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Development of Sustainable Coastal Benchmarks for Local Wisdom in Pangandaran Village Communities

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Abstract: Local wisdom is frequently used by communities in managing their coastal resources without a precise measure of sustainability. As a result, the government must develop a standard for determining the wisdom of these practices. This study aimed to create such a standard, followed by a trial to evaluate management practices in Pangandaran coastal tourism. This qualitative case study included a literature review, direct observations, and in-depth interviews with fish farmers and fishers. They are standardizing instrument criteria for sustainable fishery resource management-defined wisdom. Such wisdom is divided into fundamental thinking (factual knowledge) and management practices (procedural knowledge). Each consists of five criteria: ecosystem and resource management, planning, governance, technology, and social and economic development. Each criterion has a specific rating indicator and parameter. The results show differences in the level of wisdom between the fish farmer and the fishers. Regarding basic thinking, fishers' wisdom level is weak in three out of five criteria. Fishers reach a moderate wisdom level concerning fishing gear and technical criteria and a strong level on social and economic criteria. In contrast, the fish farmer is moderate to strong for four criteria and weak for the resources and ecosystems criterion. Regarding management practices, in general, fish farmers and fishers have the same level of wisdom. Both are weak in the ecosystem and resources, planning, and institutional criteria, while the fishing gear criteria reach moderate levels and the socio-economic criteria reach high levels.

Keywords: local wisdom; factual knowledge; procedural knowledge; sustainable coastal benchmarks; indicators

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1. Introduction

The preservation of the environment requires consistent efforts over time, so the environment can be used as a vast communal shelter rather than just briefly exploited. Article 28 H paragraph (1) of the Republic of Indonesia's 1945 Constitution states that everyone has the right to a decent and healthy environment, which is evidence of the protection and preservation of the environment. This demonstrates that the Constitution guarantees and protects the environment. Additionally, it guides the growth of the idea of environmental protection and conservation. Furthermore, this conservation concept is explicitly regulated in Article 1 No. 6 of Law 32 of 2009 on Environmental Protection and Management, which defines environmental preservation as a series of efforts to maintain

the continuity of the environment's carrying capacity. Furthermore, carrying capacity can be defined as the ability of the environment to support the survival of living things and the balance between nature and humans. The stages of planning, utilization, control, maintenance, supervision, and law enforcement are included in efforts to preserve the environment [1–3].

Furthermore, environmental damage prevention can be understood as preventive measures taken by both the government and the community to protect, manage, and preserve the environment. The government's efforts to take environmental preventive action must be based on its authority and responsibility. Similarly, the community's preventive measures must be based on their roles and responsibilities [1,2].

According to Article 1 of Article 30 of Law No. 32 of 2009 on the Protection and Management of the Environment, local wisdom is a noble value applied to the order of life in a community and, above all, to the sustainable preservation of the environment. The law also introduced the principle of local wisdom into Indonesian environmental management. In short, we must pay attention to the noble values that apply to people's lives as we strive to protect and manage the environment. Furthermore, according to a review of various types of literature, local wisdom comprises the values, norms, laws, and knowledge formed through religious teachings, beliefs, traditional values, and inherited experiences [1–4]. Local wisdom is a term commonly used by the Ministry of Maritime Affairs and Fisheries (MMAF) when describing the practice of customary or traditional communities in utilizing coastal resources. Several government programs are aimed at villages or community groups to cultivate so-called local wisdom [4]. Similarly, several authors described the practice of using coastal resources by traditional communities/customary law as local wisdom [3–7]. However, it turns out that no measurable standard can be used to assess whether the utilization practice meets the understanding of wisdom outlined in the Great Indonesian Dictionary. In this case, the word "wise" means smart, clever, and intelligent in the context of the ability to manage resources sustainably.

The definition of wisdom is widely researched and put forward in psychology. Refs. [8,9], in the Belin Wisdom Paradigm (Berlin Wisdom Paradigm—BWP), suggest several aspects of defining the word "wise". They said that the term wise includes two main aspects: factual knowledge (knowledge of accurate conditions) and procedural knowledge (knowledge of procedural matters). There are three additional aspects to consider: lifespan contextualism or long-term contextualism, value relativism (value relativism/can be measured), and recognition and management of uncertainty (understanding and managing uncertainty). Therefore, labeling community groups as keepers of local wisdom without understanding the community's basic elements and patterns of thinking and actions needs to be reviewed [8–11].

However, it is undeniable that the definition of wisdom is also widely researched and analyzed by various experts in the field of psychology. One of them is Ref. [12], who states that wisdom must be attached to the overall behavior of a person, not something that becomes specific knowledge or expertise. Finally, Ref. [13], in their analysis of various definitions of wisdom, conclude that wisdom is complex, so it will not be easy to measure.

The development of fish resource stock estimation techniques also uses the word wisdom to describe approaches in the absence of statistical data to obtain data/information from stakeholders or the community. Ref. [14] used a local community collective knowledge approach, called the wisdom of the crowd, to estimate the stock of fish resources in a particular area. The hypothesis that underlies this approach is that information and knowledge of individual resource users, when collected (in the data), will be able to produce the data/information needed to estimate the size of the stock of the resource under study. This approach is used when the data required in the conventional stock analysis are unavailable (catch statistics, catch per unit effort, etc.). The level of accuracy of fish stock estimation through this approach still requires evidence from several similar empirical studies.

Furthermore, Refs. [2,4–6,9,15] emphasized the significance of understanding the various types or types of stakeholders in the resources under consideration. In a study conducted with several colleagues, Refs. [13–15] stated that relying on information or knowledge from only one type of stakeholder has the potential to result in an accumulation of erroneous thinking concepts (regarding management resources) and myths that emerge within the community. This can happen when stakeholders are individuals whose lives are shaped by communities or customs. Social interactions (and the social institutions) result in collective cognition, manifesting as shared understanding and action. The question then arises whether the collective comprehension of the resource user community can automatically be called wise, or only if it has been around for a long time. In this context, it is recommended that the management of fish resources continues to refer to the technical guidelines issued by the authorities [16–18].

Given these facts, it is clear that not all traditional community practices/customary laws can be regarded as wise management. A community management practice cannot be considered local wisdom simply because it has been practiced for a long time or passed down from generation to generation. It must, however, be based on specific criteria that support long-term coastal management. The resource will be degraded or even destroyed if a management practice is deemed wise but is not carried out by universally applicable sustainable management principles [4]. Therefore, the MMAF and academics need to determine how to measure management practices carried out by traditional communities/customary laws to genuinely be considered wisdom in managing coastal resources [4,10].

The definition of wisdom put forward by [2,6,8] has become a reference for various studies and studies such as psychological and human development guidelines and behavioral and cognitive handling guidelines [18], including research on understanding wisdom through a cross-cultural perspective [2,5]. Thus, it can be concluded that this definition has inspired various critical writings and studies in psychology. Therefore, its validity can be used to determine the benchmark of wisdom in this study.

This study aimed to design a benchmark of wisdom in coastal resource management based on the framework of [2,9,19] regarding the definition of wisdom combined with various parameters or indicators of sustainable coastal management developed by [20–23] through a strategy for the implementation of the Code of Conduct for Responsible Coastal Fisheries (CCRF). It is understood that the indicators of sustainable coastal management have undergone many developments since the concept's inception, where the choice of the set of indicators is determined by each expert's research focus or is adapted to the availability of data, so it cannot necessarily be used in different locations or conditions or provide a comprehensive review of the state of the resource under study [24]. As a result, the Kato-recommended strategical guidelines of [20–22] are used in this study. The benchmark design is then tested on villages/community groups known as villages/communities with local knowledge.

The findings of this study can be used to assess the level of wisdom of a community's coastal tourism management practices. The central or provincial government can then use the assessment results to determine the next steps in allocating funds and facilitating or granting certain resource management rights. The Pangandaran Traditional Village was chosen as the trial site because it was designated as a village with local wisdom in coastal resource management by the Ministry of Tourism through the program "Strengthening the Role of Indigenous Law Communities in Management of Marine Resources in Coastal Areas and Small Islands Tourism" in 2021. From a theoretical point of view, this contribution aims to advance the analysis of the contribution of the Pangandaran coastal tourism activities to sustainable development in fishing areas. A critical perspective is adopted since the authors consider an overvaluation of coastal tourism as a dynamizing factor for the economies in areas dependent on fishing in Pangandaran coastal areas.

Pangandaran's fishery areas include some magnificent landscapes and attractive fishing harbors, as well as many other features that make them popular tourist destinations.

Indeed, coastal and marine tourism is the most considerable marine activity in Pangandaran, and many local entrepreneurs already operate in tourism hotspots. However, while most areas can gain from this growing market, the benefits often bypass the fishery community, and tourism activities can even have a negative impact if not managed correctly. The decision to support tourism in a fishery area should, therefore, always be carefully considered, considering the sustainability of coastal and fishery resources themselves [10].

While in some areas, fishing remains an attractive profession, in many areas of Pangandaran coastal tourism, it is becoming increasingly difficult for fish farmers and fishers to make a decent living, and local fish farmers and fisher communities can no longer depend on fishing alone. The revenue and jobs that tourism can bring to an area can help diversify the local economy and job market and provide additional income for fishing families, sometimes ensuring that their production activity remains viable.

2. Materials and Methods

2.1. The Research Location

Pangandaran District is a District in West Java province, Indonesia, formed on 25 October 2012 out of the former southern portion of Ciamis District. The population of this area in the 2010 Census was 383,848, and it was 423,670 in the 2020 Census. The administrative capital is the town of Parigi. Pangandaran District has a beach called Pangandaran Beach and Cukang Taneuh Canyon (Green Canyon).

The research was conducted in the coastal Pangandaran District (Figure 1). Six sub-districts were designated as a purposive study from 10 sub-districts, with the following considerations: (1) the geographical location of a sub-district close to or directly adjacent to Pangandaran Beach; (2) the sub-district based on the determination of the Ministry of Marine Affairs and Fisheries (MMAF) to be included in the coastal sub-district in Pangandaran District; (3) synergy with the development program that has been declared by the local government; (4) land potential that allows for the development of coastal tourism and is supported by adequate public facilities and infrastructure.

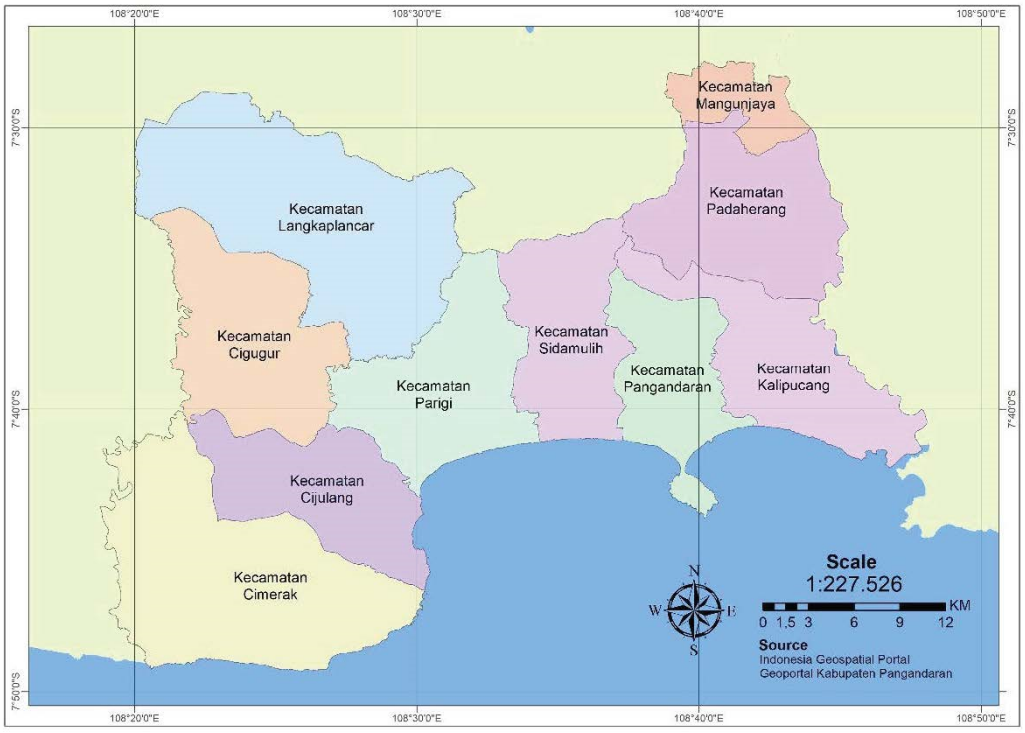

Figure 1. Pangandaran District map.

2.2. Benchmark Approach

Human wisdom, according to [6,8,9], can be measured by factual knowledge, understanding of the subject being managed, as well as procedural knowledge, the suitability of behavior, and actions used in managing the subject. Overall, the value of one's wisdom is an action based on thinking, planning, and organizing in doing something. This study uses this definition to divide the assessment of wisdom into two aspects, namely understanding and perception (factual knowledge) and procedures and actions (procedural knowledge). According to [6,8,9], actual knowledge is the basic knowledge of an individual or community group regarding essential matters such as interpersonal or intergroup relations, development, social norms, and knowledge to coordinate with each other to achieve desired outcomes. In terms of coastal resource management, based on this definition, factual knowledge can be interpreted as the knowledge of individuals or community groups related to basic knowledge of norms and coordination procedures in the use or management of excellent and sustainable coastal resources. In other words, it can be concluded that factual knowledge is the basis of understanding coastal management wisdom.

Respondents in the trial of this level of wisdom were the Pangandaran Traditional Village community, which consisted of two groups, namely fish farmers and fisher groups. The first group comprised 350 fish farmers, while the second included 360 fishers. The determination of respondents was carried out in consultation with the head of the local fishing group (comprising six groups), a fish farmer who is the administrator of the Traditional Village, consisting of the Pandega (lead), Pateh, Pasirah, Pengancang Radang, and Mata Laya as the Chairman of the Traditional Market. The discussions and interviews were conducted from June to August 2022.

2.3. Choice Criteria

This research can be categorized as research that uses a qualitative approach [25,26]. This research can also be classified as participatory action research because it uses direct interactions and discussions with stakeholders (Tables 1 and 2). Interviews were conducted to find out the rationale, planning processes, and local practices of managing coastal resources in the Pangandaran Traditional Village community according to the five criteria in terms of both factual knowledge and procedural knowledge. The results of the interviews were processed and quantified using a Likert scale [27]. The scoring system used is based on four categories: understand (1), know (0.75), doubt (0.5), and do not understand (0). The calculation of the value of wisdom was assisted by Microsoft Excel software to obtain the final value of the level of community wisdom.

The calculation formula is as follows:

$$\overline{x}_{pv} = \frac{xR_1 + xR_2 + \ldots + xR_n}{n}$$

where:

$\overline{x}_{pv}$ = Average respondent value for each parameter;

$xR_1 + xR_2 + \ldots + xR_n$ = *Respondent value for each parameter up to the n − th respondent*; and

n = Total number of respondents up to the n-th respondent.

$$x_{cv} = \frac{\sum x_{pv}}{n_{sc}}$$

where:

x_{cv} = Criteria value;
x_{pv} = Parameter value; and
n_{sc} = Number of parameters in one criterion.

Table 1. Valuation of benchmark achievement.

Criteria	Sub	Respondent				$\bar{x}_{pv}$
		1	2	...	N	
resources and ecosystem	...	...	...	...	...	...
	...	...	...	...	...	...
		Criteria value (x_{cv})				
planning and governance	...	...	...	...	...	...
	...	...	...	...	...	...
		Criteria value (x_{cv})				
Institution	...	...	...	...	...	...
		Criteria value (x_{cv})				
fishing gear and technology	...	...	...	...	...	...
	...	...	...	...	...	...
	...	...	...	...	...	...
		Criteria value (x_{cv})				
social and economy	...	...	...	...	...	...
	...	...	...	...	...	...
		Criteria value (x_{cv})				

Source: Modified Likert scale [27] with the use of Microsoft Excel.

Table 2. Achieved wisdom value criteria based on resource management.

Value x_{cv} (Criteria Value of Benchmark)	Category
$x_{cv} < 0.25$	wisdom value unidentified
$0.25 \leq x_{cv} < 0.5$	wisdom value is weak
$0.5 \leq x_{cv} < 0.75$	wisdom value is moderate
$0.75 \leq x_{cv} \leq 1$	wisdom value is strong

Source: Modified results from [27] for research suitability.

Based on the x_{cv} value or criterion value on the benchmarks obtained from processing parameter values, factual knowledge, and procedural knowledge aspects, achievement determination is grouped into four categories in Table 2. The category of wisdom level is not identified, indicating that respondents have almost no understanding or action by the criteria for resource sustainability. A weak level of wisdom means that the respondent has a basic understanding or takes specific steps but is still too ill-informed to ensure the sustainability of resources. A moderate level of wisdom means that respondents have an adequate understanding and course of action to maintain the sustainability of resources. A high level of wisdom means that the respondent has an excellent understanding and takes various steps to ensure resource sustainability.

3. Results and Discussion

3.1. Benchmarks of Wisdom in the Management of Coastal Resources

Procedural knowledge is defined as practical knowledge or strategic rationale related to behavior in structuring and considering goals, including how to handle conflicts and make alternative decisions. The definition of procedural knowledge in relation to sustainable coastal resource management can be interpreted as individual or collective knowledge in the form of strategic actions in setting goals, organizing, managing, and managing conflicts that may occur in sustainable coastal resource management. Procedural knowledge can also be considered an aspect of action in coastal management wisdom.

Refs. [20–24] defined various indicators and criteria that can be selected or used to measure the sustainability of coastal resource management according to the community's needs and context. The Food and Agricultural Organization (FAO) previously issued guidance on managing coastal resources sustainably through the Code of Conduct for Responsible Coastal Fisheries [20,21]. Extraction of the criteria options offered by [21] are

(a) resources and environment, (b) planning and governance, (c) institutional, (d) fishing gear and technology, and (e) socio-economic. Several parameters for sustainable coastal management sharpen each criterion.

The synthesis between the definition of wisdom and the criterion for sustainable management produces a benchmark for the level of wisdom in coastal resource management, which consists of two aspects: aspects of thinking/perception and aspects of behavior/action. These two aspects are each measured by five sustainable management criteria that have several selected parameters (Tables 3 and 4).

Table 3. Coastal sustainable management wisdom benchmarks based on factual knowledge.

Criteria	Sub	Indicator	Parameter
Ecosystem and resources	a	Resource availability	Resources are not always available, and are affected by fishing.
	b	Anthropogenic impact	Fishing and pollution have an impact on resources.
	c	Resource stewardship	Stewardship of coastal areas has a positive impact on resource sustainability.
	d	Resource status	Status or trends in fishing conditions.
Planning and governance	a	Rules and sanctions	Rules and sanctions are essential in resource management.
	b	Recommendation and input for planning and governance	Implementation of all systems and rules.
Institution	a	Active participation	Resource management must include all stakeholders, including local government.
Fishing gear and technology	a	Environment-friendly gear	Compliance in using environmentally friendly fishing gear.
	b	Avoid bycatch	Discard or bycatch prevention.
Social and economy	a	Resource benefit	Benefits from resources.
	b	Conservation benefit	Future benefits from resource conservation or protection.
	c	Conflict prevention	Conflict resolution efforts.

Source: Synthesis from [8,9,20–24].

Table 4. Coastal sustainable management wisdom benchmarks based on procedural knowledge.

Criteria	Sub	Indicator	Parameter
Ecosystem and resources	a	Scientific-based conservation area	Science was used to determine conservation areas, no-take zone, and prohibited species.
	b	Monitoring system	Fishing monitoring efforts.
	c	Anthropogenic control	Pollution control.
	c	Special permit in a critical area	Prohibition of or permit for mangrove/coral reef use.
Planning and governance	a	Defined management scope	Management scope and action plan are defined.
	b	Surveillance system	Development of control and surveillance and evaluation.
	c	Inclusive access rights	Inclusive rights for fishing.
	d	Research	Research on resources, fishing efforts, and capacity in coastal water.
	e	Data collection and statistics	Catch statistics and governance.
Institution	a	Management authority	Well-structured management authority and implementation.
	b	Management transparency	Transparency in management and decision making.
	c	Active participation	Management objectives based on a participatory process.
Fishing gear and technology	a	Use of legal fishing gear	Implementation of government regulations.
	b	Fishing monitoring	Limiting the amount of fishing gear.
	c	Prohibit the use of illegal gear or substances	Prohibit the use of toxic chemicals, poison, and bombs for fishing.
	d	Minimize bycatch and discard	Minimized bycatch and discard.
Social and economy	a	Conflict resolution	Conflict resolution.
	b	Economic development	Economic activities on trade and tourism.

Source: Synthesis from [8,9,20–24].

3.2. Trial of Local Wisdom Benchmarks for Sustainable Coastal Tourism Management of Indigenous Peoples of Pangandaran Village

The benchmark of wisdom in sustainable coastal management measures the level of wisdom in the aspect of factual knowledge and factors of procedural knowledge. The real knowledge aspect represents the rationale of community groups in planning existing coastal resource management. At the same time, the procedural knowledge aspect represents the practice or action taken by community groups in coastal resource management.

Wisdom is the identity of a nation's culture. For a country, coastal tourism activities are not just for business—the most important thing is that they can become a medium to maintain cultural values. The value-based tourism activities of local wisdom are expected to balance globalization, which often results in the ease with which outside cultures are incompatible with the value order in a region. Preservation and culture through tourism can be efforts to increase cultural resilience [28,29]. Groups of people who still practice traditions inherited from their ancestors have local wisdom values that are able to survive against external cultures, have the ability to integrate elements of external culture into the original culture, and have the ability to adapt without leaving the noble values of their own culture. Local wisdom can be understood as cultural values, traditional ideas, and local knowledge that are wise, full of wisdom, high value, and virtuous [30,31]. Local wisdom refers to knowledge that comes from community experiences and the accumulation of local knowledge found in communities and individuals [32]. Local wisdom is obtained through experience and initiation, as well as knowledge passed down from generation to generation [33,34].

The current Pangandaran coastal degradation has become a fisheries resource crisis and touches all aspects. This indicates the deterioration and ignorance of human behavior in managing the coastal environment and maintaining its sustainability. In addition, it cannot be denied that many young generations in Pangandaran do not recognize the potential natural and cultural wealth in their respective regions. Many of them feel unfamiliar with local cultural values that are noble for character building for the younger generation, such as the values of mutual cooperation, sincerity, and concern for the natural environment.

Coastal tourism-based wisdom is a type of tourism activity in which the primary motivation of visitors is to learn, discover, experience, and consume natural and intangible cultural products (tangible and intangible coastal cultural attractions) at tourist destinations. Culture is often the most conserved component in rural areas and is a valuable resource [35,36]. The people of the Pangandaran Traditional Village live in a rural atmosphere. Today, they still maintain the values of local wisdom that were passed on by their ancestors. They live simply and maintain a balance between humans, the physical environment, and the transcendental environment. Local wisdom possessed by indigenous peoples can be used as a vehicle for education for tourists, especially those who come from different cultures. As a type of knowledge, local wisdom is found by specific local communities through a collection of experiences and integrated with an understanding of the culture and nature of a place. It is usually passed down from generation to generation by word of mouth [10,30].

The Pangandaran community is also open to welcoming tourists who want to have cultural experiences and enjoy the natural atmosphere of the countryside. Currently, the Pangandaran Traditional Village has become a rural tourist destination, and compared to the surrounding area, the Pangandaran Traditional Village is visited by many tourists [10]. Rural tourism is an activity that focuses on the consumption of rural experiences, culture, landscapes, and artifacts [37]. This is considered to bring economic benefits to local communities as well as enhance the tourist experience with interaction opportunities between local people and tourists [37,38]. The natural beauty and cultural values of the indigenous people in Pangandaran are tourist attractions that can attract many people. Tourist attractions, both natural and man-made, represent a core component of the tourism products of an area—without tourist attractions, there are no other tourism services [31,34]. The most ideal attractions are those that are rare, cannot be replicated, and are only available in specific

destinations. Culture, heritage, and natural assets are key parts of a destination's product mix that helps give a destination a unique local character [38,39].

3.2.1. Perception and Understanding of Coastal Resource Management

The customs and beliefs held by the Pangandaran indigenous people are the basis for the current governance planning. This is because the whole community trusts the traditional village leader as the custom holder in the village. Thus, the perception and understanding of the existing management in the Pangandaran Traditional Village is closely related to the beliefs held by the majority of the Pangandaran village community. The measurement of several criteria for sustainable coastal areas shows the level of perception and understanding of the two community groups.

3.2.2. Perception and Understanding of Resource and Ecosystem Criteria

The results of interviews and observations conducted on two community groups in the Pangandaran Traditional Village show that they do not understand well that coastal resources will not always be available, and their availability is influenced by fishing or utilization activities. They assume that fish will not run out and that the area's coastal resources are stable, even though they know the importance of caring for the sea and coast. Some fishers and fish farmers only understand that pollution will affect the existence of resources. The measurement of the level of sustainability achievement for ecosystem and resource criteria in the aspect of perception and cognition (factual knowledge) is listed in Table 5.

Table 5. Value for ecosystem and resource criteria based on factual knowledge aspect.

Criteria	Sub	Indicators	Parameter	Value of Anglers/ Fishers	Value of Village Traditional Leader
Ecosystem and resources	a	Resource availability	Resources are not always available, and are affected by fishing.	0.00	0.00
	b	Anthropogenic impact	Fishing and pollution have an impact on resources.	0.21	0.40
	c	Resource stewardship	Stewardship of coastal areas has a positive impact on resource sustainability.	0.67	0.80
	d	Resource utilization status/fishing condition	Status or trends in fishing conditions.	0.50	0.60
		Criteria value		0.35	0.45

Source: Interviews with traditional leaders and fishers.

The achievement value of fish farmers' perception and understanding is higher than that of fishers, even though the criteria for resource availability both show a lack of understanding. This low level of understanding will cause the phenomenon of the tragedy of the commons, where every fisher will maximize the exploitation of existing resources until there is overfishing. Situations that take place continuously will have fatal consequences in the form of the destruction of existing resources [40]. Overall, the criteria for ecosystems and resources based on predetermined intervals are in the weak wisdom range, both in the fisher group and the village traditional leader group.

3.2.3. Perception and Understanding of Planning and Governance

The fishing communities and fish farmers are considered to understand the indicators of rules and sanctions. This can be seen from their understanding of the indicator parameters of 0.63 and 0.65 (Table 6), which means that both have realized that rules and sanctions are necessary/essential in resource management practices. According to [24,28,41–55], a set of rules to support a sufficient fish biological cycle in existing resources is necessary to ensure a resource's sustainability.

Table 6. Value for planning and governance criteria based on factual knowledge.

Criteria	Sub	Indicators	Parameter	Value of Anglers/ Fishers	Value of Village Traditional Leader
Planning and governance	a	Rules and sanctions	Rules and sanctions are essential in resource management	0.63	0.65
	b	Recommendation and input for planning and governance	Implementation of all systems and rules	0.21	0.70
Criteria value				0.42	0.68

Source: Interviews with fish farmers and fishers.

Most fishers or traditional village leaders already know that regulations in governance are essential. However, fishers do not fully understand the process of providing input to existing plans and governance. Fishers tend not to have a complete understanding of conveying their opinions and suggestions. They only discuss ideas among themselves but do not convey them directly to the fish farmer, so there is no feedback on coastal governance in the Pangandaran Traditional Village. Therefore, the fisher group is at the weak wisdom level, while the village traditional leader group has moderate wisdom (Table 6).

3.2.4. Perception and Understanding of Institutions

There are two coastal institutions in the Pangandaran Traditional Village, namely the traditional village leader institution that manages traditional markets and the coastal sector in general, and fishing community institutions in the form of fishing groups. Pangandaran fishers think there is no need to involve many parties in managing existing coastal resources (score 0.25). However, the traditional village leaders have understood well that the participation and collaboration of various parties are indeed needed, such as the customary government or local government, economic actors, researchers, and other parties to ensure that the management of existing coastal resources is sustainable. On the contrary, some think that participation can be represented by certain people (value of 0.75). Therefore, the value of the criteria obtained for the fisher group is included in the weak wisdom group. The value of a traditional village leader shows a strong level of wisdom. The assessment of institutional criteria based on the aspect of factual knowledge is presented in Table 7.

Table 7. Value for institution criteria based on factual knowledge.

Criteria	Sub	Indicators	Parameter	Value of Anglers/ Fishers	Value of Village Traditional Leader
Institution	a	Active participation	Resource management must include all stakeholders, including local government.	0.25	0.75
Criteria value				0.25	0.75

Source: Interviews with fish farmers and fishers.

3.2.5. Perception and Understanding of Fishing Gear and Technology

The fishing communities in the area have been able to identify fishing gear and technology that have the potential to damage the environment and existing coastal resources (value 0.75). This is well understood, even though a few fishers adhere to gear restrictions to avoid sanctions, and not because they want to protect the environment. However, they do not understand how to prevent bycatches of protected species (score 0.27). Therefore, they choose to release such fish back into the sea under any circumstances. Meanwhile, although fish farmers have understood the importance of preventing bycatch or protecting bycatch biota, they have not fully understood the prevention of discarded or wasted catches during the fishing process (value 0.45). Therefore, the values of both criteria belong to

moderate wisdom. The value of the achievement level of fishing gear and technology criteria in the factual knowledge aspect is listed in Table 8.

Table 8. Value for fishing gear and technology criteria based on factual knowledge.

Criteria	Sub	Indicators	Parameter	Value of Anglers/ Fishers	Value of Traditional Leaders
Fishing gear and technology	a	Use of legal fishing gear	Implementation of government regulations	0.75	0.85
	b	Avoid bycatch	Discard or bycatch prevention	0.27	0.45
		Criteria value		0.51	0.65

Source: Interviews with fish farmers and fishers.

3.2.6. Perception and Understanding of Social and Economic Aspects and Their Conformity with the Benchmarks That Have Been Prepared

With the results on social and economic criteria, factual knowledge aspects, and benchmarks for sustainable coastal management, community members and traditional village leaders have a good understanding of the indicators of resource usefulness. The parameter value obtained for community members is 0.83, and the value for traditional village leaders is 0.90. This shows the understanding that most of the community has benefited from the existing resources. This also has implications for sufficient knowledge of the indicators of conflict prevention through existing arrangements. The community has understood and assessed that the benefits received have been well distributed to minimize conflict; this is reflected in the parameter values of 0.71 for community members and 0.80 for the traditional village leaders.

The same level of understanding between community members and village leaders is also found in the indicators of the benefits of the conservation process; both community members and village officers have understood the importance of conservation but have not yet understood the further benefits that will be obtained. The assumption in both is that instant benefits in the form of a maintained environment will bring comfort and have not been based on an understanding of resource sustainability. Regarding the social and economic criteria, from the aspect of factual knowledge as a benchmark for sustainable coastal management, the value of the criteria for the two groups of respondents belongs to the category of solid wisdom. The achievement value of social and economic criteria in the aspect of factual knowledge is presented in Table 9.

Table 9. Value for social and governance criteria based on factual knowledge.

Criteria	Sub	Indicators	Parameter	Value of Anglers/ Fishers	Value of Traditional Leaders
Social and economy	a	Resource benefit	Benefit from resources	0.83	0.90
	b	Conservation benefit	Future benefit from resource conservation or protection	0.63	0.65
	c	Conflict prevention	Conflict resolution effort	0.71	0.80
		Criteria value		0.72	0.81

Source: Interviews with fish farmers, fishers, and traditional leaders.

3.2.7. Synthesis of the Criteria for Factual Knowledge and the Results of Measuring the Level of Wisdom

The synthesis carried out on the definition of wisdom by [8,9] with various indicators of sustainable coastal management recommended by [20–24] has resulted in a criterion of wisdom in managing coastal resources. The benchmark developed to assess the level of wisdom of customary/traditional law communities in the aspect of perception and understanding (factual knowledge) uses five criteria with several parameters. Testing these benchmarks on fisher groups and Pangandaran traditional village leader groups revealed

their level of perception and understanding of various parameters of sustainable coastal management (Table 10).

Table 10. Evaluation of factual knowledge criteria for wisdom category.

Criteria	Value and Status of Fishers		Value and Status of Traditional Leaders	
Resources and ecosystem	0.35	weak	0.41	weak
Planning and governance	0.42	weak	0.67	moderate
Institution	0.25	weak	0.75	strong
Fishing gear and technology	0.51	moderate	0.67	moderate
Social and economy	0.72	strong	0.81	strong

Source: Interviews with fish farmers, fishers, and traditional leaders.

It was revealed that the level of fishers' wisdom was in the weak category for the criteria of resources and ecosystems, planning and governance, and institutions; moderate for fishing gear and technology criteria; and strong for social and economic criteria. Meanwhile, the village's traditional leaders showed scores that tended to be moderate to strong for four criteria, and only one, resources and ecosystems, had a weak value.

3.2.8. Local Practices of Coastal Resource Management of Indigenous Peoples in Pangandaran Village

Measurement of the level of local wisdom in coastal resource management includes matters relating to strategic actions or steps taken by the community in the Pangandaran Traditional Village (procedural knowledge) in five aspects, namely (1) resources and ecosystems; (2) planning and governance; (3) institutional; (4) fishing gear and technology; (5) social and economic.

3.2.9. Resources and Ecosystem-Related Practices

The Pangandaran Traditional Village leader does not designate certain coastal areas or prohibit fishing at certain times, in certain areas, or for certain species. Fishing activities only stop during activities or religious holidays. The Pangandaran Traditional Village does not have a system to monitor fishing operations. The catch is recorded by basket collectors or officers at the Pangandaran Fish Landing Base. However, they have a traditional village regulation that prohibits fishers and local tourism actors from disposing of waste and garbage in the Pangandaran Beach area. This is effectively enforced by the Pangandaran Coastal Area Supervisory Agency (PCASA), directed by the Pangandaran village chief. However, observations in the field show that fishers still carry out activities that can pollute the Pangandaran coastal area, such as disposing of fish residue and washing equipment and fishing baskets on the beach. Table 11 shows the achievement values for each parameter, the overall aggregate results of the resource criteria, and the environment in the procedural knowledge aspect, revealing that fishers have a low level of wisdom. In contrast, traditional village leaders have a moderate level of wisdom.

3.2.10. Practices Related to Planning and Governance

There is no specific planning or regulation of fish resources, other than customary unwritten regulations regarding environmental hygiene and not going to sea on holy days. The same applies to recording catches or dividing catchment zones. Everything is running as it has been so far, without any background thinking to develop resource management following the effective management point of view of the Code of Conduct for Responsible Coastal Fisheries [20]. In practice, the Pangandaran Traditional Village fish farmers set various regulations based on their beliefs. Therefore, people believe that there will be reinforcements or calamities if they violate the customary rules that have been set. However, the information provided by the village customs shows that some people who are not of Balinese descent have not entirely accepted or implemented the regulation because they have different beliefs.

Table 11. Value for resources and ecosystems criteria on procedural knowledge.

Criteria	Sub	Indicators	Parameter	Value of Anglers/ Fishers	Value of Traditional Leaders
Ecosystem and resources	a	Scientific-based conservation area	Science was used to determine conservation areas, no-take zone, and prohibited species.	0.00	0.00
	b	Fishing monitor	Fishing monitoring efforts.	0.12	0.20
	c	Anthropogenic control	Pollution control.	0.90	0.90
	d	Critical area special permit	Prohibition of or special permit for the use of mangroves, seagrass, or coral reefs.	0.71	0.90
Criteria value				0.43	0.50

Source: Interviews with fish farmers and fishers.

Quantitatively, the value of the wisdom of the Pangandaran village community is listed in Table 12. The table shows that the equality of rights in the utilization indicator reaches a high value (0.69 and 0.80). The village's traditional leader has ensured that all parties can benefit from the implemented management system. Based on all the parameters tested, the fishing community group is still not identified as wise, while the village traditional leader group is classified as having weak wisdom.

Table 12. Value for planning and governance based on procedural knowledge.

Criteria	Sub	Indicators	Parameter	Value of Anglers/ Fishers	Value of Traditional Leaders
Planning and governance	a	Defined management scope	Management scope and action plan defined.	0.12	0.30
	b	Surveillance system	Development of control and surveillance and evaluation.	0.12	0.20
	c	Inclusive access rights	Inclusive rights for fishing.	0.69	0.80
	d	Research	Research on resources, fishing efforts, and capacity.	0.00	0.00
	e	Data collection and statistics	Catch statistics and governance.	0.27	0.50
Criteria value				0.24	0.36

Source: Interviews with fish farmers, fishers, and traditional leaders.

3.2.11. Institutional-Related Practices

The Pangandaran Traditional Village has five groups of fishers who function as liaisons between owner fishers and labor fishers and a forum for distributing aid if there is an assistance program from the government. Each group has a leader who represents its members when discussing or coordinating with the head of the traditional market of the Pangandaran Traditional Village. The head of the conventional market is authorized to handle matters related to the coast and manage the traditional market in the village.

In particular, the head of coastal affairs and traditional markets is the executor who regulates the implementation of existing regulations and communicates and ensures that fishing groups carry them out. According to the conventional village officers and the community, the performance of the current arrangements in the Pangandaran Traditional Village has been exercised with satisfactory transparency. Based on this explanation, the level of achievement on institutional criteria for procedural knowledge aspects of sustainable coastal benchmarks is presented in Table 13.

A low value is found for the parameter of active participation in fishing community groups, which is 0.12. This is because most of the fishing communities only follow the rules set by the traditional village leader, so they do not think it necessary to participate in determining the various rules. Meanwhile, fish farmers are of the opinion that the participation of various parties has been adequately represented by certain parties such as the skipper of the ship owner, the kulak, and the head of the fishing group. In this criterion,

based on the existing classification, the value of the criteria obtained includes weak wisdom in groups of community members and moderate wisdom in traditional village leaders.

Table 13. Value for the institution based on procedural knowledge.

Criteria	Sub	Indicators	Parameter	Value of Anglers/ Fishers	Value of Traditional Leaders
Institution	a	Management authority	Well-structured management authority and implementation.	0.50	0.50
	b	Management transparency	Transparency on management and decision making.	0.65	0.80
	c	Active participation	Management objective based on a participatory process.	0.12	0.80
Criteria value				0.42	0.70

Source: Interviews with fish farmers, fishers, and traditional leaders.

3.2.12. Practices Related to Fishing Gear and Fishing Technology

Most fishers have understood the importance of environmentally friendly fishing gear and fishing technology. They have also followed the regulations set by the government, such as the prohibition of the use of bombs, chemicals, and poisons, as well as other regulations such as the types of fishing gear that are prohibited. However, until now, there are no rules or limits governing the number of fleets that may operate. This creates the opportunity to add new fleets all the time and increase fishing efforts. There is no limit on the number of attempts or fishing fleets, and it is feared that this can damage the existing fish resources.

The bycatch, especially in protected biota, has been tried to be appropriately minimized. This is because of the socialization of the Pangandaran Fish Landing Base in coordination with the traditional market so that the biotas that are prohibited from being caught cannot be traded there. In addition, the application of the prohibition on catching protected biota is also monitored by the Marine and Coastal Resources Monitoring Base located at the Pangandaran Fish Landing Base. Fishers have also tried to minimize wasted catches by using trash fish caught or other fish of low quality to be sent to the Pengambengan area of Bali and then used as a fish meal, but based on observations, there are still fish caught that are wasted. The level of achievement of the fishers and fish farmer groups for each parameter based on the criteria for fishing gear and fishing technology in the procedural knowledge aspect can be seen in Table 14. Overall, both are classified as moderate wisdom.

Table 14. Value for fishing gear and technology on procedural knowledge.

Criteria	Sub	Indicators	Parameter	Value of Anglers/ Fishers	Value of Traditional Leaders
Fishing gear and technology	a	Use of legal fishing gear	Implementation of government regulations.	1.00	1.00
	b	Fishing monitoring	Limiting the amount of fishing gear.	0.00	0.00
	c	Prohibit the use of illegal gear or substance	Prohibit the use of toxic chemicals, poisons, and bombs for fishing.	1.00	1.00
	d	Minimize bycatch and discard	Minimized bycatch and discard.	0.38	0.70
Criteria value				0.60	0.68

Source: Interviews with fish farmers and fishers.

3.2.13. Social and Economic Related Practices

Traditional village practitioners and local fishers have understood that the current management has minimized conflicts between fishers and with tourism actors in the coastal area of Pangandaran Traditional Village. Unwritten customary rules that divide the catchment area according to the size of the boat and fishing gear, the zoning layout in

tourism areas or shops and restaurants, coastal areas/fisher settlements, and traditional market areas are considered capable of preventing such conflicts.

This arrangement is also considered to have encouraged the development of economic and tourism activities in the Pangandaran Traditional Village. The focus of coastal tourism development has an impact and a positive influence on existing coastal management. This happens because most of the catches of the fishers can be adequately channeled to other areas and in the Pangandaran Traditional Village itself, where there are currently many shops selling seafood and processed fish menus. However, when the catch is abundant, the price of fish in the market decreases. This invites dissatisfaction for fishers because there has been no effort by traditional village leaders to handle this. Therefore, the achievement value of all parameters of social and economic criteria shows that the value of the wisdom of fishers and traditional village leaders is in the category of strong wisdom (Table 15).

Table 15. Value for the social economy based on procedural knowledge.

Criteria	Sub	Indicators	Parameter	Value of Anglers/ Fishers	Value of Traditional Leaders
Social and economy	a	Conflict resolution	Conflict resolution.	1.00	1.00
	b	Economic development	Economic activities on trade and tourism.	0.62	0.90
		Criteria value		0.81	0.95

Source: Interviews with fish farmers and fishers.

The current focus of developing traditional villages is on the tourism sector, not the coastal sector. Fish prices that fluctuate to a low point, especially during the abundant fish season, are also an obstacle in terms of the economy, according to fishers.

It was revealed that the level of fishers' wisdom was in the weak category for the criteria of resources and ecosystems, planning and governance, and institutions; moderate for fishing gear and technology criteria; and high for social and economic criteria. Meanwhile, the village's traditional leaders showed scores that tended to be moderate to strong for four criteria, and only one, resources and ecosystems, had a weak value.

3.2.14. Synthesis of the Criteria for Procedural Knowledge Aspects and the Results of Measuring the Level of Wisdom

The second part of the benchmark of community wisdom—developed from the results of a synthesis between the definition of wisdom values [8,9] and indicators of sustainable coastal management [20–24]—is focused on the aspects of procedures and actions (procedural knowledge). As in the first part, the benchmark on the aspect of procedural knowledge also measures five criteria with several key parameters. Testing these benchmarks on fishers' groups and Pangandaran traditional village leader groups revealed the procedures and actions applied in carrying out coastal management (Table 16)

Table 16. Evaluation of procedural knowledge criteria for wisdom category.

Criteria	Value and Status of Anglers/Fishers		Value and Status of Traditional Leaders	
Resources and ecosystem	0.43	weak	0.50	weak
Planning and governance	0.24	un-wise	0.36	weak
Institution	0.42	weak	0.70	moderate
Fishing gear and technology	0.60	moderate	0.68	moderate
Social and economy	0.81	strong	0.95	strong

Source: Interviews with fish farmers and fishers.

It was revealed that for the criteria of resources and ecosystems, the fishing community and traditional village leaders had a weak level of wisdom. Even for the planning and governance criteria, fishers are classified as not having sufficient wisdom. The sustainability of resources for now can still be achieved because fishers and village officers have

a sufficient/moderate level of wisdom of fishing gear and technology criteria. This is supported by a moderate level of wisdom in traditional village leaders who function as role models. The challenge to improve wisdom can be constrained precisely because fishers and village officials feel that social and economic achievements are satisfactory.

4. Conclusions

This study formulated a set of benchmarks for local community wisdom in carrying out coastal resource management practices. The choice of criteria or measurement parameters used can be adjusted and developed further according to the management objectives or the context of the institutions and social conditions of the local community. If this benchmark is adopted, then the government can designate various local community practices into multiple categories of wisdom levels so that there is no longer any misunderstanding, where every method of managing local community resources is automatically referred to as wisdom. Thus, the government can develop programs for strengthening or technical facilitation in a more directed manner for local communities and customary/traditional law communities so that the level of wisdom in coastal resource management can truly achieve sustainability.

The trial results showed differences in the level of wisdom between the fish farmer group and the fisher group. In the rationale aspect, the level of fishers' wisdom is weak in three of the five criteria. Fishers achieved moderate wisdom levels for fishing gear and technology criteria and reached a relatively strong level for social and economic criteria. Meanwhile, the village's traditional leaders showed moderate to strong scores for four criteria, and only one had a weak value (resources and ecosystems). Regarding management practices, there is no difference in the level of wisdom between the two groups. Both tend to be weak regarding ecosystems and resources, planning, and institutions. At the same time, the requirements for fishing gear reached a moderate level of wisdom and socio-economic criteria reached a high level.

Indeed, tourism is one of the few industries that has kept growing, even during the economic crisis. As well as providing additional sources of income for fishing families and other local inhabitants, tourism can also help to improve sales of local fishers through a range of activities, such as direct sales to tourists, promotion in local restaurants, and festivals that raise awareness of the area's fishing activity and products. At the same time, many tourists in Pangandaran are looking for a different travel experience from the typical sun and sand package. Building on traditional activities such as fishing can help attract visitors looking for a more authentic experience, favoring more sustainable tourism that values and contributes to the local and traditional community. Efforts are needed to manage coastal tourism in Pangandaran in a sustainable manner so that Pangandaran's distinctive features as a "coastal tourism destination" will be maintained. This management cannot be separated from local wisdom that influences decision making in a locality. Efforts to minimize the negative impact of coastal tourism management and maintain the ecosystem's stability can be made by compiling an environmentally sound local wisdom management plan so that the area's arrangement can be more optimal and does not exceed its carrying capacity.

If the Ministry of Tourism Affairs continues to list the Pangandaran Traditional Village as a village with indigenous knowledge of resource management, an effective educational program about existing coastal resources is required, as is assistance and the establishment of a monitoring–controlling–surveillance system or research-based regulatory monitoring and supervision that takes into account periodic input from various parties—particularly community members, i.e., fishers—along with mentoring and establishing participatory management programs in existing coastal governance, and introducing fish.

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