Biocultural Diversity and Islandness: On human-geographical and typological approaches

Sun-Kee Hong
Institution for Marine and Island Cultures, Department of Liberal Arts, Mokpo National University
landskhong@gmail.com
https://orcid.org/0000-0002-3755-3683

Publication Information:
Received 14 October 2023, Accepted 13 November 2023, Available online 30 December 2023
DOI: 10.21463/jmic.2023.12.3.01

Abstract

Humans have long utilized the surrounding landscape and organisms as life resources and developed new species of organisms through cultivation. The utilization of biodiversity has played a vital role in advancing human culture, specifically regarding food and habitation. This accumulated knowledge on the ecosystem has transcended geographical boundaries of rivers, mountains, and seas, spreading to other countries where it has been adjusted or adopted. In addition, the languages and dialects of ethnic minorities, which comprise the biocultural diversity within the ecosystem, are becoming fragmented or disappearing as a result of syncretism due to impact of rapid westernization, urbanization, and development. Indigenous languages contain countless terminologies that reflect ecological characteristics of organisms and resources within a specific region, and if the ecosystem no longer exists, the language also disappears. Preserving and sustainably using indiscreetly-exploited natural ecosystems and biological resources is the way to protect and sustain the value of culture. Culture develops with high dependence on biological resources. World organizations such as IUCN, CBD, and UNESCO have already reported that the growing human population will increasingly rely on bio(resource)diversity. Like such, the relationship between biodiversity and cultural diversity, as demonstrated through flexibility, dynamics, and complementation observed during the interaction between these two paradigms, has emerged as a crucial model for achieving balance and coexistence necessary for human survival in the future. This paper will discuss the value of biocultural diversity, focusing on the relationship between geographical and typological characteristics of the island and seascape as well as the utilization of ecological resources. This study will further discuss how human geographical changes caused by socioeconomic influence within an island affect biocultural diversity and islandness through cases of island region in South Korea, Iriomote Island of Okinawa, and Pulau Madura, Indonesia.

Keywords

biocultural diversity, geography, islandness, typology, seascape

Biocultural Diversity and Islandness

Background

When development was of utmost priority in the past, humans have controlled nature to fulfill their desire of better living conditions. As a result, two big paradigms of biodiversity and cultural diversity have been utilized without any connection or link between them (International Conference on Biological and Cultural Diversity, 2010a, b). However, as human population grew and global environment deteriorated, the importance of biological resources continued to increase (Hong, 2007; Rozzi et al., 2013). Thus, global economic policies have increasingly shifted towards prioritizing biodiversity and the ecosystem service (Kim, 2019). Biocultural diversity is the dynamic result of the interaction between biodiversity, cultural diversity, and traditional knowledge within the ecosystem (Tsai, 2003; Bynum et al., 2009; Hong, 2011a; Michael et al., 2015; Hong, 2023). Moreover, biocultural diversity occurs within the balance between nature and culture and the interaction within the ecosystem. Thus, biocultural diversity is an indicator that can be used to evaluate the soundness of ecosystem health and the level of cultural vitality (Maffi, 2001; Loh and Harmon, 2005; Hong, 2014; Maffi and Ortixia, 2014; Sterling et al., 2017). Pretty et al. (2009) have classified and analyzed relevant properties of biodiversity and cultural diversity as "beliefs and worldviews, livelihoods and practices, knowledge bases and languages, and norms and institutions." In island regions, traditional knowledge has developed on "reading physical geography" (constellations, winds, waves, ocean currents, topography, vegetation, etc.) due to geographical attributes of being surrounded by an open body of water, the sea. Especially for life at sea, the direction of ocean currents and the strength of wind are important sources of knowledge that still play a vital role in connecting islands to continents or islands to other islands.

Korea, Japan, and Indonesia are prime archipelago countries in Asia with abundant number of islands. Through various exchanges at the sea, these countries have developed East Asia's marine culture, and play significant roles in driving the global economy in today's socioeconomic perspectives. Because of the rapidly changing global environment, the marine ecosystem that provides the basis for livelihood and life in island regions is changing, making it necessary to implement policies to address the vulnerability of marine ecosystem (Hong, 2012). In this sense, the resolution of "*Strengthening Biocultural Diversity and Traditional Ecological Knowledge in Asia-Pacific Island Regions*" adopted by the 5th World Conservation Congress (WCC) in September 2012 has important contents (IUCN Resolution 5.115) (Hong et al., 2014b; 2018). The resolution suggests that climate change, sprawling development, and pollution on islands and coasts can lead to rapid changes in the marine ecosystem, which in turn can threaten the balance between humans and nature. Moreover, the resolution proposes a global island policy based on biocultural diversity, which aims to conserve biodiversity in island regions that are highly susceptible to climate change and development while also ensuring sustainability of cultural resources.

2212-6821 © 2023 Institution for Marine and Island Cultures, Mokpo National University.
10.21463/jmic.2023.12.3.01 — https://jmic.online/issues/v12n3/1/

Table 1. Possible research topics associated with traditional ecological knowledge and biocultural diversity of island and seascape.

Traditional Ecological knowledge	Biocultural diversity
• Effect of climate (or weather) on changes in traditional ecological knowledge and changes in bioresources • Effect of cognitive system of residents on biodiversity and the ecosystem • Research on cognitive systems of fishermen (tide time, wind direction, fish spawning ground and cycles, place to collect catches, etc.) and local residents • Indigenous knowledge observed in the mode of resource (fishery and plants) acquisition • Indigenous knowledge observed in the process of resource utilization (preservation method, folk remedy, use of natural fertilizer, etc.) • Discovery of cognitive system and indigenous knowledge perceived through relevant natural phenomena (discovery of indigenous knowledge through experiences, such as foretelling of weather or good/bad harvest by observing natural phenomena)	• Correlation between cultural diversity and biological diversity • Biodiversity for survival of local community • Indigenous people's management of biological resources • Monitoring of periodical (seasonal) productive activity (for living) • Research on unique behaviors exhibited by local resident in productive activity for living and the resource acquisition process • Classification of resources in the cognitive system of local residents • Promotion of local industry through conservative development of native flora and fauna resources: horticulture of native plants, industrialization of medicine, development of products using native biological resources, etc. • Food diversity and products

Islandness and Landness

Even if islands belong to the same region or seascape, their attributes differ based on their distance from the land (i.e., neighboring city) or nearby islands (Tsai, 2003; Conkling, 2007; Baldacchino, 2020). In particular, islands can be classified into either big or small depending on their sizes. Living conditions vary greatly according to types of resources available. Thus, there are many cases where the uniqueness and identity of an island are determined by factors such as its geomantic topography, relation with the surrounding seascape, and types of marine resources. Conkling (2007) has defined islandness as a metaphysical sensation that arises from intensive experience associated with the island's physical isolation. In other words, even individuals who have relocated from another island or region will have some kind of perception for the island, which transcends distinctiveness of its unique culture.

According to Campbell (2009), unlike European islands, islands in the Pacific region are known to be vulnerable to climate, economy, and resources. Islands have maintained their identity by continuing disaster-reducing factors within the community to help provide active response towards severe environmental condition. This response has played a pivotal role in securing food in the island. Although practices to overcome physical isolation, such as surplus production, storage and preservation, agro-ecological biodiversity, supplementary food for famine, land use, etc.), settlement safety (preference for upland and resilient structure), and internal or external cooperation within community (material exchange between islands, control of consciousness and consumption) are disappearing due to land-connecting and urbanization, traditional island resilience continues to exist. Nearby land topography is one factor that determines the unique identity of islands. Physical topography of the sea (including width and depth and water, and flow velocity) also significantly influences it (Knapp, 2007; Kepel et al., 2023). Despite the proximity of an island to its neighboring island, there are many cases where the unique ecosystem and the culture of one island are affected by physical attributes of the marine region. Alfred Russel Wallace, an island biogeographer, has discovered distinctive characteristics in the form and distribution of organisms between islands and proposed the Wallace's Line (Whitmore, 1982), which runs through Bali, Lombok, and Sulawesi in Indonesia (Ali and Heaney, 2022; Hong, 2022b). The classification of islands varies greatly in terms of their spatial relationship within the seascape, including islands that are close or far from land, as well as islands that are high or low in altitude. 'Inner island and outer island' are also believed to have been formed not only through perceiving the island's geographic and typological characteristics, but also by considering its topography from the land (Ankei, 1988). Recently, the construction connecting land to an island or island to island, as well as the increasing frequency of socioeconomic exchanges between the land and the island, have led to the dilution of traditional concepts regarding physical perceptions of islands that were long prevalent in the past (Tsai, 2003; Park, 2022). The reduction of physical

distance between land and an island exhibits more characteristics of 'islandness', which encompasses both 'landness' and 'insularity', than the distinct trait of insularity alone in an island (Hong, 2022b). This study will examine concepts of islands such as 'inner and outer island', 'islands high or low in altitude', and 'islands close or far from land' to see what relationship exists in the seascape and topography and their implications. Upon examining both domestic and international cases, characteristics of these islands and their impact on islandness are analyzed.

Biocultural Heritages and Seascape

Islands are classified in various ways according to nature, such as their physical features and attributes of origin, culture, and available resources. According to the United Nations Environment Program (UNEP, 2014), islands are classified according to their height of topography, such as atolls, high-altitude or low-altitude islands, and raised coral reefs, or classified according to the cause of island topography formation, or sorted by their connection with a continent, or grouped by characteristics of volcanoes into continental islands and volcanic islands. Like Hawaii and Saipan, the Ulleungdo Island and Dokdo Island in Korea are volcanic islands, whereas the Jeju Island, like Taiwan, is a continental island. Above all, the biodiversity and native culture are the most significant values of an island. According to UNEP, "*the island area is very rich in endemic fauna and flora, which are vulnerable to human development and destruction. Although the island society is seeking ways to adapt to the natural environment, it faces the challenge of achieving sustainable development with limited island resources*." Like this, islands have unique biological resources. However, the reality is that the habitat is diminishing due to sprawling development. Madagascar is an island country with the highest number of endemic species in the world. An endemic species refers to a species that is found exclusively in one location but not found elsewhere. In addition, the island region is rich in biodiversity, isolated from the continent. It has undergone independent evolution. It possesses a unique island culture accordingly, serving as a repository of valuable organisms and cultural resources, as well as a land preserving the harsh fate and history of mankind. Many of these island heritages have been listed as UNESCO World Heritage Sites.

There are 3,383 islands in Korea (KIDI, 2022), with the majority concentrated in the Jeollanam-do Province, followed by provinces of Gyeongsangnam-do, Incheon, and Chungcheongnam-do. On the east coast, known for its gentle coastline, there are no large islands except for volcanic islands such as the Ulleungdo Island and the Dokdo Island. On the west and south coasts, tidal flats developed due to distribution of complex coastlines and islands. The west coast, in particular, has developed unique primitive fishing techniques such as the '*Doksal* (stone tidal net or stone tidal weirs)', which makes use of differences in tidal time (Lee et al., 2023). The islands of the west and south seas exhibit features of unique 'tidal flat islands', which can be found enclosed by seawater in freshwater regions or surrounded by tidal flats that become visible during low tide. Utilizing these dual characteristics of the island and the sea, island residents continue their way of life by alternating between bare-handed fishing in tidal flats and fishing in the sea (Hong, 2012). In addition, the majority of island regions in the southwestern sea have been reclaimed for rice farming or salt fields for hundreds of years. Using fluctuations in sea level, islands were reclaimed over an extended duration and cleared to cultivate rice and tidal flats were reclaimed to produce salt. Currently, bridges connecting the land and islands were installed to improve accessibility and allowing for a convenient daily life. The installation of '*Nodu*', handmade stone roads connecting islands, is also a biocultural heritage that has permeated the hard work of island residents. As such, the desperate struggle for survival has both shaped beautiful features of the island we see today and created its unique biological culture.

2212-6821 © 2023 Institution for Marine and Island Cultures, Mokpo National University.
10.21463/jmic.2023.12.3.01 — https://jmic.online/issues/v12n3/1/

The island is a companion to the sea. Through the island's streams and rivers, organic matter from the mountain flows into the sea and mixes in with tidal flats, nourishes the plankton, attracting large and small fish to gather and feed upon them. Depending on its size, an island is equipped with an ecosystem network of mountains, rivers, and seas. In other words, the island itself is an organically working ecosystem. Rainwater flowing from mountains soaks the forest. When filtered water flows out to the sea, nutriments from the forest are released into the seawater, which is why fish gather and live around the sea nearby a forest. Windbreak forest as a shelterbelt helps control the flow of these nutrients and prevents tsunamis and sea breezes. Various mangrove forests that are seen in Asian islands, such as Indonesia's small island coast, the Iriomote Island in the Okinawa Prefecture, and Taiwan, not only play an important role in preventing tsunamis, but also have recently become known as important places for blue carbon.

Recently, island residents are undergoing changes in their way of life as a result of climate change, human activities, and marine pollution in islands and seascapes (Kelman and Randall, 2018). The change in global environment suggests that cracks are developing in the balance of the natural ecosystem (Nakashima and Roúe, 2002), particularly impacting the way of life of island residents (United Nations Environment Programme, 2014.). Islanders, who have relied on resources of the island and the sea, have effectively utilized marine ecology. They have used physical characteristics of marine ecology, such as attributable changes in the topography of tidal flats due to tidal range, have developed terraced rice paddies or wells for farming using the island's insufficient water resources, or have produced sun-dried salt using hot sunlight in midsummer. In particular, island residents have been living a sustainable life by utilizing the natural circulation process. For example, life on an island is closely related to nature, such as catching octopus with bare hands in tidal flats during low tide or creating a coastal shelterbelt to mitigate damage caused by sea breezes to villages. As such, the island is where a unique culture utilizing biological resources is developed and passed down. Therefore, islands where biological activities are sublimated and transmitted into local culture are representative places that show the diversity of biological culture. However, the development of urbanization has led to the reclamation of tidal flats and their subsequent use for various purposes, causing significant damage to mangrove forests that once formed coastal ecosystems. The wind power and solar power facilities created to address climate warming ironically have resulted a situation where tidal flats, the natural carbon storages, are reclaimed and mangrove wetlands are damaged for development.

Topography and Islandness

The basic feature of an island is the presence or absence of a water body encompassing the island. According to the United Nations Conventions on the Law of the Sea (UNCLOS), an island is defined as being geographically surrounded by the sea, with its land areas exposed even at high tide. In general, when classifying islands, there has been a tendency to categorize them based on the land portion of the island. However, in recent years, they are often classified based on characteristics of the seabed area between the island and another. In particular, islands are classified based on marine geology and environment factors, including the connectivity between continental shelves, the connectivity of volcanic belts, and surrounding seawater temperature.

The definition of island topography can be divided into a traditional method and a modern (internationally used) concept of island topography. Usually, the traditional classification of an 'island' is based on the region where local residents acknowledge and call it an island, combined with factors such as the shape, distance, and resources of the island. To illustrate, the meaning of the concept of "しま (island)"in Japan, an island country, may differ from the ideological perception of "island" held by Koreans, a peninsula country, as well as perceptions in continental countries. Nevertheless,

2212-6821 © 2023 Institution for Marine and Island Cultures, Mokpo National University.
10.21463/jmic.2023.12.3.01 — https://jmic.online/issues/v12n3/1/

it is believed that this traditional method of island recognition (traditional ecological knowledge) plays a significant role in modernizing the concept. The most important thing in determining characteristics of an island is related to the formation of the island. According to the fundamental source of formation and the related topography (https://education.nationalgeographic.org/resource/island), islands can be classified into six categories: continental, tidal, barrier, oceanic, coral, and artificial.

Continental islands are those once connected to a continent. These still exist on the continental shelf. Some are formed by the separation of continents. In most cases, islands formed from the division of a large continent about 250 million years ago due to diastrophism. Examples of continental islands include Greenland and Madagascar. In other cases, continental islands may form due to weathering or erosion causing connections to the mainland to weaken or disappear. Tidal islands are a specific type of continental island where the land connecting the island and the mainland remains partially intact and becomes submerged in water during high tide. The French Island of Mont Saint-Michel is a famous example of a tidal island. Islands situated in the southwestern sea of Korea are continental islands that closely resemble tidal islands. Barrier islands are typically narrow. They run parallel to the coastline. Some barrier islands are part of the continental shelf consisting of sediments (sand, silt, and gravel). Barrier islands are separated from the coast by either lagoons or sound. Barrier islands are named as such because they function as barriers, separating the sea from the mainland. They help protect coastal areas from direct damage by storm waves and winds. Also known as oceanic islands, volcanic islands are formed through volcanic eruptions on the seabed. Oceanic islands, regardless of their height, are commonly referred to as high islands. On the other hand, continental and coral islands, which can be hundreds of meters higher than high islands, are called low islands. Coral islands are low islands formed in warm water by small sea organisms known as corals. These organisms produce a hard outer skeleton made of calcium carbonate. This substance, known as limestone, is similar to shells of sea creatures such as clams and mussels. Lastly, artificial islands are those created by humans. Artificial islands are created using various methods depending on their purpose. These islands can be formed by expanding a section of existing islands through drainage of water. This allows more land for development or agriculture.

High Island and Low Island

Ocean islands formed by tectonic activities such as volcanoes can be classified into high and low islands based on their varying altitudes above sea level. A low island is typically formed by coral reefs or sand. A high island is an island that has been raised due to volcanic activity. Vertical characteristics of these islands are important for determining the availability of resources such as groundwater storage for human settlement. According to Ankei (1988), islands that have numerous high-altitude mountains tend to possess a greater groundwater capacity. Indeed, their ability to store water quantities that may escape due to the influence of various vegetation colonies greatly helps the formation of village after residents enter the island. In some low islands in Okinawa, like Yoronjima, groundwater serves as the primary water source for agriculture (Takahashi, 2022). However, due to the relative low water resource capacity, an underground water storage tank has been installed. It is being operated.

Southwestern islands of Korea have a lower altitude than the inland. In the case of Shinan County, most inland sea islands exhibit low altitudes ranging from 200 to 300 m above sea level. However, islands in Heuksan-myeon show high altitudes ranging from 400 to 600 m. Although not consistent with the ‘concept of high and low islands’ formed by volcanic activity and coral, respectively, in terms of island classification, it can be reasonably said that islands in the inland sea are low islands while islands in the open sea are high islands based on their geographical characteristics.

Islands Close to or Distant from Mainland

The Theory of Island Biogeography (MacArthur and Wilson, 1967) can be explained in two main parts. First, large islands generally harbor a greater number of species than small islands. Second, islands that are closer to the continent harbor a greater number of species than distant islands. With these two core contexts, the process of immigration by island species and extinction has been theorized. Among organisms living on continents or large islands, many may move to nearby or neighboring islands, leading to an increase in both variety and the number of species (Whittaker and Fernandez-Palacios, 2007). This theory has recently been judged to have many errors. However, the theory of island biogeography can be utilized for park planning and urban planning in the context of landscape planning (Tsai, 2003), where it is important to secure large and small parks (green space areas as biological habitat) in harmony since ecological functions vary depending on the size of a green area within the park. Moreover, it serves as a theoretical foundation for designating protected areas with exceptional biota.

Outer and Inner Islands, High and Low Islands

In island regions of Korea's southwestern sea, there are specific terms used to distinguish different boundaries within these island's regions, such as 'outer island' and 'inner island', as well as 'upper island' and 'lower island' (Hong, 2011b). This classification of boundaries can be interpreted as traditional classification of the seascape that existed before shipping was modernized. This classification might be influenced by socioeconomic factors, such as utilization of the seascape by traditional ships and logistics distribution. It might also be determined by the direction of the waterway, which is affected by tidal flats (large tidal valleys), characteristics of the southwestern sea, and the ocean current. Recently, this traditional perception of island boundaries has also significantly changed due to changes in shipping route caused by the development of ships, a variety of logistics and distribution routes, changes in transportation rights within island regions from the construction of bridges connecting land and islands (Park, 2022), as well as changes in ocean currents and ecosystems resulting from climate change.

Historical context also exists on both outer and inner islands of the Iriomote Island located in the Okinawa Prefecture, Japan (Ankei, 2007). To the west of Iriomote Islands, there are two small islands: *Uchipanari*/*Uchibanari* (an inner island), and *Fukapanari/Hokabanari* (an outer island). In Uchipanari Island, the Nariya village had large rice paddies. Fukapanari Island has a steep topography. Keraikedagusuku Yosho, a samurai, entered the island in the late 15th century and constructed a fortress on a cliff. Then he moved to Sonai and became the head of a Samurai clan. His descendants held positions as officials, ruling the Yaeyama Islands. Fukapanari utilized slash-and-burn fields for cultivating sweets potatoes and millet in the Sonai region. Uchipanari, with a highly active coal-mining industry, was the most densely populated island in Okinawa Prefecture during World War II (300 people/km^2). After the war, coal mines were abandoned. They were all used as grazing areas for cattle. '*Panari*' is defined as distant. However, it does not necessarily mean to be physically distant. To the east of Iriomote Island, there are several islands officially called Aragusuku Island, although island residents refer to them as *Panari*.

During the rule of the Ryukyu Kingdom (1429~1879), men (15-50 years old) of low islands were forced to cultivate in Iriomote to pay their capitation tax of rice (personal communication from Ankei Y.). After the rule was over in Meiji 12 (1879), there happened land ownership or rent of the paddies. Islanders of Hatoma Island were denied the access to the paddies in Iriomote just facing their island by the people of *Uibaru*, of Iriomote (probably after Meiji 12), and were forced to move to the remoter east-ward. But they worked very hard to make the paddy even more productive than their former land. Because of this memory, the famous 'Hatoma Bushi', a folk song of the island sings:

2212-6821 © 2023 Institution for Marine and Island Cultures, Mokpo National University.
10.21463/jmic.2023.12.3.01 — https://jmic.online/issues/v12n3/1/

> *If Uibaru people come running,*
> *let us give them liquor in the caps of acorns of Quercus miyagii (instead of usual cups).*

This part is not usually printed (Teraoka, 2003), but Hatoma people still seem to have some rivalry against Iriomote people.

Islands in the north are shown as '*Kanchi-Kamiji*' using Chinese characters, while islands in the south are shown as '*Sïmuji/Shimoji*'. These two regions are separated from each other. In Ainu, '*Ri-sir/ Rishiri*' means high island, while '*Repun-sir/Rebun*' means offshore island. As an island country, Japan is divided into the Pacific region and the East Sea region (known as the Sea of Japan in Japan) with Honshu in the middle. It refers to the region within the 'Seto Inland Sea' as Setouchi. Unlike seascapes of the Pacific or East Seas, this marine region does not have strong waterways, although it has numerous islands with abundant nutrients. As such, it is determined that the distinction between the inner island and the outer island starts from a small village and extends to encompass the entire region and seascape. The upper and lower islands may also be considered artificial boundaries formed through the use of waterways and wind lines for logistics and trade. However, as vessels modernize and transportation methods diversify, these boundaries are also changing.

Overcoming Vulnerability

Climate change affects all areas of society, economy, and culture, including natural ecosystems. In the case of water resources in particular, global warming can worsen water quality and lead to a shortage of surface water and groundwater, ultimately decreasing the availability of water resources (Kelman and Randall, 2018; Hong and Grydehøj, 2022; Kepel et al., 2023). This could potentially exacerbate the burden on water resources with a more profound impact on drought-stricken regions. Rising sea levels can also lead to a decrease in freshwater resources and destroy infrastructure for living due to salinization in coastal regions. According to a report by the Intergovernmental Panel on Climate Change (IPCC AR6, 2022), more than 100 million people are expected to face water shortages in 20 years and at least 1.1 billion to 3.2 billion will face water shortages in 70 years due to global warming. In particular, hundreds of millions of Africans and thousands of South American residents are expected to suffer from water shortages within the next 20 years, while over 1 billion people in Asia face similar challenges by 2050. The calculation is based on the assumption that greenhouse gas emissions will persistently increase at the current rate. This is because as global warming progresses, the amount of water evaporation will increase with rising temperatures, consequently resulting in the reduction of water in rivers, lakes, and groundwater. This problem of water shortage on islands due to climate change is worsening at an accelerated rate due to the development of tourist attractions. In the island region around Jakarta (e.g., Pulau Pari, Pulau Tunda), due to rising sea levels, the seawater flows backwards, making the water in coastal residential areas saline, which is impossible to use as drinking water (Kepel et al., 2023). As the number of tourists increases, the shortage of freshwater resources also increases rapidly, eventually forcing coastal island residents to move to mountains (Keppel et al., 2014).

Excluding certain islands that are rich in vegetation, the majority of islands in the southwestern sea of Korea possess secondary forests. They are generally dry as a result of their low topography and geological characteristics. Nevertheless, in general, the higher the mountain and the richer the forest, the greater the water storage capacity to ensure the availability of water resources. Some island regions, like Cheongsando Island in Wando-gun, have made

efforts to address the water shortage by developing terraced rice paddies and establishing a number of wells in villages. In terms of topography, the smaller the area and the lower the island's altitude, the higher the likelihood of water shortages to occur (Hong et al., 2018). According to Ankei (1988), residents of islands with these characteristics rented land on larger surrounding islands to farm. They were fortunate if they were able to find a nearby large island or landowner willing to lend land. If that was not the case, they had to look further. In this case, they had to live a life of 'temporary migration', residing on a large island during the cultivation period. The community was responsible for protecting the remaining families in this situation. Taketomi Island of Okinawa Prefecture is a low island. Because its residents were unable to farm due to a shortage of water resources, they had to find land that had no sphere of influence in the nearby Iriomote Island and farmed there (Takahashi, 2022). Although Taketomi Island is short on resources because it is a small and low island, its island residents demonstrate a strong sense of unity. They are willing to reclaim and inhabit the land surrounding larger neighboring islands (personal comm.).

An island similar to the Taketomi Island is the Pulau Madura in Indonesia. This island is large with a lot of resources (smaller compared to the main island of Java). The sense of unity among island residents was strong and resistant to external factors. However, it actively accepted the advanced culture of Java Island such as rice paddy farming to make the island not only rich, but also to serve as an active trade hub during the East India Company era. Recent construction of a landing bridge between Pulau Madura and Surabaya, the second capital city, has resulted in an increase in the number of tourists, thereby altering the cultural identity of multiple islands (Hong, 2022b). As an island's method of transportation changes, so does the existing way of life on the island (Kakazu, 2012). This indicates a change of the traditional foundation, along with convenience. The development aimed at revitalizing an island's economy actually contributes to making island residents more vulnerable (more dependent on capital). According to Campbell (2009), the way to overcome vulnerability of various islands is a characteristic of islandness, which Campbell claims as 'traditional disaster reduction measures'. In the Pacific Island region, in particular, overcoming extreme situations such as cyclones, earthquakes, and achieving self-sufficiency of food rely on traditional potential and knowledge of the community (Nakashima et al., 2012). Thus, vulnerability does not demonstrate characteristics of an island society or community. An island is not a vulnerable place, but rather a place with resilience (Keppel et al., 2014).

Conclusion

In terms of topography, islands with high altitude or large islands do not necessarily imply richness in resources. Like the past, in the era of utilizing only resources available within the island itself, the boundary between the island and the seascape was determined by figurative characteristics such as large or small island, close to distant island, and low or high island (Knapp 2007). However, in the contemporary context, these traditional concepts are changing greatly (Hong 2023). The island's existence is determined by boundaries set by humans rather than those set by nature. Various phenomena of change in human geographic context, including changes in physical boundaries, are having impact on the psychological identity of islands, consequently resulting in changes to their biocultural diversity and capacity. The phenomenon of well-rounded change on islands and associated processes are referred to as 'islandness'. With rapid progress of globalization, modernization, and urbanization, the concept of self-sustaining and traditional islands and boundaries of seascapes are being dismantled (Deidun, 2010; Kakazu, 2012; Hong, 2022b). The concept of "isolation" is weakening and the concept of "insularity" disappearing gradually. It is now time to create a new sea boundary in accordance with socioeconomic changes (Park, 2022). While it may vary depending on the region and environment, the application of terms of resilience or vulnerability to an island might have originated from the perspective of the land to maintain changing boundaries (Hong 2022a). To overcome the vulnerability of an island and increase its resilience, it is

essential to consider the relationship between the island's form and islandness (Deidun, 2010; Hong, 2022b). It is undeniable that humans and nature interdependently interact and supplement one another within the ecosystem. However, it is crucial for the government, scholars, citizens, and experts to recognize that this connection is declining as a result of the rapidly changing global environment, sprawling development, and decreasing biodiversity. In particular, safe production and supply of biodiversity and biological resources, which play a vital role in cultural formation in climate crisis, as well as a healthy ecosystem are closely related to human survival (Rapport, 2006). Maffi (1998, 2001) has stated that biocultural diversity encompasses every aspect related to the diversity of life expressed biologically, culturally, and linguistically. This relationship is said to be interconnected (or mutually evolving) within a complex socio-ecological adaptation system (Maffi and Woodley, 2010; Rozzi, 2013). This interrelationship between biodiversity and cultural diversity also occurs within a space on land or sea known as the 'landscape' (Hong et al., 2014a; Saito et al., 2020). The quality and amount of diversity vary depending on the scope and size of this space (Baldacchino, 2020; Berkes et al., 2000). In conclusion, as seen from the diachronic perspective of environmental history, human survival in the future will rely more on biodiversity. It is especially clear that ecological resilience and sustainability in island regions will be used as a new way of coexistence to support human society in the Anthropocene (Nakashima and Roúe, 2002; Hong et al. 2014b; Kelman and Randall, 2018).

Acknowledgements

This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2020S1A6A3A01109908). I would like to acknowledge that I received advices from Professor ANKEI Yuji (Institute for Biocultural Diversity, Japan) regarding the Iriomote and Ainu's language toponymy.

This paper was compiled as a collaborative output of the discussions and activities by LINKAGE project of The Research Institute for Humanity and Nature (RIHN). The Peer Review process of the special section has been simplified.

References

Ali, J.R., Heaney, L.R., 2022. Alfred R. Wallace's enduring influence on biogeographical studies of the Indo-Australian archipelago. J. Biogeogr. 00: 1-9. (DOI: 10.1111/jbi.14470)

Ankei, Y. 1988. Interchange between High and Low Islands: Barter of Paddy and Ash in Taisho Era Yaeyama, Ryukyus. Japanese J. Ethnol. 53(1): 1-30.

Ankei, Y. 2007. Agrarian culture of Iriomote Island: the discovery of routes on the sea. Hosei University Press, Tokyo.

Baldacchino, G., 2020. How far can one go? How distance matters in island development. Isl. Stud. J.15(1): 25-42 (DOI:10.24043/isj.70)

Berkes, F., J. Colding, C. Folke, 2000. Rediscovery of traditional ecological knowledge as adaptive management. Ecol. Appl. 10(5): 1251-1262.

Bynum, N., Sterling, E., Weeks, B., Gómez, A., Roosenburg, K., Vintinner, E., Arengo, F., Domroese, M., Pearson, R. 2009. Emerging Topics in the Study of Life on Earth: Systems Approaches to Biological and Cultural Diversity. Sci. Edu. Civic Engag. 2(1): 38-55.

Campbell, J. 2009. Islandness, Vulnerability and Resilience in Oceania. Shima 3(1): 85-97.

Conkling, P. 2007. On Islanders and Islandness. Geogr. Rev. 97(2): 191-201.

Deidun, A. 2010. Challenges to the conservation of biodiversity on small islands: The Case of the Maltese Islands. Intern. J. Art. Sci. 3(8):175-187.

Hong, S.K. 2023. The future of the seascape and the humanity of islanders – Focusing on the Korean Archipelago. in: Carnell, R., Mounsey, C., (Eds.), Stewardship and The Future of the Planet: Promise and Paradox. Routledge Advances in the History of Bioethics. Routledge (DOI: 10.4324/9781003219064-12).

Hong, S.K. 2022a. Seascape restoration for climate changes, resilience and a sustainable future. in: Pungetti, G., (Ed.), Rutledge Handbook of Seascapes. Routledge (DOI: 10.4324/9780429273452-35).

Hong, S.K. 2022b. Bridge and Islandness: The case of Suramadu Bridge in Indonesia. in: Abdullah, S.A., Leksono, A.S., S.K. Hong (Eds.), Conserving Biocultural Landscapes in Malaysia and Indonesia for Sustainable Development. Springer. pp. 63-76. (DOI: 10.1007/978-981-16-7243-9_6)

Hong, S.K. 2014. Philosophy and Background of Biocultural Landscapes. in: Hong, SK., Bogaert, J., Min, Q. (Eds), Biocultural Landscapes. Springer Dordrecht. https://doi.org/10.1007/978-94-017-8941-7_1

Hong, S.-K. 2012. Tidal-flat islands in Korea: Exploring biocultural diversity. J. Mar. Isl. Cult. 1: 11-20.

Hong, S.K. 2011a. Biocultural diversity and traditional ecological knowledge in island regions of Southwestern Korea. J. Ecol. Field Biol. 34(2): 137-147.

Hong, S.K. 2011b. Eco-cultural diversity in island and coastal landscapes: conservation and development, in: Hong, S.K., Wu, J., Kim, J.E., Nakagoshi, N. (Eds.), Landscape Ecology in Asian Cultures, Springer-Tokyo, pp.11-28.

Hong, S.K. 2007. Linking man and nature landscape systems: landscaping blue-green network. in: Hong, S.K. et al. (Eds), Landscape ecological applications in man-influenced areas: linking man and nature systems. Springer, Dordrecht, pp. 505-523.

Hong, S.K, Grydehøj, A. 2022. Sustainable Island Communities and Fishing Villages in South Korea: Challenges, Opportunities and Limitations. *Sustainability* 14(24):16657. https://doi.org/10.3390/su142416657

Hong, S.K., Lee, G.A., Cho, M.R., Kim, J.E., Won, Y.T., Han, E.S., Park, H.Y., Samantha, C.H. 2018. Interdisciplinary Convergence Research Design on Island Biocultural Diversity - Case Study in Wando-gun (County) Island Region, South Korea. J. Mar. Isl. Cult. 7(1): 12-37. https://doi.org/10.21463/jmic.2018.07.1.02

Hong, S.K., Bogaert, J., Min, Q. 2014a. Biocultural Landscapes. Springer Dordrecht.

Hong, S.K., Maffi, L., Oviedo, G., Mastuda, H., Kim, J.E. 2014b. Development and Vision of Island Biocultural Diversity Initiative. in: Hong, SK., Bogaert, J., Min, Q. (Eds.), Biocultural Landscapes. Springer Dordrecht. https://doi.org/10.1007/978-94-017-8941-7_14

IPCC AR6. 2022. Climate Change 2021: Impacts, Adaptation and Vulnerability. IPCC: Geneva, Switzerland.

International Conference on Biological and Cultural Diversity. 2010a. Programme for diversity for development- development for diversity, Montreal, 8–10 June 2010, 8p.

International Conference on Biological and Cultural Diversity. 2010b. Working document on a proposed joint programme of work on biological and cultural diversity lead by the Secretariat of the Convention on Biodiversity and UNESCO, 2010 June 8-10, Montreal.

Kakazu, H. 2012. Island Sustainability: Challenges and Opportunities for Okinawa and Other Pacific Islands in a Globalized World; Trafford: London, UK, p. 297.

Kelman, I., Randall, J.E. 2018. Resilience and sustainability. In The Routledge International Handbook of Island Studies; Routledge: London, UK, pp. 353–367.

Kepel, T.L., Solihuddin, T., Risandi, J., Daulat, A., Heriati, A., Mustikasari, E., Mardiany, Hong, S.K., 2023. Water Security in Tunda Island, Banten Indonesia: Potency and Threat. J. Mar. Isl. Cult. 12: 1-16. DOI: 10.21463/jmic.2023.12.1.01

Keppel, G., Morrison, C., Meyer, J-Y., Boehmer, H.J. 2014. Isolated and vulnerable: the history the history and future of Pacific Island terrestrial biodiversity. Pacific Conserv. Biol. 20(2): 1-10.

KIDI, 2022. Current status of Korea's islands in 2022. Ministry of the Interior and Safety, Republic of Korea.

Kim, J.-E. 2019. Traditional ecological knowledge and sustainability of ecosystem services on islands: A case study of Shinan County, Jeollanamdo, Republic of Korea. J. Mar. Isl. Cult. 8: 28-35

Knapp, A.B. 2007. Insularity and island identity in the prehistoric Mediterranean. in: Antoniadou, S., Pace, A. (Eds.), Mediterranean Crossroads. The David Brown Book Company. pp. 37-62.

Lee, K.-A., J.-E. Kim, S.-K. Hong. 2023. Historical, Geographical, and Biocultural Values of 'Doksal', Korean Stone Tidal Weirs. J. Mar. Isl. Cult. 12(3): (in press)

Loh J, Harmon, D. 2005. A global index of biocultural diversity. Ecol. Indic. 5(3):231–241

MacArthur, R.H., Wilson, E.O. 1967. The Theory of Island Biogeography, Princeton: Princeton University Press

Maffi, L. 2001. On Biocultural Diversity. Linking Language, Knowledge and the Environment, Washington & London: Smithsonian Institution Press.

Maffi, L, 1998. Language: A resource for nature. Nature and resources. UNESCO J. Env. Nat. Res. Res. 34(4):12-21.

Maffi, L., Ortixia D., 2014. Biocultural diversity toolkit. Vol.1 Introduction to Biocultural Diversity. Terralingua.

Maffi, L., Woodley, E., 2010. Biocultural diversity conservation - A global sourcebook, earthscan, London, p.282.

Michael C. G., McCarter, J., Mead, A., Berkes, F., Stepp, J.R., Peterson, D., Tang, R., 2015. Defining biocultural approaches to conservation. Tren. Ecol. Evol. 30(3): 140-145.

Nakashima, D.J., Galloway McLean, K., Thulstrup, H.D., Ramos Castillo, A. and Rubis, J.T. 2012. Weathering Uncertainty: Traditional Knowledge for Climate Change Assessment and Adaptation. Paris, UNESCO, and Darwin, UNU, 120 pp.

Nakashima D, Roúe M. 2002. Indigenous knowledge, peoples and sustainable practice. in: Timmerman, P. (Ed.), Social and economic dimensions of global environmental change, vol 5. Wiley, Chichester, pp 314–324

Park, S.-H. 2022. Changing island society following the opening of the island bridge and Sustainable Development of Island Society of Korea. J. Mar. Isl. Cult. 11: 115–127.

Pretty, J., Adams, B., Berkes, F., de Athayde, S. F., Dudley, N., Hunn, E., Maffi, L., Milton, K., Rapport, D., Robbins, P., Sterling, E., Stolton, S., Tsing, A., Vintinner, E., Pilgrim, S. 2009. The Intersections of biological diversity and cultural diversity: Towards integration. Conserv. Soc. 7(2), 100–112. http://www.jstor.org/stable/26392968

Rapport, D.J, 2006. Sustainability science: An ecohealth perspective. Sustain. Sci. 2:77-84.

Rozzi, R., 2013. Introduction to integrating philosophy and ecology: Biocultural Interfaces. in: Linking Ecology and Ethics for a Changing World: Values, Philosophy, and Action, DOI: 10.1007/978-94-007-7470-4_1

Rozzi, R., Pickett, S.T.A, Palmer, C., Armesto, J.J., Callicott, J.B., 2013. Linking Ecology and Ethics for a Changing World: Values, Philosophy, and Action. Springer Dordrecht. 377p.

Saito, O., Subramanian, S.M., Hashimoto, S., Takeuchi, K. 2020. Introduction: Socio-ecological production landscapes and seascapes. in: Saito, O. (Ed.), Managing Socio-Ecological Production Landscapes and Seascapes for Sustainable Communities in Asia. Springer: Berlin/Heidelberg, Germany, pp. 1–10.

Sterling, E.J., Filardi, C., Toomey, A. et al. 2017. Biocultural approaches to well-being and sustainability indicators across scales. Nat. Ecol. Evol. 1: 1798–1806. https://doi.org/10.1038/s41559-017-0349-6

Takahashi, S. 2022. Spring water and biocultural diversity in Ryukyu Islands. Tren. Sci.. 27(1): 50-55.

Teraoka, M. 2003. A Study of Yaeyama Dance "Hatoma Bushi". Kokugakuin Junior College Kiyou 20: 157-171. https://doi.org/10.24626/kokutanb.20.0_A157

Tsai, H-M., 2003. Island Biocultural Assemblages - The Case of Kinmen Island. Geogr. Ann. 85 B (4): 209-218.

United Nations Environment Programme 2014. Guidance Manual on Valuation and Accounting of Ecosystem Services for Small Island Developing States. https://wedocs.unep.org/handle/20.500.11822/9341

Whitmore, T.C., 1982. Wallace's Line: A result of Plate Tectonics. Annal. Misso. Bot. Gard. 69(3): 668-675. http://www.jstor.org/stable/2399087

Whittaker, R.J., Fernandez-Palacios, J.M., 2007. Island Biogeography-Ecology, Evolution, and Conservation, Oxford University Press.