

DISSERTATION OF THE DOCTORAL (Ph.D.)

Human and Nature in Indonesia-Maluku
Heritage to Protect Environment in Luang Island

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ABSTRACT

This dissertation examines the practice of *Hygeralai* as a representation of the Traditional Ecological Knowledge (TEK) system. The study focuses on four primary dimensions — cognitive-linguistic, socio-cultural, historical, and ecological — within the framework of the Multiple Evidence Base (MEB) approach. The research is conducted on Luang Island, a small outer island in Maluku Province, Indonesia, inhabited by a coastal Indigenous community whose livelihood is heavily dependent on marine resources.

The main objective of this research is to analyze how the *Hygeralai* system influences the ecological cognition of the Luang community and their communicative engagement with marine ecosystems. Specifically, the study explores the functioning of traditional institutions within *Hygeralai* practices, the historical development of the system, and its ecological impacts. Additionally, it assesses the community's social-ecological resilience and the transformations resulting from interactions with formal institutions, such as churches and government programs. Methodologically, this study adopts a qualitative ethnographic approach, employing participatory observation, in-depth interviews, and a review of local historical documents. It also integrates Geographic Information Systems (GIS) to spatially map *Hygeralai* areas and analyze patterns of marine resource use. To examine socio-ecological dynamics, the research applies the adaptive renewal cycle and panarchy frameworks, alongside TEK and adaptive co-management approaches, to investigate the interplay between local knowledge, traditional institutional structures, and natural resource management strategies.

The findings indicate that *Hygeralai*, from a cognitive-linguistic perspective, shapes the ecological worldview of the Luang community, as evident in their naming, classification, and navigation of marine areas using local language, idioms, and directional systems based on natural phenomena. This demonstrates the interdependence of language, environment, and cognition in coastal communities. From a socio-cultural perspective, *Hygeralai* functions as a traditional socio-ecological governance system involving customary social structures, including village heads, *luwu* heads, *saniri*, and *marinyo*. These institutions formulate rules, prohibitions, and sanctions, while reinforcing social solidarity and resilience amid ecological disturbances. Historically, *Hygeralai* originates in local cosmology and has undergone significant transformation following the introduction of Protestant Christianity. This transformation

illustrates the system's capacity for adaptive negotiation with external values, resulting in a hybrid environmental governance model that integrates traditional customs with religious institutions. Ecologically, *Hygeralai* contributes significantly to marine sustainability, particularly by conserving populations of high-value species such as Sea cucumbers, *lola* (*Trochus niloticus*), abalone (*Haliotis* spp.), and *bia kima* (*Tridacna gigas*). Nevertheless, the system faces growing pressures from internal dynamics (e.g., shifting cultural values, weakened customary authority) and external forces (e.g., illegal fishing, climate change, marine pollution). Analysis using the adaptive cycle and panarchy frameworks suggests that *Hygeralai* retains the capacity for adaptive transformation in response to these multifaceted challenges.

This research enhances understanding of the role of local knowledge systems such as *Hygeralai* in inclusive and sustainable resource management. The MEB framework promotes epistemic equity between local and scientific knowledge systems, offering a robust theoretical foundation for community-based policy development. Academically, this study contributes to environmental anthropology, TEK study, and socio-ecological systems research, while also informing efforts to integrate Indigenous knowledge into equitable and context-specific management strategies, particularly in the outer islands of Maluku and Indonesia.

ABSZTRAKT

A disszertáció a *Hygeralai* gyakorlatát, mint a hagyományos ökológiai tudás (Traditional Ecological Knowledge-TEK) rendszerének reprezentációs formáját vizsgálja. Az értekezés elsősorban négy dimenzió tanulmányozására-kognitív-nyelvi, szociokulturális, történelmi és ökológiai - összpontosít a többszörözött bizonyítási eljáráson alapuló (Multiple Evidence Base - MEB) megközelítés keretein belül. A kutatást az indonéziai Maluku tartományban található Luang-szigeten, egy kicsi, a szigetvilág külső övezetéhez tartozó szigeten végeztük, és ahol az őslakos tengerparti közösség megélhetése nagymértékben a tengeri erőforrásoktól függ.

A kutatás fő célja annak az elemzése, hogy a *Hygeralai*-rendszer hogyan befolyásolja a Luang közösség ökológiai világképét és a tengeri ökoszisztémákkal kialakult „kommunikatív” kapcsolatukat. Az értekezés a hagyományos intézmények működését kifejezetten a *Hygeralai* gyakorlatokon keresztül belül vizsgálja, tanulmányozva ezáltal a rendszer történeti fejlődését és ökológiai hatásait. Az elemzés emellett vizsgálja a közösség társadalmi-ökológiai rezilienciáját, illetve azokat a változásfolyamatokat, amelyek a formális intézményekkel, például az egyházakkal és a kormányzati programokkal való találkozás következményei.

Módszertanilag a dolgozat kvalitatív etnográfiai megközelítést alkalmaz, részvételi megfigyeléssel, mélyinterjúkkal és a helyi történelmi dokumentumok áttekintésével. A szöveg a Hygeralai területek pontos térbeli meghatározása és a tengeri erőforrások használatának elemzése érdekében a földrajzi információs rendszereket (GIS) is használta. A társadalmi-ökológiai dinamika tanulmányozása érdekében a kutatás az adaptív megújulási ciklus és a panarchia megközelítést alkalmazza a TEK és az adaptív gazdálkodási szempontok mellett azért, hogy feltárja a helyi tudás, a hagyományos intézményi struktúrák és a természeti erőforrásokkal való gazdálkodási stratégiák közötti kölcsönhatást.

Az eredmények azt mutatják, hogy kognitív-nyelvészeti szempontból a *Hygeralai* formálja a Luang közösség ökológiai világképét, ami a tengeri területek elnevezésében, osztályozásában és a térben történő tájékozódási gyakorlatban egyaránt megnyilvánul, és amit a helyi nyelv, az idiómák és a természeti jelenségeken alapuló tájékozódási rendszerek alapoznak meg. Mindez a tengerparti közösségek esetében a nyelv, a természeti környezet és a kognitív megismerési folyamatok kölcsönös függési kapcsolatviszonyait bizonyítja.

Társadalmi-kulturális szempontból a *Hygeralai* hagyományos társadalmi-ökológiai irányítási rendszerként működik, amely felöleli a társadalmi struktúrákat, beleértve a falu vezetését, a *luwu* vezetőt, a *sanirit* és a *marinyót*. Ezek az intézmények szabályokat, tilalmakat és szankciókat érvényesítenek, miközben erősítik a társadalmi szolidaritást és az ellenálló képességet az ökológiai működési zavarok közepette. Történetileg a *Hygeralai* a helyi kozmológiából eredeztethető és a protestáns kereszténységnek a helyi közösségben történő elterjedését követően jelentős átalakuláson ment keresztül. Ez az átalakulás jól szemlélteti a rendszernek a külső hatásokhoz való alkalmazkodási képességét, ami végül egy olyan hibrid környezetvédelmi szabályozási modellt eredményezett, amely integrálja a hagyományos szokásokat a vallási intézmények működésébe. Ökológiai szempontból a *Hygeralai* jelentősen hozzájárul a tengeri élővilág fenntarthatóságához, különösen az olyan értékes fajok populációinak megőrzésével, mint a tengeri uborka, a *lola* (*Trochus niloticus* -tengeri csiga), az abalone (*Haliotis spp.*-tengeri fülcsiga) és a bia kima (*Tridacna gigas*-óriáskagyló). Mindazonáltal a rendszerre egyre nagyobb nyomás nehezedik a belső változásdinamika (pl. változó kulturális értékek, meggyengült szokásjog) és a külső erők (pl. illegális halászat, éghajlatváltozás, tengerszennyezés) miatt. A ciklikus alkalmazkodás és a panarchia keretrendszerének felhasználásával végzett elemzés azt sugallja, hogy a *Hygeralai* megőrizte az alkalmazkodási képességét a fentiekben említett sokrétű kihívásokra adott válaszként.

A disszertáció alapjául szolgáló kutatás elősegíti az olyan helyi tudásrendszerek, mint a *Hygeralai*, szerepének megértését a befogadó és fenntartható erőforrás-gazdálkodásban. A MEB elemzési keretrendszer elősegíti a helyi és a tudományos tudás közötti episztemiológiai egyensúly elismerését és szilárd elméleti alapot nyújt a közösségi szempontú szakpolitika-fejlesztéshez. Tudományos szempontból az értekezés hozzájárul a környezeti antropológiához, a TEK „tudomány” és a társadalmi-ökológiai rendszerek kutatásához, miközben az őslakosok tudásának a méltányos és kontextus-specifikus gazdálkodási stratégiákba való integrálására irányuló erőfeszítéseket is támogatja, különösen Maluku és Indonézia külső szigeteinek vonatkozásában.

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CHAPTER I : INTRODUCTION

1.1. Research Overview

Human life is highly dependent on biodiversity and ecosystem services that support food security, availability of clean water, climate stability, and overall environmental health. However, in recent decades, the global biodiversity crisis has continued to worsen. The Global Assessment Report on Biodiversity and Ecosystem Services, published by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), revealed that more than one million species are threatened with extinction in the near future (IPBES, 2019). Habitat loss due to land conversion, urbanization, deforestation, and ecosystem degradation constitutes the primary cause of these threats. This threat is further exacerbated by additional factors such as climate change, overexploitation of natural resources, pollution, and the spread of invasive species, as highlighted in the Thematic Assessment on Invasive Alien Species and Their Control, also released by IPBES (Helen et al., 2023).

Furthermore, this condition is inextricably linked to the climate crisis, which has been extensively examined by the Intergovernmental Panel on Climate Change (IPCC). In various recent IPCC reports, global warming is identified as a major threat to ecosystem stability and human well-being. These ecological pressures are exacerbated by rapid population growth (Emerton, 2020; IPCC, 2023), urgent economic demands (Castronuovo, 2024), as well as large-scale exploitation of natural resources, both on land and in the ocean (Raihan, 2024), alongside levels of pollution resulting from industrialization, which also contribute significantly to environmental degradation. One of the underlying root causes of this crisis is the dominance of an anthropocentric worldview—a paradigm that places humans at the centres of the planetary system (Steffen et al., 2011; Moran, 2017). Indeed, humans are not the only actors on Earth, but rather a part of an interconnected system of life (Capra, 1984; Tiberius, 2008; Di Paola, 2024). Therefore, a paradigm shift toward an ecological ethics approach is necessary—one that demands humans to demonstrate moral

responsibility in the management of natural resources and the environment (Dearing et al., 2015).

In response to this crisis, the IPBES report calls for urgent action through structural policy changes, the implementation of sustainable economic principles, and the recognition of traditional ecological knowledge in biodiversity management. Governments across various countries and the private sector have begun to respond by developing strategies that integrate sustainability principles. Long before the emergence of formal policies, indigenous communities around the world have developed local practices that have proven effective in maintaining ecosystems. Traditional values, such as the ancient Indonesian proverb "*di mana kaki menyentuh bumi, di sanalah langit dijunjung*" (where the feet touch the earth, there the sky is upheld), reflect a way of life harmonized with the environment. This refers to the global ecological principle expressed in the saying "When in Rome, do as the Romans do". Both proverbs emphasize the importance of adaptation, respect for nature, and the application of local ethics in human interactions with the environment.

It is important to emphasize that many communities who directly depend on natural resources for their livelihoods have developed informal regulatory systems in the form of social norms and customary rules rooted in their local culture. This framework functions as a collective self-regulatory mechanism for the responsible exploitation and management of natural resources.

The emergence of these informal institutions represents a significant response arising from deep ecological understanding and first-hand experiences of declining quality and availability of natural resources. This phenomenon aligns with the resource depletion crisis model proposed by Berkes and Turner within the Social-Ecological Systems (SES) framework, which emphasizes that excessive pressure on natural resources, can lead to depletion, ultimately resulting in both ecological and social crises. The model illustrates the complex dynamics of human–environment interactions, particularly in the context of overexploitation (Berkes & Turner, 2006). As a historical example, the community regulation system of the Székely in Hungary, which was in place from the 15th to the 19th century, demonstrates a form of social adaptation through restrictions on the use of communal resources, aimed at ensuring intergenerational sustainability (Molnár et al., 2015).

Furthermore, many indigenous communities whose livelihoods depend on natural resources—particularly marine ecosystems actively participate in the management of these resources and the environment based on traditional knowledge systems. Such practices are evident across various regions and localities, including villages Sasa (Fong, 1994), Solomon Islands and Vanuatu (Johannes, 1998), New Zealand (Ballantine, 1999) , Brazil (Anaya & Espírito-Santo, 2018) , Oceania (Aswani Canela, 2011) , dan Indonesia (Brouwer, A., 1996; Harkes., 2000; Bagir et al., 2021). Although the population of indigenous communities accounts for only about 6% of the global human population, these communities manage or have tenure over approximately 25% of the world's land surface, encompassing a significant proportion of remaining intact ecosystems and biodiversity hotspots (World Bank Group, 2023). They actively participate in and bear responsibility for conserving approximately 80% of the Earth's biodiversity.

According to data from World Population Review (WPR) as of April 2024, Indonesia's population is recorded at 279,390,258 people, making it one of the world's largest island nations in terms of population. Geographically, Indonesia is divided into 38 provinces, including eight provinces whose entire territories consist of islands. The country is renowned for its high ethnic and cultural diversity, with approximately 1,340 ethnic groups and 718 regional languages spoken across the archipelago. Around 70% of Indonesia's territory is maritime waters, while the remaining 30% is land area. Consequently, a significant portion of the world's marine species can be found in Indonesian waters (Randall, 1998; Roberts et al., 2002). Indonesia is home to more than 17,500 islands, including 111 outermost small islands. (Joseph, 2023; Kementerian Kelautan dan Perikanan Republik Indonesia, 2017; Kementerian Koordinator Bidang Kemaritiman dan Investasi Republik Indonesia, 2020), and shares borders with ten countries, both on land and at sea. Outermost small islands ¹

¹ Outermost small islands (Pulau-Pulau Kecil Terluar / PPKT) are a vital part of the sovereign territory of the Republic of Indonesia and hold strategic significance in terms of geopolitics, national defense, and natural resource management. According to Presidential Regulation No. 78 of 2005 , outermost small islands are defined as "small islands located in border areas and/or at the outermost parts of the Unitary State of Indonesia that directly border other countries."

This definition underscores their critical role not only in demarcating national boundaries but also in reinforcing Indonesia's maritime jurisdiction and geopolitical presence in the region.

Defined as islands with an area not exceeding 10,000 km² (Bakosurtanal, 2007; Hastuti et al., 2007; Pemerintah Republik Indonesia, 2017). These islands have base point coordinates that form part of the archipelagic baseline, as stipulated within the framework of international law (United Nations Oceans and Law of the Sea, 1982; St. Korowicz, 1986) even national (Hamzah, 1984; Arsana, 2007; Kapur, 2019). In the context of national policy, these areas are categorized as Certain National Strategic Areas (*Kawasan Strategis Nasional Tertentu* / KSNT) regions that hold strategic significance in terms of state sovereignty, environmental management, and the preservation of world heritage sites. As such, their development is prioritized to support the national interests of the Republic of Indonesia (Sprintall, 2009; Hendrapati, 2014; Hall, 2019; Marewa & Parinussa, 2020; Widiyanta, 2020). In this regard, the governance of marine resources in Indonesia remains predominantly guided by formal approaches rooted in modern science, which continues to shape conservation policies and interventions. While these approaches provide a strong technical framework, they often overlook indigenous knowledge systems that have long been practiced by coastal and indigenous communities as part of sustainability strategies grounded in lived experiences. In fact, in many island regions such as Maluku, local practices like *Hygeralai* have proven to play a crucial role in collectively regulating access, harvesting seasons, and the protection of sensitive marine zones. (Sukuryadi, 2023).

The sea plays a highly significant and multidimensional role in the lives of Indonesia's coastal communities. As the world's largest archipelagic nation, comprising more than 17,000 islands, Indonesia possesses a coastline stretching over

Lain atau high seas." This definition emphasizes the critical role of outermost small islands (*Pulau-Pulau Kecil Terluar* / PPKT) as markers of national sovereignty boundaries, as well as reference points in determining the archipelagic baseline for the delimitation of Indonesia's maritime zones, in accordance with international maritime law. Generally, the category of "small islands" refers to islands with an area of less than or equal to 10,000 km², as stipulated under Law No. 27 of 2007 concerning the Management of Coastal Areas and Small Islands, as amended by Law No. 1 of 2014. In this context, outermost small islands such as Luang Island serve not only as territorial assets and strategic defense outposts for the state but also as living spaces for coastal and indigenous communities who maintain local resource management systems rooted in traditional ecological knowledge, such as the *Hygeralai* practice. Although the governance of PPKT is legally under state authority, the presence of indigenous communities and their culturally-based management systems highlights the importance of an integrative approach that recognizes and incorporates local participation in safeguarding Indonesia's frontier territories.

95,000 kilometers and is endowed with abundant marine resources—ranging from rich biodiversity and fisheries potential to profound cultural and economic significance for local populations. In many coastal regions, particularly in archipelagic areas such as Maluku, the sea is more than just a source of food and livelihood. For Indonesia's coastal communities, the sea constitutes a living space — not merely a place to earn a living, but also the domain in which collective identities are born and developed. Activities such as fishing, collecting shellfish and Sea cucumbers, and cultivating seaweed are integral parts of daily life, carried out using knowledge passed down through generations. In Maluku, known as the "archipelago province" with more than 1,300 islands, the sea serves as a connecting route between islands, a source of both subsistence and commercial livelihoods, and a rich cultural and ritual space. Indigenous communities in Maluku, such as those on *Luang Island*, *Seram*, *Kei*, and *Tanimbar*, possess ecological knowledge systems embodied in local practices like *Sasi*, *Hawear*, and *Hygeralai* customary prohibitions based on seasons, zones, and spiritual values that regulate the collective and sustainable use of marine resources.

This phenomenon aligns with the paradigm of contemporary environmental anthropology, which holds that the relationship between humans and the environment cannot be separated from its social, cultural, and symbolic contexts. Within this framework, communities are not merely resource users, but integral components of complex and dynamic socio-ecological systems.

As explained by Berkes, Folke, and Gadgil (1995), traditional ecological knowledge such as that possessed by indigenous communities is a manifestation of cultural resilience and ecological adaptation to environmental change. This approach also recognizes that local practices have the capacity to shape ecological sustainability, not only through technological means, but also through embedded values, beliefs, and social structures within the community (Sukuryadi, 2023).

Luang Island is one of the indigenous communities included in the list of Indonesia's 111 outermost islands. Located near the border with Timor-Leste to the west and directly adjacent to Australia to the south, the island lies at the geographic

coordinates of 8°20'36.78" S and 128°30'32.06" E (Figure 1). The native population residing in the coastal areas of this island possesses deep traditional ecological knowledge and valuable skills in managing natural resources and the surrounding environment. These practices have been in place long before the emergence of global awareness or formal policies from the Indonesian government regarding sustainable resource.

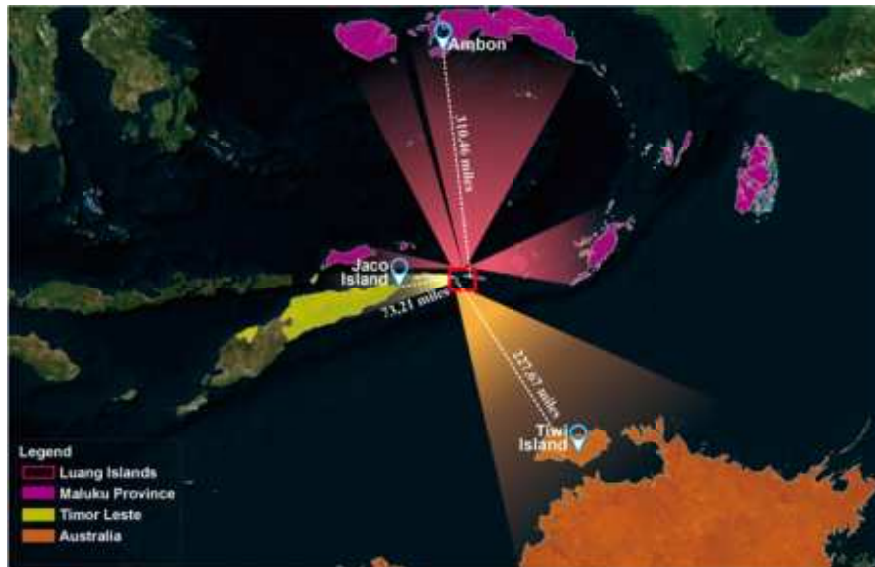


Figure 1: Map of Luang Island indicating that it is one of Indonesia's outermost small islands



Figure 2: Border monument between Indonesia and Australia located on Metiamarang Island

Hygeralai is a local knowledge system of the Luang community, consisting of a set of principles, norms, and resource management strategies oriented toward the sustainable use and conservation of both natural resources and the environment. As a local institution, *Hygeralai* regulates the utilization of natural resources through a codified set of rules and practices that have become deeply internalized within the community's daily life. This system is specifically applied to marine resource management, which, in the context of *Luang Island*, is understood as communal property resources provided by nature and collectively owned by the community.

In the *Hygeralai* system, the principle of communal or collective ownership is a prominent feature, as marine resource management is based on customary rights and regulations shaped by local cultural values, including traditional tenure systems. In addition, the social structure of the community including positions, roles, and caste backgrounds plays a crucial role in determining the distribution of authority and responsibilities within this traditional institution. Therefore, *Hygeralai* functions not only as an ecological management mechanism but also reflects an organized customary-based social order within the life of the *Luang Island* community.

The rules within the *Hygeralai* system are unwritten and rooted in conventions passed down through generations. On *Luang Island*, this system serves as the foundation for marine resource governance, guided by locally recognized principles accepted by the community. One of its key applications is the regulation of harvesting periods for *nyawi* (*Sea cucumbers*), which is restricted through a rotational open-close system applicable across all shallow water areas of the island. Under certain circumstances, such as urgent community needs for instance, to support religious events or village affairs these rules may be adjusted, allowing harvesting to begin earlier than originally stipulated.

Within the *Hygeralai* system, various provisions regarding rights and responsibilities govern the decision-making process, dissemination of information, and enforcement mechanisms. These include rituals accompanying the practice, communication media used to convey regulations, the right to sell marine products, the parties involved as participants, and sanctions imposed on rule violators. Furthermore, the rules also specify the types of fishing gear permitted during harvesting activities

Research on environmental and marine resource governance by indigenous communities on *Luang Island* remains extremely limited. This scarcity is largely due to geographical constraints *Luang Island's* remote location and limited transportation access which has resulted in a lack of systematically documented information. Most existing studies have focused broadly on fisheries, such as marine ecosystem surveys, species inventories, and political issues related to border defense and national security.

The most recent study specifically addressing marine resource management on *Luang Island* was conducted by Pannell in 1997, with a primary focus on economic and political aspects. In his research, Pannell analysed several key issues, including the origin of the term *Hygeralai* and the role of local actors in organizing the system. However, it was observed that Pannell primarily used the term *Sasi* a customary practice terminology originating from other regions of Maluku to refer to the local resource management practices. Notably, *Sasi* is not a term native to *Luang Island* itself, but rather one borrowed from external cultural contexts.

From the perspective of contemporary environmental anthropology, it is essential to understand that natural resource management systems are deeply contextual and cannot be separated from the social, cultural, historical, and geographical dynamics of the local community. For instance, *Luang Island* possesses a unique historical background that underpins the emergence of *Hygeralai* a community-based marine resource management system rooted in long-term ecological experiences. The island's social structure and traditional governance system also exhibit significant differences when compared to other regions in Maluku, as do its geographical conditions and the characteristics of its marine resources. These variations reflect how each indigenous community develops distinct approaches to respond to their environment and shape socio-ecological institutions that align with local needs and realities.

In general, the foundational principles of customary-based resource management systems around the world do exhibit certain similarities, such as the establishment of no-take zones, seasonal restrictions, and access rights regulation. However, the underlying rationales for implementing these principles are heavily shaped by local contexts. Diverse cultural values, social norms, ecological

experiences, and societal structures give rise to distinct management practices that, while appearing similar on the surface, often differ fundamentally in meaning, mechanism, and purpose.

Therefore, contemporary environmental anthropology emphasizes the importance of recognizing local diversity as a key to comprehensively and equitably understanding indigenous sustainability practices. Unfortunately, in several external studies, there remains a tendency to generalize local practices across Maluku such as the widespread use of the term *Sasi* to represent all forms of traditional resource management. Such homogenizing approaches overlook local complexity and risk reducing indigenous knowledge to a single framework that fails to reflect the actual socio-ecological realities experienced by communities like those on *Luang Island*.

Furthermore, *Hygeralai* can be understood as both an integrative framework and a regulatory instrument that guides collective action toward sustainable marine resource management within a complex social-ecological system (SES). According to Merriam-Webster (2004), a SES is defined as an ecological system intricately linked and interacting with one or more social systems. As a living customary practice within the community of *Luang Island*, *Hygeralai* can be more deeply understood through the lens of traditional ecological knowledge (TEK) and the SES framework.

From a TEK perspective, as articulated by Berkes, traditional ecological knowledge is the result of accumulated knowledge, practices, and belief systems developed through long-term adaptation to both environment and culture, and transmitted across generations by indigenous and local communities. In this sense, *Hygeralai* represents not only a set of rules governing resource use, but also a dynamic body of knowledge embedded within the islanders' lived experiences and their reciprocal relationship with the marine environment (Berkes, 2017).

This is further emphasized by Colding and Folke, who state that local knowledge systems reflect communities' understanding of ecological cycles, seasons, and the relationship between humans and nature (Colding & Folke, 2001). In addition, Molnár and Babai emphasize that TEK also encompasses the restoration and sustainable monitoring of natural resources and biodiversity (Zsolt & Babai, 2021). *Hygeralai* is not merely normative and ritualistic in nature, but also serves as a local

mechanism for natural resource management, particularly marine ecosystems such as Sea cucumbers (teripang) and other marine resources.

Meanwhile, Ostrom emphasizes the integration of social structures, traditional institutions, and local ecological dynamics as integral elements within a broader social-ecological system (SES), highlighting the interplay between governance systems and environmental sustainability (Ostrom, 2009). *Hygeralai*, as part of a social-ecological system, also reflects the SES framework developed by Ostrom. Practices such as *Hygeralai* meet the criteria of a complex system involving interactions between actors (local communities), resources (marine ecosystems and fishery products), governance structures (customary rules and prohibitions), and the biophysical environment (the waters surrounding *Luang Island*). Furthermore, this informal institution includes monitoring mechanisms, social sanctions, and the capacity to adapt to seasonal changes or external pressures all of which enhance the resilience of the system (Bennet, 1976).

This informal institution also includes monitoring mechanisms, social sanctions, and adaptive capacities in response to seasonal changes or external pressures all of which contribute to the resilience of the system. Thus, *Hygeralai* can be categorized as a form of TEK and simultaneously as part of a local SES in the management of marine resources and ecosystems, while also preserving the cultural identity of the Luang community. This perspective helps explain why customary practices like *Hygeralai* remain significant not only as cultural traditions, but also as relevant resource management strategies in contemporary environmental governance.

Within this framework, TEK is viewed as the accumulated result of local communities' experiences and observations, passed down through generations. It reflects an in-depth understanding of ecosystems, natural cycles, and sustainable resource management strategies. TEK also encompasses spiritual, ethical, and social values that shape a community's worldview and relationship with nature. Therefore, examining TEK within the context of environmental anthropology allows for a deeper understanding of human adaptation dynamics in relation to the environment, as well as the importance of preserving indigenous knowledge in efforts to conserve ecosystems and maintain the cultural resilience of local communities.

TEK is an integral component of environmental anthropology, as both fields examine the relationship between humans and their environment within social and cultural contexts. Environmental anthropology, as articulated by Julian Steward through his cultural ecology theory, emphasizes that human adaptation to the environment is a process of cultural evolution shaped by ecological conditions and available technologies. Steward argued that while the natural environment imposes certain constraints, human culture actively determines how people adapt to these conditions making TEK not only a repository of ecological insight, but also a dynamic expression of cultural resilience and environmental stewardship (Steward, 1990).

This approach is further expanded by Roy Rappaport, who emphasizes the importance of symbolic systems and rituals in regulating ecological relationships. He demonstrates that resource management is often carried out through social structures and belief systems, highlighting how cultural practices particularly religious and ritualistic elements play a central role in maintaining ecological balance and ensuring sustainable interactions between humans and their environment (Rappaport, 1968b). John Bennett adds the perspective that culture is inherently flexible and emphasizes the crucial role of human agency in responding to ecological change. He introduces the idea that humans are not merely passive recipients of environmental forces, but active agents who make strategic choices in adapting to their surroundings. This view underscores the capacity of communities to innovate, modify practices, and reshape cultural norms in response to shifting ecological conditions highlighting the dynamic interplay between culture and environment (Bennet, 1976). Emilio Moran also emphasizes that the interaction between humans and the environment is dynamic and complex, requiring a multidisciplinary approach that integrates ecology, anthropology, geography, and other social sciences. His work highlights the need to understand environmental change through both biophysical processes and human dimensions including cultural practices, economic behaviors, and social institutions to develop comprehensive insights into sustainable resource management and human adaptation strategies (Moran, 2017).

Based on the previous discussion, this study aims not only to analyze *Hygeralai* as an expression of local culture, but more deeply to position it as a traditional

ecological knowledge system that holds epistemological and practical value within the context of marine resource conservation.

Drawing on the Multiple Evidence Base (MEB) framework developed by Tengö, it is important to recognize that local knowledge systems must be respected in their own right, without being subordinated to formal scientific knowledge. Instead, they should be validated through their own internal mechanisms a process referred to as parallel validation. This approach emphasizes the coexistence of different knowledge systems on equal footing, allowing for a more inclusive, pluralistic, and contextually grounded understanding of environmental management and conservation (Tengö et al., 2014, 2017). This principle is further reinforced in the IPBES Global Assessment Report (2019), which emphasizes the importance of epistemic pluralism in the production and integration of knowledge. Within this framework, *Hygeralai* as a form of TEK is not treated as a lesser or subordinate form of knowledge that must be validated through scientific methodologies. Instead, it is recognized as legitimate and contextually grounded knowledge that can directly contribute to the formulation of more equitable, inclusive, and sustainable marine resource management policies. Thus, *Hygeralai* represents one of many equivalent evidence systems alongside modern science, offering valuable insights for understanding, interpreting, and managing the relationship between humans and their natural environment.

1.2. Problem Statement

Given that the MEB framework encompasses a broad spectrum of knowledge systems and epistemological approaches, this study focuses its analysis on four key indicators that are central to the framework: (1) Integrity of local knowledge systems, (2) Ecological contextualization, (3) Social and ecological sustainability and, (4) Reciliensi-social ecologys. To address the first indicator the integrity of local knowledge systems *Hygeralai* is analysed through cognitive-linguistic, socio-cultural, and historical approaches. These dimensions form the foundation of the holistic ecological knowledge system embedded in the customary life of the local community.

For the second, third indicators ecological contextualization and social-ecological sustainability and reciliensi-social ecologys this study conducts an in-

depth exploration of the ecological impacts of *Hygeralai* on the marine ecosystems of *Luang Island*. This includes examining how the practice influences resource regeneration, biodiversity conservation, and community resilience over time. To provide further clarity, this research includes a mapping of *Hygeralai* against the MEB indicators, along with justifications for each alignment, presented in tabular form. This table serves as a structured analytical tool to demonstrate how *Hygeralai* functions as a legitimate and contextually grounded evidence system within the broader framework of integrated knowledge production for environmental governance (Table 1).

Table 1: Mapping of *Hygeralai* against MEB Indicators

Epistemic <i>Hygeralai</i> Aspect	MEB relevant Indicator	Description
Cognitive (Cosmology, community's thought structure, understanding of the sea, natural signs, seasonal cycles)	1.Integrity of local knowledge systems 2.Ecological contextualization	The local cognitive system encompasses the cosmological worldview of the Luang community, which forms the foundational logic behind <i>Hygeralai</i> as an ecological governance practice. It includes localized knowledge of marine environments and organisms, as well as the ways in which human interactions with the sea are rhythmically structured through customary practices.
Linguistic (Terms related to <i>Hygeralai</i> , qoloquil , traditional idioms, and poetry of the Luang community) used in everyday communication as well as in specific ceremonial events.	1. Integrity of local knowledge systems 2.Intergenerational transmission	Indigenous languages embody ecological classifications and structured knowledge systems. Traditional terminology encapsulates ecological and social meanings that often resist full translation into scientific discourse, reflecting context-specific

		understandings that are deeply embedded in local worldviews and practices.
Socio-Cultural (Roles of Customary Institutions, Rituals, Rules, Traditional Governance Structures, and Deliberative Practices)	1. Integrity of local knowledge systems 2. Socio-ecological sustainability	Cultural values and customary norms are the primary regulators of the <i>Hygeralai</i> system. Knowledge is enacted through social institutions and collective rituals, serving to maintain both ecological balance and social cohesion.
Historical (Origins of the Rules, Evolution of Practices, Ancestral Narratives, and Community Memory)	1. Integrity of local knowledge systems 2. Intergenerational transmission	Historical elements provide legitimacy to customary practices. Ancestral narratives and local histories strengthen the position of indigenous knowledge in dialogue and co-production with external actors (scientists, government).
Impact on the Marine Ecosystem of <i>Luang Island</i>	1. Ecological contextualization 2. Social and ecological sustainability 3. Reciliensi-social ecologys	On <i>Luang Island</i> , the <i>Hygeralai</i> practice restricts harvesting periods and access to marine zones, allowing for the recovery of both targeted and co-harvested marine resource stocks during closure periods. This enhances ecosystem resilience and naturally maintains biodiversity through customary prohibition systems. <i>Hygeralai</i> as a social ecology system. In addition, resilience, adaptation, and transformation derived from <i>Hygeralai</i> will also be discussed as sub-sections within this chapter

Source: Researcher, 2025.
Based on the MEB framework by Tengö et al. (Tengö et al., 2014).

As a complementary argument, it is important to note that the only prior study explicitly addressing *Hygeralai* is Pannell's research from 2007. That study examined *Hygeralai* from a political economy perspective, focusing on power structures, access to resources, and the dynamics of marine resource distribution within local social relations. The methodological approach differed significantly from the cultural-ecological framework adopted in this study, as it emphasized macro-policy analysis rather than the dimension of local ecological knowledge.

Therefore, this current research offers a complementary perspective by exploring the epistemological, cognitive, and ecological dimensions of *Hygeralai*, situated within the framework of epistemic pluralism proposed by the MEB approach. Nevertheless, Pannell's study also has an important limitation: a tendency to generalize local contexts. Although the research was conducted on *Luang Island*, Pannell did not use the local term *Hygeralai*, instead adopting the more widely used Maluku regional term *Sasi*. This reflects a neglect of local specificity and terminological variation, which often carry distinct ecological and social meanings within the local community.

This study aims to contribute contextually by explicitly highlighting the terminology, practices, and institutional structures unique to *Luang Island*, in order to acknowledge and recognize epistemic diversity at the community level. Based on the above discussion, the central focus of this research is to analyse the extent of the Luang community's engagement in the management of their natural resources and environment through the practice of *Hygeralai*.

This dissertation examines four key factors influencing the functionality of *Hygeralai*, aiming to identify its significant contributions to the Luang community's capacity in managing natural resources and the environment. The analytical focus includes:

1. Cognitive and linguistic factors that shape the community's understanding and expression of *Hygeralai*;
2. Socio-cultural factors that influence the practice and preservation of the system in daily life;

3. Historical factors underlying the emergence and development of *Hygeralai* within the Luang society;
4. Determinant factors affecting the effectiveness of *Hygeralai* in maintaining marine resource sustainability and ecosystem conservation;

In the following sections, each identified condition is transformed into an analytical unit, serving as a foundational basis for conducting this study.

1.3. Aims and Research Questions

This study aims to investigate five research questions (RQs) that are closely linked to the five key factors outlined in Section 1.2. Given the complexity of the topic and drawing from Pannell's (1997) earlier study which examined *Hygeralai* from a political and economic perspective it has been established that this practice is governed by customary institutions with full authority and has significant implications for the local community's socio-economic conditions. Building upon this foundation, the present research seeks to expand the exploration of *Hygeralai* into broader and more comprehensive dimensions

Accordingly, this study is designed to conduct a more thorough and multidimensional analysis of *Hygeralai*, incorporating cognitive linguistic and historical, socio-cultural, ecological, aspects. The research falls under the category of basic or fundamental research, with the primary objective of identifying and analyzing the four research questions derived from the core issues discussed in Section 1.1. Each of these questions carries its own relevance and significance within the framework of this study. Based on the issues and context previously outlined, the following research questions are formulated:

RQ1: How does *Hygeralai* affect cognitive and linguistic aspects of Luang islanders?

Language has a vital role in ethnographic studies. That language serves as a means of encoding the environment. Hence, in order to comprehend it, we must

analyze the language employed by the population being examined. The focus of this study is on the everyday language used to describe various aspects of the natural environment. In this context, the statement "language is culture" is fitting. Order to address this particular topic, our attention will be directed towards the colloquial language commonly employed by the Luang community, along with their idiomatic expressions and oral poetic traditions. This approach makes possible allows for the collection of relevant information for ecological research, which can then be used to develop culturally suitable responses within specific ecological circumstances that align with the features of the Luang Island people.

Furthermore, the analysis of the language usage allows us to capture and understand the cognitive dynamics of the indigenous people of Luang Island, based on their experiences and interactions with their environment. To comprehend this, one must examine the cognitive processes that allow individuals from the Luang people to establish connections, evaluate and analyze events, and then acquire knowledge. As the Luang people establish relationships with their maritime environment, this sequence creates a recurring pattern in their cognitive dimension. The main objective of this section is to focus on the mapping of marine areas and their ownership. Specifically, we will examine the entry to Luang Island, the borders between deep and shallow waters, marine areas that are dominated by marine biota, as well as the sacred and hot spots in both shallow and deep sea regions. Their proficiency in marine biology and astronomy is also demonstrated.

RQ2: To what extent does *Hygeralai* work in social-cultural live of Luang islanders?

To address social-cultural aspects, the focus is on the Luang island people's traditional social structure, the government organization system, and the subject's participation in the *Hygeralai* period (open and closed). Furthermore, sanctions enforced on members of the community or outsiders who commit violations during the *Hygeralai* time must be documented. This section also raises concerns about *Hygeralai's* role as a form of social security for Luang people. Meanwhile, to better

understand the cultural aspect, an investigation will be conducted, beginning with the village government's preparatory activities before the *Hygeralai* is lifted (pre-*Hygeralai*) and ending with a series of customs that use media as a sign in their implementation.

RQ3: What historical factors contributed to the rise of a local social movement against the implementation of *Hygeralai*?

This section focuses on the origins of the *Hygeralai* practice in *Luang Island*, tracing its etymology and conceptual development. A historical approach is closely tied to the socio-cultural dimensions of the local community, as the island's historical trajectory has played a crucial role in shaping the social and cultural structures that persist today. One significant factor in this dynamic has been the introduction of Protestant Christianity, which influenced communal values, social order, and the integration of new religious beliefs with customary practices including those embedded within the *Hygeralai* framework.

To achieve a comprehensive understanding of the term and concept of *Hygeralai*, it is essential to examine the historical context of the *Luang* community, including how they experienced cultural transformations due to religious missionary influences. As part of a contextualization and comparative effort, an examination of other local terms and systems related to marine resource management across the Maluku region is also necessary. This allows for the identification of distinctions and unique characteristics of each practice. Consequently, this section not only highlights the distinctiveness of *Hygeralai* within *Luang Island* but also illustrates its resilience and continuity into the present day.

RQ4: To what extent does *Hygeralai* impact the ecosystem of *Luang Island*'s marine environment, how the dynamic of *Hygeralai* in SES and adaptive?

To address this section, we conducted an investigation into the impact of Hygeralai on the marine ecosystem of Luang Island. This research involved an analysis of Hygeralai's role as a system of traditional ecological knowledge (TEK) in the sustainable management of coastal and marine resources. Furthermore, we identified and examined various factors influencing the effectiveness and sustainability of *Hygeralai* internal factors such as shifts in social values, the weakening of customary authority, and changing community behaviors; and external factors such as the introduction of Protestant Christianity, illegal fishing by outsiders, and the ecological impacts of climate change and marine pollution. This analysis forms the basis for understanding the socio-ecological dynamics of *Hygeralai* within the framework of the Adaptive Renewal Cycle and Panarchy, and for assessing the system's capacity to respond to pressures and transform adaptively.

1.4. Relevance of The Research

By conducting an in-depth study of *Hygeralai* as part of Traditional Ecological Knowledge (TEK) which is focused on cognitive-linguistic, socio-cultural, historical, and ecological aspects this dissertation positions itself to answer various crucial issues in local-based natural resource management. This comprehensive approach to the social-ecological context is also clear evidence of the application of the MEB approach, in which local knowledge is recognised as a legitimate, equal and complementary source of information with scientific knowledge. By integrating local knowledge systems into academic analyses and natural resource governance, this research reinforces a fundamental principle of MEB, namely that diverse forms of knowledge can be combined collaboratively to address social-ecological challenges in a sustainable, inclusive and contextualised manner. This approach enables research contributions not only at the community level in practical dimensions, but also in the development of theoretical frameworks and scientific understanding in the fields of environmental anthropology and traditional ecological knowledge (TEK). As such, this dissertation offers an important foundation for the integration of local knowledge into more equitable and sustainable natural resource management policies and practices.

1.4.1 Practical Relevance

The findings of this research on *Hygeralai* hold strategic relevance for Indonesia and can serve as a foundation for formulating government policies in the fisheries and marine sectors. First, *Hygeralai* is a marine resource management system rooted in TEK that has been practiced across generations. Its success in managing and utilizing natural resources, preserving marine ecosystems, and regulating access by the Luang community demonstrates that local mechanisms can function as adaptive, low-cost, and sustainable management solutions. Second, *Hygeralai* supports the principles of community-based resource management, emphasizing the importance of active community participation in coastal governance. As such, this practice holds potential as a pilot model for developing inclusive and community-oriented national policies. Third, given the vast number of small islands scattered across Indonesia's archipelago, the country faces significant challenges in effectively reaching and managing all coastal areas. This study reveals that local communities possess strong traditional institutional capacities for autonomous local governance. Recognizing systems such as *Hygeralai* can contribute to strengthening national socio-ecological resilience. Fourth, the practice aligns with the direction of blue economy-based marine development policies, which emphasize ecological sustainability and social equity.

Finally, the research provides a crucial basis for reinforcing legal aspects through the recognition of customary systems within national regulations such as their formalization in Regional Regulations (Peraturan Daerah / Perda), the development of community-based conservation areas, and integration into zoning plans for coastal and small island regions. In conclusion, *Hygeralai* is not only a cultural heritage but also a traditional ecological knowledge and a SES as well as one of the evidences within the Multiple Evidence Base for achieving sustainable marine development in Indonesia.

1.4.2 Theoretical Relevance

The findings of this study can serve as valuable material for anthropological research, particularly in the field of environmental ecosystem, both in marine and terrestrial environments. The findings of this study can serve as a valuable resource for future research on the topic of resilience in environmental management, specifically in relation to the ability to adapt and transform using local knowledge. The aim of this research is for it to serve as an educational tool for studying Indonesian Natural Resource Management subject.

1.5. Urgency of the Research

Luang Island serves as a recently established hub for fish production, aimed at supporting the Indonesian government's initiative. China is the only country that exports more fish than Indonesia, making Indonesia the second largest fish exporter globally. Luang Island is positioned in the epicenter of marine biodiversity, which is next to the Banda Sea. It is known for having the second largest coral reef area in Indonesia (Pannell, 1997). based on the ecology survei by the WWF tahun 2015 the rate of degradation of coral reefs on Luang Island is 0% seagrass. (Estradivari et al., 2015, 2016; Marine and Fisheries Service of Maluku Province, 2021), which is far lower than other regions in Indonesia. Additionally, the island has an enormous amount of seagrass (Wagey & Z, 2008; Soleman & Noer, 2017; Tamami & Siswanto, 2021).

The presence of global climate threats and world economic and geostrategic challenges pose a significant risk to the marine environment, marine natural resources, as well as the people and culture of Luang Island. Sea's acidification is an important element that greatly influences and can cause bleaching of coral reefs around the Luang Island Sea in the future. Coral reefs in the waters of Luang Island serve as habitats and sources of nourishment for marine species. Coral bleaching may hinder the proliferation of marine organisms that inhabit it. Microscopic organisms and small organisms face challenges in their survival and are susceptible to disease, leading to a decline in their population. Gradually, the coral reef species will go extinct, causing disruption to the ecosystem in the waters of Luang Island.

Seawater acidity can also damage shelled organisms, including molluscs and seashells, in addition to coral reefs. The corrosive properties of acid may prevent the growth of shells in shelled organisms, such as the *Tridacna gigas*, which is abundant in the marine waters of Luang Island and is one of the marine organisms attracted to the *Hygeralai*. Seawater acidification can potentially disturb the biodiversity in the marine waters of Luang Island. The extensive seagrass beds in the waters surrounding Luang Island provide significant benefits as a food source for plankton and small fish (Cullen-Unsworth et al., 2014; De La Torre-Castro et al., 2014; Unsworth et al., 2014). The socio-economic and cultural conditions of the indigenous people of Luang Island may be negatively impacted by ocean acidification. Additionally, the marine fish trade commodity may experience a decrease as a result. The population of species such as oysters, mussels, sea urchins, and marine fish will decline. In the future, the people of Luang Island will encounter challenges in acquiring marine resources.

However, despite the constitutional protection provided to indigenous peoples in Indonesia, as stated in Article 18B paragraph 2 of the 1945 Constitution, Article 33, and Law Number 27 of 2007 on coastal areas, development programmes in Indonesia frequently neglect the rights, culture, and natural environment of indigenous peoples. This phenomenon can be seen in the implementation of government initiatives, such as the transmigration project, which affects the hierarchy of indigenous peoples' rights, particularly in Maluku. Government projects aimed at coastal indigenous people sometimes lack effective targeting. The over utilisation of natural resources, specifically due to fish thievery by foreign and Indonesian vessels in the waters of Luang Island, along with the use of explosive methods like as bombs, potash, and borax by local fisherman known as *andong*, poses a significant threat to the ecosystem and the well-being of the people of Luang island (Berita Maluku, 2016; Salampessy, 2016).

Therefore, the management of natural resources and marine environmental conservation in Luang Island is a collective responsibility that requires the integration of local wisdom and policies across multiple sectors. The ecological complexity of this region calls for a collaborative approach that combines indigenous traditional knowledge with modern development strategies.

1.6. Organization of Thesis

The problem formulation and the four central research questions outlined in Sections 1.2 and 1.3 are systematically examined across the seven chapters of this dissertation. These analytical components are mapped in Table 1, which indicates the chapters where each problem statement and research question is specifically addressed. The following section provides a concise yet structured overview of the content and thematic focus of each chapter.

Table 1 : Thesis in accordance with the problem formulation and research questions

Chapter	PS	RQ 1	RQ 2	RQ 3	RQ 4
Chapter 1: Introduction	√	√	√	√	√
Chapter 2: Study area	√	√	√	√	√
Chapter 3: Materials and method	√	√	√	√	√
Chapter 4: <i>Hygeralai</i> of cognitive and linguistic aspect	√	√			
Chapter 5: <i>Hygeralai</i> of social-cultural aspect	√		√		
Chapter 6: <i>Hygeralai</i> of historical aspect	√			√	
Chapter 7: Impact of <i>Hygeralai</i> toward sea ecosystem, <i>Hygeralai</i> in dynamic of SES and <i>Hygeralai</i> in the adaptive cycle and panarchy.	√				√
Chapter 8: Conclusions, recommendation and future research	√	√	√	√	√

Source: By own researcher, 2025.

CHAPTER II : STUDY AREA

2.1. Research Location

This research took place on Luang Island, Maluku Islands, Indonesia (Figure 3).



Figure 3: Map of Indonesia and the Maluku Islands.
Source: Ausralia data (2024), Luang Islands, modivided by authors

As explained earlier, the Maluku Islands constitute one of the eight island provinces in Indonesia. The region within the red color includes the Maluku Islands and a province with Ambon as its capital. Maluku comprises 1,392 islands, including 19 small outermost islands, such as Luang Island (Badan Pusat Statistik Maluku, 2022; BPS, 2021; BPS Kabupaten Maluku Barat Daya, 2021; BPS Provinsi Maluku, 2022). Southwest Maluku Regency is classified as one of the island regencies, as illustrated in (Figure 3). It has 48 islands, including 7 small outermost islands. The overall area of Southwest Maluku Regency is 72,427.2 km², with 88.1% defined as water (Estradivari, B, et al., 2016; Estradivari, Damora, et al., 2016; Estradivari et al., 2017). The area is geographically isolated in the Banda Sea, however, possesses significant potential as a marine biodiversity corridor for southern Eastern Indonesia. (Figure 4).



Figure 4: Map of Regency Southwest Maluku.
Source: Bing Maps (2024) digitized in ArcGIS by authors.

Figure 4 indicates concerning the regions covered by the administration of Southwest Maluku Regency. The yellow box indicates the research location, Luang Island. In the ancient Luang language, Luang Island is referred to as Lgona Mdon along with interview outcomes, indicate that Lgona is part of the Austronesian language family (Pannell, 2007). Luang Island has a *petuanan*² or customary territory, includes several small islands, such Liakra Island, Kapoeri, Tiaata, Nowlauna, Po'u Romkihiera, Watuwelada, Upasrui, Metutun, Metiamarang, Wekenau, and Tamta/Kalapa Island. Luang Island can be found along the coast as well as comprises two villages: West Luang and East Luang. (Badan Statistik Maluku Barat Daya, 2019) (Figure 5). Luang Island is an island surrounded by shallow water conditions, referred to as 'meti' characterized by a large span and a somewhat major coral head, covering a shallow area of 264,58 km². This circumstance makes the waters of Luang island distinct from those of other islands in Maluku.

² *Petuanan* refers to the entire customary territory in Luang Island

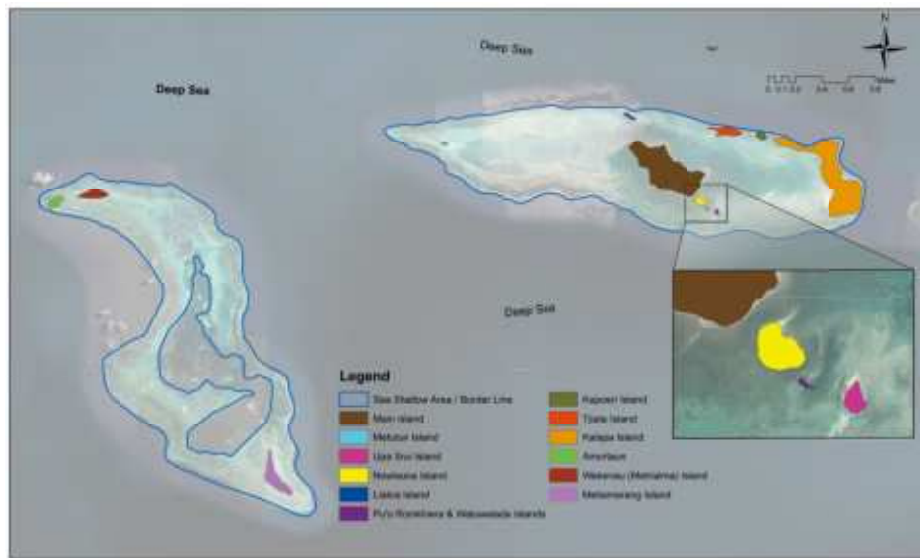


Figure 5: Maps of petuanan area of Luang Island.
Source: Bing Maps (2024), Luang Island, digitized in ArcGIS by authors.

In addition, geographically, Luang Island is located along the path of the world's three major coral reef systems (Figure 10) and adjacent to the ALKI IIIB route (Figure 6).



Figure 6: The coral triangle. Luang Island (marked by the red box) is the southernmost part of the triangle. Source: Coral Triangle Initiative on Coral reefs, Fisheries and Food security (CTI-CFF) Implementation Area-Coral Triangle Scientific Boundary, 2017

Figure 6 illustrates about the research location in Metimiarang and Besar Island, Luang, which is part of the Coral Triangle a region with the highest coral reef biodiversity in the world. This area encompasses the waters of Indonesia, Malaysia, the Philippines, Timor-Leste, Papua New Guinea, and the Solomon Islands, which possess a highly rich marine ecosystem and serve as a habitat for various species of fish, mollusks, and other marine biota that depend on coral reefs. This region falls within the scope of the Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security (CTI-CFF), a regional program aimed at conserving coral reefs and marine resources to support food security and the well-being of coastal communities. The program emphasizes conservation management, climate change mitigation, and the integration of local wisdom in the sustainable utilization of marine resources (Coral Triangle Initiative on Coral reefs, Fisheries and Food security, 2017).



Figure 7: Map of Base Point Lines, Territorial Sea Boundary Lines and Additional Zone Boundaries. Source: Geospatial Information Agency based on International Law, ANCLOS 1982

Figure 7 describes regarding the position of Luang Island among several other islands, such as Letti Island, Moa Island and Sermata Island. This position places Luang Island in a maritime strategic area. Most notable is its proximity to ALKI III B, which is marked with a pink dotted line. ALKI III B is one of Indonesia's most important international shipping lanes.

allowing foreign vessels to pass peacefully through Indonesian waters. The presence of this ALKI demonstrates the importance of the waters around Luang Island in the context of international maritime traffic (Nur, 2014).

Furthermore, the map also shows a base line drawn from Metimarang Island marked with the number 1, and a pink line with a special symbol. This base point is the basis for determining Indonesia's maritime boundaries, including territorial sea boundaries and additional zone boundaries. The Archipelago Base Line is used for archipelagic countries such as Indonesia, in the form of a straight line connecting the outermost points of the outermost islands (Chatfield et al., 2015).

The Territorial Limit Line, a line marked by the number 2 with a thick red dotted line with a special symbol. This line is drawn 12 nautical miles from the base line. Within this line, Indonesia has full sovereignty, including the territorial waters, seabed, underlying land, and airspace above. This is the boundary line between Indonesia and Australia. Exclusive Economic Zone (EEZ) Line. Governs the coastal state's sovereign rights over natural resources up to 200 nautical miles from the base line. In this case, the agreement between Indonesia and Australia on the EEZ arrangement in 1997 is the basis for each country to have sovereignty to manage natural resource rights (Chatfield et al., 2015; Massie, 2019; Pickering, 2006; United Nations Oceans and Law of the Sea, 1982).

In this context, although the Seabed Boundary Treaty does not directly delimit the waters above it (such as the territorial sea or EEZ), It continues to hold significance for Luang Island, where one of the islands, Metimarang Island, is the point from which Indonesia's base line is drawn. These base points are also used as reference points in determining seabed boundaries. Thus, the geographical position of Luang Island and its surrounding islands has implications for the determination of the seabed boundary between Indonesia and Australia. Practically, in the field, the interview results prove that the Luang community knows exactly the boundary between Indonesia and Australia.

2.2. Climate

In general, Indonesia has a tropical rainforest climate, characterized by consistently high temperatures and abundant rainfall throughout the year. This climate is commonly found in regions such as Kalimantan, Sumatra, and Papua, where humidity remains high year-round. On the other hand, some parts of Indonesia, particularly in Java and Bali, experience a tropical monsoon climate, which is marked by distinct seasonal differences between the rainy season and the dry season. Meanwhile, the eastern part of Indonesia, including Nusa Tenggara and Maluku, is more influenced by a tropical savanna climate, which has a long dry season and a relatively short rainy season. Luang Island, located in the eastern part of Indonesia, falls under the influence of this tropical savanna climate (Kementerian Koordinator Bidang Kemaritiman dan Investasi Republik Indonesia, 2020).

Luang island is located in the tropical savanna climate system, which brings about distinct seasons throughout the year. The east or dry season, which spans from June to October; the west or rainy season, occurring from December to February; and two transitional periods that bridge the east and west monsoons. During both the western and eastern monsoons, heavy rain typically occurs in February, accumulating to a total of 586.5 mm, accompanied by elevated oceanic wave activity. The most significant waves usually occur during the east monsoon, attaining heights of 4 to 6 metres. The patterns of monsoon winds significantly impact the direction and intensity of ocean currents and wave formations. The winds will influence the movement of surface water masses, thereby establishing specific current patterns around Luang Island. According to a report from the Marine and Fisheries Service of Southwest Maluku Regency, the average current speed exhibits a calm nature during the transitional season, ranging from 0.13 to 0.18 m/s. This speed escalates during the west season, reaching between 0.16 and 1.20 m/s, and further increases in the east season, where it spans from 0.21 to 1.31 m/s (BPS Kabupaten Maluku Barat Daya, 2022; BPS Provinsi Maluku, 2022) .

2.3. Topography of Luang Island

In order to comprehend the interaction between the local populace of Luang Island and its environment, it is crucial to be acquainted with the topography of the studied islands (Figure 12) (McKnight & Hess, 2004).

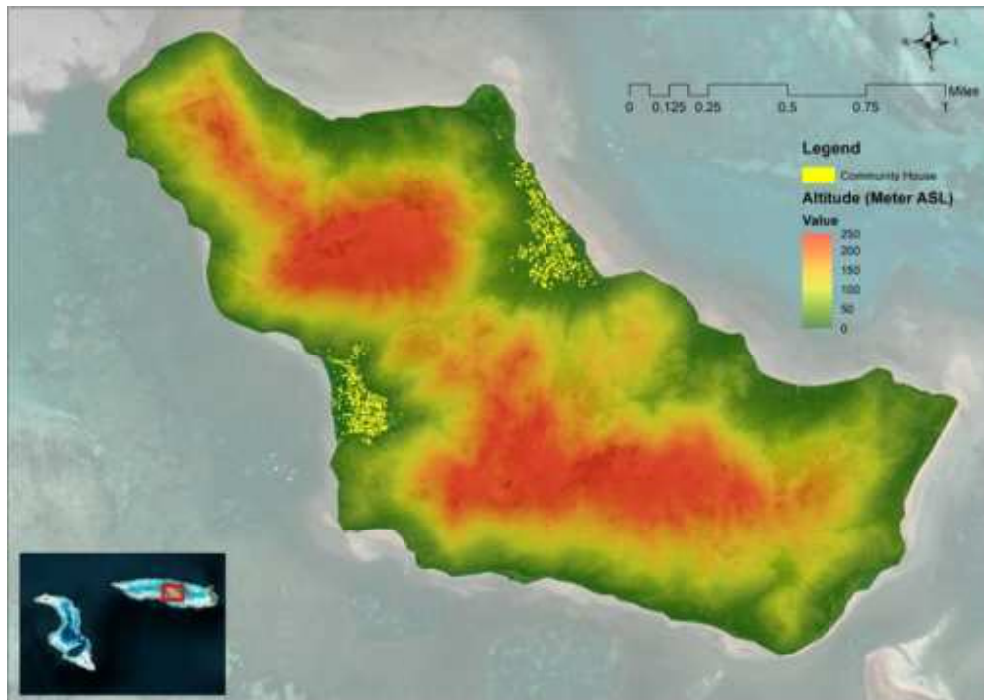


Figure 8: Topography of Luang Island.
Source: Bing Maps (2024) digitised in ArcGIS by the authors.

Figure 8 showing the variation in land elevation above sea level (ASL-Above Sea Level) distributed in color gradients. Areas of low elevation, i.e. 0-50 meters, are shown in light green and are generally located in coastal areas. These areas are dominated by lowlands suitable for human settlement and activities. Meanwhile, areas with intermediate elevations (50-150 meters) are marked in dark green to yellow, reflecting gentle slopes and small hills. The higher parts, with an elevation of 150-250 meters, are shown in orange to red, indicating the presence of steep hills or small mountains in the central part of the island.

In addition, the Figure above shows the distribution of human settlements depicted with yellow dots. Settlements appear to be concentrated in low-lying areas, especially around the

coastline. This reflects settlement patterns that tend to favor more accessible locations, with the availability of flat land that supports daily activities. The island's topography has important implications for spatial planning, natural resource management and disaster risk mitigation. For example, low-lying populated areas are potentially vulnerable to flooding or sea level rise, requiring appropriate adaptation strategies. Overall, this map provides essential baseline information for further analyses in environmental management and sustainable development on Luang island.

2.4. Ecosystems

2.4.1 Land Ecosystem

Empirically, the ecosystem on Luang Island is an interaction between living components and the physical environment that is categorised as a geographically isolated ecosystem. Geographic isolation affects ecological dynamics, such as species migration patterns, interactions between predators and prey, and plant seed dispersal. This concept is explained through the Island Ecosystem Theory proposed by MacArthur and Wilson (1967). The theory states that the size of islands and their distance from the mainland of large islands determine the number of species that can survive. Large islands close to the mainland tend to have higher biodiversity than small, remote islands (Wilson & MacArthur, 1967).

On average, small island ecosystems have high endemism, in contrast to ecosystems on Luang Island, especially terrestrial ecosystems, which have low endemism. A small proportion of terrestrial ecosystems on small islands have limited natural resources, such as freshwater, arable land, and forest products, as is the case with Luang Island. Island ecosystem offers ecosystems where human interaction with marine ecosystems is dominant, as they have abundant marine resources. These interactions impact the entire life and culture of the people of Luang Island. The dynamics of the island's ecosystems are highly dependent on management based on ecological principles. By understanding their (marine) biodiversity, geographical isolation, limited resources (especially terrestrial), and interaction with nature, they have local knowledge on conservation which they believe is an effective strategy to conserve the marine ecosystem where they live. This is not only important to protect the species but also to maintain the

ecological balance that supports their lives on the island. The main characteristics of terrestrial ecosystems can be seen in Figure 13.

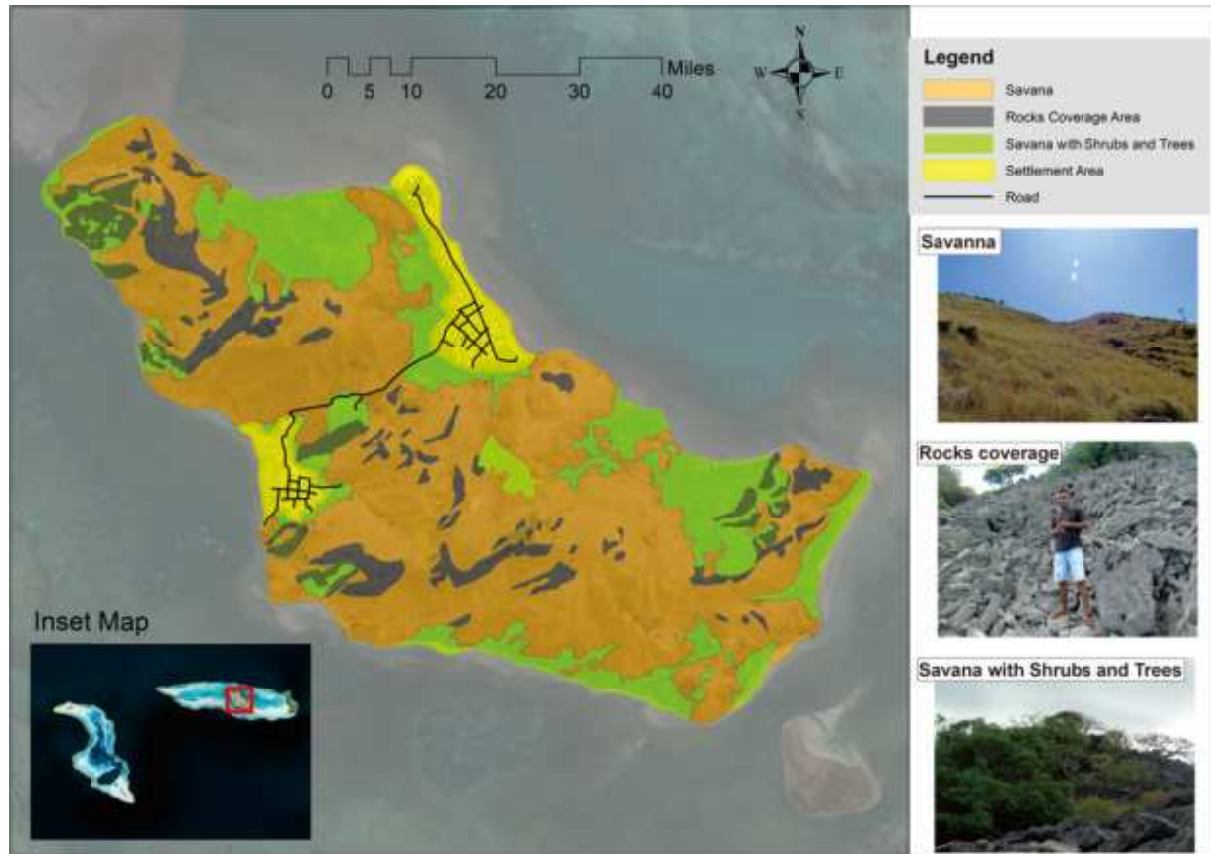


Figure 9: Map of Luang Island's terrestrial ecosystem specific to the Big Island.
Source: Researcher, 2022 & 2023.

Figure 13 is a thematic map of the land ecology of an island, compiled using the Geographic Information System (GIS) approach and showing the classification of land cover based on vegetation characteristics and physical conditions. Based on the map legend, the island's territory is divided into five main categories: savanna (dry grassland), rocky area (rocks coverage area), savanna with shrubs and trees. This area has a higher diversity of plants, ranging from shrubs to trees that have adapted to less fertile soil conditions. These types of plants include tamarind trees (*Tamarindus indica*), kapok trees (*Ceiba pentandra*), cactus trees (*Cactaceae*), and the spread of koli trees (*Borassus flabellifer*) which dominate the area.

Settlement areas, and road networks. The dominant light brown color indicates that most of the island is dominated by savanna ecosystems, which indicate dry climate characteristics and open land with low vegetation. The dark gray area shows rock cover spread across various parts of the island, indicating the presence of rocky areas that are likely unproductive for agriculture or settlement. The bright green zone shows the savanna area interspersed with bushes and trees, indicating that these areas are also commonly used by the community as gardening land by planting banana, cassava, sweet potato, beans, and corn. However, not all of these plants can grow well because they have to face the scorching heat and hard soil conditions on Luang Island. If these plants manage to grow until harvest, it is considered a miracle for the Luang community. Several date palms (*Phoenix dactylifera*), water apples (*Syzygium aqueum*), and breadfruit (*Artocarpus altilis*) also grow in this area. The soil structure in this area is a mixture of gravel, sandy soil, and hard rocks and slabs.

The residential area is shown in bright yellow and a black checkered pattern that also connects the road system indicating accessibility between areas. Supporting images on the right side of the map provide ground-truthing evidence that strengthens the spatial interpretation: savannah images show open dry grasslands, rocky areas show surface conditions dominated by large boulders, and savannah images with shrubs and trees show denser vegetation cover. Overall, this map serves as an important tool for terrestrial ecological analysis, and can support broader socio-ecological studies, such as the relationship of local communities to their ecological landscapes in the context of area-based resource management. On Luang Island, people generally keep animals such as pigs, dogs, chickens, and ducks. In addition, in some parts of the island, deer are also found living wild but are sometimes approached or captured by residents for certain needs.

2.4.2 Sea Ecosystem

Based on the marine ecosystem survey data from WWF in 2015 and 2016, and subsequent comparisons with 2024 Geospatial Information System data, reveal that the coral reef ecosystem surrounding Luang Island is predominantly composed of hard corals and atolls, with atoll regions situated on Metiamarang Island and the larger island. Atoll in Luang Island is the largest atoll in the Southwest Maluku region. Luang Island is encircled by extensive regions of

shallow water, or *meti*, characterized by low depths and rather prominent coral heads, including around 232.58 km² of shallow water (Estradivari et al., 2015). The attributes of Luang Island's waters distinguish them from those of other islands in Maluku. As discussed in the previous section, the Luang Island's *petuanan* consists of ten islands and their names are known, with *main island* being the largest land area (Figure 10 & 11).



Figure 10: Main island, as the name suggests, is the largest island in the Luang area.
Source: Indonesia National Geospatial Information Agency, 2024.



Figure 11: Ten small islands that surround the Besar Island and already have names.
Source: Indonesia National Geospatial Information Agency, 2024.

Besides the 10 identified islands, Luang possesses six unnamed small islands (Figure 12). Despite their anonymity, these islands hold significant biological value. The absence of names does not undermine their contribution to the region's marine ecosystem, as several islands exhibit the same abundant species.

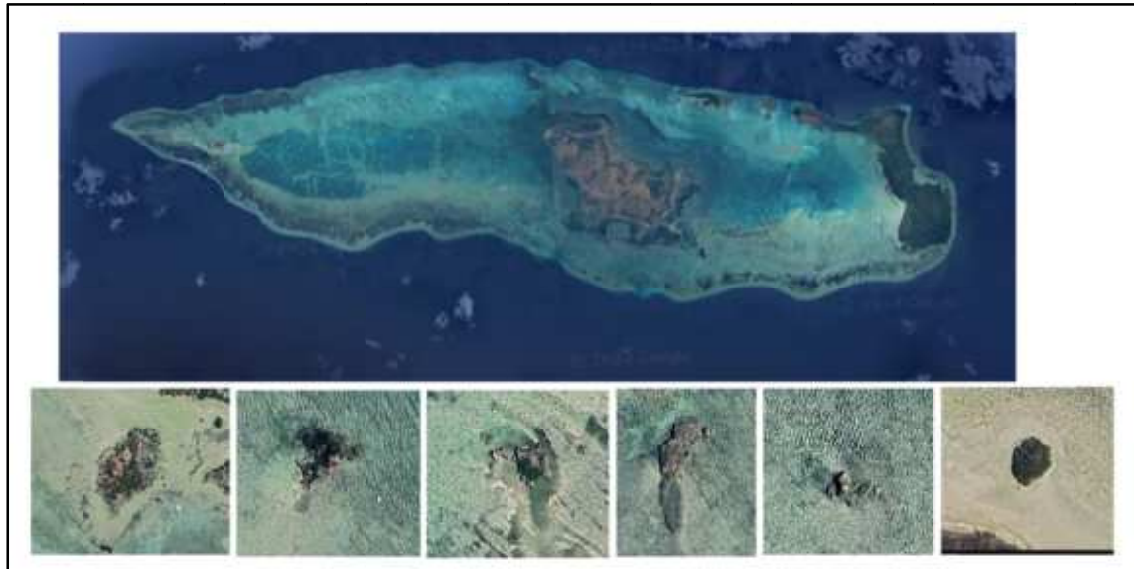


Figure 12: Six small islands surrounding the Large Island that has no name.
Source: Indonesia National Geospatial Information Agency, 2024.

Data from the Southwest Maluku Central Bureau of Statistics (BPS) (2019) indicates that Luang Island comprises two villages. The vast island is segmented into five separate coastal zones, each exhibiting unique ecological characteristics when divided by its coastal area. Satellite and field measurements reveal that the island's coastal zones are easily recognized, mostly due to their population distribution. East Luang and West Luang, which contain the most densely populated settlements, are particularly significant due to their active marine zones. Other coastal regions on the Big Island, such as Eheoini, Viena, and Batugajah, are relatively uninhabited, being primarily temporary locations; nonetheless, they are expected to evolve into densely populated settlements similar to East and West Luang. The northern region of the island is notably little populated, and the coastal ecosystem remains largely untouched. This region, lacking human interference, can function as a crucial natural sanctuary for marine organisms, facilitating the healthy development of surrounding coral reefs and seagrass beds.

Besides the main island, Metiamiarang Island (Figure 13) serves as a coral habitat for marine habitats that shares a boundary with Australia and serves as a biogeographical transition zone for fauna between the two countries. Turtles on Metiamiarang Island are frequently discovered with ring tags inscribed 'Australia', and indigenous Australian birds have been observed migrating to the larger island at specific seasons. These biodiversity-rich regions are essential for sustaining the equilibrium of marine life and are intricately connected to the efficacy of *Hygeralai* traditions that regulate human interactions with marine resources. Furthermore, the acquired data, along with the satellite imagery, indicates that the waterways surrounding Luang remain preserved.



Figure 13: Coral reef ecosystem in Besar Island and Metimiarang Island.
Source: National Geospatial Information Agency 2024.

In 2015 survey by WWF indicated that the coral reef environment surrounding the Luang Islands is in excellent health (with a coral fraction below 1%) and exhibits high biodiversity, hosting diverse coral taxa and robust coral communities, including atolls, seagrasses, and other fauna. Atolls are located in specific regions, including West Luang, West Luang 1, and West Luang 2. Moreover, West Luang 3 exhibited a notable coral abundance of $89,667 \pm 23,619.08$ SE ind/Ha (Estradivari, B, et al., 2016; Estradivari et al., 2015).

Furthermore, the presence of marine ecosystems on Luang Island, as evidenced by fieldwork including observations in 2023 of the seabeds at depths of 3-4 meters and coastal regions, indicates that the aquatic ecosystem surrounding Luang Island, both in small and large coastal areas, remains relatively healthy. The outcomes of these observations are shown in several images (Figure 14). Where marine biota, corals, seagrasses, and other plant species are in optimal health. These observations indicate that this interdependent ecosystem enables Luang's waterways remain and grow. Coral reefs serve as the primary foundation for marine ecosystems. They function as natural barriers to ocean currents, spawning grounds for fish, and habitats for many marine organisms.

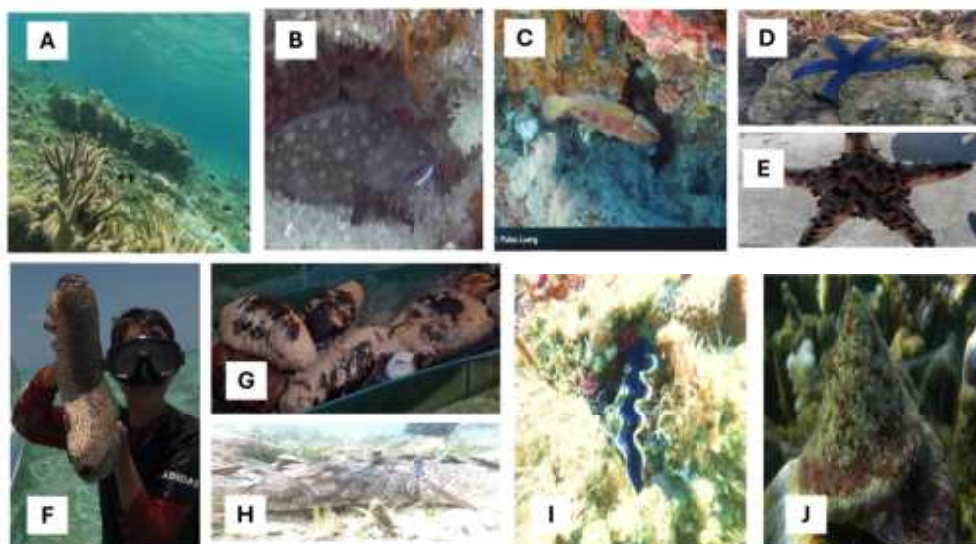


Figure 14: Some of the marine species on Luang Island. (A) the researcher with her harvest yield of *Sea cucumbers*. (B) small fish on the seabed among coral reefs, (C) grouper (*Epinephelus Coioides*), a type of reef fish, (D) blue starfish (*Linckia Laevigata*), (E) horned starfish (*Protoreaster Nodosus*), (F) sand *Sea cucumber* (*Holothuria Scabra*), (F), and *Sea cucumber*, (G) *Holothuria fuscogilva* (*White Milk Sea cucumber*), (H) *Tiger Sea cucumber* (*Bohadschia Argus*), (I) *giant clam* (*Tridacna gigas*) and (J) *Lola clam* (*Trochus niloticus*).

Source: Images A & D-J by researchers, 2023. Images B & C by WWF, 2015.

Luang Island waters are also abundant with marine biota such as several species of sea turtles (*Chelonioidea*), sea pearl shells, napoleon fish (*Cheilinus undulatus*), parrot fish (*Scaridae*), various types of giant clams (*Tridacna gigas*) and other types of biota. Moreover, the waters surrounding Luang Island harbor seagrasses and various other plant species. Seagrasses, as angiosperms, flourish in highly productive coastal habitats and are essential for sustaining marine biodiversity.

McRoy dan McMillan (1977) suggest that the function of seagrass is crucial for maintaining the equilibrium of the marine ecosystem. Seagrass beds function as nutrient recyclers in marine environments, reintroducing organic matter into the environment via a decomposition process facilitated by microbes (Mcroy & Mcmillan, 1977). This technique establishes an optimal and conducive habitat for aquatic species, serving as a feeding ground, spawning area, and a site for the growth and development of fish, as well as for the rearing of offspring, larvae, and juveniles. Moreover, seagrass ecosystems play a crucial role in sustaining the productivity of fishery resources and conserving coastal natural assets. Consequently, the preservation of seagrass habitats is crucial due to its indispensable function in sustaining the equilibrium of marine ecosystems (Green & Short, 2003).

The waters surrounding Luang Island have a varied distribution of seagrass. Coastal regions are typically populated by seagrasses of the *Enhalus* genus. At the water's bottom, a wider variety of species was observed, including *Thalassodendron* and *Thalassia*, which thrive among corals and algae. The variety of seagrass species demonstrates the abundant biodiversity sustained by coral reefs, which represent the natural wealth and ecological integrity of Luang Island. Besides serving as a protector of the marine ecosystem in the waters surrounding Luang Island, seagrass is also a source of carbohydrates for the inhabitants of Luang Island. The Luang people utilize seagrass roots as a substitute for grains and corn. The roots of seagrass are transformed into palatable nourishment for them³.

Furthermore, the findings from fieldwork in the waters surrounding Luang Island indicate a wide distribution of flora, including seagrasses. Coastal regions are typically populated by seagrasses of the *Enhalus* genus. The variety of seagrass species reflects the abundant biodiversity sustained by coral reefs, which represent the natural wealth and ecological integrity of Luang Island (Figure 15).

³ Based on data collected from field interviews. S. S, male, 49 years, 1 Aug 2023. K. P, male, 39 years, on 3 July 202. J. K, male, 48 years on, 118 July 2022. M. S, male, 70 years, on 28 July 2023. P. P, male, 56 years, 25 Juni 2023. J. S, male, 44 years, on 1 July 2022. J. W, female, 35 years on, 8 July 2023. J. S, male, 55 years, on 28 July 2023. S, W, male, 48 years, , 10 Juni 2023 L. P, male, 42 years, in Luang Island, 26 Juni 2023. K, S, male, 49 years, 8 September 2023. G. S, male, 39 years, 9 August, 2023. Q. K, 50 years, female, , 6 September 2022. Z. M, male, 60 years, 1 August 2023.

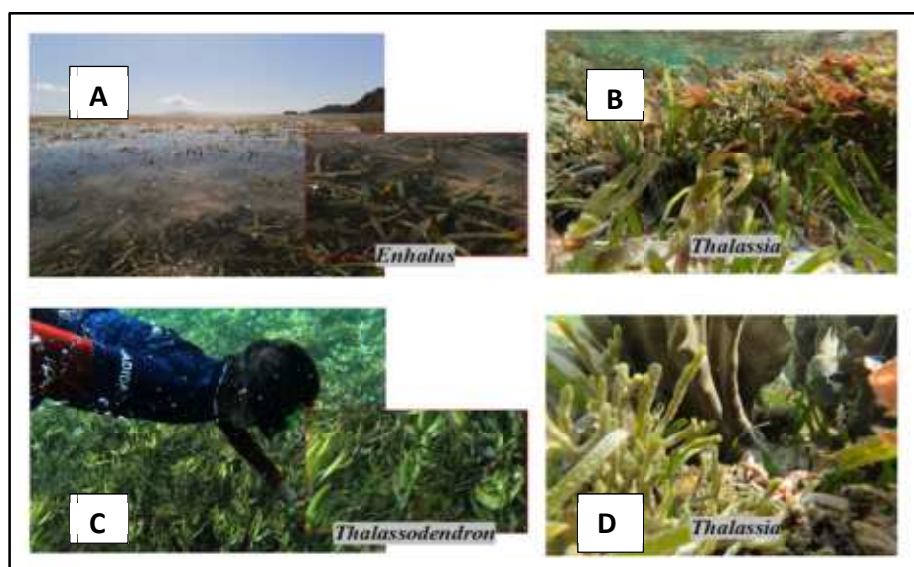


Figure 15: Seagrass species diversity on Luang Island. (A). Coastal areas are generally covered by *Enhalus*. (B & D) seagrass species of *Thalassia* type in the bottom. (C). researcher with the seagrass (*Thalassodendron* & *Thalassia*) in the bottom waters at a depth of 3 meters.

Source: authors 2023.

In summary, the field data indicate that the contribution of *Hygeralai* to the sustainability of aquatic ecosystems on Luang Island is substantial. *Hygeralai*, from an ecological perspective, can be seen as the respect for the rights of marine organisms, including *Sea cucumbers*, which are integral to *Hygeralai*, as well as the rights of other life forms such as fish, turtles, *Tridacna gigas*, and several other biota, which are also honoured by the inhabitants of Luang Island. Furthermore, coral reefs, seagrasses, and other marine plant species in the seas of Luang Island thrive unimpeded by the actions of the Luang inhabitants.

From an ecological perspective, *Hygeralai* is also seen as honoring the socio-cultural rights of the inhabitants of the marine ecosystem in the waters of Luang Island. The biota and flora in the seas of Luang Island constitute a complex network of life that participates in social interactions, thereby establishing a marine ecological community. The interrelations among individuals of this ecosystem are mutually supportive. This is evident from the roles and

advantages of each member inside the Luang Island aquatic ecological community. They exist to exchange their respective offerings.

Sea cucumbers, with their unique attributes, offer advantages to their companions in the aquatic ecosystem of Luang Island by functioning as sediment processors. *Tridacna gigas*, as a constituent of the Luang Island marine ecosystem, contributes to environmental benefits by functioning as a seawater filter, so facilitating proper consumption of the available water by other organisms. Seagrass serves as a nurturing environment for diverse marine organisms. Coral reefs serve marine life similarly to how houses serve humans, offering shelter protection, and sustenance within the seas of Luang Island. The interconnections among the ecosystem members in the seas of Luang Island resemble the reciprocal relationships among humans. Coexisting to attain a same objective. They also acknowledge conflict and competition; for instance, hard corals and soft corals fight for habitat space, among others.

2.5. Infrastructure

The policy for developing national strategic areas is governed by Indonesia Government Regulation (PP) No. 26/2008 on the National Spatial Plan. However, the development of small islands often lacks a balanced approach to economic considerations, potentially jeopardizing the sustainability of local communities' livelihoods. In this regard, the infrastructure on Luang Island remains highly limited, necessitating substantial development to effectively address the community's basic needs. Presently, Luang Island has some infrastructure in place, including transportation, roads, education, healthcare, communication and information technology, worship and water supply, although significant improvements are still required.

Multiple options exist for traveling to Luang Island from Ambon City, including a flight to the district capital of Tiakur-Moa, which takes one hour and thirty minutes. The journey from Tiakur-Moa to Luang Island by pioneer ship takes approximately 7 hours. Furthermore, maritime transportation (fast boat) is available from Ambon to Tiakur-Moa, covering a journey that takes around two days.

An alternative method is to go from Ambon utilizing with the ships (Pangorango, Sabuk Nusantara 71, and Sabuk Nusantara 80), covering a distance that requires four nights and five days. These ships visit small islands in the Southwest Maluku area. The journey from West

Luang and East Luang to the sub-district capital (Lelang) takes around 4 to 6 hours by marine motor or *jolor*⁴ (Badan Statistik Maluku Barat Daya, 2021) (Figure 16).

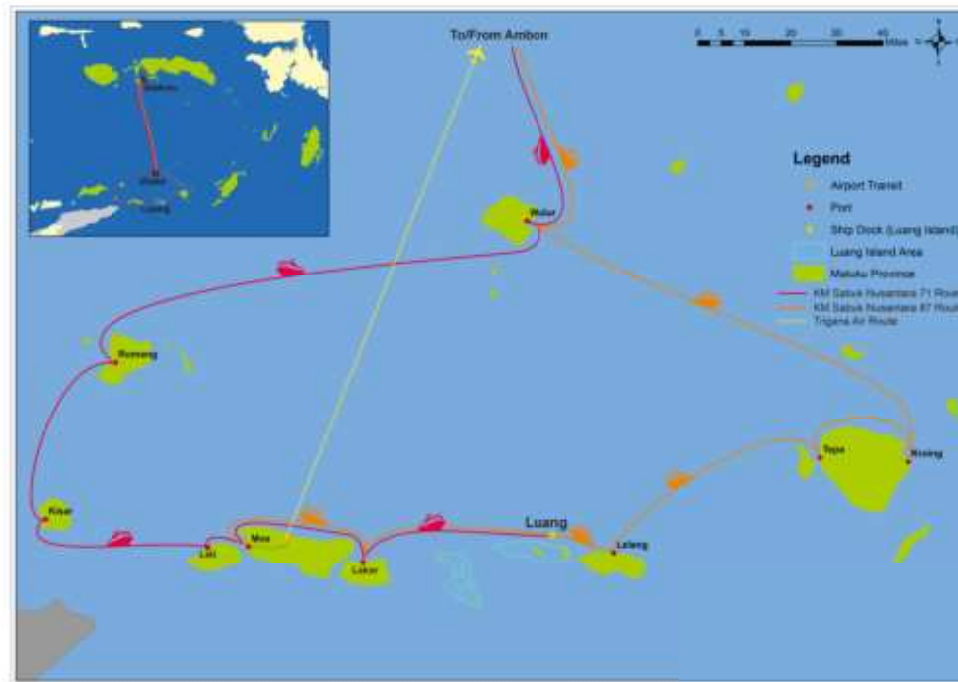


Figure 16: Accessibility to and from Luang Island.
Source: Authors

Luang Island does not have a large harbor or port. Consequently, arriving and departing boats are unable to dock in the area, hence aiding the boarding and disembarkation of passengers. Boats exclusively anchor in the seas of Luang island by tying a rope to a designated huge rock, which is indicated by a buoy that is visible above the water's surface. Several locals from East Luang and West Luang have been nominated and appointed by the leaders of both villages, in collaboration with the Indonesian National Shipping (PELNI), to tie down the ropes for all boats approaching and departing from Luang Island. The personnel responsible for tying the ropes are already at the docking spot to perform their tasks.

As previously mentioned, the waters surrounding Luang island possess an extensive shallow region that impacts all activities in the area. Consequently, a consensus has been

⁴Boats made of wood or plastic fiber that use engines.

established between the leaders of the two villages on Luang island and the Indonesian National Shipping Company, specifying that passenger boats may only enter Luang island at 06:00 in the morning, with a maximum anchorage duration of approximately 30 minutes. Passengers must be quick to disembark their belongings and exit the boat within this timeframe. Passengers disembark the boat using a ladder positioned above the water and leap into the area beneath the ladder and the hull. They utilize ropes to lower their belongings into the *jolor* to save time⁵ (Figure 17).



Figure 17: The embarkation and disembarkation atmosphere on the Sabuk Nusantara ship in the waters of Luang Island
Source: authors, 2022 & 2023

The island does not have any road facilities, but it has a road called the “jalan setapak” paved road on the main island. The construction of this road was funded by the community of Luang Island. It is a concrete road 75 cm wide, which connects one block of houses to another in the two villages. This road is also the only land route connecting the two villages with the distance of 905,81 m (Figure 18). However, residents prefer to use motorboats rather than walking, this is to save time.

⁵ This applies exclusively to large boats use the "*Monkey Ladder*," as referred to the locals, to access smaller boats (*Jolor*), since the ladder is only raised above sea level.

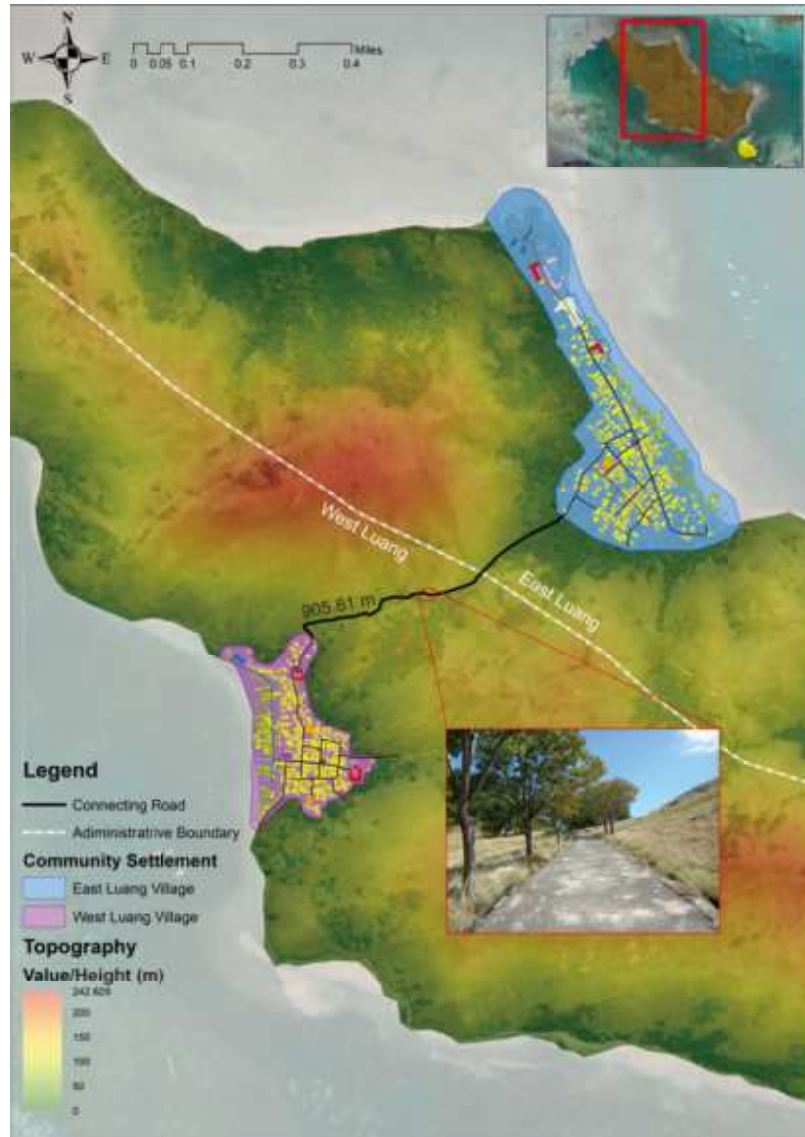


Figure 18: Connecting road between West Luang and East Luang.
Source: Bing Maps (2024) digitized in ArcGIS by authors

Movement within the villages is conducted entirely on foot, while mobility between villages and to other islands depends exclusively on motorized boats, the sole mode of transportation available to residents.

The entire village utilizes solar power for electrical requirements through a device known as a solar panel board, which charges a battery. Each house has one or several solar panel systems. During the day, the solar panel system gathers energy from sunlight and stores it in the battery, which is subsequently connected to the stavolt. At night, they utilize it to charge mobile phones, produce lights, and activate the television (for those who own one). The accessibility of education in Luang island is rather favorable (Table 2).

Table 2: Table of distribution of education access in Luang Island

Level	Number of teachers	Organizer	Location
State elementary school	14	Government	West Luang
Elementary school presidential instruction ⁶	11	Private	West Luang
State elementary school	13	Government	East Luang
Elementary school presidential instruction	10	Private	East Luang
Junior high school	8	Government	West Luang
Junior high school	9	Government	East Luang
Fisheries Vocational High School	8	Government	East Luang

Sources: (Badan Statistik Maluku Barat Daya, 2023) & results of interviews and observations in 2022 & 2023 on Luang Island.

The table 1 explains that in Luang Island, there are two primary schools in West Luang employing 14 teachers, and two primary schools in East Luang employing 11 teachers. One Junior High School in West Luang employs 8 teachers, one Junior High School in East Luang employs 9 teachers, and one fisheries vocational school in East Luang employs 8 teachers (Badan Statistik Maluku Barat Daya, 2021).

No public or private financial institutions exist on Luang island until 2024, nor is there an active cooperative. The island remains lacking of clean water, necessitating residents to go

⁶ Inpres Elementary School (Presidential Instruction Elementary School) is an educational facility issued by the Soeharto government during the New Order to expand and equalize learning opportunities for elementary school children, around 7-12 years old. This school is still classified as a government-owned school

to several smaller islands, such as Kelapa Island, to procure water for daily activities including bathing, washing, and cooking. Alternatively, they have to bathing in salty and brackish water⁷ thereafter rinsing with rainwater⁸. The island has only one freshwater source situated in Luang Timur village. Luang Island has two places of worship: GPM Church and Aliran Church, located in West Luang and East Luang, respectively, each headed by its own pastor. They own one village meeting room designated as the village hall. In terms of public health services, a Community Health Center is located in East Luang. West Luang has a health service known as Community Health sub-Center.

Telecommunications and information facilities on Luang Island are supported by the Maluku Provincial Government's Mobile Telecommunications Company, which has constructed two towers, one in West Luang and another in East Luang, both situated in the mountainous areas of the main island. Additionally, private cellular networks are accessible on the island. However, despite the presence of these cellular networks, the signal strength is frequently insufficient to adequately support the communication needs of the local community⁹.

2.6. Community and Economic Activities

The Luang indigenous community comprises individuals residing along the coastline, specifically inhabiting an island or area in the western part of Southwest Maluku known as Luang island. The total population of Luang Island, including both East Luang and West Luang, is comprised of 1,994 individuals and exhibits a homogeneous character (BPS Kabupaten Maluku Barat Daya, 2022; BPS Provinsi Maluku, 2022), (Table 3).

⁷ “*Aer Salobar*” Moluccan term for water that tastes like a mixture of fresh and salt water.

⁸ During field work there, the people of the West Luang, they had to struggle for clean water. The clean water source located in east Luang. The local government cooperation with the local government of West Luang to support the clean water for the west Luang community. This data also supported with the interviews data. L. H, male, 50 years on, 12 September 2023. L. B, 48 years, on 15 July 2023. F. M, male, 45 years, 28 July 2023. P. S, male, 50 years, on 10 September 2023. N. K, male, 43 years, 45 years, August 2022. Q.M, male, 51 years, 8 September 2023. M. M, male, 40 years, 17 August, 2023. L. K, 53 years, male, 20 September 2023. M. P, female, 55 years, 1 August 2023.

⁹ The data based on the observation in the field and interviews. L. H, male, 48 years, 5 September 2023. H. P, male, 45 years, on 15 July 2022. V. K, female, 51 years, on 20 August 2023. Z. K, 56 years, male, on 2 September 2023. P. M, male, 50 years, on 5 Oktober 2023.

Table 3: Population of Luang Island

Name of Villages	Population		
	Male	Female	Total
West Luang	423	408	831
East Luang	587	576	1.163
Total	1010	984	1.994

Source: BPS Kabupaten Maluku Barat Daya & BPS Provinsi Maluku, 2022

The land of Luang Island is unsuitable for agricultural purposes, lacking any plantations. The only crops, such as corn, are found growing in the crevices of rocks, as the soil consists solely of bedrock, calcareous material, and savanna. The flora that flourishes in this region encompasses date palms, koli, and coconut trees¹⁰. This is owing to several factors, such as, an extreme climatic characterized by prolonged dry seasons, scant rainfall, and severely limited freshwater resources. Whereas the island's landmass offers few exploitable natural assets, the surrounding marine waters exhibit exceptionally high biological productivity. Consequently, the livelihoods of the local population are oriented almost entirely toward the exploitation of marine resources.

The linkage between terrestrial ecosystems and the *Hygeralai* concept is rooted in the history of Luang ancestors who once inhabited mountainous areas and relied on local resources for subsistence and daily activities. A salient illustration involves the *koli* palm: its leaves were harvested, folded into a box-like shape, and hung from the tip of a wooden stake driven into the ground to mark ownership and territorial boundaries. This marker was collectively recognized, serving to assert individual and communal rights both on land and at sea. Such historical practices provided the framework for *Hygeralai*, particularly in the governance of marine resources. Interview data indicate that, although the forebears resided in the highlands, the present-day livelihood of the Luang community is fundamentally dependent on the sea. Hence, the limited productive capacity of the land not only fostered reliance on the abundant marine environment, but also established a historical foundation for managing coastal ecosystems through *Hygeralai*.

¹⁰ The information based on the observation in the field.

Subsequently, the primary food of the people consists of grains, including maize, an array of beans, as well as cassava, koli fruit, and fresh fish (Karuna & Serpara, 2021). Given the arid, barren¹¹ (Estradivari et al., 2016, RIEDEL, 1935, NASKAH KUNO) and rocky nature of the region, the people of Luang rely significantly on the ocean for their livelihood. The divine dispensation of resources is evident, as sandalwood is bestowed upon Timor, nutmeg graces Banda, cloves enrich Ternate (Pires, 2010) and Luang Island is blessed with an abundance of seafood (Kissiya & Biczó, 2023). The majority of the local populace sustains themselves through the practice of fishing, both as individuals and in collaborative groups, alongside engaging in the cultivation of seaweed¹² (Figure 19).



Figure 19: (A) one of the fishermen in Viena sub-village (Luang Island) who has just returned from fishing and (B) seaweed harvesting. Source: Participatory observation and interviews, 2022 & 2023.

In order to meet their daily needs, both men and women engage in fishing and hunting of octopods. This is particularly true for women, who either explore the shallow waters surrounding the main island or go to the nearby smaller islands. The tradition among the Luang people involves catching fish solely for the daily consumption, with a commitment to seek fresh fish for

¹¹ M. P, 55 years, 21 July 2022. B. S, 53 years, male, 23 September 2023. C. P, female, 55 years, in Luang Island, 1 August 2023. M. M, male, 40 years, 17 August, 2023. L. K, 53 years, male, 20 September 2023. M. P, female, 55 years, 1 August 2023.

¹² The data based on the observation and interviews. J. M, male, 45 years, 1 July 2022, P. S, male, 60 years, on 10 September 2022. D. M, male, 55 years, R. S, 29 years, 6 August 2022. S.S, male, 50 years, 8 September 2023. L. S, male, 38 years, 16 August, 2022.

the following daily meal. They do not utilize the refrigerator for storing fish, despite possessing one; its sole purpose is to keep beverages available for sale¹³. Typically, on Sunday afternoons, following the completion of all church-related activities, they go to the small islands still owned by Luang Island to engage in various activities there. They remain there for a few days (*Warini*) or potentially up to six days, returning to the main island on Saturday afternoon to engage in church activities on Sunday (Figure 20).

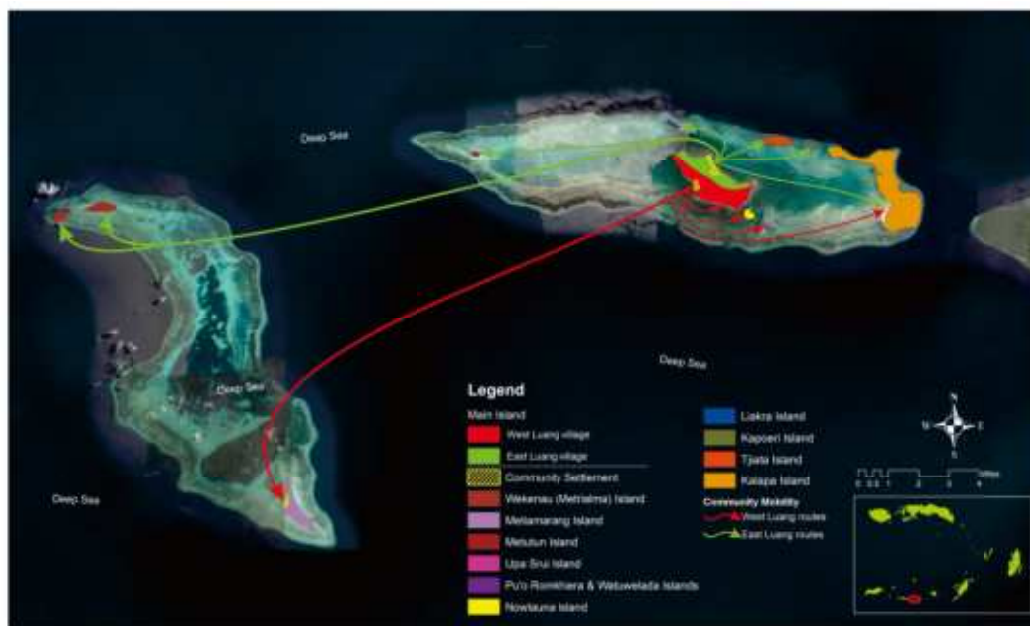


Figure 20: Map of the interaction between the Luang community and the surrounding islands within their customary territory (petuanan). Source: authors, based on field work, 202 & 2023.

On the small islands, they participate in the cultivation of agar and the collection of fish, which is subsequently processed into dried fish known as *Inkerna*. Additionally, they produce a thick liquid from fresh fish meat, referred to as *bakasang*, created by mashing the fish and mixing it with acid before storing it in a bottle for extended periods. This *inkerna*, along with *bakasang*, is typically preserved for periods of scarcity and is often paired with corn rice¹⁴ for

¹³ Y. M, 57 years, 11 July 2022. W. M, female, 51 years, on 20 August 2023. K. M, 60 years, female, on 2 September 2023. P. M, male, 50 years, on 8 Oktober2023.

¹⁴ Corn rice (nasi jagung) is a traditional staple food made by mixing rice with pounded or ground corn, then cooking them together. This dish is commonly found in eastern Indonesia, such as in Maluku, East Nusa Tenggara, and parts of Sulawesi, where corn serves as a primary carbohydrate source due to its resilience in dry climates. Corn rice is often served with salted fish, vegetables, or fermented condiments such as *bakasang* or fermented fish paste, especially during periods of scarcity or as part of cultural food preferences.

consumption. Maize represents a distinctive aspect of the culture of the Luang people. Residents typically purchase dried corn from neighboring islands through local trade routes. Additionally, some inhabitants attempt to cultivate corn on Luang Island, but only a portion of these plants successfully yield fruit, while others do not thrive.

Similar to their fellow Indonesians, they take part in the consumption of rice, often combined with coarsely ground and cooked corn. Acquiring fresh vegetables on the island of Luang poses considerable challenges. Seaweed is commonly utilized as a substitute for vegetables. Seaweed is carefully harvested and prepared with coconut, vinegar, salt, and onion. Besides fishing and cultivating seaweed, they also make natural salt (Figure 21).



Figure 21: The process of salt making by one of the natural salt farmers on Luang Island. (A) Rows of seashells filled with sea water drying in the sun on Metiamarang Island. (B) One of the salt farmers is pouring salt crystals with sea water into the shells and (C) Salt crystals that have formed Source: Participatory observation and interview, September 2023.

The process by which the people of Luang Island produce natural salt. Seashells¹⁵ are employed to gather seawater, which is subsequently dried under the sun. Once the water evaporates and salt is left behind, the process of weeding the salt formed in the shells is undertaken, utilizing seawater once more. This meticulous weeding procedure is repeated multiple times until the shells are filled with seawater, ultimately yielding pure white natural salt crystals. This salt serves essential purposes in everyday food preparation practices, aiding in the

¹⁵ Luang people call it *kuli bia*

preservation of seafood and provisions in anticipation of the opening of *Hygeralai*. Upon the opening of the *Hygeralai*, a variety of marine products are harvested alongside Sea cucumbers and sea shells, all of which are subsequently preserved using salt. Typically, the supply of salt should adequately meet the requirements for *Hygeralai*. Furthermore, it is necessary for them to embark on a sea journey from the island to adjacent islands in order to get food or agricultural goods, including rice, vegetables, sugar, and various other essential provisions to fulfill their needs. In that area, they engage in the exchange of dehydrated marine fare for agrarian goods sourced from the adjacent islands. Due to their frequent journeys to these islands, they ultimately formed familial connections with individuals from beyond the island, whom they referred to as friends, and some entered into marriage¹⁶ (Karuna & Serpara, 2021) Moreover, sellers from adjacent islands participate in the exchange of agricultural goods, including bananas, various fruits like mangoes, and an assortment of vegetables (Figure 22).



Figure 22: The atmosphere of the people from Sermatang Island coming to sell or exchange farming products with marine products on Luang Island. (A) Sellers from Sermatang Island come to sell garden produce such as bananas and vegetables on Luang Island (B) Several women came to buy vegetables (C) The Luang people exchange dried seafood (Inkerna) for bunches of bananas. Source: Field observations and interviews August 2023.

¹⁶ M, 65 years, 11 Juni 2022 in Luang Island. M, 52 years, 20 July 2022 in Luang Island. According to historical accounts, the formation of family ties within the Luang Island community is categorized into three segments: roma Luwu, which denotes a blood tie (genealogy), with its evolution beyond the leka (country). Tal'la or sahabat refers to a friendship that spans the island. Friendships are more intimate, whereas panamali refers to a familial link established by marriage. J. G. F. Riedel's 1835 compilation of notes from the Dutch archives (The Hague) reveals that, beside familial connections among the Luang people, there exist amicable links with individuals from adjacent islands.

Trader from Sulawesi also arrive to sell and buy seaweed at Luang Island. They provide food, clothing, and accommodation. The community purchases dried seaweed, allowing the residents of Luang Island to avoid traveling to the regency capital or Ambon city to sell their fish (Figure 23). They often remain on Luang Island for three months and return to Sulawesi once all products have been sold and the boats are loaded with seafood purchased for resale in Sulawesi. In the image shown in the upper left corner of the blue box, the people of Luang Island are engaging with traders from Sulawesi and purchasing essential goods. In the small green box located at the bottom left, the Sulawesi traders are tallying the seaweed acquired from a local Luang people.

The sea serves as an element of integration for the Luang people through maritime trade and commercial endeavors. The sea serves as an agent of unification that connects individuals across different islands. The degree of integration during development may differ geographically, as well as politically, economically, socially, and culturally, in relation to other regions of Indonesia (Lapian, 1992).

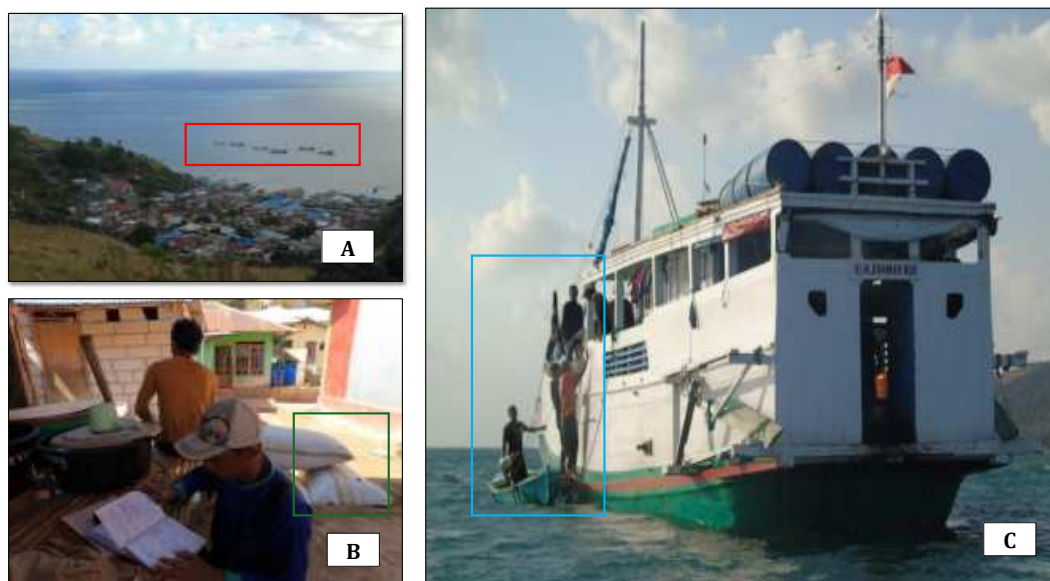


Figure 23: Ships belonging to traders from Makassar anchored at the port of Luang island. (A) Six ships belonging to traders from Sulawesi Island (Makassar City) are anchored in the waters of Luang Island (West Luang Village) (B) Two Makassar traders came to one of the houses of a resident of Luang Barat village to buy dried seaweed, and (C) Several men from Luang Island came to buy rice on a boat belonging to a Makassar trader.

Source: Results of field observations in 2022 & 2023.

The Luang people are not limited to a small bay or narrow strait in their pursuit of livelihoods as fishermen. Nonetheless, with minimal transportation and maritime technology (Hans, 1993; Horridge, 1981; Kissiya & Biczó, 2023; Wallace, 2014), their endeavors can reach distant waters. Meanwhile, specific political (Bernadie, 2003; Hall, 2019), cultural (Lapian, 2017) and economic (van Leur, 2018) factors could expand their areas of influence, including smaller entities into a broader sphere of influence. The Luang language has indeed been disseminated to many adjacent islands. Consequently, the language and culture were disseminated to the locations they reached (Chomsky, 1986; Couper-Kuhlen & Selting, 2017; Das, 2016).

2.7. Traditions

Luang Island, like many other regions, maintains a wide range of distinctive traditions that have been handed down through generations and are still actively preserved by the local community. The present discussion, however, does not attempt to catalogue every custom; it focuses instead on practices directly related to the *Hygeralai* procession. Moreover, traditional cuisine is considered here as well, for in Luang culture local dishes function not merely as sources of nutrition, but as symbols that reflect the community's relationship with the natural environment in which they reside.

2.7.1 Chew-Betel Nut

The community on Luang Island continues to preserve these traditions, which remain an integral part of their daily lives. One notable tradition is the practice of chewing betel nut (*sirih pinang*), which holds symbolic significance in kinship relations, particularly between a daughter-in-law and her mother-in-law, a practice referred to as *Nyoli*. For instance, a married woman is required to own a betel nut container as part of *Nyoli*, symbolizing her respect toward her mother-in-law. When the mother-in-law visits, the daughter-in-law must present the betel nut container for her use. Furthermore, the daughter-in-law is expected to sit with her mother-in-law and join her in chewing the betel nut. If the daughter-in-law does not chew betel nut, she is still expected to accompany her mother-in-law and engage in conversation as a gesture of respect. This tradition continues to be upheld in the Luang community. Interestingly, the practice of

chewing betel nut is not limited to women; men and even young children, as young as six years old, also partake in this tradition. Some children even bring betel nut containers to school to chew during recess¹⁷.

In addition to signifying courtesy within domestic relations, betel quid occupies a central role in the *Hygeralai* ritual complex. Here it is more than a botanical substance; it operates as a symbolic medium for strengthening social bonds, honouring customary law, and reaffirming the reciprocal relationship between humans and their maritime environment.

It should be emphasized that within the Luang *antaran* tradition, the term *siri-pinang* does not invariably denote betel leaves and areca nuts in the literal sense. In everyday practice, *siri-pinang* functions metonymically, designating the entire gift package presented as a sign of social participation, whether in contexts of bereavement or celebration. Such packages typically contain staple goods sugar, rice, and tea (*yola*) along with other items deemed useful to the host. Accordingly, the expression *siri-pinang* underscores its symbolic role as an emblem of involvement and solidarity rather than the physical presence of betel ingredients alone.

2.7.2 Sopi Drinking

The practice of drinking sopi on Luang Island constitutes a cultural expression imbued with profound social and symbolic meanings. Sopi a traditionally fermented and distilled beverage derived from the sap of the *koli* palm (*Borassus flabellifer*) functions not merely as a consumable drink, but as a key mechanism for reinforcing social cohesion and affirming customary relational structures. In a variety of ritual and ceremonial contexts ranging from *Hygeralai* rites and extended-family deliberations to inter-group conflict resolution and mourning observances marking the death anniversaries of kin sopi serves as a symbolic medium that signals unity, consensus, and respect for the prevailing social order.

The practice of drinking sopi on Luang Island is typically carried out in a rotational sequence among participants, reflecting a principle of egalitarianism that nevertheless remains

¹⁷ The data obtain where Field observations and interviews. A. S, female, 45 years on, 19 July 2022. C.S, female, 48 years, on 15 July 2023. N. P, male, 40 years, 28 July 2022, L. S, male, 57 years, on 10 September 2023. D. W, male, 48 years, 50 years, August 2022. O. L, male, 50 years, 8 September 2023. L. S, male, 38 years, 30 August, 2023. K. L, 53 years, female, 5 September 2023. C. P, female, 50 years, , 1 August 2023. W. M, female, 51 years, on 20 August 2023. K. M, 60 years, female, on 2 September 2022. B. M, male, 56 years, on 8 Oktober 2023.

framed by age and customary status. Although all community members are entitled to partake, the first turn is conventionally accorded to customary authorities or senior Figures as a gesture of respect for their symbolically and spiritually grounded authority. This ordering indicates that, while egalitarian ideals are upheld, deference to the established hierarchy is maintained. The rotational procedure not only strengthens interpersonal bonds but also reinforces social integration within the community, with *sopi* functioning as a medium for reciprocal sharing and collective solidarity. Thus, *sopi* is more than a beverage; it serves as a cultural instrument for preserving and communicating communal values, while simultaneously consolidating wider social ties in Luang society. In this way, a sense of togetherness is fostered even as the prevailing social structure is preserved through respect for elders and the customary positions each individual occupies within the social circle.

Although the practice is predominantly undertaken by adult men, its execution is tightly regulated by social and customary norms governing timing, setting, and eligible participants. Deviations such as consuming *sopi* outside ritual contexts or indulging in excessive intake are construed as infringements on collective values safeguarded by the community. Accordingly, the *sopi*-drinking tradition on Luang Island cannot be reduced to an instance of alcohol consumption; rather, it must be understood as an integral element of a broader cultural system and social structure. The practice embodies principles of kinship, deference to customary law, and the mechanisms through which the local community negotiates identity and social continuity within an inherited cultural framework.

2.7.3 Food

In addition to symbolic consumption practices such as betel chewing and *sopi* drinking, Luang Island's culture is vividly expressed through its repertoire of traditional foods. Accordingly, the following discussion shifts from ritual beverages to the culinary sphere, examining how local dishes serve not merely to meet nutritional requirements but also to embody significant ecological dimensions.

Before the people of Luang Island came to know rice as their staple food, like other regions in Indonesia, they relied on corn as their main food source. In addition to corn, fish and other marine products were also an essential part of their diet. When rice became more familiar,

the community continued to consume corn. Typically, they would cook rice mixed with corn and add leaves such as papaya leaves, moringa leaves, or cassava leaves. Boiled cassava was also a common food item. The cassava they used was dried cassava, which could be stored for a long time. As for fish, it was prepared in a simple manner, usually by boiling it with aromatic leaves known as "kemangi leaves" (basil), without adding any other seasonings. These kemangi leaves grow naturally in the mountains of Luang Island.

There are certain plants that outsiders to Luang Island do not consume, but the people of Luang do. For example, the roots of *lamun* (*Zostera marina*) plants, a type of seagrass that grows abundantly in almost all the waters around Luang Island, are used as vegetables. The *lamun* is harvested, its leaves are removed, and the roots are cleaned, grated, and then mixed with grated coconut¹⁸. There are also leaves from certain trees (whose names are unknown) growing on the land of Luang Island that are harvested and processed into vegetables. The *koli* fruit is another popular dish and was even considered a staple food alongside corn before rice became available. Typically, *koli* fruit is eaten raw, boiled, or roasted and served with fish and coconut. Additionally, seaweed is used as a fresh vegetable and is prepared in a very simple way, mixed with basic seasonings without being cooked (Figure 24).



Figure 24: Some kind of the Luang food
Source: Authors documentation.

¹⁸ *Coconut kukur* refers to a coconut whose flesh is scraped using a tool called *kukurang* to separate the coconut meat from the shell. However, the resulting shavings are larger and coarser compared to those produced using a regular coconut grater..

Pork, goat meat, and turtle meat are staple dishes traditionally served during various cultural ceremonies on Luang Island, such as roof completion ceremonies, house construction events, funerals, the launching of motorized boats (*bodi*), and weddings. These animals are slaughtered and prepared to provide meals for families attending the events. Additionally, dried corn, a staple food for the community, is typically preserved using ash from buffalo manure.

Since ancestral times, the people of Luang Island have upheld a tradition of paying fines as a form of accountability for wrongdoing. This tradition is applied when individuals commit offenses, such as speaking disrespectfully to elders or showing a lack of respect toward village officials or the village head. The fines include one pig, one buffalo, a jar of *sopi*, 593.56 EUR in cash, and sometimes gold in the shape of a crescent moon.

2.7.4 Fishing

The entire community of Luang Island relies heavily on marine resources, both as capture fishermen and seaweed farmers. Based on interviews and direct observation in the field, it was found that almost all community members, including children, women and men, have the ability to drive boats and operate boat engines. In addition, they also have strong local knowledge of sea water conditions, including the ability to read tidal cycles and weather changes, which form the basis for determining when to leave and return from fishing. The fishing traditions of the Luang people are strongly influenced by the rhythms of nature, especially the tidal cycle. When the tide recedes, they will head to shallow water areas that are believed by local knowledge to be the gathering places for fish. The catch from these shallow areas is generally not for sale, but for daily consumption, and these areas are usually the domain of women and children, who take an active role in the collection of marine products such as fish and octopus.

Meanwhile, there is also a tradition of collective fishing called *barmaeng tali*, where young men living in close proximity work together to comb shallow water areas using nets or simple fishing gear, with the proceeds divided equally. For larger-scale fishing activities, which are sold to buyers from outside the island, fishers travel to more distant marine areas such as Wekenau Island and Metiamarang. The community's spatial and ecological knowledge of these

areas is passed down through generations and forms part of their traditional ecological knowledge system (TEK). As such, the activities of fishers in Luang Island not only demonstrate an economic relationship with the sea, but also reflect complex social, cultural and ecological interactions, which continue to live on in the daily practices of the community. The geniuses of coral reef fishers caught by Luang Island fishers as illustrated in (Table 4).

Table 4 :Fish species caught in shallow and deep areas of Luang Island

Type of Fish	Scientific Name	Perpous
Garopa Fish	<i>Epinephelus spp.</i> , <i>Plectropomus spp.</i>	Sold to buyers from China and Hong Kong who come to Luang Island
Red Snapper	<i>Lutjanus campechanus</i> , <i>Lutjanus argentimaculatus</i>	Sold to buyers from China and Hong Kong who come to Luang Island
Humphead Wrasse	<i>Cheilinus undulatus</i>	Sold to buyers from China and Hong Kong who come to Luang Island
Rabbitfish	<i>Siganus spp.</i>	Consume, sell and make salted fish (dried fish)
Giant Trevally	<i>Caranx ignobilis</i>	Sold to buyers from China and Hong Kong who come to Luang Island
Ribbonfish	<i>Trichiurus lepturus</i>	Sold to buyers from China and Hong Kong who come to Luang Island
Golden Trevally	<i>Gnathanodon speciosus</i> , <i>Carangoides spp.</i>	Sold to buyers from China and Hong Kong who come to Luang Island
Mangrove Jack	<i>Lutjanus argentimaculatus</i>	Consume, sell and make salted fish (dried fish)
Pufferfish	<i>Tetraodontidae spp.</i>	Meanwhile, some species are consumed and used as bait
Parrotfish	<i>Scarinae spp.</i>	Fairly high in local markets and culinary tourism
Skipjack Tuna	<i>Katsuwonus pelamis</i>	Sold to buyers from China and Hong Kong who come to Luang Island
Ikan Tenggiri (Spanish Mackerel)	<i>Scomberomorus commerson</i>	Sold to buyers from China and Hong Kong who come to Luang Island
Ikan Selar (Yellowstripe Scad)	<i>Selaroides leptolepis</i>	Consume, sell and make salted fish (dried fish)
Ikan Tuna (Tuna)	<i>Thunnus spp.</i>	Sold to buyers from China and Hong Kong who come to Luang Island

Source: interviews and field participation observations 2022 & 2023

In addition, the people of Luang Island also practice Mensyari and Rhulu, maritime practices carried out during low tide, especially by women and children. In this activity, they explore coastal areas and shallow waters to collect various marine products such as snails, small fish, octopus, and other biota, using simple tools such as buckets or even bare hands. The catch from this tradition is generally utilised for the family's daily consumption needs, not for sale. The Mensyari tradition not only reflects subsistence activities, but is also a form of traditional ecological knowledge (TEK) that reflects the community's understanding of the tidal cycle, the behaviour of marine biota, and the management of coastal spaces for generations. This activity also serves as a means of intergenerational knowledge transfer, where adult women guide children to recognise types of marine life and safe exploration zones. In the social dimension, Mensyari reinforces the division of gender-based roles, where women and children manage coastal areas, while adult men go to sea to deeper waters. This tradition shows how the community maintains a balance between resource utilisation and ecosystem preservation, while strengthening their ocean-based cultural identity.

Meanwhile, *Rhulu* is a fishing practice that takes place at night, generally when the moon is bright and the tide is low. In this tradition, fishermen, especially young men and adults, explore shallow waters while flashing fish using torches or lamps, then catch them with spears or other simple tools. *Rhulu* requires expertise in reading fish movements and nighttime water conditions, and is part of local ecological knowledge passed down through generations. The catch is usually for household consumption, although it is sometimes sold. In addition to being a selective method of utilising marine resources, *Rhulu* also has a social function, as it is a moment of togetherness and strengthening solidarity between youth. Within the framework of the social-ecological system, this tradition shows how local knowledge directs fishing practices that are sustainable and in harmony with natural conditions, and strengthens the collective identity of the people of Luang Island as a maritime community, for more details illustrated in (Table 5).

Table 5: Mensyari and *Rhulu* Traditions

Aspect	<i>Mensyari</i>	<i>Rhulu</i>
Implementation Time	When the tide is low, usually in the morning	At night, when the moon is bright and the tide is low
Key Actors	Women and children	Young and adult men
Activity Location	Shallow coastal areas	near the village Shallow water, a bit far from the settlement
Tools Used	Bucket and gloves	buckets, simple tools Torches or lamps, spears, and other traditional fishing tools
Type of Catch	Conch, fish, octopus, marine life for household consumption	Fish for household consumption or sold in small quantities
Main Functions	For family daily consumption	For daily family consumption
Socio-cultural Values	Intergenerational knowledge transfer, gender roles, ecological education	Strengthening youth solidarity, ecological knowledge at night
Ecological Value (TEK)	Local understanding of tides, coastal zoning and marine biota	Understanding fish behavior, seasons, and the right time to catch fish
SES Relevance	Showing socio-ecological interactions that are seasonal and time-based	Showing seasonal and time-based socio-ecological interactions

Source: Based on research results 2022 & 2023

2.8. Social Structur

The social structure on Luang Island is consist of three structure units: *matarumah*, *luwu*, and *leta*.

2.8.1 Matarumah/Rumatau

*Matarumah*¹⁹ consists of two syllables: *mata*, which means "eye," and *ruma*, which means "house." *Matarumah* can be translated as "mother house" or core. Another name commonly used by the Luang people to refer to *matarumah* is *rumatau*, which is also made up of two syllables, *ruma*, which means "house," and *tau*, which means "content." The Luang people interpret *rumatau* as residences inhabited by individuals of the same descent or ancestor. In addition to *matarumahh* and *rumatau*, the Luang people use the term *matarumahh*. According to the description of *matarumah* or *rumatau* above, *Matarumah* / *rumatau* / in the concept of the

¹⁹ The inhabitants of Luang Island follow the mother's lineage (matrilineal), all property is controlled by women (matrihat), and following marriage, the custom is to dwell in the wife's familial milieu (matrilocal).

Luang people is a genealogical unit or lineage (Pritchard, 1967) and its membership is organized based on the mother's lineage²⁰ as can be seen in (Table 6).

Table 6: The names of matarumah/Rumatau on Luang Island.

Name of <i>Matarumah</i>	
East Luang Village	West Luang Village
<i>Miru, Wanata, Wolonteri, Saleky, Kanety, Pitna, Alop, Palmelay, Kuwara, Leha, Madely, Minuk, Noryata, Leha, Okra, dan Sopacua.</i>	<i>Miru, Hayer, Palpialy, Saleky, Wolonteri, Lathupun, Medaupun, dan Leunupun.</i>

Source: Own interpretasi based on the study findings in 2022 and 2023

Table 1 shows that Luang Island contains 24 *matarumah* spread across both villages. East Luang has 16 *matarumah*, while West Luang village has 8 *matarumah/rumatau/* is a stem cell that helps to build communities on Luang Island. Figure 25 shows one example of *matarumah*.

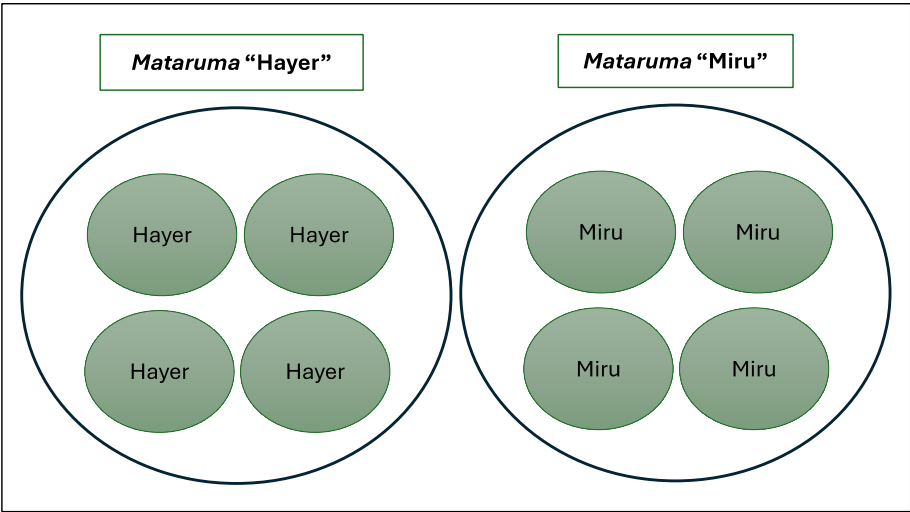


Figure 25: Matarumah in the community of Luang Island.
Source: Own-created based on research findings in 2022 & 2023.

²⁰ *Matarumahh* is the last name that follows the first name. According to the author's interpretation, the *matarumah* term same with the *fam* term in other place in Maluku. It is derived from the word family, which signifies family. It also derives from the Dutch family name.

Figure 25 shows that each *matarumah* comprises several families connected by blood relations, and each family is led by a head of family. The *matarumah* is perceived as a social structure by the Luang community, as it comprises various statuses (father, mother, and children) that establish an organized network of social relationships. Does the unity of the *matarumah* disintegrate when its members pass away or relocate? When members of a *matarumah* pass away, the quantitative strength of the group diminishes; however, qualitatively, its cohesion is preserved and continues to be upheld by the remaining members. Conversely, those who relocate to other areas (outside Luang Island) tend to exhibit a diminished sense of familial attachment.

The continuity of social networks within *matarumah*, as part of the social structure in Luang Island, remains preserved despite the passing or relocation of some of its members. In relation to this, Radcliffe-Brown, one of the key Figures in structural-functional anthropology, his concepts relevant in understanding the social dynamics in Luang Island, particularly in maintaining social networks within *matarumah*. Radcliffe-Brown argued that social structures are functional and enduring, even when individuals within them undergo changes due to death, migration, or other factors. This principle aligns with the reality in Luang Island, where *matarumah*, as one of the main pillars of the social structure, continues to exist despite changes in its members. The social functions and kinship relations within *matarumah* persist, passed down to the next generations, and remain a crucial element in maintaining the social balance of the community. Therefore, although Radcliffe-Brown's theory was developed during the classical era of structural-functionalism in cultural anthropology, its principles remain relevant in explaining how the social structure in Luang Island endures and adapts to changing times. (Radcliffe-Brown, 1918).

On the other side, *matarumah* will cease to exist if all members of the family die and no one remains alive; in this situation, the Luang people refer to it as *matarumah linyap* or *tutu matarumah* (Pritchard, 1967).

2.8.2 Luwu

Luwu is a significant component of the social structure of the Luang community, formed based on both territorial and genealogical factors. A *luwu* grounded in genealogical factors consists of *matarumah* with blood relations who reside together in a large communal house. In

contrast, a *luwu* established on territorial factors comprises *matarumah* that are not blood-related but inhabit the same territorial area. The formation of a territorially-based *luwu* typically occurs when the number of *matarumah* members within a genealogically-based *luwu* grows beyond the capacity of the shared communal house. As the number of inhabitants increases, the available space within the house becomes inadequate, resulting in overcrowding and triggering various internal issues, such as limited sleeping quarters, cooking facilities, and other spatial needs. In response to these challenges, some *matarumah* members express a desire to leave the communal house and establish independent residences outside the main house. However, this process is only carried out after obtaining approval from their *upu* (the leader of the *matarumah*).

Gradually, more *matarumah* members were dispersed from the core *matarumah* and established new homes in other regions outside the core *matarumah* surroundings. In this new territory, they were joined by additional *matarumah* members. To reduce issues in the territory, they felt compelled to construct a group with social order, solidity, and organization, so from this point, *luwu* was established territorially (Table 7).

Table 7: *Luwu* names and combination *matarumah* are incorporated

No	Name of <i>Luwu</i> in East Luang Vilage	Name of <i>Matarumah</i>	Name of <i>Luwu</i> in West Luang Vilage	Name of <i>Matarumah</i>
1	<i>Laupnu</i>	Kanety, Pitna, Alop, Palmelay dan Kuwara	<i>Horupun</i>	Miru, Hayer dan Palpialy
2	<i>Pepupnu Traupnu</i>	Noryata, Leha, Okra, dan Sopacua.	<i>Catalupun</i>	Saleky dan Wolonteri
3	<i>Teprulu Rehiara/Gerlorna</i>	Leha, Madely, Minuk dan Kanety.	<i>Leunupun</i>	Lathupun, Medaupun, dan Leunupun
4	<i>Pupgeni Maihoka</i>	Wanata, Miru, Wolonteri, dan Saleky.	-	-

Source: Own analysis based on the results of the 2022 & 2023 study.

Table 5 reveals that Luang Island has seven *luwu*, each with their own name and distribution; four are in East Luang Village and three are in West Luang. Each *Luwu* member possesses at most five *matarumah* in Luwu Laupnu, Pepupnu Traupnu, and Teprulu Rehiara/Gerlorna, all of which are in the hamlet of East Luang. Catalupun *Luwu*, located in the settlement of West Luang, has the fewest members. For more information on the geographical and geneological combinations of *matarumah* in *Luwu*, (Figure 26).

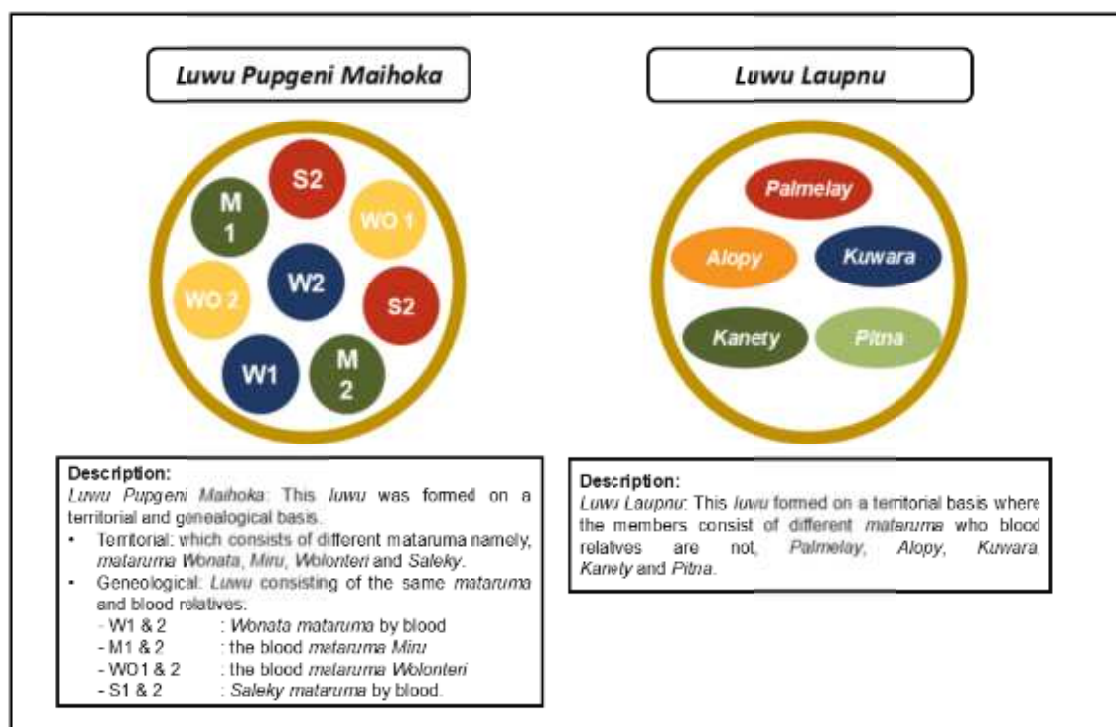


Figure 26: Combination of numerous *matarumah* in *Luwu*,
 Source: Own-created based on research findings in 2022 & 2023.

Figure 26 depicts how each *luwu* on Luang Island is made up of numerous *matarumah* of the same descent or blood, and vice versa. For example, in the circle of *luwu Pupgeni Maihoka*, the *luwu* is built using territorial and geneological elements. The land is divided into four *matarumahs*: *Wonata, Miru, Wolonteri*, and *Saleky*. On the geneological, it has some of the same and inbred *matarumah*, including *matarumah Wolonteri 1 and 2, matarumah Miru 1 and, matarumah Wonata 1 and 2, and matarumah Saleky 1 and 2*. The *luwu* circle image of *Laupnu* shows that the members of the *luwu* are territorial elements with various *matarumah*. The pictures in the two circles above show that the territorial aspect dominates the construction of a

luwu (Pritchard, 1940b). Each *luwu* has a leader, who is usually nominated by persons of native *matarumah* descent who have traditionally ruled other *matarumah*. For example, *luwu* Pupgeni Maihoka's head must originate from *matarumah* Miru, Wolonteri, or Saleky. This *luwu* chief will represent its constituents in the *adat* government structure. This is generally relevant, and the regulations are unwritten but mandatory.

2.8.3 Leta

Leta is a territorial alliance consisting of several, at least three *Luwu* (Figure 27).

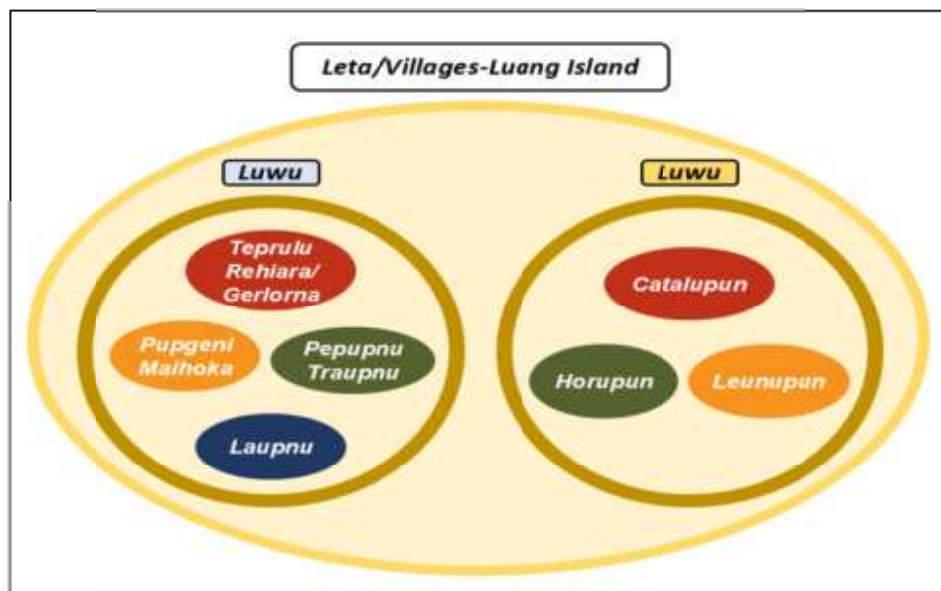


Figure 27: The combination of several Luwu forming a Leta
Source: Own-created based on research findings in 2022 & 2023

Figure 27 clearly shows that *leta* is one of the highest and greatest components of Luang Island's social structure. Leta had a leader named "raja", however, in this task, the leader is utilized. The leader of village is usually aided by the *luwu* leader, the *matarumah* leader, and several other members of the *adat* government structure. The social structure of the community on Luang Island is still being established daily. From the kinship that rules their social life to the

most extensive social life in a complex *leta*. The Luang people's social structure continues to serve as the foundation for their actions today.

Based on the discussion above, the social structure of the Luang community is formed through a complex kinship system. This system places kinship relations at the core of social organization, which is structured into key groups such as *matarumah*, *luwu*, and *leta*. The social structure is not solely based on biological relationships but also plays a significant role in strengthening community solidarity within the Luang society. Furthermore, it supports economic sustainability through the communal management of natural resources, such as marine products. Moreover, this social structure functions to preserve the cultural identity of the Luang community by ensuring that cultural values and traditions, passed down through generations, are maintained to this day. One example is the rule that the village head must come from a *matarumah* with royal lineage.

The social structure of the Luang community serves as a crucial mechanism for resolving internal conflicts, facilitated through mediation conducted by traditional elders within the *matarumah* and *luwu*. Conflicts involving land disputes, breaches of social norms, marital issues, and matters occurring at the levels of *luwu* and *leta* are addressed through family deliberations rooted in *matarumah* and *luwu* kinship ties, with the involvement of *leta* leadership. While the social structure remains a vital foundation of the Luang community's social system, it is not immune to challenges brought about by the influences of globalization and modernization. Despite the community's relatively isolated geographic location, these influences may penetrate through advancements in technology, the presence of outsiders, and children who pursue education outside Luang Island. Upon their return, they often introduce new ideas or changes that have the potential to influence the existing social system.

CHAPTER III : MATERIALS and RESEARCH METHODS

3.1. Materials

In the study of *Hygeralai* in Luang Island, the caste system and customary governance structure are positioned as important components in the research material, as they provide a deeper understanding of the dynamics of local wisdom-based marine resource management. The caste system in this region not only reflects social hierarchy, but also serves to regulate the distribution of rights, responsibilities, and roles of individuals and groups in natural resource management. Certain groups within the caste structure have symbolic and practical authority in the application of *Hygeralai*, including in the decision-making process, the implementation of traditional rites, and the imposition of sanctions for rule violations. On the other hand, the customary government structure is the institutional foundation that supports the *Hygeralai* system. The role of customary leaders such as the raja (customary head), kepala luwu, and customary elders is central in ensuring the continuity of this practice while maintaining community compliance with customary norms. Therefore, the relationship between the caste system and customary governance structures cannot be separated from the context of *Hygeralai*'s operationalisation, as both illustrate the local social and political dimensions underlying the community-based resource management system. In this study, these two elements are used as the main ingredients to examine how customary social and institutional structures sustain *Hygeralai* in the midst of ongoing social and environmental changes.

3.2. Caste System

As previously stated, the basic parts of social structure includes the people or persons engaged in social activities. A social structure is also defined by how people are arranged with one another. In addition to the previously outlined components of Luang Island's social structure, there is also social stratification. It is clear that in *luwu*, there are *matarumah* with various roles. According to research findings, the *kasta*²¹ system is founded on bloodline and authority. The

²¹ Division of society in Luang Island by class or classifications

caste system on Luang Island is divided into three groups: *marna*, *whura*, and *ata w'ara* (Figure 29), and table 6 for a description.

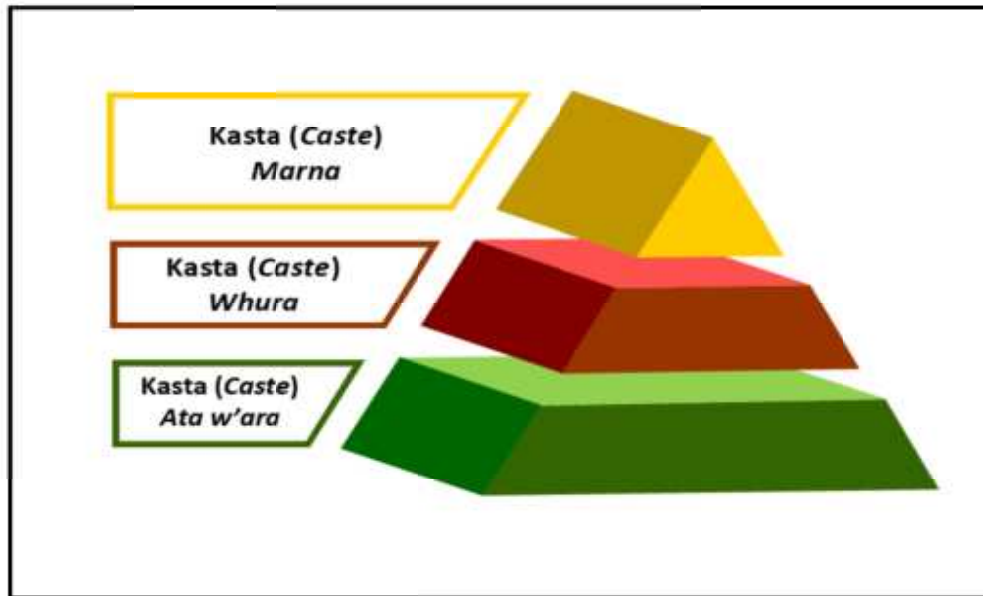


Figure 29: Caste System in the Community of Luang Island
Source: create by own based on research findings 2022 & 2023.

Table 8: Caste System in the Community of Luang Island

No	Name of <i>Kasta</i> (Caste)	Level of <i>Kasta</i> (Caste)	Name of <i>Matarumah</i>
1	<i>Marna</i>	High Caste (Aristocrat, head of government, Landlord and head of <i>adat</i>).	Miru, Saleky, and Wolonter
2	<i>Whura</i>	Middle <i>Kasta</i>	<i>Matarumah</i> lain selain tiga <i>matarumah</i> di atas
3	<i>Ata w'ara</i>	Slave/Low <i>Kasta</i>	<i>matarumah</i> dari luar Luang Island

Source: study findings for 2022 and 2023

According to the graphic and table above, the Marna caste is the highest. This caste consists of land owners or rulers as well as people of noble lineage, and they serve as heads of government and traditional heads in Luang Island's customary government system. Other factions must follow everything controlled by the Marna Caste. There are various *matarumahs* in

the Marna Caste, including Miru, Saleky, and Wolonteru *matarumahs*, which are known as *matarumah parentah*²².

The *whura* caste represents the second or intermediate social class, composed of community leaders and traditional Figures. This group functions as part of a customary institution, encompassing representatives from all clans or house informants (*kapala luwu*) and *saniri-saniri* of the state on Luang Island. Their primary role is to support and facilitate the smooth operation of the customary governance system on the island. This caste includes clans other than the three principal clans mentioned previously.

The *ata w'ara* caste, the lowest on the island of Luang, was made up of acquired slaves and migrants. This group is known as the implementation group for all customary decisions and policies made by the two castes mentioned above after customary debates (in Luang). This caste was a slave purchased from outside Luang Island. If the slave buyer's name was Louis, the slave would be given a family name based on that name. For example, if the owner bought a slave named Louis, the slave's family name will be Louis.

What role does the caste system have in the Luang people's social lives today? The adoption of Christianity had an impact on the continuation of the caste system on Luang Island, as well as on the Luang people's way of thinking in response to the caste system. In God's eyes, everyone is equal and in the same position. The growth of Indonesia's democratic system has also had an impact on ensuring that everyone has the same rights and obligations under law (positive law), rather than customary law, standing the same height and sitting equally low. The persistence of this caste structure in the modern day generates many disputes, such as in the election of the King, especially when there are other *matarumah* who aspire to be kings but are not from the par *matarumah*; this may decrease space for other *matarumah*. Marriage between castes on Luang Island is likewise prohibited due to the potential for strife. Today, the caste structure is practically extinct, although it may still be recognized in Luang traditional ritual traditions, particularly *Hygeralai*.

²² The *matarumah* is the highest level of the Luang Island community's traditional governing organization. The *matarumah* can only offer themselves as leaders on Luang Island, whereas other tribes cannot.

3.3. *Adat* Government System and Structure on Luang Island

The structure of Luang society has a significant impact on the island's political system and structures. Furthermore, Luang Island's history is significant and serves as an archetype for the development of customary systems and governance. Furthermore, while the Dutch colonial never reached Luang Island, the influence of Dutch norms on the appointment and placement of traditional leaders in customary government structures colored the *adat* government system on the island. According to the interviews data, field observations, and literature reviews and also the archival tracking in Central Maluku shows that Luang Island adheres to the customary governance system the people of Luang Island are among Indonesia's indigenous peoples, (Leirissa, 1982), particularly in Maluku (Kissiya, 2004; Kissiya & Biczó, 2022). Luang Island's government follows the *adat* government system.

Traditionally, the residents of Luang Island lived in *leta*²³ on the mountain (Kissiya & Biczó, 2024). They are grouped as previously described in tiny groups of *mataruma* and eventually form a bigger area known as *leta*. The Customary Government system lacks modern government structures such as the executive, legislative, and judicial branches. However, the operations of the three governmental administrative institutions have operated naturally in the lives of indigenous peoples; only the governance system has not been documented (de Graaf, 1977; Effendi, 1987; Kutoyo, 1977; Leirissa, 1975, 1999). Before the enactment of Law No.5 in 1979, villages in Maluku were ruled by a “Raja”. (Rumphius, 2002; Tutupoho et al., 1991). Similarly, the picture below depicts Luang Island's *adat* government organization and structure. (Figure 30).

²³ *Old Village*

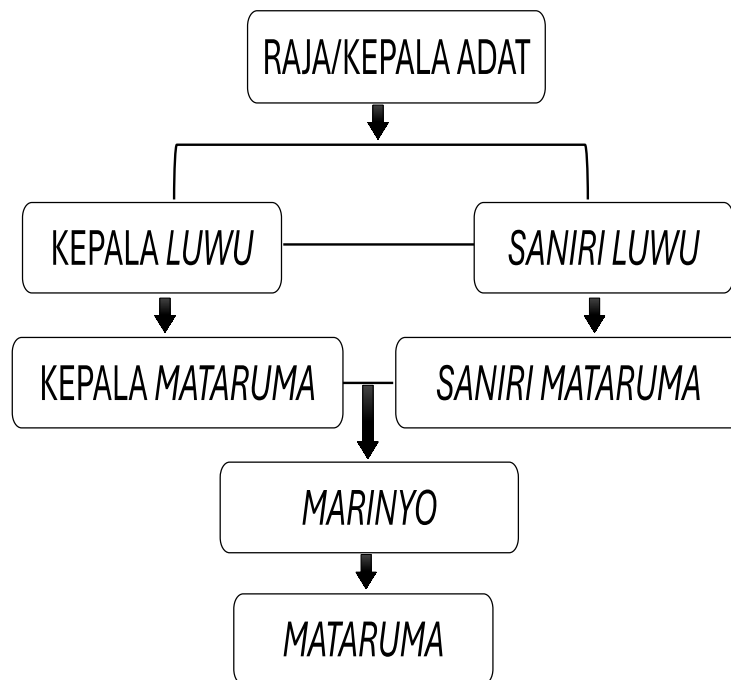


Figure 30:Adat (Customary) government structure on Luang Island
Source: Own illustration based on research findings and village archives from 2022

Figure 30 depicts the two letas on Luang Island, which are led by a “Raja” who is assisted by *adat* government institutions that manage the government, including the head of *luwu*, *saniri luwu*, the head of *mataruma*, *saniri mataruma*, and the *marinyo*. The allocation of tasks and functions for each can be outlined as follows. The Raja (pamerintah) holds the highest office in Leta/Negeri. The candidates for King were picked by the leaders of *Luwu* and *Saniri Luwu*. The candidate for king must come from the "Raja's lineage" or the parent's *mataruma*. The king's role was to lead the country for four years.

- a. Kepala *luwu* was appointed by the king to assist with government operations.
- b. Saniri *luwu* is a body of leta/state legislatures responsible for assisting in the establishment of the government. Aside from being a legislative body, this body is also responsible for electing the king under applicable customary laws. The Saniri Board is made up of *Luwu*-based officials such as the *kapitan*, traditional leaders, and landlords.
- c. The *mataruma* head assists the *luwu* head in controlling all *mataruma* members.

- d. *Saniri mataruma* assists and supervises *luwu* leaders in carrying out their tasks.
- e. *Marinyo*²⁴, A *marinyo* functioned as the King's emissary to the people. *Marinyo* will relay all actions or anything the king wishes to convey to the people by manually circling the *leta* / country and proclaiming the king's message and desire. Typically, before *marinyo*, a message is carried by yelling on every street corner in the *leta* / state context, ensuring that the entire community is aware. *Marinyo* would ring the gong to indicate that the monarch would announce to the people. Everyone understands the circumstance; when they hear the gong ring, no matter how busy they are, they must stop and listen to the message sent by this *Marinyo*. In addition, *Marinyo* is also in charge of carrying out other modest jobs. The preceding explanation raises the question of how to comprehend the relationship between the framework of Luang society, including the caste system, and customary governance as a basic social structure and system on Luang Island. They serve as a social network that governs the lives of the Luang people. If one of the structural units of Luang Island society fails, other units suffer as well. Vice versa, if there is a disruption in customary government units, others will be impacted. Their social function is motivated not just by individual wants, but also by the desire to sustain the existing social order. Thus, the social structure of the Luang community encompasses the entire network of social ties that exist there. Some sections are functionally related to one another. Each part is understood in terms of how it contributes to the overall balance of the system. The function of mutual assistance is critical in maintaining the Luang community's integrity as a whole. The interrelationship of social structural components found in the Luang community, such as the human body (Figure 31), illustrates a simple depiction of this analogy.

²⁴ A messenger from the Raja/Kepala adat/Lieder of the villages, a civil servant, or a *tabaos*. The data obtain where observation and interviews. L. K, 58 years, male, 11 August 2022. H. L, male, 40 years, 26 Juni 2023. K. L, male, 45 years, 13 September 2023. B. M, male, 48 years, 9 August, 2023. L.W, male, 50 years, male, 6 September 2022. P. M, male, 45 years on, 30 July 2023. P.L, male, 70 years, on 28 July 2023. T. L, male, 65 years, 17 Juni 2023 U. M, male, 38 years, 18 Juni 2023. L. K, male, 65 years, 8 September 2023. M. L, male, 50 years, 20 August, 2023. G.H, 60 years, male, 6 September 2022.

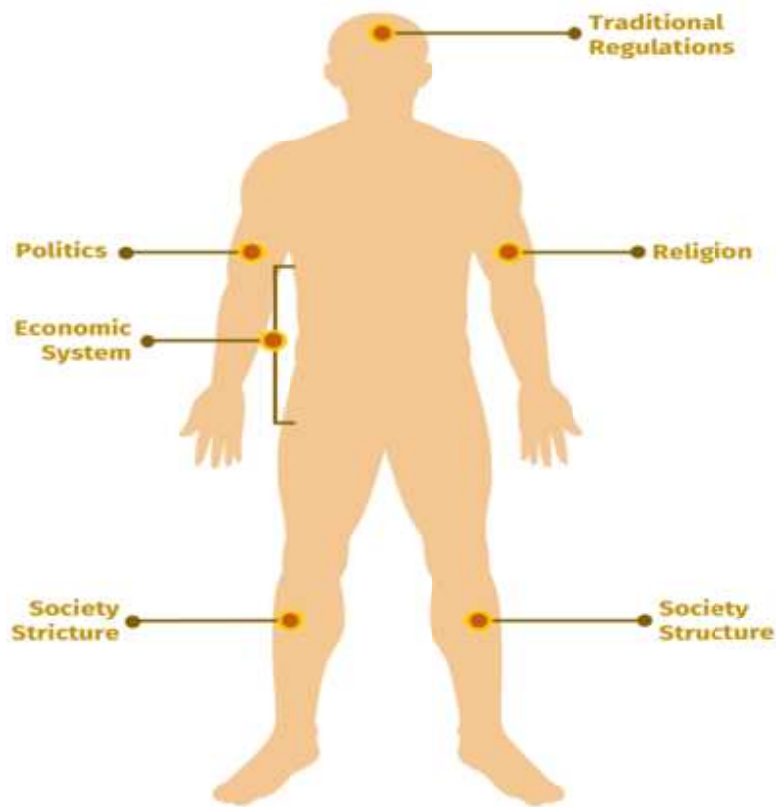


Figure 31: The Social Structure of Luang Island Society.
Source: own creation based on the findings of the 2022-2023 research.

Based on the field data obtained, it was found that, the social structure on Luang Island, as depicted by the analogy of human body, is not arbitrary. This is evidenced by the historical traces of oral tradition on Luang Island describing the union of two human bodies as a type of island unification, as well as the history of the island's social construction. Further discussion on this matter will be addressed in the following sections.

This event has become the fundamental notion and philosophy of the Luang people to this day, demonstrating that they are a unity similar to the human body. The social structure of the people of Luang Island may be seen on two scales: horizontal and vertical. The horizontal scale discusses structure and division, whereas the vertical scale discusses the division of structures,

which includes a hierarchy of the levels of the process of forming community structures on the left and right feet, the abdomen (economy), the hands of traditional organizations and churches, and the topmost part, which is a customary norm or rule.

Figure 31 is explained starting with the foot. The foot shows a community structure made up of three sub-units: *matarumah*, *luwu*, and *leta*. They are the smallest institution in the social structure of Luang Island society, despite being in the position of the feet, yet they play a significant function in the structure. Their primary function is to support other components in standing erect, moving normally, and maintaining the equilibrium of social structures. In the torso or abdomen, this sub-structure is both customary and social institutions that contribute to or impact economic factors in the community structure of Luang Island as well as impacting environmental sustainability on Luang Island²⁵.

On the other hand, there are two components, the politic²⁶ and trust component, which serve different functions. They, like the hands on the human body, perform intricate functions and play critical roles in their work. Their left-hand serves to manage, defend, and address every problem that arises in society from the traditional side. They are customary institutions with traditional leaders. Furthermore, right-handed and serve as a link between their ancestors and the Christian God (Jesus Christ). These are priests, elders, and deacons, who oversee traditional rites. The head is the topmost and greatest component of the Luang community's social structure, acting as the primary controller. The above-mentioned social structure units' operations produce customary rules and norms. They regulate the Luang people's social order and actions. Although unwritten, they tie the behavior patterns of Luang's indigenous inhabitants. From the explanation above, it is evident that the organization of the Luang Island community runs smoothly, much like a healthy creature. In carrying out their functions, the four components of this community

²⁵ L. K, 50 years, male, 11 August 2022. U. M, male, 40 years, 26 Juni 2023. B. S, male, 45 years, 13 September 2023. D. K, male, 48 years, 9 August, 2023. L.W, male, 50 years, male, 6 September 2022. S. P, male, 45 years on, 30 July 2023. M.S, male, 70 years, on 28 July 2023. D. K, male, 65 years, 17 Juni 2023 K. W, male, 38 years, 18 Juni 2023. M. W, male, 65 years, 8 September 2023. M. L, male, 50 years, 20 August, 2023. H.H, 68 years, male, 6 September 2022.

²⁶ What is meant by politics in the context of Luang Island is that customary institutions are not formal political bodies like political parties or state institutions. However, in practice, political elements are still present in traditional or informal forms. Politics in this context includes decision-making processes, power management, and the distribution of resources at the community level. Customary institutions play a vital role in appointing traditional leaders, resolving conflicts, managing the use of natural resources such as sea, and enforcing customary norms and laws.

organization work together. According to Radcliff Brown, the preceding description of the bodily image is translated into the community system in Luang Island (Figure 32).

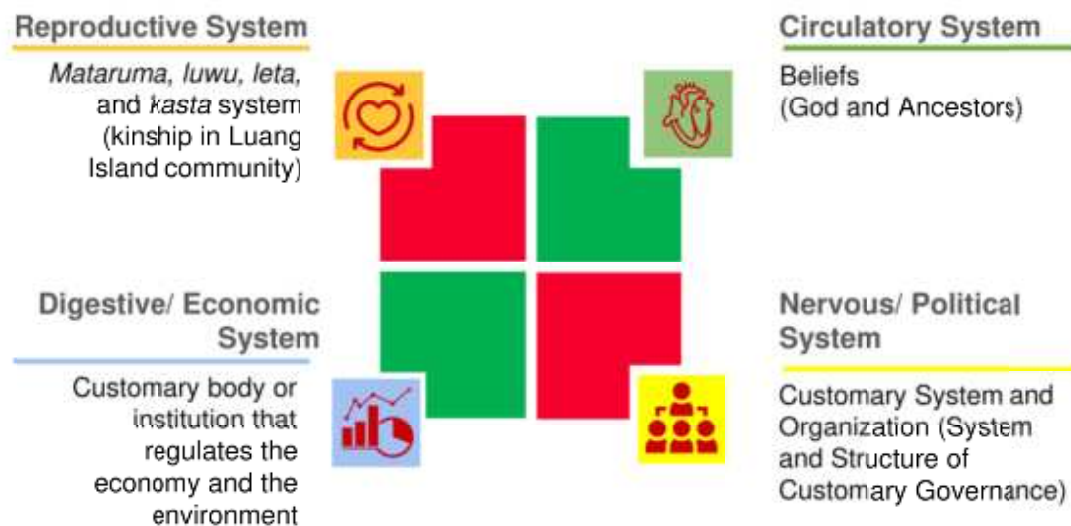


Figure 32: Luang Island's System of Society, based on 2023 data analysis and derived from Radcliffe Brown's System of Organisms (1950) (Radcliffe-Brown, 1950).

The illustration depicts the social system of the Luang community through the lens of the structural-functional approach developed by Radcliffe-Brown. Society is conceptualized as a biological organism, wherein each component functions similarly to organs within the human body. Within this framework, the concept of system reproduction refers to the mechanisms that ensure the continuity and regeneration of the Luang community as a cohesive social entity. Just as the human body requires cellular regeneration to sustain life, the Luang community relies on the creation of new generations to replace older ones, a process facilitated through birth.

In this context, the process of birth occurs within kinship relations that originate from *matarumah*, which constitutes the foundational structure of the social organization in Luang Island. This kinship system further develops into *Luwu* and ultimately forms *Leta*. These relationships extend beyond the reproductive system or familial ties involving fathers, mothers, children, uncles, aunts, grandparents, cousins, and nieces or nephews, each fulfilling specific roles. Instead, they function as an integrated system that contributes to broader and more complex structures, encompassing political, economic, cultural, and religious dimensions. For

example, an adult male within *matarumah* carries responsibilities as a father or elder brother, ensuring the care and welfare of his family. However, their roles are not confined to the domestic sphere; they also assume significant positions within the governance system of Luang Island, highlighting the multifunctionality of their social responsibilities.

The circulatory system in the human body functions to distribute blood, oxygen, and nutrients to ensure that each organ operates efficiently. In an analogous manner, the circulatory system within the Luang community represents the mechanisms by which essential elements—such as values, social norms, ethics, and regulations are distributed, exchanged, and sustained as the foundation of social life. Within this framework, traditional institutions and religious organizations (Protestant Christianity) play an integral and synergistic role. These institutions are tasked with embedding moral value systems and behavioral norms that govern both individual and collective actions, while simultaneously defining social rights, obligations, and communal responsibilities within the Luang Island community. These institutions function as cohesive forces that uphold social integration. Similar to how the human circulatory system maintains internal equilibrium, traditional and religious institutions regulate community behavior by enforcing social rules and moral sanctions, thereby ensuring conformity to established norms.

The digestive system converts food into energy essential for maintaining bodily functions. Metaphorically, within the Luang community, this concept reflects the mechanisms by which society processes and optimizes economic resources, particularly those derived from the marine environment, to ensure communal sustainability and collective prosperity. In this context, *Hygeralai*, as one of the traditional economic institutions, plays a significant role, actively engaging with environmental resources as a fundamental component of this system.

The digestive system serves not only to process economic resources but also to assimilate information, values, and innovations, incorporating them into the existing social structure. This process produces a range of outputs, including energy for sustaining social stability, cultural values, material wealth, and social norms, which are subsequently distributed across various components of society. This mechanism parallels the manner in which energy derived from food is circulated throughout the body to support the functioning of its organs.

The concept of the digestive system extends beyond processing economic resources, encompassing the assimilation of information, values, and new innovations, which are subsequently integrated into the existing social structure. Within this framework, *Hygeralai*, as a

traditional economic institution, assumes a pivotal role by actively engaging with environmental resources as an essential component of the system. This "digestive process" produces outputs such as energy to sustain social stability, cultural values, material wealth, and social norms, which are then systematically distributed across various elements of society. This mechanism parallels the manner in which energy derived from food is circulated throughout the body to maintain its functions.

The political system, analogous to the nervous system in the human body, functions to transmit signals, regulate responses, and maintain coordination among various components. Within the context of the Luang Island community, this system holds a crucial role. The political system acts as the central connector, integrating various elements within the social structure. As the central control mechanism, it manages interactions between leaders and the community, ensuring that all components of the social system such as the reproductive system, circulatory system, and digestive system operate in harmony. This coordination is achieved through the implementation of rules and procedures, much like how the nervous system maintains bodily equilibrium by regulating responses.

3.4. Research Methods

3.4.1 Research Framework

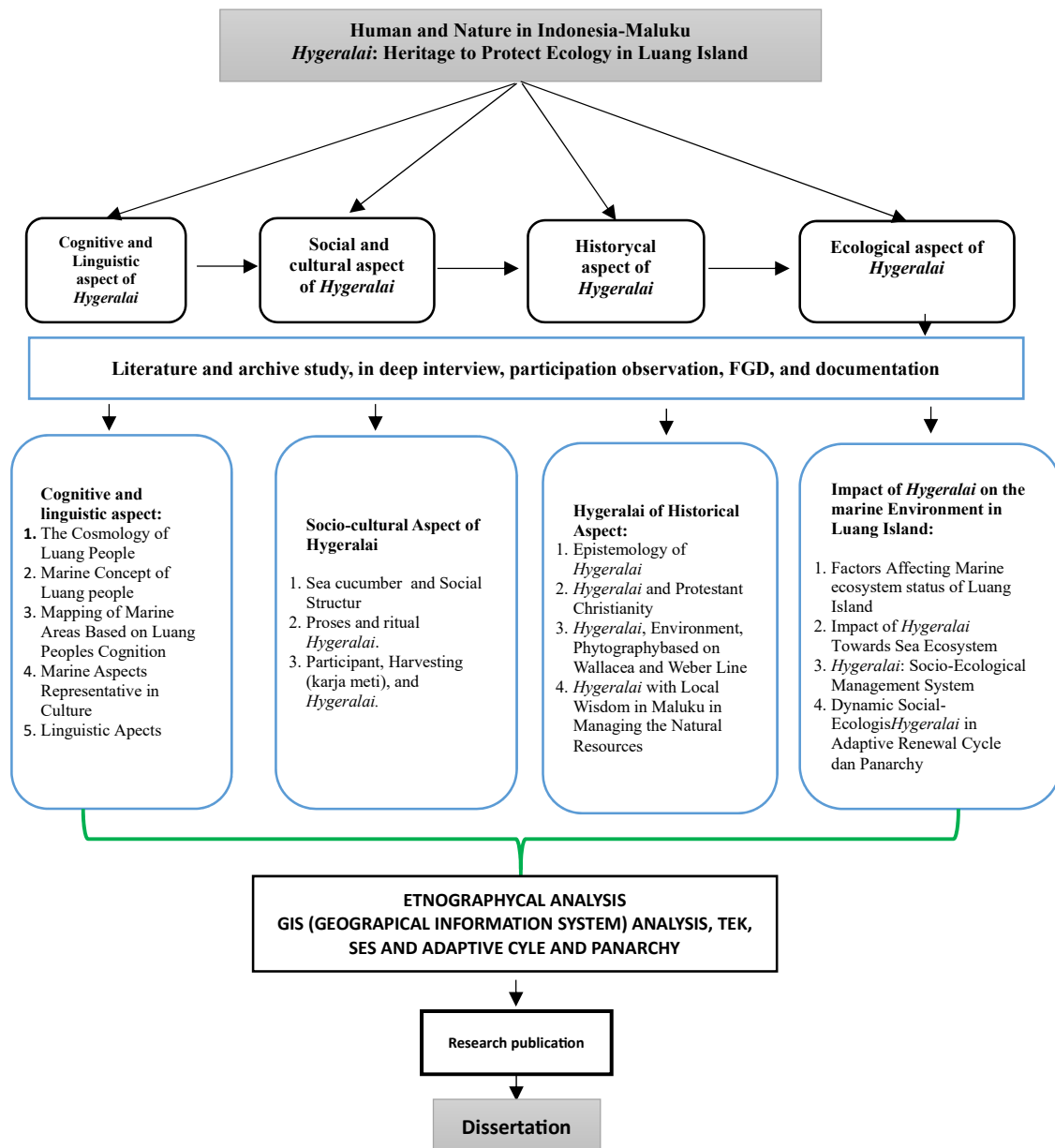


Figure 33: The framework of the research.
Source: illustrated by author, 2023

3.4.2 Research Design

This research was designed as a qualitative study using ethnographic methods and Geographic Information System (GIS) methods, and adopting an ecological anthropology approach, particularly within the framework of TEK. Integrating the methods of ethnography and GIS, these combinations can assist in addressing the research enquiries and goals of this investigation. The ethnographic method was used to deeply explore community practices, narratives and value systems related to their understanding of marine space, customary prohibitions, fishing season cycles, religious rites and local institutional structures. The research involved participatory observation, in-depth interviews, and documentation of cultural practices, including participation in ritual ceremonies such as the opening and closing of *Hygeralai* that function as part of a resource management system based on spiritual and social-ecological values.

While GIS data is a comprehensive system that encompasses geographic elements and attributes relevant to various forms of location information. This includes techniques such as remote sensing and cartographic information (Frank, 1988). The combination of GIS, ecological anthropology, and ethnography is highly appropriate for understanding the sociocultural and ecological aspects of the Luang Island community, which is located in the outer islands and is a coastal community. This interdisciplinary approach allows for a comprehensive analysis of the community's spatial and temporal perspectives. The utilisation of GIS data is essential for conducting spatial analysis of Luang Island physical characteristics and for visualising detailed ethnographic data. GIS has the capability to integrate spatial data related to Luang island with ethnographic information regarding the socio-cultural relationships of the Luang people with their environment. This research utilises GIS to facilitate the analysis and comprehension of the traditional mapping practices of the Luang people in marine environments. It focuses on studying their harvesting activities, known as *kerja meti* during the *Hygeralai* period. The research aims to uncover and comprehend the narratives that are concealed within the spatial and geographical aspects of the marine waters surrounding Luang Island. Furthermore, GIS has the capability to display marine regions that possess a significant abundance of natural resources.

The anthropological-ecological approach, particularly through the lens of TEK, offers a deeper understanding of how *Hygeralai* operates within the context of SES. *Hygeralai* functions not only as a system capable of resisting pressure (resistance) and adapting to change, but also

serves as a transducer that connects cultural values with the community's ecological practices. In this context, resistance refers to an internal regulatory mechanism that maintains traditional practices such as customary fishing methods, ritual ceremonies, and spatial zoning within thresholds that ensure overall system stability. As an adaptive system, *Hygeralai* demonstrates the capacity to adjust and evolve, both structurally and functionally, in response to environmental changes such as seasonal shifts, external pressures, or shifts in resource governance policies.

Within the SES framework, *Hygeralai* occupies a vital position as a mediator between society (the social system) and the marine environment (the ecological system). It shapes and guides human–nature interactions through customary norms, cosmological beliefs, and spatial use systems, all of which contribute to enhancing system resilience. Through *Hygeralai*, the people of Luang Island are equipped with the means to observe, respond to, and adapt to local ecological changes, while maintaining the sustainability of their marine resources. *Hygeralai* not only supports the ecological integrity of tropical coastal environments but also acts as a collective knowledge system that unites values, belief systems, and social practices in the face of uncertainty and environmental challenges. Therefore, *Hygeralai* stands as an essential component in sustaining resilience, adaptive capacity, and the potential for transformation within the social-ecological system of the Luang Island coastal community. This research was conducted in 2022 and 2023, each for a duration of 3 months.

3.4.3 Implementation of Research Ethics and FPIC Principles in Luang Island

In relation to the ethical aspects of research we refer to Free, Prior and Informed Consent (FPIC) which is a fundamental principle in the protection of the rights of indigenous peoples and local communities, including in the context of research. FPIC requires that any activity, project or research that involves the territories, resources or traditional knowledge of local communities must obtain their freely given, prior and informed consent. The term ‘free’ indicates that consent is given without external pressure, coercion, or manipulation. ‘Prior’ means that consent must be obtained before activities are implemented. While ‘informed’ indicates that all objectives, potential benefits, risks, and social and ecological impacts of the activity must be conveyed transparently and in a language that is easily understood by the community. (United Nations, 2008).

In the context of research on *Hygeralai* in Luang Island, the application of the principle of FPIC is particularly important as it concerns the collective rights of communities to their traditional ecological knowledge systems. Obtaining the consent of indigenous communities is not only a form of respect for their autonomy and sovereignty, but also a fundamental ethical and legal requirement in the practice of equitable participatory research. In addition, FPIC ensures that knowledge gained through research is not misused, and that communities have the right to refuse or withdraw their consent at any time, in accordance with applicable customary norms.

As a form of implementing the principle of FPIC in this research, researchers first reported to customary authorities before starting the entire series of research activities. Furthermore, a series of customary processes were followed, starting with the traditional welcoming of researchers and the official announcement made by *marinyo* (assistant customary leader) to all residents of Luang Island. This process signalled that the researcher's presence had been collectively accepted by the community and that the aims and objectives of the research were understood as something that did not harm or disadvantage the community. On the contrary, the community showed an open and participatory attitude, and provided active support for the smooth running of the research process in the field.

3.4.4 Sampling

In the research on *Hygeralai* as a TEK system of the Luang Island community, researchers used snowball sampling technique as an effective sampling strategy to reach informants who have in-depth knowledge of local cultural and ecological practices. This technique begins with selecting key informants, who become key informants in this study are the village head as well as the customary head, traditional leaders, religious leaders, women leaders and youth leaders.

Their selection is based on their strategic role in the social structure of the community. Traditional leaders are the primary custodians of customary values and norms directly related to *Hygeralai* practices. As symbolic and normative authorities, they have in-depth knowledge of customary rules, local history, and cultural natural resource management mechanisms. Religious leaders play an important role in reinforcing environmental values through spiritual narratives, linking nature conservation with moral and religious responsibilities. Youth leaders were chosen because they are agents of change who bridge traditional values and modern challenges, and are active in environmental education and conservation activities. Meanwhile, school principals have

a strategic role in transmitting local wisdom through formal education and instilling ecological awareness in the younger generation. As for women leaders, they contribute through domestic and socio-cultural roles, and play an important role in transmitting ecological knowledge to children. The involvement of these various Figures provides a comprehensive perspective and enriches the analysis of the sustainability of the *Hygeralai* system in the lives of Luang people.

In addition, supporting informants such as children aged 5-13 are also important. Data collection on children in *Hygeralai*'s research was conducted with a different approach from the methods used on adults, given the limitations of abstract communication and higher ethical sensitivity. Instead of passive interviews or observations, the researcher was directly involved in the children's daily activities, such as playing, swimming, or walking with them around Luang Island when the tide was low and the coastal area was open. Through this engagement, researchers created a non-formal, intimate and psychologically safe atmosphere, allowing children to express their views and knowledge of the ocean spontaneously and naturally. This approach allowed local narratives to emerge from the children about their experiences in *Hygeralai* practices, such as the zones they could and could not explore, their understanding of marine life, or the cultural stories they heard from their parents. With this method, data collection became more contextualised and experiential, while minimising the pressure that might arise in a formal interview situation. Researchers remained mindful of ethical aspects, such as obtaining informed consent, and ensuring that children's involvement was voluntary and not disruptive to their comfort.

Through the initial interviews, the researcher then asked the informants for referrals to find other relevant informants, such as traditional fishermen, *Hygeralai* ritual performers, or senior citizens and elders who hold local knowledge for generations. In addition, the selection of children as informants in *Hygeralai* research is based on the reason that they are considered as early recipients of ecological and cultural knowledge passed on through social interactions and community experiences. From a linguistic perspective, the age of 5-13 years is an active period of language development, so they naturally absorb local vocabulary including marine-related terms and customs. In addition, their involvement can be an indicator of the continuity of inter-generational transmission of *Hygeralai* values. Therefore, the participation of children not only enriches the data, but is also important for assessing the cultural and ecological resilience of the local knowledge system

By using snowball sampling technique, the process of selecting informants is done gradually through recommendations from the initial informants to the next informants who are considered relevant and have knowledge about Hygeralai. This technique allows researchers to reach individuals who are difficult to access directly, and obtain rich and contextualised data. The sampling process was stopped when the information obtained began to repeat and did not produce new themes, which signalled that the research had reached the point of data saturation. At this stage, additional informants no longer provided significant new information, so the researcher could conclude that the data obtained was sufficient to answer the research questions and support in-depth analysis.

3.4.5 Data Collection

The methods of data retrieval employed in this study are literature review including archives, interviews, observations, focus group discussion (FGDs) and documentation. In this section the data collection is presented based on five components which are also the questions in this research (table 9).

Table 9: Distribution of Data Collection in Research

No	Research components and objectives	Data collection technique	Informant/location
1	<i>Hygeralai</i> from cognitive aspect	• In-depth and unstructured interviews • Non-participatory observation	• Village leaders, traditional leaders, church leaders (pastors, deacons and elders), youth leaders, women leaders, and children aged 5-13 years old.
		•	•
	<i>Hygeralai</i> from Linguistic aspect	• In-depth and unstructured interviews • Interaction with young children aged 5-13 years old. • Non-participatory observation	• Village leaders, • traditional leaders, • Church leaders (pastors, deacons and elders), youth leaders and women leaders.
2	<i>Hygeralai</i> from social and cultural aspects	• In-depth and structured interviews • Focus group discussion	• Village leaders, • traditional leaders, • church leaders

		(FGD) • Participatory observation (getting involved in the event before the <i>Hygeralai</i> is opened, during the <i>Hygeralai</i> and when it is closed) • Interaction with young children	(pastors, deacons and elders), • youth leaders and • women leaders.
3	<i>Hygeralai</i> from a historical aspect	• Archival and literature studies • In-depth and structured interviews Field observation to settlement sites, old ones in the mountainous part, historical sites located on the mainland and in the sea waters of Luang island	• Leiden University, • Troppen Museum, • Koleksi Yan, • Maluku Museum, • Yayasan Keluarga Kaitupa, in Ambon. • Indonesia Geospatial Information Agency • Rautenstrauch-Joest Museum in Köln-Germany. • Museum für Volkerkunde und Vorgeschichte in Hamburg-Germany. • Village leaders, • traditional leaders, • church leaders (pastors, deacons and elders), • youth leaders and • women leaders.
4	<i>Hygeralai</i> from Ecological Aspect	• Literature riviiew • In-depth and unstructured interviews • Site observations to the marine waters of 10 small islands within the Luang Island petuanan both above sea and in the sea to see the ecological conditions and marine natural resources in physical and seabed structure of Luang Island waters. • Observation of coastal and terrestrial areas including forests to see if there is any gardening activity from the people of Luang Island, the types of plants, soil structure and availability of water sources.	• Village leaders, • traditional leaders, • church leaders (pastors, deacons and elders), youth leaders, women l • leaders, and school principals.

Table 6 indicates that the data on *Hygeralai* was not only acquired through the literature investigation. The fact that there is insufficient data available on Luang Island must be acknowledged. Ecological data can be acquired through reports and studies conducted by the ecological institution WWF Indonesia, the fisheries agencies of the Government of Indonesia, the Indonesian Geospatial Agency (for maps), and the Maluku Province Customs and Traditional Values Study Centre. Data was collected from various sources to support the research. These sources include studies on language (Taber & Kathy, 1989; van Dijk & De Jong, 1995) research on *Hygeralai* (Pannel, 1997), exploration of the culture of living with the Luang people (Karuna, 2012), investigation of fish and Sea cucumbers (Leha, 2020), as well as study of fish species in the Luang Island atoll (Mosse dan Huttubessy, 2023). In order to acquire historical and archival data, research was conducted at various German government organisations like (e.g., Rautenstrauch-Joest Museum in Cologne, the Ethnography Museum in Berlin, and the Museum für Volkerkunde und Vorgesichte in Hamburg) were visited. Beside that in Netherlands also like (e.g. KITLV, the Dutch archive office, the Maluku museum, the Tropen Museum, and Library of the Leiden University). Throughout the course of this investigation, several significant reference sources were identified, including Wilhelm Müller's unpublished reports and diaries (1913–1914) concerning Luang Island, printed historical manuscripts related to Luang, *Ambonsche Rariteikamer* by Rumphius which explores the Maluku region, as well as Riedel's works on the historical development of the area. To further support the analytical framework of this study, a diverse range of scholarly materials were consulted, including peer-reviewed journals, academic articles, digital media, research reports, and books. Collectively, these sources have contributed to the construction of a more coherent theoretical foundation and enhanced the conceptual linkage to the examination of *Hygeralai*.

The data from all research components were acquired through comprehensive and organised face-to-face interviews. The data from certain components was acquired through unstructured interviews. Both structured and unstructured interviews communicated a sense of authenticity and adaptability to both myself and the designated participants. This maintains a relaxed and stress-free atmosphere during the interview process. In this scenario, We had the

opportunity to pose the questions we had prepared to the informants without any hesitation. The informants, in turn, were able to respond to each question in a relaxed, adaptable, and unbiased manner.

Despite the flexible and relaxed nature of the interviews, they maintained a strong emphasis on focus and tried to obtain in-depth information. Every informant was required to offer truthful information. The purpose of this interview was to provide informants with the autonomy to acquire comprehensive information. The informants had comprehensive interviews to gain insight into, comprehend, and determine the thoughts, concepts, cultural, and social values of the Luang people regarding *Hygeralai*. This local knowledge has been passed down by their ancestors to preserve the natural environment and its resources. During the interview process, I thoroughly documented information by hand in a log book to prevent any potential data falsification.

The interview process was conducted in accordance with the conditions, timing, and location specified by the informants. The interviews were conducted at various locations, including the informants' residences, the beach, and the waters surrounding Luang Island. The location of the interview depends upon the arrangement made with the informants. In order to show respect for the time that the informants spent working to provide for their families, and with the goal of ensuring an expedient interview process, I made accommodations to fit their schedules. If we were to wait for their return from working at sea to conduct the interview process, they would lack the necessary time and focus for the interview. If there were maritime informants who were willing to being interviewed while actively engaged in their work, we would attentively shadow them aboard a motorised vessel from dawn until the completion of their duties. Due to my active participation in their job throughout the interview process, the fishermen generously rewarded me with a generous quantity of freshly caught *garopa* fish to bring home. Subsequently, the fisherman engaged in seaweed farming generously provided me with a few kilogrammes of dehydrated seaweed. However, I declined it as a gesture of respect towards them. We exchanged it by requesting young coconuts, which were typically stocked on their engine boat as food.

Multiple times, I shadowed informants and conducted interviews with them on two specific islands, notably Metiamarang Island and Kelapa Island. Due to the lengthy duration of the interview procedure, We failed to notice the sudden recession of the tide. Based on the

informant's estimations, the tide is expected to occur at approximately 2 am. Consequently, We had no choice but to rest for a few hours. The informant's calculation was proven to be accurate. The tide followed the expected schedule. Ultimately, We collectively embarked on a separate speedboat and journeyed for approximately 2-3 hours to return to the main island (Figure 34).



Figure 34: Metiamarang Island.
Sumber: Bing maps (2024) digitized in ArcGIS by authors.

The interviews were carried out in several locations, including the informants' homes, besides the beach, and in the sea waters of Luang Island, specifically at seaweed farms and while fishing. The informants were not disturbed during the interviews, as per their own request. Furthermore, the benefit for me of conducting interviews at their place of work was the chance to acquire a significantly greater amount of information.

For the linguistic aspect, We collected data by initially engaging in participant observation to identify the indigenous phrases, idioms, and categories employed in daily conversation that pertain to environmental factors. We actively participated in daily discussions on this particular component. We actively listened for unfamiliar vocabulary in the Luang language and documented them in my observation notebook (Hammersley & Atkinson, 2019; Spradley, 1979). Subsequently, we marked, enclosed in brackets, ticked off, or assigned codes to words. This facilitated the process of assessing the items that required verification from the

respondents. Therefore, drawing on my regular interactions with the individuals in my local community, we utilised this information as a foundation and point of reference to formulate additional enquiries pertaining to this particular subject matter. Subsequently, we carried out comprehensive, open-ended interviews with my sources of information.

The informants chosen for certain aspects were children between the ages of 5 and 13, taking into account their extensive vocabulary. Furthermore, their knowledge of the world may be connected to the environment in which they reside and engage in recreational activities. I collected data through direct interaction with individuals when they were engaged in activities like as playing, swimming in the sea, walking between islands during low tide, and engaging in conversations on various topics. Furthermore, following the conclusion of the interviews on the large island, We patiently awaited their return from school and proceeded to walk along the shoreline during low tide, making my way to their residence located in one of the small settlements adjacent to the large island. The duration of the walk typically spans approximately 40 minutes on foot and approximately 15 minutes by motorised boat. During our journey, we typically discuss topics related to the children's experiences and educational curriculum, and we make commitments to engage in joint activities while at sea. We acquired knowledge of terminology and children's narratives pertaining to the natural sea ecosystem.

In addition, a FGDs took held at the village hall, which serves as a gathering spot for the residents of East Luang and West Luang villages. The purpose of this activity is to verify several aspects, including historical information, the mapping of marine areas using traditional knowledge, the application of *Hygeralai* in specific areas, and the identification of sacred locations.

Observations were done to supplement and validate data obtained from interviews and FGD. This effort was undertaken with a dedicated effort to establish a connection by taking physical and mental risks to interact with the people of Luang island and understand the reasons behind their actions, it involved directly participating in activities, experiencing them personally, and documenting the researcher's observations. I conducted observations and interviews concurrently, occasionally conducting them independently based on the field conditions. During these circumstances, I actively engaged as an active participant. (Creswell, 2012)

In relation to this, the researcher recorded various important findings during the observation, including the social and collective behaviour of the community in the

implementation of *Hygeralai*, which includes the preparation stage, ritual procession, to closing, as well as the level of community compliance with the prohibition of Sea cucumber collection during the closing period. In addition, researchers observed the community's interaction patterns with the marine environment, especially in the use of sustainable harvesting methods that do not damage habitats such as coral reefs, as well as how the community treats other marine organisms. Other aspects observed included the role of social institutions such as churches, schools and youth organisations in reinforcing *Hygeralai* values through education and joint activities. Researchers also recorded elements of daily life related to marine practices, such as the use of traditional fishing gear, and customary signs for marine boundaries. In addition, local vocabulary related to the marine ecosystem, which illustrates the cognitive and linguistic dimensions of this knowledge system, was also recorded.

Small details that emerge in the observation process, especially verbal ones such as local vocabulary, relating to marine ecosystems, which illustrate the cognitive and linguistic dimensions of this knowledge system can be documented using brackets, coloured ink pens, small circles or specific codes. This technique aims to make it easier for researchers to retrace information obtained, understand the intent of informants' statements, and ensure that data references remain accurate and relevant when further analyses or clarifications are made to informants. This approach is very important in maintaining the accuracy of field data interpretation, especially in an ethnographic context that emphasises the depth of meaning in social and cultural interactions.

Documentation is a written record of previous occurrences. Documentation serves as both a supplement and a crucial method of gathering facts related to the strong mentality of a community and historical information (Biczó, 2019a). Documentation was utilised in the process of data collecting as a supplementary method alongside interviews, observations, and FGD. During this project, We analysed data obtained from newspapers and examined actual photographs. Essentially, the data in this research encompasses the phenomena being studied, revealing the mechanisms and causes behind happenings in a certain environment. The central focus of the 'thick description' (Geertz, 1973b) is the attitudes and experiences of the participants. The objective is to provide a clear and coherent description of the Luang people's characteristics and behaviours within the framework of *Hygeralai*, with the purpose of incorporating it into this dissertation.

When is field data collection completed and stopped? In conducting research in the field, researchers applied the snowball sampling technique by starting data collection from a number of key informants and supporting informants. The interview and observation process took place continuously and gradually, until finally the researcher found that the information obtained began to repeat the same pattern, without producing significant new findings. For example, descriptions of symbolism in traditional rituals, the process of inheriting cultural values, and the community's views on social change showed consistency of themes and uniformity of content between informants.

Under these conditions, it can be concluded that the data has reached a saturation point, both in terms of thematic, social meaning, and diversity of viewpoints. Researchers have also managed to collect data from various social layers in the community, so that a complete picture of the social structure and local culture can be described as a whole. Based on this, data collection can be stopped, because the research has fulfilled the main principle in the qualitative approach, which prioritises depth of meaning over the number of informants. The achievement of data saturation is an indicator that the researcher has successfully explored, understood and documented the cultural life of the Luang Island community in a comprehensive and representative manner.

The data collection process in this study was declared complete when the researcher reached data saturation, a condition in which information obtained from interviews, observations, and field interactions no longer produced new meaningful information or themes. At this stage, the main relevant themes begin to repeat and appear consistently among various informants, so that the addition of data no longer enriches the understanding of the phenomenon being studied. This data saturation is an indicator that the diversity of informants' perspectives and experiences has been adequately represented, and the collected data is considered sufficient and comprehensive to answer the research focus as a whole. The concept of data saturation refers to the thinking of Guest, Bunce, and Johnson (2006), who state that saturation is achieved when “no new information or themes are observed in the data” . In qualitative research approaches, such as ethnography, the main objective is not the number of informants but the depth of meaning and representation of the social experiences being studied. Therefore, the data collection process was halted methodologically and ethically, considering that the field exploration had provided sufficient contextual understanding of the social-ecological system of the Luang Island

community, particularly regarding traditional ecological knowledge (*Hygeralai*), which is the primary focus of this study.

Furthermore, a data tabulation process was conducted based on responses to 148 different questions posed to a number of participants, to assess the extent to which data saturation had been achieved. Referring to the standards used in qualitative research, the threshold for data saturation is considered to have been reached when it exceeds 70% (Daher, 2023; Morse, 1995). Based on the results of the tabulation of the informants' answers in this study, it was found that the level of data saturation had reached more than 90%. This indicates that the majority of important themes and information had emerged consistently, and that the diversity of perspectives had been adequately represented. Thus, it can be concluded that the information was saturated and data collection could be stopped because no new significant data or themes were found. Although this study uses a qualitative approach, the inclusion of quantitative data as a complement is important to strengthen the validity of the narrative and interpretation of the research results. The percentage of data saturation in this study is presented in tabular form to clearly show the repetition and consistency of the information obtained from the informants (Figure 35).

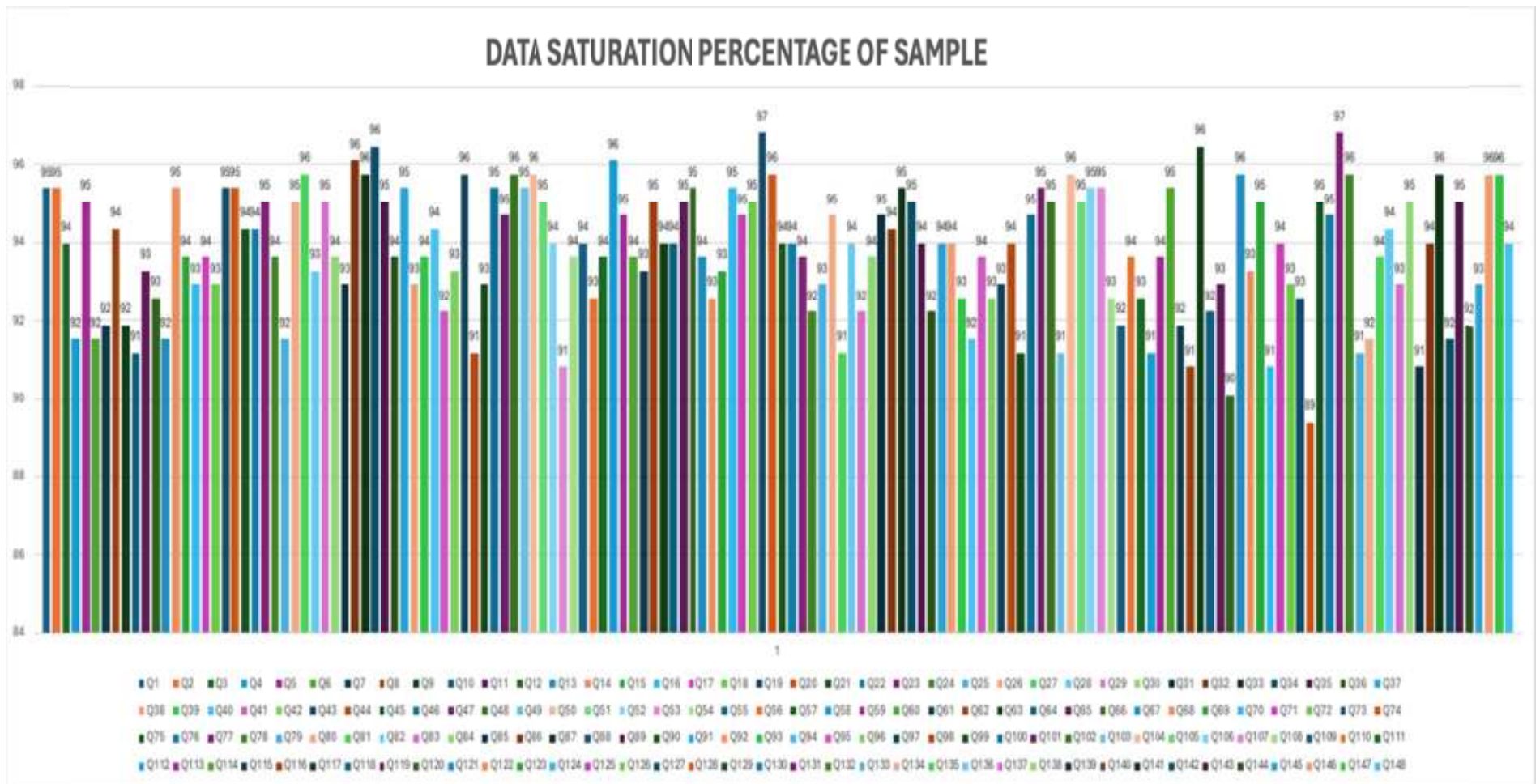


Figure 35:Percentage of sample saturation obtained through the same respondent answer.
Source: based on the research fiel

3.4.6 Data Analysis

The data in this study were analysed using according to the combination method which is ethnographic, Geographic Information Systems analysis (GIS) in the traditional ecological knowledge (TEK) framework approach, kerangka SES dan adaptive cycles and panarchy (Figure 36).

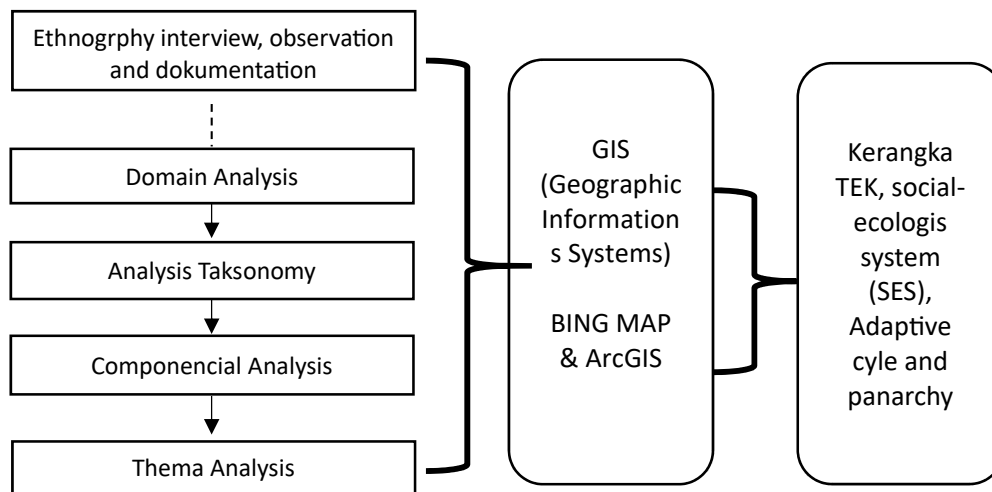


Figure 36: The analytical framework of ethnography and Geographic Information System (GIS).
Source: Own illustration based on Spradley (*Spradley & McCurdy, 1972*), Frank (*Frank, 1988*), Berkes (*Berkes et al., 1995*), Gunderson & Holling

Figure 36 illustrates about the analysis framework in the *Hygeralai* study integrates combination analysis. The analysis in this study was conducted in a gradual and structured manner, starting with ethnographic data collection and analysis as the first step. Researchers conducted participatory observations, in-depth interviews, and direct involvement in the daily activities of the people of Luang Island, such as traditional rituals, *Hygeralai* practices, and exploration of coastal areas during low tide. This data was used to identify key themes in *Hygeralai* practices, including the sea prohibition system, cultural value structures, and forms of local ecological knowledge.

Once qualitative data was collected, the next step was spatial visualisation using GIS technology. Information from interviews and participatory mapping (mental mapping) was translated into digital maps to represent no-go zones, ritual areas and fishing trails. This mapping

not only enriched the visual understanding of marine cultural spaces, but also strengthened the validity of the qualitative data.

The final step is a theory-based thematic analysis using the frameworks of TEK, SES, adaptive cycles, and panarchy. TEK was used to interpret the values, practices and local knowledge structures that shape Hygeralai as a living traditional ecological system. The SES framework is used to analyse the reciprocal relationship between the community and the marine environment, as well as the role of *Hygeralai* in maintaining the sustainability of the social-ecological system. Meanwhile, adaptive cycles allows researchers to understand the dynamics of change in the *Hygeralai* system from the phases of stability, crisis, to reorganisation. Finally, panarchy is used to read influences across scales from local to global and how external pressures (such as government policies or religious changes) can trigger transformation or adaptation at the community level. Through these stages, the analysis becomes more holistic and contextualised, explaining how Hygeralai is not only a cultural heritage, but also an active local mechanism in maintaining ecosystem sustainability and community identity.

Thus, the combination of ethnographic methods, GIS-based spatial visualisation, and the analytical frameworks of TEK, SES, adaptive cycles, and panarchy allowed this research to examine *Hygeralai* as a whole from cultural, ecological, spatial, and social transformation dimensions. This integrated analytical approach is expected to produce an in-depth, contextualised and relevant understanding in explaining the role of local knowledge in the sustainability of the SES of the Luang Island community. For detail refers to (table 10).

Table 10 : Distribution analysis by research questions(RQs)

RQs	Analysis
RQ1: How does <i>Hygeralai</i> affect cognitive and linguistic aspects of Luang islanders?	Ethnography, GIS, TEK framework, dan SES.
RQ2: What historical factors contributed to the rise of a local social movement against the implementation of <i>Hygeralai</i> ?	Ethnography, GIS, TEK framework, dan SES.
RQ3: What historical factors contributed to the rise of a local social movement against the implementation of <i>Hygeralai</i> ?	Ethnography, GIS, TEK framework, dan SES.
RQ4: To what extent does <i>Hygeralai</i> impact the ecosystem of Luang Island's marine environment? How the dynamic of <i>Hygeralai</i> in social-ecological system and resiliency?	Ethnography, GIS, TEK framework, dan SES, Gunderson and Holling

Source: by researcher own, 2025

CHAPTER IV : *HYGERALAI* of COGNITIVE and LINGUISTIC ASPECT

4.1. Introduction

This section examines the cognitive and linguistic dimensions of how the people of Luang Island view the marine ecosystem, which is an integral part of their daily lives. The discussion begins with cosmology, as it is the most fundamental and comprehensive knowledge structure that people have in understanding the world around them. Cosmology explains the Luang community's perception of the relationship between humans, the universe and spiritual forces, which also reflects their value system, beliefs and direction in life. This knowledge forms the basis for mapping space, determining orientation, and interpreting natural phenomena. For the Luang people who depend heavily on the sea, marine cosmology is not only a belief but also a practical guide in determining the time to go to sea, establishing relationships with sea creatures, and understanding the boundaries between the profane and sacred worlds. Therefore, cosmology becomes the main foundation in understanding all cognitive aspects of the Luang people's maritime culture.

In this study, cosmology includes spatial categories and directional orientation, as well as the concept of sea cosmology, which shows how the sea is spiritually and symbolically interpreted. This understanding is then linked to other cognitive aspects, such as how the Luang community maps the sea area based on local knowledge, how they treat each water zone, and how marine life is represented culturally, both through traditional narratives, spatial arrangement of settlements such as the placement of boats in the village structure, and syncretism between maritime culture and elements of Christian spirituality seen in the symbols on the church altar.

After describing the thinking structure and local knowledge of the community, this chapter also outlines the linguistic aspect, namely how language is used as a medium to store, transmit and maintain maritime knowledge. This is reflected in the naming of marine spaces, local terms for marine creatures, and the use of metaphors and verbal symbols that reflect the Luang community's worldview of the sea. By organising the discussion sequentially, from thought to language, this chapter aims to show that the Luang people's maritime culture lives not only in physical practices, but also in structures of thought and language, which are intertwined in forming a collective identity and traditional knowledge system (*Hygeralai*), showing that the

language used by the Luang people directly refers to the structure and dynamics of the marine ecosystem.

4.2. Cosmology of Luang People

Hygeralai practices, which include ecological rules and restrictions on the utilisation of marine resources, are strongly influenced by the cosmological views of the Luang people. For example, their cosmology, which views the universe as a connected and interdependent system, allows them to develop practices that are sustainable and maintain ecological balance. In this sense, Hygeralai is not just a customary practice, but also reflects the cognitive structure of the community influenced by their worldview of nature and their relationship with the environment.

As such, cosmology serves as the basis of a broader cognitive understanding that enables the Luang people to manage natural resources and adapt to their environment. This cosmology not only serves as a belief system, but also shapes the way they think and act in maintaining the sustainability of natural resources, which is reflected in the practice of Hygeralai. Therefore, understanding the cosmology of the Luang people is a crucial first step to learn how their cognitive structures shape and direct *Hygeralai* practices.

The relationship between cosmology and cognition in society can be explained through a number of theories from major thinkers in anthropology and social science. Claude Lévi-Strauss, a structuralist, sees cosmology as a reflection of the universal structure of human thinking. According to him, people construct cosmologies through patterns of binary opposition such as up-down, sky-earth, or light-dark to understand and give meaning to the world. In the cognitive anthropology approach, Roy D'Andrade explains that cultural knowledge including cosmology is stored in the human mind in the form of cognitive schemes and categories. Cosmology is learnt and passed on through social and mental learning processes, and shapes the way people make meaning of the environment (R. D'Andrade, 1995).

To this concept contributes to well Tim Ingold offers a different perspective, emphasising that cosmology is not only symbolic, but also formed from the direct experience of humans in living and interacting with their environment which he calls the dwelling perspective. In this case, cosmology is not just a belief, but the result of a living and ongoing relationship between humans and the surrounding world (Ingold, 2021).

Meanwhile, Johnson and Hunn (2010) emphasise that the belief systems and worldviews of traditional communities play an important role in shaping the way they understand and interact with nature. Johnson & Hunn underline that traditional ecological knowledge (TEK) cannot be separated from the cosmological and cultural context that surrounds it. According to them, TEK includes spiritual, moral and cosmological dimensions that are integrated into people's lives. Cosmology serves as a framework of meaning that gives value and direction to human relationships with the environment, while TEK embodies this in the form of specific and localised natural resource management practices. Johnson and Hunn reject the notion that TEK is merely practical knowledge, emphasising that it is part of a complex system of meanings shaped by experience, observation and cosmological beliefs passed down through generations. Therefore, in their view, cosmology is an integral cognitive and symbolic dimension of ecological practice, and understanding TEK fully requires attention to the underlying cosmology (Johnson & Hunn, 2010).

Indigenous peoples' cosmology encompasses their worldview, origin tales, beliefs, mythology, sacredness, faith, the supernatural, and their relationships with nature and one another. Similar to other indigenous groups, the Luang people possess a cosmology rooted in their own concepts.

4.2.1 Space Categorisation and Directional Orientation

The discussion on spatial categorisation and directional orientation is presented first to explore how the Luang people conceptually understand and structure space. The emphasis on this aspect is important to see how the relationship between *dara-dan lao* (land and sea) is not separated, but rather understood as a unified spatial mosaic in the worldview of the Luang people. Through the way they categorise space and determine direction, a structure of thought is reflected that integrates the terrestrial and aquatic environments into an overarching local knowledge system, both ecologically and symbolically.

Local concepts such as *dara-lao* (land-sea) and *lao-dara* (sea-land), as well as *mountain-pante* and *pante-mountain*, illustrate how the Luang people understand space not as two separate entities, but as a cosmic whole that is interconnected and mutually sustaining. In their view, sea and land are not strictly separated, but are understood as an ecologically and spiritually unified system, where orientation, life activities and cosmological values are intertwined in a dynamic

relationship. Land areas, especially mountains, have historical and symbolic significance as they are believed to be the origins of ancestors and the starting point of indigenous narratives such as Hygeralai, which is believed to have originated in the mountains. Although economically the land is no longer the main source of livelihood, it remains an important space of collective memory and ancestral identity in the cultural fabric of the Luang community.

This spatial approach differs from communities in other parts of Indonesia, such as Java, where spatial orientation generally uses the four cardinal systems: north, south, east and west. In this system, direction has a more technical and absolute nature, whereas the Luang community uses relational and ecological orientations, such as sea-land direction or mountain-shore position, which are more contextual and tied to the landscape and life experiences. Thus, spatial orientation in Luang communities is not only geographical or functional, but also symbolic, spiritual and cosmological. The mountain and the sea cannot be understood separately, as they form one unified cosmic reality, which underpins their thinking structures and knowledge systems.

From the viewpoint of spatial cognition, communities exhibit variations in navigation systems; some employ relative systems based on individual positions, such as "left" and "right," while others utilise absolute systems that depend on fixed references like cardinal points or landscape features (Levinson, 2003). The people of Luang Island adhere to a non-absolute spatial orientation system (North and South), wherein their navigation is anchored to permanent environmental landmarks, including the sea, mountains, and the sun's trajectory.

Cognitive Mapping clarifies that individuals develop mental representations derived from their experiences and interactions with the environment. These cognitive maps facilitate navigation and environmental exploration, while also defining the sites of commercial operations, residences, and sacred places (Tolman, 1948). This notion aligns with Ethnophysiograph, which emphasises that geographical classifications within cultures frequently mirror their social and spiritual connections (Lefebvre, 1992). In the beliefs of the people of Luang Island, the connection between water and land exceeds physical boundaries and has cosmological significance, represented by the concept of *ina ume-upu lanite* (earth-sky), which articulates the equilibrium between humanity and environment.

On the other hand, the cosmology of the Luang people is also based on cosmic duality, which views the universe as a space divided into upper and lower levels (Figure 36).

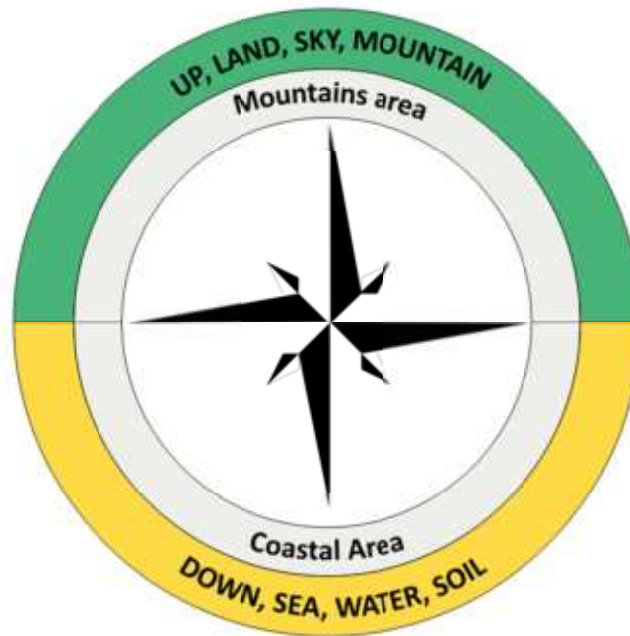


Figure 37:: The cosmology concept of Luang people.
Source: Illustrated by author based on research result, 2022 & 2023.

The illustration above represents the worldview of the Luang people, showing their belief system concerning the interconnection between geographical space, natural elements, and spiritual dimensions. The diagram categorizes the world into two primary regions: the mountainous region at the top and the coastline region at the bottom, each holding distinct importance within the Luang belief system. In Luang beliefs, the mountainous region (shown in green) is linked to the sky, earth, and mountains, representing a profound connection with the spiritual realm, ancestors, and sacred spirits. This region is viewed to be high within the cosmological order, regarded as an epicentre where supernatural forces and human engagement with ancestor spirits dominate. Conversely, coastal regions (shown in yellow) are linked to the ocean, water, and land, symbolizing terrestrial existence, daily activities, and the cycle of life and death. In numerous maritime cultures, such as that of the Luang people, the sea and water are perceived as a channel between the human realm and the domain of spirits or the unseen dimension, signifying their crucial role in understanding the connection between the physical and spiritual realms.

This illustration symbolically represents the concept of duality and equilibrium in Luang cosmology, where the mountains symbolize the vertical element and the sea the horizontal element, necessitating balance to sustain life's harmony. This division also reflects the social and economic framework of the Luang people, shaped by their interaction with the geographical environment. Furthermore, the upper and lower divisions in this image represent not just geographical distinctions but also represent the concepts of the cosmos and the underworld. Mountains are frequently perceived as sacred sites connected to celestial forces, but the sea is seen as a space of transition linked to spirits, transformation, and the cyclical nature of existence.

The concept of dualism also illustrates the intimate and unbreakable connection between the Luang people and their environment. Nature is not merely viewed as a resource, but also as a creature possessing a spirit and energy. This perspective can be seen in various aspects of everyday life, including the expressions of local language and customary rituals. The Luang people have cultivated sustainable indigenous wisdom as an integral aspect of their cultural legacy by honoring nature. Nevertheless, present-day problems such as development and climate change are progressively threatening the preservation of these historic values. Consequently, comprehending and preserving local knowledge is crucial for fostering future environmental conservation initiatives.

In cognitive anthropology, directionality refers to the way in which individuals comprehend, structure, and articulate spatial concepts influenced by their physical environment, cultural context, and social experiences. The people of Luang Island employ an orientation system grounded in ecological relationships with the sea and land, as evidenced by the concepts of *dara-lao* (land-sea) and *lao-dara* (sea-land), *pante-gunung* (beach-mountain), up-down, and *matahari nae-matahari maso* (sunrise-sunset). Moreover, these links are personified through expressions such as *ina ume-upu lanite* (earth-sky) and *lao-dara* (sea-land), which illustrate a knowledge of the interdependence between humanity and the environment. This system demonstrates that direction and location within communities are perceived not solely as geographical coordinates, but also as integral components of their social, economic, and spiritual framework.

4.2.2 Sea Cosmology

Having described the Luang people's worldview that places nature as a cosmic whole, the discussion will then focus on the sea as an important element in their cosmology as it relates to the practice of *Hygeralai*. The seascape cosmology of the Luang people is extremely complex, as evidenced by their long verbal traditions and stories, which are still regarded as true today. These encompass beliefs regarding celestial bodies, islands, rocks, marine fauna, headlands, and coral reefs. The cosmology of the Luang people is intricately connected to their physical surroundings, demonstrating the complexity of their thinking concerning the land, the water, and the intervening areas. The connection between land and sea is integral to their cosmology. This belief system demonstrates a multifaceted interaction with the natural environment, wherein each geographical feature, including mountains, coastal regions, and adjacent seas, holds substantial spiritual and cultural significance.

The cosmology of Luang Island is intricately linked to the historical narrative and identity of its inhabitants. Elders claim that Nowlawna Island is regarded as the inaugural island in the Luang Island region. According to verbal narratives, the island surfaced and submerged seven times before ultimately stabilizing and becoming a permanent feature of the region's topography. In the Luang language, the island is referred to as *Noha Pali Tepra* (where *Noha* signifies island). Tradition holds that the island's creation corresponded with the appearance of a prophetic masculine Figure named *Ilgona*, accompanied by numerous others.

The island seems to have been at its highest point prior to the main island, which currently serves as the center of life. At the summit of the mountain, a ladder and rope signify the connection between heaven and earth, serving as a means of communication between the Luang people and the sun deity, *Uplera Mermetna* and *Uplera Warwarha*. The term "Up" derives from "*Upu*," signifying God, and "*lera*" denotes the sun. Alongside the ladders and ropes, a *Tridacna gigas* is situated at the mountain peak's center. Local verbal tradition claims that within the *Tridacna gigas* exists a spiritual being, depicted as a lovely princess, responsible for protecting the island, who during full moon nights, the shell will open, permitting the princess to emerge and participate in a celebration with the other island inhabitants²⁷.

²⁷ The data were obtained from interviews. J. S, male, 60 years, on 28 July 2023. S. M, male, 45 years on, 30 July 2023. M. S, male, 70 years, on 28 July 2023. D. K, male, 65 years, 17 June 2022 J. S, male, 60 years, on 19 July 2023. S. P, male, 45 years on, 30 July 2023. M.S, male, 70 years, on 28 July 2023. D. K, male, 65 years, 17 June

This myth characterizes the *Ilgona Pali* Figure as a prophet who gave legitimacy to power during that period on Luang Island. Sahlins thinks that myths are frequently linked to political organization and authority in traditional civilizations. It serves as a mechanism to uphold social hierarchy within society (Sahlins, 1987). This is seen in the social order of *Ilgona Pali*'s descendants, carrying the surname *Miru*, who are eligible to leadership on Luang Island. The existence of *Tridacna gigas* on the mountaintop is regarded not merely as a biological entity, but also as a metaphysical symbol and spiritual protector of the island. *Tridacna gigas* is regarded as the residence of a spiritual entity manifested as a lovely princess, serving as the guardian of the island. These beliefs indicate that the local society perceives the world not just through a physical perspective but also through a cosmology perspective, wherein each aspect of nature possesses a holy significance and a relationship to the supernatural realm.

Furthermore, the tale of the *Tridacna gigas* opening on the full moon night, allowing the princess to come out and feast with other supernatural entities, signifies the notion of a holy temporal cycle in their beliefs. Full moon evenings are frequently linked to mystical energy, sacredness, and a transitional point between the human and spiritual realms in numerous religious traditions. This strengthens the conviction that nature possesses not just a material aspect but also an active spiritual component.

This belief can also be linked to the concepts of animism and totemism, where natural elements such as the sea, mountains and sea creatures are considered to have guardian souls or spirits that regulate the balance between humans and their environment. The story of the princess coming out of the *Tridacna gigas* on a certain night can also be interpreted as a symbolic ritual that represents the cycle of renewal, protection and the relationship between humans and supernatural entities.

Moreover, *Tridacna gigas* is considered a sea deity and is believed to provide protection in maritime activities (Jacobsen, 1896; Müller, 1914). These beliefs are manifested in their maritime customs, wherein the sides of vessels are decorated with *Tridacna gigas* shells and fish motifs, which are said to function as protecting talismans throughout sailing journeys. The

2023 K. W, male, 38 years, 18 June 2023. M. W, male, 65 years, 8 September 2023. M. L, male, 50 years, 20 August 2023. H.H, 68 years, male, 6 September 2022.

Tridacna gigas functions not only as an ornament but also possesses a religious significance, thought to safeguard against danger, sooth marine spirits, and ensure the safety of sailors²⁸.

The existence of *Tridacna gigas* in the maritime practices of the Luang people illustrates the intricate interrelationship of mythology, ecosystem, and culture. The sea is viewed not merely as an economic asset, but also as a sacred realm inhabited by spiritual entities. The incorporation of *Tridacna gigas* as ornamentation on vessels indicates that this practice is integral to the journey ritual, wherein sailors transport protective symbols to ensure their safety at sea. Consequently, the belief in *Tridacna gigas* within the Luang community not only embodies spiritual elements but also serves as a component of cultural identity, ecological management, and a social framework transmitted between generations. As stated by several classical anthropologists, a particular object or creature can be regarded as a symbol of social and spiritual identity for a community. Additionally, the object is believed to possess a special power or energy that contributes to the harmony of the ecosystem and the balance of spiritual life within the society that embraces this belief (Durkheim, 1975; Terry. S. Turner, 1985; Tylor, 1899). Furthermore, Julian Steward's concept of cultural ecosystem suggests that respect for *Tridacna gigas* as a sacred entity might function as a traditional conservation method. This perspective indicates that the species is not overexploited due to its significant spiritual worth.

Comparable convictions exist among other coastal communities, including the Polynesians and Bajo, who incorporate sea symbols into their spiritual systems and navigational practices. In ancient Egyptian society, shells functioned as decorations, charms, and items of burial importance (Khamis, 2022). The beliefs of maritime communities in regions such as the Red Sea incorporate shellfish into their spiritual and protective practices, forming a shared “landscape spirit” among coastal communities (Agius, 2017). Meanwhile, they believe that fish bring good luck, fertility, change, health and feelings to their lives. In addition, they also associate fish with the element of water, which has the meaning of stability, balance and tranquility.²⁹

²⁸ The data is retrieved from interview. G. W, male, 50 years, 1 August 2023. K. K, male, 60 years, on 1 July 2023. K. N, male, 67 years, 14 July 2022. K.S, male, 70 years, on 28 July 2023. M. S, male, 65 years, 19 June 2023 B. S, male, 60 years, on 19 July 2023. E. H, male, 55 years on, 30 July 2023. B.H, male, 70 years, on 28 July 2023. M. S, male, 55 years, 17 June 2022 K. W, male, 48 years, 25 June 2023. E.K, male, 65 years, 8 September 2023. E. L, male, 48 years, 20 August 2023. T. H, 68 years, male, 6 September 2022. W. S, male, 40 years, 1 August 2023.

²⁹ The data was collected by interviews. G. W, male, 50 years, 1 August 2023. K. K, male, 60 years, on 1 July 2023. K. N, male, 67 years, 14 July 2022. K.S, male, 70 years, on 28 July 2023. M. S, male, 65 years, 19 June 2023 B. S, male, 60 years, on 19 July 2023. E. H, male, 55 years on, 30 July 2023. B.H, male, 70 years, on 28 July 2023. M. S, male, 55 years, 17 June 2022 K. W, male, 48 years, 25 June 2023. E.K, male, 65 years, 8 September 2023. E. L, male, 48 years, 20 August 2023. T. H, 68 years, male, 6 September 2022. W. S, male, 40 years, 1 August 2023.

On the other hand, the verbal tradition of the Luang people illustrates that in the past, the population resided in mountainous areas in the rural and hilly areas. The choice of residential location was influenced by conditions that were often affected by inter-small kingdoms wars, so they tended to live in groups and formed legal communities that continued to develop over time. These groups have various local designations, such as *kerajaan*, *negeri*, *ohoi*, or *leta*³⁰. Conflicts between tribes and kingdoms that occurred during this period were the main factors that encouraged people to migrate to various places.

During that period, the Luang community residing in the highlands existed inside a monarchical regime. Initially, three principal kingdoms existed, which then expanded into seven kingdoms. The Luang people see the ancient mountain houses as locations of significant spiritual and historical importance. This site is regarded as the ancestral origin, where the society initially established itself prior to migrating to coastal regions in response to evolving lifestyles and environmental adaption.

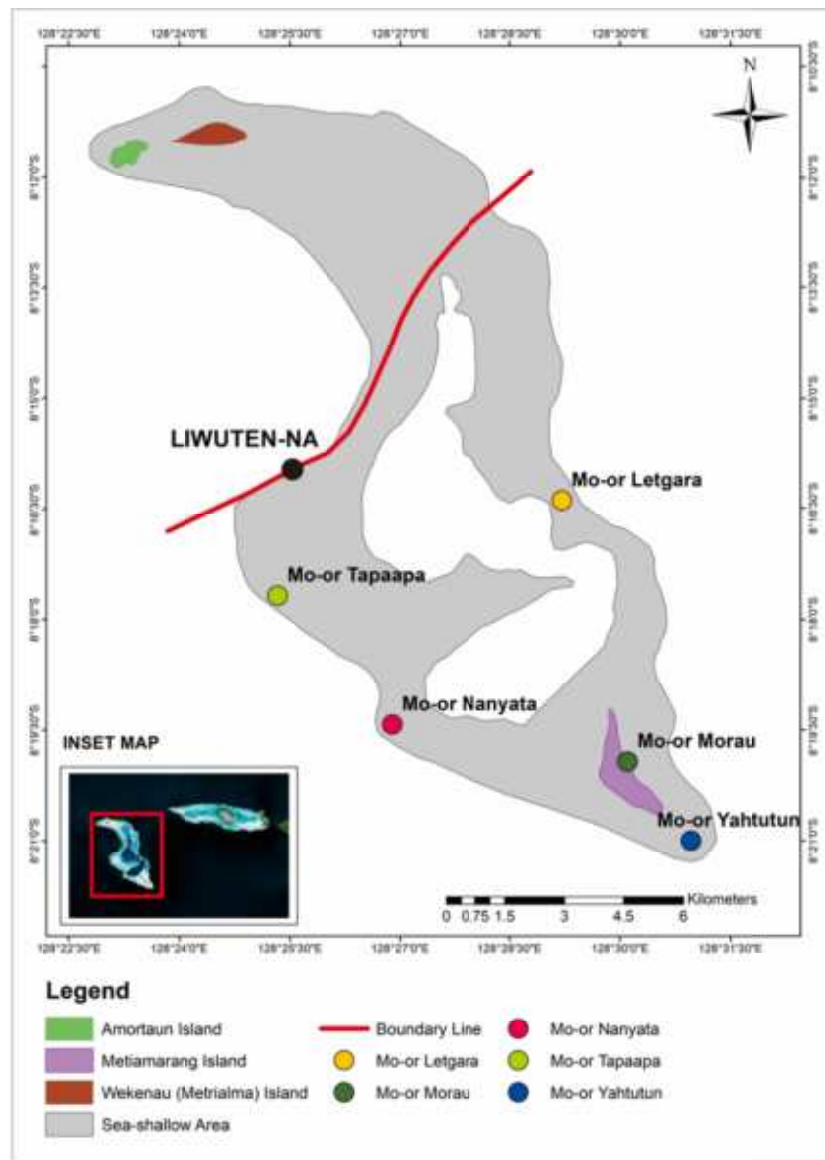
The Luang people believe that any location formerly occupied by their ancestors possesses historical significance and a connection with mystical energy or spiritual power. Consequently, these locations are maintained and respected until the present day. In their belief system, mountains are regarded as the summit of both physical and spiritual elevation. This belief is based on the premise that deceased ancestors maintain a connection to the human realm and are frequently believed to inhabit the mountains. Mountains are regarded as homes of sacred spirits and spiritual centres where supernatural powers reside, preserving the equilibrium of human existence.

Socially, the presence of mythical narratives serves a crucial role in reinforcing cultural identity, fostering social unity, and preserving harmony between individuals and their environment. The narrative of the island's guardian princess, who inhabits the *Tridacna gigas*, may be integral to traditional ceremonies, taboos, or implicit ecological guidelines, yet it is upheld by the community as a component of their indigenous knowledge. This indicates that in numerous traditional communities, mythology functions not merely as narratives transmitted

³⁰ The data were obtained from observation and interview. O. P, male, 48 years, 1 August 2023. K. K, male, 60 years, on 1 July 2023. K. N, male, 45 years, on 3 July 2022. K. W, male, 70 years, on 28 July 2023. M. S, male, 65 years, 19 June 2023. B. S, male, 60 years, on 19 July 2023. E. H, male, 55 years, on 30 July 2023. B.H, male, 70 years, on 28 July 2023. K. L, male, 45 years, 17 June 2022. K. W, male, 40 years, 18 June 2023. E.K, male, 65 years, 8 September 2023. E. L, male, 48 years, 20 August 2023. T. H, 68 years, male, 6 September 2022. S. W, male, 39 years, 1 August 2023.

throughout generations, but also as ethical frameworks and societal standards that govern the interactions among humans, nature, and the spiritual realm.

Moreover, myth concerning the coral reefs of Metimarang have significantly influenced the Luang people's worldview and their connection to the surrounding environment, particularly the ocean. Within the coral reef ecosystem of Metimarang Island, numerous sites are regarded as



possessing potent energies, with certain areas deemed exceptionally "hot" and "sacred" (Figure 38).

Figure 38: map of complecsity coral reef in metiamarang
Source: Bing Maps (2024), Luang Islands, digitized in ArcGIS by authors

Moor Yahtutun is a sand flat situated at the top of a headland, believed to have considerable spiritual importance. *Moor Morau* is a sand flat comprised of wood and is thought to have mystical abilities. *Moor Letgara*, centrally located, is regarded as a balance among the diverse components of nature. Simultaneously, *Moor Naniata* is known for being a negative sand flat, sometimes linked to adverse energy or undesirable occurrences. *Moor Tpaapa* is regarded as the most respected and intense of all the sand flat, exerting a profound spiritual impact on the beliefs of the Luang people. Additionally, *Liwuten-na* is a sand flat situated near the end point, marking the boundary of the *petuanan* area between East Luang and West Luang. The presence of these sites in Luang mythology indicates that the sea is viewed not merely as a resource for a livelihood, but also as a sacred domain filled with profound spiritual significance, preserved and transmitted over generations³¹. In the traditional belief system, the places described above are not just geographical spaces but also have a very strong spiritual and supernatural dimension. They are believed to be centers of mystical energy. Where various supernatural phenomena often occur. Local people believe that these places are the boundary between the human and supernatural worlds and therefore require special treatment. Space categorization and direction and serta pemahaman kosmologi masyarakat Luang tentang laut menjadi dasar utama dalam membentuk cara mereka berinteraksi dengan lingkungan maritim. Therefore, the marine concept must be situated within a cosmological framework that perceives the sea not merely as a physical space, but as a spiritual and social domain rich in meaning. The sea is understood as part of a cosmic order, where relationships between humans, nature, and supernatural forces take place

4.2.3 Marine Concep of Luang People Thought

Space categorisation and direction as well as the Luang people's cosmological understanding of the sea are the main basis in shaping the way they interact with the maritime environment. Therefore, the marine concept needs to be placed within a cosmological framework

³¹ P. K, male, 48 in Luang Island, 1 August 2023. J. M, male, 56 years, on 1 September 2023. B. H, male, 40 years, on 3 July 2022. W.K, male, 65 years, in Luang Island, on 28 July 2023. M. W, male, 65 years, 19 June 2023 B. S, male, 60 years, on 19 July 2023. E. H, male, 55 years on, 30 July 2023. B.H, male, 70 years, on 28 July 2023. K. L, male, 45 years, i17 June 2022. K. W, male, 40 years, 18 June 2023. E.K, male, 65 years, 8 September 2023. C. M, male, 48 years, 20 August 2023. M. W, 69 years, male, 21 September 2022. T. M, female, 64 years, 1 August 2023.

that sees the sea not merely as a physical space, but as a spiritual and social space full of meaning. The sea is understood as part of the cosmic order, where relationships between humans, nature and supernatural forces take place.

As a social space for the Luang community, the sea is not only a physical space surrounding their island, but also a social space full of meanings of interaction, economy, and social networks. In line with Henri Lefebvre, space is socially shaped through ongoing activities and relations (Lefebvre, 1992). In the context of the Luang community, daily practices such as fishing, trading, and building relationships with other villages make the sea an integral part of their social structure. Straits such as Moa, Leti, Sermatang, and Luang are not boundaries, but connecting pathways that glue the Luang community to other islands, extending social networks to Ambon and Java. The sea acts not only as a transport route, but also as a complex economic, political and cultural arena that brings individuals and groups together in a vast network of connections. This view is reinforced by the notion of public space in a marine perspective, described by Carr et al. that the sea functions not only as a natural environment, but also as a social place where human activities shape interdependent relationships within coastal communities (Carr, 1992).

As a symbolic and cultural dimension, the sea, in addition to functioning as a social space, also has deep symbolic and cultural values in the cosmology of the Luang people. Referring to the maritime history theory of Adrian B. Lapan, the sea is understood by coastal communities as a space that shapes identity and collective cultural values (Carr, 1992). In the Luang community, this is manifested through traditional seafaring rituals, the use of sea symbols in oral narratives, and the grouping of sea spaces based on ecological and spiritual values. These practices confirm that the ocean is central to the community's value system and morals, and play an important role in the intergenerational transmission of collective memory.

The sea as an axis of identity and connectivity, field findings show that the Luang people interpret the sea as a connecting element, not a separator. This is reflected in the way they describe bays and headlands as part of a harmonious spatial system. The sea becomes a unifying element that integrates the islands into a unified maritime culture. Comparisons with inland communities such as those in Seram, Sumatra and Kalimantan show that in the context of Indonesian geography, both the sea and rivers act as media for social and economic connectivity (Lapan, 2017a; Leirissa, 1997; Vlekke, 1943). Like the Mahakam and Kapuas Rivers in

Kalimantan, and the Musi and Bengkulu Rivers in Sumatra, the sea in Luang Island is a conduit for social relations, trade and cultural exchange across the region. As such, the sea in the lives of the Luang people cannot be reduced to a mere geographical space. It is a cosmological space that combines social, symbolic and identity functions, making it central to the community's existence and cultural continuity as a maritime community (Lapian, 1992a).

4.3. Cognitiv Aspect

This section explores *Hygeralai* from cognitive and linguistic perspectives. From a cognitive perspective, *Hygeralai* refers to the organized knowledge system internalized by the Luang people. This knowledge system enables the Luang people to incorporate their environment, categorize information meaningfully, and make decisions according to specific cultural norms or cognitive patterns. Comprehending the cognitive processes and information organization of the Luang people could improve this work's appreciation for the diverse methods by which they perceive and adapt to their environment.

Cosmology provides a comprehensive picture of the Luang people's world order, especially in interpreting the sea as a space that is not only physical, but also full of spiritual and social values. However, to understand how this knowledge is carried out in daily practice, further examination of the workings of their collective cognition is required. This approach will show how empirical experiences, cross-generational memories and ecological adaptation processes shape local knowledge systems that are not only functional, but also deeply rooted in people's social lives. This study will specifically explore several cognitive dimensions integrated in the Luang community's marine culture, such as how the Luang community developed a system of spatial categorisation and directional orientation, mapping of marine areas based on local cognition (mapping of marine areas), knowledge of ethnooceanography, as well as their ecological understanding of marine life and how to treat marine creatures in their daily lives. Furthermore, this section will also examine the representation of the sea in material culture such as boat forms and village arrangements, as well as the syncretism between maritime culture and Christian spirituality reflected in church altar ornaments. All of this knowledge is constructed through distinctive cognitive processes, grounded in constant interaction with the environment and transmitted through cultural practices and collective experiences.

The discussion of knowledge pertains specifically to cognitive anthropology within this context. D'andrade claims that knowledge is inseparable from culture and resides within individuals' minds, since it is a social construct that evolves via individuals' interactions with their environment and society. It establishes a framework of both explicit and implicit theory, enabling humans to organize and comprehend their environment; known as “cultural model” (Lapian, 2009, 2017).

Cultural models, as defined by Naomi Quinn, are conceptual frameworks that individuals use to comprehend reality, frequently shared and passed on across generations that influence how members of a society perceive various aspects of existence, encompassing social values and abstract concepts such as time, morality, and success. For instance, in Western cultures, "success" is typically linked to financial accomplishment and individualism, whereas in Eastern cultures, it is more commonly associated with social harmony and familial welfare (Quinn, 2021). Brent Berlin and Paul Kay perceive this setting as a cognitive framework used by individuals to comprehend specific situations (Berlin & Kay, 1999). This perspective is further supported by Jerome Bruner, who highlighted that human cognitive frameworks are constructed as narratives, enabling individuals to interpret the world not solely through scientific reasoning, but also via socially transmitted instances and narrative experiences (Bruner, 1986).

Dorothy Holland claims that cultural models constitute a framework of social norms that influence individual perceptions of the world. She also emphasizes that metaphors and cognitive habits reflect and maintain cultural paradigms across many nations. Furthermore, she emphasized the essential characteristics of cultural models, including their inheritability, interpretative flexibility, and impact on decision-making and social interactions. She believes that an interdisciplinary approach is vital for analyzing cognitive anthropology, such as linguistic and cultural studies offer significant insights into the reciprocal influence of culture and language on the formation of human perspectives (Holland, 1987).

Collective memory significantly influences individual cognition. Frederic Bartlett proposes that collective memory, linguistics, and cognitive patterns are intricately linked in determining how societies remember, interpret, and communicate information across generations. It is not merely a passive repository of information but a reconstructive process, wherein individuals continually reshape their memories based on present cognitive schemas. These schemas constitute mental patterns cognitive frameworks that facilitate individuals'

comprehension and organization of the world in accordance with their cultural experiences. Thus, mental patterns serve as a structural basis for the construction of memories within society, while collective memory emerges from the application of these patterns to interpret and recall specific events (Bartlett, 1995). Strauss, conversely, views binary oppositions as an essential framework in human cognition and the organization of the world, that the human intellect inherently categorizes concepts into dichotomous pairings, such as good/bad, light/dark, raw/mature, and nature/culture. This framework illustrates how the human intellect inherently categorizes experiences into contrasting yet complementing classifications (Strauss, 1974).

TEK is also a significant element in cognitive anthropology, which is seen as an experiential knowledge system passed within a civilization to comprehend and regulate its natural environment. It encompasses ecological practices, cognitive frameworks, and communal mental systems that influence a society's comprehension of the natural environment. The notion of TEK was formulated by numerous scientists across diverse fields, such as Fikret Berkes (1999) was among the pioneers in conceptualizing TEK as a social-ecological adaptive system, whereas Julian Steward (1955) studied the reciprocal interaction of culture and environment. Harold Conklin (1954) works the ecological categorization systems of indigenous populations, while Genevive Michell (1986) highlighted the significance of TEK in the conservation of natural resources. Consequently, TEK emerged as a significant term in ecological anthropology, ethnobiology, and environmental conservation, illustrating the influence of traditional knowledge on the sustainability of ecosystems and the cultural practices of indigenous populations.

Knowledge is fundamentally a cultural product that evolves within a particular social context. The social structure, language, collective memory, and tradition significantly influence the ways in which humans comprehend, maintain, and pass on knowledge. The cognitive anthropology approach reveals that there is no singular form of knowledge that is universally applicable, as each society organises and interprets information according to its unique cultural values. Consequently, examining the relationship between knowledge and culture is crucial for comprehending the diversity of human thought across different societal groups.

The inhabitants of Luang Island have developed an abundance of knowledge through interaction, collective memory, and adaptation over an extensive historical period, which has been passed on from generation to generation by their ancestors. It is, undoubtedly, supported by a robust mindset that represents the fundamental layer of both individual and collective

cognition, influencing how social groups perceive and engage with their social environment (Mousalimas, 1990).

4.3.1 Mapping of Marine Areas Based on the Luang People Thought

Cognitive anthropology interprets the division of territory and space using the frameworks of cognitive mapping, spatial cognition, and ethnophysiography. The territorial division system in indigenous groups is determined not just by geographical boundaries but also by cultural identity, spiritual values, and persisting mental patterns inherited through generations. The Luang people, as maritime inhabitants, have a profound familiarity with and comprehension of their marine environment. It is unsurprising that they possess a knowledge system for mapping shallow regions, that is assessed through the anatomical features of the organism based on their understanding. The Luang people categorise the *meti*/shallow region into three segments: *met kerna*, *met etla torni*, and *met lola itnehelni*.

Met kerna (*meti karing*) occurs when the water withdraws to the lowest point, revealing white sandbars in the ocean's length. In this condition, little water-filled holes emerge in multiple sites, creating a temporary habitat for diverse marine organisms. The Luang people utilise this period to gather fish and other marine organism, as they are more readily located in shallow, swamped regions. Moreover, the *met kerna* conditions enable them to travel from one island to another, employing routes that were formerly submerged by seawater. The passage from Wekenau Island to Matiamarang Island is obstructed by a substantial atoll that serves as a natural barrier. At the *Met etla torni*, the sea water conditions at this level range from knee to stomach height. The Luang people typically engage in *mensyari* activities. *Mensyari* is an effort undertaken by a collective of women to gather marine resources, including octopus and fish that meet with specified size criteria. They solely utilise their hands to gather marine goods, without employing any instruments. Men in groups capture fish in an area referred to as "*meng tali*."

According to the knowledge of the Luang people, *Met lola itnehelni*, is a specific level of low tide is regarded as the natural boundary between shallow and deep waters. In this region, individuals frequently engage in fishing and jelly cultivation. The depth of these shallow seas ranges from one foot to an adult's chest depth, serving as a natural signal for locating marine activity. In general, tidal patterns in different regions can be classified into four main types (Ben

Elghali et al., 2007), and the tides at Luang Island belong to the category of mixed tides with a single daily trend. The main characteristic of this pattern is the occurrence of one high tide and one low tide in a day, although on some occasions there can be two high tides or two low tides in a day (Estradivari et al., 2015, 2017).

The Luang community's knowledge system for mapping shallow marine areas - comprising the categories of met kerna, met etla torni and met lola itnehelni - suggests a spatial cognitive structure that is deeply internalised in their daily lives. This knowledge is not just born from passive observation of the environment, but is the result of an active and iterative cognitive process that is passed down across generations. This is in line with what is proposed by the Cognitive Mapping theory developed by Edward Tolman (1948), he explained that humans form an internal representation or mental map of the environment through direct experience (Tolman, 1948). In the context of the Luang community, their intense interaction with the sea not only results in spatial orientation, but also creates a conceptual structure about the sea that has ecological, spiritual and social values. Such mapping, although not based on modern cartographic maps, has high ecological accuracy and important social functions in regulating access, restrictions and management rights over marine space.

Furthermore, Stephen Levinson (2003) in his theory of spatial cognition emphasises that spatial orientation systems are relative to language and culture (Levinson, 2003). (Levinson, 2003). In this case, local terms such as met kerna, met etla torni, and met lola itnehelni cannot be understood simply as 'shallow areas', but must be read as part of an emic spatial orientation framework, where space is understood through water depth and the presence of certain marine species. Local language becomes a cognitive tool that shapes spatial realities and conveys these classification systems into social life

Along the same lines, Mark and Turk came up with the concept of Ethnophysiography, which shows that traditional societies identify and name landscapes not based on objective physical forms, but based on function, social meaning and ecological experience (Mark & Turk, 2017). The Luang people not only divide marine areas technically, but also based on biological observations (e.g. the types of organisms that live there) and social practices (such as no-go zones in Hygeralai). As such, their methi classification is a form of knowledge that integrates ecological cognition, cultural relations and language structures, making it a spatial system that is unique, adaptive and deeply tied to their collective identity as a maritime society.

Additionally, the Luang people identify the sea area directly in front of their village as *labuang*, although not all maritime regions receive this term. *Labuang* only indicates the primary region utilised as a harbour for vessels arriving in Luang Island, whether for commercial or other activities. This site was selected to facilitate the Luang community's oversight of incoming strangers, enabling them to control and regulate interactions with tourists. Nonetheless, this



labuang area is not utilised by passenger vessels. Furthermore, they possess extensive knowledge of the navigational paths to and from Luang Island, delineated by coral reefs that serve as natural guides for transiting vessels. This knowledge has been passed over generations and constitutes a vital component of their traditional navigation system, refer to Figure 39.

Figure 39: The main gate, entrance, and exit of Luang Island (Hawna Raa'i).
Source: researchers, 2022 & 2023.

Figure 37 illustrates the marine spatial knowledge system of the Luang people, which functions as both a geographical boundary and a reflection of their economy and culture. The North Gate (*Hawna Raa'i*) is an important part of this map; in addition to marking significant *Hygeralai* events, it functions as the primary access point to their waters, indicating that the Luang people possess an advanced knowledge of sea navigation and zoning. Within cognitive anthropology, the concept of marine space is associated with the paradigm of TEK, wherein indigenous populations have historically cultivated knowledge systems grounded in direct experience and ecological interactions (Berkes, 1999).

This knowledge involves both physical mapping and the cognitive and social structures that regulate their connection with the water, including the identification of fishing zones, sacred sites, and traditional navigation routes. This is in line with Stephen C. Levinson's view that maritime communities use navigation systems based on natural environmental orientation, including the positions of stars, ocean currents, and specific topographical features. (Levinson, 2003). In this perspective, maritime space for communities represents a system of meanings communicated through social and cultural practices, as suggested by Roy D'Andrade (1995) in his idea of cultural models. The Luang people possess an in-depth understanding of the conceptual boundary that defines shallow from deep seas. In the Luang language, this concept is referred to as *kapala meti*. Field observations indicate that this information has been imprinted from a young age, with both children and adults comprehending the concept effectively. This capability demonstrates an extraordinary understanding of marine affairs, embedded in their daily lives and passed over generations (Figure 40).

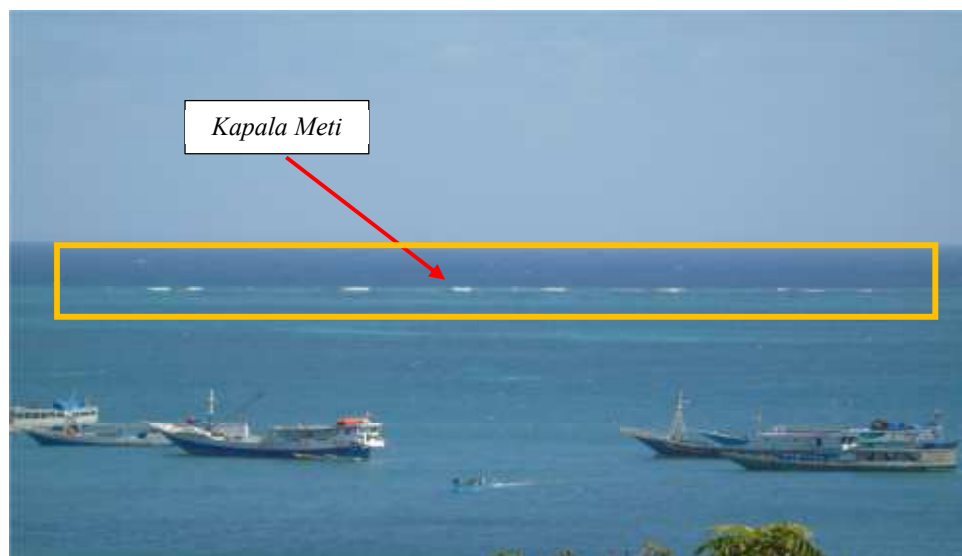


Figure 40: Imaginary line separating the meti and inner areas.
Source: authors 2022

In anthropology, imaginary lines indicate boundaries that are not physically observable but are socially, culturally, or ecologically acknowledged by a society. These may encompass physical divisions, traditional territorial boundaries, ecological distinctions, or separations based

on belief systems. Traditional societies frequently employ imaginary boundaries to establish land ownership, natural resource rights, and maritime limits that have been inherited through centuries. These lines represent not only geographical boundaries but also possess social, economic, and cosmological significance, influencing how groups view and interact with the environment.

In Yi-Fu Tuan's theory of space and place, described in *Space and Place: The Perspective of Experience*, imaginary lines are perceived as components of the social construction of space, wherein individuals establish borders influenced by their cultural experiences and values (Tuan, 2001). Coastal communities, such as those in Luang Island, define shallow and deep waters using an imaginary line determined by variations in seawater colour, which aids in navigation, fishing, and resource management. The line is depicted in the image above within the yellow box and possesses considerable ecological and economic importance for the Luang people. The Luang people exercise caution in all activities due to their understanding of the maritime environment. They are aware of the entry points to the island and the locations that will either harm or benefit them.

4.3.2 Knowledge Marine Life and How They Treat Them

The Luang people, residing near the maritime environment, has knowledge of the fish and other organisms inhabiting shallow waters, typically found in environments like coral reefs, seagrass beds, and rocky or sandy coastal areas. A prevalent category of fish inhabiting shallow waters includes reef fish, specifically *Epinephelus sp.*, *Lutjanus campechanus*, and *Siganus sp.*, which frequently seek shelter and sustenance among coral reefs. Moreover, small pelagic fish, like *Selaroides leptolepis*, *Rastrelliger sp.*, and *Sardinella sp.*, gather in large groups and are frequently located in coastal open waters, particularly during the fishing season. They possess knowledge about Sea cucumbers inhabiting sandy, muddy, and seagrass regions, along with other biota³². The results of this study also show that there are 19 types of Sea cucumbers in the waters

³² The data comes from interviews & Forum discuss Group (FGD). Y. K, 50 years, male, 15 July 2023. R.S, male, 70 years, on 28 July 2023. D. K, male, 65 years, 17 Juni 2023. L. P, male, 52 years, 26 Juni 2023. K, W, male, 40 years, 8 September 2023. E. W, male, 39 years, in9 August, 2023. T. H, 53 years, male, 20 September 2022. S. P, male, 45 years on, , 30 July 2023. M.S, male, 70 years, on 28 July 2023. D. K, male, 65 years, 17 Juni 2023 K. W, male, 38 years, i18 Juni 2023. M. W, male, 65 years, 8 September 2023. M. L, male, 50 years, , 20 August, 2023. H.H, 68 years, male, 6 September 2022.

of Luang Island, including Luang rub (*Holothuria scabra*), wave rub (*Holothuria metriatyla scabra*), black stone (*Holothuria edulis*), kapok (*Actinopyga miliaris*), red pineapple (*Thelenota ananas*), black pineapple (*Thelenota ananas*), Sepatu (*Actinopyga bannwarthi*), king, bitnik gama (*Bohadschia argus*), plain gama (*Bohadschia vitiensis*), jaipong, talenko (*Holothuria Acanthotrapeza-coluber*), namat, cera hitam (*Holothuria Halodeima-edulis*), kunyit (*Actinopyga echinites*), dugong (*Thelenota anax*), taikongkong (*Holothuria Acanthotrapeza coluber*), and susu (*Holothuria fuscogilva*)³³.

The Luang people has extensive understanding of the sustainable management of marine life in coastal and shallow areas. An example is the harvesting of Sea cucumbers, where individuals adhere to traditions that demonstrate respect for the marine ecosystem. Upon discovering a Sea cucumber, they touch its dorsal surface while communicating thoughts such as, “We take you now, but we shall leave the eggs behind to ensure your reproduction and the preservation of the island.” These activities demonstrate that the Luang people recognise the significance of preserving Sea cucumber populations for the sustainability of the marine ecosystem, highlighting the symbolic and ecological relationship between humans and their marine environment.

The Luang community exhibits comparable concern for other marine organisms, such as sandworms, in addition to the treatment of Sea cucumbers, although employing various techniques. *Ewa Launa* exemplifies local wisdom in the exploitation of marine resources, involving the collecting of huge worms as bait for fishing in shallow waters. The work is conducted solely by Luang women in a simple way; by procure little branches from a wild shrub known as *uhumeli*, measuring approximately 50 centimetres in length. Upon cleaning the branch, it is immersed in seawater to blend terrestrial and marine materials, which is said to enhance the gathering of worms³⁴.

³³ Data from the interviews recorded on the field. J. N, male, 45 years on, 19 August 2022. K.W, male, 70 years, on 28 July 2023. L. S, male, 65 years, , 19 August 2023. B. S, male, 60 years, on 19 July 2023. E. H, male, 55 years on, 30 July 2023. B.H, male, 70 years, on 28 July 2023. K. L, male, 45 years, 23 August 2023. Field observation in 2023.

³⁴ The data comes from interviews & Forum discuss Group (FGD). T. H, 53 years, male, , 20 September 2022. S. P, male, 45 years on, 30 July 2023. M.S, male, 70 years, on 28 July 2023. Y. K, 50 years, male, 15 July 2023. R.S, male, 70 years, on 28 July 2023. D. K, male, 65 years, 17 Juni 2023. L. P, male, 52 years, 26 Juni 2023. K, W, male, 40 years, 8 September 2023. E. W, male, 39 years, , 9 August, 2023. D. K, male, 65 years, , 17 Juni 2023 K. W, male, 38 years, 18 Juni 2023. M. W, male, 65 years, 8 September 2023. M. L, male, 50 years, 20 August, 2023. H.H, 68 years, male, 6 September 2022.

Upon gathering the worms, they placed them in a bucket of seawater to preserve their vitality till utilised as bait. If any worms remain after fishing, they are not discarded carelessly, but rather returned to their natural environment. This practice demonstrates that the Luang community not only utilises marine biota for their daily need but also has an ecological consciousness aimed at preserving the equilibrium of the shallow water ecosystem, ensuring the sustainability of these resources for future generations.

Coastal communities have deep knowledge of diverse marine biota, which serve not only economic functions but also hold ecological and cultural significance. From the perspective of ethnozoology, cultural ecosystem, ethnoecosystem, and symbolic anthropology, this information illustrates the continuous development of a marine resource management system grounded in indigenous knowledge. Coastal communities can preserve ecosystem balance and preserve their traditions and cultural values in relation to the maritime environment.

4.3.3 Representation of Marine Biota in the Culture

In addition to being embodied in the spatial classification system and cognitive mapping of the sea, the concept of the sea in Luang society is also expressed concretely through several forms of material culture. This representation is evident, for example, in village layouts that resemble boat structures, reflecting the symbolism of the sea as the centre of life. In addition, meanings of the sea also appear in the form of syncretism between maritime culture and Christian spirituality, particularly in the ornaments and spatial structure of church altars, which incorporate symbolic elements of the sea into religious practices. These two forms of representation show how the Luang people's maritime knowledge and experiences do not only live in the mind, but also manifest in visual forms and collective rituals. The incorporation of marine organisms as symbols in the social and spiritual conversation of the Luang people reflects their cultural mindset, illustrating the essential connection between humanity and nature. Daily experiences with the marine environment shape the community's collective decision-making, particularly on cultural and spatial factors. An illustration is the altars formed to mimic fish and shells, alongside the marine theme seen in the spatial configuration of the village, where the structures are created in the form of boats. Their proximity to nature is evident in their comprehension and application of natural indicators for navigation and life direction. For

instance, they utilise celestial bodies, like as stars and the moon, together with wind direction as natural navigational aids in their maritime endeavours, including fishing and other jobs.

Anthropology extends to maritime contexts (Strang, 2009), with boats serving as a mode of aquatic mobility for coastal populations (Hans, 1993; Horridge, 1981; Lapien, 2017b; Sopher, 1965). The Luang people are maritime communities dependent on the water for their livelihood and are referred as "sea people" due to their engagement in maritime activities and reliance on boats for transportation, as articulated by maritime experts Lapien, Bernadie, Hall, Marsetyo, and Nontji regarding the attributes of sea people (Bernadie, 2003; Hall, 2019; Marsetyo, 2018; Nontji, 2007). Consequently, discussing the sea necessitates addressing all aspects relevant to the understanding of maritime culture. The discussion of marine culture is extensive; therefore, this work is limited to the aforementioned topics.

a. Boat in Villages Layout

Boats are water transportation vessels utilised by diverse communities globally for navigation, fishing, commerce, and movement across bodies of water, including rivers, lakes, and oceans. Boats, as one of the oldest maritime technology, serve several tasks influenced by the geographical and cultural contexts of its users. In daily life, boats function as the principal mode of transportation for coastal and island communities, facilitating communication and trade with other communities (Horridge, 1981; Johnstone, 2013).

Moreover, in an economic context, boats serve as a crucial instrument in the fisheries sector, enabling fishers to access marine resources that are important for local economic viability. In numerous cultures, boats has symbolic and spiritual significance, frequently employed in spiritual ceremonies or customary events. In Toraja³⁵ culture, the boat burial ritual signifies the spirit's passage to the hereafter, whereas in the *Bajau Laut* group, boats serve both as means of transportation and as residences, illustrating their nomadic existence on the sea. In this context, the two villages on Luang Island are compared to a vessel. The metaphorical direction of sailing is categorised into three zones: fore (*gaini*), centre (*latgarni*), and aft or stern (*liirnu*). The homes are constructed in alignment with the four cardinal directions. The pattern of

³⁵ The Toraja are an ethnic group residing in the northern region of South Sulawesi province in Indonesia.

the four cardinal directions on this compass regulates the order and space of the village layout on Luang Island (van Dijk & De Jong, 1995) (Figure 41).

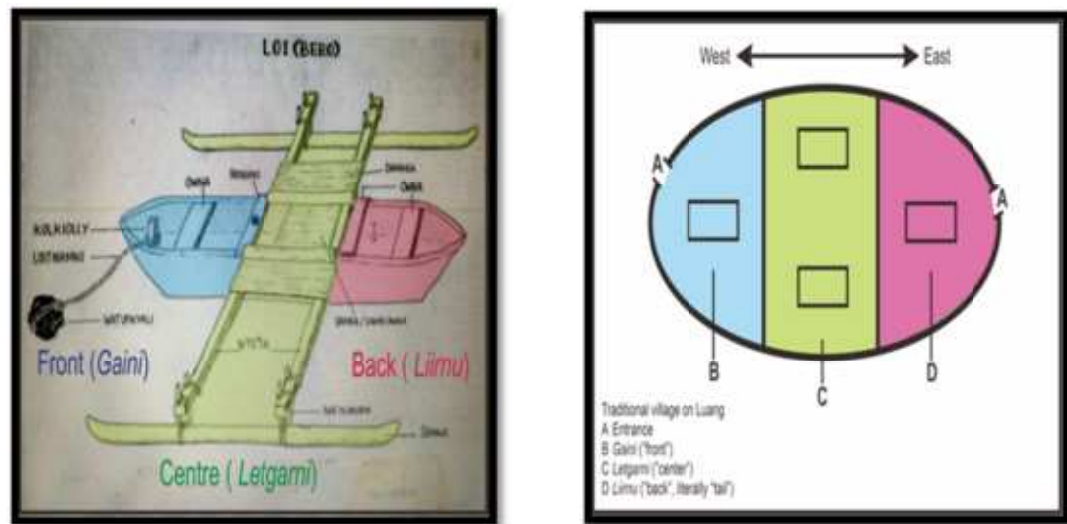


Figure 41: House layout based on boat.
Source: Kalvin Karuna (2012) dan de Jonge (1995) and modified by author, 2022.

Figure 41 illustrates that Luang Island's layout resembles a boat, symbolising the community's maritime character and social structure. The settlement layout consists of three primary zones: the front (*gaini*), middle (*latgarni*), and back (*liirnu*), analogous to the sections of a boat in maritime navigation that functions as an organisational framework while also mirroring the social hierarchy and role differentiation within the society. Moreover, the cardinal direction system significantly influences the village's layout, indicating that the Luang community structures space according to an absolute orientation (west-east) rather than a relative framework (left-right). This methodology aligns with Stephen C. Levinson's (2003) idea of the interaction between language, cognition, and navigation systems, wherein coastal cultures frequently develop orientation systems derived from environmental elements.

According to Roy D'Andrade's cognitive anthropological perspective, this boat-shaped village structure embodies the collective cognitive patterns of the Luang people, who associate their thought processes with maritime experiences and coastal ecosystem. In Claude Lévi-Strauss' structuralist theory, the village's division into front, middle, and back zones represents a

binary opposition, with the front being more receptive to outside influence and the back being more domestic, reflecting private social norms. Concurrently, the centre serves as the nucleus of social activity, where decisions are made. Additionally, in Julian Steward's cultural ecosystem, the boat-shaped village exemplifies adaptation to the coastal environment, facilitating optimal sea access, preserving social order, and sustaining a harmonious relationship with the marine ecosystem that sustains their existence.

Nonetheless, this settlement layout has evolved along its development along with population growth, shows how individuals adjust to limited space, resource requirements, and social advancement within a society. In traditional communities, like the boat-shaped villages of Luang Island, settlement structures were initially organised according to maritime ecosystem and navigation-based social systems, with spatial division adhering to the patterns of front (*gaini*), middle (*latgarni*), and back (*liirnu*).

With population growth, there occurs territorial expansion, increased settlement density, and changes in the social structure. Initially, communities provided sufficient space for each family; nevertheless, population growth necessitated the construction of additional residences, alterations to residential structures, and modifications to land ownership arrangements and access to public places. This phenomenon can be explained through Julian Steward's cultural ecosystem hypothesis, which claims that societies establish settlement patterns in response to adaptations to the physical environment and demographic shifts.

Ester Boserup's land intensification hypothesis argues that as populations grow, societies optimise the utilisation of currently available space and resources. In boat-shaped villages, spatial transformations are evident, as originally sparse settlements develop into denser configurations, adapting to infrastructure like water transportation routes and social networks. Concurrently, initially small towns develop into denser configurations, incorporating modifications in infrastructure, including water transportation routes and social networks (Boserup, 2005). In Maurice Halbwachs' (1950) perspective on collective memory, changes in settlement patterns preserve significant symbolic and cultural aspects for the community, including village orientation based on cardinal directions and clan-based social structures. This indicates that, despite the change of the village's configuration, the community's shared identity and connection to the sea are preserved as integral components of their cultural legacy.

According to Pierre Bourdieu's idea of habitus, changes in settlement are impacted not only by physical factors but also by the community's thinking and social practices. Individuals familiar with the boat-shaped village configuration will modify their spatial arrangement while preserving the fundamental principles of social and spiritual organisation. Consequently, population growth in the two boat-shaped villages of Luang Island resulted in both physical expansion and alterations in social structures, land ownership, and economic relations. Nonetheless, despite the alterations, the spatial configuration preserves the fundamental structure that embodies the community's intimate connection with the sea, navigational systems, and cultural values down through centuries (Bourdieu, 1977).

b. Syncretism of Maritime Culture and Christian Spirituality in Church Altars

Syncretism is the process through which components from diverse religious and cultural traditions integrate and interact, yielding novel forms of belief and behaviour. Bastide says that syncretism is not merely a passive combination, but entails a sophisticated process of selection, adaptation, and reinterpretation by the participating societies. The Luang community underwent an integration of marine culture and Christianity.

According to Roger Bastide (1971), cultural syncretism involves cultures incorporating new elements while retaining their present belief systems and cultural traditions. The marine components in the church altar on Luang Island indicate that Christian beliefs do not entirely substitute the maritime cultural values of the Luang people, but rather integrate with local customs. The symbolism of giant fish and shells is evident, as these symbols in coastal civilisations are frequently linked to protection, spiritual strength, and ancestral connection (Figure 42).



Figure 42: (A). The altar of the church in West Luang village is shaped like a Napoleon fish (*Cheilinus undulatus*) and a Grouper fish (*Epinephelus spp.*), (B). Church altar in East Luang village.
Source: author, 2022.

Figure 42 shows an altar in a church on Luang Island, designed in the form of Napoleon fish, Grouper fish, and *Tridacna gigas*, illustrating the strong connection between Christian beliefs and the sea culture of the local community. These altar designs are both visually appealing and rich in symbolic significance, representing the individuality of coastal communities, their religious systems, and their spiritual connection to the sea. For the inhabitants of Luang Island, the sea is perceived not merely as an economic resource, but also as a social, cultural, and sacred domain that influences their worldview. The presence of Napoleon fish (*Cheilinus undulatus*) and Grouper fish (*Epinephelus spp.*) near the altar indicates that specific marine species hold symbolic and spiritual significance within the community's beliefs. The cognitive anthropological perspective, as articulated by Roy D'Andrade's (1995) cultural model theory, claims that individuals create conceptual frameworks and cultural categories informed by their experiences and environmental interactions. The use of marine symbolism in the altar illustrates the community's contextualised comprehension of the sea and its resources within their religious activities.

According to Claude Lévi-Strauss' structuralist viewpoint, humans comprehend the world through binary oppositions, including nature against culture and sacred versus profane. This altar features fish and sea motifs representing nature, while the cross and the Figure of Jesus signify institutionalised religion and culture. The combination of these two aspects demonstrates syncretism, the integration of indigenous beliefs and Christian doctrines, enabling the group to

preserve their cultural identity within the new belief framework. Furthermore, in Victor Turner's theory of ritual symbolism, this altar can be interpreted as a metaphor of the sacralisation of the sea, wherein the sea and its inhabitants are perceived not merely as biological entities but as integral components of a spiritual framework that links humanity to a higher force.

The inclusion of *Tridacna gigas* on the altar highlights the concept of totemism, wherein specific beings are regarded as having a unique connection with the society and act as guardians. This concept aligns with Émile Durkheim's totemism concept, which claims that specific animals or natural things has significant symbolic value within a community's social and religious framework. In numerous coastal communities, *Tridacna gigas* is frequently viewed as a sea guardian gifted with mystical abilities to protect fisherman, which, within the framework of this altar, can be taken as spiritual protection during life's journey and faith (Durkheim, 1975).

Furthermore, from Julian Steward's (1955) cultural ecosystem perspective, the incorporation of marine iconography in the altar illustrates how the people of West Luang construct their knowledge system and cultural practices through interactions with the coastal environment. Maurice Halbwachs' (1950) perspective on collective memory illustrates that the use of maritime symbols in the church altar signifies the community's preservation of cultural memory within sacred space. The church in Luang Island serves as both a site of worship and a social venue that strengthens the community's identity and the incorporation of marine organism into the altar serves as a visual embodiment of their historical narrative and connection to the coastal environment, passed through generations.

The church altar on Luang Island illustrates the syncretism of marine culture and Christian spirituality, showing how external religious teachings adapt to local cultural values, symbols, and practices. This process demonstrates that religion and culture are dynamic, ever evolving through the interaction and negotiation between established traditions and modern influences, ultimately developing a unique religious identity in coastal communities like the inhabitants of Luang Island.

To conclude, the presence of Napoleon fish, Grouper fish, and *Tridacna gigas* at the altar indicates that the sea serves not merely as a physical area, but also as a sacred area filled with social and religious importance. Cognitive anthropology, structuralism, ritual symbolism, and cultural ecosystem explain how communities organise and preserve their identities by symbolic representations which incorporate their natural environment, culture, and spiritual beliefs. The

altar demonstrates that in numerous coastal communities, religion and culture are viewed as interconnected rather than distinct, collaboratively generating significance and enduring social frameworks.

4.4. Ethnooceanography

A significant relationship spanning centuries with the water and skies fosters a comprehensive understanding of how the changing seasons influence the lives of the Luang people. The Luang people's comprehension of the seasons shapes their culture and traditional behaviours aimed at using, preserving, and sustaining their environment. Awareness of the seasonal cycles and their development throughout the year is derived from variations in the landscape, animal behaviour, and environmental changes, and is crucial in determining the daily activities of the Luang people, including food availability and whether people eat at sea or on land. Thus, comprehension of weather patterns and seasonal changes is essential to their lifestyle.

Luang Island's seasonal cycle consists of three distinct seasons: the west season (*warta*), the east season (*tipru*), which corresponds to seasonal wind patterns, waves, and annual weather conditions, and the intermediate season (*warta mulain*), serving as the transitional phase between the two primary seasons. The western season (*warta*) occurs from December to February. This time experiences intense winds (*warta merna*) from west to east, frequently resulting in severe weather (*kowta kakma*) and substantial waves, hence increasing the risks associated with fishing. In these circumstances, communities modify their fishing strategies and maritime activities accordingly³⁶.

The eastern season (*tipru*), occurring from March to May, is characterised by high-speed winds flowing from east to west (*tipru merna*) that impact fish migration and the fishing grounds for many marine species. *Tran'a* (South) season, spanning June to August, is marked by more stable maritime conditions relative to the preceding season. It is significant that regardless of adverse sea and weather circumstances, the Luang people still go out to sea and perform their

³⁶ Data comes from field work through interviews. B. S, 53 years, male, 23 September 2023. Z. M, male, 55 years, 1 August 2023. V. K, female, 50 years, on 25 August 2023. K. M, 60 years, male, on 2 September 2023. S. K, male, 56 years, on 8 September 2023. U. K, male, 50 years, in Luang Island, on 16 Oktober 2023. L. P, male, 40 years on, 30 September 2022. T. M, male, 70 years, on 28 July 2023. S. M, male, 60 years, 18 Juni 2022. V.M, male, 60 years, on 19 July 2023.

usual work. They also acknowledge the transitional season (*Warta Mulain*), which signifies the period of transition between the two primary seasons of west and east. In tropical settings like Luang Island, the transitional season is marked by unpredictable weather fluctuations, including rapid changes between sunshine and intense rainfall, high winds, increased lightning activity, and localised storms. Precipitation is infrequent on Luang Island, with the possibility of an entire year passing without rainfall.

Additionally, it is remarkable that the people of Luang Island, beside the aforementioned seasonal cycles, also observe the responses of flora and fauna to their environment. This viewpoint provides a more comprehensive and complex understanding of Luang Island's environment and seasons. In a certain month, big birds from Australia are observed playing over the waters of Luang Island, extending to the coastline. Their arrival signifies the beginning of summer. A plant species known as "*galala*" reacts to the beginning of extended summer conditions³⁷ with heavy flowering³⁸. In relation to cognitive mapping (Lynch, 1960), the Luang people construct mental maps derived from their observations of avian migratory patterns and alterations in flora, enabling them to instinctively identify seasonal cycles. They recognise that each species exhibits a pattern of adaptation to its environment, serving as a natural signal for comprehending seasonal variations. This indicates that the Luang people do not merely acquiesce to environmental changes, but also actively analyse ecological patterns as integral components of their traditional knowledge system.

Consequently, the Luang Island community's comprehension of the seasonal cycle is informed not just by meteorological aspects but also by their observations of the surrounding flora and fauna. Cultural ecosystem, ethnoecosystem, and cognitive mapping elucidate that this

³⁷ The data comes from interviews & Forum discuss Group (FGD). Y. K, 50 years, male, 15 July 2023. R.S, male, 70 years, on 28 July 2023. D. K, male, 65 years, 17 Juni 2023. L. P, male, 52 years, 26 Juni 2023. K, W, male, 40 years, 8 September 2023. E. W, male, 39 years, 9 August, 2023. T. H, 53 years, male, 20 September 2022. S. P, male, 45 years on, 30 July 2023. M.S, male, 70 years, on 28 July 2023. D. K, male, 65 years, , 17 Juni 2023 K. W, male, 38 years, in 18 Juni 2023. M. W, male, 65 years, , 8 September 2023. M. L, male, 50 years, 20 August, 2023. H.H, 68 years, male, 6 September 2022.

³⁸ Based on the interviews data Forum discuss Group (FGD). Y. K, 50 years, male, 15 July 2023. R.S, male, 70 years, on 28 July 2023. D. K, male, 65 years, 17 Juni 2023. L. P, male, 52 years, 26 Juni 2023. K, W, male, 40 years, 8 September 2023. E. W, male, 39 years, , 9 August, 2023. T. H, 53 years, male, 20 September 2022. S. P, male, 45 years on, 30 July 2023. M.S, male, 70 years, on 28 July 2023. D. K, male, 65 years, 17 Juni 2023 K. W, male, 38 years, 18 Juni 2023. M. W, male, 65 years, 8 September 2023. M. L, male, 50 years, 20 August, 2023. H.H, 68 years, male, 6 September 2022.

information passes down over generations, integrating into an ecological adaption system that enables harmonious coexistence with environmental changes.

Changes in the tidal cycle significantly influence the activities of the Luang community; during high tide, fish often migrate to shallow seas, hence they utilise this period to capture fish in accordance with migration patterns and ocean currents. Conversely, at low tide, the coastal region transforms into an optimal location for foraging shells, crabs, and other marine organisms that were formerly submerged. Coastal communities possess a cognitive map of tide patterns (Tolman, 1948), facilitating the identification of optimal fishing zones and the most advantageous times for maritime activities, hence permitting successful adaptation to the marine environment's dynamics.

The people of Luang Island recognise that the most significant tides happen throughout the full moon or new moon, attributable to the moon's gravitational influence on seawater. Their understanding of the correlation between moon phases and tidal patterns indicates that they have historically established a marine calendar system grounded in astronomical data. This technology enabled them to schedule marine activities with enhanced accuracy, including optimal times for sailing and fishing. According to Aveni, coastal societies comprehended the marine calendar far before the advent of contemporary scientific theories, depending on direct observation of astronomical phenomena and oceanic dynamics (Aveni, 1995). The moon's position and minor changes in its location hold significance for the Luang people. Occasionally, the moon seems to occupy the centre of the light circle, although there are moments when its location deviates slightly to one side. This transition is regarded as an indication of the approaching transformation. The moon functions not just as a marker in the *Hygeralai* ceremony but also as a reference for marine activities, including fishing and navigating at sea. The Luang people recognise that the initial and final quarters of the lunar cycle are optimal for fishing, as the tidal variations are stronger during the new and full moons. Consequently, the existence of the Luang people is profoundly shaped by the fluctuating circumstances of the sea and sky, which act as the primary compass for their daily endeavours.

4.5 Linguistic Aspect

This section will examine *Hygeralai* from the perspective of language. The linguistic aspect refers to the approach in which the Luang people incorporate the concept of *Hygeralai* into their cognitive framework. In this case, the vocabulary or local qoloquil used in everyday conversation mirror their ecological understanding. Language serves as a mechanism to structure and communicate their comprehension of the environment, which is integrated into the communication framework of the local community.

Language and vocabulary significantly influences the cognitive framework of a society. Moreover, language plays a crucial role in the formation and transmission of knowledge within a society. The linguistic relativity theory, formulated by Edward Sapir and Benjamin Whorf, claims that the structure of language influences individuals' cognition and their categorisation of the surrounding world. Language serves not just as a medium of communication but also influences individuals' attitudes and perceptions of reality (Sapir, 1912; Whorf, 2012). Language enables humans to interact and to establish and preserve conceptual categories distinctive to each culture. Research by Brent Berlin and Paul Kay demonstrated that colour classification systems across communities adhere to universal patterns while remaining affected by local cultural influences. This study indicates that while individuals' cognitive abilities are generally comparable, the organisation and structuring of knowledge are significantly shaped by their cultural contexts (Berlin & Kay, 1999).

The relationship between language and the environment can be examined through diverse linguistic theories that explain how language influences human comprehension of nature and aids in ecosystem conservation efforts. In the Luang Island community, the concept of *Hygeralai* embodies indigenous knowledge that contributes to the preservation of the natural resources and marine ecosystem's. Its application within the community's communication framework fosters conservation values, hence ensuring the sustainability of the ecosystem. However, if the term *Hygeralai* is no longer utilised or comprehended by the younger generation, not only will the word be vanished, but also the ecological principles it portrays.

According to this, in daily conversation, the Luang people use a taxonomy and categorisation in their vocabulary and terminology. The terminology unintentionally relates to the surrounding elements of nature, which then developed to identify taxonomy. This taxonomy illustrates the Luang people's perception of their environment and their observation of events and objects within it, that shows the relationship between human cognitive processes and the physical

and conceptual dimensions of culture within a civilisation. They perceive the physical environment as though they are immersed in it.

Taxonomies and classifications are implicitly embedded in the everyday colloquial language used by the people of Luang Island, often without their conscious awareness. Their close relationship with nature shapes their cognitive frameworks and perceptions of the physical world, which are reflected in the ways they categorize and communicate about their environment. While the terminology employed by the Luang community may align with that of other groups within the same ethnic cluster, the meanings of identical terms can vary and may be used interchangeably depending on context (Table 11).

The people of Luang Island engage in multilingual practices in their daily lives, primarily using three languages. Field observations indicate that the Luang language predominates in everyday conversations and is central to various traditional ceremonies. This language exists in several variations, including a simpler form that is widely understood and a more complex variant typically reserved for ritualistic and customary events. In addition to the Luang language, Ambonese Malay is also spoken, albeit to a lesser extent. This dialect, characterized by linguistic features distinctive to Ambon, was introduced through cultural acculturation, especially by Luang youth who pursued higher education in Ambon City or through migration. Meanwhile, Indonesian, as the official language of the Republic of Indonesia, is acquired through formal education, beginning from elementary school (SD) through to senior high school (SMA).

Table 11: Example of expressions in Luang Dialect/Languages that has multiple meanings in other languages

Language/Dialect	Word/Expression
1. <i>Puri</i>	
Luang	Puri
Melayu Ambon	The name of a type of fish
Bahasa Indonesia	Istana or Keraton, one of the rooms inside the palace, a house of worship in Hinduism.
Actual meaning	Kepuri Island, one of the islands around Luang Island which is shorter than the other islands around it
Metaphor	Short, concise, and clear
2. <i>Meti</i>	
Luang	<i>Meti</i>

Melayu Ambon	<i>Aer turung</i>
Bahasa Indonesia	Low tide
Actual meaning	The condition of the sea surface changes periodically according to the gravity of the sun and moon
Metaphor	No money, empty wallet
3. <i>Pembeli Meti</i>	
Luang	Pembeli meti
Melayu Ambon	Buyers
Bahasa Indonesia	Investor
Actual meaning	The person who wins the Sea cucumber price auction
Metaphor	People who bought Sea cucumbers at the <i>Hygeralai</i>
4. <i>Karja Meti</i>	
Luang	<i>Karja meti</i>
Melayu Ambon	Harvesting
Bahasa Indonesia	Harvesting
Actual meaning	Harvesting in shallow areas during <i>Hygeralai</i>
Metaphor	Going to harvesting areas and having activities in shallow areas
6 <i>Mensyari</i>	
Luang	Gathering marine products when the tide is low in the morning
Melayu Ambon	Gathering marine products
Bahasa Indonesia	Sailing
Actual meaning	Going to shallow water area
Metaphor	Earn, strive, and work hard
7. <i>Meti Kerna</i>	
Luang	Low tide until the seabed is visible
Melayu Ambon	Dry
Bahasa Indonesia	Low tide
Actual meaning	Low tide to dry state
Metaphor	Having nothing, no money, and an empty wallet
8. <i>Muka Meti</i>	
Luang	Muka Oktober
Melayu Ambon	Face
Bahasa Indonesia	Face
Actual meaning	Face
Metaphor	New people, new faces, and new arrivals in a region
9. <i>Koliahu</i>	

Luang	Sea cucumber
Melayu Ambon	Sea cucumber
Bahasa Indonesia	Sea cucumber
Actual meaning	Sea cucumber
Metaphor	Gentle, calm and ugly.

Source: Analyses by authors according to research result, 2022 & 2023

Table 10 illustrates the language employed by the people of Luang Island in their daily conversations, particularly terms pertaining to the natural environment. This expression illustrates the close connection between human existence and the environmental circumstances, particularly the ocean. Beyond their literal definitions, several terms possess metaphorical connotations employed in social and economic context. The term *puri* in the Luang language denotes Kapuri Island, a little island neighbouring to Luang Island. In Ambon Malay, *puri* denotes a species of fish, whereas in Indonesian, it signifies a Hindu palace or place of worship. Metaphorically, *puri* in Luang signifies shortness and clarity, referring to the small size of Kapuri Island relative to neighbouring islands.

The term *meti* in the Luang language signifies low tide, which corresponds with the meanings in Ambon Malay (*aer turung*) and Indonesian (*air surut*/low tide). *Meti* accurately describes the cyclical fluctuations in sea level resulting from the gravitational effects of the sun and moon. Metaphorically, *meti* is employed to characterise declining or challenging economic conditions. The term *meti* has developed into various variations, each has distinct connotations and social and economic implications for the people of Luang Island.

The term *pembeli meti* signifies an individual who wins in the Sea cucumber auction. This phrase exists just in Luang and lacks an equivalent in Ambon Malay or Indonesian. The term is metaphorically used to describe an individual who purchases Sea cucumbers during a *Hygeralai* event. *Karja meti* in Luang refers to the collection of marine products during *Hygeralai*. In Ambon Malay and Indonesian, the term is interpreted as harvesting. The true definition is to perform activities in shallow aquatic regions. The term metaphorically refers to an individual who visits or engages in activities within the harvesting zone.

The term *mensyari* in the Luang language denotes the activity of collecting marine products during the morning low tide. In Ambon Malay, the term similarly describes the harvesting of marine products, however in Indonesian, it is predominantly associated with the act

of going to sea. *Mensyari* might metaphorically be translated as the action, effort, and diligence that exemplify the community's enthusiasm for livelihood fulfilment. The phrase *Meti Kerna* in the Luang language indicates the phenomenon of seawater receding to the extent that the seabed becomes visible. In Ambon Malay, it signifies dry, although in Indonesian, it retains the connotation of low tide. This term metaphorically denotes a condition of complete deprivation, exemplified by a lack of financial resources or an empty wallet.

Muka meti is a phrase in the Luang language signifying the early of October. In Ambon Malay and Indonesian, the phrase signifies face. Metaphorically, the phrase denotes an individual who has recently arrived in a location or a newcomer within a community. *Koliahu* in Luang denotes Sea cucumber, which is comparable to the term in Ambon Malay and Indonesian for Sea cucumber. Besides its original definition, the term has a metaphorical connotation that characterises an individual with a gentle and calm attitude, and dark skin.

This phenomenon can be examined through multiple theories, including Harold Conklin's ethnoscience theory, Naomi Quinn and Claudia Strauss's cognitive schemas and cultural models theory, as well as theories from ecological linguistics and ethnolinguistics that explain the interrelation of language and environment in shaping individuals' mindsets and cultures.

Harold Conklin (1954) claims that indigenous peoples show complex ecological classification systems that frequently exceed the richness and detail of modern scientific classification systems. Within the Luang Island society, the term *meti* demonstrates the evolution of this ecological classification system. *Meti*, signifying low tide, refers not only to the actual occurrence of tides but also describes deteriorating economic circumstances or an individual in financial hardship (*meti kerna*). This indicates that the people of Luang Island not only notice environmental events but also integrate this comprehension into their social and economic context. According to Conklin, individuals categorise ecological elements by their physical attributes and associate them with their social experiences and needs.

Furthermore, Naomi Quinn and Claudia Strauss (1997) formulated a theory of cognitive schemas and cultural models, explaining how individuals within a society comprehend and categorise their experiences into comprehensive cognitive frameworks. The Luang Island community's utilisation of marine terminology, such as *meti buyer* (the one who secures the Sea cucumber auction) and *karja meti* (marine products harvesting activity), signifies the use of an ecologically-oriented cognitive framework. The daily habits of individuals reliant on the ocean

has influenced their perspectives, where notions of the ocean not only mirror the physical ecosystem but also affect their communication, economic management, and social structures. Quinn and Strauss claim that recurrent experiences inside a certain setting establish profound cognitive schemas that ultimately influence a culture's thought processes, behaviours, and communication methods. In this setting, the regular interactions of Luang people with the fluctuating sea have established a cultural framework focused on maritime ecosystem.

From the standpoint of ecological linguistics and ethnolinguistics, believes that language serves not merely as a medium of communication but also mirrors the manner in which humans adapt and connection between them and to their environment. The terms *mensyari* (gathering marine products) and *meti kerna* (economic difficulty) illustrate that natural events are not merely described linguistically but are also assimilated into different aspects of life, including labour, economy, and societal status. In the Luang Island culture, language serves as a mechanism for comprehending their environment, aligning with the Sapir-Whorf hypothesis, which argues that language influences individuals' perceptions and interpretations of reality.

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Beyond vocabulary, taxonomies and categorizations are also evident in the idiomatic expressions employed in the daily conversations of the Luang people. Idioms, defined as fixed combinations of words or phrases whose meanings cannot be interpreted literally, serve as a linguistic reflection of cultural norms and social values. The meaning of an idiom typically transcends the sum of its individual lexical components, emerging instead from shared cultural conventions and established communicative practices within a community. Within the framework of pragmatic theory, idioms hold a vital role in facilitating social interaction. According to the theory of conversational implicature, idiomatic expressions often convey meaning indirectly, requiring listeners to infer the speaker's intended message from the broader conversational context. This phenomenon is particularly evident in the communicative behavior of the Luang community, as illustrated in (Table 12) (Grice, 1975).

Table 12 : Example of idioms exist in Luang Island

Luang Language	Expression 1	Expression 2
<i>Herleleu tuten tiane</i>	Seeking for shelter	Staying with family
<i>Maktoma Komna Hopa</i>	Slow walk like hermit crab	Irresponsive at work
<i>Tnyeeni maktooma trutni</i>	Big belly like a Trutni fish	
<i>Lina Liu riewa rakla iina lhetna</i>	Small fish playing on land can trick big fish in the black sea	1. Youth can not fool elderly 2. You are the player, I am the coach
<i>Gaimu metamni maktoma inmetma</i>	Ugly face like Gutana fish	Dark skinned like Gutana fish
<i>Gaimu metamni kuliahu</i>	Black faced like Sea cucumber	Black faced like Sea cucumber
<i>Mhoplalyara/minliariorno ha orai yangmhorat/reri inmu amu</i>	Sailing away to study in a foreign land, but should not our your family	No matter how far we go, we should not forget our family
<i>Mlyolanekwa' la puri nekwa, yana la tiata</i>	1. Puri/kapoeri, a small island next to Luang Island 2. Tiata, one of island in Luang island with elongated shape	1. Speak concisely and clearly 2. Do not beat around the bush

Source: result from field examination in 2022 & 2023

This table presents idioms in the Luang language that illustrate the community's significant connection to the natural environment, particularly the sea, and their social and cultural values. These idioms have dual meanings: a literal interpretation that defines environmental conditions or natural phenomena, and a metaphorical interpretation that expresses social, economic, and cultural values in everyday life. *Herleleu tuten tiane*, which literally translates to *take shelter on the headland*, metaphorically signifies *remain within the family*. The headland serves as a shelter from the wind and waves at sea, allowing the Luang people to utilise the concept to characterise an individual seeking temporary refuge or safety inside another family. Drawing on Symbolic Interactionism, this perspective suggests that language is shaped through everyday social interactions influenced by the surrounding environment. In this view, individuals construct meanings based on their lived experiences with nature, leading to linguistic expressions that serve as symbols of their ecosystem-based lifestyle. Rather than simply adapting to environmental conditions, the language used by these communities reflects the dynamic process through which they negotiate and interpret their relationship with nature. *Maktoma Komna Hopa*, translating to "walking slowly like a hermit crab," refers to an individual who is

inefficient in their work performance. Hermit crab are slow organisms whose movements are infrequent, illustrating how the Luang people leverage their studies of marine life to elucidate human behaviour.

Also, *Tnyeeni maktooma trutni*, signifying *big belly like a Trutni fish*, is employed to characterise an individual with a large stomach. This illustrates the comparison between the physical traits of people and marine animals, exemplifying ecological linguistics, wherein the environment influences human language development. The Sapir-Whorf hypothesis claims that language functions not merely as a communication tool but also influences human perception and categorisation of actuality. The daily experience of the Luang people with Trutni fish serves as a reference for depicting the human body's shape.

“A small fish playing on land can fool a big fish in the black sea” (*Lina Liu riewa rakla iina lhetna*) is a metaphor with two meanings: first, that a young child cannot trick an old man; and second, that you are the player and I am the coach. Similar to how little children cannot mislead adults, small fish typically cannot battle huge fish in an ecological setting. This is a reflection of the idea of social hierarchy in which those with greater life experience and education tend to hold greater influence and knowledge. According to Quinn and Strauss's concept, people's thought processes and language abilities are shaped by cognitive schemas that they develop via repeated exposure to a certain setting. The way people on the Luang Island think is a reflection of the leadership and social order that they have internalised.

Gaimu metamni kuliahu means *black face like a Sea cucumber* and *gaimu metamni maktoma inmetma* means *ugly face like a Gutana fish*, two more idioms with ecological importance. Some aspects of the look of humans are compared to those of Sea cucumber and Gutana fish in Luang culture. This is consistent with ecological linguistic theory, which states that the way individuals talk about things, including bodies, is influenced by their experiences in the environment.

There are also very important societal messages in the idiom *reru inmu amu/mhoplalyara/minliariornoha orai yangmhorat*. In its literal sense, the phrase means *sail away to study in a foreign land, keep in mind mother and father*. However, when applied to social situations, it denotes the idea that, regardless of how far we travel, we should never forget our parents. This demonstrates how important kinship and parental respect are in Luang culture. According to Basil Bernstein's sociolinguistic theory, a society's language is a window into its

principles. As an aspect of Luang cultural identity, this term expresses the importance of family and devotion to one's family.

Mlyolanekwa' la puri nekwa, yana la tiata is another expression that emphasises the value of direct, concise speech. In its most literal sense, this term describes the two islands that make up Luang Island: the small and compact Puri and the long and narrow Tiata. Meaning *don't beat around the bush* or *speak briefly, concisely and clearly* in a metaphorical sense. This illustrates how people make use of geographical elements in their surroundings as symbols for principles of effective communication. That people's speech patterns and linguistic structures are affected by their surroundings is an essential principle of Sapir-Whorf's contextual theory.

In parallel with the use of vocabulary and idiomatic expressions, traditional poetry related to the marine ecosystem also plays a significant role in various cultural practices of the Luang community. From the perspective of ethnolinguistic theory, traditional poetry is regarded as a component of a cultural communication system that embodies a community's worldview and understanding of reality. In this sense, traditional poetry functions as a reflection of how a society interprets social relationships, the natural environment, and the spiritual values it upholds. In coastal communities such as Luang, traditional poetic forms frequently incorporate terminology associated with the sea, tides, and maritime life, thereby illustrating the profound influence of the surrounding environment on both linguistic structure and cultural expression (Sapir, 1912). The Luang people possess poetic traditions comparable to those of other ethnolinguistic groups. A notable instance is the recitation of traditional poetry on the third night of mourning to honor a deceased family member. Field observations, corroborated by interviews, reveal that these poetic expressions often feature natural elements, underscoring the integral role of nature in Luang cultural narratives.

The Luang traditional poem is typically performed on the third night following the death of a family member as part of a commemorative ritual. Within Luang cosmology, this third night is believed to signify a critical transitional phase, during which the soul begins its journey toward the spiritual realm. The recitation of traditional poetry during this period functions as a ritual guide, symbolically facilitating the peaceful departure of the deceased's soul from the human world and ensuring its acceptance by the ancestral spirits. This practice encapsulates the philosophical worldview of the Luang community, wherein death is not regarded as a finality, but rather as an essential stage within the continuous and cyclical nature of life.

Findings from field observations, participatory engagement, and interviews reveal that traditional poetry in the third-night ritual serves not only as an expression of collective mourning but also as a culturally embedded medium for comprehending and accepting the life-death continuum. These poetic texts are delivered in the Luang language, a form that is infrequently used in everyday communication and is locally referred to as *bahasa pulau kecil* (“small island language”). This specialized register, rich in references to the natural world, is considered a higher, esoteric form of language reserved for specific ceremonial contexts, including the Hygeralai ritual. Among the younger generations children and adolescents’ proficiency in *bahasa pulau kecil* is generally limited. However, through sustained participation in ritual practices, they gradually acquire familiarity with and mastery of this culturally significant linguistic form (Table 13).

Table 13: Traditional poetry in Luang

Language/Dialect	Word/Expression 1	Word/Expression 2	Word/Expression 3	Element of nature
Luang	Amayei Ina narmire di aiwa gala weta-weta ida Wolantuturparni.... de metina napenpenga De Wolantuin de meti kerna. De Inaletna lawa letnah Me inliu ndela liuralamni. Inwola norawola rahei, womata plara mornu raraheila lalumlumti wawanu	Bulan purnama membawa pasang tinggi, namun saat ia lenyap, laut pun surut kering. Ikan dari luar berenang ke samudera luas, sementara ikan yang terbiasa di perairan surut tetap bertahan. Bulan bercengkrama dengan ikan Samandar, hidup bersama di atas batu yang dilapisi lumut.	Seorang tua yang dulu kuat, tegap, dan penuh keberanian, di masa senja terjebak dalam kelemahan dan rasa sakit. Tubuh besar yang dulu kokoh, kini tak berdaya, hingga akhirnya berpulang dalam panggilan Sang Pencipta. Tak memiliki anak kandung, ia merawat anak orang lain, dan meninggalkan rumah sebagai warisan bagi generasi penerus.	Narmire: Full moon Gala weta-weta ida: High tide Metina: Shallow water Plara: Samandar fish Wawanu lalumlumti: Mossy rocks in the sea
English	The full moon brings high tides, but when it is gone, the sea recedes dry. Fish from outside swim out into the wide ocean, while fish accustomed to low tide stay put. The moon communes with the Samandar fish, living together on a moss-covered rock.		An old man who was once strong, sturdy, and full of courage, in his late years is trapped in weakness and pain. A large body that was once sturdy, is now helpless, until he finally passed away at the call of the Creator. Having no biological children, he took care of other people's children, and left a home as a legacy for the next generation.	
Luang	Rohan denla meti kerna laran wen'a Hiwi dela romanwuwanu, napli nyora repra Wawin ndela orno ahla ralani napli nyora repra, Imolma ndela woora apanu Phera wen'a.	Burung bangau hidup di daerah meti, namun tetap kelaparan. Ayam bertengger di atas atap rumah, tetapi tak menyadari fajar telah menyingsing. Babi hutan bersembunyi di semak belukar, namun ia tahu saat pagi telah tiba. Sementara itu, burung pombo di puncak gunung menikmati hidupnya dengan kenyang.	Burung bangau dilambangkan dan ayam dilambangkan sebagai orang luang asli, tidak tahu bahasa adat. Sedangkan babi dan burung Pombo di lambangkan sebagai pendatang, tetapi mereka bisa mengetahui bahasa adat luang. Burung bangau itu hidupnya di lautan tapi dia menahan laparnya setengah mati padahal dalam meti. Ayam di atas bumbungan rumah, tetapi tidak tahu fajar sudah naik.	Pipi orliyai: Big does
English		The crane lives in the meti area, but is still hungry.	Storks and chickens symbolize the original luang people, who	

		The chicken perches on the rooftop but doesn't realize dawn has broken. The wild boar hides in the bushes, but it knows when morning has come. Meanwhile, the pombo bird at the top of the mountain enjoys a well-fed life.	do not know the language. The pig and the Pombo bird are symbolized as migrants, but they know the luang language. The stork lives in the ocean but he is holding his hunger half-dead even though he is in a meti. The chicken is on the roof of the house, but does not know that dawn has risen.	
Luang	Upa ana ama hialy, ina nara maka mormyori jar-jari mia Topana idama nisam momow idla luana ralamni ni, terlebeh luhorupun Skarang di agaur taruli ma ahopa tarlara Ma anyoplu di anyopla kemenmeha Ali awa di de adona uwali lekwa	Kini, aku telah mengikat kemudi di buritan perahu, dan telah mengangkat layar tinggi untuk berlayar. Maka, saat aku pergi, tak akan ada jalan untuk kembali lagi.	Kini aku telah tiada, meninggalkan seluruh keluarga di Soa Horupun. Namun, dalam kehidupan ini, kalian yang masih hidup tetaplah saling berbuat baik satu sama lain.	Ralamni: Steering Kemenmeha : Sailing Layar: sail
English	Now I have tied the steering wheel to the stern of the boat, and have raised the sails high to set sail. So, when I leave, there will be no turning back.		Now I'm gone, leaving behind my entire family in Soa Horupun. However, in this life, those of you who are still alive keep doing good to each other.	
Luang	Dudumlah liakra Taunu, ndriwalah poneltutnu Honona ita tawokwoka talileleu	Ketika angin bertiup kencang, kita tak lagi bisa meninggalkan pulau, karena gelombang besar mengguncang Liakra dan seluruh perairan sekitarnya.	Cuaca buruk tidak bisa berlayar jauh	Angin: Wind Gelombang: Tide
English		When the wind is strong, we can no longer leave the island, as huge waves rock Liakra and all the surrounding waters.	Bad weather conditions hinder long-distance navigation.	
Luang	Ama, skrang di omli awa, riwa omlea leka watlauna heunu auliauna wali Mere yana mammiah watu	Jika sudah berada di dekat batu besar dan di sisi pohon yang rindang, janganlah melempar kerikil	Jika telah pergi ke alam lain, janganlah kembali mengusik kehidupan kami	Omli awa: Big rock Leka watlauna: Big tree Watu watnyanyaklu: Stones/pebbles

	watnyanyaklu laa maka mormyori ami	untuk mengusik kami yang masih hidup		
English	If you are near a large rock and by the side of a shady tree, do not throw stones to disturb us who are still alive.		If you have gone to another world, do not return to disrupt our existence.	

Source: Based on field observations in 2022 & 2023

An abundance of natural metaphors the moon, the sea, birds, and other animals depict the cycle of life and culture in the poetry included in this table. In the sentence "*Bulan purnama membawa pasang tinggi, namun saat ia lenyap, laut pun surut kering*," for instance, the moon represents a life that is ever changing. The coastal Luang people use the sea as a central aspect in their symbolic system, with the rise and fall of the tides representing the cycle of life and death, respectively. An individual's sense of self and their ties to their native land are symbolised by metaphors like the outer fish swimming into blue water and the inner fish remaining still. The idea of cognitive frameworks proposed by Quinn and Strauss provides an explanation for this phenomenon. It states that when people spend a lot of time in the same place, they develop an emotional framework that shows up in their language and culture. Staying in the *meti* represents attachment to local traditions and culture, and it also serves as a link for the Luang community's social identity to the state of the sea and the fish habitat.

One other way of looking at it is as a metaphor for the cycle of human life from a thriving youth to the inevitable decline that comes with becoming older and the corresponding changes in one's place in society. The verse is a meditation on ageing and the impact one leaves behind. What the Luang people mean when they say, "*An old man who was once strong, strapping, and full of courage, in his late years is trapped in weakness and pain*," is that they accept ageing as something that happened to everyone. Not only does an elderly man's passing leave the world behind, but he also leaves behind a legacy of home and beliefs that will be passed down to generations to come. As a result, it's clear that in Luang culture, passing on one's wealth is just part of the social obligation to keep traditions alive and family ties strong. Using metaphors abundant in nature, this poem conveys the idea of intergenerational responsibility, which is central to ethnolinguistic theory, which believes that language and cultural expressions serve as instruments for the preservation of societal values.

"*Now I have tied the steering wheel to the stern of the boat, and have raised the sails high to set sail*," is one of several lines in this table that addresses death as an inevitable part of life. After my return, there will be an end to this. The semiotic theory put forward by Peirce states that cultural symbols and language take on deeper meanings as a result of people's interactions with one another. Boats are commonly symbols of change in marine cultures; in this poem, the sails and boat are more than just a mode of transportation; they signify the ultimate journey to another dimension.

On top of that, the verse "*If you have gone to another world, do not return to disturb our lives*" demonstrates the Luang people's faith in the afterlife and the importance of keeping the living and the dead in peace with one another. It is in accordance to ecological linguistic theory, which states that language is a reflection of how people relate to their beliefs and the environment. A strong traditional social and belief structure is indicated by the idea of not interfering with the lives of the living after death.

Certain poetry in this collection serve the purpose of transferring cultural values to the younger generation. For instance, in the poetry referencing cranes and chickens, "*Cranes inhabit meti regions, yet still experience starvation*." Chickens roost atop rooftops, oblivious to the arrival of morning. The cranes and chickens represent the indigenous Luang people who lack comprehension of their own language, whilst the indigenous boars and Pombo birds symbolise the migrants who have greater knowledge of Luang culture compared to the indigenous people. This highlights the apprehension regarding the erosion of indigenous knowledge among the youth and the significance of preserving traditions. From the viewpoint of ethnolinguistic theory, language serves not merely as a tool for communication but also as a mechanism for safeguarding cultural values and communal identity. The Luang people developed a classification system through poetry that depicts birds and other creatures as symbols of social and cultural status, reflecting an individual's worth within their community based on traditional customs and beliefs.

Poetry like "*When the wind blows hard, we can no longer leave the island, because big waves rock Liakra and all the surrounding waters*" is also remarkable as a reflection of life's unpredictability, change, and reliance on the environment. According to cultural ecosystem theory, a people's lifestyle is shaped by their environment. For the Luang people, the sea plays a significant role in their daily lives. The Luang stress the importance of facing life's obstacles with wisdom by tying.

Overall, the diverse vocabulary, idioms, and traditional poetry of the Luang community are not merely emotional expressions, but rather form an essential part of the cultural framework that upholds the existence of *Hygeralai* as a form of Traditional Ecological Knowledge (TEK). In this context, *Hygeralai* is understood not only as a customary system of restrictions on harvesting or the use of natural resources, but also as a manifestation and means of transmitting cultural values sustained through oral language and symbolic expressions.

Thus, poetic and idiomatic expressions serve not only as aesthetic elements, but also play a crucial role in preserving and transmitting the values of *Hygeralai* across generations. Through these oral forms, the collective memory regarding environmental governance and the sacred relationship between humans and nature is reinforced. The strong connection between *Hygeralai* and the power of language and traditional narratives emphasizes that the sustainability of this system is deeply dependent on the preservation of oral traditions, which serve as the cultural foundation of the Luang community.

CHAPTER V : *HYGERALAI* of SOCIO-CULTURAL ASPECT

5.1. Introduction

This section comprehensively examines the interconnections between *Sea cucumber* populations, the social structure of the Luang Island community, and the practice of *Hygeralai* as a custom-based natural resource management system. *Sea cucumbers* in this context are not only economically valuable, but also play an important role in the formation and maintenance of social structures, and bind community solidarity. Understanding the biological, social and economic dimensions of *Sea cucumbers* is therefore key in explaining the sustainability of the *Hygeralai* system. The first study in this section focuses on *Sea cucumber* populations and their relationship to the social structure of the Luang community. The distribution of access to harvesting areas, yield sharing, and decision-making authority is inseparable from the caste system and customary leadership. Ecological knowledge of *Sea cucumber* life cycles, habitats and sustainable harvesting techniques are part of the cultural heritage passed down through generations, and form the basis of *Hygeralai* practices. It should also be noted that, while *Sea cucumbers* are the main species in *Hygeralai* arrangements, in practice, communities also harvest other marine species such as abalone (*Haliotis asinina*), giant clams (*Tridacna gigas*) and lola (*Trochus niloticus*) during customary harvest periods.

The discussion then turns to Luang Island's involvement in the Sea cucumber trade in the Asia-Pacific region. It is important to show how local practices based on indigenous wisdom are also under pressure from the global market. Price dynamics, the role of investors (methi buyers) and the expectations of outside markets influence the way communities manage their resources. The tension between economic and cultural values is a major concern in this context. Apart from being an economic commodity, Sea cucumbers also function as an important element in maintaining the social order of the community. The harvest is not only utilised for personal needs, but also for collective interests such as church construction, support for traditional activities, and social solidarity. This process demonstrates how local cultural values such as gotong royong, fair share and social responsibility are realised through the utilisation of natural resources.

Finally, this section systematically outlines the stages of Hygeralai implementation, from preparations such as monitoring sea products and auctioning Sea cucumber prices, conducting opening and closing rites, establishing harvesting areas, enforcing customary sanctions, to the roles of actors involved in coordinating and implementing the system. Customary Figures such as kings, soa heads and elders, work closely with the church and community to ensure the smooth running and compliance with Hygeralai rules. Community participation in the harvest is also organised based on the prevailing social structure, reflecting the social as well as ecological sustainability of the system.

5.2. Sea cucumber Population and Social Structure in Luang Island

The explanation of *Hygeralai* from previous social and cultural perspectives, particularly about the *Hygeralai* procession, starting with the determination of the *meti* buyer and closing with the *Hygeralai* ritual, focused on several fundamental aspects related to Sea cucumber. In this section, it is crucial to describe and analyse how Sea cucumbers impact the lives of the Luang people and the environment in which they live. Sea cucumbers are a biotic phenomenon, like any other organism, and are also understood as an ecological entity that cannot be ignored in this study. The relationship between Sea cucumbers and the Luang community forms a unified ecosystem network where their lives are interdependent and mutually influential.

An ecosystem is a functional system (Moore et al., 2006), comprising both the physical environment (Bentley et al., 2014) and the species inhabiting it (Geertz, 1963). The Luang people and Sea cucumbers represent an interdependent and influential ecosystem on Luang Island. This is shown through patterns and procedures in *Hygeralai*, serving as an interface for establishing interactions with nature and utilizing natural resources on Luang Island, particularly Sea cucumbers. These patterns illustrate the cultural characteristics of the Luang people, reflecting their connection with the surrounding environment (Bennet, 1976). The utilization of natural resources by the Luang people is both shaped by and influences customary organizations, cultural values, and the surrounding ecosystem, particularly the marine biota and Sea cucumber population.

The population of animals is a factor influencing the equilibrium of species variety in a specific region, which also involves humans in the area (Scoones, 1999). Moreover, Strang asserts that population engages with the ecological opportunities and limitations of a community.

The opportunities and limits arise from the interactions and results of relationships among components of ecosystems, including socio-cultural systems (Bates et al., 2014), that collaborate, operate, function, and progress within a cohesive framework (Foster & Anderson, 1998). Before defining how Sea cucumbers and their populations maintain the social structure of the indigenous people of Luang Island, as well as their own sustainability, we will briefly describe the Sea cucumbers from Luang Island and their connection to the Sea cucumber trade in Asia and the Indo-Pacific.

5.3. Luang Island's Sea cucumber in Asia -Pacifik Trade

The perception of Sea cucumbers significantly differs based on individual or societal perspectives of their positioning. Initially, *Sea cucumbers* appear to be only soft, slender, and sluggish creatures; nonetheless, they offer significant economic value and potential. The discussion of Sea cucumbers and their population in the waters of Luang Island is integrally linked to the involvement of Chinese traders in Indonesia, particularly in Maluku, and the trading of Sea cucumbers. The origins of Sea cucumbers in global trade remain a contentious issue. The Sea cucumber trade originated in the waters of the Asian continent, particularly in the Indo-Pacific region. Numerous scholarly studies before 2019 believe that the start of the *Sea cucumber* trade in Indo-Pacific waters occurred 500 to 1000 years ago (Setyastuti et al., 2019). Sea cucumbers rose to prominence as a highly valued commodity following the decline of the spice trade in the 18th and 19th centuries. Nevertheless, their involvement in trade predates these periods, albeit without achieving the same level of significance as spices. Historically, the *Sea cucumber* trade was largely dominated by Chinese merchants (Reid, 1998; van der Chijs, 1886)

Certain literature implicitly indicates that Luang Island was a producer of Sea cucumbers in the Indo-Pacific trade during the 15th century, facilitated by Chinese traders. The literature analysis reveals that Luang Island was recognized as a Sea cucumber producer even before the 15th century. In addition to Luang Island, the Aru Islands, Moa Island, Tanimbar Islands, and Kei Islands were significant producers of Sea cucumbers in the trade (de Graaf, 1977). These regions were the focus of Chinese traders seeking to procure *Sea cucumbers* and sea pearls in the century before the 15th century. Van Leur's theory claims that ethnic Chinese were present in Maluku and remained there to purchase Sea cucumbers in the 7th (Van Leur, 1955). A record of Maluku was discovered in the tambo of the Tang dynasty in China (618-906), referencing

'*Miliku*', a region utilized as a reference point for determining the direction to the Holing Kingdom (*Kalingga*) in the West. W.P. Groenveldt identified 'Mi-li-ku' as Maluku/Moluccas (Kissiya, 2019; Kissiya et al., 2021; Pattiasina, 2020). This indicates that Maluku was recognized in China as early as the 7th century.

Subsequently, we compared it with the findings from interviews and verified by the residents of Luang Island, indicating that historically (the precise year remains unknown), Chinese individuals resided on Luang Island, although in the capacity as traders. They arrived at Luang Island to procure Sea cucumbers and sea pearls. They resided on boats anchored in the *labuang*³⁹, seas of Luang Island and sought permission to purchase Sea cucumbers. During the 17th and 18th centuries, certain literature expressly indicates that, in addition to Chinese traders, Makassarese traders were prominent Sea cucumber merchants in the Asia-Pacific trade, sourcing their Sea cucumbers from Luang Island

Sea cucumbers is positioned as an intermediary between cultures, with multiple justifications; firstly, this study discovered a relic of the Chinese traders who visited Luang Island to purchase Sea cucumbers, which remains maintained to this day and is referred to as “*Gong China*.” Secondly, the interview results indicated that the Chinese referred to Luang Island as “*Luang Mae Fah*,” which translates to *Ibu* Island (Mother Island)⁴⁰. Third, since the implementation of *Hygeralai*, particularly in the auction of *meti* prices (Sea cucumber prices), the prospective purchasers have predominantly been Chinese, along with some buyers from Korea and Japan. Additionally, the discovery of ancient porcelain dishes on Luang Island. It is unsurprising that Sea cucumbers from Luang Island had a role in the Sea cucumber trade in earlier centuries. The current distribution pattern of Sea cucumbers in Luang Island via *meti* buyers has changed, however it remains plausible that Sea cucumbers from Luang Island have reached the Asian and Pacific Sea cucumber trade through these routes.

³⁹ *Labuang* is the name for the main area in the waters of the Luang Island that directly faces the front of the village.

⁴⁰ The data comes from interviews. J. K, female, 50 years, 28 July 2023. L. H male, 55 years, on 11 September 2023. G. M, male, 40 years, 12 Agustus 2023. C. K, male, 40 years, 18 September 2023. Y. M, male, 44 years, 38 August, 2023. K. H, 48 years, male, 28 September 2023. W. K, male, 50 years, 8 August 2023. L. W, female, 55 years, on 30 August 2023. K. M, 60 years, male, on 2 September 2023. S. K, male, 56 years, on 8 September 2023. Z. S, female, 50 years on, 18 July 2023. S.P, male, 50 years, on 28 July 2023. K. M, female, 50 years, 10 Oktober 2023. I. W, male, 56 years, on 23 Oktober 2023.

5.4. The Role of the Sea cucumbers in Maintaining the Social Structur of the Luang Community

Sea cucumbers and their numbers significantly influence the sociocultural dynamics of the Luang Island indigenous people. Sea cucumbers are crucial to sustaining the social framework of the Luang community. *Sea cucumbers* lack a relationship to the cosmological ideas of the Luang people, unlike *Tridacna gigas*, which are rooted in a mythological context. Nonetheless, the function of *Sea cucumbers* appears to be more structural and practical. *Sea cucumbers* facilitate the connection between spiritual practices and the daily existence of the Luang people, influencing their routines, rituals, and social interactions. The shared activities are manifested through the roles of each member within the social framework of Luang Island's customary institutions. They collaborate synergistically to attain shared objectives.

Sea cucumbers constitute one of the foundation of the local economy , serving as a resource for economy and sustenance. Participant observation in the field indicates that Luang Island's waters have 21 species of Sea cucumber, all of which are listed in the procurement list for *meti* purchasers. No written document exists; nevertheless, discussions with the heads of the two villages indicate that the harvest (*meti*) following the opening of the *Hygeralai* changed as follows: 2017 (247 tons), 2019 (245 tons), 2021 (248 tons), and 2023 (246 tons). The annual variation in population levels influences the yield. The significant fluctuation of Sea cucumber populations at Luang Island, relative to other regions, demonstrates the efficacy of the *Hygeralai* ritual in preserving the marine ecosystem. As comparison, in Korea, the species *Apostichopus japonicus* is harvested annually throughout October and November (Kang et al., 2017), and in Sri Lanka, some species may only be harvested when they measure between 32 cm and 56.3 cm, as per the suggested monetary size (Dissanayake & Wijeyaratne, 2010). Meanwhile, on Luang Island, as previously explained regarding the regulations on the size of *Sea cucumbers* at the time of harvest, depending upon the species. This exemplifies the effective implementation of *Hygeralai*, which mandates that Sea cucumber harvesting occurs biennially.

Sea cucumber serves as a connection between the inhabitants of Luang Island, their ancestors and God, rather than as sacrifices in the *Hygeralai* ritual. In contrast to Rapaport's study of the use of pigs as sacrificial offerings in the rites of the Maring people in Tsembaga, Papua New Guinea (Rappaport, 1968a). In North Africa, a study on cattle and their relation to the cultural behavior of the local Nuer community was conducted by Pritchard The study

concludes that cattle are not merely economic commodities but are also regarded as symbols of social status and wealth among the Nuer community (Pritchard, 1940a). Marvin Harris, in his analysis of cattle, pigs, war, and witches in India, examines human beliefs in various dogmas and traditions through a materialist perspective. He argues that culture and religion evolve as adaptive responses to material challenges faced by societies, rather than existing solely as spiritual or dogmatic phenomena (Harris, 1989). Additionally, Geertz study on chicken grafting practices in Bali-Indonesia, it is not merely a form of entertainment or a contest between animals, but it also represents a microcosm of Balinese culture. This activity unveils symbols of masculinity, social stratification, power relations, and the collective emotions of the local community. Through an interpretative approach, Geertz analyzes cockfighting as a daily practice that reflects the complex and profound dynamics of Balinese culture (Geertz, 1973b). The purpose of human-animal connections is to enhance the distinctiveness of the group (human/society) itself. Numerous methods of harvesting and religious activities, which are still observed today, are indeed associated with animals. As a Dawson highlight, despite being inherently social beings, humans remain associated with animals (N. Dawson et al., 2021)

Sea cucumbers illustrate adaptive behaviour in the waters of Luang Island and signify a conceptual domain of rarity (WoRMS, 2024) speciality as a highly nutritious organism (Bordbar et al., 2011), valued in the global market (S. W et al., 2023), crucial for maintaining marine ecosystem stability (Purcell et al., 2016), and effective in traditional medicine (Kareh et al., 2018; Kumar & Shaikh, 2022; Lovatelli et al., 2004; Pangestuti & Ari, 2017). Implicitly, this identity reveals their efforts to sustain and perpetuate the social structure of the Luang Island community to the present day. Sea cucumbers can and do constitute all elements of the social organization of Luang Island as reflected in the *Hygeralai* ritual.

At the surface level, it is clear that each member of Luang Island social structure expresses themselves and their identity within a publicly constructed social world shared through celebratory processions. However, it goes unnoticed that there is an “alternative life” on the seabed of the waters surrounding Luang Island that actually plays a role in organising it all, which are Sea cucumbers and their populations. Sea cucumbers facilitate and enable all components of the social structure of the Luang community to work and operate towards a common goal. From their ecosystem in the waters of Luang Island, Sea cucumbers have become the controlling mechanism of action for the people Luang community. Sea cucumbers illustrate

how organisms, including animals and plants, can influence the cultural and social dynamics of human populations, as noted by Hardesty (Hardesty, 1977).

Unlike cosmologically based animals, *Sea cucumbers* show a practical connection between ecosystem and society. The dependability and reciprocal impact of the Luang Island community on Sea cucumbers, not merely as a symbol of spiritual significance but as a vital resource, demonstrates a functional and sustainable interaction with the environment. Conversely, the inhabitants of Luang Island, through *Hygeralai* rituals, significantly contribute to the protection and preservation of Sea cucumber populations. The biennial harvesting regulation established by traditional institution can guarantee the viability of the Sea cucumber population in Luang Island. This reciprocal relationship sustains and maintains the social and cultural foundation of the Luang Island community (Figure 41). These relationships appear to correspond with the overall idea of integral ecological networks, as articulated by Geertz, wherein human groups and their adjacent ecosystems are intricately interconnected and mutually reliant (Geertz, 1973b).

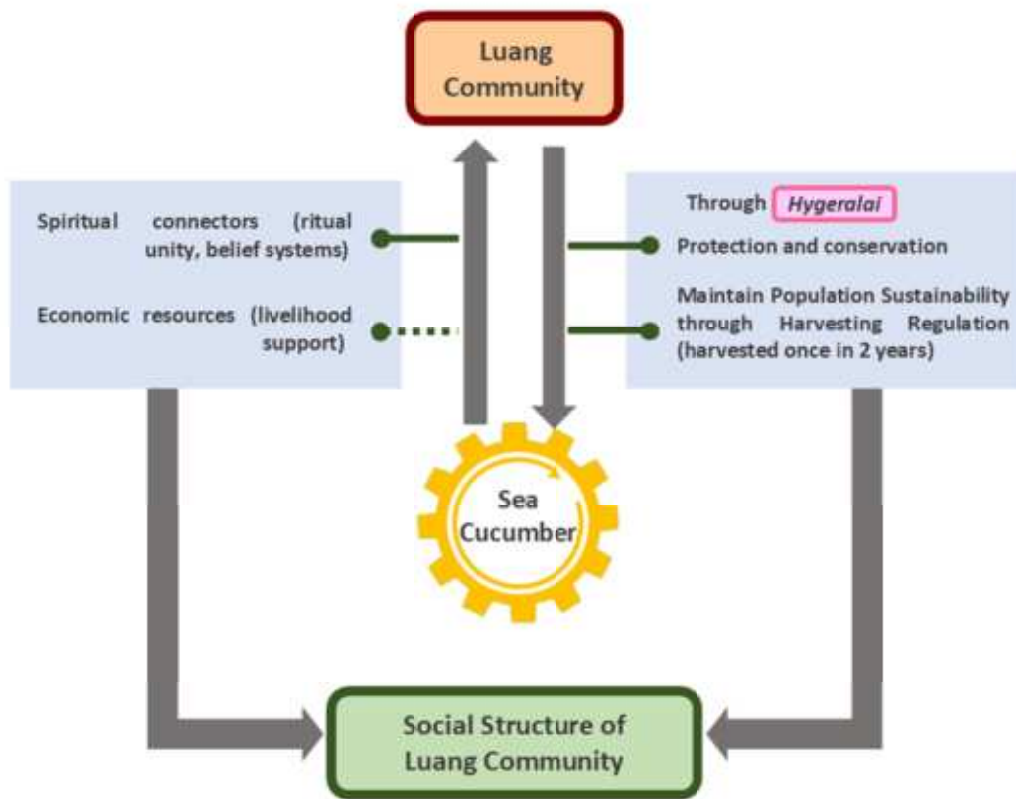


Figure 43: Mutualism between *Sea cucumber* and Luang community.
Source: Own illustration, based on the field work

In conclusion, the role of *Sea cucumbers* in Luang Island society is more than just ecological significance; it is a foundation of social cohesion, spiritual practices and sustainable livelihoods. The importance of this species highlights the importance of preserving traditional practices such as *Hygeralai*, which not only maintains ecological balance but also ensures the sustainability of the unique social structure of Luang Island.

5.5. *Hygeralai* Organizer

The customary social and institutional structures in the implementation of *Hygeralai* in Luang Island are concrete manifestations of the TEK system, which integrates technical, social, spiritual, and institutional dimensions in the sustainable management of natural resources. As emphasised by Nancy Turner (2005) and Fikret Berkes (1999), TEK is not just a collection of

practical knowledge about local ecosystems but also includes cosmological relationships and a long history of interaction between indigenous peoples and their environment (Berkes, 1999; Nancy. J. Turner, 2005). In this context, *Hygeralai* is run by a network of customary institutions that function collectively and hierarchically, consisting of the village head, head luwu, saniri, head matarumah, saniri matarumah, and marinyo, who each have specific mandates and functions in the regulation of marine harvesting activities, especially Sea cucumbers.

Interestingly, this social structure is also inseparable from the legacy of the caste system on Luang Island, although it is no longer formally used. In practice, the influence of caste can still be recognised from the key positions occupied by certain matarumah. For example, the head of *luwu*, coming from the matarumah of Miru, a clan with *marna* (highest) caste status, shows how socio-historical legitimacy still influences customary institutional structures. In contrast, middle-caste matarumah, such as Palmelay, play an important role in supporting *Hygeralai* activities, creating a layered but functionally inclusive system.

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The role of the church in this context reinforces the adaptive co-management approach proposed by Armitage et al. (2007), which is resource management based on collaboration between formal and non-formal actors that allows local systems to respond adaptively to social and environmental dynamics (Armitage et al., 2007). The church is not only present as a religious institution but also serves as a channel for the integration of new spiritual values into the customary system, for example, through opening and closing prayers for *Hygeralai* activities, as well as official announcements at the church pulpit. The active involvement of these religious institutions strengthens the normative legitimacy of *Hygeralai* in a society that continues to undergo socio-cultural change. In other words, the sustainability of the *Hygeralai* system cannot be separated from the functional synergy between customary social structures, Christian spirituality, and community institutions. The power of the village head, as well as the customary

head, as the highest decision-maker, emphasizes the importance of recognizing local institutions in resource governance. The coherence between these actors strengthens the resilience of the social-ecological system, enabling *Hygeralai* to survive, transform, and become a sustainable management model based on local wisdom and responsive to the challenges of the times.

5.6. Process *Hygeralai* (Preparation *Hygeralai*)

The *Hygeralai* process in Luang Island illustrates a comprehensive and structured local knowledge system, which is very suitable to be studied within the framework of TEK. TEK, as described by Nancy Turner (1978, 2005), includes not only knowledge about species and ecosystems, but also the social, spiritual, ethical and institutional aspects that collectively govern human relationships with their environment (Turner, 1978; 2005). In *Hygeralai* practice, this is reflected in each stage that is passed before the ritual opens and closes.

First, monitoring marine biota, such as Sea cucumber growth and regeneration, reflects the community's ecological understanding of the life cycle of marine species. This knowledge is not theoretical, but derived from observation and experience, passed down from generation to generation through direct practice and collective stories. This monitoring shows that the Luang community does not exploit marine resources indiscriminately, but rather follows natural indicators that serve as a reference to determine the right time to harvest, thereby maintaining the sustainability of the resource.

Secondly, the auctioning of Sea cucumber prices and the involvement of investors (methi buyers) show that *Hygeralai* not only regulates ecological aspects, but is also connected to traditional economic systems based on collectivity. This process is customarily organised, involving social actors such as traditional leaders, religious leaders, and community leaders, which shows the existence of a distinctive collective decision-making system in TEK. As Turner asserts, TEK systems always have a strong informal institutional dimension, tasked with maintaining ecological and social order through social mechanisms such as customary sanctions or moral regulations.

Thirdly, the establishment of harvest periods and the performance of customary rituals reflect a strong link between ecological knowledge and local spirituality. These rituals are not merely ceremonial, but have deep ecological and social meaning-they reinforce the community's

collective commitment to the prohibitions and ethics of resource management. In terms of TEK, this shows that environmental management is not separated from cultural values and community cosmology. Rituals become a way to 'harmonise' humans with nature, and renew spiritual connections with the sea as a living and sacred entity. (Turner, 2008).

5.6.1 Monitoring the *Sea cucumber* development and decision of the period

Not all marine products from Luang Island are included in the *Hygeralai*; only specific types of biota. *Hygeralai* is typically applied to marine resources with significant economic worth or those that are valued for consumption by markets and local populations. Among the marine biota harvested in the *Hygeralai* is *Sea cucumber* and *Tridacna gigas*. The head of *luwu* is responsible for monitoring the development of marine life and reporting observations to the village leader. The leader of *Luwu* examines the waters of Luang Island to determine the readiness of the *Sea cucumber* for harvest⁴¹. The acceptable length of the *Sea cucumber* for harvesting during the *Hygeralai*, as jointly established by the customary institution, is 30-50 cm, with a diameter of 25-50 cm. At this size, a *Sea cucumber* is estimated to weigh approximately 5-6 kg. While the harvested size of *Tridacna gigas* ranges from 30-60 cm in length⁴². *Sea cucumber* of this size and weight have reached maturity and is optimal for harvesting, thus exhibit excellent quality and are in demand by investors⁴³.

The head of *luwu* is responsible to determine the period (opening and closing times) of the *Hygeralai*, which is discussed at a meeting involving the two villages of West Luang and East Luang. The meeting includes the village heads, the head of *luwu*, *saniri luwu*, head of *matarumah*, *Saniri matarumah*, and traditional elders. The decision to open the *Hygeralai* was

⁴¹ The data comes from interviews & Forum discuss Group (FGD). S. P, 48 years, male, 13 July 2022. M. L, male, 50 years, 20 August, 2023. H.H, 68 years, male, 6 September 2022. K. W, male, 38 years, 18 Juni 2023. M. W, male, 65 years, 8 September 2023. M. P, male, 56 years, 1 August 2023. J. S, male, 60 years, on 28 July 2023. S. M, male, 45 years on, 30 July 2023. M. S, male, 70 years, on 28 July 2023. D. K, male, 65 years, 17 Juni 2022.

⁴² Based on the interviews data Forum discuss Group (FGD). Y. K, 50 years, male, 15 July 2023. R.S, male, 70 years, on 28 July 2023. D. K, male, 65 years, 17 Juni 2023. L. P, male, 52 year, 26 Juni 2023. K, W, male, 40 years, 8 September 2023. E. W, male, 39 years, 9 August, 2023. T. H, 53 years, male, 20 September 2022. S. P, male, 45 years on, 30 July 2023. M.S, male, 70 year, on 28 July 2023. D. K, male, 65 years, 8 September 2023. M. L, male, 50 years, 20 August, 2023. H.H, 68 years, male, 6 September 2022.

⁴³ The information based on the partisipation observation in the field and interviews data. M. S, 58 years, male, 11 August 2022. W. W, male, 40 years, 26 Juni 2023. K. L, male, 45 years, 13 September 2023. B. M, male, 48 years, 9 August, 2023. L.W, male, 50 years, male, 6 September 2022. S. P, male, 45 years on, 30 July 2023. M.S, male, 70 years, on 28 July 2023. D. K, male, 65 years, 17 Juni 2023 K. W, male, 38 years, 18 Juni 2023. M. W, male, 65 years, 8 September 2023. M. L, male, 50 years, 20 August, 2023. H.H, 68 years, male, 6 September 2022.

made collaboratively based on the timing determined by the head of *luwu*. Furthermore, the choice to open the *Hygeralai* takes into account other factors, including the optimal timing or known as *lersamomuou*, which is related to low tide, lunar positioning, weather conditions (precipitation and wind), and crop purchasers. The optimal period is typically determined by an event of optimum *Hygeralai*, combining with the most significant low tide in the early morning hours, at around 5 AM, particularly during the western season in October. The duration of one month is set by traditional institutions for harvesting (*karja meti*) in the *Hygeralai*⁴⁴.

The selection of certain marine species to be the object of management in *Hygeralai*, such as Sea cucumbers as the main species, shows the selective introduction of species with high economic and ecological value. This reflects the TEK principle of selective use of resources by Berkes, which is the utilisation of resources based on an understanding of the ecological value, life cycle, and function of species in the ecosystem (Berkes, 2012). Setting a minimum size and weight for harvesting demonstrates the Luang community's understanding of reproductive timing and biological maturity, in order to maintain a sustainable population as well as to obtain good quality.

The use of natural indicators such as low tide (*lersamomuou*), the position of the moon, weather conditions, and seasons as the basis for determining harvest time is a form of applying environmental cue-based knowledge in TEK. This shows that the Luang community has its own ecological dating system that is not only empirically accurate, but also in harmony with the dynamics of the natural cycles of the sea. The one-month marine harvest period determined by customary institutions demonstrates the principle of temporal regulation, which is prevalent in

⁴⁴ The data based on the interviews & Forum discuss Group (FGD). J. S, male, 60 years, on 28 July 2023. S. M, male, 45 years on, 30 July 2023. N. M, 46 years, male, on 18 September 2022. Z. L, male, 56 years, on 7 September 2023. V. K, female, 46 years, on 23 August 2023. S. P, male, 45 years on, 30 July 2023. M.S, male, 70 years, on 28 July 2023. D. K, male, 65 years, 17 Juni 2023 K. W, male, 38 years, 18 Juni 2023. M. W, male, 65 years, in Luang Island, 8 September 2023. M. L, male, 50 years, 20 August, 2023. H.H, 68 years, male, 6 September 2022. S. P, male, 45 years on, 30 July 2023. M.S, male, 70 years, on 28 July 2023. D. K, male, 65 years, 17 Juni 2023 K. W, male, 38 years, 18 Juni 2023. M. W, male, 65 years, 8 September 2023. M. L, male, 50 years, 20 August, 2023. H.H, 68 years, male, 6 September 2022.

TEK systems, limiting the time of exploitation to allow for resource regeneration and recovery. This reinforces aspects of sustainability and custom-based conservation.

5.6.2 Prospective *Meti* Buyers and *Meti* Price Auction

Three months prior to the opening of the *Hygeralai*, the leaders of both villages compose an open letter sent to all Indonesians and foreign investors from the previous *Hygeralai* period to identify prospective buyers. The *Hygeralai* typically commences in October; thus, the letter is composed and disseminated in July. This letter is issued by the Maluku provincial fisheries agency and church institutions for dissemination in churches, to friends, relatives, and former buyers. All prospective buyers are often aware of the fact that a *meti* price auction occurs biennially to mark the opening of the *Hygeralai*. The interview results indicate that during the *meti* price auction at *Hygeralai*, neither the indigenous community nor the Luang community participated as prospective buyers⁴⁵.

However, starting from the 2023 *meti* price auction, residents from Ambon and Makassar City participated as prospective *meti* buyers.⁴⁶ The drafting of the open letter three months prior to *Hygeralai*'s opening demonstrates the existence of a local administrative governance system. This process is in line with the principle of temporal regulation in TEK, where resource management is organised according to certain customarily agreed times. The dissemination of the letter through church networks and social-community relations also indicates the existence of social memory and informal knowledge transmission practices, where important information regarding local ecology and economy is passed on through relevant social institutions. Prospective buyers have registered to the leaders of the two communities during the registration period, and any individual seeking to register will be denied by the local authority after the deadline. Following to the registration session, the head of the two villages conduct a meeting with staff and customary institutions to establish the date for the customary meeting with prospective *meti* buyers⁴⁷. Restricting access

⁴⁵ This is due to the necessity for *meti* to have substantial capital to qualify as a prospective buyer. The abundance of diverse *Sea cucumber* species in Luang Island significantly influences their auction prices.

⁴⁶ The data based on the interviews. H. K, 54 years, male, on 23 August 2022, M. M, 65 years on 15 September 2023. G. S, male, 55 years, on 19 July 2023. S. P, male, 45 years on, 30 July 2023. M.S, male, 70 years, on 28 July 2023. D. K, male, 65 years, 17 Juni 2023 K. W, male, 38 years, 18 Juni 2023. M. W, male, 65 years, 8 September 2023. M. L, male, 50 years, 20 August, 2023. H.H, 68 years, male, 6 September 2022.

⁴⁷ The data comes from observation in the field and interviews. K. S, male, 50 years, on 10 August 2023. A. W, 48 years, male, on 15 August 2023. V. S, male, 70 years, on 28 Oktober 2023. B. H, male, 59 years, 21 September 2023. A. S, male, 48 1 August 2023. K. P, male, 60 years, on 1 Oktober 2023. H. M, male, 49 years on, 18 July

through a registration system for prospective buyers and rejecting those who miss the deadline reflects the principle of access control in TEK (N. J. Turner, 2008), which regulates access to natural resources so that they are managed by local values and structures. This is important as a form of protection for the ecological and cultural systems of the Luang community from external pressures that can disrupt the social-ecological balance.

Subsequently, to determine the date for the customary meeting and the *meti* price auction, the two village heads inform prospective buyers via letter or telephone with the scheduled date of the customary meeting and the *meti* price auction. Prospective buyers from outside Luang Island typically wait two weeks to a month for a customary meeting to be organized. In addition to the challenging transportation and considerable distance, prospective buyers must endure a waiting period of two weeks to one month for a boat from Ambon to Luang Island, or alternatively, take a flight from Ambon to Moa, followed by a boat ride from Moa to Luang Island.⁴⁸

By not involving local communities as potential buyers, but still as managers and collective beneficiaries, this practice demonstrates the principles of collective rights and resource stewardship that are integral to the TEK system. This means that although economic relations occur with outsiders, control over resources remains in the hands of indigenous peoples through customary institutions and collective deliberation mechanisms (Berkes et al., 2000).

Upon the prospective buyers' arrival on Luang Island, the meeting was used to be had promptly held on the scheduled day. The two village heads directed *marinyo* to deliver an announcement to the everybody in both villages. All announcements or information from the village leaders are conveyed through *tabaos*, which is a method of disseminating information or notifications to the entire Luang community by loudly shouting⁴⁹, without the aid of instruments, at every corner and street in the village of Luang Island (Figure 44).

2022. F.S, male, 54 years. on 28 July 2023. M. S, male, 60 years. 19 Juni 2023. B. W, male, 60 years, on 19 July 2023. E. H, male, 55 years on, 30 July 2023. B.H, male, 70 years, on 28 July 2023.

⁴⁸ The data collecting based on the Focus Group Discussion (FGD) & interviews. F. M, male, 56 years, on 13 August 2023. H. K, 48 years, male, on 16 Oktober 2023. V. L, male, 60 years, on 5 Oktober 2023. C. H, male, 45 years on, 30 September 2023.

⁴⁹ *Marinyo*'s vocal reaches an average intensity of 75 dB Sound Pressure Level (SPL) and has an effective range of 75 meters. According to Hartmann's (1997) conceptual theory on the mechanisms of sound, its measurement (including decibels), and the adult human auditory range of 70-90 dB SPL, shouting can markedly amplify vocal loudness up to 75 meters (Hartmannn, 1997). Additionally, the positioning of standing points is modified to align with the village's spatial configuration, ensuring that the message disseminates to a maximum number of people, including those in remote locations from the village center.

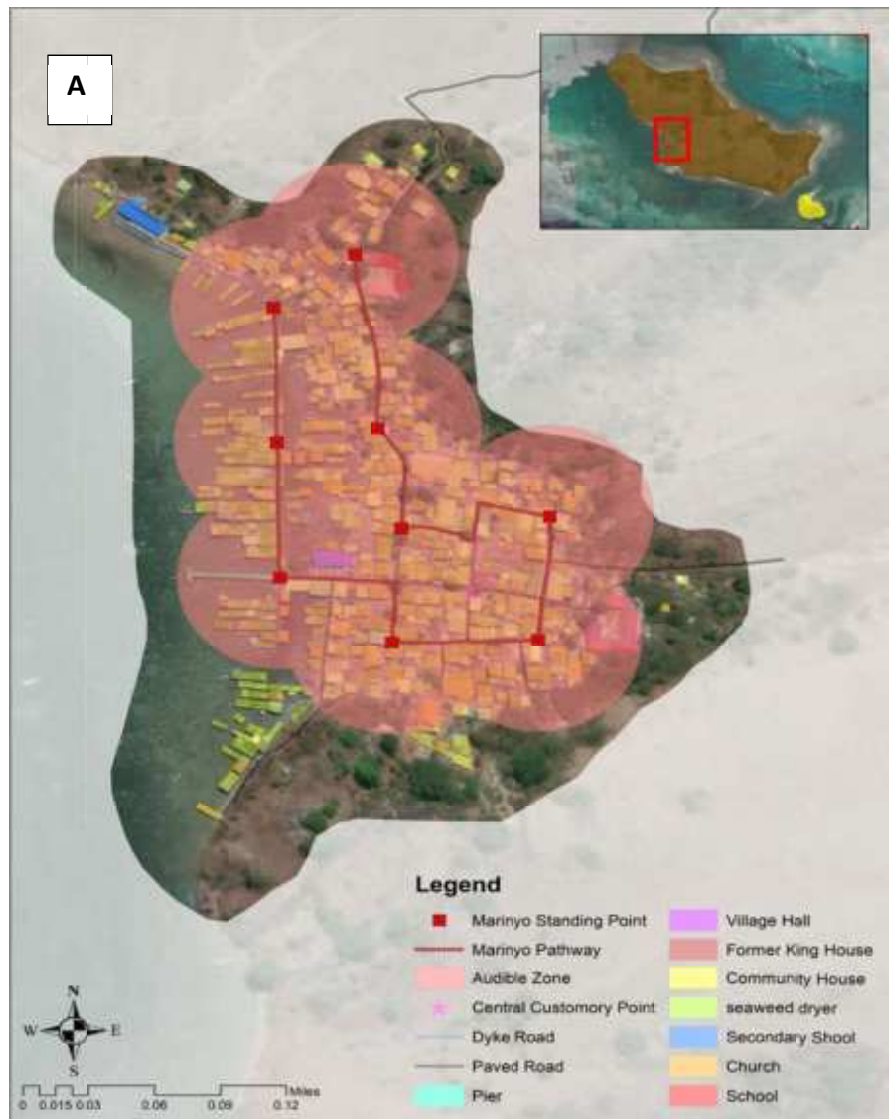




Figure 44: (A) & (B). Marinyo standing point and audible zone during tabaos in East Luang Village. The white arrows shows the direction in which the marinyo walk within the village at each corner and street within the two villages, the red box is the marinyo standing position, and the transparent red bubble is the audible zone level of the marinyo.

Source: Bing Maps (2024) digitalized in ArcGIS by authors.

Figure 42 presents *marinyo* movement in both villages on Luang Island. The white arrows on the map show the direction of *marinyo* walks along the village streets, including both primary streets and intersections. These streets are constructed to facilitate access to all regions of the community, guaranteeing that no region is uninformed from important information disseminated via *tabaos*. The red circles in the image indicate important positions that ensure the audible coverage, where *marinyo* is positioned to convey messages. From these positions, *marinyo* conveys messages that hold significant implications in the social and cultural lives of the people of Luang Island. The transparent red bubble indicates the region covered by the *marinyo*'s voice from each standing position. This area signifies the audible range of the *marinyo* and the community's effective hearing threshold.

From this side *Hygeralai* also shows clear the intimate connection between village layout and traditional communication customs. *Marinyo* functions as a custodian of tradition and a unifying force that connects the community with customary institutions. The representations of standing points, audible zones, and movement patterns not only demonstrate the effectiveness of traditional communication but also show the continued relevance of traditional values in the governance of social space in Luang Island. This context illustrates the integration of local customs with village spatial planning to foster sustainable social life. The *tabaos* tradition is typically conveyed in the Luang language. The message related to a customary meeting and auction regarding *meti* prices.

The notice serves as an announcement to the community, inviting members of the customary institution, youth leaders, and women leaders to participate in a meeting with *meti* buyers to discuss on the pricing of *meti*. The meeting is used to be organized end of September (in 2023, 23 September, at 4:00 PM), after the water's recede and will occur at the village hall. People, including those from outside the community, are permitted to participate as prospective buyers in the auction of *meti* and to monitor the *meti* region⁵⁰ in the shallow seas of Luang Island. The term *harga meti* is used by the people of Luang Island to refer to the per-kilogram purchase cost for all varieties of Sea cucumbers in Luang Island, which the auction winner must pay to the Luang community.

The *meti* pricing auction is attended by traditional elders, youths, security personnel, and prospective *meti* buyers. In 2019, a Japanese buyer secured the *meti* price auction on Luang

⁵⁰ The shallow seawater area in Luang Island that is used as a harvesting area in *Hygeralai*.

Island. In 2021, the *meti* price was won by a Korean buyer. In 2023, there were four prospective buyers: two from outside Indonesia, one from Korea and one from China. Two buyers arrived from the nearby communities of Ambon and Makassar⁵¹. The auction was secured the man from China and the man from Makassar. Both parties proposed the maximum price for super Sea cucumber at 22.47 EUR per kilogram, thus both won as buyers of *meti* in 2023. The criterion for winning the *meti* price auction was that the Sea cucumber price proposed by these two purchasers exceeded that of the other two potential bidders⁵². The ambiance of the *meti* price



auction is depicted (Figures 45).

Figure 45: (A&B) Customary meeting and *meti* price auction led by the headmen of Luang Barat and Luang Timur villages. (C&D) The blue and purple circle are representative of the buyers of China team. The yellow and red circle are representative of buyers of Korea
Source: Author's documentation.

⁵¹ The result of field work in Luang Island on 23 September 2023. V. L, male, 60 years, 12 Oktober 2023. R. M, female, 38 years, on 21 Oktober 2023. N. K, 53 years, male, on 11 Oktober 2022. Z. K, male, 39 years, on 18 Oktober 2023.

⁵² The data comes from observation of fieldwork and interviews. on 23 September 2023. H. L, male, 53 years, on 19 Oktober 2023. R. S, male, 50 years, on 1 July 2022. O. P, male, 50 years, 15 Oktober 2023. K. K, male, 37 years, on 1 July 2023. W. S, male, 35 years on, 3 August 2023. K.W, male, 39 years, on 28 July 2023. M. S, male, 65 years, 19 Juni 2023. C. W, male, 40 years, on 19 July 2023. W. S, female, 50 years on, 17 Oktober 2023. B.H, male, 64 years, on 28 September 2023. W. S, male, 45 years, 23 Oktober 2022. K. W, male, 40 years, 18 Juni 2023. E.K, male, 65 years, 8 September 2023. L. M, male, 48 years, 20 August, 2023. T. H, 68 years, male, 6 September 2022. S. W, female, 39 years, 21 Oktober 2023.

International buyers, from China and Korea, were each accompanied by a representative fluent in Indonesian. Despite they are limited ability to communicate in Indonesian, their fluency is insufficient; therefore, to prevent misunderstandings, every foreign buyer must be accompanied by a translator from Luang Island⁵³. Moreover, the two winners of the *meti* price auction were required to pay 599 EUR known as *siri pinang*⁵⁴ funds to each of the two villages, along with a security deposit of 30.000 EUR each. According to the agreement, if the auction winner or buyer of marine products, disappears, the funds will not be refunded and will be allocated to each village on Luang Island. The auction winner must settle the payment prior to the *Hygeralai*'s opening. Of the *siri pinang* funds amounting to 599 EUR, 149.70 EUR will be allocated to the church⁵⁵. The presence of buyers from outside Luang Island such as China, Korea, Ambon, and Makassar in the *meti* auction process reflects an important dynamic between the *Hygeralai* system and external influences. In theory, TEK not only regulates sustainable resource utilisation, but also includes social mechanisms that ensure that interactions with outsiders remain within the corridors of local values, customary norms, and collective control (Berkes, 2012; N. J. Turner, 2008).

Furthermore, the auctioning of *Sea cucumber* prices is administrative and normative, with binding customary rules. Who can buy, what the procedure is, and what contributions are made. Obligatory, as the Luang people call *siri pinang* and security deposit. These contributions reflect a form of moral and material contract between the buyer and the local community, which serves as a social enforcement *mechanism* (Berkes et al., 2000). The buyer is required to fulfil the payment obligation, and if they violate the agreement, the funds are not returned and are

⁵³ The data comes from observation on field work, Focus Group Discussion (FGD) & interviews. K. S, male, 39 years on, 18 July 2023. P.P, male, 70 years, on 25 July 2023. B. S, male, 49 years, 25 Juni 2022. Q. K, male, 46 years, on 9 September 2022. L.W, male, 50 years, male, 6 September 2022. D. L, male, 36 years, 1 August 2023. M.S, male, 57 years, 8 September 2023. B. K, male, 65 years, on 24 Juli 2022. R. W, male, 56 years on, 26 July 2022. O.W, male, 70 years, on 27 July 2023. S. P, male, 52 years, 28 Juni 2023. S. K, male, 45 years, on 11 July 2022. M. P, male, 55 years on, 21 July 2023. M. W, male, 50 years, on 20 September 2023. S. K, male, 58 years, 18 september 2023. F. K, male, 40 years, 26 July 2023. V. K, male, 50 years, 13 September 2023. L. W, male, 60 years, 10 August, 2023.

⁵⁴ *Siri pinang* have many meaning. In this context, *siri pinang* fund refer to the dowry or price that prospective buyers need to be paid to the village to acquire the exclusive rights to the *meti*. Participatory observation in the field on September 23, 2023.

⁵⁵ The data based on observation and interviews. P.K, male, 48 years, 5 September 2022. M. P, female, 56 years, 16 September 2023. J. K, female 60 years, 20 September 2023. D. L, male, 61 years, 13 Oktober 2023. J. S, male, 39 years, on 14 Oktober 2022. I. W. male, 30 years, in Luang Island, 30 July 2022. Y.L, male, 39 years, on 27 Oktober 2023. S. M, male, 49 years, 15 Oktober 2023. I. S, male, 40 years, on 11 July 2022. T. P, female, 55 years on, 21 Oktober 2023.

allocated for the benefit of the community. This shows that in the TEK system, there is a social sanction mechanism that not only maintains compliance with customary regulations, but also strengthens collective accountability for the sustainability of the jointly managed marine ecosystem.

Following the traditional meeting and the methi price auction, the methi buyer takes care of the administrative process at the Southwest Maluku Regency Fisheries Office regarding the seafood management licence on Luang Island and prepares all the necessary equipment for the Hygeralai event. At the same time, the two village heads together with the customary institutions gather at the church to announce the opening of the *Hygeralai* event and present gifts from the siri pinang fund donated by the two winners of the methi price auction.

5.6.3 The Opening and Closing Rituals of *Hygeralai*

Hygeralai occurs biennially, however, in specific circumstances, the opening may occur sooner if there is an urgent demand from the community, such as for the church's specific needs⁵⁶. The church will discuss with the customary institution to explain their aims and objectives. Upon receiving approval from the customary institution, *Hygeralai* can be immediately opened to meet the demand. In 2019, at West Luang Village, the church, made by an urgent need for building, collaborated with the customary institution, resulting in the early opening of the *Hygeralai*.

Similar circumstance was happened in 2023, Luang Timur Village was finalizing the construction of the church building, causing the church in Luang Timur to coordinate and request a division of the harvest from the *Hygeralai* event⁵⁷. The production from the main island and adjacent smaller islands was utilized for the personal needs of the East Luang people, whilst the entire harvest from Wekenao Island was allocated to fulfil the needs of the local church⁵⁸.

⁵⁶ The data comes from interviews. G. S, 55 years, , on 10 September 2023, N. M, male, 60 years, T. W, male, 40 years, 7 Oktober 2023. R. W, male, 40 years, 8 September 2023. E. W, male, 39 years, 9 August, 2023. T. H, 50 years, male, 20 Oktober 2023. I. K, male, 50 years, 1 August 2023.

⁵⁷ The data based on the interviews & Forum discuss Group (FGD). A.M, male, 48 years, on 21 August 202. F. P, male, 60 years, on 25 Oktober 2023. C. K, male, 50 years, 19 Oktober 2023. J. M, male, 40 years, on 15 Oktober 2023. M. P, male, 34 years on, 21 July 2023. L.W, male, 50 years, male, 6 September 2022. D. L, male, 36 years, 1 August 2023.

⁵⁸ The data based on the observation in the field work and interviews. K. M, male, 58 years, on 28 September 2023, Y.K, male, 5 years on 20 September 2023. L. S, male, 45 years, 19 Juni 2023. W. W, male, 40 years, 26 Juni 2023. K. L, male, 45 years, 13 September 2023. M. S, male, 55 years, on 20 July 2023. B. M, male, 48 years, 9 August,

It is evident that the access to marine resources in the shallow waters of Luang Island is rigorously governed by the traditional *Hygeralai* system established over centuries but dynamic and flexible as well according to local situation. The people of Luang Island has dual rights over access to maritime resources, both as individuals and as members of the community. This dual right is manifested in the *Hygeralai* harvest management system. At times, the harvest of the Luang Island communities is regarded as household income, while at other times, it is contributed to the village as part of the collective communal resources. This role as a community member might be regarded as a citizen's duty towards their local community about the maintenance of communal resources. The dual rights can be seen by the West Luang village community transferring a portion of their 2021 harvest to the church, followed by the East Luang community doing the same in 2023, while the remainder is allocated for familial needs. As previously elucidated, *Hygeralai* in marine *petuanan* refers to communal resources regarded as being collective rights and being communally owned.

As *Hygeralai* often last for a duration of one month, the *Hygeralai* used to be held from mid Oktober until mid November (in 2023, opened on October 13, 2023, and closed on November 13, 2023)⁵⁹. Three consecutive days prior to the opening of the *Hygeralai*, the Village Head appoints *Marinyo* to the *tabaos* to announce the opening of the *Hygeralai*. The announcement indicates that people are prohibited from making noise and must constantly maintain calm in the village. Pray to the ancestors and God for the island's protection. The community is encouraged to prepare their hearts and bodies for the *Hygeralai* event. Consequently, all members of the Luang Island community have both mentally and physically prepared prior to the opening of the *Hygeralai*.

The *Hygeralai* opening and closing ceremony requires several materials to facilitate the ritual, including *sopi* (the traditional alcoholic drink), areca nut, and dark-colored cloth in replacement of koli leaves. The head of *matarumah* is responsible for arranging these attributes

2023. M. S, male, 55 years, on 20 July 2023. L. S, male, 45 years, 19 Juni 2023. W. W, male, 40 years, 26 Juni 2023.

⁵⁹ The data comes from the observation in the field work and interviews. Z. M, male, 60 years, 1 August 2023. V. K, female, 46 years, on 30 August 2023. K. M, 56 years, male, on 18 September 2022. Z. L, male, 45 years, on 18 September 2023. C. M, female, 50 years, 5 July 2023. Z.T, male, 48 years, on 20 July 2023. K. M, 60 years, male, on 2 September 2023. S. K, male, 56 years, on 8 September 2023. B. S, 53 years, male, 23 September 2023. Z. M, male, 55 years, 1 August 2023. V. K, female, 50 years, on 25 August 2023. K. L, male, 45 years, 13 September 2023. B. M, male, 48 years, 9 August, 2023. L.W, male, 50 years, male, 6 September 2022. D. L, male, 36 years, 1 August 2023.

prior to the opening of the event. *Sopi* and areca nut are utilized in the ritual, while dark-colored fabric substitutes koli leaves, which are attached to a log to mark the borders of the harvesting area. *Sopi*, betel leaves, areca nuts, and tobacco are typically central to the rituals. These items are procured in advance by the customary institution from neighboring islands, with the costs covered by the institution itself. Meanwhile, the cloth used as a substitute for koli leaves belongs to the customary institution (Figure 46).

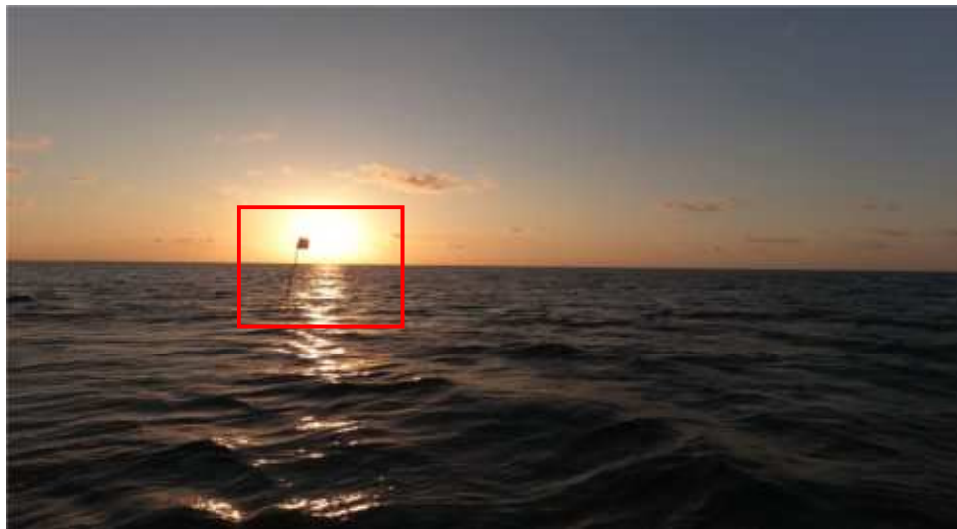
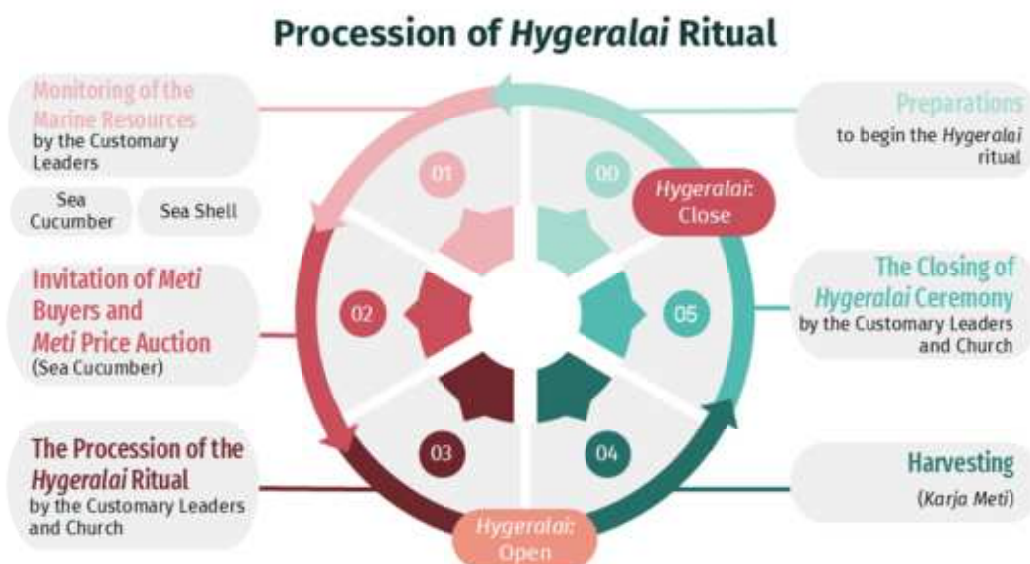


Figure 46: Harvesting border sign made from dark-colored fabric substitutes koli leaves.
Source: Author documentation

On the evening prior to the *Hygeralai's* opening, the village head and traditional institutions conduct a customary meeting and prayer at 10 PM in the village hall, collectively engaging in the customary prayer. Prior to the opening of the customary prayer, the *marinyo* distributes *sopi* into small glasses for all participants. Once every participant at the traditional assembly has gotten their *sopi*, the village head opens the gathering with a greeting of "*kalwedo*" and they drink in the *sopi* together⁶⁰. This prayer asks for the ancestral spirits for peace and calm in the village,

⁶⁰ The data based on the interviews & Focus Group Discussion (FGD). J. S, male, 60 years, on 28 July 2023. H. W, female, 56 years on, 18 July 2023. S.P, male, 58 years, on 20 July 2023. M. P, male, 48 years, 10 Juni 2023, C. P, male, 56 years, on 10 September 2023. L. P, male, 42 years, 26 Juni 2023. L. W, male, 40 years, 21 Oktober 2023. K. P, male, 39 years, on 3 July 2022. K. P, male, 48 years on, 16 Oktober 2022. M. S, male, 70 years, on 28 July 2023. P. P, male, 56 years, 25 Juni 2023. L. W, male, 50 years, on 1 July 2022. J. W, female, 40 years on, 8 July

smooth harvesting operations, and abundant yields for the entire community of Luang Islands, alongside a request for favourable weather conditions. Subsequently, they head to the *meti* region, where as *saniri luwu*, assigned by the village lead, is instructed to release three drops of *sopi* into the sea and disperse the chewed areca nut across the water's surface while reciting the prayers. This prayer expresses respect and appreciation to the ancestors, the rightful owner of the *meti* (*tuang meti*), the sovereign of the land, and to God. Upon the end of this ritual, they return to shore to ready themselves for the *Hygeralai* the following day. *Hygeralai* is open for one week on the main island and three weeks on Metiamarang and Wekenau islands⁶¹. Upon completion of harvesting, it is time to close the *Hygeralai*. In a manner similar to the *Hygeralai* opening ritual, certain *Saniri* members head to the *meti* location, where they release three drops of *sopi* into the seawater while reciting a prayer and lifting their hands towards the sky. This



prayer asks the ancestors to protect all maritime resources and their surroundings on Luang Island. They express gratitude for the blessings, abundance, and grace when collecting marine goods in the *meti* region of Luang Island. The *Hygeralai* has been closed and will reopen in two years, in 2025. The entire *Hygeralai* procession can be seen the Figure 47 below.

2023. J. S, male, 55 years, on 28 July 2023. S. W, male, 48 years, 10 Juni 2023 L. P, male, 42 years, 26 September 2023. P. K, male, 45 years, 8 September 2023. M. S, male, 39 years, 9 August, 2023. T. H, 50 years, male, 6 September 2022. M. S, male, 55 years, 1 Oktober 2023.

⁶¹ This data was obtained through field observation, FGD and interviews. S. M, male, 45 years on, 30 July 2023. M. S, male, 70 years, on 28 July 2023. K. W, male, 45 years, 8 September 2023. E. W, male, 39 years, 9 August, 2023. T. H, 50 years, male, 6 September 2022. Z. M, male, 60 years, 1 August 2023. V. K, female, 46 years, on 30 August 2023. K. M, 56 years, male, on 18 September 2022. Z. L, male, 45 years, on 18 September 2023.

Figure 47: The *Hygeralai* procession.
Source: Researcher, based on 2022 & 2023 research results.

The organization and dynamic interrelation among structures in the *Hygeralai* rituals result in a social construct developed through interactions within the Luang community, between the Luang people and their ancestors, and between the Luang people and nature. Berger and Luckmann (1966) claim that social construction functions effectively and synergistically through three primary components: externalization, objectivication, and internalization (Berger & Luckmann, 1966). In the context of *Hygeralai*, externalization signifies the process whereby the inhabitants of Luang Island formulate and articulate societal values, establish spiritual connections with ancestors and religious belief, that is Christianity, and comprehend the significance of symbolic communication in the execution of the ritual. The process entails the utilization of diverse devices that have been designated as media to facilitate the *Hygeralai* ritual. The communication involved incorporates both verbal and nonverbal components, each of which holds importance in the composition and significance of the ritual. Nonverbal signals enhance and complement verbal communications, simultaneously reflecting the culture of the Luang Island people during the *Hygeralai* ritual (Knapp & Hall, 2021).

In *Hygeralai* ritual practice, many symbolic aspects are employed to establish and preserve connections with ancestors and enhance communal solidarity. This is evident in practices such as ancestral prayers, the dripping of *sopi* over seawater, and the channelling of chewed the Areca nut, which is subsequently sprayed onto the seawater's surface. Elements such as Areca nut, tobacco, and *sopi* are recognized not only as mediums for communicating with ancestors but also as offerings loaded with profound symbolic significance. They symbolize tranquillity, solidarity, and communal unity.

Furthermore, the utilization of these symbols functions as a mechanism for legitimizing decisions that obligate all community members to collectively perform the *Hygeralai* ritual. The rope employed to secure the cloth to the log in the *Hygeralai* ritual serves as a binding symbol, representing the connection between the wood and the significance of the *Hygeralai* ritual. This symbol carries a significant message to the Luang community: the restriction from untying the rope, save by members of customary institutions possessing special power. Furthermore, three stones are positioned adjacent to the base of the wood embedded in the seabed, each representing

strength, support, and balance. These symbolic components not only enhance the spiritual value of the *Hygeralai* but also mirror the social and cultural framework of the inhabitants of Luang Island.

Body movement (Bourdieu, 1977; Mauss, 2006), space and silence (Knapp & Hall, 2021; Andersen, 2007) are considered significant forms of symbolic communication. In many contexts, symbolic communication is often considered more effective than verbal communication (Hall, 1959). The *Hygeralai* ritual, as previously described, is conducted at night, symbolizing silence that fosters a concentrated environment for communion with ancestors and God. Furthermore, the act of lowering the wood bound with a dark-coloured fabric, referred to by the Luang people as lowering the flag, serves as a symbolic indication that the harvesting process starts and symbolizes a sense of unity. This symbolic connection enhances the spiritual importance and cultural relevance of the ritual.

Within this context, Geertz asserted that humans are symbolic beings, as human communication is invariably associated with the utilization of symbols. Through these symbols, humans generate certain meanings that ultimately become a cultural network. Interpreting its meaning necessitates an understanding similar to interpreting the message within a text (Geertz, 1978). Moreover, Spradley stated that the utilization of symbols as a means of communication or social interaction is achievable through the process of interpretation. Consequently, humans will adapt not just to their physical surroundings but also to their symbolic environment (Spradley, 1972). The *Hygeralai* ceremony represents not merely a collection of rituals or customs, but a framework of values and significances established and inherited by the inhabitants of Luang Island.

Objectivication happens when principles articulated through *Hygeralai* rituals and symbols are viewed as integral components of an objective social reality that governs the lives of the people of Luang Island. The *Hygeralai* traditional ritual, initially an individual or collective expression, is subsequently acknowledged as a norm that must be respected and preserved. Internalization is a process whereby individuals assimilate the principles inherent in ancient ceremonies into their worldview. In this context, the significance and principles inherent in the *Hygeralai* traditional ritual contribute to an individual's identity, therefore influencing their behavior and actions during the *Hygeralai* procession as well as in their daily life outside the event itself.

Thus, the *Hygeralai* traditional ritual not only symbolizes customs but also serves to establish, reinforce, and disseminate the social structures that govern the lives of the Luang Island people. Consequently, it may be concluded that the Luang environment is an ecosystem governed by rituals which function to preserve the system's structure, and it emphasizes that harvesting functions not merely as an economic endeavour but also as a cultural practice that preserves ecological equilibrium.

5.7. Participant, Harvesting (*karja meti*) *Hygeralai* and Roles

5.7.1 Participant of *Hygeralai*

All members of the Luang Island community, including children, adults, women (even those who are pregnant), and men, participate in the *Hygeralai*. All participants in the Sea cucumber harvesting process must have swimming and diving skills, along with an assessing ability to identify Sea cucumbers. Migrants are prohibited from engaging in the collection of marine items during the *Hygeralai*, with the exception of individuals employed as teachers, health professionals, security personnel, and priests, who are permitted to participate. The *Raja*, village head, and members of customary institutions have no privileges. All citizens have equal rights in the act of harvesting. This indicates that each indigenous individual is permitted to collect Sea cucumbers based on their own capabilities. No regulations exist that restrict the quantity of Sea cucumbers that the community may gather. In this Sea cucumber harvesting activity, all residents have the opportunity to obtain Sea cucumbers, ensuring that no individual is left without a yield; hence, every community member receives a share of the yield.

5.7.2 Harvesting (*karja meti*)

Several critical factors must be considered in the carrying out of harvesting (*karja meti*). Initially, all community members must be present in the area of the *meti*. Secondly, widows are prioritized to be the first to access the bottom of the *meti* area, which usually requires their waiting until the water lowers to knee height, approximately 40 cm, to facilitate harvesting. Thirdly, prior to any community members entering the *meti* area, they have to comply to an

instruction from a *matarumah* member responsible for the harvesting zone who has come prior (Figure 48).



Figure 48: The situation of harvesting (*karja meti*). (A) *matarumah* member responsible for monitoring, (B) the situation of the low tide (*meti*) at the harvest, (C) atmosphere of harvesting with boats, and (D) a community member swimming, and (F) The member of Luang people is holding their harvest.

Source: Authors, 2023

Harvesting often occurs during low tide, around at 5 AM. Consequently, people depart for the *meti* area at approximately 3 AM in the morning to get a strategic location for optimal results. Due to the darkness, they use light devices like as flashlights or cloth-wrapped torches attached to wooden handles. During the harvesting process, all people comply to *Hygeralai* regulations about the permissible size of collected Sea cucumbers. While the primary focus of harvesting is on Sea cucumbers, other marine resources, including *Tridacna gigas* with a harvested size typically measuring 30–60 cm in length, *shellfish*, may also be collected, dependent upon the *Rochia* reaching a minimum diameter and length of 30 cm each. Furthermore, when harvesting, the community is restricted from utilizing modern tools and is permitted just to use diving

goggles and chewed coconut meat, which is then sprinkled on the water's surface to clarify the water, enabling a clear view of marine resources⁶².

5.7.3 Hygeralai area

The harvesting (*karja meti*) is not carried simultaneously across the marine waters of Luang Island. The harvesting area in *Hygeralai* is derived from the historical division of *Petuanan* on Luang Island; although not identical, the *petuanan* division serves as the foundation for determining the *Hygeralai* implementation area. Prior to the opening of the *Hygeralai*, one of the customary institutions of *saniri luwu* from both villages established the borders of the harvesting (*karja meti*) area in the maritime zones surrounding the main island and smaller islands. Metiamarang Island was divided into five parts by *siniri luwu* of West Luang Village, while *Saniri Luwu* of East Luang Village organized the harvesting area on Wekenau Island into three distinct areas (Figure 49).

⁶² The data comes from observation of participation in the harvesting event on October 13, 2023 and interviews. G.M., 58 years, on 2 September 2023, D.M, 67 years, on 4 September 2023. W. W, male, 40 years, 26 Juni 2023. K. L, male, 45 years, 13 September 2023. B. M, male, 48 years, 9 August, 2023. L.W, male, 50 years, male, 6 September 2022. D. L, male, 36 years, 1 August 2023. E. M, male, 54 years, 28 August 2022. Q. P, female, 17 August 2022. F. K, female, 9 Oktober 2023. E. P, male, 58 years, on 19 July 2023.

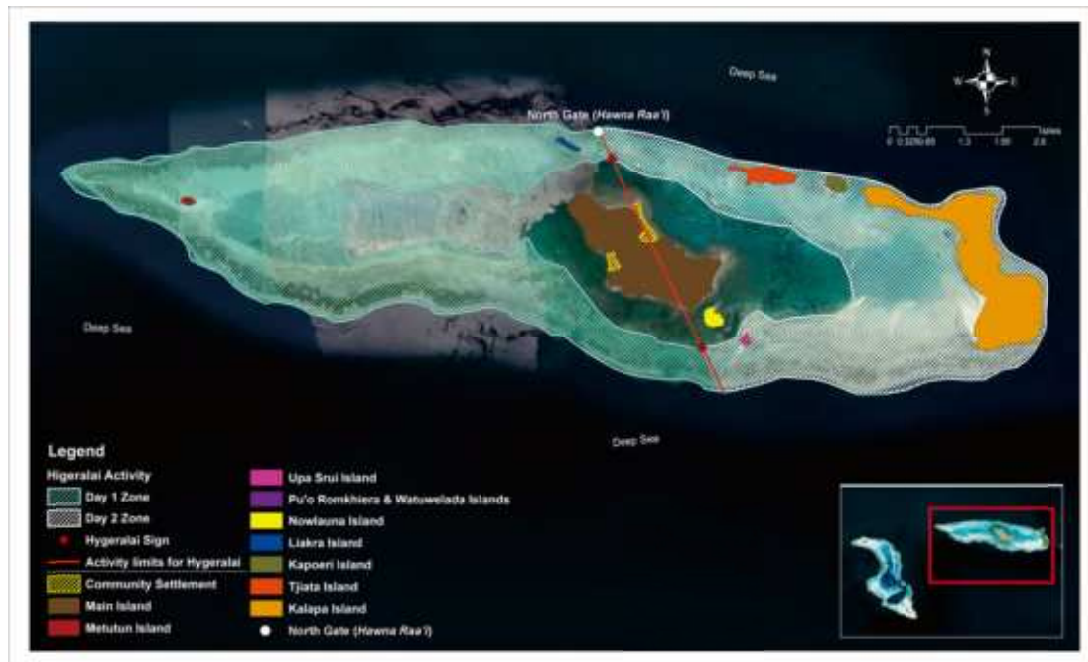


Figure 49: Harvesting (*karja meti*) area on a *Hygeralai* on Luang Island in 2023. Source: Study findings of 2022 and 2023, rendered via Bing Maps (2024) and digitized in ArcGIS by the authors.

Figure 49 shows the maritime map of the main island and adjacent smaller islands, segmented into two parts. The white circle marks the northern entrance (*Hawna raa'i*) to Luang Island and indicates the place of the boundary line within the territory. The allocation of the area is determined by the harvesting (*karja meti*) day in the *Hygeralai*, with different areas for Day 1 and Day 2. The harvesting area is shown using various shade patterns to clearly differentiate the two zones. Green coloring indicates the day 1 harvesting zone, while white coloring indicates the day 2 harvesting area. The initial day opens at the northern entrance (*Hawna Raa'i*) to Metutun Island. The second day opens at the north gate (*Hawna raa'i*) and continues to Kelapa Island. The Figure above illustrates a distinctive sign imitating a *Hygeralai* symbol, encircled in red, with red lines marking the boundaries for harvesting (*karja meti*) in *Hygeralai* and signifying the opening point for harvesting activities. On the initial day of harvesting, individuals are forbidden from crossing the borders indicated by *Hygeralai* signs.

Harvesting on the main island and its smaller adjacent islands are regulated by customary institutions for a duration of one week. Following the second day, from the third to the sixth day, all communities are permitted to harvest in both the area designated on the first day and the area

designated on the second day. On this day, everyone can harvest according to the capabilities and sensitivities of each individual. Following one week in collecting marine goods in this region, the activity continues on Metiamarang Island and Wekenau Island.

The implementation of the *Hygeralai* areas on Metiamarang and Wekenau Islands will occur following the completion of harvesting on the main island. Metiamarang Island is divided into five zones, with the condition that marine goods from these areas would be gathered in accordance with the boundaries established by the Head of Luwu West Luang Village. The initial day of harvesting on the island starts from *Liwuten-na* to *Pyera Kea*. The second day starts from *Pyera Kea* to *Mo-or Nanyata*. The third day of harvesting starts from *Mo-or Nanyata* to *Mo-or Yahtutun*. The fourth day starts from *Mo-or Yahtutun* to *Hinyar Tipru*. The fifth day starts at Hinyar Warta and finishes at *Watletan Wahra*. Upon the conclusion of the fifth day, the entire community is permitted to harvest the yield from the five zones at their choice (Figure 50).

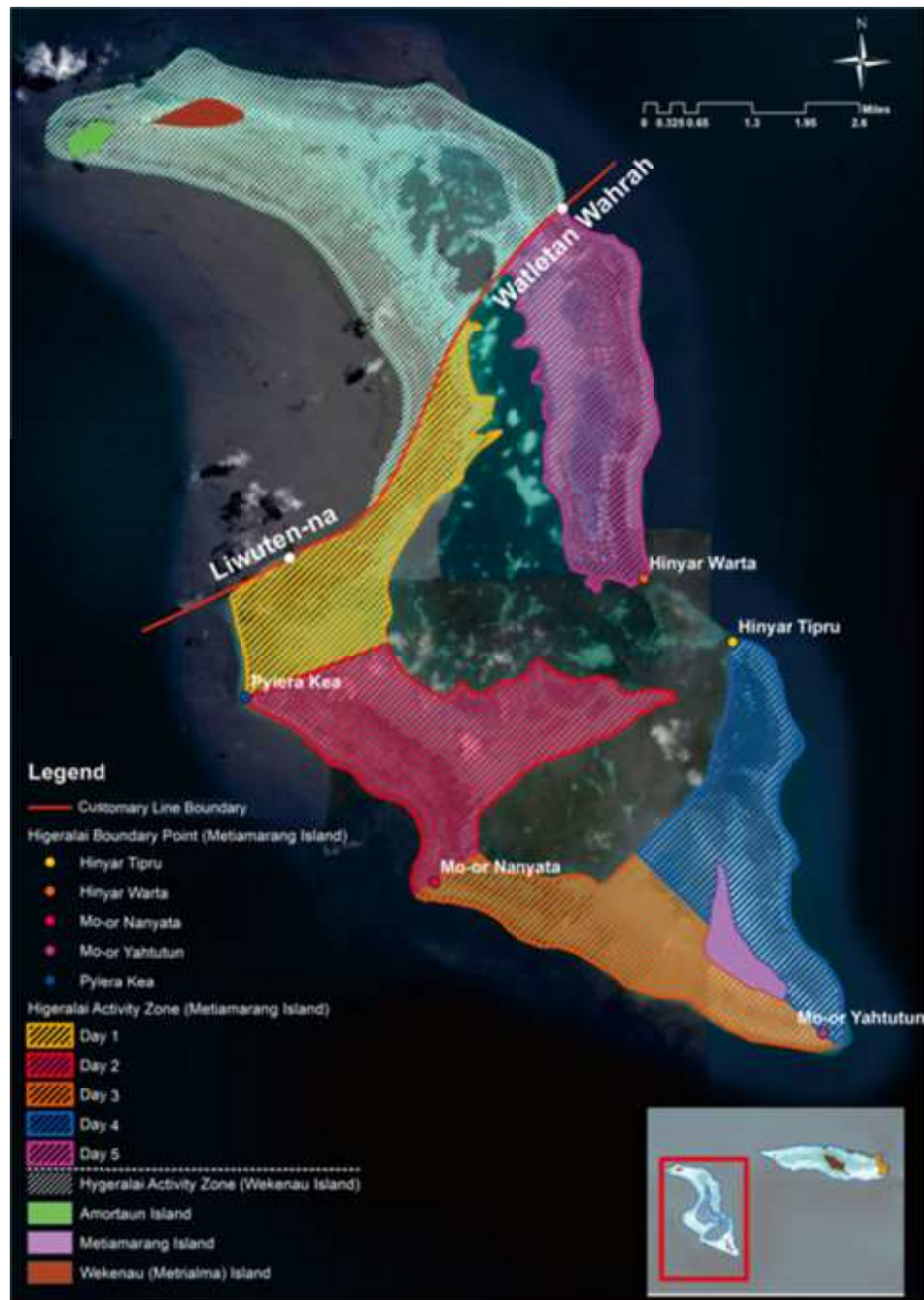


Figure 50: Harvesting (*karja meti*) area in a *Hygeralai* on Metiमारang Island in 2023.
 Source: Information in the mapping based on 2022 and 2023 research results, visualized via Bing Maps (2024) and digitized in ArcGIS by authors.

The harvesting area in the *Hygeralai* on Wekenau Island differs from that in Metiamarang due to the unequal division of the customary *petuanan* area between East Luang and West Luang Villages, with East Luang being smaller. Consequently, the East Luang customary institution divides the harvesting area into three parts, each designated for a different day of harvesting. On the first day, harvesting occurs from Leri to Tnye-na Ayohora. On the second day, it extends from Tnye-na Ayohora to Liwuten-na, while on the third day, harvesting continues from Leri to Watletan Wahrah. In subsequent days, the area division returns to that of the main island, allowing all community members to choose any of the three areas or to harvest in all three zones within a single day (Figure 51).



Figure 51: Harvesting area (*karja meti*) in a *Hygeralai* on Wekenau Island in 2023. Source: Information in the mapping based on 2022 and 2023 research results, visualized via Bing Maps (2024) and digitized in ArcGIS by authors.

As is commonly understood, the sea and its natural resources are communally owned under customary law. While it is true that land, water, and the natural resources therein belong to the state, the state also grants protective access to the rights of Indigenous communities. Consequently, the customary rights (*hak adat*) in Luang Island are acknowledged by the state. The customary institution regulates the marine domain through a zoning and rotational system for harvesting. This implies that harvesting does not occur uniformly across all designated coastal (*meti*) areas of Luang Island on the same day. The daily and zonal harvesting system is designed to allow time for the recovery of marine biota populations in each zone, reflecting an ecosystem-based approach aimed at ensuring the sustainability of marine resources. Restrictions on harvesting by day and zone are further strengthened by customary regulations prohibiting the use of destructive methods, such as trawl nets, fish bombs, or poisons.

This zoning system also prevents injustice in harvesting by regulating individuals' behaviour to mitigate greed. This practice contains a social aspect, wherein each individual is expected to engage with a sense of communal responsibility to save the environment for future generations. Consequently, respect for ancestors appears as a crucial principle in governing sustainable marine harvesting activities. Each zone in the area reflects the Luang Island community's understanding of the physical spatiality of maritime waters in a complex customary manner. This strengthens the community's social connection to its maritime environment, where the use of marine resources serves not only economic purposes but also social and cultural needs for the people of Luang Island.

The position on the harvesting boundary zone in *Hygeralai* shows the connection between the spot or maritime area and the lives of the Luang Island people. The zone dividing point on the main island is marked from the northern gate referred to as *hawna raa'i* by the Luang people. This location serves as the main point of entry and exit of the island. They believe that not all sides of Luang Island's waters are suitable for entry, as the boundary between shallow and deep water is covered by dense coral, making this location significant as a navigational reference in their maritime activities. Similarly, the harvesting zone locations on Metiamarang Island and Wekenau Island show a sense of place attachment while also serving as a marker indicating that the waters of Luang Island have a spirit and soul that may harm their safety if exploited. Consequently, the zoning system encourages individuals to honor nature and cultivate

self-awareness, recognizing that they are not the main character of the nature but rather an integral component of their environment.

Another aspect that demonstrates the knowledge of the Luang people, in addition to the aforementioned zoning, is their ability to determine the timing of *Hygeralai* based on tidal patterns. The Luang people recognize that tides influence the maritime habitat and the accessibility of harvestable resources. The tides influence water depth; hence, at high tide, the waters deepen, causing certain marine resources, such as Sea cucumbers and *Tridacna gigas*, to become more dispersed or difficult to access. Conversely, during low tide, certain coastal regions typically submerged become exposed, facilitating an increase in Sea cucumber accessibility.

Moreover, the presence of a distinct customary *petuanan* boundary line between Metiamarang and Wekenau Islands emphasizes the significance of local community sovereignty over their marine *petuanan* territories. This boundary outlines Wekenau and Amortaun Islands, the *petuanan* of East Luang village, from Metiamarang, the *petuanan* of West Luang village, while also guaranteeing that maritime management practices are executed by groups with customary rights to the area.

The inclusion of traditional rituals before and after the harvest demonstrates respect for ancestors and nature, emphasizing that harvesting serves not merely as a means of profit but also as a cultural practice that sustains ecological equilibrium. Consequently, it may be asserted that the environment of the Luang people is one regulated by rituals, wherein these rituals serve to maintain the integrity of the system. These conservation initiatives not only save the marine habitat but also guarantee that marine resources may sustainably support the economy of the Luang Island community.

5.7.4 *Hygeralai* Operational Regulation and Compliance Rate

As explained earlier, the *Hygeralai* has operational regulations, which although not written, are binding on all members of the Luang Island community (Table 13).

Table 14: The operational regulations of *Hygeralai*

When *Hygeralai* is open, it is prohibited:

- Engaging in any activities at sea or in the *Hygeralai* area during the night on the first and second days of the *Hygeralai*, both on the main island and the islands of Metiamarang and Wekenau.
 - To breach the boundaries established by customary institutions.
 - Participating in the harvesting process, for individuals who are not descendants of the Luang people.
 - Employing explosive devices and similar tools that can harm and jeopardize marine habitats.
 - Harvesting marine resources that are extracted in the *Hygeralai* without adherence to the size requirements established by customary institutions⁶³
-

When *Hygeralai* is closed, it is prohibited:

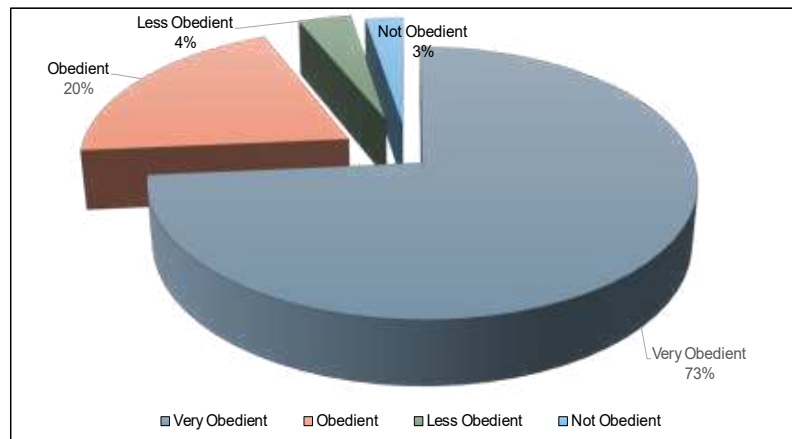
- Harvesting marine resources drawn into the *Hygeralai*⁶⁴
 - Moving Sea cucumbers from their native habitats to other locations.
 - Employing explosive devices and similar methods that can harm and jeopardize the marine ecosystem.
 - Taking corals and rocks.
-

Source: authors, research results 2022 & 2023

⁶³ The data comes from interviews. M. P, male, 48 years, 23 July 2023, G. P, male, 56 years, on 10 September 2023. D. W, male, 43 years, 29 Juni 2023. R. H, male, 45 years, 8 September 2023. L. S, male, 46 years, 30 August, 2023. B. S, 53 years, male, 23 September 2023. Z. M, male, 55 years, 1 August 2023. V. K, female, 50 years, on 25 August 2023. K. M, 60 years, male, on 2 September 2023. S. K, male, 56 years, i, on 8 September 2023. Z. S, female, 55 years on, 18 July 2023. S.P, male, 48 years, on 20 July 2023. K. M, female, 50 years, 10 Oktober 2023. I. W, male, 56 years, on 23 Oktober 2023. M. K, male, 49 years, 26 September 2023. M. S, male, 39 years, 11 Oktober 2023. B. M, male, 50 years, 9 August, 2023. O. K, 53 years, male, 29 September 2022. C. W, male, 50 years, 22 Oktober 2023. Z. W, female, 40 years, on 23 September 2023. K. K, 40 years, male, on 18 September 2022. W. M, male, 50 years, on 14 Oktober 2023.

⁶⁴ The Luang people call harvesting in the *Hygeralai* as *karja meti*, which is defined as the activity of collecting sea products that are collected in this *Hygeralai* in the low tide/shallow water/*aer meti* area.

The Luang indigenous people strictly adhere to the *Hygeralai* operational regulations, and all members of the Luang Island community are obliged to report any breaches of these regulations to the customary government. Multiple factors contribute to the Luang people's



adherence to the principles of *Hygeralai*; within their cosmology, they hold the belief that, in addition to the sun, the sea serves as the residence of their God regarded as the God of marine fertility, specifically the *Tridacna gigas*. This clam is also represented as a woman residing in the sea to preserve the marine ecosystem. Regarding this matter, it will be discussed specifically in the section on the Luang people's cosmology in chapter five. Furthermore, the sea serves as a crucial source of livelihood for them. the ocean serves as their vital source of sustenance. The interview results indicate that the Luang people continue to adhere to the *Hygeralai* regulations. The level of community adherence to *Hygeralai* regulations is illustrated (Figure 52).

Figure 52: Percentage of Luang community compliance with *Hygeralai* regulations.
Source: Data based on 2022 & 2023 research results.

The Figure 52 shows the compliance percentage of the Luang Island community with *Hygeralai* regulations. Out of 375 informants interviewed, 276, representing 73%, indicated that the people of Luang Island were highly compliant with the *Hygeralai* regulations. Seventy-five informants indicated obedience at a rate of 20%, while fourteen individuals, representing 4%, reported being less obedient, and ten individuals, constituting 3%, identified as disobedient. The data presented in the chart above indicates that the majority of individuals in Luang Island

adhere to the *Hygeralai* regulations. Compliance with *Hygeralai* is a fundamental component to ensure the smooth implementation of the *Hygeralai* procession.

In terms of people's compliance with the regulations governing *Hygeralai*, the situation is very positive. Although there are no written records of violations recorded at the village level, discussions with village leaders and traditional authorities indicated that there were no cases where Luang Island communities were involved in violations of *Hygeralai* regulations. In addition, our confirmation with community members, as well as comparing it with the results of participatory observations we conducted in the field, both before the start of the *Hygeralai*, during its opening, and after its closing showed a significant level of compliance among the community. Violations that may occur are usually related to external parties and not local residents, such as fishermen from East Nusa Tenggara-Alor and foreign fishermen who are involved in illegal fishing activities in the waters around Luang Island. Customary rules apply to them, but the penalty is not paid in buffaloes, or *sopi* but in money amounting to 2.380.952 EUR. It is clear that customary law applies not only to Luang people but also to people outside Luang Island.

Based on the aforementioned *Hygeralai* practices, it can be concluded that *Hygeralai* exhibits several distinctive characteristics. *Hygeralai* signifies regulation, crucial to Luang society, since it preserves sacredness and shapes the social structure of the Luang people by the repetition of symbolic actions. It facilitates the coordination of relationships between individuals and society, ensuring the legitimacy of social functions and the hierarchy of social institutions within Luang society. Furthermore, *Hygeralai* regulations are crucial for preserving the collective identity of the Luang people, fostering unity, and ensuring a sense of security among them.

As stated by Durkheim, Turner et al. Geertz, Douglas and Bourdieu that regulation in rituals plays an important role in maintaining sacredness, strengthening relationships within a community and the sustainability of the culture itself. Regulation ensures that each element of the ritual is performed consistently so that its symbolic meaning and social function can be maintained and passed on by the next generation (Bourdieu, 1977; Douglas, 1966; Durkheim, 1975; Geertz, 1973a). Regulation also involves the management of marine natural resources, particularly Sea cucumbers, as well as the utilization of technology and fishing equipment. Moreover, it includes the capacity of a community to monitor, preserve, and enforce the

boundaries of harvesting. According to Von Benda Bacman and Zerner, the governance and regulation of access to natural resources and specific regions are dictated by the customary ownership structures of a community, which also encompass technological utilization (Benda-Beckmann von et al., 1992; Zerner, 1994a).

Hygeralai signifies a communal harvesting event wherein the inhabitants of Luang Island collectively gather Sea cucumbers. The quantity of harvesters per individual is inconsequential; it is dependent upon the capabilities of each member of the Luang community during the harvesting period. The display of social solidarity shown in this harvesting party is a significant factor in addition to the quantity of Sea cucumbers acquired. This is seen in their behavioural habits during the harvesting operation. The communal experience of collective harvesting promotes pride and emotional fulfilment in individuals. It alleviates social strain, reduces social disparity, and develops a sense of satisfaction among each member of the Luang community. *Hygeralai* can be regarded as a form of social security for the Luang community.

Moreover, *Hygeralai* pertains to the sustainable management of natural resources. Sustainable natural resource management, in this context, refers to the implementation of *Hygeralai* through a periodic system that incorporates both open (harvesting time) and closed (non-harvesting time) phases. Conversely, Garret claims that open access natural resource management and communal ownership entail dangers. He asserts that free access implies an unsustainable approach to natural resource management, which results in the overexploitation of natural resources (Garret, 1968).

This contrasts with the situation on Luang Island, which periodically holds harvesting events every two years. In the past three periods, considering the previously mentioned harvesting volume alongside the population growth throughout these periods, there is no substantial variation when compared to the Sea cucumber population on Luang Island due to harvesting. Nearly two thousand individuals collectively engaged in the harvesting event over a period of one month, although there was no exploitation of marine resources, particularly Sea cucumbers. The harvesting celebration is not novel to the inhabitants of Luang Island, having been practiced since ancestral times. Consequently, the population of Luang Island corresponds with the Sea cucumber number in the surrounding waters.

The *Hygeralai* symbolizes seasons and natural cycles, which it incorporates into rituals, including the estimation of low tides, lunar positioning, and wind velocity. The Sea cucumber

ecosystem is significant to the culture and spirituality of the Luang people. It demonstrates respect and supranatural influence over the vegetation. Furthermore, imparting ecological and astronomical knowledge to the youth (Strauss, 1966), acknowledging the position of the Luang people within the universe, while preserving cosmic equilibrium on Luang Island. Boas emphasizes that analysing the community's interaction with the surrounding natural environment and cycles is crucial for understanding how these factors influence their rituals and beliefs (Boas, 1967). Consequently, *Hygeralai*, from a cultural perspective, serves not merely as a ceremonial act but as an instrument for linking the Luang people to their social norms and their spiritual realm.

CHAPTER VI : *HYGERALAI* of HISTORICAL ASPECT

6.1. Introduction

This chapter examines in depth the origins of the concept and practice of Hygeralai in the context of the indigenous people of Luang Island by tracing its relationship with the natural environment, socio-cultural dynamics, and historical development. The focus of the study includes four main aspects: first, the historical background of the emergence of Hygeralai as a custom-based resource management system; second, its relationship with local ecological conditions through a phytogeographic approach in the context of Indonesian flora; third, the influence of the entry of Protestant Christianity on the practices and values inherent in Hygeralai; and fourth, the position of Hygeralai in the landscape of conventional social regulations related to natural resource management in the Maluku region more broadly. Through this interdisciplinary approach, it is expected to understand how Hygeralai not only acts as an ecological mechanism, but also as a cultural expression and social system that continues to transform in the face of changing times.

An examination of four main aspects in this section is important to gain a comprehensive understanding of the *Hygeralai* system as a natural resource management practice based on a complex traditional knowledge system. Firstly, tracing the origins of *Hygeralai* concepts and practices provides the historical and conceptual foundations necessary to understand how the system was formed and developed within the cultural context of the Luang people. Secondly, the phytogeographic approach and the study of the local natural environment help to explain the linkages between *Hygeralai* practices and the specific ecological conditions of Luang Island, which played a role in shaping the traditional ecological knowledge structure of the local community. Third, the importance of examining the influence of Protestant Christianity lies in how the new values interact, transform or integrate with customary practices, including the *Hygeralai* system. Finally, comparing *Hygeralai* with conventional forms of social regulation in the Maluku region opens up space to see the uniqueness, continuity and change in community-based resource management systems.

6.2. Etymology *Hygeralai*

Oral tradition provides a detailed account of the history of Luang Island, serving as a valuable source for reconstructing the historical narrative of both the island and the term *Hygeralai*. Based on our analysis of literature, statistical data, and interviews, it appears that only a portion of Luang Island's history is interwoven with the animistic origins of *Hygeralai*⁶⁵. The term's evolution from a mere word or concept to a significant aspect of local knowledge in the lives of the indigenous people reflects a long historical journey. This transformation is further illustrated by the development of the name *Hygeralai*, as highlighted in the following excerpt from an interview.

Oral tradition offers a comprehensive description of Luang Island's history. The history of *Hygeralai* and Luang Island can be put together with the help of these sources. According to our findings from analyzing literature, statistics, and field interviews, just a portion of Luang Island's history is entwined with the animistic etymology of *Hygeralai*. There is a long historical path behind the transformation of *Hygeralai* from simple word or concept to local knowledge in the life patterns of Luang Island's native inhabitants.

Hygeralai in history start with the three men from Luang Island embarked on an exploration for a new spot on the island. They discovered a site considered suitable and advantageous for residing. Subsequently, they agreed to select individual territories and create their names. Each of them claimed his land in a different way. The first individual constructed a stone offering platform (*Watu*) as a sign (*gheralyai*), while the second individual embedded his spear (*Welahra*) into the ground as a sign (*gheralyai*). Meanwhile, the third individual, Tonulu Takrulu, took koli leaves (*hgerlarkuhi*) into a container, hung them on the end of a log and stuck them on the ground as a sign (*gheralyai*) (Figure 53). Upon completion, they commenced an evaluation of whose markers were more numerous and whose territory was the most expansive⁶⁶.

⁶⁵ The term animistic explains, what is the origin of the name *Hygeralai* and how is related this term to the animism of Luang peoples's.

⁶⁶ Information gathered from field observations, focus group discussions (FGD), and interviews. P. S, 50 years, male, 5 Juli 2023. M, S, 58 years, male, 11 August 20022. S. K, male, 59 years, 20 September 2023. C.S, male, 40 years, on 15 July 2023. L. M, male, 45 years, 5 July 2023, G. P, male, 58 years, on 10 September 2023. D. W, male, 60 years, 70 years, August 2022. S.S, male, 62 years, 8 September 2023. P. M, male, 40 years, 12 August, 2023. W. K, 60 years, male, 23 September 2023. C. P, female, 50 years, 1 August 2023. P. K, female, 60 years, on 20 August 2023. I. L, 50 years, female, on 1 September 2023. R. M, male, 65 years, on 8 Oktober 2023.

The analysis of the signals revealed that the signs of Tonulu Takrulu exhibited greater diversity and encompassed extensive territories, as confirmed by the two men (Pannell, 1997).

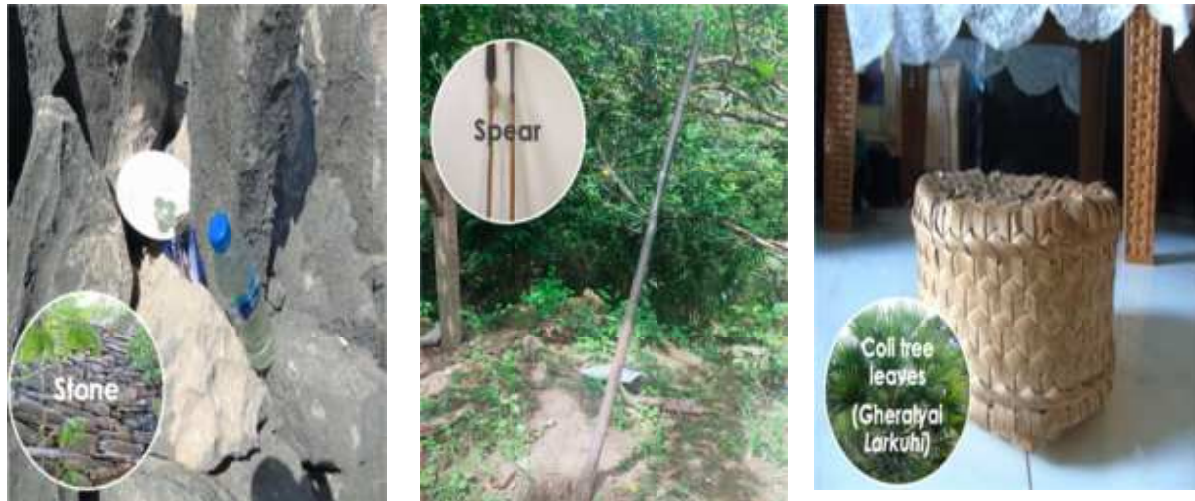


Figure 53: (A): The sign of stone offerings. (B): A spear driven into the ground. (C): a sign made of dried koli leaves woven into a box. Source: research results in 2022 and 2023 on Luang Island.

The previous description indicates that *Hygeralai* arrived in Luang Island through an extensive historical process throughout time. This event occurred as also mentioned by Lloyd (1986) and to this day, most Luang people are aware of and keep this narrative in their memory. The objective of creating these signs is to enable individuals to identify and acknowledge their property ownership. Furthermore, the markers established the territorial borders between them, ensuring no future misunderstanding.

The sign created by Tonulu Takrulu from koli tree leaves serves as a marker of ownership and reflects an individual's fundamental motivation for self-confidence within his group. The motivation comes from the differences between communities and is characterized by values of superiority (Cohen, 1993; Eriksen, 2017; Koentjaraningrat, 1974). Takrulu Haluru was motivated to design a unique sign from koli leaves (*Hgeralay hgerlarkuhi*) to mark his own territory. Thus it may be argued that Tonulu Takrulu is the owner and initiator of the sign made from koli leaves (*hgeralyai hgerlarkuhi*). Moreover, the sign represents not only Tonulu Takrulu but also serves as an identity for both the "location" and the "community residing there."

Similarly, the stone and spear signs used by the other two men are considered as indicators of their own ownership and identity, as well as that of village-based communities in Luang Island. In this instance, many social identities are portrayed on *geralyai* objects.

History plays a crucial role in the social and cultural reconstruction of a society (Biczó, 2019b), here historical heritage can be passed down both consciously and unconsciously (Dawson, 2002; Graham, 1997; Ricklefs, 2007; Wiedemann, 2015). Similarly, *Hygeralai* in Luang Island is part of the historical and cultural process inherited from the "orang tatua" or ancestors of Luang Island, whether through direct awareness or unintentionally. Furthermore, *Hygeralai* also functions as a key determinant of the future of the Luang Island community, particularly in the context of its continuity as an indigenous community.

Still around a term and name they are always come from originates and significant event that occurred within a local community which is as well interconnected with language as an element of culture (Davidson, 2004). Language is a conventional and flexible system of articulated sound symbols employed for communication to express thoughts and emotions (B et al., 2012), set of phonetic symbols used by individuals within a society for cooperation, interaction, and self-identification (Carroll, et al., 2012). Moreover, the concept of naming serves as an expression of thinking and a medium of communication among language users within a culture. On the other hand, language and cognition within a group are inextricably connected (Ringe & Eska, 2013), and in some ways it might also be associated with religious beliefs (Kridalaksana, 1982). In the linguistic framework, each word undergoes a developmental process (Hickerson, 1980) and sound change influenced by the user's environment and culture (Zsiga, 2013).

Likewise, *Hygeralai* originates from an incident that genuinely occurred in the social life of the Luang people in the past, which has a connection to the language. *Hygeralai* originates from the ancient language of Luang Island (table 3).

Term of <i>Hygeralai</i>		
Factor	Luang Language (<i>Lgona Ltiery</i>)	English
History	First man: <i>hgeralyai watu</i> Second man: <i>hgeralyai welahra</i> Third man: (Takrulu Harulu): <i>hgeralyai hgerlarkuhi</i>	Sign of the Stone Sign of the Spear Sign of the Koli tree leaves
Language contextual		
• The word origin	<i>Hgeralyai</i> <i>hgerlarkuhi</i> “ <i>higer</i> ” originated from the four letters before the word <i>hger</i> (<i>lyai</i>) and <i>hger</i> (<i>larkuhi</i>).	Sign Koli tree leaves A sign made of woven koli tree leaves
• Phonetic	“ <i>Lai</i> ” originated from <i>hger</i> (<i>lyai</i>) and letter “ <i>i</i> ” from word <i>hgerlarkuh(i)</i> . <i>hgeralyai</i> + <i>hgerlarkuhi</i> = <i>Hygeralai</i>	

Table 15: Term *Hygeralai* of *Lgona Ltiery* side.

Source: Research on 2022 & 2023

The table above explains that the term *Hygeralai* originates from a fusion of two syllables in the Luang language (*Lgona Ltiery*), specifically *Hgeralyai* and *hgerlarkuhi*. The study revealed that the linguistic condition on Luang Island exhibits differences between written and spoken forms in certain instances. The word “*geralyai*” is spoken by reading the first consonants “*hg*” and the fourth consonant “*r*” surrounding the vowel “*e*” as “*hyger*.” Subsequently, the consonants “*ly*” followed by the vowels “*ai*” are pronounced as “*lai*,” resulting in the overall pronunciation of “*hgeralyai*” as “*Hygeralai*.” Moreover, relating to the reference of *Hygeralai*, the interview results indicate that the letter “*i*” at the end of the word *Hygeralai* is derived from the term *hgerlarkuhi*. Hence, the current linguistic phenomenon related to “*Hygeralai*” in Luang society comes from the words “*hgeralyai*” and “*hgerlarkuhi*” which are adapted to the phonetic pattern of Luang society. This kind of sound change, if we analyzed more deeply in linguistic studies, especially in the branch of phonology, is known as allophone. Allophones refer to sound variations that arise from a phoneme (Chaer, 2019). This variation appears depending on the position of the phoneme in the word, without affecting the meaning (Keraf, 2016).

Refers to Anna Lunsu Dalgneault in Dinneen and Halverson statement, that the loss of language entails more than the more disappearance of words, sentences, and analogous expressions, we are, in fact, losing our worldview or concept regarding our identity (Dinneen, 1995; Halverson, 2013). The term *Hygeralai* refers to a system of meaningful and articulate sound symbols, which are arbitrary and traditional, utilized by the Luang people to express their feelings and thoughts to this day. The Luang people continue communicating in the Luang language. They believe that language defines their identity.

Additional, data concerning the *Hygeralai* practice is derived from the historical context of the division of Luang Island and its surrounding smaller islands, namely Metimarang Island and Wekenao Island. Luang Island was historically divided into three parts according to three principal kingdoms. The three kingdoms were the Nohulu Gyrierna kingdom, the Nohputi Raitiaun/Ilmarna kingdom, and the Mnyetu/Nohapona Raiapnu kingdom. The establishment of territory on Luang Island and its surrounding smaller islands served as the foundation for the future delineation of marine territory in the practice of *Hygeralai*. These are the kings of their various *petuanan* or areas on Luang Island who monitor *Hygeralai* by custom. The timeline for the implementation of *Hygeralai* in environmental and natural resource management on Luang Island remains uncertain. It is believed to have originated from the split of Luang Island into three principal kingdoms. To safeguard each *petuanan*'s natural resources on land and at sea and to avoid theft.

In this historical dimension, *Hygeralai* is viewed within the framework of cosmology, where it is understood as an integral part of local cosmology a worldview that unites humans, nature, and spiritual forces within a sacred relational order. Within this cosmological framework, *Hygeralai* functions as a marker of the boundary between the profane and the sacred, serving as a mechanism for maintaining harmony between human beings and the universe. It encompasses ecological, social, and spiritual dimensions that are not separated from one another, but are instead interwoven within a unified system of values.

As a cosmological construct, *Hygeralai* reflects the belief that nature both marine and terrestrial is not an empty space to be exploited, but rather a realm inhabited by ancestral spirits and supernatural forces that must be respected. Every prohibition (taboo), symbol (such as koli leaves, customary stones, and Spear), and ritual accompanying conservation practices is not merely functional but carries ritualistic and symbolic significance. Violating *Hygeralai* is

perceived as an act that disturbs cosmic balance and may invite calamity, both ecologically (environmental degradation) and spiritually (illness, misfortune).

This concept aligns with the notion of relational ontology as articulated by Philippe Descola, who argues that in many Indigenous cosmologies, the relationships between humans and non-humans (such as nature, animals, and spirits) are founded on spiritual interconnectedness rather than domination (Descola, 2013). *Hygeralai* embodies this kind of relationship, wherein the sea is not solely regarded as a source of livelihood, but as a living entity with its own will, deserving of reverence and respectful treatment.

Thus, *Hygeralai* as a cosmology governs the relationship between humans and their environment based on principles of harmony, spiritual ethics, and submission to natural laws believed to be inherited from the ancestors. It constitutes not only ecological knowledge but also a moral and spiritual framework that underpins the socio-ecological sustainability of the Luang community. In this context, violations of *Hygeralai* are not merely matters of customary law but are also regarded as transgressions against a broader cosmic order. This foundational aspect of *Hygeralai* within the cosmological framework is presented in (Table 15).

Table 16: The initial characteristics of *Hygeralai* on Luang Island

Aspects	<i>Hygeralai</i> at first	<i>Hygeralai</i> before the introduction of Protestant Christianity-Transition
System Name	<i>Hygeralai</i> (early phase)	<i>Hygeralai</i> adat (Karena dikoordinir oleh lembaga adat)
Area of Application	Land <i>petuanan</i> and sea <i>petuanan</i>	Land <i>petuanan</i> and sea <i>petuanan</i>
Purpose of <i>Hygeralai</i>	As a marker of territorial ownership, territorial boundaries, identity and differentiation of a community group at that time. Sacred or honoured territories both on land and at sea.	Signalling ownership and territorial boundaries. As a sign of prohibition as well as management of natural resources on land and sea. Such as koli fruit and coconut fruit, Sea cucumber and natural seaweed that grow in the shallow waters of Luang Island for ownership.
Ownership	Private and communal	Private and communal
Initiative	Communal initiatives of shared ownership. Sacred places belonging to ancestors both on land and in the sea. By agreement and cosmology of the Luang community.	For private property <i>Hygeralai</i> is run at the request of the individual or property owner, and for communal property to marine natural resources and by mutual agreement.
Materials or media	Woven Koli Leaves, Stones, Spears Sopi and areca nut and betel leaf.	Woven Koli leaves, stone, wood, Sopi and areca nut and betel leaf.
Person in charge	At this time the Luang people still lived in groups called <i>luwu</i> . So the <i>Hygeralai</i> is coordinated by the head of adat and the head of <i>luwu</i> .	Very strong Customary Law

Sanction	Socio-communal (ostracism, customary admonitions), mythological (curses/belief in punishment by nature)	Socio-communal (ostracism, customary admonitions), mythological (curses/belief in punishment by nature)
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Source, Made by Author, 2025 based on the research result 2022 & 2023.

Table 13 illustrates two important phases in the evolution of the *Hygeralai* system on Luang Island: the early phase and the transition phase before the introduction of Protestant Christianity. In the early phase, *Hygeralai* functioned as a SES rooted in the local cosmology of the Luang people. It served the primary purpose of marking ownership and territorial boundaries, as well as an expression of identity and social differentiation. More than just an administrative function, the area marked by *Hygeralai* both on land and sea is seen as a sacred space guarded by ancestors, in line with the animistic and relational view of nature as described by Descola (2013) in the theory of relational ontology. (Descola, 2013).

In terms of ownership, the *Hygeralai* system in its early phase reflected the duality between private and communal property rights. Places considered sacred, especially in the sea and coastal areas, were safeguarded through the collective agreement of communities living within a luwu-based social structure. The initiative to designate *Hygeralai* came from a communal consciousness that was cosmological in nature, emphasising that the management of space and resources was a shared spiritual responsibility. Materials used as symbols, such as koli leaves, stones and spears, function as symbolic and sacred media in marking areas and prohibitions.

Entering the transitional phase before Christian influence, there was a shift in the function and organisation of *Hygeralai*. Its purpose was not only as a symbol of identity and prohibition, but also as an explicit mechanism in the management of natural resources such as koli fruit, coconut, Sea cucumber and seaweed. The initiative to establish *Hygeralai* began to emerge from individuals or private property owners especially in the land area while for the marine area, it remains based on communal decisions. This reflects the formation of a hybrid management pattern between individual and collective ownership, in line with Pamela McElwee's (2020) idea of hybrid environmental governance (McElwee et al., 2020).

In both phases, the sanction systems in place showed continuity between social norms and spiritual beliefs. Sanctions in the form of social ostracisation, customary reprimands and belief in curses from nature signalled that the system had high symbolic power in enforcing

compliance. Ultimate responsibility for the implementation of *Hygeralai* remains with the customary chiefs and luwu heads, who are recognised in the transition through increasingly organised customary law structures. This transformation therefore not only demonstrates adaptation to social and ecological dynamics, but also reinforces the role of *Hygeralai* as an integral part of TEK, as described by Berkes (1999), which involves spiritual relations, ecological knowledge and social structures in community-based resource management..

6.3. *Hygeralai* and the Emergence of Christianity of Protestan Dedomination

The evolution of *Hygeralai* on Luang Island occurred with the emergence of Protestant Christianity. The church collaborated with the local government in this process, although the significance and importance of *Hygeralai* remained consistent. In the following part will concisely outline the introduction of Christianity to Luang Island and the current status of *Hygeralai*, because this strange impact modified fundamentally the local culture. The initial preaching endeavor was undertaken by the Dutch in 1805-1806 in East Luang; however, it was unsuccessful due to the lack of a favorable response from the local population. In 1810, the Dutch reintroduced the Sanhedring faith, which was favorably embraced in East Luang village. Reverend Herdengsz arrived in East Luang in 1815 and conducted the inaugural baptism on October 15, now recognized as the day that Christianity was introduced to the region (Enklaar, 1980). The development of *Hygeralai* on Luang Island occurred with the emergence of Protestant Christianity. He converted Sanhedring to Protestant Christianity and attempted to stop the practice of idolatry by destroying the idols on Luang Island. This move stimulated controversy within the community. The disagreement was settled upon the arrival of Reverend Joseph Kam in East Luang (de Graaf, 1977; Leirissa, 1999; Müller, 1914).

The demise of the sculptures honored by the locals signified the commencement of initiatives aimed at eliminating diverse beliefs and practices on Luang seen as idolatrous and necessitating eradication⁶⁷. However, certain rituals on Luang Island persist, as the practice of *Hygeralai* continues to be protected although adjusted to align with Christian theological beliefs. Elements signifying the performance linked to *Hygeralai*, specifically stones, koli foliage, and

⁶⁷ Data was obtained through focus group discussions (FGD) and interviews. F. M, 35 years, 2 August 2023. K. L, male, 45 years, 17 Juni 2022. K. W, male, 40 years, 18 Oktober 2023. E.K, male, 37 years, 8 September 2023. S. L, male, 48 years, 20 Oktober, 2023. C. L, 68 years, male, 6 September 2022. S. W, male, 36 years, 1 August 2023.

coconut leaves, remain in use⁶⁸. Van Dijk's claim that the Dutch arrival in Southeast Maluku influenced culture confirms this claim. The government's policies and those of Christian missionaries adversely affected traditional cultural artifacts, as demonstrated by the removal of ancestral sculptures (de Jonge & van Dijk, 1995).

The destruction of the sacred statues venerated by the Luang community, failed to convert them to Christianity. A like situation occurred in the Maluku region under the control of the Maluku Protestant Church. In May 1960, the Maluku Protestant Church published a Message of Repentance addressing the congregation's commitment to old concept, with six points encouraging members and church authorities to align their lives with the Cristian religion. This appeal also became a factor influencing the conduct of various traditional ceremonies, notably *Hygeralai* in Luang Island. Since the introduction of Christianity, *Hygeralai* has undergone developments in several aspects (table 14).

Table 14: Table of *Hygeralai* practices upon admission and after

Aspect	<i>Hygeralai</i> at the time of the arrival of Protestant Christianity	<i>Hygeralai</i> after the arrival of Protestant Christianity
System Name	<i>Hygeralai: custom</i>	<i>Hygeralai: custom</i>
	<i>Hygeralai: church</i>	<i>Hygeralai: gereja</i>
Area of Application	Land jurisdiction: <i>Hygeralai</i> enforced in land jurisdiction.	Land jurisdiction: <i>Hygeralai</i> enforced in land jurisdiction.
	Sea jurisdiction, <i>Hygeralai</i> enforced in sea jurisdiction.	Sea jurisdiction, <i>Hygeralai</i> enforced in sea jurisdiction.
Purpose of <i>Hygeralai</i>	Boundary markers, ownership markers, prohibition signs, and management of natural resources in land and marine territories, were including sacred sites on land and at sea.	Boundary markers, ownership markers, prohibition signs, and management of natural resources in land and marine areas, including sacred sites on land and at sea..
Ownership	Individuals and groups	Individuals and groups
Initiative	For private property, <i>Hygeralai</i> is run at the request of the individual or property owner and is not coordinated by customary institutions but has been transferred from customary institutions to church institutions, which is why it is referred to as church <i>Hygeralai</i> . For communal property, it is coordinated by mutual agreement and applies to marine natural resources. This is still	For private property, <i>Hygeralai</i> is run at the request of the individual or property owner and is not coordinated by customary institutions but has been transferred from customary institutions to church institutions, which is why it is referred to as church <i>Hygeralai</i> . For communal property, it is coordinated by mutual agreement and applies to marine natural resources. This is still

⁶⁸ The data was acquired from focus group discussions (FGD) and interviews. G. L, 40 years, 3 August 2023. M. K, 55 years 5 August 2023. B.H, male, 64 years, on 28 September 2023. W. S, male, 45 years, 23 Oktober 2022. K. W, male, 40 years, 18 Juni 2023. E.K, male, 65 years, 8 September 2023. L. M, male, 48 years, 20 August, 2023. T. H, 68 years, male, 6 September 2022. S. W, female, 39 years, 21 Oktober 2023.

	coordinated by customary institutions, which is why it is referred to as customary Hygeralai and applies to communal ownership.	coordinated by customary institutions, which is why it is referred to as customary Hygeralai and applies to communal ownership..
Materials or media	Coconut leaves, cloth, and a rectangular board bearing a cross symbol, Sopi and areca nut and betel leaf.	Coconut leaves, cloth, and a rectangular board bearing a cross symbol, Sopi and areca nut and betel leaf.
Person in charge	Collaboration between indigenous institutions and churches	Collaboration between indigenous institutions and churches
Sanctions for those who violate <i>Hygeralai</i>	Customary sanctions: One buffalo, 20 liters of sopi, woven koli leaves in the shape of a box, and one gold coin in the shape of a moon. These are paid to the customary chief, who then distributes them to members of the community in need.	Customary sanctions: 30 kg of pork, 20 liters of sopi, and one gold coin in the shape of a moon. This is paid to the customary chief, who then distributes it to members of the community in need.
	Church sanctions: sanctions from God	Church sanctions: sanctions from God

Source: Created by Author, 2025 based on research results 2022 & 2023

Table 14 describes the implementation of *Hygeralai* on Luang Island during the early days of Protestant Christianity and after the strengthening of church institutions, showing important transformations in the customary social-ecological management system. During both periods, *Hygeralai* continued to be implemented in two main zones, namely land and sea, demonstrating its continuity as a space management system based on local wisdom. Its primary purpose remained consistent: to demarcate territorial boundaries, ownership, and the protection of resources, both in sacred and ecologically productive areas. However, there was a significant shift in terms of the initiative for implementation and institutional authority. While in the early days *Hygeralai* was entirely controlled by customary institutions and practiced based on local cosmology, after the arrival of Protestant Christianity, management of private ownership began to be carried out by the church in the form of church *Hygeralai*, while communal management remained the domain of customary institutions (customary *Hygeralai*).

Transformation is also evident in the use of symbols and media. Traditional symbols such as koli leaves and stones are being combined with or replaced by boards marked with crosses and white cloth, reflecting the integration of Christian spiritual values into customary practices. This indicates the formation of a hybrid environmental management system (McElwee et al., 2020) in which custom and religion support each other. Those responsible also involve collaboration between traditional leaders and the church, strengthening the social legitimacy of this practice.

The sanction system reflects duality: traditional sanctions still take the form of material fines such as buffalo, *sopi*, and traditional gold, while church sanctions are spiritual in nature, in the form of threats of divine punishment for violators of moral values.

Thus, *Hygeralai*'s transformation during these two periods demonstrates the dynamics of TEK adapting to cosmological and institutional changes. The integration between customary institutions and the church shows the community's capacity to maintain and simultaneously modify conservation systems that are deeply rooted in their socio-cultural structure. This model reflects a form of adaptive co-management that not only maintains ecological sustainability but also strengthens social cohesion and spiritual legitimacy within the Luang community.

6.4. *Hygeralai*: Natural Environment and Phytogeography within Indonesia's Flora

Geographical environment is one of the factors that play an important role in the study of naming or onomastic of a name or term (McElwee et al., 2020). Not all elements of nature are used simultaneously in the process of naming or referring to a name or term. Only those elements of nature that are relevant to the environment in which the term or name evolved are considered. This is also the case with the name or term *Hygeralai*. Historically, *Hygeralai* is affiliated with one particular element of nature, which corresponds to the geographical conditions in which the Luang people live. One of the elements of nature utilised by the ancestors of the Luang people in the past was the *koli* tree, which is a plant that grows around them.

The *Hygeralai* applied by the ancestors at that time was certainly based on certain experiences and considerations. Based on interviews obtained, it is known that the ancestors used signs in the form of *koli* leaves (*gheralyai hgerlarkuhi*) to mark their land, which was considered based on two things. Firstly, both sentient and non-sentient elements in their surroundings could be employed to aid accessibility and everyday functions. Secondly, the consideration was also fuelled by the ideas, hopes, ideals and values of Luang Island's ancestors in creating a mark that suited their wants and needs (Kissiya & Biczó, 2024).

Luang Island is a small landform with dry and barren soil, it is difficult to get clean water sources, so their lives are entirely dependent on the sea (Estradivari, B, et al., 2016; Karuna & Serpara, 2021; Kissiya & Biczó, 2022). The natural environment on Luang Island is very

different from other areas in Maluku. There are no plants such as cloves (*Syzygium aromaticum*), nutmeg (*Myristica fragrans*), mangosteen (*Garcinia mangostana*), or sago (*Metroxylon sagu*), which grow in areas such as close islands in the region, Banda, Ternate, Seram, Haruku, Nusalaut, Saparua, and Buru. In contrast, plants such as koli (*Borrassus flabellifer*), date palm (*Phoenix dactylifera*), tamarind (*Tamarindus indica*), coconut (*Cocos nucifera*), and some unidentified wild plants grow on Luang Island. When compared to plants that grow elsewhere in Maluku, the plants that grow on Luang Island tend to be difficult to thrive as they are somewhere between reluctant to die and alive, as the Indonesian saying goes ‘die reluctantly live unwillingly’. It is true that the plants that grow in Maluku in particular and Indonesia in general are not all evenly distributed. Since Indonesia is characterised as an archipelago, the different geographical conditions and the position of Indonesia which is flanked by two continents and two oceans make this country Indonesia is abundant in flora and fauna, though their distribution is uneven across regions. Each region in Indonesia has a different abundance of flora and fauna and has different characteristics. This is evidenced by the Wallacea and Weber lines⁶⁹ (Figure 54).

⁶⁹ The Wallace and Weber Lines are two imaginary lines that divide Indonesia and provide important insights into the region's different ecosystems. The Wallace Line, located between Bali and Lombok, marks the boundary between Asian and Australian fauna, while the Weber Line, further east, marks the transition of flora and fauna from the two regions. Knowledge of these lines helps scientists understand how species evolve and adapt in different environments, as well as how changes in geography and climate affect biodiversity in Indonesia. By studying these lines, we can better appreciate Indonesia's natural wealth and the importance of conservation. The Wallace and Weber lines are used in conservation research to understand species distribution and biodiversity in Indonesia. By knowing the ecosystem boundaries marked by these lines, scientists can identify areas of high biodiversity and those at risk from threats such as deforestation or climate change. This research helps in formulating more effective conservation strategies that focus on protecting the species and habitats unique to each area, while also providing guidance in the restoration of degraded ecosystems and sustainable management of natural resources. There are several articles that provide evidence that these lines are still very important in the world of research. See also Stephen Oppenheimer, 1998. Yan Xin Hew, et al in Co-occurrence of dual lineages within *Simulium* (*Gomphostilbia*) atratum De Meijere in the Indonesian Archipelago along Wallace's Line. Jason R. Ali, Lawrence R. Heaney, 2024. Another article uses this line in its study Alfred R. Wallace's enduring influence on biogeographical studies of the Indo-Australian archipelago.

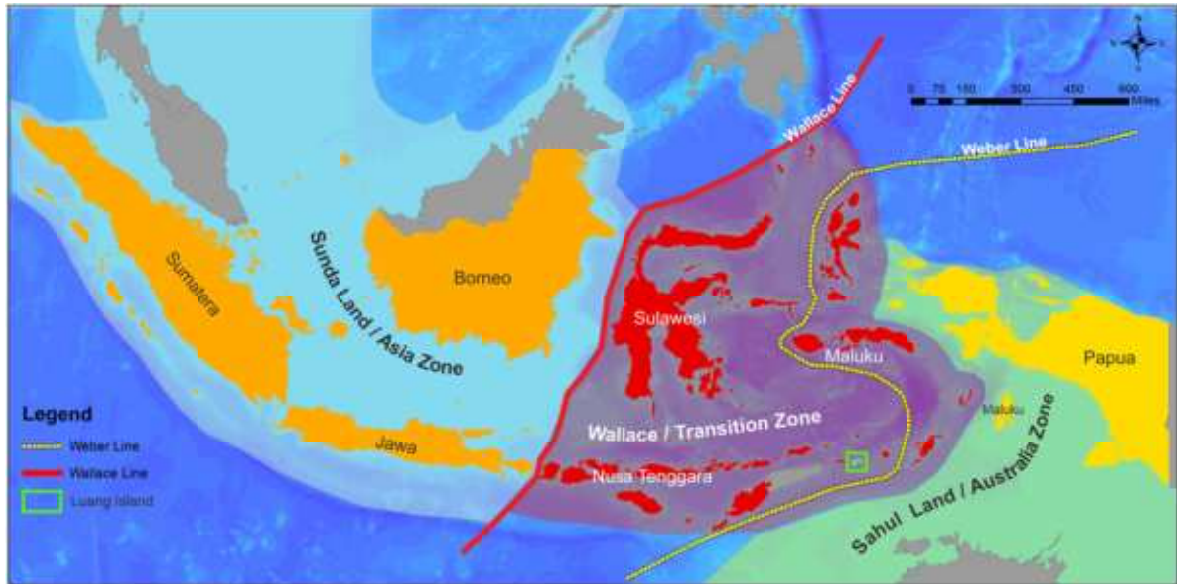


Figure 54: Map of flora and fauna in Indonesia based on Wallace Line and Weber Line
 Source: Stephen Oppenheimer, *Eden In The East* (Oppenheimer, 1998)

Alfred Wallace, in the 1850s made his expedition to the archipelago, he greatly admired the richness and diversity of this extraordinary flora and fauna ; Wallace, 1862). The map above shows the area of flora and fauna in Indonesia divided into three zones according to the concept of Wallacea and Weber. Each of these zones is characterised by different flora and fauna. The western region of Indonesia, which includes the islands of Java, Sumatra, and Kalimantan, has flora and fauna with Asiatic characteristics, separated by the Wallacea line. The central region of Indonesia, which includes the islands of Sulawesi, Nusa Tenggara, and parts of Maluku, is a transitional zone (Wallace, 1862) where the flora and fauna transition from Asiatic to Australia types, or vice versa. The flora and fauna in this region have a mixture or similarity with both types. This region is known as Wallacea, because Wallace investigated extensively this region. Meanwhile, eastern Indonesia, which includes small islands in the Moluccas such as the Aru Islands, Tanimbar Islands, and Papua, is included in the Austratic flora and fauna zone, with types of flora and fauna similar to those in Australia (Nontji, 2009). On the other hand, Weber's line divides the flora and fauna region almost the same as Wallace's, but he calls the western

region of Indonesia Sunda Land, the eastern region of Indonesia Sahul Land, and the central region of Indonesia is still called the Wallacea Line (Oppenheimer, 1998).

Referring to the segmentation of plant species regions in Indonesia according to the Wallacea and Weber biogeographical concept, Luang Island is included in the transition zone, where the flora that grows on Luang Island is a blend of between the Asiatic zone and the Australia zone. Based on the results of field observations and apparatus studies there are several plant species that grow in Luang Island belonging to the Asiatic zone, one of which is the koli tree (*Borassus flabellifer*). Globally this Genus has five species, in Indonesia this genus has two species namely *Borassus flabellifer* and *Borassus heineanus*, of these two species, *Borassus sundaicus* is native to Indonesia, while *Borassus flabellifer* is an introduced species from India (Simanjuntak et al., 2006). The koli tree that grows on Luang Island is a species of *Borassus flabellifer* that originated in India.

According to Leonard Andaya, Maluku is one of the exotic worlds with marine products (Pearl, Sea cucumber), nutmeg, mackerel and other marine products⁷⁰ and cloves so that it became the most important destination and became a struggle between Europeans (Portuguese, Spanish, Dutch and British) in world trade (Andaya, 1993). Through sea trade journeys ranging from Africa, India, Malacca, Nusantara (Indonesia), Maluku, Banda, Ambon and Ternate (Braudel, 1988; Hall, 2019; Lapian, 2017a) it is certain that traders from Arabia, India, and China (Chaudhuri, 1985) had visited and transacted with the Luang people (Figure 55).

⁷⁰ Our analysis based on other historical literature in this regard is that cloves began to be traded to China from around 500 BC and to India from around 200 BC. Initially, various accounts of Asian traders from classical Chinese or Indian texts mentioned the spice as originating from a land in the East with the description of the location difficult to trace, mainly due to limited knowledge of the place of origin of the spice. As sea trade developed after the 5th century, Europeans tried to trace the origin of the spice clove through the name of this commodity. They encountered difficulties because the cloves they obtained through the Arabs and Persians were unknown as to their origins and where they came from. As the shipping routes that passed through the archipelago became better known to world traders, Europeans eventually traded with the people of the archipelago including in the Maluku Islands as a source of spices including the clove commodity. Then, at the end of the 15th century, the Portuguese took over the Indian Ocean trade route. Together with that, they also took over the clove trade with the Treaty of Tordesillas with Spain. In addition, there was also a trade co-operation agreement between the Portuguese and the Sultanate.

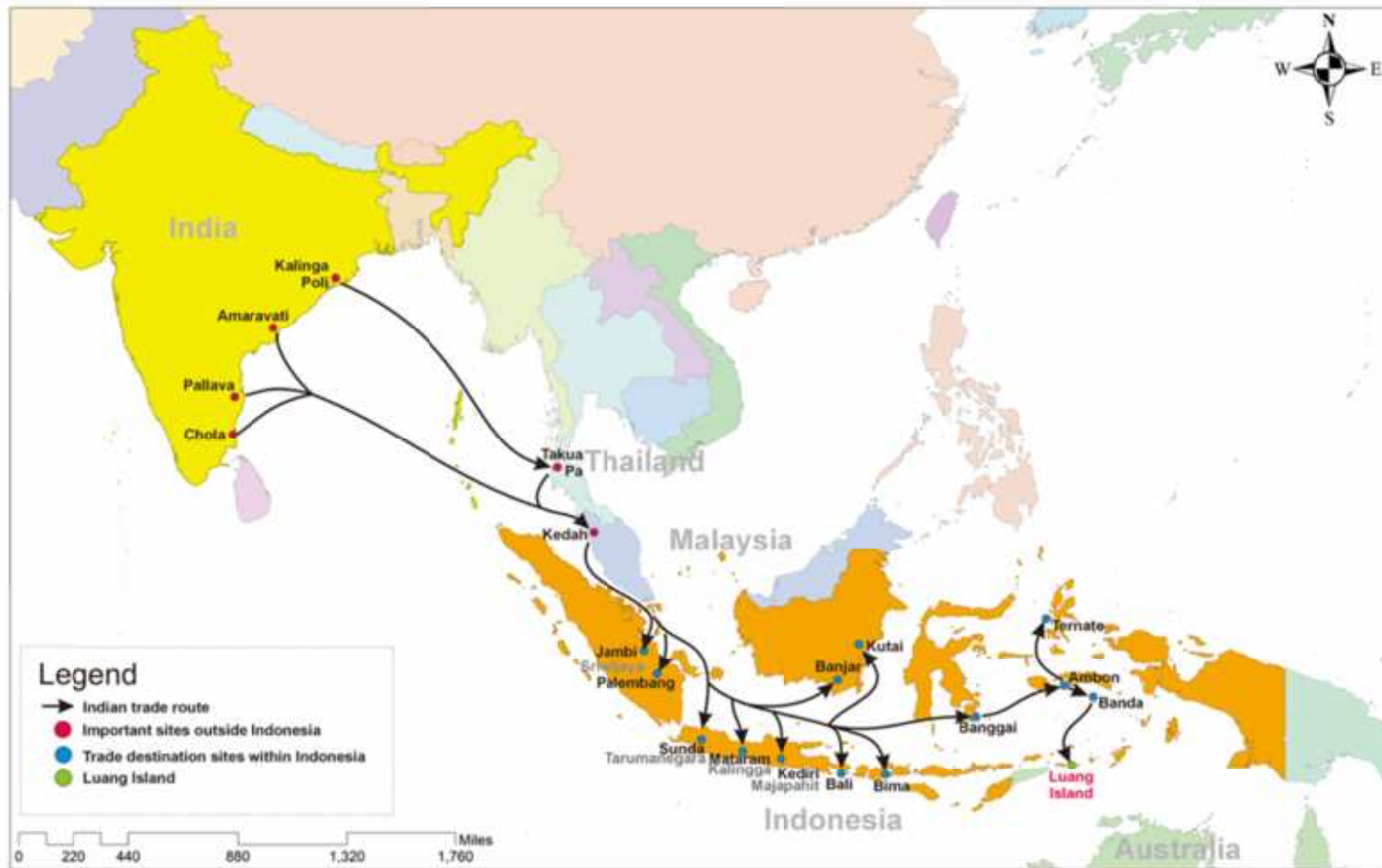


Figure 55: Map of Indian traders' journey to Indonesia (Nusantara) in the 5th century Masehi. Source: Adopted from Donkin and modified by the author, 2024. The data in this map is the result of analysis of historical literature studies, especially the map of Maluku's position in the trade route⁷¹.

⁷¹ About this, see Maluku in world trade routes and in Asia such as Trade and Civilization in the Indian Ocean written by K.N. Chaudhuri, 1989. The Clove and Nutmeg Trade Routes up to the 16th Century. Sailing of European People Look for Cloves and Nutmeg Producing Areas by A.B.Lapian, R.Z. Leirissa, R.A. Donkin. Trade Routes of Southeast Asia. The Start of the Arabian Spice Trade. Silk Road and Spice Road. See also Eden in The East by Stephen Oppenheimer 1998.

Figure 55 shows the journey of Indian traders to the archipelago to trade and buy seafood and cloves. This is marked by the discovery of *palawa* writings in Sanskrit on stone pillars where sacrificial offerings are remembered (*Yupa*) in East Kalimantan, Kutai. This evidence also marks the end of the prehistoric period in Indonesia. Subsequently, kingdoms characterised by Hinduism emerged in Indonesia such as in Java (Tarumanegara Kingdom, Kalingga, Kediri, Singosari, and Majapahit), in Palembang (Sriwijaya Kingdom), in Bali the Isyana Dynasty, Bima and Maluku. In Maluku⁷², the Southwest, Tanimbar Islands and Kei Islands also received Hindu influence.

Another analysis comes from us regarding the movement of koli plants to Luang Island, based on the background that the Luang people are strong sailors, they sail to other islands to buy or also exchange dried sea products with garden products belonging to the inhabitants of these islands. In addition to the neighboring islands, they usually sail to places like Banda, Ambon, Ternate where there are many traders from India, Malacca, and Arabia. Through this activity, the Luang people also obtained koli fruit to be used as provisions on the journey back to Luang Island. The explanations above suggest that *Hygeralai* is affiliated with one of the plant species originating from India and at the same time help this work to further identify the ecosystem of Luang Island.

6.5. *Hygeralai* and TEK of the Natural Resources in Maluku

Within the framework of Indonesia's archipelagic society, the Maluku Islands represent an archipelago characterised by its rich cultural diversity. Hence, the entire region is commonly referred to as the "thousand islands" in this context (Habiboe, 2004). These cultural assets are constantly developing, as demonstrated by the fluctuating dynamics of the community. The transformations that happened are documented from multiple sources during both the pre-colonial and colonial eras. One notable account comes from Georg Eberhard Rumphius, a German naturalist employed by the Dutch East India Company (VOC) in the mid-17th century until his death in 1702. Rumphius detailed the cultural practices and societal conditions of the

⁷² Luang Island, located in the Southern Daya Islands, is one of the areas that experienced Indian cultural influence. In addition to the presence of the Koli plant, the island's social structure features a caste system and weaving traditions that continue to be practiced today. Furthermore, the Luang people's cosmological understanding of the cardinal directions, symbolized by a chakra, reflects their holistic view of the universe and functions as a timekeeping tool for organizing their activities.

Moluccan population in Ambon in his *Ambonsche Landbeschrijving*, which provides valuable insights into the traditions of Amboina's inhabitants during the 17th century (Cooley, 1962). In another work, *Ambonsche Rariteikamer*, Rumphius described the abundance of natural resources both terrestrial and marine while also recognizing the local population's expertise in utilizing flora, fauna, and other biota for survival. Despite his detailed observations, he occasionally referred to these resources as "strange stuff" (Rumphius, 1702), reflecting a perspective shaped by his European background.

Traditions that endure and embody positive values play a crucial role in fostering development and preservation. A particularly significant cultural component is the commitment of local communities to maintaining the stability of the natural environment, which they regard as the foundation of life. This natural ecosystem encompasses both terrestrial areas, such as forests, and marine regions, along with the rich natural resources they harbor. Traditional wisdom, often governed by customary institutions, serves as a vital mechanism for traditional communities in conserving these resources. Each region within Maluku employs distinct terms and historical practices for environmental and resource conservation. One notable example is the practice of *Sasi*, a local tradition that reflects a community-driven approach to sustainability.

The term *Sasi* is predominantly recognized among the people of Central Maluku and is often perceived as a uniform term representing similar practices throughout the Maluku region. This perception is shared not only by the Moluccans themselves but also by those outside the region. The spread of the term *Sasi* beyond Central Maluku is thought to be closely tied to Ambon's role as the capital of Maluku Province following Indonesian independence. As a central hub of interaction for various ethnic groups from across the Maluku archipelago and other parts of Indonesia, Ambon served as a cultural crossroads that facilitated the wider dissemination of the concept of *Sasi*.

Over time, *Sasi* became a generalized term for practices involving time-based restrictions on the exploitation of natural resources, both terrestrial and marine, paralleling similar traditions with different terms in other parts of Maluku. This phenomenon can be attributed to several factors, including limited documentation and understanding of local histories, generational knowledge gaps, reliance on oral traditions, familial modes of education, and the exclusion of certain aspects of local historical content from formal educational curricula.

Consequently, the cultural and historical narratives of Maluku have been predominantly shaped by the traditions of Central Maluku and Ambon.

In this context, *Hygeralai* on Luang Island serves purposes and functions similar to *Sasi* in Central Maluku, with comparable practices observed under different names in other regions, such as *Hawear* in the Kei Islands and *sihit* on Buru Island. Broadly, the term *Sasi* is derived from the word “sanction,” signifying a prohibition. This concept involves the restriction of harvesting or damaging specific natural resources for a designated period to ensure sustainability and environmental conservation (Garrison, 2021). The implementation of *Sasi* engages various societal elements, including customary institutions, religious organizations, community leaders, and village residents, all working collaboratively to safeguard natural resources and promote environmental stewardship (Kusumadinata, 2015). Moreover, *Sasi* is fundamentally an endeavor to preserve social etiquette, including initiatives aimed at the equal sharing of revenue derived from local natural resources among all citizens. Our literature review indicates that the majority of the discourse surrounding *Sasi* centers on its role within customary law, with no studies addressing the historical origins of *Sasi*.

The unique geographical location and natural environment of Luang Island make *Hygeralai* historically, linguistically, and culturally distinct from *Sasi* and similar terms used in other parts of Maluku. Additionally, Luang Island has a distinct customary and social structure, which results in a different approach to resource management compared to other regions.

CHAPTER VII : IMPACT of *HYGERALAI* on THE MARINE EKOSYSTEM, *HYGERALAI* IN SOCIAL-ECOLOGICAL SYSTEM AND ADAPTIVE CYCLE

7.1. Introduction

This section discusses the impact of *Hygeralai* on the marine ecosystem of Luang Island. We begin by examining the extent to which the local community adheres to the customary rules of *Hygeralai*. Furthermore, we explore the significance of the Sea cucumber as a primary species, along with other species that are simultaneously harvested within the *Hygeralai* framework, in maintaining marine ecological balance. In addition, this section addresses the influence of *Hygeralai* on the daily lives of the Luang people, particularly in terms of behaviors aimed at preserving the population of marine resources beyond *Sea cucumbers* and associated species. The overarching goal is to ensure the sustainability of natural resources and the marine ecosystem. It is also essential to examine the various factors that influence these practices. Lastly, we analyze how customary institutions respond to and collaborate with other stakeholders, such as the church, schools, and women's associations, in reinforcing the implementation of *Hygeralai*.

Ecological impacts are never singular; rather, they are the result of complex interactions between internal (local) systems and external pressures originating outside the community. In this regard, the TEK approach becomes highly relevant in explaining these dynamics. As Berkes (2017) argues, TEK is not a static system of knowledge but an accumulation of ecological experiences developed through long-term socio-cultural adaptation to the environment. In the context of *Hygeralai*, this system represents a localized form of TEK situational, flexible, and grounded in careful observation of natural cycles and social relations. However, the effectiveness of TEK is significantly influenced by the community's capacity to maintain its ecological practices amid external pressures such as the introduction of Protestant Christianity, shifting cultural values, climate change, geographical vulnerability, and development policies that are often misaligned with local values. The resilience of *Hygeralai* is thus a central focus in this section, with the aim of analyzing the extent to which this traditional ecological knowledge system can endure and adapt to multiple challenges, both internal and external.

This analysis is crucial in determining whether *Hygeralai* continues to fulfill its function in maintaining marine ecological balance and preserving local cultural values, or whether it is undergoing weakening due to social, economic, environmental changes, and external policy interventions. By exploring its resilience, this study seeks to understand the adaptive dynamics of *Hygeralai* as a living and evolving SES in the face of contemporary transformations. Therefore, to fully comprehend the impact of *Hygeralai* on the marine ecosystem of Luang Island, it is essential to analyze how this local knowledge system operates within the framework of a socio-ecological system that is in continuous interaction with internal community factors and dynamic external challenges. This section will subsequently lead into an analysis of the socio-ecological dynamics of *Hygeralai* through the lens of the adaptive renewal cycle and panarchy framework.

7.2. Impact of *Hygeralai* on the Marine Environment in Luang Island

Returning to the specific regulations of *Hygeralai*, certain rules such as harvesting only *Sea cucumbers* that meet the minimum size requirements and the use of environmentally friendly tools that do not damage or extract coral reefs are strictly observed. As mentioned earlier, although *Hygeralai* primarily focuses on *Sea cucumbers*. The *Hygeralai* system reflects customary practices that go beyond social or ritual obligations; it embodies an ecological response to environmental conditions. The regulation on harvest size, for instance, illustrates a local understanding of the life cycle and regenerative capacity of marine species particularly *Sea cucumbers* ensuring that individuals are not harvested before reaching biological maturity. This directly contributes to the sustainability of their populations in the waters surrounding Luang Island. Likewise, the prohibition of destructive fishing techniques and the protection of coral reefs signify the Luang community's collective awareness of the need to preserve the integrity of marine ecosystems. These ecosystems are crucial not only for supporting marine biodiversity but also for delivering ecosystem services such as food sources, shoreline protection, and maintaining the chemical balance of coastal waters.

In the practice of *Hygeralai* on Luang Island, in addition to *Sea cucumbers* as the primary commodity, other ecologically significant marine species are also harvested, including abalone (*Haliotis asinina*), giant clams (*Tridacna gigas*), and topshells (*Trochus niloticus*). These three species play key ecological roles in tropical marine ecosystems, particularly within coral reef and seagrass bed habitats, which serve as their primary environments. Abalone, for example,

functions as a herbivorous grazer that helps regulate algal growth on rocky and coral surfaces, thereby preventing algal overgrowth that could inhibit coral development. *Tridacna gigas* acts as a natural water filter, enhancing water clarity and overall reef health by filtering plankton and particulate matter. Additionally, *giant clams* maintain a symbiotic relationship with *zooxanthellae* algae, which contributes to marine primary productivity. *Trochus niloticus* serves as a biofilm and microalgae grazer, keeping coral surfaces clean and supporting the broader reef ecosystem. Its hard shell, after death, also provides secondary habitat for other marine organisms.

Consequently, the *Hygeralai* regulations regarding the timing and methods of harvesting these species not only aim to ensure the sustainable use of marine resources for economic benefit but also to preserve their essential ecological functions within the shallow coastal waters of Luang Island. With regard to daily subsistence practices, which marine species are harvested for consumption? This raises important questions about the role of local ecological knowledge not only in resource management but also in broader efforts to protect marine ecosystems. The sustainability and effectiveness of such systems are influenced by a range of internal factors, which will be further examined in the subsequent section.

7.3. Internal Factors Affecting Marine Ecological Status of Luang Island

As previously discussed in Chapter 5 under the section *Hygeralai* Operational Regulation and Compliance Rate, the people of Luang Island generally demonstrate strong adherence to the rules of *Hygeralai*. Although *Hygeralai* is widely respected as a binding customary system, there are inconsistencies in community compliance not in terms of premature marine harvesting, but rather regarding coastal environmental hygiene.

When discussing *Hygeralai* within the framework of natural resource management, we are, in effect, addressing the health of marine ecosystems, particularly the coastal and shallow-water ecosystems surrounding Luang Island. In this context, improper waste disposal practices along the shoreline such as littering plastic and food packaging reveal a persisting weakness in ecological discipline among certain individuals in the community. Such actions undermine the fundamental purpose of *Hygeralai*, which not only regulates the utilization of marine resources but also plays a vital role in safeguarding marine ecosystem health. If left unaddressed, this issue poses a significant threat to the sustainability of marine ecosystems in the coming years.

Moreover, *Hygeralai*, though an initiative for environmental protection by the Luang community, frequently encounters difficulties from external visitors. The practice, considered sacred by the local community, emphasizes respect for nature, particularly through the stringent restriction of trash. Nevertheless, numerous people from outside Luang are either oblivious to this culture or choose to disregard it, resulting in the discarding of plastic trash, food packaging, and other waste. This waste not only reduces from the aesthetic appeal of beaches and coral reefs but also adds contaminants that jeopardize marine ecosystems. For instance, wasted plastic can decompose into microplastics, which are then swallowed by marine organisms, resulting in significant health issues or mortality.

Despite the elevated standards of sanitary compliance and commendable ecological awareness in daily practices, there are individuals who exhibit a lack of concern towards waste disposal. Field observations revealed that certain individuals discard waste in the coastal region. The daily practices of the Luang community also promote environmental degradation. Coastal garbage disposal remains a persistent site for the reckless disposal of plastics, cans, and other waste. The local government is endeavoring to educate the community by conducting socialization every Friday and organizing coastal clean-up initiatives, provided garbage bins in areas within the village⁷³. The village government established a regulation enforcing fines on individuals who dispose of waste along the coastline, enforcing a penalty equivalent to twice the value of marine items harvested over a two-week period. For instance, after a fortnight, the harvest amounted 361.90 EUR, in collaboration with churches and educational institutions ranging from Elementary School to Senior High School /Vocational High School. This initiative is the result of a decision made by the leaders of both villages and their staff, which was then conveyed to the local community⁷⁴.

The church incorporates environmental challenges into its weekly pastoral care by referencing the significance of God's word. For instance, nature was divinely created for human

⁷³ Based on data collected from field interviews. D. K, male, 65 years,, 17 September 2022 J. S, male, 47 years, on 19 July 2023. D. P, male, 35 years on, 30 July 2023. M.S, male, 70 years, on 28 July 2023. F. K, male, 55 years, 11 July 2023, C. P, male, 65 years, on 10 September 2023. P. S, male, 46 years, 26 July 2023. C, S, male, 40 years, 8 Oktober 2023. E. W, male, 49 years, 9 August, 2023. T. H, 50 years, male, , 6 September 2022. Z. M, male, 60 years, 1 August 2023. V. K, female, 46 years, on 30 August 2023. K. M, 56 years, male, on 1 September 2022. Z. L, male, 45 years, on 18 September 2023.

⁷⁴ The data obtained was observations and interviews. R. W, female, 48 years, 9 August 2023. V. W, female, 40 years, on 12 July 2022. C. M, male, 50 years on, 8 September 2022. P. K, male, 50 years, on Oktober 2023. O. K, male, 56 years, 25 September 2023. M. S, male, 50 years, on 10 September 2023.

responsibility; hence, by preserving the environment, we fulfil God's word and honor Him as the Creator of heaven and earth. By indirectly destroying nature, we have affronted God's creation, humiliated the Creator, and violated His commands. Our interaction with nature unequivocally demonstrates the glorification and respect of God. The "Luang people" consistently express gratitude for God's blessing bestowed upon them through the remarkable abundance of the sea. (mengulang lagi, tolong di cek paragraph before 5.1.2.). It was by the fieldwork results, from an ecological perspective, *Hygeralai* is also seen as honoring God as the creator. The Luang people view themselves as integral to this ecosystem, symbolizing the aspiration for a renewed creation, a new heaven, and a new earth, free of pollution and destruction (Revelation 21:1). God's mandate to humanity is to establish peace between mankind and the environment. According to Genesis 1:28, humans, being the pinnacle of creation, are tasked with preservation over all creation. This obligation is further emphasized by Christ's teachings, which highlight respect for God's creation. Consequently, humans are regarded as an essential component of nature, alongside flora, fauna, and the whole of creation, holding a responsibility to nurture and preserve the environment rather than to dominate or exploit it. They believe that humility in natural resource management is essential for fostering a peaceful relationship with nature. Utilizing marine materials necessitates an understanding of their preservation. Conversely, while *Hygeralai* represents an initiative by the Luang people to protect the marine environment, there are variables that also influence the sustainability of ecosystem health in the waters surrounding Luang Island. These forces originate externally and within⁷⁵.

To enhance conservation awareness, environmental education is imparted in schools, from Elementary to Senior High/Vocational High School, focusing on the local wisdom of Luang people in environmental protection, namely *Hygeralai*. This material is included into local content subjects or subjects pertaining to ecosystems. Furthermore, the findings from field observations throughout the classroom learning process indicate the integration of methods for utilizing natural resources in the waters of Luang Island as a means of generating family income. Field studies indicate that to mitigate monotony in presenting local content and enhance

⁷⁵ Based on the observation in the field and data collected from field interviews. R. W, female, 48 years, 9 August 2023. V. W, female, 45 years, on 9 July 2022. L. S, male, 50 years on, 10 July 2022. Z. M, male, 67 years, on 20 July 2023. P. P, male, 56 years, 25 September 2023. K. S, male, 50 years, on 19 September 2023. J. W, female, 35 years on 8 July 2023. J. S, male, 55 years, on 28 July 2023. S. W, male, 48 years, 10 September 2023. O. W, male, 42 years, 26 Juni 2023. K. M, male, 45 years, 8 September 2023. E. W, male, 39 years 9 August, 2023. L. P, 45 years, male, 6 Oktober 2023. R. W, male, 55 years, 1 August 2023.

comprehension, educators employ engaging learning strategies and direct observation at conservation sites to encourage student understanding. The government persistently collaborates with youth, women's organizations, churches, and schools to conserve natural resources and enhance environmental quality for future generations on Luang Island⁷⁶.

The village authorities also foster collaboration with youth and women's organizations to guarantee that their activities yield a beneficial impact and align with the sustainable development goals established by both village administrations. They are catalysts for change, possessing the vigour and enthusiasm that encourage innovation and initiatives aimed at preservation and improvement of the environment in Luang Island⁷⁷. This youth organization has concrete actions, including biweekly garbage collection in the sea on Wednesdays and monthly community environmental clean-ups in the village on Saturdays.

Concurrently, women's organizations also play a role in environmental management in Luang Island. They have implemented a specific measure to counsel mothers against disposing of waste in designated areas. They claim that women are particularly susceptible to the challenges of waste disposal, as they are more closely associated with kitchen waste, necessitating further efforts to foster comprehension and increased awareness regarding the significance of environmental protection for sustainable living⁷⁸.

Conversely, population and development in the coastline region of Luang Island are expanding. Field observations demonstrate that the rising population and individuals' unilateral actions towards the environment are indicators that impact the sustainability of the marine

⁷⁶Data based on the observation and interviews. Q. M, female, 38 years, 1 September 2022. K. S, female, 40 years, 18 September 2022. T. S female, 35 years, 8 September 2022. J. K, female, 42 years, 20 September, 2023. B. P, 45 years, female, 6 August 2023. L. S, male, 38 years, 30 August, 2023. B. S, 53 years, male, 23 September 2023. C. P, female, 55 years, 1 Agustus 2023. W. M, female, 51 years, on 20 August 2023. K. M, 60 years, female, on 2 September 2023. P. M, male, 50 years, on 8 Oktober2023.

⁷⁷ The data comes from interviews. G. P, male, 38 years, 17 July 2023. C. P, male, 38 years, 18 July 2023. M. W, male, 37 years, 8 September 2022. M. L, female, 30 years, 20 August, 2023. L. M, 45 years, male, 6 September 2023. This data is the result of interviews with the informants. K, male, 65 years, 17 September 2022 J. S, male, 47 years, on 19 July 2023. D. P, male, 35 years on, 30 July 2023. M.S, male, 70 years, on 28 July 2023. H. K, female, 59 years on20 September 2023. C.S, male, 40 years, on 15 July 2023. L. K, male, 40 years, 20 July 2023, G. P, male, 56 years, on 10 September 2023. D. W, male, 43 years, 29 years, August 2022. S.S, male, 50 years, , 8 September 2023. L. S, male, 38 years, 30 August, 2023. B. S, 53 years, male, 23 September 2023.

⁷⁸ The data based on the interviews. T. P, male, 40 years, 12 September 2023. R. M, female, 33 years, 18 September 2023. M. M, female, 40 years, 8 September 2022. J. K, female, 42 years, , 20 August, 2023. L. P, male, 52 years, 26 Juni 2023. K, W, male, 40 years, 8 September 2023.E. W, male, 39 years, 9 August, 2023. T. H, 53 years, male, 20 September 2022. M. P, male, 56 years, 1 August 2023. V. K, female, 46 years, on 23 August 2023. N. M, 46 years, male, on 18 September 2022. Z. L, male, 56 years, on 7 September 2023.

ecosystem on Luang Island. Reclamation efforts that convert sloping sandy beaches into concrete zones for residential development and seaweed-related operations, such rope separation, cleaning, drying, and storing, can adversely affect marine ecosystems. This transition not only eliminates natural coastal habitats but also leads to the generation of unavoidable household waste due to settlements in reclaimed regions, hence intensifying pressure on marine ecosystems.

This problem of waste disposal is further compounded by the lack of a structured waste management system in Luang, leading to an accumulation of waste that is washed into the sea during rain or tides. To ensure a good future for Luang's aquatic ecosystem, this should certainly be given more attention by the authorized regulatory.

Hygeralai represents both a tradition and modern day example of a holistic system that impacts the social, economic, and environmental frameworks of the inhabitants of Luang Island. *Hygeralai* has a multifaceted role in the marine ecosystem. The biennial harvesting regulation allows Sea cucumbers to grow, develop, and regenerate, safeguards corals from degradation caused by over-exploitation, and preserves the diversity of both flora and fauna. External factors provide a significant hazard, including fish theft by *andong* fishermen and possible destruction resulting from the use of explosives and bleach in fishing practices. The site's position along the ALKI route may exacerbate pollution from transit commercial tankers and could also lead to contamination from external individuals engaging in seaweed cultivation. Small islands are biologically known for their possible isolation and reduced survival rates resulting from minimal genetic diversity. The proximity to Australia, a potential stopover for flora and wildlife, may facilitate the preservation of biodiversity and prevent extinction; yet, one must remain aware of the risk posed by invasive species. Ultimately, despite the stringent regulations governing *Hygeralai*, the risk of internal degradation of Luang Island persists, as public awareness of coastal trash remains inadequate. Make the ecological perspektif.

7.4. External Factors Affecting marine Ecological Status of Luang Island

This study examines external factors affecting the sustainability of the aquatic ecosystem health of Luang Island, in addition to *Hygeralai*, an environmental conservation initiative by the Luang community. The variety of flora and fauna presents problems to the future of Luang Island's marine ecosystems, as this richness makes Luang an attractive target for exploitation. The seas of Luang Island have seen theft by *andong* fisherman, occasionally leading to conflicts

and confrontations between Luang Islanders and the thieves⁷⁹. In 2016, *Andong* fishermen from Alor Island (East Nusa Tenggara) travelled to Luang to harvest marine products, resulting in a compensation payment of approximately 2,400,024 EUR to the indigenous community following a trial at the Fisheries Department and the Southwest Maluku Regency House of Representatives. These funds are allocated via each village leader and subsequently utilized for village and community development initiatives⁸⁰. Furthermore, they employ destructive methods, utilizing dynamite and borax. Dynamite fishing causes immediate harm on coral reefs, destroying ecosystems that require decades to restore. Concurrently, the borax employed to paralyze fish may leach into the water, impacting both the fish population and surrounding flora and fauna. These illegal behaviors persist unaltered, owing to Luang's marginal status in law enforcement initiatives⁸¹.

Data from Global Fishing Watch indicates significant fishing activity in 2018 related to the fish theft incident involving Andong fishermen and Alor Island. The portal publishes many forms of maritime activity data, sourced from multiple origins. The Vessel Monitoring System (VMS) apparent fishing effort data relates to fishing activities collected from ten nations, including Indonesia. The Belize High Seas Fisheries Unit (BHSFU) supplies VMS data. The data is gathered through Belize's vessel monitoring system via satellite and disseminated every three days, encompassing information on the position, speed, direction, and movement of vessels. VMS data from 2012 to 2024 indicated elevated fishing effort in the waters surrounding Luang Island (Figure 55). Despite a reduction in the intensity of fishing activity in this area over the past three years, the problem continues to be a matter of concern. The decline in fishing activity may be attributed to various factors, including alterations in marine resource management policy and enforcement against illegal fishing practices. Nonetheless, it is important to acknowledge that despite the decrease, there remain signs that Luang waterways constitute a sensitive region for fishing activities, both domestically and globally. Consequently, enhanced monitoring and

⁷⁹ D. M, 58 years, 23 August 2023. O. P, male, 48 years, on 1 August 2023. K. K, male, 60 years, on 1 July 2022. K. W, male, 40 years, 18 Juni 2023. E.K, male, 65 years, 8 September 2023. E. L, male, 48 years, 20 August, 2023. T. H, 68 years, male, 6 September 2022. S. W, male, 39 years, 23 August 2023.

⁸⁰ Based on data collected from field interviews. N. S, male, 49 years, on 8 August 2023. E. M, male, 37 years, on 9 July 2022. N. S. N, male, 39 years on, 30 July 2022. O.W, male, 68 years, on 27 July 2023. S. S, male, 50 years, 28 June 2023 P. K, male, 40 years, on 115July 2022. K. P, male, 55 years on, 21 July 2023. M, male, 60 years, 1 August 2023.

⁸¹ M. S, male, 55 years, on 20 July 2023. L. S, male, 45 years, 19 June 2023.

more efficient policies are important to guarantee the sustainability of marine ecosystems in the region and to prevent detrimental fishing practices.



Figure 56: VMS data monitoring of actual fishing effort in the waters around Luang Island (A & B). It can be seen that there are indications of high fishing efforts in 2018.

Besides fishing, Luang Island's proximity to the Indonesian Archipelago Sea Route (ALKI) intensifies environmental stresses. The ALKI is a significant maritime route linking the Pacific Ocean with the Indian Ocean. Vessels, notably big tankers, frequently navigate this route and cross or approach Luang waterways. An instance is this oil/chemical tanker en route to New Zealand (Figure 57). The ecological consequences of these vessels are significant. Unintentional oil spills, intentional garbage disposal, and noise pollution from these vessels disturb the marine ecosystem. Oil spills, regardless of their scale, may cover coral reefs and disrupt the marine fauna residing within them, whilst sewage discharge introduces poisons that accumulate in the food chain. Moreover, the continuous movement of tankers and huge vessels generates physical disruptions in the water column, including wave turbulence that can harm sensitive coral formations. The external hazards are particularly alarming as they arise from acts outside the authority of the Luang community, complicating mitigating efforts.

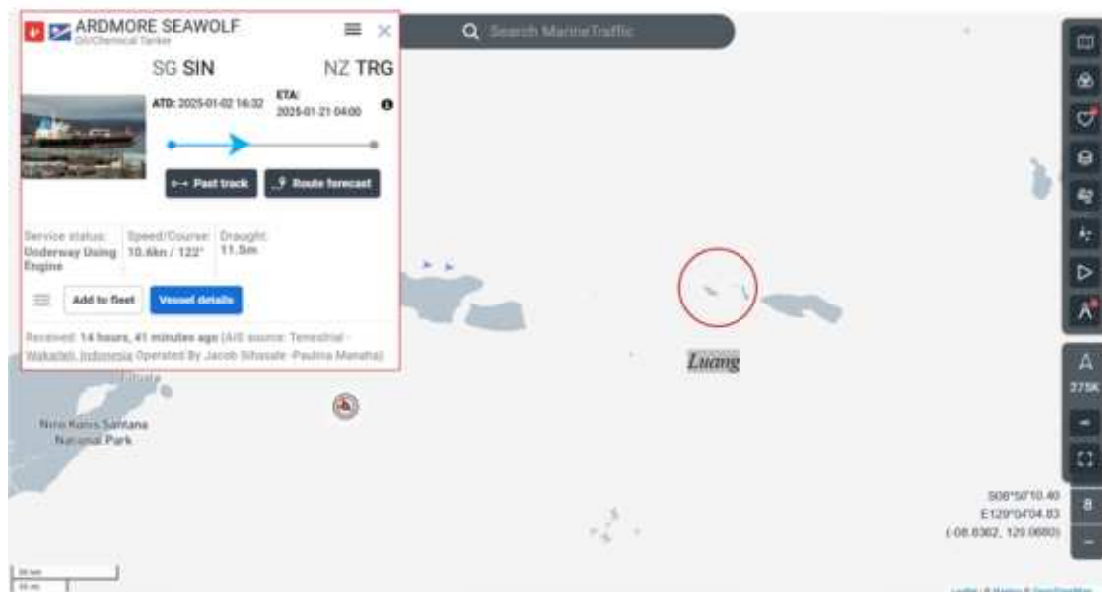


Figure 57: Oil/chemical tanker recorded passing through the area around Luang Island. The following data is taken from the Marine Traffic website which is sourced from Automatic Identification System (AIS) data.

Moreover, natural factors such as ocean waves, currents and coral bleaching significantly particularly in the waters of Luang Island are powerful forces of nature that can cause significant damage to marine ecosystems. Large waves crashing against the shore can erode coastlines, damage coral reefs, and disrupt the habitats of various marine creatures. Additionally, strong ocean currents can transport sediments and pollutants over vast distances, polluting waters and damaging ecosystems. Changes in ocean current patterns due to climate change can also disrupt the life cycles of various marine species and upset the balance of marine ecosystems (Berkes et al., 2000; Berkes & Turner, 2006; Ostrom, 2009) in the Luang Island waters.

Coral bleaching constitutes a significant hazard to coral reef ecosystems, when corals expel their symbiotic algae, resulting in a white appearance. Coral bleaching is driven by several variables, including global warming and marine pollution. Data from the National Oceanic and Atmospheric Administration (NOAA) (Figure 58) indicates that coral reefs in the Luang water area are still categorized as "watch," which is the second classification following "No Stress." This indicates that coral reefs remain in favorable condition, particularly in contrast to Papua Island, which, on average, has reached the 'Alert 2' level.

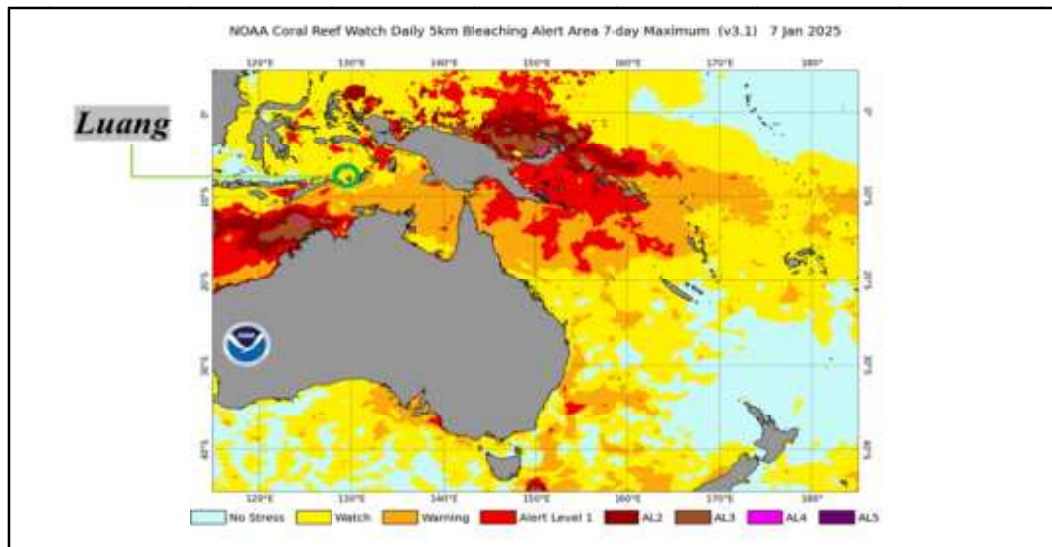


Figure 58: Map from NOAA report showing coral bleaching warning conditions. Luang Island is indicated in green circle, and it is in the yellow or 'watch' zone.

Overall, the presence of marine ecosystems on Luang Island, as evidenced by fieldwork including observations of the seabed at depths of 3-4 meters and coastal regions, indicates that the aquatic ecosystem surrounding Luang Island, both in small and large coastal areas, remains relatively healthy. The *Hygeralai* tradition suggests that this interconnected web of life enables the preservation and utilization of Luang's waters for the collective benefit of the Luang community. This discovery demonstrates the effectiveness of the sustainable practice inherent in the *Hygeralai* tradition in preserving the marine habitat surrounding Luang Island. The existence of coral reefs and the population of marine biota, along with seagrasses and other marine plants, remain in relatively excellent condition. This research has not determined the percentage of coral health levels, necessitating collaboration with relevant parties to compare the coral health examined by WWF in 2015, which was below 1%, and determine whether it has persisted or improved over the last seven years. The NOAA assessment indicates that coral reefs on Luang Island are in the yellow “watch” zone; nonetheless, it has not substantially affected the present state of corals and marine life on the island.

7.5. *Hygeralai*: Socio-Ecological Management System

The various disturbances described above underscore the need to understand *Hygeralai* as a social-ecological management system through the theoretical frameworks of non-equilibrium ecology and patch dynamics, as developed by Pickett, Kolasa, and Jones (1992). These perspectives reject the outdated notion of ecosystems as inherently stable and in perpetual balance. Instead, they argue that SES are dynamic, unpredictable, and perpetually exposed to disturbances. This makes such frameworks highly relevant for analyzing *Hygeralai* as a living local system that continuously transforms in response to social, economic, and ecological pressures on Luang Island.

From a non-equilibrium theory perspective, imbalance is not a sign of system failure but a natural condition that drives renewal and innovation. In the case of *Hygeralai*, such imbalances arise from a combination of internal and external disturbances. Figure 57 illustrates the *Hygeralai* in Social-Ecological Management System as a living governance mechanism that constantly interacts with internal and external stressors. Within the theoretical framework of non-equilibrium ecology and SES, systems like *Hygeralai* are not viewed as static or permanently stable but as dynamic, undergoing fluctuation, disturbance, reorganization, and adaptation as part of their natural cycles (Pickett et al., 1992; Holling, 2001).

At the top of the visualization, *Hygeralai* is depicted as the central node of social-ecological governance, mediating human–environment relationships through customary values and conservation practices rooted in TEK. However, this system faces internal disturbances such as the disposal of domestic waste along the coastline, the construction of settlements in ecologically sensitive coastal zones, and the erosion of customary authority in enforcing traditional sanctions and norms. These internal disruptions reflect broader social transformations, including shifting cultural values and increasing economic pressure.

Externally, *Hygeralai* is further challenged by factors such as overexploitation of marine resources by outside fishers (e.g., *andong* fishers), marine pollution due to maritime traffic along Indonesia’s Archipelagic Sea Lanes (ALKI), and global climate change impacts like coral bleaching and storm surges. The interplay of internal and external disturbances generates a non-equilibrium condition that threatens both ecological sustainability and community cohesion.

In response, differentiated outcomes emerge across patches distinct local socio-ecological units on Luang Island, as described by the theory of patch dynamics (Pickett et al., 1992). Some

local communities retain *Hygeralai*'s principles and display strong resilience, while others undergo significant ecological degradation and cultural transformation. This reveals that the system does not respond homogenously but varies based on local conditions, institutional capacities, and the socio-cultural foundations of each patch. The final segment of the visualization highlights adaptation and adjustment pathways, illustrating that communities possess the capacity to respond to disruption through institutional and social reorganization. This includes integrating *Hygeralai* values into formal institutions such as schools and churches, strengthening village government roles in environmental management, and encouraging active participation by youth and women in conservation efforts. These adaptive responses align with the concept of adaptive governance, where ecological sustainability is supported through social learning, cross-actor participation, and institutional flexibility.

This raises a critical question: Do formal institutions such as Christianity (Protestantism) and the state education system introduced from outside Luang Island constitute a form of disturbance to *Hygeralai*? Or can they be reinterpreted as partners in reinforcing local ecological knowledge?. Overall, the *Hygeralai* system on Luang Island represents a dynamic model of locally grounded social-ecological management that is conceptually aligned with the theories of non-equilibrium ecology and patch dynamics. Thus, the sustainability of *Hygeralai* should not be viewed as the persistence of a singular, monolithic system, but rather as a complex mosaic of interacting social-ecological patches. This case offers critical insights into how local knowledge systems can endure, transform, and meaningfully contribute to sustainable natural resource governance in tropical archipelagic contexts (Figure 58).

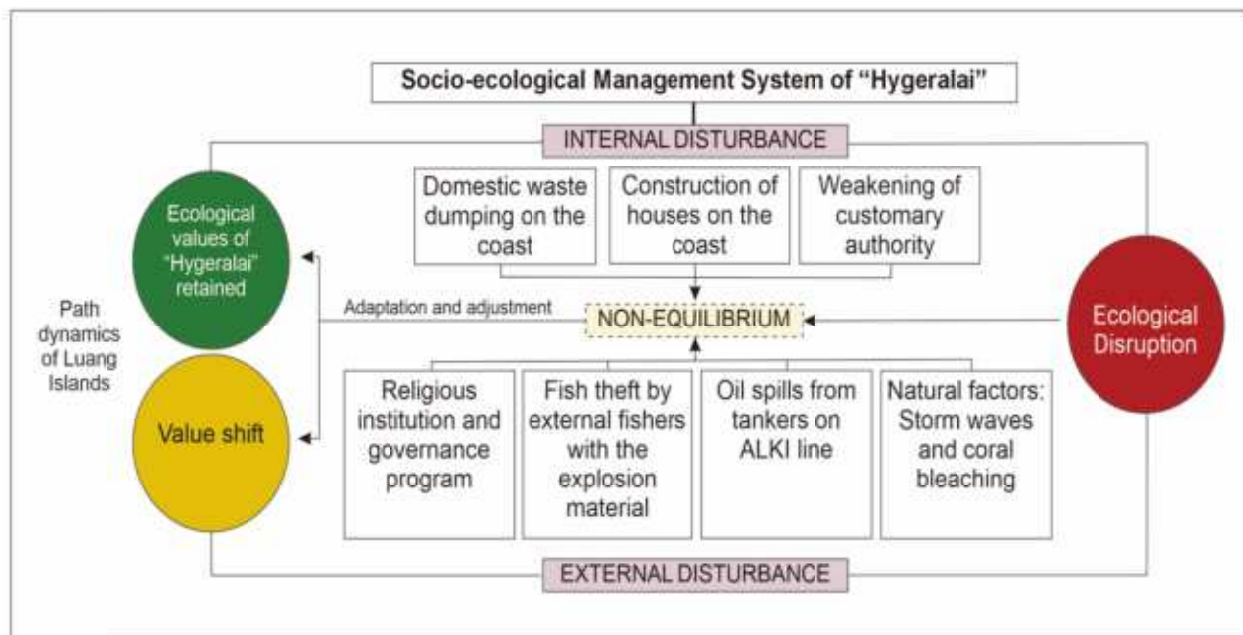


Figure 58: Source: reserchers 2025, based on the field data and refers to the Pickett, Kolasa, dan Jones (1992).

7.5. The Dynamic of Social-Ecology *Hygeralai* in Adaptive Renewal Cycle and Panarchy

From both theoretical and practical perspectives, the integration of the two aforementioned approaches positions *Hygeralai* not merely as a system capable of persistence, but as one that can evolve through institutional reorganization. Despite operating under conditions of imbalance, the Luang community has successfully transformed the core values of *Hygeralai* into new institutional channels, such as village regulations, formal education curricula, and church-based governance structures. This process reflects the reorganization phase of the adaptive renewal cycle, reinforcing *Hygeralai* as a form of local ecological knowledge that continuously adapts and remains relevant within the broader framework of sustainable resource management in archipelagic regions. The combined perspectives of non-equilibrium ecology and patch dynamics thus provide a more realistic, inclusive, and context-sensitive analytical lens for understanding the resilience and transformation of customary systems such as *Hygeralai*, particularly in navigating the complexities and uncertainties of a rapidly changing era. *Hygeralai*, as a form of traditional ecological knowledge practiced by the community of Luang Island, functions not only as customary norms for marine resource management but also reflects a complex and dynamic

social-ecological system. To understand the resilience and adaptive capacity of this system in the face of internal and external pressures, the theoretical frameworks of adaptability and panarchy developed by Holling and Gunderson provide a robust conceptual foundation. This subsection aims to examine how *Hygeralai* persists, transforms, and reorganizes itself in response to social, ecological, and institutional changes. As a living and dynamic system of traditional ecological knowledge, *Hygeralai* does not evolve in a linear or static fashion, but rather through continuous processes of change. Within the framework of the adaptive cycle theory proposed by Holling and Gunderson, the dynamics of *Hygeralai* can be understood as unfolding across the four core phases of exploitation, conservation, collapse, and reorganization. These phases reflect how the Luang community constructs, maintains, and restructures its social-ecological relationships in response to environmental, social, and institutional changes. This cyclical model offers an analytical lens through which the resilience and evolution of *Hygeralai* can be examined over time, illustrating how local knowledge systems adapt to shifting conditions while sustaining their core ecological and cultural functions (Figure 58).

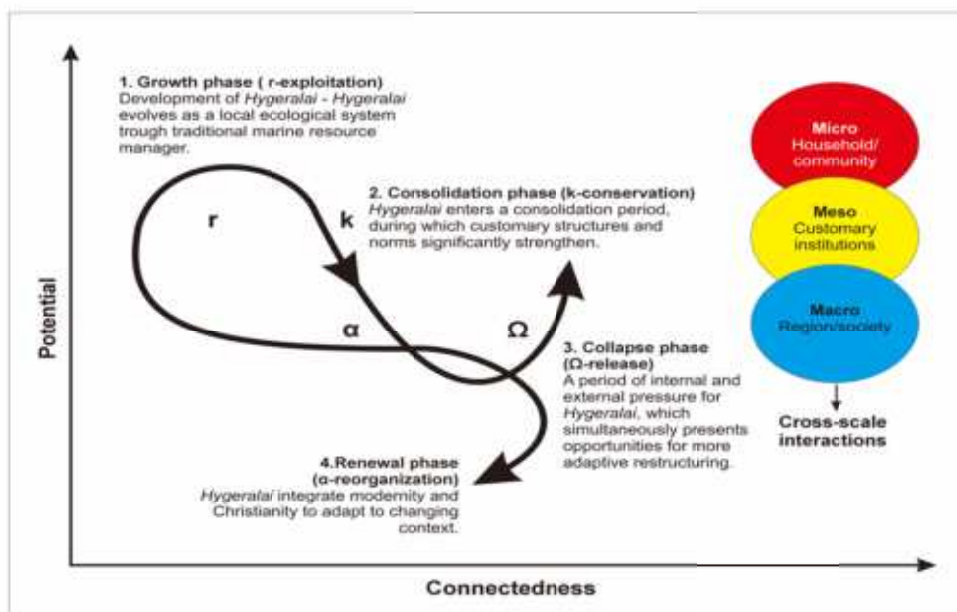


Figure 58: *Hygeralai* in adaptive Cycle and Panarchy. Based on the research field. Source: researcher 2025, refers to Gunderson & Holling (Gunderson & Holling, 2002)

Figure 58 illustrates the evolutionary dynamics of *Hygeralai* as a local social-ecological system using the adaptive cycle framework within the panarchy theory developed by Gunderson and Holling. The figure explains how *Hygeralai*, as a form of TEK in the management of marine resources on Luang Island, undergoes systemic change involving four main phases: initial development, reorganization, disruption, and reintegration. The vertical axis represents the system's potential, while the horizontal axis reflects the degree of social connectedness together indicating the system's stability and vulnerability in responding to external and internal pressures.

1. Initiation Phase (r-Exploitation)

This stage represents the initial phase of the growth of *Hygeralai* as a form of traditional ecological knowledge. During this period, the people of Luang began to formulate and implement various customary rules and created symbolic prohibitions, such as the use of koli leaves, stones, and spears as territorial boundary markers. These markers not only served to distinguish personal and group-owned spaces but also functioned as claims of ownership over land and sea areas, including outermost regions such as reef edges and sacred sites. From the cosmological perspective of the Luang people, these spaces are believed to be the dwelling places of ancestors and nature guardians. In this phase, the zoning of marine areas began to be developed organically by the community. The exploitation phase is characterized by cultural and ecological exploratory processes that evolved through collective experience and direct observation of the surrounding environmental dynamics.

2. Consolidation Phase (K-Conservation)

After passing the initial exploration phase, *Hygeralai* enters a consolidation period, during which customary structures and norms significantly strengthen. At this stage, the community collectively manages natural resources based on traditional rules, with effective social sanctions enforced to ensure compliance. *Hygeralai* becomes a well-established regulatory framework widely accepted in daily community life. However, this phase is also characterized by a tendency for the system to become rigid and less responsive to external changes, which can hinder adaptation to new social and environmental dynamics.

3. Collapse Phase (Ω -Release)

The Collapse Phase (Ω -Release) in the Adaptive Renewal Cycle theory describes a critical condition where the social-ecological system undergoes intense pressure, resulting in the breakdown of structures that have previously supported its stability. In the context of Hygeralai in Luang Island, this phase represents a period of disruption caused by a combination of internal community pressures and external influences. Internally, signs of collapse are evident in changes in community behavior, the development of settlements in coastal areas, the weakening of the authority and role of customary institutions in enforcing norms, and the loss of symbolic power of traditional markers such as koli leaves, adat stones, and traditional spears.

Externally, the introduction of Protestant Christianity brought significant changes to the community's cosmology, replacing the local spiritual worldview that emphasized a sacred relationship between humans and nature. The presence of modern education and infrastructure development further weakened the dominance of traditional values in daily life. Ecologically, illegal fishing by outsiders, marine pollution from large vessels passing through the strategic ALKI shipping lane, and the impacts of climate change such as coral bleaching added to the growing ecological degradation.

These pressures resulted in systemic collapse characterized by the breakdown of social cohesion, weakening collective ownership over customary marine territories, and disruption of ecological functions essential for the community's sustainable livelihood. However, according to the adaptive cycle theory, this collapse phase is not merely an endpoint but also an opportunity to build new, more resilient structures. In the context of *Hygeralai*, the destruction of old structures becomes a gateway to redesigning customary values to better fit contemporary conditions, including their integration into formal education systems, religious institutions, and village governance. Therefore, the Ω (release) phase is a crucial stage in the system's regenerative process, creating space for transformation toward a more adaptive and sustainable social-ecological governance.

4. Renewal (α -Reorganization)

In this phase, the system begins to rebuild more adaptive structures. *Hygeralai* does not disappear but transforms: its values are integrated into new channels such as church sermons, school curricula, village regulations, and conservation programs. Local institutions youth groups, churches, and women's communities play an active role in reorganizing institutions and ecological practices.

Simultaneously, Cross-scale interaction in the context of *Hygeralai* refers to the dynamic relationship between three levels of social institutions: micro (household/community), meso (customary institutions), and macro (state or regional institutions) in the collective management of natural resources. Within the framework of the adaptive cycle and panarchy theory (Gunderson & Holling, 2002) these cross-scale interactions are part of the dynamics of a SES that continuously moves through phases of exploitation, conservation, release, and reorganization. The *Hygeralai* system's ability to adapt, survive, and renew itself in the face of internal and external pressures demonstrates that it is not a static system, but one that is constantly transforming in order to maintain resilience and sustainability.

At the micro level, *Hygeralai* practices are embedded in the daily lives of communities through harvest rules, zoning restrictions, and traditional religious rituals. Local communities are the primary agents in implementing TEK, which is built on direct experience, observation of nature, and local cosmology. Within the SES framework (Berkes et al., 2000; Berkes & Turner, 2006; Ostrom, 2009), these communities play a key role in maintaining the balance between humans and nature through governance based on local norms and values.

At the meso level, customary institutions such as the *luwu* chief, *saniri*, and *matarumah* function as intermediaries between the community and broader institutions. They develop and implement the *Hygeralai* system based on institutionalized normative and symbolic structures. This process reflects a form of hybrid governance which customary governance synergizes with modern institutions, such as churches and village governments. The result is a mixed institutional form that strengthens the legitimacy and adaptive capacity of the system.

Meanwhile, the macro level encompasses various structural influences such as development policies, formal education, the expansion of Protestant Christianity, global markets, and global climate change. These factors not only create pressure but also open up opportunities for more adaptive restructuring of the system. Thus, cross-scale interactions within the *Hygeralai*

system are not linear or hierarchical but complex and mutually reinforcing. These relationships enable social learning, institutional innovation, and adaptive restructuring that strengthen long-term sustainability. This aligns with Panarchy Theory, which emphasizes the importance of interconnections between levels as the primary mechanism for maintaining the resilience of the entire SES.

CHAPTER VIII: CONCLUSION AND RECOMMENDATION

8.1. Conclusion

This concluding section revisits the four research questions initially posed in the introduction. Each question is restated and systematically addressed, with the corresponding conclusions presented accordingly.

1. How does *Hygeralai* affect cognitive and linguistic aspects of Luang islanders?

Hygeralai influences the cognitive aspects of the people of Luang Island by shaping the way they understand and classify marine space, time, direction, and ecological relations symbolically and socially. This knowledge is part of Traditional Ecological Knowledge (TEK), a knowledge system that develops locally and is passed on across generations through direct experience, observation of nature and cultural structures. TEK in the *Hygeralai* context is rooted in local cosmology, where the sea is not only understood as a physical space, but also as a living entity connected to spiritual forces and ancestors. This cosmology becomes a collective framework that regulates ecological behaviour, such as fishing time, prohibited zoning, and the performance of traditional rites. In linguistic aspects, *Hygeralai* is also manifested in local vocabularies, idioms, and traditional poem marine zone naming systems, ritual terms and nature metaphors. Language acts as the main medium in transmitting traditional ecological knowledge, while strengthening the cultural identity of coastal communities. Thus, *Hygeralai* as part of TEK not only stores ecological information, but also becomes a meaning structure that connects the community to the environment in a sustainable and meaningful way.

2. To what extent does *Hygeralai* work in social-cultural life of Luang islanders?

Hygeralai functions significantly in the socio-cultural life of the people of Luang Island as a custom-based and hereditary marine resource management system. This system focuses on Sea cucumber management, which is not only of high economic value in the Asia-Pacific trade network, but also has an important position in the social structure of the community. In the context of Traditional Ecological Knowledge (TEK), *Hygeralai* reflects local knowledge that is structured and internalised through rites, language, harvesting practices (*karja meti*), as well as collective rules such as the establishment of

prohibition areas, population monitoring, and harvest timing. The entire process—from preparation, to opening and closing rituals, to auctioning Sea cucumber prices and involving participants—demonstrates the close relationship between people, nature and cultural values. Within the Social-Ecological System (SES) framework, *Hygeralai* is an example of adaptive community-based governance, with high levels of social compliance, clear division of roles, and internal mechanisms to maintain a balance between marine ecosystem sustainability and the socio-economic needs of the community. As such, *Hygeralai* is not only a traditional system, but also a representation of the integration of local knowledge in building social-ecological resilience in Luang Island.

3. What historical factors contributed to the rise of the implementation of *Hygeralai*?

Hygeralai on Luang Island is the result of a complex interaction between local cosmology, religious dynamics, and ecological conditions typical of small islands. The transformation of the *Hygeralai* system involves three main dimensions of change. First, ontological change, which is a shift from an animistic view that sees nature as a living entity, towards a relational view that places humans and nature in a reciprocal relationship called relational ontology. Secondly, the epistemological shift, triggered by the introduction of Christianity, encouraged the integration of local knowledge systems and religion in the form of synthesis, in accordance with the Multiple Evidence Base (MEB) approach. Thirdly, institutional change characterised by the involvement of cross-institutional actors from customary leaders, churches and customary governments in collaborative resource management, as one example within the Hybrid Environmental Governance framework.

Ecological aspects also have an important contribution to make in shaping the character of *Hygeralai*, including through phytogeographic and natural history data supporting the presence of specific plants used in indigenous symbolism, as well as its connection to the biogeographical boundaries of Wallacea and the Weber Line. *Hygeralai* is derived from the Luang people's own internal historical narratives, thus making it an authentic, community-based natural resource management system. Besides functioning as an instrument of natural resource management and ecological conservation, *Hygeralai* also

plays an important role in strengthening the cultural identity and local legitimacy of the Luang people's.

4. To what extent does *Hygeralai* impact the ecosystem of Luang Island's marine environment? How the dynamic of *Hygeralai* in social-ecological system and resiliency? *Hygeralai* on Luang Island is a custom-based social-ecological management system that contributes significantly to the conservation of marine ecosystems. Through regulating harvest times, prohibiting destructive fishing gear and marking sacred areas, *Hygeralai* maintains the sustainability of important species such as Sea cucumbers, clams and lola. However, this system faces internal pressures such as weakening customary authority and shifting values, as well as external pressures of illegal fishing, marine pollution and climate change impacts. Within the framework of the adaptive renewal cycle and panarchy, *Hygeralai* shows the dynamics from exploitation, conservation, collapse, to reorganisation phases, where customary values are integrated into church institutions and village governance. Its resilience lies in the community's capacity to adapt and transform institutions collaboratively across scales. *Hygeralai* thus reflects the dynamic, resilient and contextualised practice of TEK in maintaining the marine ecological balance of Luang Island.

8.2. Recommendation

The findings of this study can suggest several recommendations for the government, higher education institutions, and local communities, Through environmental conservation, community empowerment, and cultural policies, the government plays a critical role in preserving the *Hygeralai* tradition. As these three parties have strategic roles in ensuring that *Hygeralai* and Luang people tradition is sustainable and can contribute to the strengthening of cultural identity and sustainable natural resource management. There is a strategic role for each party in ensuring that this tradition is sustainable and can contribute to the strengthening of cultural identity and sustainable natural resource management.

a. Government

Maritime border regions have abundant marine resources of commercial significance and are integral to the cultural identity of coastal communities reliant on the sea. The maritime

culture of indigenous border communities, including their local wisdom in marine resource management, contributes to the preservation of ecosystem equilibrium. Nonetheless, these regions are vulnerable to threats like illegal, unreported, and unregulated (IUU) fishing by both domestic and foreign fishermen, which can adversely affect the livelihoods of local fishermen, deplete marine resources, and damage ecosystems due to unsustainable exploitation practices. Consequently, strengthening national defence in border regions is essential to maintain sovereignty and protect maritime economic resources. Measures like enhanced patrols by the Indonesian National Army-Navy and Marine Security Agency of the Republic of Indonesia, the application of maritime surveillance technologies, and rigorous legal enforcement against marine resource theft must be optimised. Furthermore, a community welfare-oriented strategy should be considered by enhancing local fishermen's capabilities through access to fisheries technology, seafood storage and distribution infrastructure, and market assistance to facilitate their economic competitiveness.

Obviously, the government should prioritise the development of sufficient infrastructure to support the long-term welfare of the border areas on Luang Island and other islands, as well as to enhance their ability to distribute marine products to Ambon or other locations. To make the distribution of fishing goods easier, transportation facilities including ports and scheduled transport vessels are crucial between islands. The border region has the potential to become a sovereign, prosperous, and sustainable territory for decades to come if national security, economic management, ecological preservation, and indigenous peoples' maritime cultures cooperate together.

b. *Higher Education Institutions*

Universities in Maluku, particularly Pattimura University, has distinctive attributes that set them apart from other institutions in Indonesia. This distinctiveness aligns with the natural resource potential of the Maluku region. Pattimura University is recognised for the notion of “Bina Mulia Kelautan,” which embodies its mission as a hub for the advancement of extraordinary human resources, science, technology, and art, distinguished by and rooted in “Sea Island.” This university plays a critical role in performing research, documentation, and the design of scientifically grounded policies to assist the preservation *Hygeralai* on Luang Island and adjacent coastal regions, particularly on small outermost islands. Pattimura University's

engagement in cultural and environmental preservation is a significant advancement towards achieving a development goal rooted in marine potential and local wisdom.

Numerous coastal communities in remote regions possess extensive local wisdom, yet have not received sufficient attention in scientific inquiry. Consequently, higher education institutions must establish more inclusive research and community service initiatives to ensure that the traditions and cultures of remote regions are documented and transmitted to future generations. Furthermore, scholars are anticipated to establish collaborative networks with local communities, particularly in the areas of data collecting, cultural mapping, and the preservation of language and traditional practices.

A participatory approach is essential to ensure that populations in remote areas are not merely subjects of research, but are actively engaged as participants in the preservation of their traditions. Initiatives like community service learning, extensive ethnographic study, and cultural workshops can be executed to guarantee that underserved regions have academic focus and sustained advancement. Moreover, higher education institutions can contribute to the advancement of technology advances to mitigate the information access disparity in remote regions. For instance, through the use of digital media, online platforms, and audiovisual documentation, scholars can aid local communities in preserving and sharing their indigenous knowledge, thereby providing it available to younger generations and international researchers.

Moreover, the establishment of local culture study centres within universities might serve as a strategic initiative to investigate and conserve traditions in regions that have been minimally explored by formal research. Consequently, higher education institutions and scholars broaden their research and promotional activities to involve not only readily accessible regions but also coastal and remote areas rich in cultural heritage that remain mostly undocumented. This method aims to ensure that traditions like *Hygeralai* as a TEK and other customary practices endure and thrive, serving both as local cultural heritage and as integral components of a valued and conserved national identity.

Support the development of locally grounded curricula, particularly in schools located on remote and outer islands of Maluku, by systematically integrating TEK with contemporary scientific frameworks, in alignment with the MEB approach.

c. Luang Island Community

Simultaneously, local communities, as the owners and main participants of *Hygeralai*, bear significant responsibility for preserving and maintaining this cultural tradition. Community engagement in rituals, education of youth, and adaptation to modern circumstances are essential to prevent the extinction of this culture. In the context of advancing modernisation, communities must discover inventive methods to preserve traditions, such as cultural festivals, traditional training, and utilising digital media to present *Hygeralai* to a broader audience. Furthermore, local communities must persist in enforcing customary regulations related to the management of natural resources, shown by the biennial Sea cucumber harvest cycle, which serves as an effective model of conservation rooted in local wisdom.

All residents and visitors of Luang Island, particularly those living in coastal areas, have a personal and collective obligation to keep the environment clean. Keeping the area clean is vital for more than simply aesthetics; it also helps preserve the marine habitat, which provides the majority of the population's livelihood. Marine life is under danger of extinction due to pollution of the ocean and the destruction of coral reefs caused by littering, particularly plastic trash. Therefore, it is important that everyone gets into the habit of properly trash can placement, actively participates in recycling initiatives, and works together to keep the beach clean. By bringing more people into the conversation, we can preserve the coastal environment, improve community welfare, and ensure the marine ecosystem can thrive for future generations.

Through the collaboration of the government, universities, and local communities, it is expected that *Hygeralai* will remain in its development and adaptation while preserving the fundamental values inherited from ancestors. With policy backing, scholarly research, and community engagement, this practice can not only endure long-term but also serve as a paradigm of community-based natural resource management applicable in other places. This collaboration will guarantee that *Hygeralai* continues to be integral to the cultural identity of the Luang people, while offering broader social, economic, and environmental advantages for future generations.

8.3. New scientific findings

A notable innovation is the examination of *Hygeralai* within the framework of the blue bioeconomy, namely how this tradition might serve as a paradigm of local wisdom-driven marine resource management that fosters a sustainable blue economy. In marine economic research, methodologies that integrate community-based cultural, economic, and conservation elements

remain limited (Berkes et al., 2000; Ostrom, 2009). This research can demonstrate how *Hygeralai* can be modified as a blue economy model that is both economically viable and environmentally sustainable.

The utilisation of ethnographic approaches and geographic information systems in the examination of *Hygeralai* offers a novel approach to investigating and analysing its influence on individuals' perspectives on ecological decision-making, which significantly affects various aspects of life. This research effectively demonstrates how social interactions in *Hygeralai* practices influence individual views of resource ownership, economic distribution patterns, and environmental responsibility. This methodology offers profound insights into the influence of cultural experiences on the cognitive framework and ecological conduct of coastal communities, thereby enhancing the comprehension of the interrelationship between tradition, ecosystem, and social dynamics among indigenous peoples.

Another innovation is the study of how *Hygeralai* represents a form of indigenous-based economic democracy, wherein decisions regarding resource allocation are governed not by free markets or governmental laws, but by communal systems that emphasise equity in society and sustainability. This study offers a novel perspective on how traditional economic systems may serve as alternatives to capitalistic models that frequently exploit local resources.

This research is innovative in its methodology on customary law and rights. Numerous coastal regions experience disagreements between customary law and legal provisions concerning the management of marine resources. The study examines how *Hygeralai* can serve as a model for integrating customary law with governmental policy in natural resource management, thereby fostering harmony between local community interests and national rules. This methodology can serve as a significant reference for policymakers in formulating policies that are more inclusive and grounded in local knowledge.

In the context of Applied Anthropology, this research demonstrates how anthropology can utilize emic knowledge about local culture in practice to create more effective and sustainable solutions. Emic knowledge refers to the understanding of the Luang indigenous community regarding *Hygeralai* from their own perspective, including values, norms, belief systems, and social practices that shape how they interact with their environment and resources. By understanding the local community's viewpoint, anthropology can play a role in designing policies and development programs that not only consider economic and ecological aspects but

also take into account the social and cultural dimensions that underpin the community's way of life. Furthermore, the integration of emic knowledge into development policies minimizes community resistance to externally introduced changes and enhances the effectiveness of development programs. An approach that respects and accommodates local culture can also build trust and active participation from the community, ultimately contributing to the long-term sustainability of any development initiative. Therefore, applied anthropology plays a crucial role in bridging the gap between modern policies and traditional practices, ensuring that development remains rooted in community values and is beneficial to the local population.

This study offers new perspectives on the integration of *Hygeralai* into both formal and non-formal educational systems, particularly in the context of education and cultural inheritance. This study may serve as a tool to convey traditional values to the younger generation, whether via educational programs, community education initiatives, or cultural festivals that revitalise the significance and practice of *Hygeralai*. This custom is preserved by the local community and serves as an educational resource for the broader community regarding the significance of culture-based conservation.

Beyond the utilization of findings at the university level, experiences at the secondary school level show that many students possess a sensitivity to local wisdom, which can serve as an essential foundation for learning and cultural preservation. Students often grow up in environments that strongly uphold traditional values, giving them a deep understanding of practices, customs, and knowledge systems passed down by their communities. This sensitivity to local wisdom can be utilized in various aspects of education, such as cultural integration into the curriculum, experience-based teaching, and research projects that highlight local traditions. With this approach, education is not only focused on academic theories but also provides space for students to understand, appreciate, and apply local knowledge in their daily lives. Furthermore, their involvement in cultural preservation can strengthen community identity and promote the sustainability of cultural heritage amidst the growing wave of modernization.

8.4. The extended applicable research

The *Hygeralai* research on Luang Island presents significant opportunities for further scientific advancement, particularly concerning the potential integration of blockchain technology in the seafood auctioning process within the *Hygeralai* system. The expanding digital

economy may leverage blockchain to enhance transparency in the auction process, mitigate the danger of price manipulation, and provide a more equitable distribution for local fisherman. This will represent a turning point in the examination of technological integration with traditional systems, particularly with the digitisation of local knowledge for the economic viability of coastal communities.

Climate change has significantly affected coastal communities, especially Luang Island. Future research could reveal how *Hygeralai* can serve as a method for social resilience in response to environmental crises, including increasing sea levels, marine ecosystem degradation, and seasonal variations impacting marine harvests. This study can link *Hygeralai* to the adaptation of coastal communities in response to global environmental concerns, a topic that remains underexplored within the framework of indigenous-based climate policy.

Most linguistic research on local culture primarily concentrates on documenting indigenous terminology and vocabulary. This research may represent the initial study to examine *Hygeralai* from a generative linguistic approach, specifically regarding the unique structural patterns of its communication system and its reflection of the cognitive framework of the Luang people. Future research may investigate how metaphors, ceremonial expressions, and communication patterns in *Hygeralai* could reveal a more profound cognitive framework of human interactions with the sea and natural resources on Luang Island.

This finding may facilitate additional investigations in genetics and bioarchaeology by exploring potential genetic connections between the Luang people and other coastal cultures exhibiting similar *Hygeralai* practices. Through the application of DNA analysis and bioarchaeological data, study can provide evidence of migration and cultural connections that may have influenced this custom historically. This research will be the inaugural investigation to connect cultural elements with genetic evidence in the examination of indigenous coastal community systems.

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