

Local tradition of the Biak people in Owi Island for marine resources conservation

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Abstract. This study aimed to understand the local ecological knowledge of the Biak people concerning marine resource management. A qualitative approach was employed, using interviews and shared observations to collect data, which was then analyzed thematically. The study found that the local ecological knowledge is preserved through customary law, named the *Sasisen*. It acts as a ban on fishing in certain areas, allowing the marine ecosystem to rest and recover. These practices, integrated into rites, beliefs, and traditional fishing tools, reflect the community's strong cultural bond with the sea. Historically, headmen were highly effective in establishing and enforcing rules, as well as passing on these values to future generations. Even with the pressures of modernization and unsustainable fishing, the local wisdom of the local tribe, the Owi community, endures. Integrating this local knowledge into official conservation strategies will embed such practices more deeply, ensuring that they become a core part of managing the eco-region. This approach would enhance ecological sustainability and cultural preservation. Owi Island could then serve as a model for community-based marine conservation rooted in local tradition.

Key Words: indigenous knowledge, marine conservation, *Sasisen*, traditional fishing, Owi Island.

Introduction. The Biak people of Sareidi Village on Owi Island depend heavily on marine resources. For them, the ocean is not merely a source of livelihood but also a space for spiritual, social, and cultural life passed down through generations (Awak et al 2016). Fishing activities, diving (*molo-molo*), and the ban on fishing in certain areas (the *Sasisen*) demonstrate a local collective management system. They also proactively establish zones for prohibitions and periodic ecosystem recovery through joint deliberations with the church congregation and village government (Dharmawan & Pramudji 2020). These practices reflect a strong, reciprocal relationship between humans and nature, which highlights the importance of this community's traditional knowledge system for environmental sustainability.

The ocean-dwelling community, in the Biak-Eastern Islands, shows a very strong interrelationship with the sea as the main source of livelihood and cultural identity. The human-environment interaction in the coastal region is not only economic but also a reflection of social systems and collective values. Local knowledge, such as the prohibition system of tradition (*Sasisen*) for protecting marine life, and the use of natural signs like stars in navigation, indicate that the people have created a sophisticated traditional ecological system. Such knowledge system surfaces day-to-day confrontations with and adaptations to harsh and risky natural conditions, as elucidated by Acheson (1981) and Smith (1988) regarding the hazards and uncertainties of traditional fisheries activities. Similarly, a number of other coastal communities worldwide have been observed to corroborate the assertion that indigenous knowledge systems represent essential ecological adaptations required for the survival of coastal communities (Aswani & Hamilton 2004; Gerhardinger et al 2009).

Across-country studies foreground that local ecological knowledge plays an important role in natural resource management, especially in marine zones. While Gadgil et al (1993) had pioneered arguments favoring the use of local knowledge for biodiversity conservation under the traditional social-ecological system, Cullen et al (2007) and Karnad (2022) later linked local ecological knowledge with social dimensions such as

wealth, status, and participation in resource management decision-making, demonstrating that there was a correlation between the distribution of local knowledge and social influence. Likewise, Aswani et al (2018) asserted that whilst under pressure from modernization, the local ecological knowledge practices remain relevant but demand an adaptive integration with scientific approaches and formal policy. In studies from Brazil and Papua, Gerhardinger et al (2009) and McLean et al (2023) confirmed that the success of marine conservation areas unequivocally depends upon the respect and incorporation of local ecological knowledge among the local communities.

This paper attempts to identify and describe the forms of community knowledge on Owi Island in the sustainable management of marine resources through customary systems and local rituals. Through qualitative and participatory observation approaches, this study is centered on the conservation and protection of marine life through limitations on capture activities, time-based rotations of closing and opening marine areas (*Sasisen*), and prohibitions against destructive practices. These practices demonstrate that the community is capable of setting up conservation frameworks in terms of local values that are as effective as modern conservation policies. As Prasetyo et al (2020) confirmed, recognition and integration of customary systems such as *sasi laut* in Misool, Indonesia, affirm that conservation is understood not only in technical terms but also in cultural and spiritual terms. Areas of documentation and strengthening of local knowledge, therefore, become crucial steps for just and contextualized conservation.

An ethos was articulated by the local people in their knowledge system: local ecological knowledge possessed by the people of the Owi Island is not just cultural heritage but an ecological strategy-reflective, rational, and adaptive to the challenges of the marine environment. This is evidenced by their traditional management systems like *Sasisen*, which prohibit the use of destructive fishing gear and designate restricted zones, giving evidence that they are capable of carrying out community-based conservation independently. The main hypothesis of this paper is that local ecological knowledge can play the role of both an alternative to and the complement of formal conservation policies if recognized by law and supported by the state's institutions. Resonating with this, Thornton & Scheer (2012) and Benham (2017) have emphasized the participation of the public in concert with local knowledge in managing complex social-ecological systems. Recognizing that the sea is considered not only an economic resource but also a sacred space and social identity, conservation will be deemed meaningful and sustainable.

The objective of this study is to examine and analyze the role of traditional ecological knowledge in community-based marine conservation on Owi Island, highlighting mechanisms for prohibiting illegal exploration through customary rules such as *Sasisen*, the use of traditional fishing gear, and ritual and spiritual practices that support ecological and social balance. This study aims to explore how cultural values, spiritual norms, and traditional leadership collectively shape a sustainable natural resource management system, as well as identify the challenges faced in maintaining this system amid the tide of modernization and economic pressures. Additionally, this research seeks to propose an environmental conservation model rooted in local wisdom and strengthen the legal standing of indigenous communities in national conservation policies as part of ecological justice and recognition of coastal communities' rights.

Material and Method

Research approach. This research applies a descriptive qualitative method to gain a deep understanding of the local wisdom of the community on these islands, Owi, in conserving the marine ecosystems. This kind of research does not operate statistically but demonstrates the complex social and cultural reality through narratives and interpretations of qualitative data. The main instrument for this research is the researcher himself, actively involved in the process of collecting and interpreting data. The researcher has prepared a semi-structured interview guide to allow for more flexible and open-ended information from the participants. This approach corresponds to Creswell's (2014) perspective that in qualitative research, the quality in process and

output of research is chiefly formed through the researcher himself as the primary instrument.

Population and sample. Participants in this research were purposively selected. Criterion-per-such participant refrains from being restricted because it is expected to contribute relevant information about local practices in conserving the sea. Participants nominated include local leaders, veteran fishermen, and those who stay home to take care of the house, but are actively engaged in environmental conservation activities on Owi Island. They must be counted because they possess living, experiential knowledge of such traditional practices. The number of participants is not strictly determined, but is really towards the maximum in-depth information obtained until saturation of data occurs. This is backed by Patton (2002), who stated the strength of qualitative research lies in its participants, but in the depth and meaning of data collected.

Data collection. Through this method, data collection procedures can be achieved by using an interview, participatory observation, and document retrieval. Interviews were conducted face-to-face with an open question frame maximum free explanation of local values by informants. Participatory observation was done by joining the activities of people living on the shore, like fishing or traditional celebrations, to capture the sociocultural context within those activities. Such additional documentations, like pictures, audio recordings, and field notes, contribute to rich data and bolsters validity. Triangulation of data was used for ensuring the validity of data by combining different sources and techniques (Denzin 2009).

Data analysis. The data collected was processed by using the theory of thematic analysis, in which major themes derived from the interview and observation results are found. The process of the analysis started with transcription of data, then coding, categorizing the codes, and then deducing relevant concept themes. Similarly, the active role of the researcher indicates meaning behind cultural practices discovered in the field according to the interpretative approach. Data validity is maintained through member check by validating the result interpretation with participants to ensure the same interpretation of meanings. This is the strategy recommended for analysis, according to Braun & Clarke (2006), which emphasized the importance of reflective involvement by the researcher in a qualitative study.

Location of the study. Owi Island (Figure 1) lies in the south, opposing the coastline of the city of Biak, East Biak District of Biak Numfor Regency. It is around 33.6 km away from the village of Sareidi to Biak Numfor Regency and about 11.5 km from Sareidi Village to East Biak District (Numberi 2009). Water transportation is being used by the public to District from the village of Sareidi, whereas taxi service and motorcycles are common for getting to the Biak Numfor Regeneration/City from the various other districts. The time taken for people to reach the District from Sareidi is something within 30 minutes, the reach to the mainland only taking 15 minutes to 20 min, which depends on the number of passengers or the weight of the boat on that particular day (Numberi 2009). In cases of using land transportation by car or motorbike from the district to the town, the time could go somewhere around 7-10 minutes. Land journey-wise, the route from the Biak Timur District to Kota Biak is through paved roads. Otherwise, if people from District Biak Timur use sea transportation, they will reach Kota Biak in about 10-15 minutes. The island of Owi extends 820 hectares from the boundary of Sareidi Village to the capital of Biak Regency. The Biak ethnic group inhabiting Owi Island is the aboriginal inhabitants of Biak who used to migrate from the capital of Biak Regency to the nearby islands. The Kampung Sareidi area is divided into RT, RW, and hamlets in one village, i.e., RT 1, RT 2, and RW 1, RW 2, and also hamlet 1 and hamlet 2.

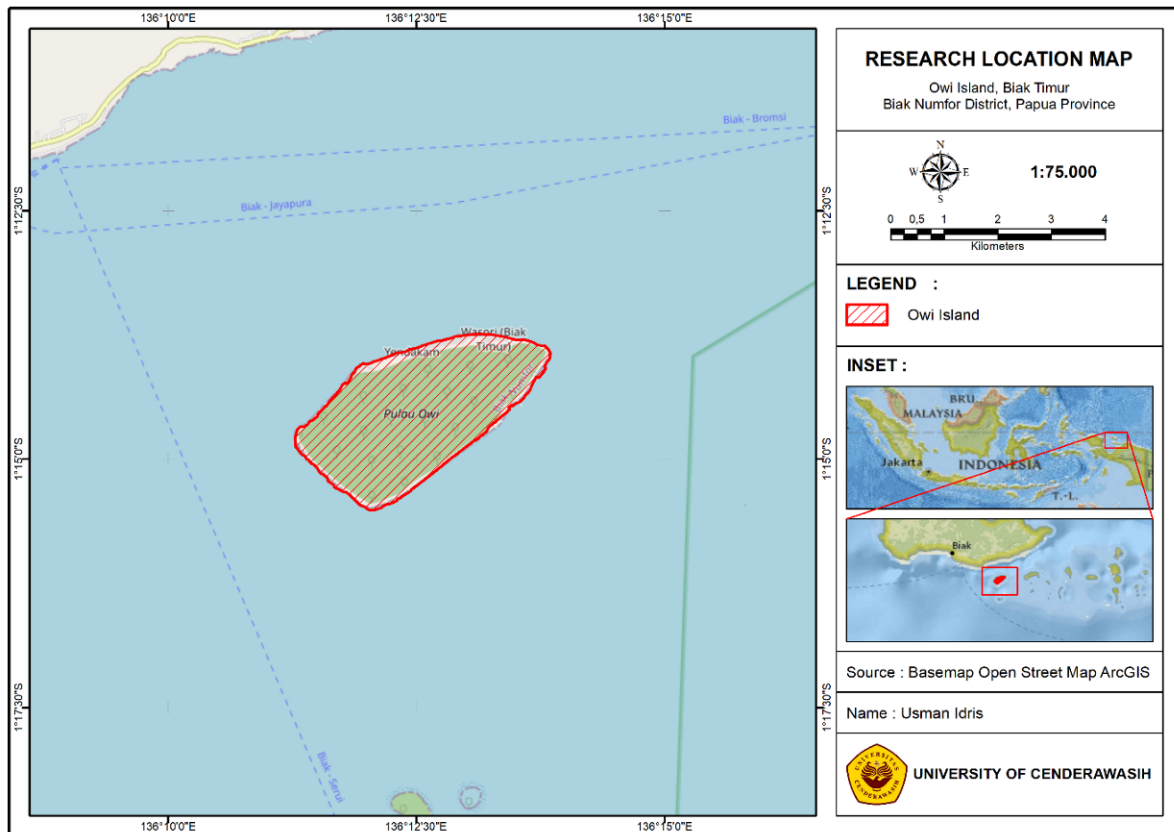


Figure 1. Map of research location, Sairedi Village Owi Islands.

Results

Prohibition of irresponsible exploration of resources through customary rules.

The prohibition on wild fishing in Owi Island constitutes a part of local wisdom, passed down through generations among the indigenous communities. These rules are not purely symbolic but have become a social system that is internalized into day-to-day life among the residents. Local knowledge of seasons, the life cycle of fish, and spawning areas is the primary basis for setting up the borders of the areas where such activities are banned (Numberi 2009). Communities consider the effect of overexploitation that will endanger their coastal marine ecosystem, which is their primary source of livelihood. Therefore, an outright ban is collectively set and upheld through local customary mechanisms.

The prohibition system is usually recognized through *Sasisen* practices, whereby certain parts of the coastal waters are prohibited for some time to aid in the recovery of fish stocks. The elders decide to open or close the site area following ecological observation and consultation. Any violation of the agreement is considered by the community as an offense against social and natural harmony and, therefore, subject to social or customary sanctions (Numberi 2009). The mere presence of the ban makes the community take greater responsibility for their marine environment of their own accord without depending fully on the national regulation (Harrison 2017). In this context, the living customary law becomes one of the best assets to a community-based conservation approach.

Besides the ecological reason, the ambiguities of the *adat* system speak of spiritual values that place the sea into a sacred realm. Hence, the sea is not only seen as a space for fishing but also a space endowed with a spirit that demands respect (Numberi 2009). Hence, some said sea areas are believed to be guarded by spirits that will be angry should humans pursue their selfish interests there. Thus, this prohibition against wild fishing becomes the balancing force for relationships between humans and nature and the intangible spirit world (Bender & Bustamante 2024). This sacred dimension

further strengthens the people's compliance with the rules handed down from their forefathers.

Strict compliance with these local rules became a very determinant factor in ensuring the sustainability of marine resources in Owi Island. The practice has fostered marine biodiversity and has maintained the population of fish from local extinction (Arthington et al 2016; Swan et al 2016). Compared to the other places that have been recorded to have suffered from overfishing, the people of Owi Island still have a relatively healthy marine stock due to that culture-based conservation approach (Numberi 2009). Local rules bind the people together as they collectively manage their marine resources as a common property. This suggests that conservation need not always be state-driven but can emanate from a strong local system.

On the other hand, challenges have arisen as modernization and increasing economic needs have brought in outside values. Modern fishing becomes an alluring temptation to some of the young people: bomb fishing and the use of giant nets, in particular (Moore & Jennings 2008). This poses a grave threat to the continuation of the customary rules that have been guarded for so long. Therefore, it becomes very important to support and strengthen this customary system through collaborative efforts with the government, NGOs, and educational institutions. This ban against wild fishing is not only a cultural heritage but also an ecological solution embedded in local knowledge and communal solidarity (Fernández-Llamazares et al 2021; Dyrset et al 2022).

Rituals for safety and good fishing. The rituals of safety and success are part of living and livelihood on Owi Island and are dependent upon the ocean. The community feels that the ocean is not just a space for economic activities; instead, it is alive and has spiritual power that must be respected through various rituals and customs. Before going on a sea trip, usually far, far away or large-scale fishing, the fishermen will conduct a simple ritual either at home or at the beachfront. As part of the ritual, they would offer betel nut, cigarettes, and sometimes the blood of a chicken to the spirit of their ancestors or the spirits of the ocean, asking for their protection and a good catch. Such spiritual customs do strengthen the respect for nature, but also reinforce social solidarity within a fishing community (Deb 2018; Cao 2025).

In addition to the offerings, some taboos serve a sanctified spirit and should not be broken during the preparations or execution of fishing activities. For example, families should never quarrel the previous night before the fishermen go out, as this is thought to bring bad luck or an accident at sea. As with men, the women have a great deal to do with ritual preparation of special food and prayers for safety that have been handed down for generations (Wospakrik & Reed 2016; Tekege & Rahanra 2022). Certain foods that are considered "hot" or "sharp", such as chili peppers and raw onions, are avoided because it is believed that such things would bring disaster while on the ocean. This tradition shows how divine and symbolic values connected with safety are deeply embedded in socioeconomic activity in Owi Island.

Other rites are performed in places that are considered sacred throughout the island and the ocean; for example, large stones by the shore where ancestral spirits are believed to dwell, or some specific reef. Small offerings might be placed on these sites, either individually or as a group, as preemptive measures before the fishing season. The ritual elders themselves generally hold special knowledge regarding suitable auspicious times for fishing that stems from ancestral calculations of the lunar calendar or signs from nature (Torreon & Tiempo 2021). When a fellow villager suffers misfortune in the ocean, the totemic community as a whole will perform a ritual to remove the curse at the site where the misfortune occurred, so that similar incidents will no longer happen. Consequently, safety became not only an individual affair but a communal responsibility upheld through ritual practices and local wisdom (Maulidyna et al 2021).

These ritual practices often precede the regeneration process and cultural education of their youths. Children and youths are invited to watch and participate in these rituals as an educational exercise, so they gain an understanding of the symbolic meaning and the values of respecting nature. The transfer of knowledge is not just oral but also through direct practice, increasingly resulting in cementing the cultural habitus

of the coastal population (Cabana et al 2020). In this context, rituals function as an ecological instruction that builds respect for the ocean and an ethical code for its utilization. It is realized that the ocean can get "angry" if not treated well is a valued norm built into the daily life of Owi Island residents.

Inserting the rituals directly into the economic and spiritual life of the people of Owi Island, essentially, also designates the Pulau Owi community's cultural values-based resource-management system. This further clarifies that sustainable fisheries are not just about formal regulation; it extends to the moral realm and the sacred, really stubbornly maintained by the community since time immemorial. This tradition, if documented and applied in conservation programs, could feature as a case study of a successful and sustainable local-wisdom-based conservation practice. In a world that has become very much rational and technological, this cultural legacy of Pulau Owi acts as an alternative to production logic in favor of relational ethics with nature. Therefore, the safety and successful fishing of Pulau Owi Rituals are not mere customs but more so an indigenous knowledge system that deserves recognition and preservation.

Use of traditional fishing gear as a form of ecological wisdom. The use of traditional fishing gear in the Owi Island society is a true reflection of ecological wisdom inherited from generation to generation. The fishing gear, such as fish arrows, spears, and fish traps of bamboo or local wood, was chosen not because fishers were technologically handicapped but because of deep ecological considerations (Idris et al 2021; Rumbekwan et al 2025). They are selective fishing methods that do not cause coral reefs to be damaged, do not constitute fishing for juvenile fish, and do not interfere with the reproductive cycle of the marine ecosystem. These practices demonstrate that the people understood the rhythm of nature and practiced the principle of balance between man and nature. Since their main dependence is on the sea yields, environmental conservation becomes an integrated part of their culture and survival.

Traditional fishing gear also relates to local knowledge systems that stem from the collective experiences of coastal communities. The people of Pulau Owi ascertain the times for fishing based on the phases of the moon, highs and lows in the sea current, and the season of winds; hence, traditional fishing gear is employed contextually and adaptively. They practiced restraint in excessive exploitation of the seas and refused to use modern means of harvesting, like drag nets and explosives, that would cause disruption in the habitat of the sea. This means their local wisdom is not merely something of myths, but very much a community-based natural resource management system (Berkes 2006; Kadir et al 2021; Rizal et al 2022). In this sense, traditional fishing gear comes to symbolize that sustainable ecological relationship.

The use of traditional fishing gear emphasizes the social and cultural implications that stand very tall for strengthening the identity of the Owi Island indigenous community. These fishing gears are not only economic instruments but form part of customary rituals and socialization for younger generations to understand the importance of conserving the marine environment. The use of these gears is often taught from father to son or from old to young, thus ensuring the regeneration of sustainable ecological values. The fishermen with traditional gear activities also strengthen stakeholder relationships within the community through the collective work and equitable sharing of fish catch (Freeman et al 2018; Hamelin et al 2024). This is where ecology, culture, and social solidarity become inseparable.

The environment that surrounds traditional fishing gear also includes the ideas with which a society produces and manufactures tools. The traditional fishing gear's social organization, or management principles for production and use, must be respected before planning any conservation initiatives. But then conservation methods developed elsewhere sometimes threaten and erode those principles and the environment in which traditional fishing gear exists. These pressures are also insubstantially threatening the ecological practices with the intrusion of foreign fishermen, modern fishing methods, and promotion of industrial-based development. Many outsiders use destructive technology and seem to have no respect for the customary system of the local community (Aswani 2020; Touwe 2020). This has caused a reduction in the quantity of catches, but great

social tensions and inequalities in access to marine resources. Hence, traditional fishing gear is not merely an ecological symbol but also a form of resistance to a system of exploitation that is social injustice. As such, holding onto traditional fishing gear is the very form of ecological sustainability and self-determination of the Owi community in the flow of modernization.

Under the modern conservation framework, local practices like the use of traditional fishing gear should be recognized as part of the overall strategy for marine resource protection. The local wisdom reflected through this traditional fishing gear attests that the indigenous community knows how to nurture and sustain its environment without employing sophisticated technology (Asrawijaya 2024; Baulch 2024). Strengthening local knowledge systems on the one hand, and safeguarding the rights of indigenous communities in managing marine areas, should form the basis of national policy on the other. There must be concerted effort on the part of government and conservation organizations to assist communities such as the Owi Island people in building a culture-based model of conservation. Hence, traditional fishing gear is not only the heritage of the past, but also the key to a future of ecological sustainability in the Indonesian coastal areas.

Application of Sasisen to preserve the environment. *Sasisen* is a wisdom tradition; by practicing such local wisdom, Owi islanders had derived an ancient method of safeguarding their environment under the guise of customary values. This tradition involves prohibiting the exploitation agreed upon by Owi islanders within certain sea and land areas considered sacred or in a recovery phase for a determined period. The local people in the prohibited areas will not fish, hunt, or take forest produce during the duration of the ban. This approach is somewhat comparable to modern conservation areas—that is, buffer zones or conservation zones that limit access to keep in balance the ecosystem (Purwanto et al 2021). Therefore, through *Sasisen*, the Owi community seemingly controls the healing cycles of nature by itself, without the need for external intervention.

Sasisen has been instituted not just as a suitable protector of the ecosystem but also to reinforce the social and spiritual values of the local community. The process of designating *Sasisen* areas is done by way of collective decision-making through a musyawarah involving *adat* figures and village heads; thus, community participation is encouraged in the management of natural resources. Traditional ceremonies in the *Sasisen* area designation, including symbolic prohibitions, help to solidify the site as sacred in the minds of the community whose members are psychologically conditioned not to flout the rules (Keiluhu et al 2023). This offers a clear stance that *Sasisen* is more than just ecological prohibitions, but is symbolic of the human-nature spiritual relationship. It inherently becomes a potent tool for indigenous ecological consciousness building from within.

Sasisen has proven to guarantee fish populations and the marine ecosystems surrounding Owi Island from an ecological perspective. The collection, however, goes with heightened intensity after the filial period has expired, and it has been revealed that in the closure period, the fish population could have regenerated. This confirms that the *Sasisen* had caused gains in assuring the sustainability of the marine resources. This proves well that local knowledge and community-based management systems could perhaps be tried as an alternative solution to the marine environmental crises faced by many coastal areas in the world (Katikiro et al 2015; Stori et al 2019). Hence, *Sasisen* is not only relevant to culture but may also serve well if adopted as a sustainable conservation model.

In this way, *Sasisen* strengthens the social-ecological resilience of the Owi Islanders to deal with external pressures such as resource exploitation and climate change. As the outside world witnesses a decrease in marine yield due to overfishing, the people of Owi withstand theirs due to discipline in applying the *Sasisen* protective orders. It creates an ecological backup system that supports the people in adjusting to natural variability. Further, *Sasisen* also champions moderation, self-control, and patience in the use of nature. These values are deemed relevant in facing global challenges such as

environmental degradation and the restoration of marine ecosystems (Danovaro et al 2021; Ahmed & Tamim 2025).

On the other hand, since the encroachment of external cultures, the onset of economic pressures, and the transformation of the modes of idiomatic expressions in the young generation, the process of sustaining *Sasisen* activities has begun to face challenges. Some people started transgressing the boundary of *Sasisen* either due to immediate economic needs troubling their conscience or outright ignorance of the cultural relevance laid as sanctions (Lewerissa et al 2021). Hence, instigating reinforcement and safeguarding the roles of traditional institutions, both many and pragmatic, interfacing with outside forces, namely NGOs, academia, and local governments, is required to ensure the sustainability of this arrangement. One possible approach to the revitalization of these *adat* values could lie in integrating *Sasisen* into formal conservation policies and local education curricula. Thus, *Sasisen* will secure itself as a sustaining pillar of culture-based environmental preservation in Owi Island.

Role of traditional leaders in enforcing customary rules. Traditional leaders on Owi Island have a central position in preserving the customary laws for the guidance of the local community in their day-to-day life. They serve as mediators in disputes and protect cultural values transmitted from generation to generation. Being vested with a high moral and spiritual authority in Owi society, the decisions of these traditional leaders, known as *mananwir*, are binding on all citizens. In this manner, they can become key players in decision-making processes related to sea, forest, and customary territory management (Innah et al 2013; Budiyanto 2015; Reumi 2018). Rule enforcement is carried out through persuasion and deliberation, which are the expressions of local wisdom and the collective spirit of the indigenous communities.

Traditional leaders on Owi Island must also play an active role in engineering the resource use activities, particularly those related to fishing and coastal maintenance, into regimes that respect the principles of local customs. For instance, they make rules about when and where fishing is allowed in an attempt to maintain ecological equilibrium in the sea. Traditional leaders summon violators of such regulations to enlighten and warn them sternly. There might be social sanctions or a fine imposed in some cases by way of the enforcement of very much respected customary law (Krisifu 2016). This makes them traditional leaders and custodians for preserving ecosystem sustainability and social stability in their communities.

The role of traditional leaders as enforcers of regulation is also very important concerning the promotion of local knowledge amongst the younger generations. They continue to play a crucial role in the passage of cultural values by oral story, through traditional ceremonies, and by practical training in the field itself (Fatubun 2021). The younger generation is instructed through these activities in respect for the sea as a sacred space and the customary laws relating to the interactions between human beings and nature. Threatened by modernization coupled with the penetration of outside values, these local structures of custom could become weakened. Hence, in addition to being traditional educators, traditional leaders undertake regenerative functions for the perpetuation of Owi culture.

Traditional leaders usually maintain an intermediary position between the indigenous communities and the exterior actors in their social domain, such as local governments, NGOs, or private parties. Therefore, they would try and ensure that foreign interventions observe customary laws and do not bring forth a perturbation of the existing social structure. They represent the community in pursuit of cultural interests and guarding collective rights over customary land and sea (Frank & Idris 2020). This places their position strategically in this fight for ecological justice and indigenous sovereignty; thus, they carve out a role for traditional leaders that is not only local but also ambitious to rightly defend and protect the broader collective rights of indigenous communities.

Discussion. Traditional ecological knowledge proves to be a strong base for community-based marine conservation. In the opinion of Drew (2005), traditional ecological knowledge plays its role not only in preserving biodiversity but also in maintaining the socio-cultural sustainability of the coastal community through spiritual values and customary management systems. The *Sasisen* practice on Owi Island is concrete evidence that traditional ecological knowledge is an effective mechanism for the regulation. According to the works by Gerhardinger et al (2009) in Brazil, they have already found that embedding traditional ecological knowledge into marine conservation area management will increase community compliance with bans on overexploitation. These local specific wisdoms, such as *Sasisen*, are not just items of the cultural heritage but also ecological solutions aligned with contemporary conservation principles.

Thornton & Scheer (2012) found that the review they conducted upon looking further into the collaboration between science and local knowledge makes the management of complex environments more effective. The Owi community has proved the reality of applying this principle by deliberately talking things over with the traditional leaders, church figures, and village officials, and as a result, this has led to the establishment of no-take zones. Active agents are monitoring systems constructed with the support of such processes and monitoring systems from all above cases followed the path as seen in the Ruiz-Mallén & Corbera (2013) paper, which serves as the bridge treating traditional ecological knowledge and ability to modernize the terms in socio-ecological resilience from knowledge about local community abilities to read natural dynamics and adapt conservation strategies. Many knowledge systems build strong bonds between humans and nature in the face of climate change and other receding environmental conditions.

In studies like that of Teixeira et al (2013), local fishermen showed that they are excellent at identifying benthic ecosystems associated with marine habitats. Owi Island has the same application, where ancient knowledge based on generations provides the right time and right places for fishing. However, Karnad (2022) studies "a significant aspect" within the participatory mapping strategy to include traditional people in the management of coastal areas. Recognition of this mapping method serves as an advocacy strategy for indigenous communities to assert their sovereignty over the sea and its resources. Such demonstrates that daily subsistence practices may give birth to knowledge with ecological accuracy that can be measured with modern technology brought by scientific advancement.

The multidisciplinary science of traditional-ecological knowledge should, thus, employ science along with culture and spirituality in the establishment of conservation policies. Drew & Henne (2006) have even stated that interdisciplinary openness between conservation science and cultural studies is necessary to environmental preservation; it will not primarily be a matter of biological data but the social structure of local communities. Over Owi Island, exploitation is prohibited through customary taboos accompanied by ritual religious beliefs, which shows that conservation is not only about technicality but also about sacredness. This theme strongly supports that of Proulx et al (2021) on marine surveillance, attesting to the effectiveness of partnerships between indigenous societies and scientific institutions. The environmental traditions and ancestral wisdom of Owi Island demonstrate that conservational actions can be addressed and conceived as central parts of a community's social system.

Aswani & Hamilton (2004) pointed out to integrating customary marine tenure and local knowledge into community-based conservation management. This is true since the traditional management of Owi Island has control of the marine boundaries, controlling them culturally and through customary leadership. For these communities, indeed, ownership is granted and a duty is put upon them to protect their coastal ecosystems. According to Shackeroff & Campbell (2007), recognition of traditional ecological knowledge by conservation politics still has its institutional challenges, but the Owi Island communities can go forth full with customary values even where formal support is absent. Among other things, it means giving more institutionally recognized political status to national customary laws that are in line to promote participatory and equitable conservation.

The research by de Sousa et al (2022) into the traditional fishermen of Brazil confirms that the fundamental driving force for effective community action toward conservation is a more habitual attachment to the sea, emotionally and spiritually. Evidence also indicates that the Owi community considers the sea as a space full of life and spirit. Precautions before going out to sea, taboos concerning food, and restraint from quarreling before sailing show that conservation is not only about cost saving, but a moral and spiritual practice. McLean et al (2023) have also stressed that conservation decisions that refer to local knowledge and cultural values in protecting migratory marine species will be more successful. Hence, the establishment of customary conservation forms a very good ethical thrust and a spiritual foundation for the ecological sustainability of marine resources.

Traditional knowledge in Owi-bound areas, again, happens to be representations of local fishing gears that exemplify selectivity and sustainability principles. The use of spears, fish arrows, and bamboo-trap gear further demonstrates ecological understanding, reflecting how habitat destruction can impact fish stock sustainability. That research by Cullen et al (2007) shows that the distribution of local ecological knowledge often correlates with social structure and access to resources, with communities with high levels of traditional ecological knowledge taking a more active role in environmental conservation. Tools serve as symbols of cultural identity and doors of resistance against destructive industrial exploitation. Therefore, the survival of traditional fishing gears serves as resistance in a subliminal ecological resistance against the bad consequences of modern exploitation.

As Stori et al (2019) mentioned, traditional ecological knowledge is the most important link to implement an ecosystem-based strategy in a coastal setting that has been disrupted. On Owi Island, *Sasisen* is a form of rotational closure of the fishing areas that are alternatively tagged for the recovery of marine ecosystems, with the system leaving fish populations increased in number and size after the period. The fact that similar systems have been in place in indigenous communities throughout the Pacific, as noted by Aswani et al (2018), points out that local practices continue to be relevant despite the pressures of modernization and the need to be complemented by scientific approaches in line with this. *Sasisen* is wisened in the sense of containing all three aspects of an understanding, the spiritual, moral, and ecological value. This is important because it means that *Sasisen* is not just banning, but is extremely adaptable as a system of resource management.

Calamia (1999) has formulated its methodology to paraphrase traditional ecological knowledge with GIS to apply the concept at Owi Island. Therefore, when written together with spatial data and documentation mapping, it postulates that this wealth of traditional ecological knowledge would be raised to a more scientific, more participatory basis, of course, while establishing a firmer position for indigenous communities in national marine policy at the same time. Let them become principal actors in the restoration of coastal environments. Conservation will therefore no longer proceed above but instead will be based on horizontal participation. Thus, state policies should rather encourage the complementary approaches toward traditional ecological knowledge and modern technology, not replacements.

Strengthening marine conservation based on traditional ecological knowledge, just in the case of the Island of Owi, should be seen in terms of ecological justice and the rights of indigenous peoples. Drew (2005) and Benham (2017) also posit the proposition that local residency will contribute greatly towards the conservation system. Owi Island will prove to be the right model on how the indigenous people there can independently govern and protect their maritime environment, efficiently, spiritually, and sustainably. The future of their oceans may be right in the palms of Indonesia, making sure it is preserved. Therefore, not only are they ecologically important, but moral and political policies have to be made to ensure mutual and sustainable conservation.

Conclusions. The indigenous knowledge of the Biak people in Owi Island plays a critical role in maintaining the healthy conditions of the seas through an integrated customary system. The community practices traditional prohibitions (such as *Sasisen*), religious rituals, and the use of eco-friendly traditional fishing gear to ensure that marine resources are sustained. This mechanism performs an ecological purpose and also represents spiritual, social, and cultural meanings passed on to succeeding generations. Social-ecological resilience, which is constructed on mutual aid and adherence to customary practices, suggests that community-based conservation can be far more effective than through formal approaches alone. Thus, local wisdom, in this situation, becomes a very vital instrument in an equitable and sustainable resource management that is both ecological and cultural.

Moreover, one of the best examples is the *Sasisen* traditional prohibition system as a clear embodiment of an adaptive and participatory community ecological conservation mechanism. It is structured in such a way that stocks of fish can be restored through a closed and open system that revolves around the very famous customary leaders and village governments who exchange assessments. Making fish stocks recover is possible by a closed-open system periodically closing and opening fishing grounds discussed by customary leaders and village governments. It is ecologically political that the ban on rampant exploitation is linked with the supernatural, which will keep community compliance high. Traditional leaders have become enforcers and moral educators for promoting the sustainability of conservation values among later generations. This thus proves that preservation does not always need high-tech applications but may be based on the local value systems that have proven most effective through their inhibitory factors over generations.

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