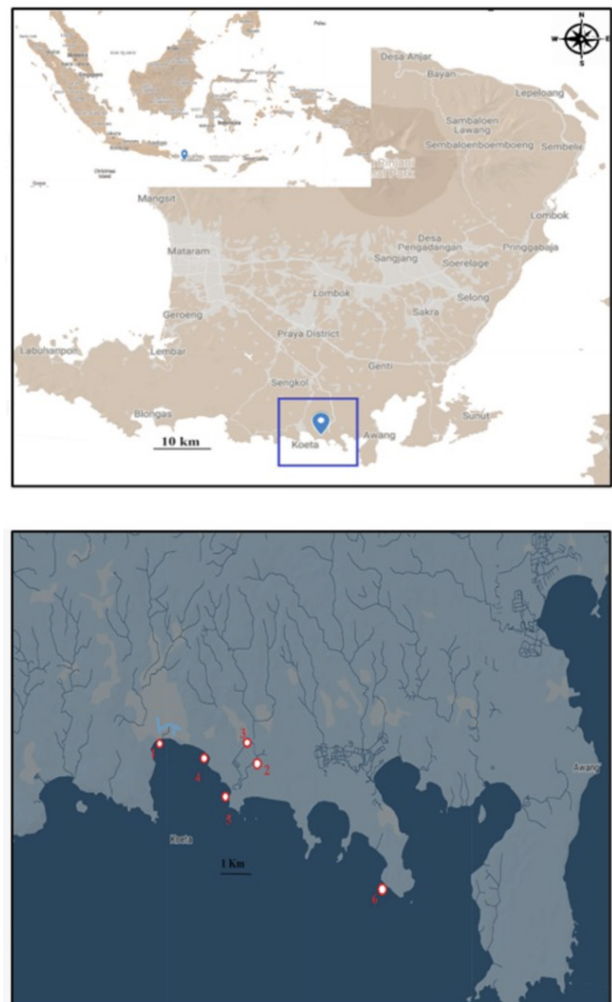


Figure 1. The map showing six study sites of the brachyuran crabs in Mandalika Tourism Special Economic Zone (SEZ), Lombok, West Nusa Tenggara

RESULTS AND DISCUSSIONS

This research revealed 402 brachyuran crabs representing 13 families, 22 genera, 35 species, and seven specimens identified to genus level at six sites (Table 1). Twelve species were recorded from MST, five species from MTA-1, nine species from MTA-2, fifteen species from BBP, eight species from PB, and nine species from PS. Species of Ocypodidae was recorded from five out of six sampling sites. Meanwhile, Grapsidae and Sesamidae were recorded from four sampling sites.

Within the recorded species, nine species are edible, i.e., *Cardisoma carnifex*, *Episesarma versicolor*, *Grapsus albolineatus*, *Grapsus tenuicrustatus*, *Myomenippe hardwicki*, *Ocypode ceratophthalma*, *Portunus pelagicus*, *Thalamita crenata*, *Thalamita* sp1., and *Varuna litterata* (Fig. 2) (Ng, 1998). Locals commonly known as three species of "rajungan" are *Portunus pelagicus*, *Thalamita crenata*, and *Thalamita* sp1., while other species are known as "yuyu". *Cardisoma carnifex* has a large body size that reaches 15 cm carapace width. In other regions, such as Papua, locals consume this crab daily (Murniati, 2023). However, on Lombok Island, the locals consumed this crab only if they found it in an abundant population, especially during the rainy season. This result shows that despite the small record of brachyuran crabs, Mandalika SEZ has a high potency of valuable protein resources. Further exploration for monitoring purposes would reveal more data than that presented here.

Brachyuran crabs are helpful not only as food resources but also as indicators for environmental assessment. For example is *Tmethypocoelis* sp1 which recorded only in MTA-2. This crab has small body size and is known to be hardly adapted to high-polluted environments (Fig. 3). *Tmethypocoelis* indicates that the area has low or zero contamination of toxic pollutants (Dutrieux, 1992).

Figure 4 shows the representative record for the diversity of brachyuran crabs around Mandalika SEZ. Ocypodidae took the highest percentage of the occurrence since this group was readily observed in their habitat. This family is active during the day at low tide in open areas and has a slow movement; thus, it is relatively easy to observe and catch (Hughes, 1966). Meanwhile, other families, such as Calappidae, Menippidae, and Oziidae, usually hide between rocks on rocky beaches. Most of these brachyuran crabs were collected by hand.

The specific fishing method for each group or family is essential to gain more brachyuran crab species. Therefore, further interviews with the locals, habitat observation, literature study, and experiments with different tools are necessary. For example, the fisherman uses a gillnet or mini trawl for fishing *Portunus* (Ihsan et al., 2014), a lift net with bait for fishing *Scylla* (Sahat et al., 2015), and mousetrap for collecting *Cardisoma* (Takahashi & Nishida, 2018).

Table 1. Checklist of the brachyuran crabs from Mandalika, West Nusa Tenggara, including their edibility information and commercial value.

Taxa	Study Sites						Total	Edibility	Commercial value (traded)
	MST	MTA 1	MTA 2	BBP	PB	PS			
Gecarcinidae									
1. <i>Cardisoma carnifex</i>	3						3	V	-
Grapsidae									
2. <i>Metopograpsus quadridentatus</i>	7						7	-	-
3. <i>Grapsus albolineatus</i>				3	4	3	10	-	-
4. <i>Grapsus tenuicrustatus</i>				5	2		7	-	-
5. <i>Pseudograpsus albus</i>						12	12	-	-
Ocypodidae									
6. <i>Austruca annulipes</i>	4		34				38	-	-
7. <i>Austruca perplexa</i>	23						23	-	-
8. <i>Ocypode ceratophthalma</i>	13				5	3	21	V	-
9. <i>Tubuca coarctata</i>	4		1				5	-	-
10. <i>Tubuca demani</i>	5	14	30				49	-	-
11. <i>Tubuca dussumieri</i>	8		9				17	-	-
12. <i>Tubuca forcipata</i>		4					4	-	-
13. <i>Tubuca</i> sp1.		11	6				17	-	-
Varunidae									
14. <i>Metaplax distinctus</i>	15						15	-	-
15. <i>Varuna litterata</i>	6						6	V	-

Taxa	Study Sites						Total	Edibility	Commercial value (traded)
	MST	MTA 1	MTA 2	BBP	PB	PS			
Sesarmidae									
16. <i>Episesarma versicolor</i>			6				6	V	-
17. <i>Parasesarma</i> sp1	8		20				28	-	-
18. <i>Parasesarma</i> sp2	8	5	11				24	-	-
19. <i>Neosermatium</i> sp1		2					2	-	-
Dotillidae									
20. <i>Tmethypocoelis</i> sp1.			34				34	-	-
Calappidae									
21. <i>Calappa hepatica</i>				2			2	-	-
Carpiliidae									
22. <i>Carpilius convexus</i>				3			3	-	-
Eriphiidae									
23. <i>Eriphia sebana</i>				1		1	2	-	-
Grapsidae									
24. <i>Grapsus albolineatus</i>				3	4	3	10	V	-
25. <i>Grapsus tenuicrustatus</i>				5	2		7	V	-
26. <i>Pseudograpsus albus</i>						12	12		-
Menippidae									
27. <i>Myomenippe hardwicki</i>				1			1	V	-
28. <i>Myomenippe</i> sp1.				2			2	-	-
Oziidae									
29. <i>Epixanthus dentatus</i>				5			5	-	-
30. <i>Ozius guttatus</i>				3			3	-	-
31. <i>Ozius tuberculatus</i>				2			2	-	-
32. <i>Ozius truncatus</i>						4	4	-	-
Portunidae									
33. <i>Portunus pelagicus</i>				4	1	3	8	V	V
34. <i>Thalamita crenata</i>				1	2	2	5	V	V
35. <i>Thalamita</i> sp1.				1	7		8	V	V
Total	104	36	151	41	27	43	402		

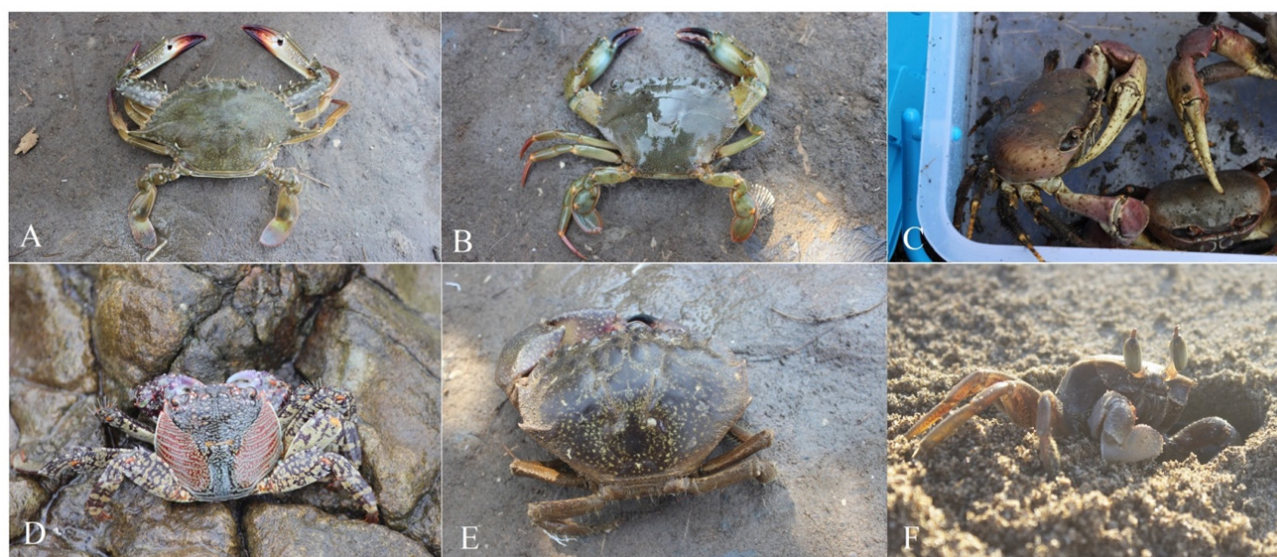


Figure 2. Representative of edible brachyuran crabs from Mandalika, Central Lombok, West Nusa Tenggara. A. *Portunus pelagicus*, B. *Thalamita crenata*, C. *Cardisoma carnifex*, D. *Grapsus albolineatus*, E. *Myomenippe hardwicki*, F. *Ocypode ceratophthalma*.



Figure 3. Male *Tmethypocoelis* sp1 collected from MTA-2, Mandalika, Central Lombok, West Nusa Tenggara.

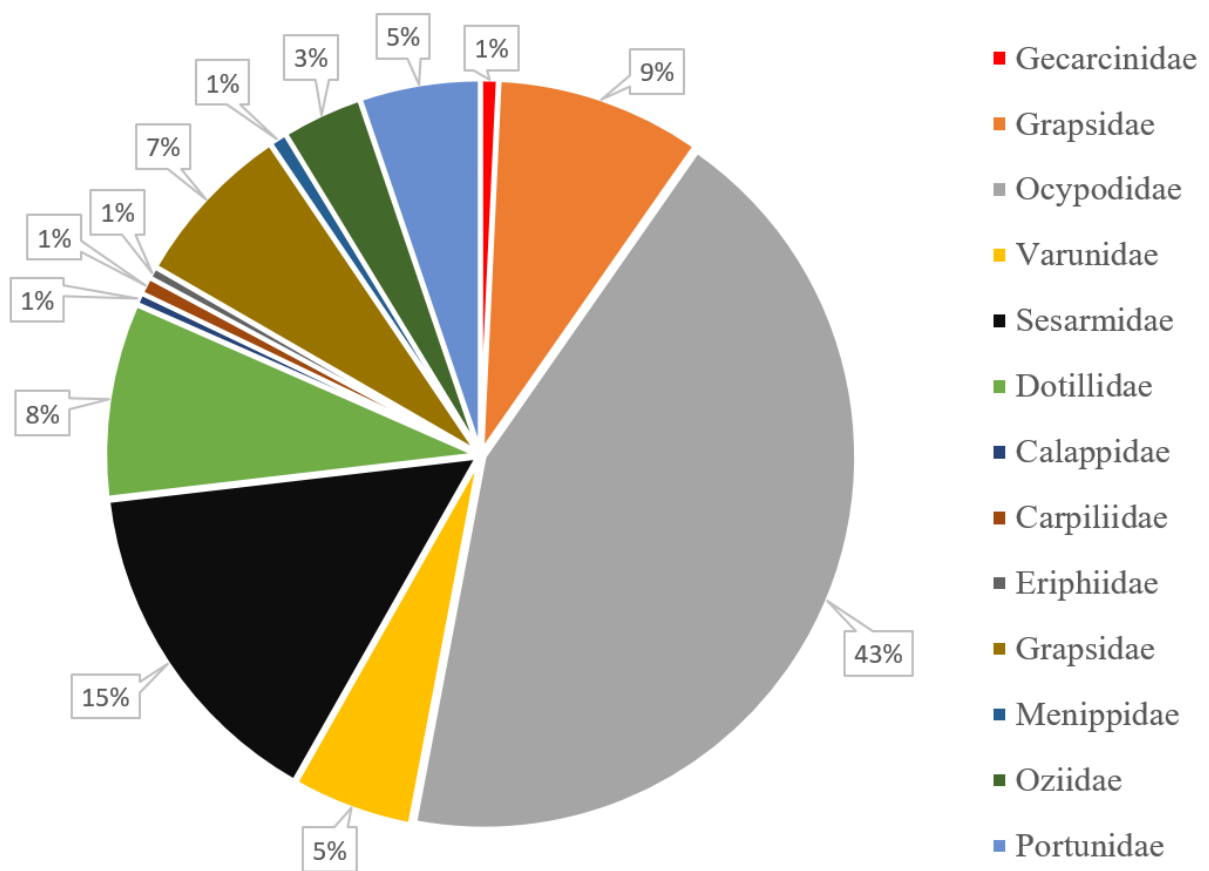


Figure 4. The diversity of the brachyuran crab's family at Mandalika (in percentage).

CONCLUSIONS

The brachyuran crab in Mandalika is mostly a member of the Ocypodidae, and almost half of all brachyuran crabs reported in this study are members of this family. The present study also revealed that there are 35 species of brachyuran crabs in Mandalika, nine of which are edible. The crabs' commercial value aligns with their edibility; thus, protecting their habitat is essential to supporting government food security programs. We recommend doing further research with time series sampling to better understand the stock pattern in nature.

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