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Species Inventory and Potential of Gastropods at Tongga Beach, Mboeain Village, West Rote District, Rote Ndao Regency, Indonesia

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Abstract: Tongga Beach is one of the tourist destinations that is frequently visited by tourists as well as local residents from neighboring districts. In addition to serving as a recreational area, the surrounding community utilizes the beach as a source of livelihood by collecting fish, shellfish, and snails for consumption. The harvesting of these marine organisms is generally carried out during specific seasons, particularly the dry season, when low tide conditions make it easier for residents to collect shellfish, snails, and other marine organisms for personal consumption or commercial purposes. This study aimed to identify the species and potential uses of gastropods found at Tongga Beach, Mboeain Village, West Rote District, Rote Ndao Regency. The research was conducted from October to December 2024 using the line transect method. A total of 17 gastropod species were identified, belonging to 6 orders, 9 families, and 13 genera. Three gastropod species were utilized by the local community as food sources, namely *Nerita picea*, *Canarium olydium*, and *Canarium urceus*. In addition, 14 gastropod species were utilized as ornamental materials, including *Cerithium nodulosum*, *Rhinoclavis vertagus*, *Clypeomorus bifasciata*, *Nerita plicata*, *Nerita tessellata*, *Conomurex luhuanus*, *Conus shikamai*, *Conus ebraeus*, *Vexillum dactylus*, *Strigatella retusa*, *Nassarius vibex*, *Crassispira quadrifasciata*, *Cymbiola rossiniana*, and *Helicigona faueri*.

Keywords: Gastropods; Gastropod Potential; Tongga Beach.

Introduction

The sea is one of the most important components of life on Earth. For many species of flora and fauna, the marine environment serves as a habitat where ecological processes occur and ecosystems are sustained. For humans, the sea provides a valuable source of livelihood and contributes significantly to meeting daily needs (Wahdaniar, 2016). Fishermen depend on marine resources through fishing activities, while coastal communities also utilize coastal areas as marine tourism destinations that support local economic development.

As the human population continues to increase, the demand for food resources, particularly those rich in protein, has also risen significantly. This growing demand has intensified the exploitation of marine resources, including aquatic organisms such as gastropods. Consequently, studies on the existence, diversity, and utilization of gastropods are necessary to ensure their sustainable management and conservation.

Research on gastropods is important because these organisms play significant ecological and economic roles in coastal ecosystems. Ecologically, gastropods function as detritivores and decomposers of organic matter and serve as bioindicators of water quality due to their sensitivity to environmental changes and habitat disturbances (Sesfao et al., 2019). Furthermore, the presence and diversity of gastropod communities can reflect the stability of coastal ecosystems and the environmental conditions of aquatic habitats, (Nontji, 2007). Economically, several gastropod species are utilized as food resources, raw materials for handicrafts,

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and commodities with commercial value that can contribute to the income of coastal communities, (Dharma, 2005). Therefore, research on gastropod species occurring in the Tongga Beach area is essential to provide scientific information regarding gastropod diversity and their utilization by local communities.

In recent years, many coastal areas have been developed as tourist attractions due to their diverse natural resources, including mangrove forests, beaches, fisheries, and the various organisms inhabiting these ecosystems. One of the important biota supporting coastal and marine ecosystems is gastropods. Gastropods are marine organisms that are highly sensitive to changes in water quality and environmental conditions, (Sesfao et al., 2019). In addition to their ecological importance, gastropods possess considerable economic value because their shells can be used as ornamental materials, while their meat can be consumed as a food source.

Tongga Beach is one of the tourist destinations frequently visited by tourists and residents from neighboring districts. Besides serving as a recreational site, the local community utilizes the beach as a source of livelihood by harvesting fish, shellfish, and marine snails for consumption and trade. Fishing is the primary occupation of many residents in the area. The collection of marine organisms is conducted throughout both the rainy and dry seasons. However, according to information obtained from local residents, gastropods and other marine organisms are more abundant and easier to collect during the dry season, when seawater levels recede during low tide. Many of the gastropods collected are sold in local traditional markets for consumption, while non-edible species with attractive shells are sold to buyers who use them as raw materials for handicrafts and ornamental products.

Preliminary observations at the study site revealed that several gastropod species are commonly encountered by local communities, including *Canarium olydium*, *Conus ebraeus*, *Nerita picea*, *Nerita plicata*, and various other species. Therefore, this study aimed to identify the gastropod species present at Tongga Beach and assess their potential utilization by the local community.

Methods

This study employed the line transect method to examine the distribution of gastropods along the coastal area. A line transect consists of a straight line established across the sampling area, while quadrats are square frames placed along the transect line to facilitate systematic sampling (Fita, 2021). At the study site, five observation transects were established, with a distance of 50 m between adjacent transects.

Quadrats were placed in areas exposed during the lowest tidal conditions and that were accessible for sampling. All gastropod specimens found within each quadrat were collected and placed in sample bags for identification. The collected specimens were subsequently identified to species level using relevant taxonomic references. Data on the potential utilization of gastropods were obtained through direct interviews with local community members who regularly collect and utilize these organisms.

Results and Discussion

Tongga Beach is located in Mboeain Village, West Rote District, Rote Ndao Regency. The beach is well known for its scenic beauty and serves as a recreational destination for both local residents and visitors from neighboring districts. In addition to its tourism value, Tongga Beach functions as an important area for local livelihoods, where residents collect marine organisms for food and operate small fishing boats. The beach also serves as a transportation route to Nuse Island. The dominant substrates found at Tongga Beach are sandy and rocky (coral) substrates, which provide suitable habitats for various gastropod species. The present study recorded a total of 17 gastropod species belonging to 6 orders, 9 families, and 13 genera. The identified species were *Cerithium nodulosum*, *Rhinoclavis vertagus*, *Clypeomorus bifasciata*, *Nerita plicata*, *Nerita picea*, *Nerita tessellata*, *Canarium olydium*, *Canarium urceus*, *Conomurex luhuanus*, *Conus shikamai*, *Conus ebraeus*, *Pterygia dactylus*, *Strigatella retusa*, *Nassarius vibex*, *Crassispira quadrifasciata*, *Cymbiola rossiniana*, and *Helicigona faueri* (Table 1).

Based on Table 1, a total of 17 gastropod species were identified, representing 6 orders, 9 families, and 13 genera. The order with the highest diversity was Neogastropoda, comprising 5 families, 6 genera, and 7 species. This finding is consistent with the study of (Wahyuni et al., 2017), who reported that Neogastropoda is among the gastropod orders with the greatest species richness. Most members of this order exhibit a broad ecological distribution and can adapt to various habitats. While only a few species inhabit freshwater environments, the majority occur in marine habitats ranging from the littoral zone to deep-sea ecosystems and are generally predatory in nature.

Although Neogastropoda exhibited the highest species richness, the most abundant species recorded in this study was *Canarium urceus*, with a total of 64 individuals. The high abundance of this species may be attributed to its ability to adapt to local habitat conditions. During extreme low tides, *C. urceus* is known

to migrate to seagrass leaves, which provide both food resources and protection from environmental stress (Ahmad, 2018). The second most diverse order was Caenogastropoda, represented by 1 family, 3 genera, and 3 species, followed by Littorinimorpha with 1 family, 2 genera, and 3 species, Cycloneritida with 1 family, 1 genus, and 3 species, and Systellommatophora with 1 family, 1 genus, and 1 species.

Table 1. Gastropod Species Recorded at Tongga Beach

Ordo	Family	Spesies	Jlh
Caenogastropoda	Cerithiidae	*Cherithium nodulosum*	13
		Rhinaclavis vertagus	9
		Clypeomorus bifasciata	14
Cycloneritida	Neritidae	*Nerita plicata*	12
		Nerita picea	42
		Nerita tessellata	8
Littorinimorpha	Strombidae	*Canarium olydium*	53
		Canarium urceus	64
		Conomurex luhuanus	18
Neogastropoda	Conidae	*Conus shikamai*	14
		Conus ebraeus	47
	Mitridae	*Pterygia dactylus*	16
		Strigatella retusa	8
	Nassariidae	*Nassarius vibex*	17
	Pseudomelatomidae	*Crassispira quadrifasciata*	13
	Volutidae	*Cymbiola rossiniana*	7
Systellommatophora	Helicidae	*Helicigona faueri*	41

The occurrence of gastropods in this area indicates that Tongga Beach still possesses environmental conditions that support the survival of benthic organisms, particularly gastropod mollusks. The relatively undisturbed coastal environment, combined with the presence of rocky, coral, and sandy substrates as well as tidal fluctuations, constitutes important factors influencing the distribution and abundance of gastropods in the area (Odum, 1993). Gastropods commonly inhabit intertidal zones where food resources such as algae, detritus, and small organisms are abundant. Furthermore, rocks and coral structures provide shelter from wave action and predation, thereby enhancing habitat suitability (Nybakken, 1992).

The diversity of species recorded in this study suggests that Tongga Beach contains a variety of habitats capable of supporting gastropod species with different ecological requirements and adaptations (Romimohtarto & Juwana, 2007). Habitat heterogeneity is widely recognized as a key factor contributing to species richness in coastal ecosystems.

Members of the family Neritidae, including *Nerita plicata*, *Nerita picea*, and *Nerita tessellata*, were found in relatively high numbers on rocky and coral substrates. Species within this family possess a strong attachment capability that enables them to withstand wave action and currents in intertidal environments. In addition, these species typically graze on algae growing on rock surfaces, making rocky habitats particularly suitable for their survival. The presence of *Nerita* species is often regarded as an indicator of healthy rocky intertidal habitats that continue to support diverse marine communities (Pribadi et al., 2017; Wilhelmsen & Reise, 1994).

Species belonging to the family Strombidae, such as *Canarium olydium*, *Canarium urceus*, and *Conomurex luhuanus*, were predominantly associated with sandy substrates. Gastropods of this family are generally active on sand surfaces, where they feed on detritus and microorganisms. In addition to their ecological functions, several Strombidae species possess economic value because they are harvested and consumed by local communities. This utilization demonstrates the close relationship between coastal communities and marine biological resources at Tongga Beach (Marjuki et al., 2012).

The discovery of 17 gastropod species at Tongga Beach highlights the area's considerable biodiversity potential and emphasizes the importance of maintaining its ecological integrity. Sustainable conservation and management strategies are therefore necessary to ensure the continued existence of gastropod populations and their availability for future generations. Further studies focusing on population density, spatial distribution, diversity indices, and environmental quality are recommended to provide a more comprehensive understanding of the ecological condition of Tongga Beach and its associated coastal ecosystems (Supriharyono, 2007).

Cerithium nodulosum

Description:

Cerithium nodulosum is a marine gastropod belonging to the family Cerithiidae and is commonly found in tropical coastal areas, especially in intertidal and shallow subtidal zones. This species generally lives on sandy and muddy substrates, as well as around seagrass beds and coral rubble (Carpenter & Niem, 1998). The shell of *Cerithium nodulosum* is elongated and conical, with distinctive nodules or bumps on each whorl. The shell color varies from light brown to dark brown, often with dark spiral lines. The shell size generally ranges from 3–8 cm. Its habitat is commonly

found in sandy or muddy areas. *Cerithium nodulosum* serves as a food source for various predators such as shorebirds, small fish, and sea stars (Reid, 2007). This species plays an important ecological role as a detritus and microalgae feeder on aquatic substrates, thereby helping to maintain the balance of coastal ecosystems. In addition, *Cerithium nodulosum* is also a food source for predators such as shorebirds, small fish, crabs, and sea stars. This species is often found in waters that still have relatively good environmental conditions and are rich in organic matter (Abbott & Dance, 2000). *Cerithium nodulosum* is commonly used by local communities as a decorative material.

Rhinaclavis Vertagus (Soreang & Banggae, 2018)
Description:

The shell of *Rhinoclavis vertagus* is elongated and conical with many whorls. The shell surface is usually rough and lined, with colors ranging from grayish white to brown. The shell can reach up to 8 cm in length. This species is commonly found around mangrove areas and coral reefs. The beautiful shell of *Rhinoclavis vertagus* is often collected and is also used as a cleaner in marine aquariums. As a benthic organism, *Rhinoclavis vertagus* plays an important role in coastal ecosystems as a detritivore and grazer, feeding on detritus, microalgae, and biofilms, thereby helping nutrient recycling and maintaining the ecological balance of shallow waters (Taylor & Glover, 2004). This species is also known to help clean substrates from organic debris and algae, making it useful as a natural cleaner, while its shell is valuable as a decorative material (Spurung, 2001). This species is commonly utilized as an ornamental material by coastal communities.

Clypeomorus bifasciata (J. Biologi et al., 2014)
Description:

The shell of *Clypeomorus bifasciata* is relatively short and broad with a conical shape. The shell surface is usually smooth and glossy, with spiral lines extending from the apex to the base of the shell. The shell color is generally brown or cream with darker stripes. The shell size usually ranges from 1–2 cm. This species is commonly found in sandy areas. *Clypeomorus bifasciata* is often kept in marine aquariums because of its role as a natural cleaner and the beauty of its shell. Marine gastropods, including *Clypeomorus bifasciata*, have broader economic potential both as food sources and ornamental commodities. Several gastropod species have long been utilized by coastal communities as sources of animal protein because they contain relatively high levels of protein, minerals, and essential amino acids, especially edible gastropod species (Cob et al., 2008).

Nerita plicata (Mauli dkk, 2021)
Description:

The shell of *Nerita plicata* is round and flattened. The shell surface is usually rough with small protrusions. The shell color varies from creamy white to reddish brown, with unique lines or patterns. The shell size generally ranges from 3–4 cm. *Nerita plicata* serves as a food source for various marine animals, such as fish and birds, and is also used as a decorative material for small ponds. Intertidal gastropod species are utilized as traditional food and have important socio-economic value for coastal communities because they are easily collected (Oktavia et al., 2023). In the economic sector, gastropod shells are used for tourism souvenirs, decorations, jewelry, and local handicraft products that are directly connected to the tourism industry (Simard et al., 2024).

Nerita picea (Wahyuni et al., 2017)
Description:

The shell of *Nerita picea* is round and slightly flattened. Its shell has a distinctive black or dark brown color with a characteristic shine. The shell surface is usually rough and textured, and the shell size generally ranges from 2–4 cm. *Nerita picea* is highly adaptable to extreme tidal conditions. This species has high cultural value. Its soft flesh is often boiled and consumed as a snack. The shell is also frequently used to make jewelry and ornaments. *Nerita picea* has a high physiological adaptation ability to changes in temperature, salinity, and air exposure, allowing it to survive in dynamic coastal environments (Marshall et al., 2023). The presence of *N. picea* is associated with the health of mangrove and coastal ecosystems because gastropod diversity can reflect habitat quality (Maha et al., 2024). Therefore, *Nerita picea* is important not only as a biodiversity component but also as a bioindicator of coastal environmental conditions. *Nerita* species contain significant amounts of protein and minerals for traditional consumption (Lukas et al., 2024).

Nerita tessellate (Ardiyansyah et al., 2023)
Description:

The shell of *Nerita tessellata* is oval-shaped with a rough and textured surface. Its distinctive characteristic is a black-and-white checkered pattern covering the entire shell surface. The shell size generally ranges from 1–2 cm. *Nerita tessellata* is usually attached to rocks. This species is very popular as a cleaner in marine aquariums because it helps remove algae attached to glass, live rocks, and aquarium decorations.

Canarium olydium, (J. P. Biologi et al., 2024)
Description:

Canarium olydium is a species of marine snail belonging to the family Strombidae. Its shell has a distinctive oval shape with a slightly pointed tip and varies in color, including brown, cream, and white. The shell size generally ranges from 20–35 mm. This species is usually found in shallow marine waters, often living among coral reefs or in sandy areas. *Canarium olydium* is commonly utilized as a food source.

Canarium urceus (Waters & Lombok, n.d.)
Description:

Canarium urceus, commonly known as the small pitcher snail, is a marine snail belonging to the family Strombidae. The shell of *Canarium urceus* has a distinctive elongated and curved shape resembling a small pitcher. The shell surface is usually smooth and glossy, with colors ranging from white to yellowish brown. The shell size varies but generally ranges from 3–5 cm. This species is commonly found in sandy or muddy areas. The meat of *Canarium urceus* is edible, while its beautiful and unique shell is used as a decorative material. This species is one of the marine gastropods from the family Strombidae that has important ecological and economic potential in tropical coastal areas, especially in seagrass ecosystems, muddy-sand habitats, and shallow intertidal zones (Diamante et al., 2024). *C. urceus* has high abundance in seagrass ecosystems and is easily collected by coastal communities, making it a potential local commodity for both consumption and creative industries (Rismawati et al., 2024).

Conomurex luhuanus (Waters & Lombok, n.d.)
Description:

Conomurex luhuanus is a popular species of marine snail. Its shell is elongated with a slightly pointed tip. The shell color pattern is highly variable, ranging from white with orange or brown spots to completely brown. The shell size varies but generally ranges from 5–8 cm. This species is often used as a decoration or jewelry material. *C. luhuanus* is utilized more for its shell than for its meat (Binh & Thao, 2022). This potential is important because it supports the diversification of coastal resource utilization. However, excessive exploitation for shell trading without proper management can reduce natural populations, especially in tourist areas with high collection rates (Mutlu, 2022). Therefore, the conservation of habitats such as seagrass beds and sustainable utilization management are essential to maintain the sustainability of this species.

Conus shikamai(Terlau, dkk., 2023)
Description:

Conus shikamai is a species of marine snail belonging to the family Conidae. The shell of Conus shikamai usually has a conical shape, as its name suggests. The shell color pattern is highly variable but generally consists of combinations of brown, cream, and orange. This species is found in shallow marine waters, often living among coral reefs or on sandy sea bottoms. Conus shikamai contains peptides that can be used as pain relievers and anti-inflammatory agents. In addition, Conus shikamai has the potential to be developed as a natural resource for handicraft and decorative industries.

Conus ebraeus (Natan et al., 2023)
Description:

The shell of *Conus ebraeus* has a characteristic conical shape with a smooth and glossy surface. Its color pattern is very striking, consisting of a combination of black and white that forms abstract patterns. The shell size generally ranges from 25–62 mm. *Conus ebraeus* is usually found living among coral reefs or on sandy sea bottoms. The beautiful and unique shell of *Conus ebraeus* is often collected as an ornamental shell. It is also frequently used as a research object to study toxins, evolution, and ecology. The venom of *Conus ebraeus* has the potential to be developed into pharmaceutical products.

Pterygia dactylus (Herrmann dan Dekkers, 2022)
Description:

Pterygia dactylus is a marine snail belonging to the family Mitridae. The shell of *Pterygia dactylus* is conical in shape with a smooth and glossy surface. The shell color varies from light brown to dark brown with darker spiral lines. The shell size generally ranges from 2–5 cm. *Pterygia dactylus* is commonly found living among coral reefs or on sandy sea bottoms. Its beautiful shell is often collected and used as an ornamental decoration.

Strigatella retusa (Fita, 2021)
Description:

Strigatella retusa is a marine snail belonging to the family Mitridae. Its shell is conical in shape with a smooth and glossy surface. The shell color usually varies from light brown to dark brown with darker spiral lines. The shell size generally ranges from 2–5 cm. *Strigatella retusa* is commonly found living among coral reefs or on sandy sea bottoms. Its beautiful and unique shell is often collected by shell enthusiasts (Riniatsih, 2009).

Nassarius vibex (Aditya dan wahyu et al., 2020)
Description:

The shell of Nassarius *vibex* is elongated and conical with a smooth surface. Its color ranges from light brown

to dark brown, often with darker spiral lines. The shell size generally ranges from 1–2 cm. *Nassarius vibex* is commonly found on sandy or muddy sea bottoms. This species is popular as a cleaner in marine aquariums because it helps remove organic debris and maintain substrate cleanliness.

Crassispira quadrifasciata (Lombok et al., 2025)
Description:

Crassispira quadrifasciata is a species of marine snail belonging to the family Pseudomelatomidae. Its shell is elongated and conical with distinctive grooves. The shell surface is usually smooth and glossy, with a white or cream-colored background. A characteristic feature of this species is the presence of four brown or dark reddish bands running across the shell, which is why it is named *quadrifasciata*. The unique shell pattern of *Crassispira quadrifasciata* can serve as inspiration in design fields, such as batik motifs or textile patterns.

Cymbiola rossiniana (Lestari, dkk 2021)
Description:

Cymbiola rossiniana is a marine snail belonging to the family Volutidae and is known for its beautiful and unique shell. The shell of *Cymbiola rossiniana* has a distinctive elongated oval shape with a slightly pointed tip. The shell surface is usually smooth and glossy, with colors varying from brown, cream, to white. This species is found in deeper marine waters and lives on sandy or muddy sea bottoms. The beautiful and unique shell of *Cymbiola rossiniana* is highly sought after by collectors and is also used as an ornament or display item.

Helicigona faueri (Natan et al., 2023)
Description:

Helicigona faueri is a species of land snail belonging to the genus *Helicigona* and the family Helicidae. The shell of *Helicigona faueri* is generally round or slightly oval, with a smooth or slightly textured surface. The shell color varies from yellowish-brown to dark brown, often with darker spiral lines. Its body is soft and grayish or yellowish in color. *Helicigona faueri* plays an important role as a decomposer, helping to break down organic materials such as fallen leaves into smaller particles. Its meat is rich in protein, making it a potential food source in some cultures.

Potential Uses of Gastropods

Gastropods are one of the most diverse groups of mollusks and are commonly found in coastal and shallow marine ecosystems. These organisms play important ecological and economic roles in the lives of coastal communities. Ecologically, gastropods function as components of the food chain, decomposers of organic matter, and bioindicators of water quality because they are highly sensitive to changes in habitat conditions. The presence of gastropods in a particular aquatic area can indicate that the coastal ecosystem is still in good and stable condition (Nybakken, 1992).

In addition to their ecological functions, gastropods also have considerable economic potential. Several gastropod species are utilized as food because of their high protein content. Furthermore, gastropod shells are often used for handicrafts, decorations, souvenirs, and other products with high market value. Some gastropod species are also utilized in the fields of medicine and scientific research because they contain bioactive compounds that have the potential to be developed into pharmaceutical products (Dahuri, 2003).

The significant potential of gastropods makes them an important marine biological resource that deserves further study and conservation. Increasing human activities in coastal areas, such as overharvesting, pollution, and habitat destruction, may affect the abundance and diversity of gastropods in nature. Therefore, an inventory of gastropod species is necessary to determine their diversity, utilization potential, and to support the sustainable management of coastal resources (Supriharyono, 2007).

Gastropods have long been utilized by many communities, including those living around Tongga Beach, Mboeain Village. Gastropods have important economic value, both from their meat and from their shells, which can be used as decorative materials. Based on information obtained from local residents, several gastropod species have potential as food sources and as raw materials for ornaments and handicrafts. The gastropod species identified in this study and their potential uses are presented in Table 2.

Table 2. Potential Uses of Gastropods in Mboeain Village

Spesies	Use	
	Food Source	Decorative Materials
Cherithium nodulosum		√
Rhinaclavis vertagus		√
Clypeomorus bifasciata		√
Nerita plicata		√
Nerita picea	√	√
Nerita tessellata		√
Canarium olydium	√	
Canarium urceus	√	√
Conomurex luhuanus		√
Conus shikamai		√
Conus ebraeus		√
Pterygia dactylus		√
Strigatella retusa		√
Nassarius vibex		√
Crassispira quadrifasciata		√
Cymbiola rossiniana		√
Helicigona faueri		√

Based on the analysis presented in Table 2, the most common use of gastropods is as raw materials for ornaments and decorations. Fourteen gastropod species are utilized for decorative purposes, namely *Cerithium nodulosum*, *Rhinoclavis vertagus*, *Clypeomorus bifasciata*, *Nerita plicata*, *Nerita tessellata*, *Conomurex luhuanus*, *Conus shikamai*, *Conus ebraeus*, *Pterygia dactylus*, *Strigatella retusa*, *Nassarius vibex*, *Crassispira quadrifasciata*, *Cymbiola rossiniana*, and *Helicigona faueri*. This finding is consistent with interviews conducted with local residents, who stated that certain species have recently become highly sought after by buyers of decorative raw materials. One of the most popular species is *Helicigona faueri*, which is commonly purchased by people from neighboring districts at a price of IDR 18,000 per kilogram for use as decorative material. Another species, *Conus ebraeus*, is usually purchased at a price of IDR 10,000 per kilogram. The shells of other species are commonly used by local residents and visitors as household decorations and souvenirs. In addition to their use as decorative materials, some gastropod species are utilized as food and sold in traditional markets. These species include *Nerita picea*, *Canarium olydium*, and *Canarium urceus*.

The extensive use of gastropods as decorative materials indicates that gastropods at Tongga Beach have considerable economic value for coastal communities. The unique shell shapes, attractive colors, and natural patterns found in several species are the main reasons for their popularity as raw materials for handicrafts and household decorations. Gastropod shells are generally durable and are widely used in the production of souvenirs, accessories, home decorations, and various other handicraft products (Dharma, 2005).

The high demand for certain species, such as *Helicigona faueri* and *Conus ebraeus*, suggests that these species have a higher market value than others. The economic value of gastropods provides additional income opportunities for coastal communities and can contribute to improving household livelihoods. The trade of gastropod shells also demonstrates economic interactions between coastal communities and other regions that utilize shells as raw materials for handicraft industries (Dahuri, 2003). Furthermore, gastropod shells, which are rich in calcium carbonate, can be processed into various products, including bioceramics, organic fertilizers, animal feed supplements, and natural cosmetic ingredients (Kumaran et al., 2020). Therefore, gastropods possess not only ecological importance but also significant economic potential that can support sustainable coastal development.

The use of gastropod shells as decorative materials also shows the potential for developing a creative economy based on coastal resources. If properly managed, these resources can be developed into regional products with higher cultural and economic value. In addition, the presence of tourists visiting Tongga Beach provides marketing opportunities for handicraft products made from gastropod shells. This condition can support the improvement of the local community's economy through the development of small-scale businesses based on marine resources (Supriharyono, 2007). Besides being used as decorative materials, several gastropod species such as *Nerita picea*, *Canarium olydium*, and *Canarium urceus* are utilized by local communities as food sources. These species are commonly consumed because they contain relatively high levels of protein and are easily obtained in coastal areas. The utilization of gastropods as food indicates that these organisms play an important role in meeting the food needs of coastal communities, particularly as an alternative source of animal protein (Nybakken, 1992).

Although gastropods have considerable economic potential, their utilization should be carried out wisely to prevent population decline in nature. Excessive harvesting of gastropods, especially species with high market value, can disrupt the balance of coastal ecosystems and threaten the sustainability of certain species. Therefore, management and conservation efforts are needed through sustainable utilization practices and increased public awareness of the importance of protecting coastal ecosystems (Odum, 1993). The trade of marine shells in the tourism and creative industry sectors has even become an important source of income for coastal communities in many tropical countries (Morris, 2013).

According to Marjuki et al. (2012), gastropods are utilized by Indonesian communities as food sources, and some species are also used as traditional remedies for asthma. As a food source, gastropods contain high levels of protein, minerals, and nutrients, making them widely consumed by coastal communities. Certain bioactive compounds found in some gastropod species are believed to help relieve respiratory disorders such as asthma, although their effectiveness still requires further scientific investigation.

Several gastropod species are highly sensitive to changes in habitat conditions, such as heavy metal pollution, salinity fluctuations, and mangrove degradation. Therefore, their presence or population decline can be used as an indicator of coastal ecosystem health (Amin et al., 2009). Thus, the inventory of gastropods at Tongga Beach is important not only for understanding their economic value but also as a basis for monitoring coastal environmental conditions in a sustainable manner.

Figure 1. *Chonus shikamai*

Figure 2. *Canarium olydium*

Figure 3. *Helicigona faueri*

Figure 4. *C. quadrifasciata*

Figure 5. *Cymbiola rossiniana*

Figure 6. *Canarium Urceus*

Figure 7. *Conomurex luhuanus*

Figure 8. *Nerita plicata*

Figure 9. *Cerithium nodulosum*

Figure 10. *Conus ebraeus*

Figure 11. *Nerita picea*

Figure 12. *Nerita tessellate*

Fugure 13. *Nassarius vibex*

Figure 14. *Pterygia dactylus*

Figure 15. *R. vertagus*

Figure **16.** *Clypeomorus bifasciata*

Figure 17. *Strigatella retusa*

Conclusion

The utilization of gastropods by the local community can be divided into two main functions, namely as food sources and as decorative materials. Three species are utilized as food sources, while most of the other species are used as decorative materials, indicating that gastropods have not only consumptive value but also creative economic value. These findings confirm that the presence of gastropods supports the livelihood needs of local communities and has the potential to be developed as a source of local income based on coastal resources. Scientifically, the results of this study show that the diversity of gastropod species and their patterns of utilization reflect the close relationship between biodiversity and the socio-economic activities of coastal communities. Thus, the objectives of this study, namely, to identify gastropod species and determine their forms of utilization, have been achieved. This study recommends the sustainable management and utilization of gastropods to maintain their populations in natural habitats. In addition, further research is needed on population density, conservation status, and the economic value of gastropods so that their utilization can be optimized without disrupting the balance of coastal ecosystems.

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Conflicts of Interest

The authors hereby declare that there are no conflicts of interest related to this research.

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