



Local Wisdom of Squid Fishing Communities in Tomini Bay for Fish Resources Sustainability

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Abstract. Gorontalo Regency, located on the coast of Tomini Bay, is one of the coastal areas rich in marine resources, including squid. Squid catching has become an important activity for the local community in fulfilling their daily needs and also as a main source of income. This study aims to determine the local wisdom of squid fishing communities in Langgula Village, Batudaa Pantai Sub-district, Gorontalo Regency. This research was conducted from May to June 2023. The research methods used were interviews and direct observation. The data and information collected were processed using descriptive qualitative analysis. What was analysed included customary rules and local provisions in the Langgula Village community. Based on the results of the research, information was obtained that the fishermen of Langgula Village have a tradition of determining a good day when starting to lower the boat, have a prayer in starting fishing activities, fishermen still have belief in certain myths. The knowledge system of traditional fishermen in Langgula Village comes from experiences passed down from one generation to the next. Langgula Village Community Islamic values are found in the efforts and efforts made by fishermen, namely efforts by predicting the weather based on astrological calculations or astronomical calculations but in determining the good day there is still a combination of belief in days that have lucky days.

Keywords: Local Wisdom, Tomini Bay, Squid

1. INTRODUCTION

Gorontalo Regency is one of the regencies in Gorontalo Province which is located in the coastal area of Tomini Bay. Administratively, this area is divided into 11 (eleven) sub-districts, one of which is Batudaa Pantai sub-district and is a sub-district located in the southern part directly adjacent to Tomini Bay. Langgula Village is one of the villages located in Batudaa Pantai Sub-district. Based on the observation that Langgula Village is located in a coastal area, of course, it has the potential for fishery resources with the

livelihood of the community mostly as farmers and fishermen. One of the fishery resources that has been recognized by the Batudaa Pantai community is squid. Squid belonging to the Cephalopoda class are carnivorous animals because they have the habit of eating animals such as shrimp and pelagic fish caught with their tentacles (1). The coastal communities of Tomini Bay have rich and unique knowledge about squid fishing that has been passed down from generation to generation.

This local wisdom includes fishing techniques that are naturally adapted to the environment, an understanding of squid behavior and habitat, and knowledge of natural factors that affect catch. However, with environmental changes, climate change, and economic pressures, squid fishing practices based on this local wisdom may be challenged. A more in-depth study of local wisdom in squid fishing in Tomini Bay is important not only to honor local cultural heritage, but also to help build sustainable and adaptive management strategies. Local wisdom is a traditional view and knowledge that becomes a reference in behavior and has been practiced for generations to meet the needs and challenges in the life of a community. Local wisdom functions and is meaningful in society both in the preservation of natural and human resources, the defense of customs and culture, and is beneficial for life (2).

Referring to Law No. 31/2004 Article 6 on Fisheries in (3), stating that fisheries management for the benefit of fishing and fish farming must consider customary law and/or local wisdom and pay attention to the role of the community is supported to be the constitutional basis for local wisdom-based management. This makes natural resource management will be carried out from the regional level to the centre and will reduce the role of the state which has been too dominant.

Translated with DeepL.com (free version)Local wisdom has good ways to maintain environmental sustainability, especially in coastal areas, including in processing coastal areas not using equipment that tends to damage the environment such as the use of fish bombers, digging coral reefs, and others. Local wisdom that exists in a community must be beneficial to them, because local wisdom made by a community is useful for themselves in managing coastal and marine resources or as a certain social control tool. (4). As an example of local wisdom in Maluku, where the marine resource management system in Maluku is customary, the fishing community calls it the Petuanan sisi concept, which is a system that prohibits fishing communities from carrying out fishing activities in certain periods or in certain seasons. This is also a traditional value which is local wisdom, to prevent over fishing (5).

The purpose of this research is to find out how efforts can be made to preserve and integrate local wisdom in squid fishing practices for the sustainability of fish resources in Tomini Bay.

2. METHODS

This research was conducted from May to June 2023 at Langgula Village, Batudaa Pantai Subdistrict, Gorontalo Regency, Gorontalo Province, Tomini Bay Waters.

Data collection is done by direct observation of the situation and conditions that occur in the research area, as well as other social contexts involved. The method used in this research is descriptive survey and observation method which aims to get a factual and concrete picture of the Local Wisdom of Squid Catching Fishermen Community in Langgula Village, Batudaa Pantai Sub- district, Gorontalo Regency, Gorontalo Province.

Primary data collection, which is data collection conducted to obtain data through direct collection from the field. Conducting an ethnographic study to understand the local culture, values and traditions associated with squid fishing in coastal Tomini Bay. This involved participatory observation, in-depth interviews with fishermen and local community leaders, and the recording of detailed field notes. Conduct surveys to gather local knowledge on squid fishing, including traditional fishing techniques, knowledge of squid habitat and behavior, and factors affecting catch. This survey can be conducted with a structured questionnaire to fishers and other coastal communities. local knowledge and squid fishing practices are integrated with local ecological systems and how they influence each other.

Secondary data, which is obtained from literature books and several related agencies and the validity of the data can be accounted for. Data collection was done through observation and interviews. Observations in observation activities are carried out on: a) settlements and the surrounding environment, as well as activities within them. Meanwhile, interviews were conducted with informants, namely Adat leaders, village leaders (Kepala Desa), and residents of Langgula Village. Generally, residents were interviewed for 1 - 2 hours/person at home (at night), or on the coast (during the day). The information collected includes: a) examining the social and cultural dimensions of the local wisdom of the fishing community in fishing activities. b) identifying what local wisdom is still practiced in the lives of the fishing community of Langgula Village. In this study, the respondents who will be interviewed are 2 - 10 people, then will be sought back information that knows more about the local wisdom, so that information will be obtained from several respondents.

The data and information that has been collected will be processed using qualitative descriptive analysis. What is analyzed includes customary rules and local provisions in the Langgula Village community. The qualitative data collected will be interpreted using the theoretical triangulation method, which compares and combines various theories in one field of science and or across fields of science, especially the fields of population science, sociology, anthropology, and regional development planning. Qualitative descriptive analysis is data processing carried out through logical considerations using sentences from systematic authors based on observed behavior.

3. RESULTS AND DISCUSSION

3.1.Squid (*Loligo* sp) Resources

Squid (*Loligo* sp) are demersal or semi-pelagic inhabitants of coastal areas and continental shelves to a depth of 400 m. Some species live up to brackish waters. Squid perform diurnal movements, which during the day will group near the bottom of the water and will spread in the water column at night. Squid are attracted to light (positive phototaxis), therefore they are often captured using light Roper et.al. 1984 in (6).

Squid is included in the Mollusca Phylum, Class Cephalopoda, which is an invertebrate animal (avetebrate), soft-bodied, which some of its members are protected with a shell of lime substance and some others without a shell Cephalopoda comes from the word cephal: head, poda: foot, which means having legs (tentacles) on the head. Some types of cephalopods have commercial value and are one of the important biological resources in the marine fisheries sector such as squid, cuttlefish, and octopus (7).

Fluctuations in the catch of a fish species are not always caused by fishing, but can be caused by changing environmental conditions. The effect of these changes in environmental conditions can be both direct and indirect on a particular fish species' presence in a body of water. The abundance of food in a body of water can cause groups of predatory fish to congregate in the area. Seasonal factors and annual changes in temperature and salinity will affect the distribution and abundance of a fishing ground. fishermen's income is the amount of money earned by fishermen from fishing activities at sea. Based on the results of interviews with respondents in Langgula Village, the income of fishermen at the beginning of the month (Hulalo Bohu) and the dead month (hulalo pate) can be seen in the following table:

Table 1. Catches of squid fishermen in Langgula Village.

Arrest	Results	Cost	Total Revenue
Beginning of the Month	Rp. 900,000	Rp. 150,000	Rp. 750,000
Dead Moon	Rp. 300.00	Rp. 150,000	Rp. 150,000

(Source: Personal Data, 2023)

Based on the results of research conducted in Langgula Village, there were 23 squid fishermen, each of whom carried out fishing activities (Trip) 3 times at the beginning of the month and at the end of the month, the total revenue, from the catch obtained at the beginning of the month was Rp. 900.000, in three trips with costs incurred by fishermen amounting to Rp. 150,000, and total income is Rp. 750,000, and fishing in the dead month the total revenue from the catch obtained is Rp. 300,000, in three trips with costs incurred by fishermen amounting to Rp. 150,000, and total income is Rp. 150,000.

Type of Squid (*Loligo* sp) Fishing Gear

The traditional fishing gear used in catching squid is Totabito, the fishing community of Langgula Village uses traditional tools for dozens of years and is still used in catching squid. The totabito squid fishing gear used during the research in Langgula Village, Batudaa Pantai Subdistrict, Gorontalo Regency has a construction similar to a fishing rod in general, but there are several parts that are specially made to increase the catch. Totabito has several parts, namely the capstan, fishing line, totabito fishing eye, kili- kili (swivel) and LED lights. Totabito on the tail has a hook that resembles jigs, in the form of a back hook, the difference lies in the number of back hooks, in jigs there are 2 stacks of back hooks while in totabito there is only one back hook (8). This is in line with Rakian (9) that squid fishing rods are shaped like shrimp, fish or other shapes with many fishing eyes on the tail but do not have a back hook (barb). The totabito used has been modified by fishermen specifically for squid fishing and has LED lights with three types of colors: blue, green and colorful (red, blue and green). This squid fishing rod is called totabito by local fishermen and generally uses squid and fish bait.

Local Wisdom in Preserving Resources

The age characteristics of fishermen in Langgula Village out of 53 respondents interviewed, in the age criteria of 20-30 years have a percentage value of 20.75%, 31-40 years old criteria as much as 35.85%, 41-50 years old criteria as much as 28.30%, and 51- 60 years old criteria as much as 15.09%. But overall, the average age of fishermen is still in productive age, which is expected to have a good income in running their business. Age level can affect physical strength and work experience as a fisherman. As explained by Mareto in (10), age can affect a person's work ability, because productive work ability will continue to decline with increasing age. Based on data from the national family planning coordinating agency (BKKBN), the productive age ranges from 15-60 years. Soukotta in Rahma et al, (11)

Tim G. Babcock, states that wisdom is knowledge and ways of thinking in the culture of a human group, which is the result of observation over a long period of time. Wisdom contains a description or assumption of the community concerned about matters relating to the structure of the environment, how the environment functions, how nature reacts to human actions, and the relationships that should be created between humans (society) and their natural environment (12). Local wisdom is a tradition passed down from one generation to the next. Local wisdom can take the form of religion, culture or customs that are generally oral. The role of local wisdom as a law or rule implemented in these coastal areas is very important, considering the historical side that was obtained through a very long process and passed down orally by the community for generations (13). The people of Langgula Village still uphold the traditions and customs from the past until now in catching, from the results of interviews with informants that the people of Langgula Village often carry out traditions or traditional knowledge.

The knowledge system regarding natural conditions by the fishing community of Langgula Village includes elements of knowledge as stated by informants such as knowledge of seasons, and days of departure, knowledge of clouds, and knowledge of stars. The

determination of a good day in the lowering of the boat can be said to be a collaboration between the tradition of maintaining the habits of their predecessor sailors with the application of religious values. The religious value in question is the effort of fishermen to avoid bad risks by calculating astronomy or astrology. The fishing community in Langgula Village, especially squid fishermen who still believe in and use astrological constellations in catching squid, can be seen in Figure 2.

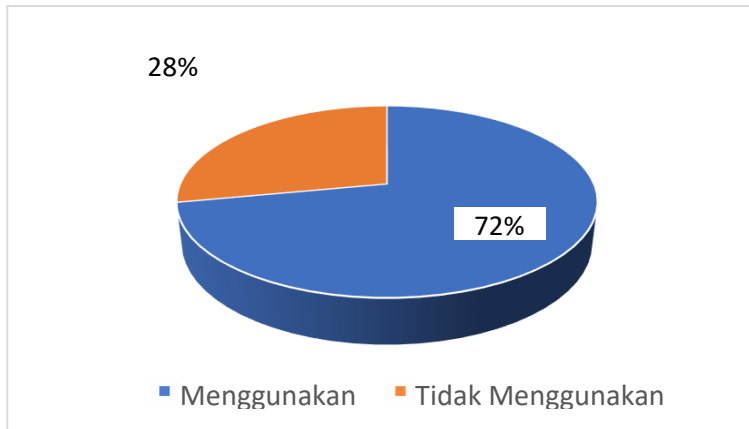


Fig 1. Fishermen who still believe in using an astrological compass. (Personal data source, 2023)

Regarding knowledge about the season and the day of departure, the fishing community of Langgula Village understands that in July-September is the East Season, in this season game is available but must pass through challenges in fishing activities, because the waters in this season are choppy. In December fishermen believe the peak season will come with abundant results. Therefore, the time of departure must be calculated carefully in order to get the maximum catch, when conducting fishing activities fishermen must see a good time, for example on Tuesday at 7 o'clock so as to get a high value. The astrological records of the squid fishing community can be seen in the following table

Table 2. Determination of fishing hours and departure times.

Hari	Jam											
	6	7	8	9	10	11	12	1	2	3	4	6
Senin	○	⊙⊙	×		BIN	⊙⊙	BIN	○	⊙⊙	×	⊙⊙	⊙⊙
Selasa	⊙⊙	BIN	⊙⊙	BIN	○	⊙⊙	×	⊙⊙	BIN	⊙⊙	×	○
Rabu	BIN	○	⊙⊙	×	⊙⊙	BIN	⊙⊙	○	BIN	⊙⊙	×	⊙⊙
Kamis	×	⊙⊙	BIN	⊙⊙	BIN	○	⊙⊙	BIN	○	⊙⊙	⊙⊙	BIN
Jumat	⊙⊙	BIN	○	⊙⊙	×	⊙⊙	BIN	⊙⊙	BIN	○	⊙⊙	×
Sabtu	⊙⊙	×	⊙⊙	BIN	⊙⊙	BIN	○	⊙⊙	×	⊙⊙	BIN	⊙⊙
Minggu	BIN	⊙⊙	BIN	○	⊙⊙	×	⊙⊙	BIN	○	⊙⊙	⊙⊙	⊙⊙

Description:

○	:	⊙⊙	:	ConBINlations
⊙⊙	:	⊙⊙	:	High Score
	:	×	:	Fortune
	:	⊙⊙	:	Wretched

The determination of good and bad hours is based on long-standing traditions and habits and based on experience that has been tested. Based on the results of the study, only 72% of Langgula Village fishermen interviewed believe in astrological records used by as a reference to know good and bad hours in catching so as to minimize accidents while at sea and there will still be income.

The people of Langgula Village in determining fishing activities, especially in catching squid, fishermen usually go to sea in a certain month such as the early month or in Gorontalo language called Hulalo Bohu, fishermen catch at the beginning of the month on the 2nd to 8th day, in interviews with the fishing community of Langgula Village that the catch will be abundant because the squid will look for food in that month. Fishermen in Langgula Village, especially squid catchers, use tools such as totabito equipped with LED lights to attract squid. Using electric light tools that function as callers of positive phototaxis organisms. Laevastu and Hela in Ahmad (14) state that the presence of light sources in the sea makes positive phototaxis organisms will approach the light source. These organisms will later become a food source for squid. In determining the catch, the community also looks at weather conditions at night in the 8th month of the day, the people of Langgula Village call it the term Lomela or the change of currents and weather, in this month the

community rarely goes down to sea because it will be risky for the safety of fishermen in fishing activities. Even so, there are also fishermen who go to sea without thinking about safety at sea.

In the bright moon on the 9th to 15th day, there is usually a bright moon in the Gorontalo language called *mobango hulalo*, according to the results of interviews with squid fishing communities in Langgula Village, namely fishermen catching only 1 to 2 times in catching during the bright moon, according to fishermen in the bright moon squid will spread out looking for food with moonlight and the catch is not abundant. In line with the explanation (15) during the bright moon is actually very ineffective. At that time, moonlight illuminates the sea surface in a very large area and the presence of squid is also very spread out. mentioned that marine organisms will be more difficult to collect during moonlight, because light is evenly distributed in the waters. An effective way to concentrate squid can be done by strengthening the light intensity and concentrating the irradiation direction to the bottom of the chart.

In the dead month, the 17th to the 29th day is called the dead month or in Gorontalo *Hulalo Opaté*, in the explanation of an informant that fishermen's income is not abundant and sometimes they do not make a catch. From the results of interviews with the people of Langgula Village, the dead month is the breeding time of all organisms in the sea and one of them is squid. In that month, fishermen do not conduct fishing activities.

One of the local wisdoms of the Langgula Village fishing community in fishing activities is the *Do'a Solawat*. The prayers used by fishermen when they want to do fishing activities or when they lower the boat are an effort to ask the creator to always be protected and blessed by the fishing activities they carry out. When a newly built boat is ready to be operated, the local community calls it *Mopolahu Lo Bulotu*. The ceremony begins with a congratulatory prayer recited by one *Sarada'a* person. While reciting the prayer, a priest stirs the water provided in a kettle filled with leaves. The leaves used are *Codiaeum variegatum* croton leave, the community calls it the *Polohungo* flower. The *Solawat* prayer is performed around the beach by Langgula villagers led directly by an imam or in Gorontalo *Hatibi*, the uniqueness of this activity is that all families make various types of cakes, after which a traditional leader will recite prayers and all residents are expected to sit cross-legged around the beach. The purpose of this ceremony is to reject disaster in the form of accidents at sea, it is also believed and expected that there will be an abundant fish season.

Fishing communities have customary taboos and restrictions related to squid fishing, such as the prohibition of catching squid laying eggs and the prohibition of catching squid on certain days. Fishing communities have in-depth knowledge of squid habitat and behavior, which helps them to catch squid sustainably. This local wisdom has proven effective in preserving squid resources in Tomini Bay. This is evidenced by the maintained squid population and the relatively stable welfare level of the fishing community. By preserving and developing local wisdom, it is hoped that fishing communities in Tomini Bay can continue to utilize squid resources sustainably to improve their welfare and preserve the sea for future generations.

Research conducted, Marine resource management in Idragiri Hilir Regency Riau, especially in Panglima Raja Village indicates the existence of local wisdom in the management of marine areas such as the existence of prohibitions adhered to by the local community, including the prohibition of sticking black cloth in sea waters, prohibited from using motorized Songko fishing gear and also prohibited from having sex in sea waters (15). The way of fishing is done traditionally, and is carried out through a collective agreement called Se'e or Sasahara which means a statement of agreement for villagers, to provide a joint statement with traditional leaders, traditional leaders, religious leaders, government and the community to carry out these ceremonial activities, taking into account the customary laws that apply to the Kakorotan Talaud Island community.

4. CONCLUSIONS

Local Wisdom of Squid Catching Fishing Communities in Tomini Bay Coastal Gorontalo Regency, Gorontalo Province Squid catching fishing communities in Tomini Bay coastal, Gorontalo Regency, Gorontalo Province, have a wealth of local wisdom that has been passed down from generation to generation in catching and managing squid resources. Fishing communities use traditional fishing gear that is selective and does not damage squid habitat, such as squid nets and squid fishing rods, totabito.

Sourced from experiences passed down from one generation to the next, such as knowledge in squid catching activities. The people of Langgula Village use a very unique fishing gear, namely the use of injectable light fishing aids to catch squid to assist in fishing activities. The fishing activities carried out by Langgula Village fishermen are based on the principles of life that are closely related to social and spiritual values that contain very deep meaning, namely about the relationship between fellow humans, nature (environment), and their god. There are habits of fishermen that are often done and practised. The habits of fishermen related to fishing activities such as there is a habit of determining a good day when they want to lower the boat, there is a prayer led by an imam accompanied by several meals on the boat, there are taboos and myths that are still believed by fishermen and there is a culture of gratitude when obtaining fish catches.

There needs to be a 'forum' that can accommodate fishermen's activities both socially and economically. For example, forming and activating fishermen groups. The knowledge and classification system that fishermen have about marine resources is very important to be explored, because it can be used as material for the development of fishing gear technology, as well as the preservation of marine resources.

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