

**PRELIMINARY STUDY OF THE POTENTIAL OF SHRIMP AND ITS
MANAGEMENT PERSPECTIVE IN NEGERI SEJUTA BAKAU,
WAROPEN REGENCY, PAPUA PROVINCE**

**Studi Pendahuluan Potensi Udang dan Perspektif Pengelolaannya di Negeri
Sejuta Bakau Kabupaten Waropen, Provinsi Papua**

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ABSTRACT

Shrimp are a superior commodity caught in the waters of the Land of a Million Mangroves, Waropen Regency, Papua Province. This research was carried out in February 2023 in the waters of Waropen Regency with the aim of assessing the potential of shrimp species and their management entities. This research uses a survey method in data collection and species identification is carried out by examining basic morphometric characteristics, namely (color and body shape). The results of the research show that there are 3 types of shrimp belonging to the Penaeid family, and 1 type belonging to the Palaemonidae family. The potential of shrimp at the research location is very potential. This is supported by the condition of the habitat and aquatic environment which is still good. Apart from that, utilization is still relatively low, where fishing tools and facilities are still relatively simple. However, to maintain its sustainability it is necessary to manage and utilize it in a measurable manner.

Keywords: Mangrove, Potential Shrimp, Waropen Regency

ABSTRAK

Udang merupakan komoditas unggulan yang tertangkap di perairan di Kabupaten Waropen, Provinsi Papua yang dikenal dengan Negeri Sejuta Bakau. Penelitian ini dilaksanakan pada bulan Februari 2023 di perairan Kabupaten Waropen yang bertujuan untuk mengkaji potensi jenis udang dan entitas pengelolaannya. Penelitian ini menggunakan metode survey dalam pengumpulan data, dan identifikasi jenis dilakukan dengan mengkaji karakteristik morfometrik dasar, yakni (warna, dan bentuk tubuh). Hasil penelitian menunjukkan bahwa terdapat 3 jenis udang yang tergolong udang famili Penaeid, dan 1 jenis tergolong famili Palaemonidae. Potensi udang di lokasi penelitian sangat potensial. Hal ini didukung oleh kondisi habitat dan lingkungan perairan yang masih baik. Selain itu, pemanfaatannya masih tergolong rendah,

dimana alat dan sarana tangkap masih tergolong sederhana. Meskipun demikian, untuk mempertahankan kelestariaannya maka perlu pengelolaan dan pemanfaatannya secara terukur.

Kata Kunci: Kabupaten Waropen, Mangrove, Potensi Udang

INTRODUCTION

The coast of Waropen Regency is a shrimp producer with the main catchment of penaeidae shrimp supported by a mangrove ecosystem of around 26,491.03 ha contributing 2.62% of the mangrove area in Papua (Papua Provincial Forestry and Environment Service, 2010). Mangrove areas in Waropen Regency are spread from the mouth of the Sanggei River, Urei Fasei District, to Sawai District, and Lower Waropen District and Enggerus District. The existence of the mangrove ecosystem is certain to greatly support the potential of fishery resources in Waropen Regency. Where the mangrove ecosystem is known to be the main habitat of various marine aquatic biota that has economic value and non-economic biota, so that it becomes a potential fishing ground area in coastal and marine areas.

Shrimp is one of the fishery products that has a very close relationship with the existence of mangrove ecosystems. The existence of a large and relatively natural mangrove ecosystem (pristine) on the coast of Waropen Regency is one of the huge potential fishery resources that must be managed properly. The catch of fishermen in Waropen Regency is dominated by fish, crabs and shrimp. Generally, shrimp are found around the waters of Urei Fasei District, Risei Sayati District, Demba District, Masirei District and Lower Waropen District of Waropen Regency.

Shrimp fishing in Waropen Regency generally uses floating nets (trammel nets) stretched out in the sea, or estuaries supported by wood at both ends. The commonly used mesh size is 2 inches and 3 inches or known in 2 and 3 finger net fishermen. Shrimp are caught in river estuaries, estuaries, coasts and offshore. Currently, shrimp fishing in Waropen Regency is starting to be boosted by the local government in meeting export targets as a source of regional income. Therefore, it is necessary to manage and utilize measurably and sustainably. The purpose of this study is to find out the types of shrimp caught by fishermen, habitat conditions and an overview of their use in the waters of Waropen Regency.

METHODS

Place and Time

This research was conducted in Urei Fasei District, Ureifasei District, Lower Waropen District and Demba District and Masirei District of Waropen Regency in February 2023. The location is determined by purposive sampling on several types of ecosystems, namely river, estuary, and coastal (sea) areas to determine shrimp species, habitats, and their management entities (Figure 1).

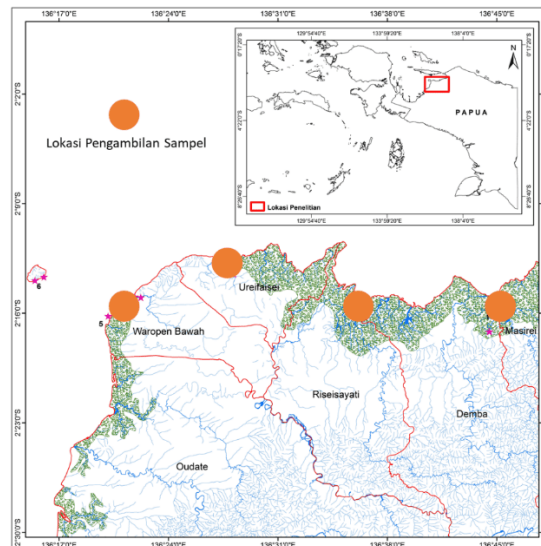


Fig 1. Map of Research Locations on the Coast of Waropen Regency

Data Source

The data is sourced from primary data and secondary data. Primary data was obtained through field surveys and secondary data was obtained through literature review. Primary data collection is focused on collecting samples from fishermen's catches, and interviews. Other data collection is the collection of data on the total daily catch, fishing gear and their amount, fishing location, actual catch conditions, selling prices and marketing locations as well as obstacles faced in shrimp fishing.

Data Collection Techniques

Data collection to determine the types of shrimp, habitat and distribution was carried out by collecting fishermen's catches during direct surveys in the field using nets with mesh sizes of 2 and 3 fingers (2 and 3 inches) installed by fishermen at night which were placed against the current in the zone near mangroves, estuaries and in the shallow sea. The fishermen's catches were sorted based on basic morphometric characters (color, body shape) as well as length and weight and then used as a sample. The total samples sorted were 48 samples. The shrimp samples are put into the plastic sample that has been provided beforehand, then given 70% alcohol which functions as a preservative. In addition, free collections are also carried out to complete the number of types of fishermen's catches such as in collecting fishermen and in markets. The samples obtained were photographed, and then preserved.

Data Analysis

The shrimp obtained from fishermen's catches were measured in total length (cm) from the rostrum to the telson and their weight (grams) (Figure 2). It is then identified by observing morphological features such as color, and body shape which refer to several literatures, namely Lovett (1981), Carpenter & Niem (1998). Measurement using the morphometric method is a good technique to distinguish body shapes in the population (Parenrengi *et al.*, 2007). The samples that have been identified are further described. Management entities such as fishing areas, utilization of catches, conditions of fishing facilities, fishing gear and fishermen, and their management are discussed in a descriptive manner.

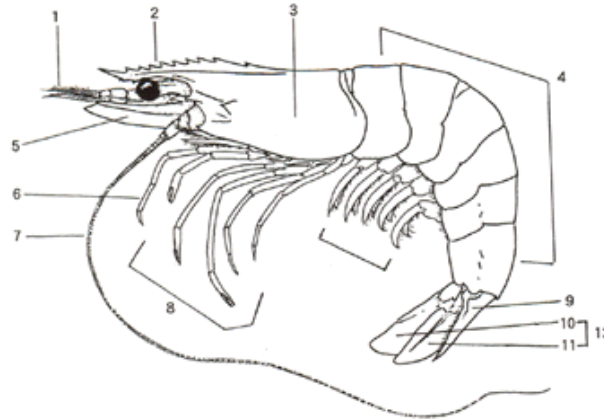


Fig 2. Morphology of *Penaeus* spp shrimp.

Information: 1. Antennula, 2. Rostrum, 3. Carapace, 4. Abdominal segments, 5. Scaphocerite, 6. Maksiliped, 7. Antenna, 8. Periopods, 9. Telson, 10 & 11. Eksopod dan Endopod segmen, 12. Uropod (Takeda et al. 2000).

RESULT

From the survey results, 4 types of shrimp were found to be the target of fishermen in Waropen Regency (Table 1), consisting of 3 types of Penaeidae families, namely dogol shrimp (*Metapeneus ensis*), jerbung shrimp (*Penaeus merguensis*), tiger shrimp (*Penaeus monodon*) and 1 type of Palaemonidae family, namely lobster (*Macrobrachium rosenbergii*).

Table 1. Hasil identifikasi jenis udang hasil tangkapan nelayan di perairan Kabupaten Waropen.

Types of Shrimp	Famili	Number of samples (cm)	Average Total Length (cm)	Average Weight (gr)
Windu Shrimp (<i>Penaeus monodon</i>)	Penaeidae	12	12	35
Jerbung Shrimp (<i>Penaeus merguensis</i>)	Penaeidae	12	7	43
Dogol/white shrimp (<i>Metapeneus ensis</i>)	Penaeidae	12	10	32
Lobster (<i>Macrobrachium rosenbergii</i>)	Palaemonidae	12	10	70

DISCUSSION

Types of Shrimp

Windu Shrimp (*Penaeus monodon*)

In the world of trade, tiger shrimp (*Penaeus monodon*) is known as pancet shrimp, jumbo tiger prawn, giant tiger prawn, black tiger prawn or black tiger shrimp. Tiger shrimp has a turquoise body with striped lines and a hard and slightly rough textured body on its belly (Agung et.al., 2022). Tiger shrimp has a salinity tolerance in the range of 35-45 ppt. The growth of tiger shrimp is shown in the process of molting the skin. Tiger shrimp usually immerse themselves in mud to avoid the threat of predators (Sumeru & Anna, 2004). In foraging, tiger shrimp are active at night (nocturnal) with a variety of foods such as crustaceans, mollusks, small fish, worms, insect larvae, and organic residues (Murtidjo, 2003).



Fig 3. Windu Shrimp (*Penaeus monodon*)

The natural food of tiger shrimp is the crustacea group, bivalves and gastropods (mollusk group), plant parts (macrophytes), Foraminifera sp. (zooplankton group) and detritus (Suryandari, *et.al.*, 2018). Tiger shrimp are benthic and love a soft substrate. In its life cycle, adult tiger shrimp lay eggs in the sea then the hatching larvae will move to the estuary area. When they are adults, tiger shrimp will move in groups to the sea to mate (Mudjiman & Suyanto., 2003). Tiger shrimp in the waters of Waropen Regency are generally caught in areas near the estuary towards the sea.

Jerbung Shrimp (Penaeus merguensis)

Jerbung shrimp or white shrimp (white shrimp) has the characteristics of thin and slippery skin, yellowish-white color with green spots and some are reddish-yellow. Jerbung shrimp (*Penaeus merguensis*) is one of the important economic fishery resources (Kusrini *et al.*, 2009; Selvia *et al.*, 2019; Sudarso *et al.*, 2022). Jerbung shrimp is one of the fisheries potentials in the waters of Waropen Regency.

Jerbung shrimp are benthic and can adapt to different types of substrates, but prefer muddy and sandy clay substrates. Adult lobsters are mostly found in shelf areas, especially near river mouths (Naamin, 1975), while in Hutapea *et al.*, (2019), they are more commonly found in mangrove areas. According to Liao (1985), the jerbung shrimp in the zoea phase begin to eat zooplankton and then when they grow up eat carrion and detritus.

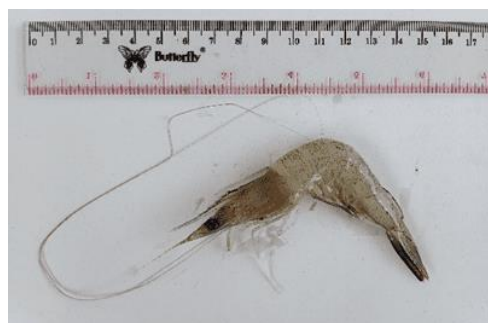


Fig 4. Jerbung Shrimp (*Penaeus merguensis*)

Jerbung shrimp (*Penaeus merguensis*) is a type of penaeid shrimp whose habitat is spread throughout Indonesian waters. Jerbung shrimp tend to be caught by fishermen in estuaries and mangrove suburbs. According to Hutapea *et al.*, (2019), the natural habitat of the jerbung shrimp is in the bottom area with a depth of 72 m. Meanwhile, the young are in brackish water, such as river estuaries and beaches. The more mature this type of shrimp is, the more they like to live in the sea. Therefore, the size of the shrimp usually indicates age. Adult shrimp

at spawning migrate to the middle of the sea to mate at a depth of about 50 m. Usually after the female shrimp change their shells, they will group and mate. Jerbung shrimp in Waropen Regency are generally caught around the banks of mangroves, and river estuaries.

Dogol Shrimp (Metapeneus ensis)

This shrimp has a thick and rough skin, a slightly yellowish pink color. The trade name is pink shrimp, some are yellow and yellow called yellow white shrimp. Dogol shrimp (*Metapeneus ensis*) is an important type of shrimp after the *Penaeus* shrimp type. Dogol shrimp is the main type in the genus *Metapeneus* (Takeda *et al.*, 2000). Generally, both male and female dogol shrimp have a less flat or thin body shape, the size of female shrimp tends to be longer than male shrimp (Hasanah *et al.*, 2017). Small-sized shrimp are often found in brackish water (Takeda *et al.*, 2000).



Fig 5. Dogol Shrimp (*Metapeneus ensis*)

Dogol shrimp (*Metapeneus ensis*) prefers areas with sandy mud substrates with food variations such as crustaceans, polychaeta, mollusks, fish, algae, and detritus (Fahlevi *et al.*, 2021). In accordance with the waters of Waropen Regency which has many muddy rivers. In the waters of Waropen Regency, many dogol shrimp are caught around river estuaries and on the banks of mangroves. Such a substrate is very suitable for dogol shrimp habitat (Hartono *et al.*, 2020).

Lobster (Macrobrachium rosenbergii)

Lobster is a freshwater shrimp with various colors such as bluish-green, brownish-green, brownish-yellow and spotted like tiger shrimp but more rounded in shape. Lobster is an important commodity in Waropen Regency. Lobsters are caught by fishermen around rivers from upstream to areas bordering intertidal areas.

Lobsters are biota that eat basic organisms and omnivore carrion, and are a type of freshwater animal that has high economic value. Lobster is a freshwater shrimp that has high economic value. Lobsters can still be found in estuarine areas because they can still tolerate environmental factors (Fahlevi *et al.*, 2021).



Fig 6. Lobster (*Macrobrachium rosenbergii*)

Fishing Area

The coastal waters of Waropen Regency are a very potential shrimp fishing area and have opportunities to be utilized. The water area along the coast of Waropen Regency is supported by the existence of a mangrove ecosystem as a habitat area, spawning area, and nurturing area for various types of shrimp. The distribution area of shrimp fishing areas spreads from Wapoga District, Inggerus District, Oudate District, Lower Waropen District, Ureifaisei District, Riseisayati District, Demba District and Masirei District (Figure 1). Meanwhile, Wolani, Soyoi Mambai, Wonti and Kirihi districts are districts located on the mainland.

Generally, fishermen in Waropen Regency catch shrimp, fish and crabs in estuaries, estuaries, and mangroves with simple fishing gear such as rowboats and nets. Shrimp fishing by fishermen is carried out not far from the coast, even only around estuaries near settlements. This condition is influenced by the type of fishing gear owned.

Condition of Fishing Facilities, Fishing Gear and Fishermen

Fishermen's fishing facilities in Waropen Regency generally use rowing boats which are also usually equipped with sails, and some fishermen already have a Johnson 15 PK engine with a net measuring 2-3 millimeters. Based on the results of interviews with fishermen, it was found that there were no nets made specifically for shrimp.

The coastal communities of Waropen Regency, especially in districts directly adjacent to the sea and estuaries, are people who carry out daily fishing activities, crabs, shrimp and others, including collecting shellfish. However, shellfish collection activities are mostly carried out by mothers. The condition of murky waters with large and relatively good mangroves and the many river estuaries so that it has consequences for the potential, especially shrimp, which is so high because of the suitability of the habitat as a foraging area, as a spawning area, as a rearing area, and as a living area.

Fishermen in Waropen Regency can be classified as subsistence fishermen, where fishermen who catch fish generally only meet their own needs (Charles, 2001). Fishermen in Waropen Regency are very ironic because often their catch, especially shrimp, is sold at a fairly cheap price. This is due to the limitations of processing and handling before being sold to the market. In addition, this condition is also caused by accessibility constraints where the distance and transportation from the city (market) are difficult to access and very expensive. The fuel oil (BBM) needed by each district varies. For example, in Demba District, based on the results of interviews with the community, if you travel 1 trip, you must need about 30 liters, which costs Rp. 300,000,-.

Fishermen in Waropen Regency generally use a fleet of boats made of fiber or wood assisted by 15 PK and 40 PK outboard motor engines and use nets measuring 2-3 inches. Fishermen's catches, especially shrimp, if they are excessive, are only sold in markets to meet local consumption needs while containers for export purposes do not yet exist. This also affects

the low price of shrimp at the fisherman level. In terms of fishing gear ownership, fishermen in Waropen Regency are categorized into individual fishermen, namely fishermen who have their own fishing equipment, and in their operation do not involve other people.

Utilization of Catch

Shrimp caught by the community in Waropen Regency are generally sold for consumption to the market. Meanwhile, exports have not been the target of arrest. Shrimp at the local market are sold at a rate of about 1 plate or 1 stack or about \pm 500 grams which is priced at around Rp.50,000,-. Although there is no data on shrimp catches recorded, it is certain that the potential of shrimp is still very potential to be utilized, where from the results of interviews with fishermen, it is found that shrimp commodities have not been the target of fishermen's catches for export purposes until now. This condition is caused by several things, such as limited supporting facilities and infrastructure, especially in post-harvest processing, limited collection entrepreneurs and others. In addition, from the results of fishermen's interviews, that the results of the arrest to date are still quite abundant.

With this overview of utilization, it is suspected that fishing efforts are still categorized as low so that shrimp fishing is still very possible to be improved because there is still an opportunity for further development. Although there needs to be a separate study to clarify these allegations, this information can be considered in making management policies in the future. Although there are no shrimp collectors and export companies in Waropen Regency, or in other words, shrimp fishing is only for local consumption needs, but indirectly if there is a continuous increase in fishing efforts, especially for high-value shrimp species, it will have an impact on the population stock in nature. For example, the jerbung shrimp (*Penaeus merguensis*) in its life cycle in the mangrove forest estuary as a nursery area and the sea as a spawning area (Gilanders *et al.*, 2003).

Sustainable Shrimp Resource Management

Shrimp is a renewable resource, however, utilization through fishing must be managed so that it does not cause overexploitation. The intensity of shrimp fishing in the waters of Waropen Regency is still low, but in the future, if not managed properly, it is possible that it will experience threats to its sustainability and sustainability.

Sustainable management of shrimp resources in fisheries arises because there is a global issue about limited shrimp resources on the one hand, and the need for shrimp resources continues to increase due to the increase in population on the other hand. The application of the concept of sustainable shrimp resource management is expected to save shrimp resources from extinction and at the same time save the interests of human life that depend on these resources.

Sustainable use of resources is a utilization strategy to provide benefits for human life that are not destructive. According to Monintja (2000), the sustainable use of fishery resources has several criteria, namely: 1) the catch does not exceed the amount that can be utilized, 2) uses less fuel, 3) legally legal fishing gear, 4) the investment required is low, and 5) the product has a good market. Furthermore, Pane & Suman (2020), that in the management of fishery resources, in principle, management methods are classified into two parts, namely controlling the size of shrimp caught and controlling the number of catches. Based on existing conditions, there are several management strategies proposed, including: closing areas and fishing seasons, limiting the size of shrimp caught, regulating the size of nets, limiting the number of catches, restricting fishing gear, fishing quotas, and limiting fishing efforts.

CONCLUSION

There are 4 species of shrimp that are often caught in Waropen Regency, namely dogol shrimp (*Metapeneus ensis*), jerbung shrimp (*Penaeus merguensis*), tiger shrimp (*Penaeus monodon*), lobster (*Macrobrachium rosenbergii*). The water condition of the mangrove ecosystem as a habitat for shrimp in Waropen Regency is still very ideal. The potential for an increase in the catch of penaeid and Palaemonidae shrimp in Waropen Regency is still quite an opportunity, but it needs measurable and sustainable management and utilization. Some strategies that need to be considered in the context of sustainable management and utilization include: closing areas and fishing seasons, limiting the size of shrimp caught, regulating net size, limiting the number of catches, restricting fishing gear, fishing quotas, and limiting fishing attempts.

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