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DECAPOD INVENTORY UNVEILING SPECIES RICHNESS AN DISTRIBUTION IN THE LAMPUNG REGION, INDONESIA

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ABSTRACT

Indonesia is recognized as one of the world's centers of crab diversity, with approximately 1,400 species of Brachyura and an estimated 210–300 species of Anomura. However, the data on crab diversity is sparse and understudy in some areas. This study aims to assess the richness and distribution of crabs in Lampung region. Survey was conducted in Tanggamus, the West Coast of Lampung, and East Lampung using purposive sampling approach. A total of 23 crab species from six families were recorded from Lampung region. Tanggamus exhibited the highest species diversity compare to West Coast and East Lampung. The member of family Xanthidae was frequently observed across all three regions. Further studies are recommended to examine ecological drivers, climate change impacts, and anthropogenic pressures influencing crab distribution to support effective conservation strategies.

Key words: Anomura, Brachyura, crabs, purposive sampling, richness

INTRODUCTION

Crabs belong to the order Decapoda (Crustacea) is a taxonomic group with a high level of diversity with more than 17,635 species spread across 2,725 genera (Sammy de Grave et al., 2009; González-Tizón et al., 2013; Yazicioglu, 2017; Davie, 2021). The Brachyura and Anomura infraorders are among the most significant contributors, with around 7,200 and 2,500 species, respectively (Davie et al., 2015; Davie, 2021). In Indonesia, the infraorder Brachyura dominates with up to 1,400 species, while the infraorder Anomura is recorded as reaching ± 210 - 300 species (Hutomo & Moosa, 2005; Wardiatno et al., 2015; Hanim et al., 2023; Safrudin et al., 2023; Siallagan et al., 2023; Widyastuti, 2023; Rahayu, 2025; Shih et al., 2025).

Crabs play a significant role in maintaining the structure and function of coastal ecosystems due to their large abundance which could serve as vital bioindicators for assessing the quality of aquatic environments (Velásquez et al., 2020; Pati et al., 2023). Crabs primarily influence their surroundings through burrowing and bioturbation, processes that involve the construction of tunnels and the excavation of sediment. These activities facilitate sediment aeration, the redistribution of organic matter, and the cycling of nutrients, while simultaneously providing essential shelter and protection from predators.

The Lampung region, located within the Sunda Strait, where three Indonesian Fisheries Management Areas converge: WPP 711 (Java Sea), WPP 572 (Indian Ocean), and WPP 712 (Natuna Sea, Karimata Strait, and South China Sea), is rich in marine biodiversity and fisheries productivity influenced by the interaction of water masses and ocean currents from those three WPs (Suman et al., 2017; Rahayu et al., 2023). Furthermore, the coastal ecosystems provide a wide range of microhabitats that support diverse crab assemblages, with sediment composition, vegetation cover, salinity gradients, and tidal dynamics strongly influencing habitat selection and alongshore distribution patterns (Luppi et al., 2013; Checon & Costa, 2017; Glaspie & Seitz, 2018). The crabs diversity in Lampung includes taxa from families such as Ocypodidae, Grapsidae, Sesarmidae, Dorippidae, Portunidae, and Porcellanidae (Budiman et al., 1977; Pratiwi & Rahmat, 2015; Damora & Nurdin, 2016; Heirina et al., 2021; Putri et al., 2022) .

Several studies of crabs had been conducted in this region e.g taxonomy and ecology. Hakim et al. (2018, 2019) made taxonomic and nomenclature revision on *Dorippoides facchino*; and also described new species of *Pseudoporcellanella manoliensis*. Research on ecological aspects of crabs conducted on commercial species such as *Scylla serrata* and *Portunus pelagicus* (Damora & Nurdin, 2016; Putri et al., 2022). Nonetheless, more data and information on crabs are still needed to provide reference for conservation and suistanable management efforts. Therefore, we aimed to identify the types of crabs found in the Southern Peninsula of Sumatra, particularly in Lampung Province where the data were provided herein.

MATERIALS AND METHODS

Research was conducted in July 2023 at three regencies in Lampung Province, i.e. Tanggamus, Pantai Barat, and Lampung Timur within which 12 sampling points were surveyed (Fig. 1). These areas were selected to capture the regional variability of coastal habitats and to provide a representative overview of crab diversity along the southern coast of Sumatra. The selection of sampling locations considered factors such as accessibility, habitat type, and ecological significance, ensuring that both frequently studied and relatively unexplored sites were included.

Surveys in Tanggamus Regency were conducted at Kerang Mas Beach, Tiska Beach, Maringgai Beach, and Pasir Putih Beach, encompassing sandy shores, estuarine zones, and mangrove fringes (Fig. 2 A and B). Sampling sites in Lampung Timur Regency were located in Badak Limau Beach, Ketapang Beach, Tengor Beach, Kiluan Beach, Gigi Hiu Beach, Karmila Beach, Harapan Beach, and Karang Putih Beach, representing diverse coastal landscapes shaped by tidal and sedimentary variations (Fig. 2 D). In Pesisir Barat Regency, surveys were

carried out at Sawang Balak Beach, Walur Beach, and Labuhan Jukung Beach, characterized by mixed rocky and sandy substrates with adjacent mangrove and estuarine areas (Fig. 2 C).

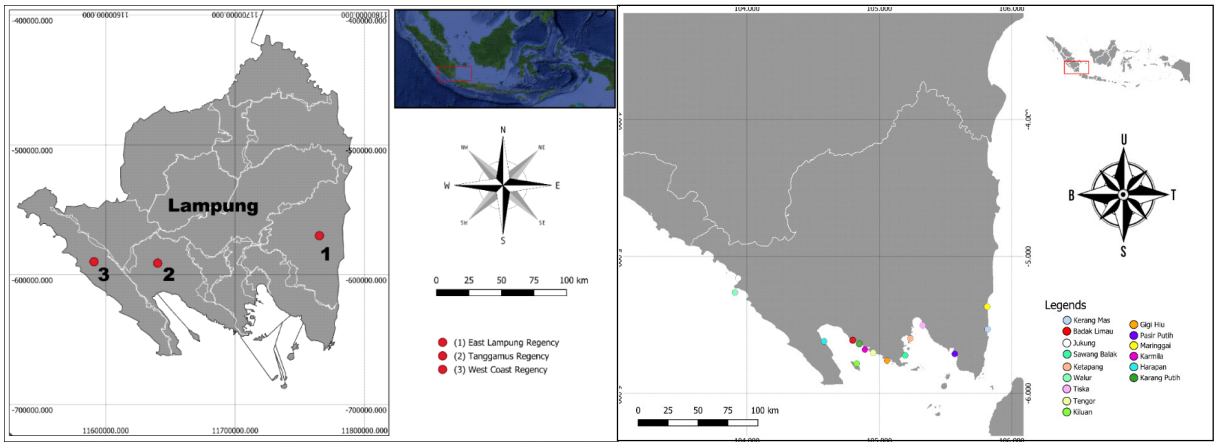

Figure 1. Map of Lampung Province showing the main sites and sampling locations.

Figure 2. Decapods habitats in Lampung **(A, B)** Tanggamus Regency, **(C)** Pesisir Barat Regency, and **(D)** Lampung Timur Regency.

This study employed a purposive sampling considering logistical constraints, including limited time, tidal conditions, and site accessibility, while still allowing the collection of representative specimens and species distribution from the study area (Hanim et al., 2023). Samples were collected from the intertidal zone during low tide. Crabs were hand-collected during the morning to afternoon, while additional sampling was conducted at night with the assistance of local fishermen, when many intertidal crab species are more active and therefore easier to detect.

Collected specimens were fixed in 70% ethanol for 24 hours and then transferred to 96% ethanol for long-term preservation. Some specimens were used for genetic identification

purposes. Specimen documentation was performed using a Nikon D3400 digital camera. Species identification was conducted based on morphological characters with reference to Naderloo (2017), Davie (2021), and Poore & Ahyong (2023). We referred to World Register of Marine Species, Marine Species Identification Portal, and Biodiversity Heritage Library for species identity. Taxonomic nomenclature follows the World Register of Marine Species except for the freshwater taxa which follow the other taxonomic literature.

RESULTS

We recorded a total of 23 crabs which consist of 18 species Brachyura, four species Anomura, and one freshwater crab (Table 1, Fig. 3). We observed that total species richness is highest in Tanggamus and family Xanthidae has the most species among others. Our results provide additional species list which have not been recorded from previous research in Lampung region (Budiman et al., 1977; Pratiwi & Rahmat, 2015; Damora & Nurdin, 2016; Heirina et al., 2021; Putri et al., 2022).

Table 1. A list of decapods observed and collected from Lampung

No	Family/Species	Location		
		Tanggamus	**Pantai Barat**	**Lampung Timur**
	BRACHYURA			
	Dorippidae			
1	*Dorippe frascone*	√	-	-
	Dromiidae			
2	*Dromidiopsis indica*	√	-	-
	Matutidae			
3	*Matuta victor*	-	-	√
	Parthenopidae			
4	*Daldorfia horrida*	√	√	√
	Portunidae			
5	*Charybdis japonica*	√	-	-
6	*Thalamita spinimana*	√	-	√
	Sesarmidae			
7	*Episesarma chentongense*	-	-	√
8	*Grapsus albolineatus*	√	√	√
9	*Metasesarma obesum*	√	√	√
	Xanthidae			
10	*Actaeodes tomentosus*	√	-	-
11	*Atergatis floridus*	√	-	-
12	*Atergatis integerrimus*	√	-	√
13	*Etisus laevimanus*	-	-	√

14	*Etisus utilis*	√	-	-
15	*Euxanthus exculptus*	√	-	-
16	*Lophozozymus pictor*	√	-	-
17	*Pilodius areolatus*	√	-	-
18	*Zosimus aeneus*	√	-	-
14	*Etisus utilis*	√	-	-
15	*Euxanthus exculptus*	√	-	-
16	*Lophozozymus pictor*	√	-	-
17	*Pilodius areolatus*	√	-	-
18	*Zosimus aeneus*	√	-	-
	ANOMURA			
	Diogenidae			
1	*Dardanus megistos*	√	-	-
2	*Dardanus brachyops*	√	-	-
3	*Clibanarius longitarsus*	√	-	-
	Porcellanidae			
4	*Petrolisthes elongatus*	-	-	√
	FRESH WATER			
	Gecarcinucidae			
1	*Parathelphusa convexa*	√	√	-

Figure 3. Decapods observed and collected in Lampung.

DISCUSSION

The Tanggamus region exhibited the highest species diversity that associated with the variety of available substrates, including sandy, muddy, rocky, and estuarine habitats. The family Xanthidae was the most dominant, represented by nine species, followed by Diogenidae with three species, and Portunidae and Sesarmidae with two species each. *Metasesarma obesum* inhabit leaf litter, mollusk shells, and sandy areas, typically situated away from seawater to avoid predation (Steinke et al., 1993; Sherman, 2003; Ravichandran et al., 2006; Cuellar-Gempeler & Munguia, 2013; Bouchard et al., 2013). Portunidae species, including *Charybdis japonica* and *Thalamita spinimana*, inhabit sand, mud, and coral reefs (Hartnoll, 1975; Bertness, 1981; Morrison & Spiller, 2006; Seike & Nara, 2007; Sallam et al., 2008; Sara et al., 2014; Hamid et al., 2016; Murniati, 2017; Xu et al., 2023).

In muddy areas, species from the Dorippidae, such as *Dorippe frascone*, and Dromiidae, such as *Dromidiopsis indica*, were recorded (Bento & Paula, 2018; Davie, 2021). In the rocky intertidal zones exposed at low tide, Xanthidae species including *Zosimus aeneus*, *Atergatis integerrimus*, *Atergatis floridus*, *Actaeodes tomentosus*, *Pilodius areolatus*, and *Lophozozymus pictor* were abundant, some exhibiting bright carapace coloration and containing toxins such as tetrodotoxin and saxitoxin (Clark & Ng, 1998; Llewellyn et al., 2002; Tsai et al., 2006; Takeda & Komatsu, 2018; Syuhriatin et al., 2023). Porcellanidae species, such as *Petrolistheses elongatus*, were found under rocks (Steger & Gardner, 2007). In the estuarine area of Tengor, where freshwater and seawater mix, black muddy sands influenced by tidal fluctuations create unique habitats that support species such as *Parathelphusa convexa*, the fresh water crab.

Lampung Timur region is characterized by a coastline dominated by fine sandy substrates with minimal coral reef cover. *Matuta victor* (Matutidae) was recorded on sandy substrates, a habitat typically associated with shallow waters and sandy to sandy, muddy bottoms (Naderloo, 2017; Chairunisa et al., 2024).

Further inland, at the transition zone between the beach and mangrove forests, the substrate composition shifts toward a mixture of sand and mud with relatively high organic matter content. Such conditions favor the presence of Sesarmidae species, including *Metasesarma obesum* and *Episesarma chentongense*, which exhibit high tolerance to salinity fluctuations and muddy substrates and also seemingly favor substrates farther from open seawater and coastline (Ribeiro et al., 2020). Hence, mangrove habitats provide a relatively stable environment, offering protection from wave action and an abundant food supply derived from mangrove leaf litter.

A comparable relationship between substrate heterogeneity and crab assemblages is observed in Pantai Barat region, where coastal environments are characterized by a wide range of substrates, including sand, mud, and mixed sediments. *Metasesarma obesum* is more frequently associated with muddy and sandy, mud substrates rich in organic matter. In addition to substrate conditions, the presence of river mouths in West Coast forms dynamic estuarine systems which provide suitable habitats for freshwater to brackish-water species, including *Parathelphusa convexa* (Susilo et al., 2020).

The overall patterns of crab species richness and distribution in Lampung indicate the influence of substrate type and habitat heterogeneity. The area with complex and diverse microhabitats, such as Tanggamus and Pantai Barat, could harbor higher species richness and a broader range of families than Lampung Timur. Further ecological studies are needed to qualitatively investigate the roles of various substrates and habitats in shaping spatial patterns, species diversity, and distribution across the whole Lampung region, given the region's unique position at the southern tip of Sumatra.

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