

Species Composition of Aquatic Resources in Lantebung Mangrove Ecotourism Area, Makassar, Indonesia

ABSTRACT

The mangrove ecotourism area is an alternative place for recreation for the community, so that it is thought to disturb the presence of it is thought to disturb aquatic resources. This study aims to analyse-analyze the species composition of aquatic resources in the Lantebung mangrove ecotourism areasystem. Data collection used a survey method, and the research was conducted from October to November 2023 in the Lantebung mangrove ecotourism area in Makassar, Indonesia. The results showed that the composition of fish species consisted of five dominating fish species, namely Tawes (*Garresabbreviatus*) 3904 fish (39.40%), Peperek (*Nuchequulanuchalis*) 2389 fish (24.11%), Peperek (*Eubleekeria splendens*) 1021 fish (10.30%), Rejung fish (*Sillago robusta*) 975 fish (9.84%), and Peperek (*Leiognathuslongispinis*) 910 fish (9.18%). The diversity of aquatic resources included 29 species of fish with 9985 individuals, 19 species of crustaceans with 117 individualspecies, 40-tenspecies of mollusca-Mollusca with one individual in each species, -each and one species of cnidaria-Cnidaria with one speciesindividual. The highest fish species composition is Tawes fish (*Garresabbreviatus*), andthe diversity of aquatic resources is dominated by fish, crustaceans, mollusca, and the lowest type of cnidaria the lowest type is Cnidaria.

Keywords: ecotourism; species composition; aquatic resources; mangrove

1. INTRODUCTION

Mangrove forests in Indonesia are scattered in several provinces, one of which is in Makassar, South Sulawesi Province. Makassar City as-is one of the cities that holdswith mangrove potential with an area of 25 ha. The northern area is approximately 1,000 x 250 m, and the southern area is approximately 700 x 50 m [1]. The mangrove area provides ecological benefits as a spawning, nurturing, and feeding location for a-variety-of-various fish, shrimp, crabs, and other marine life [2].

Mangroves have ecosystem services to maintain the diversity of aquatic resources. According to [3], mangroves can also-provide direct and indirect benefits, such as fishing around mangrove forests. In addition to the internal value and beauty of mangroves, mangrove ecosystems provide services, such as absorbing CO₂ in the air, -shelter for fish, crabs, shellfish, as seagrass and shelter for fish, crabs, shellfish, seagrass, and coral reef zones.

Mangrove ecosystems also have a wide range of physical, biological, and economic functions. In addition, mangrove ecosystems are also-used-by-marine-organisms-rine organisms also use mangrove ecosystems to start the food chain by utilising-utilizing mangrove litter. On the other hand, people also often use the area around mangroves as ponds, -m. Mangroves are cut down as firewood and medicinal materials [4].

However, over time, the diversity of aquatic resources can be threatened by human activities and habitat factors resulting from mangrove habitat degradation, pollution, climate change,

overfishing and resource extraction, mangrove diseases, and species invasions. Degraded mangroves can threaten the survival of many species that depend on these ecosystems. ~~This~~ can lead to the disruption of the balance of the mangrove ecosystem.

This research is ~~important-necessary~~ because the diversity of aquatic resources plays an ~~important-essential~~ role in natural resource conservation efforts. In addition, aquatic resources include various ~~types of~~ organisms, including fish, microorganisms, and aquatic plants, that help maintain the balance and stability of aquatic ecosystems. ~~In relation to this,~~ This study aims to ~~analyse-analyze~~ the species composition of aquatic resources in the Lantebung mangrove ecosystem in Makassar ~~city~~City.

2. RESEARCH METHODS

2.1 Research Location

This research was conducted ~~from October to November 2023 in the mangrove ecotourism area~~ in the Lantebung mangrove ecotourism area from October to November 2023.



Fig. 1. Research Location Map

Comment [Rh1]: Please translate to english each legend of Map. Hutan mangrove to mangrove forest or mangrove ecosystem, Wisata mangrove Lantebung to Lantebung Mangrove Ecotourism, etc.

2.2 Data Collection Methods

~~Data collection methods through survey techniques and direct involvement in the fishing process.~~ The data collected are primary data and secondary data. Primary data, such as samples of aquatic resource ~~species species~~ composition, ~~are collected by survey and direct involvement in the fishing process~~ ~~Data collection methods through survey techniques and direct involvement in the fishing process.~~ ~~Data collection is carried out by fishing surveys~~ ~~Fishing surveys carry out data collection~~ to identify types of aquatic resources. Fishing surveys are carried out in collaboration with local fishermen. Secondary data, ~~in the form of is~~ data taken from literature studies.

Species composition of aquatic resources was done by identifying and recording species of fish and aquatic organisms using guidelines from the web pages www.fishbase.se and www.fishider.org.

2.3 Data Analysis

The species composition of aquatic resources in mangrove ecotourism Lantebung Makassar City can be calculated based on the equation [5]:

$$Ks = \frac{ni}{N} \times 100\%$$

Description:

Ks : fish species composition (%)

Ni : number of individuals of each fish species

N : number of individuals of all fish species

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3. RESULTS AND DISCUSSION

Lantebung mangrove forest provides an environment for a variety of various fish and other aquatic resources. During the study, various species of fish, crustaceans, mollusca and enidaria were obtained. Various fish species, crustaceans, mollusca, and Cnidaria were obtained during the study. The following aquatic resource analyses were conducted, with fish species composition as the representative.

3.1 Composition of Fish Species

Fish collected during the study from various fishing gear (Gill nets, Rakkang, and Bubu) totalled 9985 fish consisting of 29 fish species. Of the 29 species recorded, only one type of fish is classified as cartilaginous fish, namely stingray (*Hypanus sp.*), while the other 28 fish species are classified as true bony fish. The types of fish recorded from various types of net catches, Rakkang, and Bubu gear during the study are shown in Figure 2.

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The top five fish species were Tawes (*Garresabbreviatus*) with 3904 fish (39.40%), Peperek (*Nuchequulanuchalis*) with 2389 fish (24.11%), Peperek (*Eubleekeria splendens*) with 1021 fish (10.30%) and Rejung (*Sillago robusta*) with 975 fish (9.84%) and Peperek (*Leiognathuslongispinis*) with 910 fish (9.18%).

Meanwhile, the least number of fish caught were grouper (*Epinephelussexfasciatus*), puffer fish (*Arothronmanilensis*), Jangki Timun fish (*Scolopsisvosmeri*), Hayam fish (*Aluterus scriptus*), Stingray fish (*Hypanus*), glass fish (*Ambassisinterrupta*), Mud Stargazer fish (*Uranoscopus*) and Glodok fish (*Boleophthalmusboddarti*).

The most fish samples collected in this study were Tawes (*Garresabbreviatus*). However, when viewed from the species based on the family, the peperek species from the Leiognathidae family dominates the species composition with four species. According to [6] that, this species prefers the waters of river estuaries, and inhabits shallow waters, and can also be found in estuary areas. Then, [7] added that the Leiognathidae tribe is dominant in the waters around Jakarta Bay.

The species composition of Peperek fish was 2389 (24.11%), *Eubleekeria splendens* (1021 (10.30%)), *Leiognathuslongispinis* (910 (9.18%)) and *Gazza minuta* (368 (3.71%)) with the total number of Peperek fish species being 4688 (47.30%) of the total catch.

The diversity of fish caught around the Lantebung mangrove ~~has a good impact on~~ greatly impacts the ecosystem, ~~both~~ ecologically and economically on fishermen. [5] argues that ~~the diversity of species~~ species diversity and wide ~~distribution of fish~~ fish distribution provides an ~~important role in the ecosystem~~ are essential in maintaining the ~~balance of the food chain cycle in the waters~~ water's food chain cycle balance.

The presence of mangrove forests around these water areas causes the environment to be fertile, because mangroves provide organic matter that supports the life of aquatic biota in the ecosystem. This condition makes mangroves a ~~good-suitable~~ good-suitable habitat for biota to find food. Peperek fish ~~utilise~~ utilize zooplankton, molluscs, crustaceans, nematodes, and phytoplankton as food [8]. Meanwhile, Tawes or Selanget fish inhabit habitats at the bottom of coastal and estuary waters. They obtain their food from bottom organisms and detritus, with bacillariophyceae as the ~~main-primary~~ main-primary food, microcrustaceans as supplementary food, and molluscs larvae as supplementary food [9].

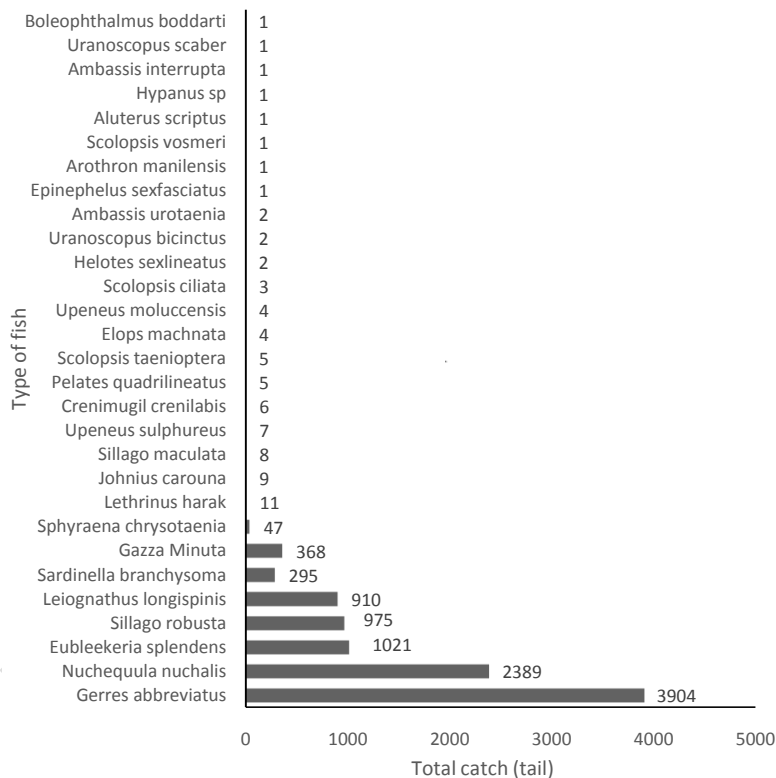


Fig. 2. Types of fish caught in Lantebung

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The abundance of Peperek fish and Tawes fish is thought to be influenced by the availability of food in their habitat in the mangrove ecosystem. [10] stated that the availability of fish food in a habitat will affect the individual, then will have an impact on higher trophic levels, such as populations and ~~finally communities~~ communities, and this relationship contributes to species

interactions [11]. Even [12] found a positive relationship between food availability ~~with~~ and individual growth and abundance.

~~Some other fish species caught with low species composition entered the mangrove ecosystem for several reasons~~ For several reasons, other fish species caught with low species composition entered the mangrove ecosystem. According to [13], these are: (1) protection against predators; ~~prey fish will enter mangrove areas to shelter from predators.~~ This situation arises due to the complex root structure of mangroves, which inhibits the movement of predators, and the high level of turbidity reduces the visibility of predators; (2) food-related, which indicates that this ecosystem provides a variety of food ~~as it is~~ associated with high productivity. ~~It~~ This leads to high abundance and diversity of fish in the mangrove ecosystem.

Fish diversity in the Lantebung mangrove ecosystem is ~~quite relatively~~ high ~~when~~ compared to the results of research from the Ciporeang River in LeuweungSancang Nature Reserve, which only obtained ~~6 six species of fish~~ fish species [14]. ~~While in comparison,~~ research conducted [15] ~~managed to collect~~ collected 15 species of fish in the mangrove waters of the Donan River and Sapuregel River, Cilacap.

3.2 Diversity of Aquatic Resources

The diversity of aquatic resources in Lantebung mangrove ecotourism waters consists of 29 species of fish, 19 species of crustaceans, ~~10 ten~~ species of mollusks, and one species of ~~enidaria~~ Cnidaria. ~~Overall, t~~ there are 59 ~~types~~ of resources with ~~a total number of~~ 10113 species in the mangrove ecotourism waters, with the following description.

Comment [Rh4]: Types or Species?
29+19+10+1 = 58, and it is species.

Comment [Rh5]: 10113 species or individual?
Please recheck. The statement "10113 species" is contrast with "59 species". Please clarify

3.4.1 Fish Species

Figure 2 shows that ~~during the study 29 types of fish samples were found~~ 29 types of fish samples were found during the study, with a total of 9985 fish. Samples of various fish species were found through fishing gear used by fishermen in the waters around the Lantebung mangrove, except for Glodok fish (*Boleophthalmusboddarti*), which was obtained through hand-catching at the Lantebung mangrove site. ~~At low tide, Glodok fish species are often found around mangrove forest habitats~~ Glodok fish species are often found around mangrove forest habitats at low tide. [16] ~~noted that~~ Glodok fish, ~~or~~ commonly known as mudskipper, is one of the bioindicator fish species in mangrove ecosystems.

3.4.2 Types of Crustaceans

Crustaceans were caught using two types of fishing gear, Rakkang and Bubu. Some crustaceans were also caught by hand around the mangrove habitat. The total number of crustaceans ~~species~~ identified was 19 species, with 117 individuals (Figure 3). Gazami crab (*Portunustrituberculatus*) was the most dominant species with 30 species, and then the second most species was king crab (*Portunuspelagicus*), followed by the third most species was Vaname shrimp (*Litopenaeusvannamei*) with 17 species. Samples found in the mangrove forest included several species, including: ~~Biola crab~~ Fiddler crab (*Uca annulipes*), ~~Biola crab~~ (*Uca acuta*), ~~Biola crab~~ (*Ucatetragonon*), Beach crab (*Metopograpsus frontalis*), ~~Beach crab~~ (*Metopograpsusthukuhar*), and Krama crab (*Episasermasp*), each with one species.

In crustaceans, catches are dominated by crabs because sandy and muddy habitats are habitats favoured by crabs. According to [17], crabs prefer sand and muddy ~~sandsand~~ substrate types. Sand substrates ~~tend to~~ make it easier to ~~move and~~ move to other places,

while mud substrates usually contain little oxygen, so the organisms that live in them must be able to adapt to this situation. As for the opinion of [18], it strengthens the assumption that the Portunus clan lives in ~~a variety of various~~ habitats, namely: sandy mud, sand, and muddy sand.

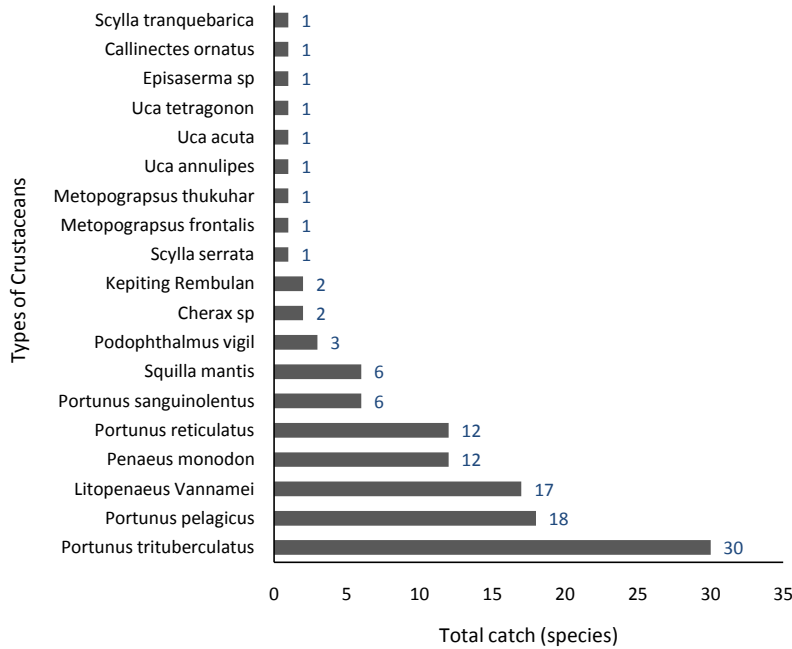


Fig.3. Crustacean species caught during the study

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The catch is Vaname shrimp (*Litopenaeusvannamei*) around the Lantebung mangrove. The ~~results of research~~ ~~research results~~ [19] state that mangrove leaf litter ~~is able to increase~~ ~~increases~~ the immune response and survival of Vaname shrimp (*Litopenaeusvannamei*). ~~While~~ The samples obtained in the mangrove forest habitat of one tail each, among others: ~~Biola Fiddler~~ crab (*Uca annulipes*), ~~Biola crab~~ (*Uca acuta* and), ~~Biola crab~~ (*Uca tetragonon*), Beach crab (*Metopograpsus frontalis*), ~~beach crab~~ (*Metopograpsusthukuhar*) and Krama crab (*Episesarma*sp).

Many types of crustaceans are found during low tides, such as the ~~type of Biola~~ Fiddler crab ~~which consists of three types, namely, which consists of~~ *Uca annulipes*, *Uca acuta*, and *Uca tetragonon*. According to [20] ~~revealed that several types of Uca can live together in the same habitat, but these types usually have different behavioural patterns and have different, several types of Uca can live together in the same habitat, but these types usually have different behavioral patterns and~~ microhabitats so that the ecological niches of these crabs can be separated. The density of Biola crab species, namely *Uca tetragonon*, can be found near the mouth of the river towards the sea at low tide. [21] stated that the density of *Uca tetragonon* species is influenced by the high frequency of submerged habitats.

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While in mangrove trees, beach crabs or crabs of ~~the species~~ *Metopograpsus frontalis* and *Metopograpsus thukuhar* were found. Among the mangrove trees ~~found were~~ *krama* crabs (*Episasermap*) and holes in the muddy soil as habitat and shelter. [22] argues that substrate grain size determines crab distribution because crabs have shown morphological adaptations to substrate conditions.

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3.4.3 Types of Mollusca and Cnidaria

There are 11 species of Mollusca and Cnidaria, divided into 10 ~~species of Mollusca and one species of Mollusca and one~~ Cnidaria (Figure 4). Each resource totalled one species. The Cnidaria species, Jellyfish (*Aurelia aurita*), was found during high tide and entered the mangrove area.

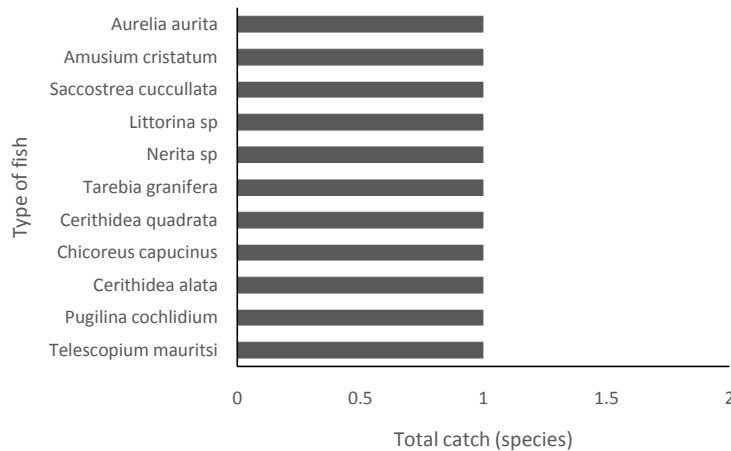


Fig. 4. Types of Mollusca and Cnidaria caught

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The types of mollusks caught include Telescope snail (*Telescopium mauritsi*), Unam snail (*Pugilina cochlidium*, *Chicoreus capucinus*), Belitung snail (*Cerithidea alata*, *Cerithidea quadrata*, *Tarebia granifera*), Unam snail (*Chicoreus capucinus*), Belitung snail (*Cerithidea quadrata*), Belitung snail (*Tarebia granifera*), Sea snail (*Nerita sp.*, *Littorina sp.*) and Sea snail (*Littorina sp.*). While 2 types of oysters, namely Batu oyster (*Saccostrea cucullata*) and Simpang oyster (*Amusium cristatum*).

According to [23] ~~that~~, the mangrove ecosystem area is one of the habitats for ~~mollusc~~ ~~mollusk~~ groups. In addition to being a habitat, mangroves also function to provide food and other organic sources. [24] added that environmental factors ~~that affect the distribution of molluscs affecting mollusks' distribution~~ include air temperature and water temperature, water pH, ~~and~~ soil pH, and salinity. According to [25], ~~molluscs-mollusks can~~ generally tolerate a temperature range of 0-48°C. Another type of resource is the type of Cnidaria, namely jellyfish species (*Aurelia aurita*). One of the factors causing the discovery of this type of resource is thought to be due to tidal factors. When the tide occurs, jellyfish species enter ~~around~~ the mangrove habitat along with the rising water level. According to [26], *Aurelia aurita* is found more near the coast than in the middle of the sea. Jellyfish are more commonly found in shallow waters, and the presence of freshwater flow~~s~~ from rivers or mangrove swamps [27].

The function of mangrove ecosystems as a feeding ~~ground, spawning ground, and nursery ground will make various types of resources gather, spawning, and nursery ground will gather various types of resources~~ and make mangroves a suitable habitat. According to [28], the influx of nutrients from mangrove leaf litter is one ~~of the factors that affect~~ ~~factor affecting~~ the productivity of aquatic biota in coastal areas. Fish resources ~~that are~~ in the ecosystem, either sedentary or just transit to spawn and raise their young, further add to the diversity of aquatic resources in the area. According to [29], the distribution of aquatic resource diversity in mangrove ecosystems varies temporally, influenced by water temperature and tides.

4. CONCLUSIONS

1. The highest fish species composition is Tawes (*Garres abbreviatus*), but in terms of numbers, it is dominated by the peperek fish family.
2. ~~The diversity of aquatic resources is dominated by fish species~~ Fish species dominate the diversity of aquatic resources, ~~then followed by~~ crustaceans, ~~and~~ ~~mollusca~~ ~~Mollusca~~, and; the lowest is the type of ~~cnidaria~~ ~~Cnidaria~~.

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