

Environmental Intuition and Cultivated Attention Support Coastal Resilience among Women Divers in East Asia

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Perspective

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Abstract

Coastal resilience research increasingly recognises the importance of Indigenous and local ecological knowledge in supporting adaptation to environmental change. Yet resilience continues to be understood primarily through knowledge that can be documented, transferred, and incorporated into management frameworks. Less attention has been paid to the cultivation of perception through which environmental change first becomes recognisable. This paper argues that environmental intuition is the embodied outcome of cultivated attention: a relational capacity developed through long-term engagement with dynamic marine environments that enables coastal communities to perceive and anticipate subtle ecological change before it can always be explicitly articulated or readily measured.

Drawing on ethnographic fieldwork among the *haenyeo* (female freedivers) of Jeju Island, and situated within a broader comparative framework linking the *hainü* of Taiwan and the *ama* of Japan, the paper examines how enduring relationships with the sea educate attention and shape everyday environmental judgement. Rather than treating water as the setting within which ecological knowledge is acquired, it argues that learning occurs with water through continual immersion, where perception, memory, bodily experience, and social learning become inseparable. In doing so, the paper reframes coastal resilience not simply as the capacity to respond to environmental disturbance, but as the capacity to perceive and anticipate environmental change while it is still unfolding. This perspective demonstrates how ethnography complements marine science by revealing dimensions of adaptive capacity that remain largely invisible within conventional resilience frameworks, while offering new directions for interdisciplinary approaches to coastal resilience and environmental change.

Introduction

On a humid afternoon in Namdal-ri[1], what began as an ordinary conversation over coffee took an unexpected turn. Cho Mi-ja lowered her voice and glanced towards the entrance of the café before speaking. The older *haenyeo*, she explained, must not overhear. The conversation initially appeared to concern intergenerational tensions within the village fishing association, frustrations with its leadership, and widening divisions between younger and older divers. Yet as Han Soo-yeon, Kang Hae-jin, and Cho Mi-ja[2] reflected on these tensions, their discussion repeatedly returned to the sea. Water, they suggested, had become "rotten" (*sseogeun mul*, 썩은 물). The phrase did not refer to pollution or declining water quality, but to a deeper moral unease. Mistrust, entrenched relationships, and changing values were understood through the language of water, revealing a relationship in which the sea was never simply the physical environment within which they worked. It was a medium through which social relationships were interpreted, ethical responsibilities negotiated, and ecological change made meaningful.

Listening to their conversation, it became increasingly clear that the sea occupied a position quite unlike that assumed in most discussions of coastal resilience. It was not treated as an external environment to which people adapted, nor simply as a resource upon which livelihoods depended. Rather, the sea

emerged as an active participant in everyday life: something that disciplined, instructed, and occasionally resisted those who entered it. Years of diving had taught these women to notice subtle shifts in currents, temperature, visibility, and the behaviour of marine life, but they also spoke of moments when they simply *knew* that conditions were wrong, even when they struggled to explain why. Such judgements were neither mystical nor irrational. They were cultivated through decades of embodied engagement with a dynamic marine environment, where careful observation, repeated practice, and accumulated experience gradually became inseparable from intuition.

For those who spend their lives working at sea, the capacity to perceive environmental change before it can be fully articulated may be as important as the ecological knowledge that has become central to contemporary resilience research. Yet intuition remains curiously absent from much of the literature on coastal adaptation. Indigenous and local ecological knowledge are now widely recognised as valuable for understanding environmental change and informing more sustainable management, but these discussions have tended to privilege knowledge that can be documented, categorised, and transferred. Far less attention has been paid to the embodied processes through which environmental perception itself is cultivated, or to the relationships that make such perception possible. I suggest that environmental intuition is the embodied outcome of cultivated attention: a capacity that develops through sustained engagement with dynamic marine environments, where repeated observation, bodily experience, memory, and social learning gradually become inseparable. Rather than representing a mysterious form of knowing, intuition emerges through long-term relationships with water that educate perception and enable subtle environmental change to be recognised before it can always be consciously articulated.

How, then, should we understand intuition within coastal resilience? Over the past two decades, resilience has become one of the defining concepts through which environmental change is understood. As coastal communities confront rising sea levels, changing ocean temperatures, biodiversity loss, and increasingly unpredictable weather, researchers have moved beyond viewing resilience simply as the capacity to recover from disturbance. Increasingly, attention has turned towards the social, cultural, and institutional conditions that enable communities to anticipate change, adapt to uncertainty, and sustain relationships with dynamic marine environments. Within this shift, Indigenous and local ecological knowledge has assumed a prominent place, challenging technocratic approaches to coastal management by demonstrating that long-term engagement with particular environments often generates sophisticated understandings of ecological processes.

This recognition has been an important corrective. Ethnographic and interdisciplinary research has shown that fishers, divers, and other coastal communities possess detailed knowledge of tides, currents, species behaviour, seasonal variability, and environmental change that complements scientific observation rather than standing in opposition to it. Such work has contributed significantly to more participatory approaches to marine conservation, fisheries management, and climate adaptation, while also drawing attention to the cultural values embedded within environmental knowledge. Yet, despite these advances, resilience research has largely concentrated on knowledge that can be articulated,

documented, and incorporated into policy. Knowledge is frequently understood as something that people know and can explain.

The conversations I shared with the *haenyeo* suggested something rather different. Experienced divers often struggled to explain why they chose to abandon a dive, alter their route, or postpone entering the water. Their decisions were rarely presented as instinct, nor as the product of a conscious calculation of environmental variables. Instead, they described a gradual attunement to the sea, cultivated through years of immersion, repetition, observation, and shared practice. Intuition, in this sense, was neither an alternative to ecological knowledge nor a mysterious sixth sense. Rather, it emerged through sustained relationships with water itself. It was relational, embodied, and continually refined through everyday encounters with a changing marine environment.

Recognising this distinction matters because it shifts attention from environmental knowledge as a body of information to environmental perception as an ongoing practice. Before knowledge can be shared, recorded, or mobilised, the environment must first be perceived. The capacity to notice subtle changes in water colour, wave rhythm, current direction, underwater sound, or the behaviour of marine organisms is not acquired instantaneously, nor can it be reduced to a checklist of observable indicators (Mallon, 2023). It develops through prolonged engagement with place. If resilience concerns how communities anticipate and respond to environmental change, then understanding how perception itself is cultivated becomes just as important as documenting the knowledge that emerges from it.

For the *haenyeo*, however, water is more than the medium through which ecological knowledge is acquired. It actively shapes perception, judgement, and action. Understanding resilience therefore requires attention not only to what people know about the sea, but also to how the sea shapes the very conditions through which knowing becomes possible. Water is not simply something that is observed; it is something with which one learns to live. This relational understanding challenges assumptions that resilience depends solely upon the transmission of ecological knowledge, suggesting instead that resilience is cultivated through continuous engagement with dynamic marine environments. By foregrounding intuition as an embodied form of environmental perception, this paper contributes a neglected dimension to debates on coastal resilience while demonstrating how ethnographic research can reveal forms of environmental understanding that remain largely invisible within conventional resilience frameworks.

This paper argues that intuition constitutes a neglected dimension of coastal resilience. Drawing on long-term ethnographic fieldwork among the *haenyeo* of Jeju Island, I demonstrate that intuition is neither an innate ability nor an inexplicable instinct, but a cultivated form of environmental perception that emerges through sustained engagement with the sea. Rather than treating intuition as separate from ecological knowledge, I show that it develops alongside it through years of embodied practice, social learning, and continual interaction with dynamic marine environments. Understanding resilience therefore requires attention not only to the knowledge communities possess, but also to the processes through which they learn to perceive environmental change before it can always be readily articulated.

While grounded in the experiences of the *haenyeo*, the argument extends beyond Jeju. Throughout the paper I suggest that this relationship between water, perception, and intuition offers a way of thinking about maritime knowledge that resonates more broadly across East Asia. Rather than presenting a comparative analysis, Jeju serves as the ethnographic foundation for developing a conceptual framework through which the experiences of Taiwan's *hainü* 海女 and Japan's *ama* 海女 (both translate directly as sea women) can later be understood. Together, these maritime traditions point towards what I refer to as the Blue Triangle: a regional constellation of diving cultures in which long-term relationships with the sea cultivate distinctive forms of environmental perception. In this article, however, the Blue Triangle functions primarily as a conceptual horizon rather than the object of empirical comparison.

The paper begins by reviewing debates on coastal resilience, Indigenous and local ecological knowledge, and environmental perception, identifying a gap in current understandings of how intuition develops through enduring relationships with marine environments. It then outlines the ethnographic approach before examining the everyday practices by which the *haenyeo* learn to perceive, interpret, and respond to the sea. Building on these findings, the discussion develops a relational understanding of water in which intuition emerges through continual engagement with dynamic marine environments and considers the wider implications of this perspective for the Blue Triangle as a conceptual framework for understanding women's maritime knowledge across East Asia. The paper concludes by reflecting on how environmental intuition extends contemporary debates on coastal resilience and demonstrates the contribution that ethnographic research can make to marine science and coastal management.

Ultimately, this paper argues that understanding coastal resilience requires moving beyond what people know about the sea towards understanding how long-term relationships with water cultivate the capacity to perceive, anticipate, and live with environmental change.

From ecological resilience to coastal adaptation

Resilience has travelled considerably from its origins in ecology. Holling's foundational distinction between stability and resilience challenged the assumption that healthy ecosystems necessarily return quickly to a single equilibrium following disturbance. Resilience instead described the capacity of an ecological system to absorb change and persist, even where its internal relationships were reorganised in the process (Holling 1973). This shifted attention away from constancy and towards uncertainty, thresholds, and the possibility that ecological systems may occupy more than one relatively stable state.

The concept subsequently moved beyond ecology as scholars began to consider the close interdependence of environmental and social change. Adger (2000), for example, defined social resilience as the capacity of groups and communities to cope with external stresses arising from social, political, and environmental disturbance. His analysis was especially pertinent to communities whose livelihoods depended directly upon ecological resources, while also cautioning against assuming that ecological resilience would necessarily produce resilient social institutions or equitable outcomes.

Resilience therefore became less a property of ecosystems alone and more a way of examining the relationships through which people and environments respond to change.

This social–ecological perspective was developed further through the related ideas of adaptability and transformability. Walker et al. (2004) described resilience as the capacity of a social–ecological system to absorb disturbance and reorganise while retaining its essential structures, functions, and feedbacks. Adaptability referred to the capacity of actors to influence that resilience, whereas transformability described the possibility of creating a fundamentally different system when existing ecological or social arrangements became untenable. Folke et al. (2010) similarly emphasised that resilient systems do not remain unchanged. They continually adjust while navigating thresholds, uncertainty, and interactions across different spatial and temporal scales.

This broader understanding is particularly useful for coastal settings, where environmental variability is not an exceptional interruption but an ordinary condition of life. Coastal communities must respond not only to recognisable disturbances, such as storms, erosion, marine heat events, or declining fisheries, but also to slower and less easily separated changes in species distribution, seasonality, water conditions, livelihoods, and access to marine resources. Resilience in such contexts cannot be reduced to recovery after a single event. It concerns the capacity to recognise change, adjust everyday practices, and determine when established ways of living with the sea can be maintained and when they must be altered.

Yet the breadth of resilience has also created difficulties. Its movement across ecology, development, planning, and climate adaptation has produced considerable variation in how the term is defined and whose resilience is being protected. Reviews have consequently stressed the need to ask resilience of what, to what, for whom, and towards which desired future, rather than treating resilience as an inherently positive or politically neutral outcome (Béné et al. 2014; Meerow et al. 2016). These questions are especially important in coastal communities, where the preservation of ecological function, economic productivity, cultural practice, and institutional authority may not always be mutually compatible.

For the purposes of this paper, coastal resilience is therefore understood not as a return to a previous condition, nor as the passive endurance of environmental stress, but as the socially and ecologically situated capacity to perceive, negotiate, and respond to marine change. This definition places adaptation within the everyday relationships through which coastal environments become known. It also raises a question that has received less sustained attention: before communities can adapt to environmental change, how do they first come to perceive it?

Indigenous and local ecological knowledge

The expansion of resilience thinking has been accompanied by growing recognition of Indigenous and local ecological knowledge. This scholarship has challenged the idea that scientific observation provides the only reliable account of environmental change, demonstrating that people who live and work within

particular environments often develop detailed understandings of species, seasons, ecological relationships, and variability. Such knowledge is not simply inherited information. It is continually tested and revised through practice, observation, and changing environmental conditions.

Berkes et al. (2000) were particularly influential in connecting traditional ecological knowledge with adaptive management. Their review showed how local practices could support the monitoring of ecological change, responses to environmental feedback, and the management of uncertainty and ecological surprise. They also stressed that these practices were sustained through institutions, social learning, cultural values, and particular understandings of human–environment relations. Traditional ecological knowledge was therefore not presented as a static collection of observations but as part of a wider knowledge–practice–belief complex (Berkes, 2012). While Berkes emphasised the adaptive capacities of such knowledge systems, Ingold (2000) approached environmental understanding from a complementary perspective, arguing that knowledge emerges through skilled, embodied engagement with the world. Rather than accumulating information about an environment, people learn by dwelling within it, as perception develops through continual movement, practice, and attention. Together, these perspectives suggest that environmental knowledge is not simply possessed but cultivated through sustained relationships with place. This emphasis has proved especially valuable in marine and coastal research. Huntington (2000), drawing on work involving bowhead whales, beluga whales, and herring, demonstrated how traditional ecological knowledge could contribute to scientific research and ecological understanding. At the same time, he identified practical and epistemological difficulties in bringing such knowledge into scientific settings, including the tendency for it to be described in terms already recognisable to Western science. More recent scholarship has consequently moved away from treating scientific knowledge as the standard against which other forms of environmental knowledge must be validated. Instead, it increasingly advocates epistemological pluralism, recognising Indigenous, local, and scientific knowledge as distinct yet complementary ways of understanding environmental change, each with its own criteria of validity and contribution to environmental governance (Yanou et al., 2023; Brewer and Hapke, 2024; Park and Hikuroa, 2023). The multiple evidence base approach proposed by Tengö et al. (2014) and Bartlett et al. (2012), for example, begins from the premise that different knowledge systems can generate valid evidence according to their own processes of production and evaluation. Connections can then be made across them without requiring one system to be translated fully into the terms of another. This principle is echoed in the Mi'kmaw concept of Two-Eyed Seeing (*Etuaptmumk*), which encourages engagement with both Indigenous and Western knowledge while preserving the integrity of each. Rather than positioning one as the benchmark for the other, Two-Eyed Seeing recognises that different ways of knowing illuminate different aspects of the world, and that understanding emerges through respectful dialogue between them (Peltier, 2018). Yet while these approaches have transformed debates over whose knowledge counts in environmental governance, they have devoted comparatively less attention to how environmental knowledge itself is cultivated through sustained engagement with particular environments.

This recognition is increasingly reflected within international biodiversity and fisheries governance. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), for example,

understands Indigenous and local knowledge systems as dynamic bodies of social and ecological knowledge, practice, and belief, grounded in place and continually evolving through experience and innovation. Similarly, the Food and Agriculture Organization's (FAO) *Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries* call for traditional and local knowledge to inform the conservation, restoration, and co-management of aquatic and coastal ecosystems. Together, these developments represent an important shift away from viewing coastal communities merely as recipients of scientific advice towards recognising them as active producers of environmental understanding. At the same time, the value of such knowledge continues to be framed largely in terms of the environmental information it contributes to governance and decision-making. Comparatively less attention has been paid to the perceptual capacities through which such knowledge is cultivated: the everyday processes of observation, judgement, and embodied engagement that enable people to notice ecological change before it is formally articulated or scientifically measured. It is precisely these perceptual processes, through which environmental understanding is cultivated before it becomes explicit knowledge, that remain comparatively underexplored.

Nevertheless, difficulties remain when living knowledge enters research, assessment, or management frameworks. In order to travel beyond the relationships and settings in which it is produced, knowledge often has to be elicited, described, documented, and made communicable. Tides may be mapped, species observations recorded, seasonal calendars constructed, and practices translated into recommendations. These processes can be valuable, particularly where communities seek greater recognition within environmental decision-making. They can also, however, draw attention towards those aspects of knowledge that can most readily be expressed as information.

This does not mean that Indigenous and local ecological knowledge scholarship understands knowledge only as a transferable body of facts. On the contrary, some of its most important contributions have been to show that knowing is inseparable from practice, values, social relationships, and place. The narrower point is that the processes through which such knowledge becomes legible to institutions can leave less articulated dimensions of environmental engagement harder to recognise. A diver may be able to describe currents, seasonal conditions, and changes in marine species, yet still struggle to explain why, on a particular morning, the water feels wrong. What is at stake here is not the absence of knowledge, but a form of perception that may precede its conscious explanation.

The haenyeo occupy a particular position within this discussion. I do not use the term Indigenous to describe them, nor do I suggest that the different histories and political claims gathered beneath the category of Indigenous and local knowledge are interchangeable. Rather, this scholarship provides an important point of departure because it has demonstrated that environmental knowledge is situated, practised, socially transmitted, and formed through enduring relationships with place. The argument developed here extends that insight by asking how the capacity to perceive environmental change is itself cultivated. Before ecological knowledge can be documented, communicated, or brought into coastal management, something must first be noticed.

Taken together, these developments reveal both the strengths and the limitations of contemporary resilience scholarship. Considerable progress has been made in recognising that environmental knowledge is situated, relational, and developed through long-term engagement with place. At the same time, resilience research has largely concentrated on the knowledge that communities possess and how that knowledge can inform adaptation, conservation, and environmental governance. Comparatively less attention has been paid to the cultivation of environmental perception itself: the processes through which subtle ecological change is first recognised before it can be consciously articulated, shared, or incorporated into collective practice.

This paper builds upon, rather than departs from, these advances. Rather than asking what coastal communities know about marine environments, it asks how they come to know. In doing so, it treats intuition not as an inexplicable instinct nor as knowledge beyond explanation, but as a cultivated capacity that emerges through sustained engagement with dynamic marine environments. It is through this lens that the experiences of the *haenyeo* are explored. Their everyday practices offer an opportunity to examine how relationships with water shape perception, judgement, and action, and in turn illuminate an often-overlooked dimension of coastal resilience.

The following section outlines the ethnographic approach adopted in this study before examining how intuition is cultivated through the everyday lives of the *haenyeo*.

Ethnographic approach

The findings presented in this paper draw upon long-term ethnographic fieldwork conducted with the *haenyeo* of Jeju Island between 2018 and 2026. Across three periods of fieldwork, I worked alongside divers in coastal communities across multiple shorelines, participating in everyday activities, observing diving practices, attending community gatherings, and undertaking repeated semi-structured and conversational interviews. Rather than documenting diving solely as an economic activity or cultural tradition, the research sought to understand how relationships with the sea are cultivated through everyday practice and how these relationships shape environmental perception.

Fieldwork was undertaken over multiple visits to capture seasonal variation and to allow relationships of trust to develop over time. Returning to the same participants across successive field seasons made it possible to revisit earlier conversations, explore changing interpretations of environmental conditions, and observe how discussions of the sea shifted in response to ecological, social, and institutional change. This longitudinal engagement proved particularly important because intuition rarely emerged through direct questioning. Instead, it became visible through repeated conversations, shared experiences, and the gradual accumulation of observations across different contexts.

The ethnographic approach was informed by the principles of *talanoa*, understood not as a method transferred from the Pacific to Jeju, but as a relational orientation to research grounded in reciprocity, openness, and dialogue (Ramala, 2024). Rather than treating interviews as isolated moments of data extraction, conversations unfolded over months and, in many cases, years. Participants regularly

revisited earlier discussions, challenged my interpretations, expanded upon previous accounts, or introduced new experiences that reshaped my understanding of their relationships with the sea. This iterative process recognised knowledge as something co-produced through sustained engagement rather than elicited through a single encounter. Such an approach proved particularly valuable when exploring intuition, since participants often found it easier to demonstrate or narrate ways of perceiving the sea over time than to define them explicitly.

Participant observation remained central throughout the research. Time was spent accompanying divers before and after dives, observing interactions within fishing communities, and participating in everyday social settings where discussions of weather, currents, marine species, and changing sea conditions naturally emerged. These conversations frequently extended beyond environmental observations to encompass family relationships, generational change, local politics, spirituality, and moral responsibility. Rather than representing separate domains of social life, these themes revealed the ways in which environmental perception was embedded within broader relationships between people, community, and sea.

Analysis proceeded iteratively throughout the research. Fieldnotes, interview transcripts, and audio recordings were revisited alongside observations made during subsequent periods of fieldwork. Instead of applying a predetermined coding framework, analysis developed through continual comparison between conversations, observations, and participants' own reflections. Particular attention was given to recurring descriptions of environmental judgement, references to changing water conditions, expressions of uncertainty, and moments in which divers acted decisively despite finding it difficult to explain the basis of their decisions. Over successive periods of fieldwork, these recurring patterns suggested that intuition was neither instinctive nor inexplicable, but emerged through long-term engagement with dynamic marine environments.

The longitudinal nature of the research proved critical in recognising this pattern. Had the study relied upon interviews conducted during a single field season, intuition might have appeared as little more than occasional anecdote or individual experience. It was only through returning to participants over three periods of fieldwork—revisiting conversations, observing changing environmental conditions, and reflecting collaboratively upon earlier interpretations—that intuition emerged as a consistent feature of everyday life with the sea. In this sense, the iterative character of the research mirrored the phenomenon under investigation: just as environmental perception is cultivated through repeated engagement with water, anthropological understanding developed through repeated engagement with the people who live and work within it.

To protect participants' identities, all personal names are pseudonyms, and selected place names have been anonymised where appropriate. Ethical approval for the research was granted by the University of Lancashire, and informed consent was obtained throughout the project. Participants retained the opportunity to revisit earlier conversations and clarify or expand upon their contributions during subsequent field visits, reflecting the collaborative and ongoing nature of the research.

Although this paper is grounded ethnographically in Jeju, it forms part of a broader programme of research examining women's maritime knowledge across East Asia. Since 2025, my research in Taiwan has incorporated fieldwork with *hainü*, exploring relationships between marine environments, intuition, and environmental knowledge within coastal communities. While this work informs the conceptual development of the Blue Triangle, it does not yet constitute an ethnographic corpus comparable in depth to that presented here. Likewise, exploratory fieldwork undertaken with *ama* divers in Kyushu, Japan, during 2018 provided an initial opportunity to discuss diving practices, environmental knowledge, and changing coastal livelihoods over a period of approximately two months. These conversations offered valuable comparative insights but were neither designed nor intended as sustained ethnographic investigation.

Accordingly, the Blue Triangle should not be understood as a comparative ethnography in which Jeju, Taiwan, and Japan are afforded equal analytical weight. Rather, the concept emerges from the recognition that these maritime traditions share long histories of women's diving cultures and enduring relationships with the sea, while differing in their historical trajectories, social organisation, and contemporary environmental challenges. In this article, the *haenyeo* provide the ethnographic foundation through which the conceptual framework is developed. The experiences of the *hainü* and *ama* are introduced more cautiously as comparative points of reference that suggest broader regional possibilities and identify directions for future collaborative research.

Cultivating Perception: Learning to Read the Sea

The first time I asked a *haenyeo* how she knew when conditions were safe to dive, I expected a practical answer. I anticipated a discussion of tides, currents, weather forecasts, or water temperature. Instead, the response was both immediate and elusive. "You just know," she replied with a smile before turning the question back on me. "How do you know when something isn't right?" The conversation moved on before I had the opportunity to ask what she meant. It would take another two years of returning to Jeju before I began to appreciate that the answer was not withholding information. Rather, it reflected the difficulty of describing a way of perceiving the sea that had become inseparable from everyday life.

This distinction emerged repeatedly throughout the fieldwork. When I asked experienced divers how they assessed conditions before entering the water, they rarely began by listing environmental indicators. Instead, they spoke about years spent learning to become attentive: watching older women prepare their equipment, observing the colour of the water before sunrise, noticing subtle changes in currents, listening to conversations on the shoreline, and gradually developing confidence through repeated immersion. Knowledge was never described as something acquired in a single moment. It accumulated slowly, often without participants recognising precisely when experience had become judgement.

On several occasions while visiting fishery collectives on the east coast of Jeju, I observed divers preparing to enter the water before quietly deciding against diving. There was little conversation. Wetsuits were adjusted, floats and gathering nets checked, and the sea observed in silence. No one

appeared hurried. Although the weather forecast often suggested favourable conditions, several women remained on the shore longer than I expected. There was rarely prolonged discussion or disagreement. A few women would continue watching the sea, while others quietly began loosening their wetsuits or setting their floats back down, and the decision gradually spread through the group without the need for explicit explanation. When I later asked why they had chosen not to dive, the responses were strikingly similar. The water, they explained, "wasn't right". Attempts to elaborate often produced only fragmentary descriptions: the current looked different, the sea felt unusually heavy, or visibility was unlikely to improve. None of these observations appeared sufficient in isolation to justify abandoning the dive. Taken together, however, they formed a coherent judgement that conditions were unsuitable.

For an outsider, such decisions can easily appear intuitive in the everyday sense of the word: rapid judgements made without conscious reasoning. Yet prolonged engagement with the haenyeo suggested something rather different. These judgements were neither spontaneous nor mysterious. They reflected years of repeated encounters with the sea, during which countless observations gradually became embodied. The women rarely separated what they saw from what they felt. Changes in water colour, the movement of suspended sediment, the behaviour of fish, the direction of swell, the quality of light, even the sound of waves breaking against the shoreline formed part of a single perceptual field. Asked individually, these observations often appeared insignificant. Experienced together, they became meaningful.

This process was perhaps most visible when younger divers described learning from older women. Formal instruction played only a small role. No one sat down to explain precisely how currents behaved under different weather conditions or how to identify the subtle changes that preceded deteriorating visibility. Instead, learning occurred through observation, imitation, correction, and repetition. Younger women watched where experienced divers entered the water, how long they remained beneath the surface, and when they decided to abandon a dive. Mistakes were expected. Judgement developed gradually through experience rather than through the memorisation of rules.

Such learning challenges conventional understandings of environmental knowledge as a body of information that can simply be transmitted from one generation to the next. Certainly, ecological knowledge was shared through conversation, instruction, and collective practice. Yet what distinguished experienced divers was not simply that they knew more facts about the sea. Rather, they had developed a different way of attending to it. Over time, perception itself became educated. The sea ceased to be an external environment requiring interpretation and instead became a continual partner in the cultivation of judgement.

It was only after returning to the same women across successive field seasons that this distinction became fully apparent. Early in the research, I repeatedly interpreted comments such as "the water feels wrong" as expressions of experience that participants found difficult to verbalise. By the final period of fieldwork, I realised the problem lay partly with my own questions. I had assumed that environmental judgement could be explained through discrete indicators that preceded action. The haenyeo described

something much less divisible. Perception emerged through long-term relationships with the sea in which observation, bodily experience, memory, social learning, and everyday practice had become inseparable. Intuition, therefore, was not a substitute for ecological knowledge. It was the way ecological knowledge came to be lived.

The Education of Attention

As my fieldwork progressed, I became increasingly aware that becoming a *haenyeo* involved far more than learning how to dive or harvest marine resources. It required learning how to attend to the sea. Water was not simply the medium within which diving took place, nor merely a resource from which livelihoods were drawn. Rather, it occupied an active role in shaping everyday decisions, relationships, and moral understandings. Participants frequently described the sea as something that demanded respect, rewarded patience, and punished complacency. These expressions were not offered metaphorically. Instead, they reflected a lived understanding in which learning to dive also meant learning what deserved attention and how to respond appropriately to what the sea revealed.

This became particularly apparent during conversations about environmental change. Initially, I expected discussions to focus on declining catches, warming waters, or shifting marine ecosystems. While these concerns were certainly present, participants often framed change in relational rather than ecological terms. The sea was described as becoming more difficult to read, less predictable, or somehow different from previous years. Such observations rarely emerged as isolated environmental measurements. Instead, they were intertwined with broader reflections on community life, ageing, generational change, and the responsibilities of those who entered the water. Environmental change was therefore experienced not only through altered ecological conditions but also through changing relationships with the sea. What was being described was not simply a transformation in the marine environment, but a transformation in what could be perceived through long-term engagement with it.

Although this paper is grounded ethnographically in Jeju, the experiences of the *haenyeo* resonate with a wider body of scholarship on women's breath-hold diving traditions across East Asia. Research on Japanese *ama*, for example, has consistently demonstrated that diving expertise is cultivated through long-term engagement with particular coastal environments, where skill depends not only upon technical competence but also upon intimate familiarity with local currents, seasonal rhythms, underwater topography, and the ecological dynamics of specific fishing grounds (Akimichi, 1984; Martínez, 2004). Rather than treating expertise as the acquisition of abstract knowledge, this literature emphasises the inseparability of embodied practice, environmental experience, and sustained engagement with place. More recent work has also begun to document Taiwan's *hainü*, situating these women within a broader East Asian tradition of breath-hold diving while emphasising the distinct historical, ecological, and cultural contexts in which their knowledge has developed (International Center for Folk Culture Studies, 2022). These studies do not suggest that the *haenyeo*, *hainü*, and *ama* constitute a single cultural tradition, nor should the important differences between them be overlooked. Rather, they point towards a shared analytical question: how do long-term relationships with particular marine environments cultivate

the perceptual capacities through which divers learn to recognise, interpret, and respond to changing conditions? It is this comparative question, rather than claims of cultural equivalence, that underpins what I later describe as the Blue Triangle.

During my own fieldwork, this education of attention extended beyond reading environmental conditions to shaping how participants understood social relationships within the community. One afternoon, while discussing growing tensions within the village fishing association, Cho Mi-ja, Han Soo-yeon, and Kang Hae-jin repeatedly returned to the expression "rotten water". At first, I interpreted this literally, assuming they were referring to pollution or declining water quality. My misunderstanding prompted laughter before the women patiently explained that the phrase referred instead to corruption, entrenched authority, and relationships that had become stagnant. Water provided the language through which social life was understood. It was not simply something observed but something that carried ethical significance, offering a vocabulary through which participants interpreted trust, responsibility, and collective wellbeing. The same relationships that educated ecological attention also shaped moral attention, directing awareness towards the qualities of social life that sustained or undermined the community. The boundaries between environmental and social worlds proved considerably more porous than I had initially assumed.

This ethical dimension also surfaced during my conversations in Taiwan. While the language differed, experienced *hainü* similarly spoke of the importance of restraint, respect, and knowing when not to harvest. Decisions about entering the water or abandoning a collection were framed not simply in terms of personal safety or economic return but as expressions of an ongoing relationship with the sea. Comparable themes have also been documented among Japanese *ama*, where cooperation, restraint, and attentiveness remain central features of diving practice. Across all three communities, marine environments were understood not merely as places from which resources were extracted but as environments that educated both perception and judgement, shaping not only how divers acted but what they learned to notice.

The significance of these observations became clearer over successive periods of fieldwork. The sea did not merely provide the setting within which environmental knowledge was acquired. It shaped how participants learned to notice, judge, and respond. Experienced divers spoke of being corrected by the sea as much as by older *haenyeo*. A poor decision was remembered not because someone explained why it was wrong, but because the consequences were experienced directly in the water. Through repeated encounters with currents, weather, underwater visibility, marine life, and the outcomes of countless everyday decisions, divers gradually learned what deserved attention and how seemingly insignificant observations acquired meaning. Learning therefore occurred through continual engagement with a dynamic environment that resisted certainty and demanded humility, attentiveness, and restraint. Water was neither backdrop nor object of knowledge. It constituted the relational conditions through which perception itself was educated.

Sensing Change Before It Becomes Visible

If environmental intuition emerged through long-term relationships with water, its significance lay not simply in enabling divers to interpret present conditions but in allowing them to anticipate change before it became fully apparent. Experienced *haenyeo* frequently described recognising subtle shifts in the sea long before they could be articulated as discrete observations. Rather than responding only to visible hazards or measurable environmental indicators, divers often adjusted their behaviour in response to impressions that only later became understandable through changing currents, deteriorating visibility, altered marine life, or worsening weather conditions.

These anticipatory judgements rarely appeared dramatic. More often they were expressed through small adjustments in everyday practice: entering the water from a different point along the shoreline, shortening a dive, abandoning a familiar harvesting ground, or deciding not to enter the sea at all. Such decisions were seldom explained through reference to a single environmental cue. Instead, they reflected the integration of multiple observations that had become inseparable through years of embodied experience. By the time a diver could fully explain why conditions had changed, the decision itself had often already been made.

This distinction has important implications for understanding resilience. Much resilience research has been concerned with how communities adapt to, recover from, and govern environmental disturbance once hazards become apparent (Cabana et al., 2023; Fox et al., 2023). Far less attention has been paid to the perceptual capacities that enable communities to recognise environmental change before it becomes sufficiently visible to demand a response. Among the *haenyeo*, however, resilience often began much earlier. It lay in the capacity to recognise subtle environmental transformations while they were still unfolding, before they became readily apparent to others or sufficiently pronounced to require immediate action. Anticipation therefore emerged not as prediction in the scientific sense, but as an embodied sensitivity to environmental trajectories cultivated through long-term engagement with the sea.

The value of this sensitivity became particularly apparent during discussions of environmental change. Participants frequently remarked that "the sea is changing," yet these observations were rarely reduced to single causes such as warming waters or declining catches. Instead, change was experienced cumulatively through altered rhythms, unfamiliar currents, changing distributions of marine species, and a growing sense that places once considered dependable had become increasingly uncertain. Such observations were grounded in decades of continual engagement with particular stretches of coastline, enabling divers to detect gradual transformations that would be difficult to capture through isolated observations alone.

Comparable themes have also been documented in studies of Taiwanese *hainü* and Japanese *ama*, where diving expertise is consistently described as emerging through long-term engagement with local marine environments, embodied practice, and careful attentiveness to changing ecological conditions rather than through technical skill alone (Martínez, 2004; International Center for Folk Culture Studies, 2022). These accounts reinforce the view that environmental judgement develops through sustained

relationships with particular seascapes, while also highlighting the distinct historical, ecological, and cultural contexts in which each diving tradition has evolved.

Seen in this way, intuition is not opposed to scientific observation. Rather, it operates at a different temporal scale. Scientific monitoring often identifies environmental change through systematic measurement across time. The *haenyeo*, by contrast, experience change through continual participation within dynamic marine environments. Their judgements emerge not from isolated observations but from the accumulation of thousands of encounters with particular places. Intuition therefore represents neither instinct nor inexplicable insight. It is the embodied capacity to perceive environmental change while it is still unfolding.

Environmental intuition, therefore, was neither instinct nor an ineffable quality possessed by a select few. It emerged through years of living with the sea, where perception, memory, bodily experience, and continual engagement became inseparable. Recognising this relational process opens new ways of understanding how coastal communities perceive and respond to environmental change.

Discussion: Environmental Intuition and Coastal Resilience

This paper began with a seemingly straightforward question: how do experienced divers know when conditions have changed? The ethnography suggests that the answer cannot be reduced to the recognition of individual environmental indicators, nor to the accumulation of ecological knowledge acquired through experience alone. Rather, environmental judgement emerges through the gradual cultivation of perception itself. Over years of repeated engagement with the sea, observation, bodily experience, memory, and social learning become inseparable, enabling divers to recognise subtle environmental transformations before they can necessarily explain them. Environmental intuition, therefore, is neither instinct nor an inexplicable "sixth sense". It is a cultivated form of relational expertise grounded in long-term engagement with dynamic marine environments.

This distinction has important implications for contemporary understandings of coastal resilience. Research on resilience has increasingly recognised the importance of Indigenous and local ecological knowledge in understanding environmental change and supporting adaptive responses. Much of this scholarship, however, has understandably focused on documenting, representing, and mobilising Indigenous and local ecological knowledge in ways that can inform environmental governance and management frameworks (Varghese and Crawford, 2020; Pirie et al., 2026). Yet comparatively less attention has been paid to the perceptual processes through which such knowledge is cultivated in everyday practice. The ethnography presented here suggests that an equally significant dimension has remained largely overlooked: the cultivation of perception itself. Before environmental knowledge can be communicated, recorded, or incorporated into policy, something must first be noticed. The ability to notice is not universal; it is learned. I suggest that environmental intuition is the embodied outcome of cultivated attention: a capacity that develops through sustained engagement with dynamic marine environments, through which repeated observation, bodily experience, memory, and social learning

gradually become inseparable. Rather than representing a mysterious form of knowing, intuition emerges through long-term relationships with water that educate perception and enable subtle environmental change to be recognised before it can always be consciously articulated. Resilience, in this sense, begins not with information, but with attention.

This shift—from knowledge to cultivated attention—extends current understandings of adaptive capacity. Adaptive capacity does not begin at the moment communities respond to environmental change, but much earlier, in the gradual education of attention through which environmental change first becomes perceptible. The ethnography therefore suggests that resilience is rooted not only in the ability to act upon environmental knowledge, but also in the relational processes through which perception, judgement, and anticipation are cultivated. This represents a subtle but important reorientation of resilience thinking, shifting emphasis away from knowledge as an accumulated body of information towards the relational processes through which perception itself is cultivated.

The ethnography presented here further complicates assumptions that observation is a neutral or automatic process. Experienced *haenyeo* do not simply possess more ecological knowledge than novice divers; they perceive the marine environment differently. Years of immersion cultivate forms of attentiveness through which changes in currents, underwater visibility, wave energy, marine life, weather, and light become meaningful as part of an integrated perceptual experience rather than as isolated environmental variables. Perception, in other words, is itself an adaptive capacity. Environmental intuition should therefore not be understood as a substitute for ecological knowledge, but as the embodied expression of ecological knowledge that has become lived through continual engagement with the sea.

Understanding resilience in these terms also reframes the role of intuition. Within both scientific and everyday discourse, intuition is often understood as rapid decision-making that operates outside conscious reasoning. Such interpretations either celebrate intuition as mysterious expertise or dismiss it as subjective judgement. Neither adequately captures what the *haenyeo* described. Their decisions did not emerge independently of ecological knowledge; rather, ecological knowledge gradually became embodied through continual practice until observation and judgement became inseparable. Intuition was therefore neither irrational nor beyond explanation. It represented the lived expression of accumulated environmental experience and the embodied outcome of cultivated attention.

Perhaps the most significant contribution of this study is to suggest that resilience should be understood not simply as the capacity to respond to environmental change, but as the capacity to perceive change while it is still unfolding. Throughout the fieldwork, experienced divers rarely described reacting to obvious environmental hazards. Instead, they adjusted their behaviour in response to subtle shifts that were often difficult to isolate verbally: a current that felt unfamiliar, changes in the quality of underwater light, altered visibility, unexpected movements of marine species, or simply the sense that "the water was not right". Such judgements were not predictions in a scientific sense. Rather, they

reflected an anticipatory awareness cultivated through long-term familiarity with particular places. Resilience therefore begins before response. It begins with anticipation.

This emphasis on anticipation introduces an important temporal dimension to discussions of environmental knowledge. Scientific monitoring generally identifies environmental change through systematic measurement, comparison, and analysis across time. The *haenyeo*, by contrast, experience environmental change continuously through everyday participation in the sea. Their knowledge develops through thousands of repeated encounters with particular stretches of coastline, allowing subtle departures from familiar environmental rhythms to become perceptible long before they might be identified through formal measurement alone. These approaches therefore operate across different temporal registers. Scientific monitoring identifies what has changed and frequently explains why. Environmental intuition recognises that change is occurring while it is still emerging within lived experience. Neither perspective is sufficient on its own. Rather, they illuminate different dimensions of environmental change and together offer a richer understanding of adaptive capacity than either could provide independently.

Rather than positioning these approaches in opposition, the findings suggest they are fundamentally complementary. Marine science, for example, provides increasingly sophisticated methods for monitoring oceanographic conditions, biodiversity, coastal geomorphology, and climate-driven environmental transformation (Cavanaugh et al., 2025). Ethnography, by contrast, illuminates how these changing conditions are experienced, interpreted, and acted upon by communities whose livelihoods depend upon continual engagement with the sea (Dua, 2024). Scientific evidence explains environmental processes; ethnographic evidence explains how those processes become meaningful within everyday life. Bringing these perspectives into dialogue therefore offers opportunities not simply for interdisciplinary collaboration, but for rethinking how coastal resilience itself is conceptualised.

The ethnography also invites a reconsideration of how relationships between people and marine environments are understood. Throughout the fieldwork, water consistently emerged as more than the setting within which ecological knowledge was acquired. It shaped how divers learned to notice, remember, judge, and anticipate. Learning did not occur independently of the sea before being applied to it. Rather, it unfolded through continual engagement with dynamic marine environments that continually reshaped perception itself. I describe this relational process as a water ontology. By this I do not imply that water possesses agency in any simplistic sense, nor that the sea functions as an anthropomorphic teacher. Rather, the concept recognises that perception, knowledge, and action are constituted through ongoing relationships with water rather than existing independently of it. Learning therefore occurs with water rather than simply about it. Water is not merely the object of environmental knowledge; it is the relational medium through which environmental knowledge becomes possible.

Viewing the findings through this lens also helps explain why participants consistently spoke about the sea in moral as well as ecological terms. Expressions concerning patience, humility, restraint, and respect were not simply cultural values applied to environmental practice. Rather, they emerged through

continual engagement with marine environments that resisted certainty and rewarded attentiveness. Decisions to abandon dives, delay harvesting, or refrain from entering the water altogether reflected ethical relationships with uncertainty as much as technical assessments of environmental conditions. The sea therefore shaped not only ecological understanding but also particular dispositions through which appropriate action became possible. Environmental perception was inseparable from environmental ethics.

These observations also provide a foundation for extending the discussion beyond Jeju. Although this paper remains grounded in the experiences of the *haenyeo*, preliminary fieldwork among Taiwanese *hainü* together with existing scholarship on Japanese *ama* suggests that similar relational processes may extend across women's maritime traditions in East Asia. The purpose of introducing the Blue Triangle is therefore not to propose a new cultural region or to suggest direct equivalence between distinct diving communities. Rather, it identifies a shared research problem: how long-term relationships with water cultivate environmental perception within women's maritime societies. The Blue Triangle should therefore be understood less as a comparative model than as a heuristic framework that opens new possibilities for investigating how different coastal communities develop environmental intuition through sustained engagement with dynamic marine environments while remaining attentive to their unique historical, ecological, and cultural contexts.

Taken together, these findings suggest that environmental intuition should not be regarded as an alternative to scientific observation, nor simply as another aspect of Indigenous and local ecological knowledge. Rather, it constitutes a distinct dimension of coastal resilience through which ecological knowledge becomes perceptual, embodied, and actionable. This distinction carries practical implications for coastal adaptation and environmental governance. As climate change accelerates coastal transformation and marine ecosystems become increasingly dynamic, resilience will depend not only upon improving environmental monitoring but also upon recognising the forms of perception cultivated by communities whose lives remain intimately connected to the sea. Such capacities cannot always be reduced to datasets, indicators, or management guidelines, yet they remain fundamental to understanding how environmental change is first recognised and subsequently acted upon.

Ultimately, the contribution of this paper lies not in replacing scientific understandings of coastal resilience with ethnographic ones, but in demonstrating that each addresses different dimensions of the same challenge. Scientific observation explains environmental change; ethnography reveals how people learn to notice and live with it. Recognising environmental intuition as the embodied outcome of cultivated attention shifts resilience research away from asking only what communities know towards asking how communities learn to perceive. This shift has implications not only for anthropology but also for marine science, coastal management, and interdisciplinary approaches to environmental change. Coastal resilience depends not only on what communities know about the sea, but on how enduring relationships with water educate attention, cultivate anticipation, and enable people to respond while environmental change is still unfolding.

Conclusion

This paper began by asking a deceptively simple question: how do experienced divers know when conditions have changed? The ethnography presented here suggests that the answer cannot be reduced to the observation of individual environmental indicators or to the accumulation of ecological knowledge alone. Rather, environmental judgement emerges through long-term relationships with the sea in which perception, bodily experience, memory, and social learning gradually become inseparable. Environmental intuition, therefore, is neither instinct nor an ineffable quality possessed by a select few. It is the embodied outcome of cultivated attention: a capacity that develops through continual engagement with dynamic marine environments.

By examining the everyday experiences of the *haenyeo*, this paper has argued that environmental intuition constitutes an overlooked dimension of coastal resilience. Existing discussions of Indigenous and local ecological knowledge have transformed understandings of how communities adapt to environmental change, yet they have largely concentrated on the knowledge that can be articulated, documented, and incorporated into environmental governance. The findings presented here suggest that equal attention should be given to the cultivation of perception itself. Before environmental knowledge can inform adaptation or management, environmental change must first be recognised. Resilience therefore begins not simply with knowledge, but with the education of attention.

The concept of water ontology provides one way of understanding this process. Rather than treating water as the passive setting within which ecological knowledge is acquired, this paper has argued that enduring relationships with water shape the conditions through which perception, judgement, and anticipation emerge. In doing so, it shifts attention away from viewing resilience solely in terms of responding to environmental change and towards understanding how communities cultivate the capacity to perceive change while it is still unfolding. This perspective also provides the conceptual foundation for the Blue Triangle as a framework for future comparative research into women's maritime knowledge across East Asia, while remaining attentive to the distinct histories and environmental contexts of the *haenyeo*, *hainü*, and *ama*.

The implications extend beyond anthropology. As marine environments become increasingly affected by climate change, biodiversity loss, and accelerating coastal transformation, no single discipline can adequately understand or address these challenges. Scientific monitoring remains indispensable for identifying environmental change and explaining its causes. Ethnography contributes something equally important: an understanding of how environmental change is perceived, interpreted, and acted upon within the everyday lives of communities whose relationships with the sea have been cultivated over generations.

The future of coastal resilience research will not be secured by choosing between scientific observation and Indigenous and local ecological knowledge. Rather, it depends upon recognising that long-term relationships with water cultivate forms of attention, perception, and anticipation that neither approach can fully understand in isolation. If marine science teaches us how oceans are changing, ethnography

reveals how people learn to notice that change while living within it. Bringing these ways of knowing into dialogue offers one pathway towards more adaptive, more inclusive, and ultimately more resilient coastal futures.

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Competing Interests

The author declares no competing interests.

Author Contributions

The author conceived and designed the study, conducted the ethnographic fieldwork, undertook the analysis and interpretation of the data, developed the conceptual framework, prepared the figures, and wrote, reviewed, and revised the manuscript. The author read and approved the final manuscript.

Ethics Approval and Consent to Participate

Ethical approval for this research was granted by the BAHSS Ethics Review Panel, University of Lancashire (Ref. BAHSS2 01163) prior to the commencement of the ethnographic fieldwork. The research was conducted in accordance with the approved protocol and the ethical principles of the American Anthropological Association, including informed consent, respect for participants, confidentiality, and the avoidance of harm. Informed consent was obtained from all participants involved in the research, and all fieldwork was undertaken in accordance with applicable local protocols, permissions, and research requirements.

Data Availability

Data Availability declaration: not applicable

Consent to Publish

Consent to Publish declaration: not applicable

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Footnotes

1. Namdal-ri is a pseudonym and does not refer to a real location in Jeju. The name has been altered for two reasons. First, it protects the anonymity of younger haenyeo who participated in this research and requested that their identities remain confidential; all personal names used throughout the paper are therefore pseudonyms. Second, it safeguards the specific field site where the 3D model was produced, helping to protect the location from unwanted external attention and ensuring the continued preservation of the site.
2. Han Soo-yeon, Kang Hae-jin, and Cho Mi-ja are pseudonyms used to protect the identity of a younger-generation haenyeo who requested anonymity.