

Local Wisdom and Spatial Management of Marine Resources: *Erang Pakboya-boyang* as a Model for Sustainable Environmental Practices

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ABSTRACT

The marine ecosystem faces escalating degradation from global pressures, but the local management of these resources remains deeply guided by traditional frameworks of religion and belief. This research examines how spiritual wisdom in Patorani culture contributes to marine resource management in Galesong Sub-district, Takalar Regency, located on the southern coast of South Sulawesi. Using an ethnographic approach, this qualitative study explores the role of ritual practices in the management of marine resources by Patorani fishermen. Data were collected through documentation, literature review, interviews, and observation. The findings highlight the series of rituals, such as *pakdoangang* (safety prayers), *kasipalli* (taboos), *papasang* (messages), and the use of *pakkaja* and *balla-balla* fishing gear, which form an imaginary dialogue with spiritual forces. The rituals are viewed as a spatial engagement between the fishermen and the *Torani* fish (flying fish) to ensure successful fishing. This study shows that these rituals embody spiritual wisdom in marine resource management, aligning traditional practices with sustainability. Future research is recommended to quantitatively measure the ecological impacts of these practices on fish stocks and conduct comparative studies with other indigenous maritime cultures to explore the adaptability of these principles in broader contexts.

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1. Introduction

For centuries, coastal communities have productively managed marine and coastal resources, fostering relationships based on a deep-seated dependence on nature. The relationship between the community and marine environment often experiences a shift in understanding when viewed as a mere economic factor (Awange and Kiema, 2019). This is caused by a lack of access to marine resources for effective community fishery management. A lack of knowledge and skills in using environmentally friendly fishing gear results in overexploitation of resources. Modern, commercially driven approaches often supply traditional ecological knowledge that contains generations of wisdom regarding sustainable harvesting practices (Ruslim et al., 2025). Consequently, a balanced, reciprocal relationship with nature has been replaced by an extractive relationship, threatening both biodiversity and the community's cultural identity.

Indigenous and traditional people inhabiting coastal and marine areas have developed sophisticated systems not only for utilization, but also for sustainably managing the great biodiversity surrounding them. This follows the results of Neumann et al. (2017), who illustrated the inseparable relationship between community culture and biological life, where the origins of environmental conservation have been rooted in ancient cultures found in all parts of the world since ancient times (Marlina, Et.al 2023). Thus, the management of biological resources requires the wisdom of local communities regarding the environment, which is essentially a religion and value system embraced by the community (Gbadegesin and Gbadamosi, 2024). This holistic approach contrasts sharply with conventional top-down

management as it integrates spiritual reverence and ethical responsibility directly into resource use. Recognizing this knowledge, often termed Traditional Ecological Knowledge (TEK), is crucial for developing more effective and socially just conservation strategies.

Recognizing and integrating the local culture of traditional communities is vital for sustainable marine and coastal resource management in Indonesia. While conventional management often imposes standardized top-down regulations, local cultures possess adaptive, time-tested strategies that are frequently overlooked (Plieninger et al., 2023). One innovative solution for flexibly utilizing coastal and marine resources is to develop local cultures that can thrive in a global society (Gattuso et al., 2018). One of the communities in the Galesong District, *Patorani* fishermen, who specialize in catching *torani* fish and their eggs, serves as a prime example. Their unique traditions offer a model of wise resource management that can provide critical insights for broader conservation efforts, thereby demonstrating a crucial component of effective conservation planning.

Patorani fishermen represent a community with profound historical and cultural significance in Indonesia. For centuries, their specialized practices have made them key exporters of *torani* (flying fish) eggs, a testament to their deep and successful understanding of marine ecosystems (Hasriyanti et al., 2023). At the heart of their tradition is a unique spiritual and practical knowledge system called *erang pakboya-boyang* that governs holistic resource management. However, like many indigenous traditions, this invaluable local wisdom now faces increasing pressure from modernization and a shift towards purely economic exploitation, threatening its continuity and the sustainable balance it maintains. Therefore, resources and nature must be managed in harmony with existing religious and cultural values (Arsal et al., 2023).

The core of the *erang pakboya-boyang* system extends beyond mere fishing techniques; it represents a fundamentally different worldview of the human-nature relationship. This philosophy is built on a deep respect for the sea and its creatures, viewing them as creations to be honored rather than resources to be conquered (Sumaila et al., 2021). This is evident in their principle of not being driven by greed (*nafsu*), even when the economic value of the catch is high, and their steadfast commitment to traditional, non-destructive gear, such as *pakkaja* and *balla-balla*. This stewardship-based approach stands in stark contrast to the dominant modern paradigm, which often treats marine ecosystems as passive commodities that can be exploited for maximum short-term profit (Yuan et al., 2024). This philosophical divergence makes *Patorani's* local wisdom a critical subject of study, offering potential insight into the age of widespread marine degradation.

Sustainable marine management represents a dual crisis. On the one hand, the well-documented degradation of marine ecosystems driven by uncontrolled exploitation harms both the environment and welfare of fishing communities (Lincoln et al., 2021). However, there is concurrent neglect of indigenous knowledge systems that can offer solutions (Montefalcone et al., 2025). For example, the spiritual wisdom of *Patorani* culture remains largely undocumented and misunderstood, often viewed as a historical folklore rather than a practical governance strategy (Ali et al., 2025). This highlights a critical gap in current approaches: the failure to analyze these indigenous knowledge systems as functional, systematic models of resource management rather than as historical artifacts.

Although a valuable foundation for the *Patorani* culture exists, research is often fragmented. For instance, previous studies by Demmallino and Ali (2018) focused on describing religious and occult rituals, whereas the economic analyses by Syah et al. (2020) examined their value in terms of blue carbon accounting. Ali et al. (2025) analyzed local knowledge as an adaptation strategy to environmental change, and Hasriyanti et al. (2023) explored knowledge systems in educational contexts. Historical accounts have documented their significance. While essential, these studies are limited in scope, often treating spiritual and practical components as separate cultural artifacts. Consequently, this study analyses how these diverse elements, from prayers and *taboos* to fishing gear, interact and function together as a cohesive and systematic model of resource management, exploring the underlying ecological logic that has yet to be fully addressed in the literature.

Addressing these challenges and the identified research gap, this study aimed to explore the practice of spiritual wisdom in *Patorani* culture and its potential integration into marine resource management. This research is guided by the following central research question (RQ1): How does the spiritual wisdom of the *Patorani* culture in the Galesong District inform the sustainable management of marine resources? By answering this question, this study offers a significant contribution to the understanding of the nexus

between local wisdom and environmental sustainability. This study provides actionable insights into conservation efforts aimed at mitigating ecosystem change, enhancing community welfare, and reconciling economic and environmental preservation goals. Ultimately, this study proposes a culturally based fisheries management model that can inspire the development of more holistic and sustainable marine protection policies at local and global levels.

2. Method

This study used a descriptive ethnographic research design to collect data. Descriptive ethnography aims to describe the life and culture of the community under study in detail. Ethnography is an in-depth and comprehensive research method for understanding the culture and life of a particular community through direct observation and interactions with its members (Fatchan, 2015). This requires a deep understanding of the culture and lives of the *Patorani* community, which can be achieved only through direct observation and interaction with community members. This approach was chosen because it aims to understand *erang pakboya-boyang* as a functional management model that requires in-depth exploration of the *Patorani* community's lived experiences, cultural values, and spiritual worldviews. This study seeks to gain a deeper understanding of how marine resource management policies are influenced by Patorani's spiritual and cultural wisdom. Ethnography allows researchers to explore the relationship between cultural aspects and marine resource management policies thoroughly. Ethnographic methods enable researchers to understand practices and policies in a broader cultural context. This helps to analyze how marine resource management policies are reflected in the Patorani people's daily practices and how their spiritual values influence their approach to resource management.

This study was conducted in the Galesong Sub-district, located within the Takalar Regency in South Sulawesi, Indonesia (Figure 1). This area was selected as the primary ethnographic research unit because it is a significant center for the Patorani fishing community in the region. The sub-district is characterized by a high concentration and rapid growth of the Patorani population, making it an ideal setting for in-depth cultural studies. Furthermore, the Patorani have a long and deeply rooted history in Galesong, ensuring that their cultural traditions and local knowledge are embedded in the community. These demographic and historical factors provide a rich context for exploring the *erang pakboya-boyang* knowledge system in its authentic environment.

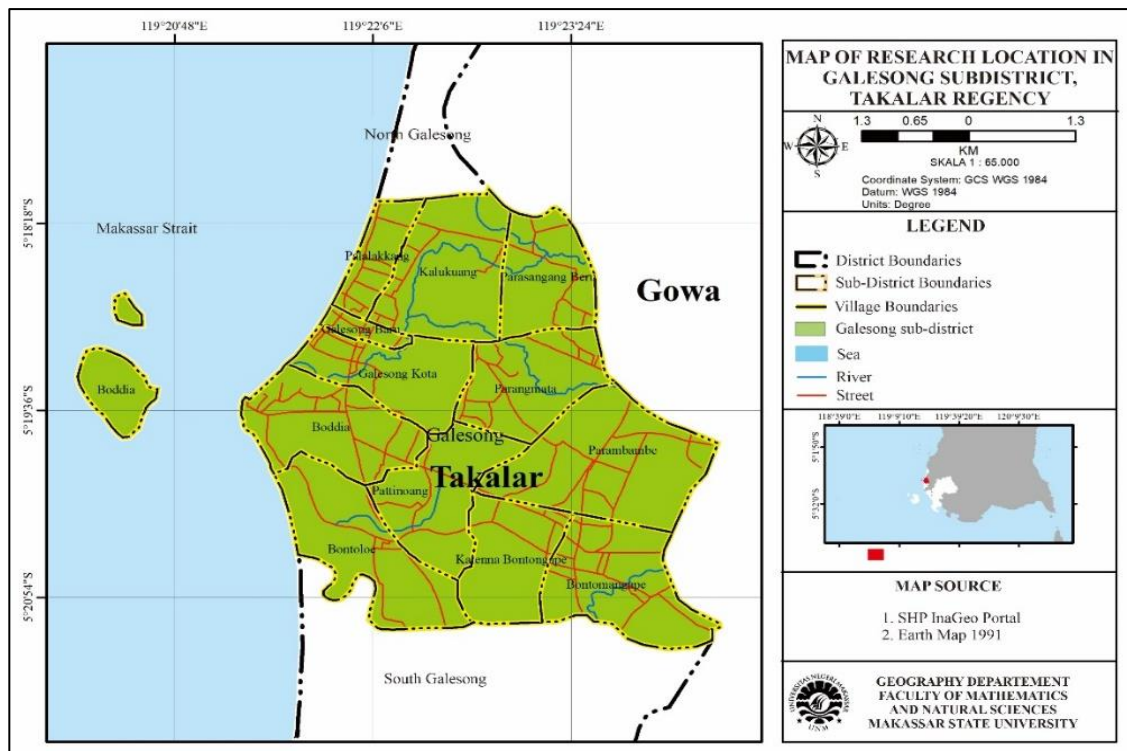


Figure 1. Research location map

This study was structured around three core research variables to explore the subject comprehensively. The first variable, Spiritual Wisdom, encompasses foundational concepts guiding resource management, including the religious beliefs, values, and inherited rituals of the Patorani people. The second variable, Marine Resource Management, covers practical applications and systems such as policies for sustainable use and traditional harvesting techniques. The third variable, Patorani Culture, examines the broader social context, including customs, social structures, and behavioral patterns relevant to marine activities. Together, these variables allowed for a holistic analysis of how spiritual beliefs are translated into cultural norms and enacted as sustainable management practices.

Data for this ethnographic study were drawn from primary and secondary sources to ensure a comprehensive understanding of Patorani culture. Primary data were sourced directly from Patorani community members and cultural events such as rituals and daily fishing practices. This direct engagement was crucial because the core of erang pakboya-boyang is unwritten, embedded in lived experiences and tacit knowledge essential for achieving the research objectives of this study. Secondary data consisted of existing documents, including historical records, previous academic studies on Patorani culture, local community archives, and regional maps. These sources were selected to provide a historical context, verify the information gathered from the interviews, and situate the findings within a broader scholarly framework.

The data collection techniques in this study involved several methods to gain a deep understanding of the life and culture of the Patorani fishing community in the Galesong subdistrict. 1) Observation was conducted directly by observing the daily activities and way of life of Patorani fishermen in their natural environment, allowing for a contextual understanding of their practices and social interactions. 2) Interviews with key participants were conducted to gather primary data from individuals who played a significant role in the Patorani tradition. These include traditional teachers or anrongguru who possess cultural knowledge, the guru baca or pinati who lead Patorani rituals, the sea juragan or tamparang retainer who commands the fishing fleet, the land juragan or papalele who plays a central role in the community structure, and laborers or ship crew known as sawi, who are actively involved in the operational and structural functions of the Patorani group.

The study involved in-depth engagement with three key participants, selected through purposive sampling. The selection criteria required individuals to possess deep, firsthand knowledge of the erang pakboya-boyang system and to represent one of the three crucial roles within the Patorani fishing tradition: spiritual advisor (Anrongguru), boat leader (Punggawa), and crew member (Sawi). This strategy was chosen to prioritize the depth and richness of the data over the numerical quantities. The credibility and validity of the findings are thus established not by the number of participants, but by the strength of the data provided by these key role representatives, from whom data saturation was deemed to have been reached as the information began to converge on central, recurring themes. The following is a summary of the participants' identities (Table 1).

Table 1. Participants identity

No	Code of Participants	Age	Role in Patorani Community	Description	Qualitative Code
1	Participants 1	29	Sawi (Crew Member)	Provided information on kasipalli (taboo objects).	P1-SAWI
2	Participants 2	48	Anrongguru (Spiritual Advisor)	Explained taboos and restrictions during the voyage.	P2-GURU
3	Participants 3	-	Punggawa (Boat Leader)	Leads pakdoangang, chants kelong, and oversees fishing preparations.	P3-PUNGG

Source: Data analysis, 2025

Data analysis in this study followed a systematic multistage process. Initially, a descriptive analysis was conducted to organize and summarize the data from the field notes and interview transcripts, providing a comprehensive portrayal of the Patorani community's daily life and cultural practices. The core of the analysis employed a six-phase framework for thematic analysis, as outlined by Braun and Clarke (2006). The process began with (1) data familiarization, where all interview transcripts and

observation notes were repeatedly read to achieve deep immersion in the data. Next, (2) initial codes were systematically generated across the entire dataset, labeling significant features relevant to the research question. These codes were then (3) collated into potential overarching themes (e.g., "Spiritual Governance," "Ritual-Based Fishing Techniques"). In the subsequent phases, these themes were (4) reviewed and (5) refined, defining the essence of each theme and how they were interrelated. The final phase involved (6), producing the narrative analysis presented in the findings section, in which each theme was supported by persuasive data. Throughout this interpretive process, the theoretical framework of TEK was applied as an analytical lens. This allowed the research to move beyond mere description, enabling an analysis of how the identified cultural practices function as a cohesive system for sustainable environmental management (Silva-Ávila et al., 2025; Tran et al., 2024)

The data for this study were gathered through participatory observations and in-depth interviews. Following data collection, all field notes and interview transcripts were systematically aggregated and categorized to create an organized dataset. The dataset was subjected to rigorous thematic analysis to identify recurring patterns and concepts. The central aim of this process was to uncover the intricate relationships among the community's practices, beliefs, and emergent themes from the data. Ultimately, this combination of ethnographic methods is crucial for gaining a comprehensive understanding of the lives of Patorani people in the Galesong Region.

3. Results and Discussion

This study aimed to deconstruct the *erang pakboya-boyang* knowledge system of Patorani fishermen to understand how it functions as a cohesive model for sustainable marine resource management. The findings presented in this section address this objective by revealing that *erang pakboya-boyang* is a comprehensive system that integrates spiritual beliefs manifested through prayers (*pakdoangang*), taboos (*kasipalli*), and messages (*pappasang*) with specific ecological practices (Athanasίου et al., 2017). Theoretically, this system functions by reframing the human-nature relationship from one extraction to one of relation and negotiation, with each spiritual element serving to guide and constrain practical fishing practices. Together, these elements form a holistic framework for sustainable resource utilization (Narayan et al., 2016). The following subsection details each component to illustrate their synergistic operations.

Patorani fishing activities, which have been practiced since the 17th century, are deeply embedded in a series of religious rituals and beliefs intended to bring goodness and luck to catching *torani* (flying fish) and their eggs. While previous studies have generally described a series of religious rituals performed (Hasriyanti et al., 2023), this study explains the virtues of *erang pakboya-boyang* in more detail. The system is understood as having spiritual power within Patorani culture, guiding wise actions in protecting and utilizing marine resources. The entire spiritual series was carried out two months before the *assawakung* (going to sea) season in May and June, and included *pakdoangang* (prayer), *kasipalli* (taboo), *pappasang* (message), the process of lowering *pakkaja* and *balla-balla* fishing gear, and *kelong* (song). These elements are not performed in isolation; rather, they are interconnected components of a holistic governance framework that embeds ecological wisdom into spiritual practice.

Patorani fishermen divide the ritual series into three ritual parts: the *Appakruru Patorani* ritual, *Ri Tamparanga* ritual, and *Attayang Patorani* ritual. The *Appakruru Patorani* ritual was performed during the preparation period until Patorani's departure for *assawakung* (fishing). The *ri tamparanga* ritual is a special ritual performed by Patorani members while sailing, which must be performed by courtiers and the *Sawi*. The *attayang Patorani* ritual must be performed by *anrong guru* (traditional teacher), *pinati* (reading teacher), *punggawa bonto* or *papalele* (landlord), and Patorani's wife and extended family who are waiting for Patorani's arrival from fishing. This tripartite structure demonstrates a comprehensive ritual cycle that involves not only fishermen at sea, but also the land-based community, reinforcing the collective nature of the Patorani fishing community.

3.1. Pakdoangang (Prayers)

Pakdoangang is a sacred and foundational stage in the Patorani fishing process performed before the crew embarks on their voyage. This ritual is more than a simple request for luck; it functions as the initial act of situating the fishing expedition within a spiritual rather than purely economic framework.

Prayer is considered an essential component of technical knowledge of fishing (erang pakboya-boyang), signifying that successful fishing depends on spiritual consent as much as on practical skills. Through this act of prayer, fishermen are not merely making a passive request; they are actively entering into a respectful dialogue with the spiritual forces that govern the sea, seeking permission, and establishing a reciprocal relationship with the sea. As cited by one of the participants (P3-PUNGG), the contents of pakdoang are as follows:

"Irate rammang makdonteng, kupailalang sorongang. Naungko mae, bonei tangngana biseangku. Parassianga ripantarang, rassi tongi ilalang. Ooo Nabbi, palakanga dallekku battu ri karaeng Allah Taala siagang battu ri Nabi Muhammad. Ooo Nabbi Pakere, Nabbi Haedere, sarea mange dallekku battu ri karaeng Allah Taala siagang battu ri Nabi Muhammad." (P3-PUNGG)

Meaning: In the sky, clouds are clumped with a million hopes. Please come down and fill my boat with water. Filling the outside and inside of the structure. Ooo Prophet (fish gods) sends down my sustenance from the Allah SWT and Prophet Muhammad. Ooo Prophet Pakere, Prophet Khaidir, sent down my sustenance from Allah SWT and Prophet Muhammad."

Patorani rely on their sense of smell to determine the presence of flying fish in the sea. At a relative distance, they can distinguish the smell of flying fish. In this case, the *tamparang* courtier (sea captain) plays an important role in reciting a *pakdoangan* (prayer) before lowering the *pakkaja* and *balla-balla*. The purpose of prayer is to shake the arrival of the flying fish, and the fish spawns. Thus, this ritual represents a critical moment in which empirical observation is seamlessly integrated into spiritual actions to influence the natural world. The verses of this prayer are as follows:

"Bagenda Ali appanaungi, Nabi Muhamma' antannangi, Jibirelek ampongembang, Allah Taala ampantamai, Kurru pole sumanga'nu, Jangang kebokku minne dallekanna ballakku, ri pakkarena-karenannu". (P3-PUNGG)

Meaning: Sire Ali who lowers, Prophet Muhammad who installs, Gabriel who dispels, Allah Taala who inserts, comes with your soul, my white chicken in front of my house, and your playground.

The *pakdoang* ritual, as performed aboard the *Patorani* fishing vessel, is documented in the series shown in Figure 2.



Figure 2a. Pakdoang Process



Figure 2b. Pakdoang Process



Figure 2c. Pakdoang Process



Figure 2d. Pakdoang Process

3.2. Kasipalli (Taboos)

Kasipalli (taboos or pamali) is used as cargo in *Patorani* fishing boats. The results of an interview with R1-SAWI said:

"Risekrea biseang paboya juku, sanna kasipallina punna angngerang tauwwa kammayyamintu, feel ase hump lekleng, angngerang batu misang, siagang assung anu lebbaka nipake".

Meaning: Loading black glutinous rice, either as rice or cake, is not permissible. Loading tombstones and using mortar, whether made of stone or wood, is prohibited. Bringing these items is believed to disrupt the spiritual purity required for a successful and safe journey.

However, the significance of this prohibition extends beyond mere superstition and reflects a deeper cosmological worldview that is central to *Patorani*'s environmental management. The forbidden items—black glutinous rice, tombstones, and used mortars—are symbolically tied to the domains of land, domestic life, and death. By forbidding these items on the boat, the *kasipalli* enforces a ritual separation between the sacred, living realm of the sea and the profane realm of the land. This act of maintaining symbolic purity reinforces a worldview in which the ocean is not a passive resource to be exploited but a powerful and sentient space that demands respect and reverence. This reverential attitude is a cultural foundation that indirectly encourages cautious and sustainable resource use.

Other taboos that should not be practiced by the boat crew or their families include R2-GURU, which stated that some of the taboos are as follows:

"Takkulleai sambarang nikana punna irateki kappalaka. Irate biseang paboya juku parallu tutuki rikana-kana bajika, kasipallina anjo punna akkana-kana tena, siagang tena kulle akbicara olok-olok niaka mantang ri bontoa. Mingka punna tarpassa nisabbu anjo, sambeangi arenna, kana jarang nisambaeangi arenna anjari i tetterek. Punna kongkong arenna i tarang gigi, tedong anjari i cammi".(R2-GURU)

Meaning: It is not allowed to speak carelessly (without control) on *Patorani* boats. On a flying fishing boat, it is unacceptable to say "no" and mention the names of animals on land. If necessary to do so, the names should be changed to horses being called fast, dogs being called sharp-toothed, and buffaloes being called pitch-black.

3.3. Pappasang (Message)

The exploitation carried out by *Patorani* fishermen always adheres to the *pappasang*, which reads:

"Allel sikeddeka sikira-kira niaki lammajikia, pelaki jaia punna niaki lammanraki"

Meaning: "Take a little when it brings goodness or happiness, but avoid a lot, when the lot turns out to be disastrous."

Patorani's ancestors advised that in doing any work related to the lives of many people, the issue of benefits should be considered first. What is the meaning of a lot of production, but can it cause disasters in the future? A small amount of produce that can be enjoyed by our children and grandchildren is more meaningful than a large amount that can no longer be enjoyed in the future.

This *pappasang* serves as a powerful articulation of core sustainability principles. Theoretically, it functions as a local formulation of intergenerational equity, which is fundamental to sustainable development. The advice to prioritize the well-being of "children and grandchildren" over immediate maximum production directly reflects the ethical commitment to preserving resources for future generations (Karakas et al., 2024). Furthermore, the warning against taking "a lot" when it can lead to "disaster" is a culturally embedded version of the precautionary principle and fisheries concept of Maximum Sustainable Yield (MSY) (Li, 2023). This demonstrates a sophisticated, long-term understanding of ecological limits, framing resource management as a moral responsibility rather than an economic calculation.

3.4. *Pakkaja* and *Balla-balla* fishing gear

The basic materials for making *Patorani* fishing gear are obtained from local sources; therefore, the distinctiveness of fishing gear technology is local because it is created by the local community. *Patorani*'s ability to manifest fishing gear in a more complex form of *erang pakboya-boyang* from the *torani* fishing community. The basic materials for making *pakkaja* are rattan and gosse (a type of seaweed with a special aroma), and the materials for making *balla-balla* are coconut leaves. These materials are sacred and are offered. Sacred nature comes from a series of rituals performed on the material before use, where the material is given *pakdoangang* (prayer) and *read* (mantra) to strengthen the material in catching *torani* (flying fish). The use of more coconut leaves in the *balla-balla* increases the capacity to catch more fish. Coconut leaves that begin to dry have a special smell and are very favored by *Torani* fish as a spawning site because the structure is rather rough and not slippery; therefore, the condition of the material is an attraction for *Torani* fish to attach to the *balla-balla* and then lay eggs. The capacity to accommodate and collect *torani* fish eggs in *balla-balla* is greater than that in *pakkaja*, but both operations are still used together. This is because *pakkaja* is used to catch the mother, whereas *balla-balla* is used to collect eggs. *Pakkaja* and *balla-balla* fishing gear are shown in Figure 3.



Figure 3a. *Pakkaja*



Figure 3b. *Balla-balla*

3.5. *Kelong* (Song)

The deployment of *pakkaja* and *balla-balla* fishing gear is not merely a technical task, but a pivotal ritual. This ritual is performed by chanting traditional songs known as *kelong*. The primary purpose of the *kelong* is to act as a spiritual summon, calling *torani* (flying fish) towards fishing gear. This chant is a collective act led by the *Punggawa* (boat leader, P3-PUNGG), followed by the chorus of crew members or *Sawi* (P1-SAWI). The verses of this summoning song, as shared by the participants, are as follows.

"Pole torani, pole torani, pole torani, ri allakna bombang, ri tekona arusuka, ri balembenna takak. Battu ngaseng mako mae, mannurung i timborok, i warak, irawa, irate. Ri pakkarek karenannu ri ribainennu. I pantarang mintu tulolonna satangnga, lompoa pungkukna. Ia riolo, ia angngallei bungasakna, ia ri boko ia angngallei pallateanna. Pole ngaseng mako mae, i lau, i raya, i timborok, i warak. Takbalakna kaluarayya. Akjallo bania, tambung loro".

Meaning: Welcome *torani*, welcome *torani*, welcome *torani*. From the cracks of the waves, the swirls of the currents and curves of the reef. Come all hither. Come from the south, north, down, up, in your playground to your wife. Satanga girls already had large hips. He who is first gets the virgin; he who is later gets the mark. Come all here, from West, the East, the South and the North. They swarm like ants and rage-like bees, and pile up like garbage.

Kelong is more than a simple song; it is a performative act of communication that reinforces *Patorani*'s relational worldview of the marine environment. By personifying the *torani* fish and inviting them to their "playground" and "to their wife," the fishermen frame the act of fishing not as a harvest but as a negotiation between human and non-human actors. This perspective, in which nature is treated as a sentient entity to be persuaded rather than a resource to be extracted, is a recurring theme in *Patorani* spiritual wisdom, as noted in previous studies (Hasriyanti et al., 2023). The use of seductive and communal imagery underscores management ethics rooted in attraction and respect rather than

force and domination. This ethical foundation is crucial for fostering the restraint necessary for a long-term ecological balance, directly contributing to the sustainability of the fishery.

Patorani depend on the sea for their livelihoods, and it is considered that they have a lot of knowledge related to various marine phenomena; thus, they are effective in fishermen's production activities. The method of fisheries through the *Patorani* culture follows the results of research by Carrella et al. (2020) and Wijermans et al. (2020), who stated that fisheries originally used methods that maximized behavioral knowledge and minimized tool use. The sharpness of knowledge that is not found outside the general community is supported by *the knowledge of the Patorani*. They can use some life experiences that their ancestors passed on when modern knowledge is compared to this aspect. This deeply contextual place-based knowledge allows them to adapt and thrive in their specific marine environments in ways that standardized universal knowledge often cannot.

Patorani fishermen coexist in the marine environment and use various responses that function as adaptive strategies. One strategy is the use of religion, magic, rituals, and beliefs to carry out the value of a strong relationship with the sea (Evolvi, 2020; Mbaye et al., 2023; Putri et al., 2022; Rozi & Taufik, 2020). The marine environment is a more open geographical space that, in terms of cultural, political, and economic interests, is a place for effective communication (Fu et al., 2016). *Patorani* maintained the culture of coastal space in the local culture of the Galesong community. In doing so, they sustain a resilient socio-ecological system, in which cultural identity and environmental stewardship are intrinsically connected.

The *Patorani* ritual is inseparable from knowledge in the form of a combination of existing religious ritual ceremonies, where there is an element of irrational thinking in its implementation that has been passed down through generations (Demmallino & Ali, 2018; sRisdayani et al., 2022; Syah et al., 2020). The *patorani* contains prayers asking for protection from God so that in the ritual, there is awareness so as not to abandon the delivery of offerings or existing rituals. The preservation of spiritual and occult values and rules has a beginning and is contained in the knowledge (*pangngissengang*) owned by the community. According to Hasriyanti et al. (2023), the behavior of *Patorani* fishermen is influenced by two environmental conditions: the external environment and the internal environment, which were born in ancient times and then became a habit. Beliefs are formed from these inherent habits and transcendental experiences in magical and other institutions. As a manifestation of respect, *Patorani* fishermen perform various ceremonies to ask for safety and ward off bad luck before going to the sea. These religious ceremonies use *matera*, are accompanied by majestic behavior, and serve offerings with special ingredients. If the rituals *kasipalli* and *pappasang*, are not carried out with full seriousness, it is believed that they will not get results when going to sea, even if they do not go to the sea.

Pamali, also known as *Kasipalli*, contains taboos and prohibitions that the Balinese people must avoid. *Patorani* believes that the constancy of the mantra or reading that is effective will produce income in their favor. The prohibition related to *kasipalli* is a *sarak* that goes hand-in-hand, so that it should be fulfilled. The belief among *Patorani* fishermen is that if something that does not violate is done, then they will get many results in their catch, and if they do something that violates, then magical power will be lost (Chaiphap et al., 2013; Intem et al., 2021). This magical power affects *Patorani's* income as it is related to overall welfare. They need magical powers to bring in their dream coffers in the form of *torani* fish and eggs. Warnings are given to *Patorani* fishermen, both *sawi* and *punggawa*, so that things that are considered to disturb the arrival of *torani* fish do not enter the *pakkaja* or *balla-balla* to spawn and lay eggs.

Patorani fishermen are traditional fishermen who prioritize environmentally friendly fishing strategies through *erang pakboya-boyang*. This refutes the theory put forward by Sahayaraju and Jament (2021) and Yu et al. (2018), who stated that traditional fishers play a major role in the destruction of ecosystems in coastal and marine areas. The desire to obtain large catches has encouraged traditional fishermen to use fishing techniques that damage the sustainability of marine resources. However, this was not observed in the *Patorani* culture system. Exploitation always adheres to the *pappasang*, which reads: "*Allei sikeddeka sikira-kira niaki lammajikia, pelaki jaia punna niaki lammanraki*" Meaning: "Take a little when it brings goodness or happiness, but also avoid a lot, when the lot turns out to be disastrous" (Siringoringo et al., 2019).

The wisdom of managing *torani* (flying fish) resources through *Pattorani* culture is seen in the use of local fishing gear, namely *bale-bale* and *pakkaja* made from rattan, coconut leaves, and bamboo, which are sacred in the *Annyikko Pakkaja* (luring *Pakkaja*) ceremony. The awareness of *Patorani* fishermen regarding the fishing gear of *Patorani* fishers has not changed over time. With *erang pakboya-boyang*,

they maintain fishing habits and a culture that adopts sociocultural norms at the local level. The use of traditional fishing gear, *pakkaja* and *balla-balla*, is a form of friendly interaction with the environment. This is reinforced by the theory expressed by Deli (2023) and Lloret et al. (2018), who state that nature and the environment interact with humans in a constantly moving dynamic (dynamic equilibrium) that reaches a point of balance. According to Huda et al. (2020) and Primayanti and Puspita (2022), humans have knowledge, skills, and behaviors that reflect harmony and wisdom in response to the environment. However, Patorani's knowledge can refute Wiradana et al.'s (2021) opinion that the existence of local community knowledge of the environment is a form of environmental orthodox or environmental orthodoxy, in which the local community's knowledge is always blamed for environmental damage. Therefore, Patorani local culture with orthodox thinking attempts to deconstruct it with more critical thinking towards the environment in the form of new thinking, especially since Patorani local culture is the result of the interaction of the environment and humans and is also the result of a long and continuous process (Hasriyanti et al., 2016). Another form of spiritual wisdom is *kelong* (song), which refers to joy, cheerfulness, and gratitude for the results obtained in the process of fishing. The *erang pakboya-boyang* knowledge system is shown in Figure 4.

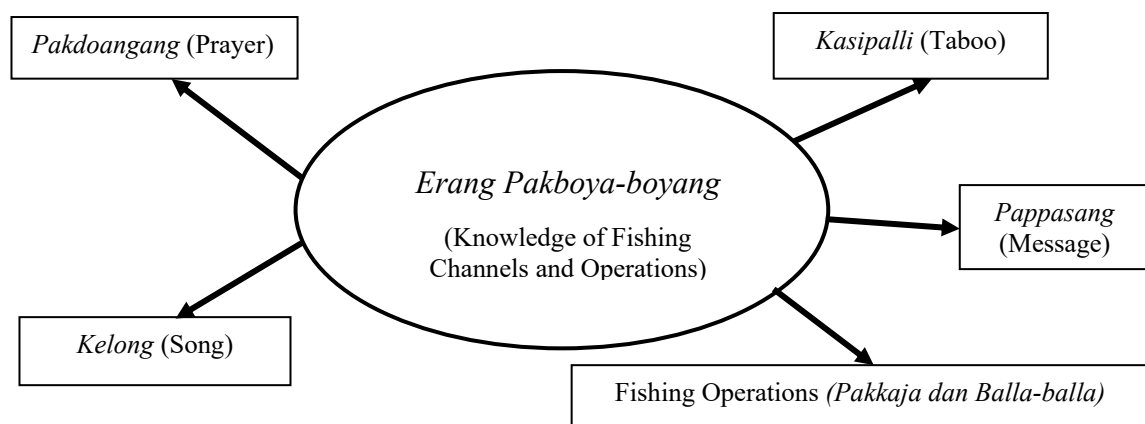


Figure 4. *Erang Pakboya-boyang* Knowledge System Scheme

The results of this study are reinforced by Fatchan's (2015) definition of ethnography, which seeks to understand behavior based on natural and cultural truths. In the context of Patorani, this requires an understanding of the symbolic meanings embedded in the local culture. As noted by Hasriyanti et al. (2023), these symbols, ranging from objects and sounds to complex social actions, express the community's core values. Each ethnic group possesses unique traits that guide its collective actions and define its identity. Consequently, ethnography was the ideal method for capturing the distinct and nuanced cultural logic underpinning the Patorani society.

Patorani fishermen have beliefs and convictions that the ritual stages must be carried out seriously, and it is sacred for them to carry it out properly to ensure safety during *assawakung* (fishing) and to avoid the anger of the sea gods. To date, torani fish egg collection operations still use these actions, which are spiritual knowledge inherited from ancestors (Hasriyanti et al., 2016). In the Patorani ritual, mystical and magical elements are syncretized with elements of Islam, including the recitation of mantras during the ritual process, as a form of respect for the marine environment. These magical elements have positive values as guidelines for conserving and managing marine and coastal resources in the concept of sustainable development (Scarano, 2017). Thus, what might be dismissed by outsiders as 'magic' is, in fact, a deeply embedded cultural mechanism for enforcing ecological respect and promoting intergenerational resource stewardship.

When placed in a broader scholarly context, the findings on the *erang pakboya-boyang* system align with and diverge from patterns observed in other indigenous maritime communities, highlighting their unique characteristics. The use of *kasipalli* (taboos) to enforce ritual separation between terrestrial and marine realms resonates strongly with findings on 'tapu' (sacred prohibitions) in Melanesian societies, which also serve to regulate access to marine resources by framing the sea as a sacred domain (Tilot et al., 2021; Tilot et al., 2022). However, the Patorani model is distinct in its highly articulated combination of an explicit moral philosophy (pappasang) with direct communicative practice (Kelong). While many

Traditional Ecological Knowledge (TEK) systems are based on deep ecological observations and adaptive rules (Martin et al., 2010; Tang & Gavin, 2016), the *Patorani* system is uniquely predicated on a continuous, relational negotiation with nonhuman entities, guided by a clear principle of intergenerational equity. This comparison reveals that while the use of cultural rules for sustainable management is a common feature of TEK, Patorani's emphasis on a moral and communicative framework offers a distinct and valuable model (Rexhepi & Bajrami, 2025).

The implications of this research are both practical and theoretical, offering a tangible model of sustainable practices that challenges purely techno-economic approaches to resource management. For policymakers and conservation practitioners, the findings suggest an urgent need to integrate local wisdom, such as the *erang pakboya-boyang* system, into formal co-management strategies that respect cultural and spiritual frameworks. Although these findings are insightful, the limitations of this study must be acknowledged. As this is a qualitative ethnographic study with a small number of participants in a specific location, its findings are not broadly generalizable, nor do they quantitatively measure the ecological impact on fish stocks. These limitations highlight the critical directions for future research. Subsequent studies should conduct quantitative analyses to assess the ecological outcomes of *Patorani* practices as well as comparative studies with other indigenous fishing communities to explore the adaptability of these principles in different contexts.

4. Conclusion

This study concludes that the Erang pakboya-boyang knowledge system functions as a cohesive and effective model for sustainable marine resource management by systematically integrating spiritual beliefs and ecological practices. The theoretical implication of this finding is that enduring conservation frameworks are not merely technical or regulatory, but are fundamentally built upon a community's relational worldview with their environment. The universal meaning of the Patorani case is that it provides a powerful, real-world counternarrative to top-down, purely economic management models, demonstrating that culturally embedded spiritual practices can be a viable pathway for sustainable development. Building on this, future research is essential in two areas: first, quantitative studies to measure the ecological impact of Patorani fishing patterns on fish resources and second, comparative research to understand how the principles of relational management adapt across different maritime cultures.

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AI Use Declaration. e.g The authors used Grammarly: AI Writing App, version 9.89.0 for language editing. The authors reviewed and edited all AI-assisted outputs, and we are fully responsible for their content and any errors.

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