SCIENTIFIC CULTURE
www.sci-cult.com

SCIENTIFIC CULTURE, Vol. 12, No. 1.1, (2026), pp. 1619-1629
Open Access. Online & Print

DOI: 10.5281/zenodo.11425218

FOLK KNOWLEDGE IN FISHERMEN'S SEAFISHING ACTIVITIES: A CASE STUDY IN CENTRAL VIETNAM

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Received: 10/10/2025
Accepted: 10/11/2025

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ABSTRACT

The study surveyed and analyzed the current status of conservation and application of traditional knowledge in fishing activities of fishermen in the coastal provinces of Central Vietnam. The main objectives include: assessing the level of preservation, application and transmission of traditional knowledge in the fishing community; identifying natural, social and economic environmental factors affecting the transformation of traditional knowledge; and proposing solutions to preserve, integrate and promote traditional knowledge in sustainable fisheries development. The survey results from 400 fishermen showed that the most strongly preserved knowledge included identifying seafood species by local names (3.96 points), improving fishing techniques based on experience (3.96 points), understanding the seasonal relationship with the appearance of fish species (3.96 points), and the ability to combine traditional knowledge with modern technology (3.96 points). However, the study also pointed out prominent challenges such as the decline in interest of the younger generation (3.98 points), the impact of climate change on knowledge accuracy (3.96 points), and the risk of losing traditional skills such as fishing gear making (3.86 points). Folk knowledge is widely applied in six main aspects: seafood identification, fishing techniques, weather forecasting, marine ecology, fishing culture and adaptability.

KEYWORDS: Folk Knowledge, Seafood Capture, Central Fishermen, Sustainable Development.

1. INTRODUCTION

The resilience of fishing communities in Central Vietnam has long been intertwined with deeply rooted folk knowledge systems, which include locally inherited environmental perceptions, weather prediction methods, species identification, fishing seasons, and seafaring techniques. Despite playing a pivotal role in supporting daily livelihoods and ecological sustainability, these traditional knowledge systems remain underdocumented, undervalued, and increasingly marginalized in policy frameworks and modern fisheries science. This neglect becomes more critical when considered against the backdrop of environmental degradation, overexploitation of marine resources, climate variability, and the growing dominance of industrialized fishing practices.

Folk knowledge among seafaring fishers in Central Vietnam has evolved through generations as an adaptive mechanism that allows communities to engage in fishing activities with a nuanced understanding of their marine environment. Comparable traditions have been reported in various global contexts. For instance, studies in Brazil and Ghana have emphasized the significance of such knowledge systems in enabling small-scale fisheries to persist in the face of ecological and social uncertainty [1, 2]. In Vietnam, however, the scientific and developmental discourses surrounding marine fisheries often ignore or only superficially acknowledge these vernacular insights. The disparity between state-driven marine policies and local epistemologies leads to increasing gaps in implementation efficiency and stakeholder cooperation [3].

Furthermore, traditional ecological knowledge (TEK) in the fishing practices of Central Vietnam has begun to erode under the pressures of socio-economic transformation and environmental degradation. Coastal development projects, pollution, sand dredging, and the intensification of aquaculture have disrupted traditional fishing grounds and marine biodiversity, reducing the efficacy of inherited ecological understandings. This is not an isolated phenomenon. Research conducted in Lagos, Nigeria, for example, highlights how environmental disturbances such as sand dredging directly affect the viability of traditional fishing practices and the socioeconomic stability of artisanal fishers [4]. In the Vietnamese context, such environmental challenges are compounded by the increasing influence of centralized market-oriented policies that prioritize economic output over local knowledge integration [3, 5].

Simultaneously, generational shifts in knowledge transmission have weakened the intergenerational continuity of folk knowledge. Younger generations, often drawn toward urban employment and modernized lifestyles, show less interest in or access to the oral traditions and hands-on practices that once sustained their communities. The work of Godoy et al. [6] on the Tawahka Indians illustrates that the presence of market incentives and institutional education can accelerate the attrition of traditional knowledge. This trend appears evident in Central Vietnam, where knowledge custodians age without sufficient institutional support to document or transmit their expertise systematically.

Traditional fishing knowledge in Central Vietnam encompasses various domains, including folk taxonomy, navigation using stars and winds, interpretation of animal behavior, and knowledge of fish migration cycles. Similar systems have been extensively recorded among Brazilian artisanal fishers, where fish are categorized using a folk taxonomy based on morphology, behavior, and ecological function [7, 8]. Yet, in Vietnam, official statistics and resource management programs have seldom incorporated such classifications, relying instead on standardized scientific categories that may lack local relevance or application. This exclusion not only undermines the legitimacy of traditional knowledge but also limits the effectiveness of conservation and management strategies intended for localized contexts [9].

Climate change presents an additional layer of complexity. Fisher communities report observable shifts in ocean currents, storm frequencies, and fish population dynamics that challenge established patterns of prediction and response. Research from Accra, Ghana, confirms that such changes have strained the applicability of folk knowledge, even as fishers attempt to recalibrate their practices [10]. In Central Vietnam, climate-induced environmental volatility similarly destabilizes local ecological knowledge. The urgency of adaptation highlights the importance of integrating traditional insights with scientific models to enhance resilience [11, 12].

Institutional frameworks for fisheries governance in Vietnam have largely favored top-down regulatory approaches. These have resulted in conflicts between small-scale fishers and regulatory authorities, especially in implementing marine protected areas and anti-IUU (illegal, unreported, and unregulated) fishing measures. As Ruddle [13] emphasizes, ignoring community-based management systems often leads to resistance or non-compliance, especially when fishers perceive

regulations as misaligned with lived experience and local norms. In Central Vietnam, this disconnect is evident in complaints regarding the inaccessibility of official fisheries data, inadequate consultation, and the poor fit of conservation policies with community realities.

Moreover, knowledge loss risks eroding not only ecological resilience but also cultural identity. Folk knowledge is closely linked with cultural expressions, belief systems, and communal rituals associated with fishing. Research in Ghana and the Philippines has shown that fishing practices are deeply integrated with cosmologies and religious observances, affecting how communities perceive marine stewardship and interspecies relationships [1, 14]. Similarly, Vietnamese coastal communities possess rich oral traditions and symbolic practices embedded within seafaring life, yet these dimensions are rarely addressed in policy, education, or academic research [15, 16]. Given these conditions, the current trajectory of development in Central Vietnam's fisheries sector poses a threat to the continuity and relevance of folk knowledge in fishing communities. The lack of systematic documentation, institutional support, and interdisciplinary integration of traditional knowledge into fisheries management exacerbates the vulnerability of both human and ecological systems. The failure to incorporate local epistemologies not only marginalizes indigenous voices but also hinders the formulation of sustainable and context-sensitive marine policies.

2. THEORETICAL BASIS

2.1. Concept of Folk Knowledge and Local Ecological Knowledge

Traditional knowledge, also referred to as indigenous knowledge, is a system of skills, practices, and experiences accumulated over many generations within a community, reflecting the long-term interaction between humans and their natural environment [13]. In the field of fisheries resource management, Ruddle (1994) emphasizes that such knowledge encompasses an understanding of fish behavior, migration and reproduction patterns, as well as fishing methods and conservation practices developed through the lived experiences of fishing communities [13].

Local ecological knowledge (LEK), as a vital component of traditional knowledge, is particularly concerned with ecosystems and ecological processes within the local environment [17]. Grant and Berkes (2007) argue that fishermen's ecological knowledge can be regarded as an expert system, offering detailed and accurate insights into aquatic resources that are often difficult to obtain through modern scientific approaches.

2.2. Folk Taxonomy in the Field of Fisheries

Folk taxonomy represents the way local communities perceive, classify, and name the organisms in their environment. Begossi et al. (2008) conducted a comparative study of folk taxonomy of fish among fishing communities in the Atlantic Forest and Amazon coasts of Brazil, demonstrating the richness and accuracy of local taxonomic systems [2]. The study confirmed that species and higher taxonomic levels in folk taxonomy are real and have scientific value.

Similarly, Ramires et al. (2012) study of folk taxonomy of fish in Ilhabela (São Paulo/Brazil) recorded 117 local names for 159 different fish species, demonstrating the richness and accuracy of folk knowledge in recognizing and classifying marine species [11]. The study found that local fishermen not only differentiated species based on morphological characteristics but also on the behavior, habitat and economic value of each species.

2.3. Folk Knowledge on Ecology and Management of Aquatic Resources

Traditional knowledge of aquatic ecology encompasses many complex aspects, from understanding the reproductive cycles, migration patterns, and feeding habits of fish species to the environmental factors that influence their distribution and abundance. Seixas and Begossi (2001) in their study of zoological knowledge of fishing communities in Ilha Grande (Atlantic forest coast, Brazil) showed that local fishermen had a deep understanding of 129 marine species, including detailed knowledge of the ecology and behavior of each species [18]. Begossi et al. (2012) analyzed the artisanal fisheries of Paraty (southeastern coast of Brazil) as a socio-ecological system (SES), in which traditional ecological knowledge plays an important role in the sustainable management of resources [2]. This study shows that local fishermen have developed management strategies adapted to local ecological conditions, including rotation of fishing areas, closed fishing periods, and rules to protect spawning areas.

3. RESEARCH METHODS

3.1. Subjects and Methods of Investigation

Subjects of investigation Within the framework of the study on folk knowledge in the fishing

activities of fishermen in the Central region, information was collected from 400 boat owners and fishermen working in the fishing industry belonging to **three main groups** (1) Boat owners with 15 years or more of experience in fishing activities, possessing rich folk knowledge on fishing techniques, weather forecasting and identification of aquatic resources; (2) Skilled fishermen with 10 years or more of experience, directly participating in fishing activities and having in-depth understanding of marine ecology, behavior of seafood species and traditional fishing methods; (3) Elderly people in the fishing community (aged 60 and over) are those who preserve and pass on folk knowledge through many generations, have knowledge about the history of fishing development and changes in the marine environment over time.

Methods, tools and techniques applied The study used stratified sampling combined with purposive sampling to ensure the representativeness of the target groups and geographical characteristics of each research area. A structured questionnaire was designed to survey aspects of folk knowledge in seafood fishing, including knowledge of classification and identification of seafood species, traditional fishing techniques and tools, knowledge of weather forecasting and sea conditions, understanding of the reproductive cycle and migration of fish species, customs and festivals related to fishing, as well as changes in folk knowledge in the modern context.

3.2. Location and Time of Investigation

Research locations The survey was conducted in coastal areas of Thanh Hoa province, including Hau Loc district; Hoang Hoa district; Sam Son city; Quang Xuong district; Nghi Son town. The selection of locations was based on the criteria of having a large fishing community, a long-standing tradition of fishing, and diverse fishing methods from nearshore to offshore.

Research period The survey was implemented from March 2024 to August 2024, in which the main field survey phase took place from April to July 2024 to ensure information collection during different seasons of fishing activities. Secondary data sources were collected and compiled during the period 2010-2024 from reports of the Department of Agriculture and Rural Development of Thanh Hoa province, the Department of Fisheries, fishermen's associations, and related scientific research.

3.3. Investigation Content

The survey content is structured into main thematic groups to collect comprehensive information on folk knowledge in seafood fishing activities

- **Assess the knowledge system on seafood identification and classification:** Survey fishermen's knowledge about the main seafood species in the area, including local names, identification characteristics, classification by economic value and ecological characteristics. Collect information on how to distinguish gender, age and quality of seafood species based on practical experience.
- **Analyze knowledge on traditional fishing techniques and tools:** Study traditional fishing methods, types of fishing gear used, how to make and maintain fishing gear, fishing gear techniques suitable for each seafood species and weather conditions. Evaluate changes and improvements in fishing techniques over time.
- **Survey of knowledge on weather forecasting and marine conditions**: Collect information on weather forecasting methods based on natural observations such as sky color, cloud shape, wind direction, and behavior of marine animals and birds. Study how fishermen assess safety conditions for going out to sea and returning to shore.
- **Analysis of knowledge on marine ecology and natural cycles:** Assess fishermen's understanding of the reproductive cycle, migration of marine species, the influence of environmental factors such as tides, water temperature, and salinity on marine activities. Collect information on traditional fishing areas and reasons for choosing these areas.
- **Survey of customs, festivals, and beliefs related to fishing:** Study lucky rituals, taboos, and community festivals related to fishing activities. Analyze the role of spiritual factors in the lives and production activities of fishermen.
- **Assessing changes and adaptations of traditional knowledge:** Analyzing changes in traditional knowledge under the impact of modern technology, climate change and socio-economic factors. Assessing the level of knowledge transmission between generations and the challenges in preserving traditional knowledge.

3.4. Data Processing Method

Statistical processing method Quantitative data were analyzed using SPSS 26.0 software to perform descriptive and inferential statistics. Descriptive

statistics such as frequency, percentage, mean score and standard deviation were used to describe the characteristics of the research sample and the prevalence of folk knowledge types. Data were presented in the form of tables, charts using Microsoft Excel 2021 software and in-depth charts were created using R software to illustrate complex relationships.

Document analysis method Synthesize theoretical and practical bases from official reports of fisheries management agencies, archives at local museums and cultural centers, domestic and international scientific research works on folk knowledge in the field of fisheries. The comparative method is applied to compare the folk knowledge of the research area with other areas in the country and the world, thereby highlighting the unique characteristics and common points of folk knowledge in seafood fishing.

4. RESULTS AND DISCUSSION

4.1. Current Status of Fishing Activities in Vietnam

Vietnam's long coastline (over 3,260 km) and large exclusive economic zone (~1 million km²) provide a natural comparative advantage for fisheries development; accordingly, capture and aquaculture have been important drivers of employment and export earnings. Official statistics for 2024 report a total aquatic product output of about 9.5 million tonnes, of which roughly 3.8 million tonnes came from natural (capture) fisheries (Directorate of Fisheries, 2024). At first glance these figures suggest sectoral stability. However, a closer reading reveals a critical mismatch between **short-term production and long-term resource sustainability** estimated in-sea reserves are only ~4.7 million tonnes while sustainable annual exploitation capacity is put at ≈2.4 million tonnes yet annual capture has exceeded 3 million tonnes. This gap between reported production and biological carrying capacity signals overexploitation rather than benign growth, and it mirrors patterns documented elsewhere where rising landings mask declining stock status (e.g., regional studies summarized by Paz-Alberto et al., 2020; Begossi et al., 2012) [2, 19].

Three linked lines of evidence from both national reports and comparative international studies explain this divergence. First, fishing practices that increase catchability including bottom trawling and other destructive gears accelerate local depletion and habitat loss. Empirical work from various coastal contexts shows that such gears reduce benthic complexity and nursery habitats, lowering long-term productivity despite short-term gains [1, 2]. In Vietnam, reports of bottom trawling, electric shock and explosive methods correspond with these global findings and help explain why observed yields remain high while exploitable reserves decline.

Second, governance and compliance shortcomings compound biological pressures. The Fisheries Transparency Initiative (FiTI) finds limited disclosure across many management domains (FiTI, 2025), and the European Commission's yellow card (since 2017) highlights persistent illegal, unreported and unregulated (IUU) fishing and gaps in vessel monitoring. Hundreds of vessels still operate without VMS and there are documented incursions into foreign waters (EC reporting; national summaries). This creates a structural contradiction: Vietnam has adopted stronger laws (e.g., the 2017 Fisheries Law) and policy measures, yet implementation, monitoring capacity and incentives for compliance lag behind a governance gap also observed in other developing fisheries [10].

Third, environmental change is shifting the ecological baseline. Local fishers and recent studies report distributional shifts many commercially valuable species moving offshore or declining in traditional areas consistent with warming, altered currents and extreme weather events (climate assessments summarized in Paz-Alberto et al., 2020; national environmental reports) [19]. These ecological shifts reduce catch per unit effort in nearshore fisheries and raise operating costs (longer trips, fuel), creating a feedback loop in which fishers intensify effort or expand gear types to maintain incomes, thereby worsening depletion.

When we compare Vietnam's situation with international literature, both confirmations and tensions appear. **The Vietnamese case confirms global patterns** (1) modernization and market incentives drive effort escalation and gear change; (2) weak enforcement and limited transparency allow IUU and unsustainable exploitation to persist; (3) climate change interacts with local drivers to accelerate uncertainty [4, 6, 19]. At the same time, notable divergences emerge. Unlike some regions where co-management and community stewardship have been systematically scaled [2], in Vietnam co-management remains piecemeal pilot projects exist but are not yet embedded across governance levels. **This creates a policy tension** centralized regulation (inspections, licenses, VMS mandates) is necessary but insufficient without local buy-in and transparent benefit-sharing, a point underscored by Ruddle (1994) and recent case comparisons.

A few emergent patterns deserve emphasis as they shape future policy directions. One is the

growing policy interest in combining enforcement (VMS, stricter licensing) **with livelihood support and capacity building** efforts to support alternative income, upgrade vessels lawfully, and install VMS are promising but uneven in coverage. **Another is the expanding role of aquaculture** as production from capture stabilizes or declines, aquaculture's share in national output grows a structural shift that changes socio-economic dependencies and may relieve (or shift) pressure on wild stocks depending on feed and habitat practices. **Finally, social-ecological research in Vietnam highlights the potential to integrate local ecological knowledge (LEK) into monitoring and area management** experiences elsewhere and preliminary Vietnamese pilots suggest that fisher knowledge can improve spatial management and compliance if institutional channels exist to incorporate it [2, 17].

In short, the headline production figures mask important contradictions apparent stability in national tonnage coexists with declining exploitable reserves; legal and policy frameworks coexist with implementation gaps; and short-term economic incentives undercut long-term sustainability. Addressing these contradictions requires a multi-**pronged strategy** (1) scale up enforcement and transparency while closing governance loopholes that enable IUU; (2) accelerate community-based co-management pilots and formalize mechanisms to incorporate LEK into management; (3) invest in climate-adaptive monitoring and spatial planning to anticipate shifting species distributions; and (4) align socio-economic incentives (alternative livelihoods, market controls, gear buy-back) so that fishers are not forced into ecologically damaging responses to declining catches. These measures reflect lessons from both global case studies and Vietnam's own recent experience, and they form the basis for moving from short-term yield maintenance to genuinely sustainable fisheries management.

4.2. Research Results

The survey results from 400 fishermen in coastal areas of Thanh Hoa province have provided valuable information on the status of traditional knowledge in fishing activities. Through analyzing different aspects of traditional knowledge, the study has clarified the level of preservation, application and transmission of traditional knowledge in the local fishing community.

Table 1: Knowledge of Seafood Identification and Classification.

Content	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean Score	Standard Deviation
Accurately identify major seafood species in the area	4.3	6.3	19.0	42.5	28.0	3.84	1.04
Know the local names of most seafood species	4.0	6.5	15.8	36.8	37.0	3.96	1.07
Distinguish the sexes of important seafood species	5.8	7.3	13.8	37.3	36.0	3.91	1.14
Know how to assess the quality of seafood based on physical characteristics	5.5	7.5	13.8	42.0	31.3	3.86	1.11
Classify seafood according to economic value	5.8	7.5	13.5	41.0	32.3	3.87	1.12
I understand the ecological characteristics of seafood species	5.5	7.8	11.0	42.3	33.5	3.91	1.12

The survey results showed that fishermen had a high level of mastery of knowledge in recognizing and classifying seafood with an average score ranging from 3.84 to 3.96.

The ability to know the local names of most seafood species scored the highest (3.96), with 73.8% of fishermen agreeing and strongly agreeing, reflecting that indigenous knowledge is a basic foundation and is well passed down in the fishing community. Similarly, knowledge of ecological characteristics (3.91) and the ability to distinguish the sexes of important seafood species (3.91) were high, indicating that fishermen not only know how to identify but also understand the biological factors related to species.

However, knowledge of correctly identifying major seafood species in the area had the lowest mean score (3.84) with a standard deviation of 1.04, indicating a certain difference in the level of understanding among fishermen, possibly due to the different living ranges and fishing activities of each person, leading to uneven exposure to major seafood species in practice.

Table 2: Knowledge of Traditional Fishing Techniques and Tools.

Content	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean Score	Standard Deviation
Proficient in traditional fishing methods	4.8	8.3	14.0	39.5	33.5	3.89	1.11
Know how to make and use traditional fishing gear	4.5	8.3	15.5	40.0	31.8	3.86	1.09
Can maintain and repair fishing gear	4.5	8.5	14.0	40.5	32.5	3.88	1.09
Know how to choose the right fishing gear for each seafood species	3.8	8.3	13.5	41.5	33.0	3.92	1.06
Understand the right time to use fishing techniques	3.0	7.5	14.3	43.8	31.5	3.93	1.01
Can improve fishing techniques based on experience	3.8	7.5	11.5	43.3	34.0	3.96	1.05

The results showed that fishermen had a good level of mastery of traditional fishing techniques with average scores ranging from 3.86 to 3.96. Knowledge of the ability to improve fishing techniques based on experience scored the highest (3.96), reflecting the importance of accumulated experience in the practical labor process. Knowledge of the appropriate time to use fishing techniques also scored high (3.93), indicating that fishermen have a clear understanding of ecological cycles and the marine environment. Notably, knowledge of making and using traditional fishing gear had the lowest average score (3.86) with a standard deviation of 1.09, indicating a differentiation in the fishing community in this skill, reflecting the fact that more and more fishermen are using available modern fishing gear, leading to traditional knowledge of making fishing gear no longer being as popular as before, especially among the current generation of young fishermen.

Table 3: Knowledge of Weather Forecasting and Sea Conditions.

Content	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean Score	Standard Deviation
Can predict weather based on observing sky color	3.8	8.5	13.5	42.0	32.3	3.91	1.06
Know how to recognize weather by cloud shape and color	4.3	7.0	14.0	39.3	35.5	3.95	1.08
Can predict storms through natural signs	3.5	10.0	14.0	40.5	32.0	3.88	1.08
Understand unusual animal behavior that signals bad weather	3.0	10.3	18.0	35.8	33.0	3.86	1.08
Can assess safe conditions for sailing	3.5	9.8	16.5	33.3	37.0	3.91	1.11
Know how to observe wind direction to predict weather	4.3	7.8	16.5	39.3	32.3	3.88	1.08

Knowledge of weather forecasting and sea conditions showed a fairly uniform level of understanding among the fishing community with mean scores ranging from 3.86 to 3.95. The ability to recognize the weather through cloud shapes and colors scored the highest (3.95), with 74.8% agreeing and strongly agreeing, reflecting the popularity and effectiveness of this skill during fishing.

The ability to forecast weather based on sky color (3.91) and assess safety conditions for going out to sea (3.91) were also highly rated, indicating that fishermen have the ability to observe environmental signs in general to make timely decisions. Predicting storm winds through natural signs (3.88) and observing wind direction to forecast weather (3.88) are also important skills that are well maintained in the community.

However, knowledge about abnormal animal behavior signaling bad weather had the lowest mean score (3.86), with a standard deviation of 1.08, indicating that this skill is uneven among fishermen, reflecting the reality that some highly specific

knowledge, requiring careful observation and long-term accumulated experience, is at risk of being lost in the context of changing living environments and modern marine exploitation conditions.

Table 4: Knowledge of Marine Ecology and Natural Cycles.

Content	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean Score	Standard Deviation
Understand the reproductive cycles of major marine species	4.8	9.0	14.8	38.5	33.0	3.86	1.12
Know the migration patterns of fish species in the area	4.0	5.5	16.3	41.8	32.5	3.93	1.03
Understand the influence of tides on marine activities	3.5	7.5	18.0	39.3	31.8	3.88	1.05
Know the impact of water temperature on the distribution of marine species	3.0	8.0	17.5	41.3	30.3	3.88	1.03
Be able to identify effective fishing areas based on experience	4.8	7.5	13.5	40.8	33.5	3.91	1.09
Understand the relationship between seasonality and the presence of fish species	4.5	4.8	12.8	46.5	31.5	3.96	1.02

Knowledge of marine ecology and natural cycles showed a wide range in mastery with average scores ranging from 3.86 to 3.96. Understanding of the relationship between seasonality and the presence of fish species scored highest (3.96), with 78.6% of fishermen expressing agreement, reflecting fishermen's acumen in observing and remembering natural cycles associated with fishing activities.

The ability to recognize fish migration patterns in the area was also highly appreciated (3.93), demonstrating fishermen's observational ability and practical experience in identifying seasonal migration patterns of aquatic species. Understanding of the influence of tides and water temperature on the activities and distribution of seafood reached 3.88, respectively, indicating that fishermen have a relatively good level of awareness of marine environmental factors affecting ecology.

The ability to identify effective fishing areas based on experience also scored quite high (3.91), with 74.3% of respondents choosing the level of "agree" and "strongly agree", demonstrating the role of experiential knowledge in the process of selecting fishing locations. Knowledge about the reproductive cycle of marine species mainly reached an average of 3.86, with the highest standard deviation (1.12), showing that there is still a significant difference in the level of understanding among the fishing community in this area partly due to the impact of short-term exploitation and lack of attention to long-term resource regeneration.

Table 5: Knowledge of Customs, Festivals, and Beliefs Related to Fishing.

Content	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean Score	Standard Deviation
Perform rituals for good luck before going out to sea	5.3	7.0	12.5	37.8	37.5	3.95	1.12
Obey fishing-related taboos	7.5	9.3	11.3	38.0	34.0	3.82	1.21
Participate in fishing-related community festivals	5.5	8.5	11.3	39.5	35.3	3.91	1.14
Believe in spiritual factors that influence fishing results	5.0	9.8	10.8	40.0	34.5	3.89	1.13
Pass on fishing cultural values to the next generation	5.8	10.8	10.5	41.5	31.5	3.82	1.16
Understand the meaning of traditional fishing symbols	4.5	10.8	13.8	38.5	32.5	3.84	1.13

The survey results show that knowledge of customs, festivals and beliefs related to fishing is quite high with the average score ranging from 3.82 to 3.95 and high standard deviation (from 1.12 to 1.21), reflecting the richness and diversity in fishermen's cultural awareness and practices. Performing lucky rituals before going to sea has the highest average score (3.95), with 75.3% of respondents choosing "agree" and "strongly agree", showing that belief in traditional rituals still plays an important role in the spiritual life of the fishing community. In contrast, the content of compliance with taboos related to fishing has the lowest average score (3.82) and the highest standard deviation (1.21), reflecting the significant difference in maintaining or adjusting customs under the influence of modernization, communication and changes in individual awareness. Understanding traditional

symbols, participating in community festivals, transmitting fishing cultural values to the next generation, and belief in spiritual factors all had above average scores (from 3.82 to 3.91), indicating that in general, this cultural knowledge is still maintained and transmitted in the fishing community, although there are fluctuations between different individuals and generations.

Table 6: Changes and Adaptations of Folk Knowledge.

Content	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean Score	Standard Deviation
Traditional knowledge is still valuable in the current conditions	3.8	10.3	14.5	39.8	31.8	3.86	1.09
Combining traditional knowledge with modern technology	3.0	7.8	13.0	43.3	33.0	3.96	1.02
Climate change has affected the accuracy of traditional knowledge	3.5	8.3	14.0	37.8	36.5	3.96	1.07
Young generation is less interested in traditional knowledge	4.8	5.8	13.3	39.0	37.3	3.98	1.08
Take measures to preserve traditional knowledge	4.0	6.0	11.8	42.0	36.3	4.01	1.04
Traditional knowledge needs to be recorded and preserved systematically	4.3	6.5	13.3	43.0	33.0	3.94	1.05

The results show that fishermen have a positive perception of the value and importance of traditional knowledge with high mean scores ranging from 3.86 to 4.01. The need for measures to preserve traditional knowledge scored the highest (4.01), with 78.6% of fishermen agreeing and strongly agreeing, indicating a clear awareness of the need to maintain and protect traditional knowledge in the context of modernization and social change. Similarly, the need for traditional knowledge to be recorded and preserved systematically was also highly valued (3.94), reflecting the need to organize and systematize the existing knowledge repository to avoid loss. Notably, 75% of fishermen said that the younger generation has little interest in traditional knowledge (3.98), reflecting a major challenge in passing on knowledge to the next generation and maintaining the local cultural heritage. In addition, 74.3% of fishermen agreed that climate change has affected the accuracy of traditional knowledge (3.96), indicating the need to continuously update, revise and re-examine knowledge that was built in previously stable environmental conditions. In addition, the combination of traditional knowledge with modern technology also scored quite high (3.96), demonstrating that the trend of integrating tradition and innovation is gradually forming in the thinking of the current fishing community. In general, the survey results show that the folk knowledge in seafood fishing of fishermen in the Central region is still preserved and applied relatively well, especially in basic aspects such as species identification, safety assessment and determination of fishing areas.

However, some more complex aspects such as deep ecological knowledge, traditional fishing gear making skills and spiritual elements are showing signs of decline or strong differentiation in the community.

5. CONCLUSION

The findings of this study confirm that the traditional knowledge embedded in the fishing activities of Central Vietnamese fishermen constitutes a rich and multi-dimensional system, accumulated and transmitted across generations. This body of knowledge encompasses seafood identification, fishing techniques, weather forecasting, and an understanding of marine ecological processes. Such knowledge not only ensures livelihood efficiency and safety but also contributes to the broader goal of sustainable fisheries development. These results resonate with Ruddle's (1994) observations that local fishing communities possess highly detailed and practical insights into fish behavior, migration, and resource management strategies.

Nevertheless, the study highlights significant challenges to the continuity of this knowledge system. Modernization, climate change, and shifts in social structure are eroding both the content and the mechanisms of transmission. Specific domains such as deep ecological knowledge, the skills of traditional gear making, and spiritual or belief-based practices show marked decline, particularly among younger generations. This aligns with the findings of Godoy et al. (1998), who demonstrated that market incentives and formal education can accelerate the erosion of folk knowledge in indigenous communities. A similar pattern has been documented in Vietnam, where the intergenerational transfer of ecological knowledge has weakened

under the pressures of urban migration and changing livelihoods (Phạm Thị Hà Xuyên, 2016).

An apparent contradiction emerges: while fishermen continue to rely heavily on traditional knowledge in daily practice, there remains no systematic mechanism for documenting, preserving, or integrating this knowledge into official management frameworks. This gap has also been observed in global contexts. For instance, Begossi et al. (2012) showed how integrating artisanal ecological knowledge into fisheries management in Brazil enhanced sustainability outcomes, whereas in Vietnam, reliance on state-driven regulatory models without adequate incorporation of local ecological knowledge has often led to poor compliance and reduced effectiveness (Ngô Thị Thanh, 2020).

Furthermore, the findings suggest that modernization has created both opportunities and risks. On one hand, fishermen reported combining traditional practices with modern technology, reflecting an emerging hybrid model that allows for adaptation under changing ecological and market conditions. On the other hand, limited investment in technology, human resources, and infrastructure constrains the capacity of fishing communities to adapt. This duality mirrors international experiences: in the Philippines, Paz-Alberto et al. (2020) noted that local ecological knowledge remained valuable when complemented with scientific data, whereas its exclusion led to ineffective management interventions.

In sum, the results both affirm and extend the existing literature. They affirm global findings that traditional ecological knowledge remains indispensable for small-scale fisheries, particularly in contexts of environmental uncertainty. At the same time, they highlight a uniquely Vietnamese paradox: although traditional knowledge remains actively applied in practice, its future is undermined by weak institutional support and insufficient mechanisms for preservation. This paradox underscores the urgent need for new models of integration particularly co-management approaches that systematically combine local ecological knowledge with modern science as a foundation for sustainable fisheries governance in Central Vietnam.

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