

Three Species of Crustacea (Decapoda, Caridea) in Lalar Liang Village, West Sumbawa, Indonesia

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Abstract: Freshwater shrimps have a wide distribution in Indonesia's aquatic ecosystems, and play an ecological and economic role that has the potential to improve the community's economy. The entry of invasive species into Indonesian waters is a threat to native species. Therefore, an inventory of native species is needed as a consideration for sustainable fisheries management. However, information regarding the presence and status of freshwater shrimp in West Sumbawa has never been reported. Most rivers in West Sumbawa are seasonal, with high discharge during the rainy season and drying up during the dry season. This research is an exploratory descriptive study using shrimp abundance data calculated as the ratio of individual shrimp counts to the total count across all stations. Samples were collected in March 2026 from three stations during high-water discharge using a traditional bamboo trap called a bubu, which the local Sumbawa people call kodong. This study provides baseline data on three species of freshwater shrimp (Decapoda: Caridea) found in Lalar Liang Village, West Sumbawa. The species obtained were two species of the family Palaemonidae, namely *Macrobrachium rosenbergii* (De Man, 1879) and *Macrobrachium latidactylus* (Thallwitz, 1891), and one species of the family Atyidae, *Caridina typus* (H. Milne Edwards, 1837). The species *Macrobrachium rosenbergii* (De Man, 1879) had the highest relative abundance (46.67%), followed by *Caridina typus* (H. Milne Edwards, 1837) (37.33%) and the lowest, *Macrobrachium latidactylus* (Thallwitz, 1891) (16.00%). These three species are full migrants and natives and are classified as least concern (LC). This study adds to the data on the distribution of freshwater Caridea species in Indonesia and can inform policy-making on ecosystem management, habitat protection, and sustainable freshwater shrimp fisheries.

Keywords: Caridea; Freshwater; Lalar Liang; Prawn; Shrimp.

Introduction

Sumbawa Island is one of the two main islands in West Nusa Tenggara Province, Indonesia. The district area located in the western part of Sumbawa Island is West Sumbawa. Lalar Liang is a village in West Sumbawa Regency, characterized by hills and rain-fed rice fields to the east (terrestrial ecosystem), and a coastal and marine environment to the west (aquatic ecosystem). Therefore, it has the potential to host interesting flora and fauna for study.

Aquatic ecosystems can be grouped into marine, brackish and fresh waters [1]. One group of macroinvertebrates found in aquatic ecosystems is crustaceans. Crustaceans include crabs, crayfish, lobsters, shrimps and prawns [2]. Types of crustaceans (Decapoda; Caridea) can generally be found in three types of aquatic ecosystem habitats, with three families, namely Alpheidae, Atyidae and Palaemonidae, having high diversity and wide distribution in the Indo-Malaya region [3]. Freshwater shrimp (Shrimp; Prawn) have a unique lifestyle, such as being able to live on land and being amphidromous [4], which influences their distribution [5]. Amphidromous is an unusual type of diadromous in which a brief transition from freshwater to seawater occurs during the juvenile stage, but most of the feeding, growth, and spawning activities occur

in freshwater. Diadromous itself is defined as a migration category, where all migration activities cross sea/fresh waters [6]. Furthermore, certain types of shrimp can survive in water with low pH in peat swamps, which is a limitation on which organisms can survive [7].

Research on freshwater shrimp is important because migratory freshwater Decapoda are often important biotic components of tropical river communities. Human activities, such as overfishing, pollution, and habitat loss, have significantly altered natural processes, causing the population of freshwater shrimp to decline each year and posing challenges to its conservation [8]. Conservation assessments are limited by a lack of localized population data and habitat-specific threat information. This challenge is especially critical for unlisted or data-deficient species in the IUCN framework. Growing anthropogenic pressures, such as habitat degradation, pollution, and invasive species, highlight the urgent need for systematic field surveys and ecological documentation to inform biodiversity management and conservation policies in freshwater systems [9]. However, information on the types of freshwater shrimp on Sumbawa Island remains limited, especially in West Sumbawa, where none have been reported. This study provides basic data on the types of freshwater shrimp found in Sumbawa, especially in Lalar Village, West Sumbawa,

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and their abundance. These findings contribute to species biodiversity information, sustainable fisheries management considerations, and the development of freshwater shrimp conservation strategy policies.

Research Methods

Study area and samples collection

This is an exploratory descriptive research study conducted in March 2026 in Lalar Liang Village, Taliwang District, West Sumbawa Regency, West Nusa Tenggara, Indonesia. (Figure 1). Data collection utilized traditional fishing gear known as bubu in Indonesian, or kodong by the Sumbawa people, which was filled with grated coconut powder (Figure 1), at three observation stations (Figure 2; Table 1). Locations were selected based on accessibility for sampling and to represent distinct characteristics of the Caridea habitat. The river is classified as a periodic river, exhibiting high water discharge during the rainy season and reduced discharge or complete dryness during the dry season. Traps were set in the afternoon until sunset (05:00–06:30 pm) and retrieved in the morning (07:00–10:00 am). Species identification was performed with high discharge during the rainy season and reduced d by examining morphological characteristics [3], [9]–[12]. Taxonomic confirmation of samples was conducted using the Global Biodiversity Information Facility (GBIF) (<https://www.gbif.org/>).

Table 1. Description of freshwater Caridea habitats, in Lalar Liang, West Sumbawa

Sample location	Habitat description	Coordinates
St. 1	Substrate: muddy, sandy, gravel; Flowing water	Lat: -8.823442°; Long: 116.840218°
St. 2	Substrate: muddy, sandy; Dammed water	Lat: -8.816373°; Long: 116.843203°
St. 3	Substrate: Rocky, sandy; Flowing water	Lat: -8.832624°; Long: 116.845738°



Figure 2. a) sampling site (St 1); b) St. 2; c) St. 3.

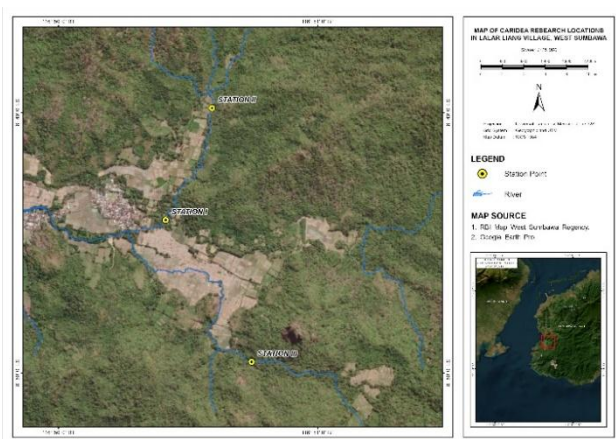


Figure 1. Map of Caridea research and representation of freshwater Caridea habitats in Lalar Liang, Taliwang District, West Sumbawa



Figure 3. Traditional traps used to collect samples (Bubu (Indonesian); Kodong (Sumbawa)).

Data analysis

Abundance indicates the number of individuals in a population [13]. Shrimp abundance was assessed by

counting individual shrimp at each station, followed by calculating relative abundance as the proportion of each station's count to the total shrimp count across all stations. This method enabled comparison of shrimp abundance among stations. The collected data were analyzed to calculate the relative abundance of Caridea which was obtained using the formula:

$$DR = \frac{n_i}{N} \times 100\%$$

Where, n_i is the number of individuals of the specific species (i); N =total number of all individuals of all species obtained; DR =relative abundance.

Results and Discussion

Freshwater shrimp are widely distributed in Indonesia and belong to the subphylum Crustacea and the order Decapoda. Generally, the freshwater shrimp found belong to the Atyidae and Palaemonidae families, and are dominated by species from the genus *Macrobrachium* [14]. Three species of freshwater shrimp obtained in Lalar Liang Village, West Sumbawa, West Nusa Tenggara, namely *Caridina typus* (H. Milne Edwards, 1837), *Macrobrachium rosenbergii* (De Man, 1879), and *Macrobrachium latidactylus* (Thallwitz, 1891), are included in two families, namely Atyidae (*Caridina typus* (H. Milne Edwards, 1837)) and Palaemonidae (*Macrobrachium rosenbergii* (De Man, 1879); *Macrobrachium latidactylus* (Thallwitz, 1891)) (Table 2; Figure 3). The number of freshwater shrimp species identified in this study is lower than the eight species belonging to the genera *Macrobrachium* and *Penaeus* reported in the Inland Islands of Mempawah Regency [15]. However, it exceeds the two species, *Macrobrachium australe* and *M. placidulum*, found in the Tinombo River, Tinombo District, Parigi Moutong Regency, Central Sulawesi Province [16]. Freshwater shrimp usually live at temperatures of 25-29 °C. The optimal temperature for shrimp growth is in the range of 28-31°C [15]. The genus *Caridina* sp. lives in freshwater rivers with temperatures between 22-28.5°C, while *Macrobrachium* lives in freshwater rivers with a temperature range of 25-35°C, with water clarity of 12-18 cm, pH (7.1-7.3, and dissolved oxygen of 6.9-7 mg/L [17], [18].

Caridina typus (H. Milne Edwards, 1837) is one of the freshwater shrimp species that has the widest distribution in the Indo-West Pacific [11], [19]. This species is usually found in leaf litter and under rocks with sand and mud substrates [11]. The local people in West Sumbawa call this shrimp uyang kokok (uyang = shrimp/prawn), referring to its small size, and it is usually found in groups. Before the use of traps like today, this shrimp in its habitat could be found hiding in the fronds of bamboo that fell into the water, and holes dug into the ground, and under rocks. *Caridina* sp. has the potential to be used as an ornamental shrimp because it has a small body size and attractive colors [15].

The other two types of shrimp come from the genus *Macrobrachium*, which is a genus that plays a key ecological and socioeconomic role in tropical freshwater ecosystems [1]. At the research site, two species were identified: *Macrobrachium rosenbergii* (De Man, 1879) and *Macrobrachium latidactylus* (Thallwitz, 1891). These

shrimp species are widely consumed and possess significant economic value. The local community refers to *Macrobrachium rosenbergii* as Uyang olet, as this species is typically found in rivers near mountainous or hilly regions. In contrast, *Macrobrachium latidactylus* is known locally as Uyang Pistol, a name derived from the male's claw morphology, where one claw is noticeably larger than the other, resembling a soldier carrying a pistol. This species is distributed in eastern Indonesia, namely the Lesser Sunda Islands, Papua, Maluku, and Sulawesi. This freshwater shrimp was first described based on specimens collected from North Sulawesi in 1891 [15].

Freshwater ecosystems are important in terms of biodiversity and life cycle balance in tropical regions [20]. Rivers in the Indo-Pacific highlands experience extreme hydrological variations and are characterized by freshwater fish species with amphidromous life cycles [5]. The Indo-Malayan region contains more than half of the global species diversity, with its peak in Indo-China and southern China. The Shrimp group mainly inhabits flowing waters [21].

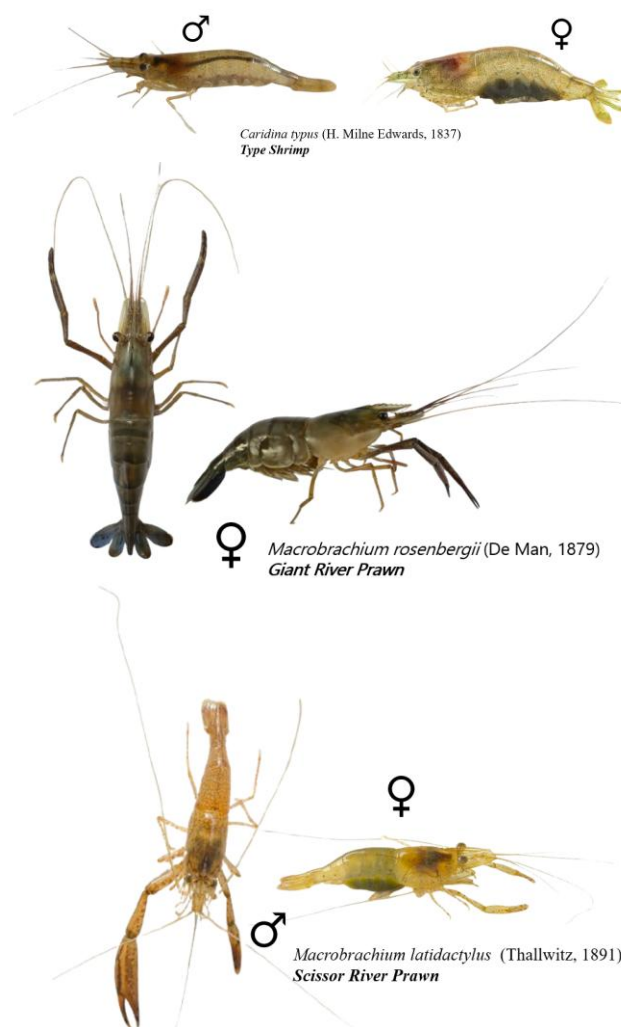


Figure 3. Three species of Caridea in Lalar Liang River, a) *Caridina typus* (H. Milne Edwards, 1837); b) *Macrobrachium rosenbergii* (De Man, 1879); c) *Macrobrachium latidactylus* (Thallwitz, 1891).

Table 2. Compilation of names of three Caridea species found in Lalar Liang, West Sumbawa

No	Species	Family	English	Indonesian	Sumbawa
1	<i>Caridina typus</i> (H. Milne Edwards, 1837)	Atyidae	Type Shrimp	<i>Udang Caridina;</i> <i>Udang beras</i>	<i>Uyang Kokok</i>
2	<i>Macrobrachium rosenbergii</i> (De Man, 1879)	Palaemonidae	Giant River Prawn	<i>Udang Galah</i>	<i>Uyang Olet</i>
3	<i>Macrobrachium latidactylus</i> (Thallwitz, 1891)	Palaemonidae	Scissor River Prawn	<i>Udang air tawar</i>	<i>Uyang Pistol</i>

Freshwater shrimp are important organisms in their habitat, which play an important role in maintaining ecological balance and the food chain [20]. The three freshwater shrimp species obtained in this study are full migrant species with Least Concern status and are native Indonesian species [19], [22]. The genus *Macrobrachium* is a freshwater shrimp that has the highest diversity [23]. The genus *Macrobrachium*, such as *Macrobrachium spinipes* (Schenkel, 1902) and *Macrobrachium rosenbergii* (De Man, 1879), migrate to brackish water to spawn, and the young shrimp return upstream [24]. *Macrobrachium rosenbergii* (De Man, 1879) has the highest relative abundance (46.67%) and is one of the most studied species in Indonesia after *Penaeus vannamei* (Boone, 1931) [25]. The genus *Macrobrachium* was also found to have high relative

abundance in a study of shrimp abundance in the Tuweley River, Tolitoli Regency [15]. Freshwater shrimp from the genus *Macrobrachium* are among the aquatic cultivation commodity species that have high economic value in the world [26], [27]. *Macrobrachium rosenbergii* (De Man, 1879) is very popular in many Asian countries. In Kalimantan, this species was successfully domesticated and cultivated with a salinity preference of 8 ppt [28]. The lowest relative abundance was observed in *Macrobrachium latidactylus* (Thallwitz, 1891) (16.00%). The decline in freshwater shrimp (*Macrobrachium* sp.) populations in rivers can be caused by overfishing, habitat loss, and pollution [29]. These two species were only found at two of the three sampling stations. Meanwhile, *Caridina typus* (H. Milne Edwards, 1837) was found at all sampling locations.

Table 3. Distribution and relative abundance of Caridea in Lalar Liang, West Sumbawa, and its conservation status

No	Species	Conservation Status (IUCN)	Native to Indonesia	Number of Individual			Total	DR (%)
				ST. 1	ST. 2	ST. 3		
1.	<i>Caridina typus</i> (H. Milne Edwards, 1837)	Least concern [19]	Native	5	8	15	28	37.33
2.	<i>Macrobrachium rosenbergii</i> (De Man, 1879)	Least concern [30]; Fully Recovery [31]	Native	2	0	33	35	46.67
3.	<i>Macrobrachium latidactylus</i> (Thallwitz, 1891)	Least concern [22]	Native	3	9	0	12	16.00
Total							75	100

Note: IUCN=International union for conservation of nature

Conclusion

Based on the research results, it can be concluded that the three shrimp species found were Amphidromous and native Indonesian with least concern status, with one species, namely *Macrobrachium rosenbergii* (De Man, 1879), having full recovery status. *Caridina typus* (H. Milne Edwards, 1837) was found at all sampling stations, *Macrobrachium rosenbergii* (De Man, 1879) was the most abundant species, and *Macrobrachium latidactylus* (Thallwitz, 1891) had the lowest abundance. Habitat protection for these three Caridea species is essential to ensure their continued survival. Further research conducted over extended periods and across multiple seasons is recommended to examine the reproductive and migration periods of these shrimp species. Such studies may contribute to the development of sustainable fisheries.

Author’s Contribution

R.R. Kawirian: conceptualized the research; Collect data and analysis data; wrote the manuscript. A. Dermawan: reviewed

the manuscript. M.Y. Mau: prepared the map, figures and tables.

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