

Local Ecological Knowledge and Fishing Practices of Fishermen on Barrang Lompo Island, Makassar City

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and Salwia 

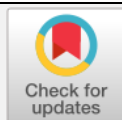
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ABSTRACT

Marine ecosystems in small coastal and island communities play a vital role in sustaining local livelihoods. This study adopts a phenomenological approach, following the Stevick-Colaizzi-Keen method, to examine the forms of local ecological knowledge (LEK) held by fishermen on Barrang Lompo Island and how this knowledge informs their fishing practices. Drawing on Coleman's Rational Choice Theory, the findings demonstrate that fishing behavior is shaped by ecological knowledge acquired through prolonged environmental interaction and passed down through generations. Rituals, traditions, and the use of ecologically responsive fishing gear are not merely cultural expressions; they are part of rational decision-making shaped by factors such as financial resources, anticipated returns, type of catch, availability of labor and equipment, market demand, pricing, and risk assessment. The choice to use or refrain from using fish bombs, for instance, reflects deliberate reasoning grounded in both experience and ecological insight. This study offers a sociological perspective on fishermen's motivations and knowledge systems, contributing to the broader conservation discourse and highlighting the importance of knowledge transmission for fostering sustainability within fishing communities.

Keywords: Fishery Resources; Fishing Practices; Fishermen; Local Ecological Knowledge; Rational Choice

1. Introduction

Indonesia is the world's largest archipelagic and maritime nation, comprising 17,504 islands (Badan Pusat Statistik, 2021) and a coastline stretching approximately 99,093 kilometers (Purwaningsih et al., 2021). Strategically located between the Pacific and Indian Oceans, the country has abundant marine and fishery resources. According to the People's Coalition for Fisheries Justice (KIARA), in 2017, there were 12,827 coastal villages and 8,077,719 fishing households, highlighting the centrality of fishing activities to coastal livelihoods. This data underscores the urgency of ensuring marine resource sustainability, given the magnitude of their ecological value and the number of communities that depend on them for daily subsistence.

Coastal ecosystems in Indonesia face mounting pressures from population growth, pollution, overexploitation, and climate change. Additional stress is caused by unsustainable practices, such as coral mining, anchoring in reef areas, and destructive fishing methods, including the use of cyanide, explosives, and fine mesh nets (Ferrol-Schulte et al., 2015; Siry, 2011). Over the past several decades, the unsustainable use of marine resources has increased significantly, leading to the degradation of coral reefs, seagrass beds, and mangrove ecosystems. These forms of degradation threaten marine environments' ecological balance and long-term viability through terrestrial and marine-based activities (Hasim, 2021). The impacts of global climate change are expected to further exacerbate these issues, particularly for coral reefs and marine fisheries (Lam et al., 2020). Indonesia is projected to experience the steepest decline in marine fish catch of any nation, with estimates suggesting a reduction of over 20% by 2055 (Cheung et al., 2010). For many small coastal communities, whose economies and food security are directly tied to marine systems, these developments represent an acute threat to their livelihoods.

From the social ecology perspective, the relationship between humans and the environment can be understood through environmental determinism and possibilism. Environmental determinism posits that the structure of the environment has a psychological influence on human behavior and culture (Livingstone, 2011). This perspective suggests that environmental dominance has historically driven communities to develop rituals reflecting their interpretation of natural phenomena and belief in supernatural powers. In structural-functionalist thought, myths and rituals are seen as instruments of social integration, serving psychological functions by alleviating anxiety and social functions by fostering solidarity, identity, harmony, and cultural continuity (Susilo, 2019). On the other hand, environmental possibilism, first introduced by French geographer Paul Vidal de la Blache, emphasizes human agency. He argued that although the physical environment imposes limitations, human behavior is shaped by culture and individual psychology, which guide how people adapt and utilize nature (Ratnasari & Basuki Dwisusanto, 2024; Safitri & Hariyanto, 2019). In this view, humans are not passive recipients of environmental influence but are capable of making conscious choices about interacting with their surroundings, through technology, values, and cultural practices (Livingstone, 2011).

The Bugis-Makassar people of South Sulawesi are widely recognized for their deep maritime heritage. Their seafaring traditions extend across the Bone Gulf, Makassar Strait, Java Sea, Timor Sea, and even as far as the Atlantic Ocean (Akhmar et al., 2024). This extraordinary maritime mobility is rooted in sophisticated indigenous knowledge, advanced shipbuilding techniques, and navigational skills for open-sea travel (Salim, 2024). Bugis-Makassar fishermen possess specialized knowledge of economically important marine species, spawning areas, and seasonal indicators based on wind patterns, wave behavior, and fish movement. Historically,

they relied on a range of sensory and intuitive tools—*pakkita* (sight), *parengkalinga* (hearing), *paremmau* (smell), *panedding* (intuition), and *tettuang* (faith)—to interpret signs from the sea and assess environmental risks (Yunandar, 2017). These capabilities are embedded in a broader cultural framework that includes rituals and *pamali* (taboos), which serve ecological, economic, social, and spiritual functions (Arief et al., 2021).

Barrang Lompo Island (Figure 1), one of the 13 islands within the jurisdiction of Makassar City, is the most densely populated among the 121 islands of the Spermonde Archipelago. This archipelago extends across the Makassar Strait from Takalar Regency to Pangkajene Islands Regency and is home to 5,336 residents (Badan Pusat Statistik Kota Makassar, 2024). Previous studies on the Barrang Lompo fishing community have noted the prevalence of environmentally harmful practices. Previous studies identified the widespread use of fish bombs as a defining feature of destructive fishing behavior in the area (Yunandar, 2017; Zaelany, 2019).

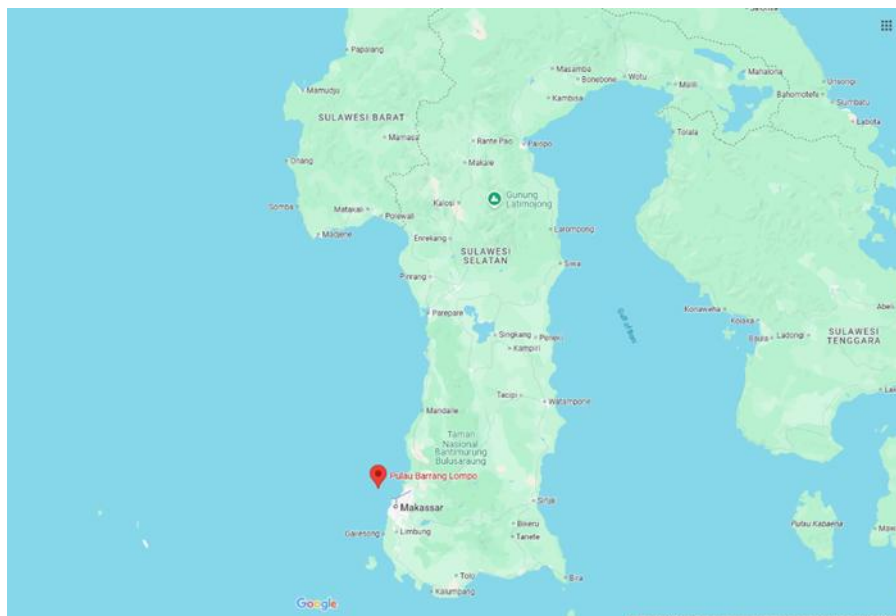


Figure 1. Geographic location of Barrang Lompo Island

Note. Map retrieved from Google Maps. ©2025 Google. Used with permission and in accordance with Google's Terms of Service.

Although related studies address fishing behavior and environmental degradation, this study diverges in focus and analytical approach. For instance, Du emphasizes technological innovations and ecological efficiency in global fisheries (Du, 2024). Azizova et al. examine the role of education in shifting local perceptions toward sustainable fishing (Azizova et al., 2024). McLean, meanwhile, compares local ecological knowledge (LEK) with scientific data to support resource management (McLean, 2016). While acknowledging the significance of LEK, this study focuses more directly on the socio-cultural dimensions of fishing practices, particularly the norms, traditions, and rational decisions that influence how fishermen interact with marine resources.

Given this context, conducting an in-depth exploration of how local ecological knowledge and rational decision-making shape fishing practices on Barrang Lompo Island is important. By understanding what fishermen know about the ecology of the fish they harvest, and how they interpret and respond to environmental and economic pressures, this research aims to support

the development of more sustainable and culturally grounded approaches to fisheries management.

2. Literature Review

2.1. Local Ecological Knowledge of Fishermen

Olsson and Folke define Local Ecological Knowledge (LEK) as the knowledge held by specific communities regarding their local ecosystems, comprising both scientific understanding and practical experience (Pereira Gomes et al., 2025). LEK is closely tied to efforts to sustainably conserve natural resources to ensure their availability for future generations (Bender et al., 2014). This knowledge is developed through experiential interactions with the natural environment and is often transmitted culturally, either vertically across generations or horizontally through social interaction and collective practices (Farr et al., 2018; Murray et al., 2006). It encompasses direct observations, lived experiences, inherited memories, and ancestral narratives passed down through oral traditions (McLean, 2016).

LEK within fishing communities includes perceptions of marine and fishery resources, fish abundance and distribution patterns, and understanding the biological and ecological characteristics of various species (Johannes et al., 2000). For traditional fishermen, this knowledge extends to species classification, behavioral patterns, ecological interdependencies, and conservation practices relevant to their fishing grounds (Zeineddine et al., 2022).

In the context of sustainable fisheries, LEK provides critical insight into local resource management. Bender et al. identified a strong correlation between LEK and scientific data in documenting the overexploitation of traditional fisheries in the Southwest Atlantic, where declines were noted in species such as bluefish (*Pomatomus saltatrix*), grouper (*Epinephelus marginatus*), and multiple *Mycteroperca* species, as well as large parrotfish, over the past six decades (Bender et al., 2014). In a study conducted in Pernambuco, Brazil, Zeineddine et al. documented how fishermen utilize LEK in selecting bait species, particularly herring (*Harengula clupei*) and mackerel scad (*Decapterus macarellus*), in ways that reflect ecological awareness and inform the development of sustainable harvesting strategies (Zeineddine et al., 2022). Their findings support the importance of incorporating fishermen's knowledge into conservation planning through participatory dialogue and co-management frameworks.

Cultural values such as reverence for the sea and adherence to marine taboos reinforce a conservation ethic deeply rooted in traditional belief systems and passed down through generations (Tamrin et al., 2023). In the domain of capture fisheries, various factors influence how fishermen interact with marine ecosystems. These include years of fishing experience, operational scale, the types of fishing gear employed, and the diversity of targeted species or fishing portfolios (Stoll et al., 2017). Such variables affect the nature and scope of ecological information that resource users access through daily practice (Farr et al., 2018). However, McLean et al. found that while LEK levels were relatively consistent across individuals, they did not significantly influence perceptions of fishery health or levels of awareness and support for marine protected areas, as measured through Cultural Consensus Analysis (McLean et al., 2022).

2.2. Rational Choice in Fishing Practices

Rational Choice Theory originates from James Coleman's proposition that while sociology should address macro-level phenomena such as social systems, these should be explained through micro-level analysis grounded in individual behavior (Ritzer, 2012). The core premise of Coleman's theory is that individuals act purposefully to achieve goals influenced by their

values and preferences (Harris, 2024). Within this framework, two fundamental elements are central: actors and resources. Actors are individuals or groups capable of making decisions, while resources refer to the assets or means under their control and subject to their interests.

In the context of fisheries, fishermen's actions, including their fishing strategies and gear choices, are shaped by a range of decisions that may be technical, social, or ecological. Wu et al. found that aligning conservation programs with ecological policy objectives can significantly increase fishermen's motivation to engage in environmentally responsible behavior (Wu et al., 2024). This heightened participation reflects a form of rationality that integrates ecological concerns with social incentives. Their study also highlights several factors influencing fishermen's environmental behavior, including ecological awareness, perceived risk, willingness to invest in sustainability, income level, employment status, workforce size, access to technological training, cooperative membership, and formal education. These variables interact with broader economic conditions and sociocultural backgrounds to inform individual decision-making.

Additional research by Sholeh et al. identified environmental degradation in coastal areas, such as sedimentation in the Segara Anakan region, due to prolonged human-environment interactions (Sholeh et al., 2019). In response, fishing communities have developed adaptive strategies, with livelihood diversification emerging as a key approach to sustaining economic security while preserving ecological balance. These adaptations exemplify rational responses to environmental constraints, demonstrating how local actors weigh costs, benefits, and long-term sustainability in their decision-making processes.

3. Research Methodology

This study employed a qualitative descriptive method using a phenomenological approach. Phenomenology seeks to elaborate and understand the meanings of human experiences through an inductive perspective that emphasizes individuals' lived realities and interprets the complexity of social phenomena (Creswell, 2018). The research followed the phenomenological procedures adapted from Stevick, Colaizzi, and Keen (Moustakas, 1994). To ensure the credibility of the findings, the study employed triangulation techniques, including data triangulation, source triangulation, and method triangulation (Miles et al., 1994).

Table 1. Phenomenological Stages

Stage	Description
Defining the scope of the phenomenon	Focused on the fishing practices of fishermen on Barrang Lompo Island, including their local ecological knowledge, rituals, and rational decision-making.
Developing a list of questions	Composed of in-depth and open-ended questions regarding fishing experiences, performed rituals, decisions related to fish bombing, and environmental views.
Data collection	Conducted through interviews with fishermen, direct observation of fishing activities and rituals, and documentation of traditional practices and social norms.
Data analysis	Involved transcribing interviews and observations, identifying significant statements, and grouping them into themes or units of meaning.
Description of the	Formulated core meanings from participants' experiences and

Stage	Description
essence	examined how social norms and local knowledge shape fishing behavior in socio-ecological contexts.
Reporting the results	Presented thematic analysis findings with direct quotations from informants alongside phenomenological interpretation.

Based on the transcribed data, the researcher identified sentences and paragraphs containing significant meanings related to the studied phenomenon. Each key statement was assigned a code label that described its content or underlying meaning. Codes with similar meanings were then grouped into broader thematic categories using axial coding. For instance, “safety ritual” and “hope for fortune” were categorized under *Rituals and Social Norms*. In contrast, “operational cost considerations” and “fishing gear adaptation” were grouped under *Rational Choice and Adaptation*.

Table 2. Research Informants

No.	Name	Age	Current Occupation	Work Experience
1	H. Baharuddin	74	Punggawa (Boat Owner)	60 years (fisherman)
2	Ahmad Syaid	51	Punggawa (Boat Owner)	32 years (fisherman)
3	Arsyad	49	Fish Collector	23 years (fisherman)
4	Ahmad	40	Fishmonger	22 years (fisherman)
5	Majja	66	Fishmonger	30 years (fisherman)
6	Edi Kukang	60	Fisherman	45 years
7	Haming	39	Fisherman	28 years
8	Syahril	35	Sawi (Crew Member)	25 years
9	Andi Suro	44	Sawi (Crew Member)	22 years
10	Rahman	42	Sawi (Crew Member)	30 years
11	Saparuddin	45	Sawi (Crew Member)	32 years

A total of 11 informants were purposively selected based on their experience and involvement in fishing practices on Barrang Lompo Island (see **Table 2**). Although the sample size was relatively small, the richness of the interview data and the use of multiple triangulation methods ensured data depth and reliability. Data triangulation was achieved by gathering information from different fishermen, observing fishing activities and ritual practices firsthand, and reviewing documentation related to community traditions. Source triangulation involved interviews with community leaders and traditional elders who possess knowledge of fishing customs and rituals, in addition to the primary data obtained from active fishermen. Method triangulation included combining in-depth interviews, participant observation, and document analysis.

Data saturation was reached when recurring themes emerged and no new significant information was identified between the 9th and 11th interviews. This is consistent with the principles of phenomenological research, which prioritize data depth over sample size (Creswell, 2018). Furthermore, the relatively homogenous characteristics of the fishing population on Barrang Lompo Island supported the attainment of saturation within this range. All participants provided informed consent before data collection, and the respective informants approved all published information.

4. Results and Discussion

4.1. Fishermen's Local Ecological Knowledge and Fishing Practices

Local ecological knowledge (LEK) refers to information and understanding of the natural environment developed through sustained interaction with ecological systems (Berkes et al., 2000). In fishing communities, this knowledge is shaped by various factors, including years of fishing experience and the types of gear employed (Farr et al., 2018).

4.1.1. Intergenerational Information

On Barrang Lompo Island, most fishermen are second- or third-generation fishers, having inherited the profession from their parents. Among the 11 informants in this study, 10 began fishing in childhood. Several did not complete elementary school due to economic hardship and the need to accompany their parents to sea. Scholars examining the drivers of child labor have often adopted an economic perspective, linking poverty with the early involvement of children in labor activities. In low-income households, children are frequently encouraged to contribute through manual labor, particularly in agriculture, plantation work, or informal services (Derby, 2016; Gärtner & Gärtner, 2011; Menon & Rodgers, 2018).

As explained by one informant, Haming:

"I started working as a fisherman because I saw my father doing it, and then I was invited to join him at sea when I was still in elementary school. Eventually, I dropped out of school, and until now, I have only been a fisherman."

This statement illustrates how limited access to formal education contributes to restricted livelihood options. The transmission of fishing knowledge, from gear preparation to reading environmental cues, typically occurs within the family. This process includes both technical knowledge and behavioral norms. Another informant, Mr. Edi Kukang, shared:

"From my parents, I first learned to go to the sea to catch fish, was taught how to make fishing gear, and even how to repair the engine. We were also told about taboos at sea, such as asking for permission before going, not speaking rudely or inappropriately while at sea, and not sitting leisurely on the boat's edge with our feet dangling in the water. These manners can be seen as disrespectful actions toward the sea. After all, we know that every place has its guardian. It is not just on land; it is the same at sea."

These forms of informal education function as mechanisms for intergenerational knowledge transfer. Children accompanying their parents learn technical skills, culturally embedded values, and ecological respect (Adonteng-Kissi, 2018). The intergenerational knowledge identified in this study is summarized in Table 3.

Table 3. Intergenerational Local Ecological Knowledge

No.	Type	Local Ecological Knowledge
1	Knowledge	<ul style="list-style-type: none"> Identifying fish locations based on current direction Understanding seasonal changes based on wind patterns, ocean currents, and fish behavior Estimating ocean depth

No.	Type	Local Ecological Knowledge
		<ul style="list-style-type: none"> Recognizing species of fish, sea cucumbers, and other marine organisms
2	Skills	<ul style="list-style-type: none"> Operating various types of boats Using fishing gear Constructing and repairing fishing tools Maintaining boats and engines
3	Rituals/Traditions	<ul style="list-style-type: none"> <i>Barzanji</i>: recitation during the launch of a new boat <i>Parappo</i>: offerings to sea guardians before departure <i>Apparuru</i>: prayer ritual held one hour before departure at the home of the boat owner (<i>punggawa</i>)
4	Taboos at Sea	<ul style="list-style-type: none"> Departing without asking permission Speaking rudely Using negative expressions such as "no" Making noise at sunset (<i>maghrib</i>) Urinating at the bow Letting feet dangle over the edge of the boat

The knowledge transmitted through family, elders, and community rituals on Barrang Lompo Island is not always explicitly tied to environmental sustainability. Like the *sasi* system in Maluku, a set of customary rules and rituals regulating the temporary use of natural resources (Adhuri Supriadi, 2013), local practices reflect embedded ecological understanding, even if not framed in formal conservation terms.

Braga-Pereira et al. define LEK as a corpus of knowledge, whether acquired individually or collectively, developed through firsthand experience and observation (Braga-Pereira et al., 2022). In Barrang Lompo, ritual practices serve as expressions of respect and caution. For example, before going to sea and upon arriving at the fishing grounds, fishermen often present offerings (*sesajen*) and perform *apparuru* prayers as acts of gratitude and requests for safety and an abundant catch. Similarly, marine taboos (*pamali*) convey behavioral norms that embody reverence for the sea and its unseen powers. For local fishermen, letting one's feet hang over the boat is considered arrogant and disrespectful, symbolizing a lack of humility in the face of nature.

The persistence of these traditions in rural and island communities is attributed to a worldview shaped by environmental determinism, where nature is not only a source of livelihood but also a force to be respected and negotiated with (Susilo, 2019).

4.1.2. Fishing Experience

Regarding fishing experience, the findings indicate that 90% of the informants have worked as fishermen since childhood, with most having only completed elementary school. This condition is mainly due to economic limitations within their families, which prevented them from pursuing further education and compelled them to work alongside their parents or relatives from an early age. The knowledge acquired through this socialization process, combined with long-term interaction with the marine environment and fellow fishermen, contributes significantly to their local ecological knowledge.

One of the informants, Majja, is currently 66 years old. He married in 1977 and had seven children, four of whom have passed away. As a child, he began fishing with his parents and

graduated from elementary school in 1973. He later moved to Sinjai Regency, where he worked as a *gae* (hook-and-line) fisherman for four years before returning to Barrang Lompo Island to get married. In order to support his family, he worked as a crew member (*sawi*) on a fishing boat owned by a *punggawa* (boat owner) who used fish bombs. For ten years, Majja served as the bomb thrower on the boat until he was arrested in the waters of Pangkajene and Islands Regency and was detained for six months at a local police station. He later worked as a diver for a sea cucumber trader (*juragan teripang*) for 20 years. After experiencing partial paralysis on five occasions due to the dangers of diving and ultimately suffering from vertigo, he transitioned to selling meatballs (*bakso*) in 2003. As Majja recounted:

"After getting married, I worked for a boat owner (punggawa) to support my wife and children. At first, I was just a crew member. Since the punggawa used bombs to catch fish, I started observing and learning how it was done. I eventually realized that the explosions did not reach the seabed; if they did, no fish would be caught. Later, I was given the responsibility of being the bomb thrower. I did this for about 10 years until I was arrested in Pangkep and detained for six months at the police station."

Majja's account illustrates how his knowledge regarding bombs and their environmental implications was shaped by his experience working under the direction of a fishing boss. He also noted that, at the time, the use of bombs was standard practice among boat owners, leaving few alternatives.

Another informant, H. Baharuddin, a *punggawa* who owns two boats for sea cucumber fishing, began his career as a fisherman at 15. He shared a similar experience:

"To be honest, I was involved in illegal fishing using bombs for about 20 years. The use of fish bombs here has been passed down through generations – since my grandfather's time, they have been using them. However, from my experience, I know that fishermen lose out when the bomb explodes on the seabed because the coral gets destroyed, but no fish are caught. So, you have to locate the fish's position and depth beforehand. You could say that through experience, fishermen can figure out the location and depth. Back then, I was the tukang keker (the person determining detonation timing), and behind me was the bomb thrower. We would go out on a small boat while the main boat stayed anchored."

H. Baharuddin's testimony supports Majja's account regarding the widespread use of fish bombs. His reflections demonstrate an awareness, developed over decades, of the importance of preserving coral reef ecosystems. Although he participated in bomb fishing, he emphasized that skilled fishermen learned to avoid damaging coral by detonating bombs above the reef, not directly on it. His ecological awareness extended to other destructive methods, such as the use of potassium cyanide, which he explained as follows:

"Potassium cyanide started being used here around the 1990s. The Taiwanese were the first to bring it, and we went together to catch Napoleon fish. After that, many Chinese buyers came looking for live grouper and coral trout, which they bought at high prices. That was when fishermen here started using poison in large numbers. However, this poison, son, it damages the coral. It destroys it not immediately but slowly because it contains toxins."

According to H. Baharuddin, potassium cyanide, while more recent than bomb fishing, poses a greater long-term threat to coral reef ecosystems.

Table 4. Local Ecological Knowledge from Fishing Experience

No.	Type	Local Ecological Knowledge
1	Knowledge	<ul style="list-style-type: none"> ▪ Fish bombs do not damage coral if detonated two meters below the surface, away from the seabed. ▪ Potassium cyanide causes gradual coral degradation due to its toxic properties. ▪ Trawl nets damage coral and reduce fish populations.
2	Fishing Tools	<ul style="list-style-type: none"> ▪ Traders from Taiwan introduced potassium cyanide. ▪ Trawl nets (<i>pukat harimau</i>) are used by fishermen from other regions in the Spermonde waters and around Barrang Lompo Island.
3	Supporting Tools	<ul style="list-style-type: none"> ▪ Fishermen from Madura Island introduced compressors as diving support equipment.

Table 4 summarizes key aspects of local ecological knowledge derived from fishing experience, including direct experiential knowledge and insights gained through interaction with fishermen from other regions.

The knowledge gained through social learning, extended peer interactions, and adaptation to environmental dynamics contributes to a sophisticated understanding of the marine ecosystem. The deep dependence of local communities on nature reflects a philosophical worldview that regards nature as an integral component of life. In this context, harming nature is equated with harming life itself (Hidayat et al., 2010). Consequently, fishermen's practices are oriented toward survival strategies that maintain ecological balance. Their interpretations of natural signs and processes constitute a body of situated knowledge called local ecological knowledge (Murdiati, 2015).

4.1.3. Types of Fishing Gear

The socialization, interaction, and adaptation processes differ across communities, shaped by geographic location, ecological conditions, demographic characteristics, sociocultural factors, climate, and other contextual variables. As a result, the local ecological knowledge that emerges also varies, reflecting distinct ways of understanding and engaging with the environment. For the fishermen of Barrang Lompo Island, fishing gear knowledge stems from intergenerational transmission and interactions with fishermen from other regions. Years of practical experience have refined their ecological awareness, particularly regarding the tools they use.

The study identified six main types of fishing gear commonly used by Barrang Lompo fishermen: hooks, nets, fish bombs, potassium cyanide, fish traps (*bubu*), and spearguns, with compressors employed as auxiliary diving equipment. Fishing gear such as hooks, nets, fish traps, spearguns, and even bombs has been used across generations and is considered part of the community's fishing tradition. However, interactions with fishermen from other regions introduced innovations such as using compressors and potassium cyanide (see **Table 5**).

Table 5. Types of Fishing Gear Used Within the Framework of Local Ecological Knowledge

No.	Fishing Gear	Source of Knowledge	Fishermen's Perception
1	Hooks	Previous generations	Non-destructive
2	Nets	Previous generations	Non-destructive
3	Fish bombs	Previous generations	Non-destructive
4	Poison – Potassium cyanide	Experience	Destructive
5	Fish traps (<i>bubu</i>)	Previous generations	Non-destructive
6	Spearguns	Previous generations	Non-destructive
7	Compressors	Experience	Non-destructive

Fishermen on Barrang Lompo Island demonstrate ecological awareness shaped by direct interaction with their marine environment. They express concern for the sustainability of marine resources and the ecological systems that support them. According to their understanding, potassium cyanide is the only fishing method that directly damages coral reefs, as it seeps into the seabed and causes slow degradation. In contrast, fish bombs are considered less harmful by local fishermen, as they are typically detonated below the water surface rather than at the coral bed.

Despite this perception, the fishermen recognize the ecological harm caused by trawl nets (*pukat harimau*), which they associate with environmental degradation and declining fish populations. Consequently, they avoid using trawls in their fishing practices.

While the belief that fish bombing is non-destructive persists among some fishermen, the practice has notably declined recently. As Ahmad, one of the informants, explained:

"For the bomb materials, it used to cost Rp 1,250,000 per sack, but now it is Rp 4,250,000, and even that is hard to obtain. So, while there used to be around 20 boats using bombs, now only 4 remain, and even those only go out 2 or 3 times a year."

According to Ahmad, the primary reason for abandoning fish bombs is not environmental concern but the increasing cost and limited availability of materials, alongside the heightened legal and safety risks associated with their use.

In contrast, another informant, H. Baharuddin, offered a spiritual rationale:

"Since I returned from the Hajj, son, a year later, I stopped using bombs. I went to the holy land for Hajj in 2007. I told myself it was no longer appropriate; I would always lie. Because if I were honest, I would eventually get fish."

For H. Baharuddin, the decision to stop using destructive fishing tools was rooted in his religious beliefs. He viewed the practice of fish bombing as incompatible with the values of honesty and moral integrity emphasized in his faith. Thus, his choice reflected an ethical and spiritual transformation rather than a reaction to ecological or economic pressures.

4.2. Discussion

The fishing practices of Barrang Lompo Island fishermen are grounded in ecological knowledge acquired through prolonged interaction with their environment and reinforced through intergenerational socialization. This deep reliance on the sea and its ecosystems and recognition that nature cannot be fully controlled or altered have fostered a worldview

emphasizing respect and deference toward natural forces. Rituals performed by fishermen serve as expressions of cultural identity and as mechanisms to seek protection, safety, and blessings from the spiritual or supernatural entities they believe inhabit the marine environment.

These ritual practices align with Coleman's theory of rational choice, particularly the role of social norms and social capital in shaping individual decision-making (Coleman, 1990). Coleman argues that particular actions are influenced by shared norms, which emerge from collective behaviors or the absence of formal regulatory structures. In this context, ritual performance is a rational response to environmental uncertainty, informed by deeply embedded cultural norms.

The decisions made by Barrang Lompo fishermen regarding fishing methods and gear selection are similarly guided by rational considerations. These include the availability of financial capital, expected economic returns, type of catch targeted, available labor and equipment, buyer demand, and prevailing market prices. For many years, local fishermen considered fish bombs a rational choice, as they perceived them efficient and not overtly harmful to seabed ecosystems. However, the trend of abandoning fish bombing is also rooted in rational reasoning.

Several factors have contributed to this shift in practice:

- 1) The increasing scarcity of raw materials required to produce fish bombs.
- 2) Rising costs associated with acquiring these materials.
- 3) High operational expenses that no longer justify the risks, particularly the threat of legal sanctions.
- 4) A growing recognition that the practice fosters dishonesty, conflicting with ethical and religious values.

These changing practices are consistent with Ritzer's interpretation of rational choice, wherein individuals evaluate and compare available alternatives' relative value and feasibility (Ritzer, 2012). The most logical option offers the most significant benefit while remaining realistically attainable. In this framework, fishermen continually weigh potential economic, legal, and moral outcomes before deciding their fishing strategies.

Homans further connects rationality to three core propositions: success, stimulus, and value (Homans, 1961). Fishermen are likelier to repeat actions that have yielded favorable results, respond to familiar environmental cues, and choose the most rewarding behaviors. The declining use of destructive fishing practices on Barrang Lompo Island thus reflects a dynamic process in which traditional knowledge, economic logic, and evolving value systems converge.

5. Conclusion

Local Ecological Knowledge (LEK) is transmitted across generations through cultural practices, experiential socialization, and the continued use of traditional fishing gear. Rituals and traditions serve as artistic expressions of environmental determinism, while adopting various fishing technologies reflects a worldview informed by ecological possibilism.

The fishing practices of Barrang Lompo Island fishermen are shaped by their ecological understanding, which is rooted in prolonged interaction with the marine environment and reinforced through generational transmission. The rituals, traditions, and gear choices associated with fishing activities are informed by rational decision-making. These decisions are based on financial capital, anticipated profits, targeted fish species, available human and material resources, market demand, and perceived risks.

Preserving these ritualistic and cultural practices is essential to ensuring the continuity of LEK in tandem with technological advancements in the fishing sector. Maintaining this balance supports the long-term sustainability of marine resources and ecosystems. Greater government involvement is required to strengthen these efforts, particularly through targeted programs providing material support and capacity-building initiatives. Such interventions will help align traditional ecological knowledge and local fishing practices with broader sustainability objectives.

6. Acknowledgment

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7. Declaration of Conflicting Interests

The authors have declared no potential conflicts of interest regarding this article's research, authorship, and/or publication.

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