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Tidal-flat islands in Korea: Exploring biocultural diversity

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Abstract Korea's islands are mostly located along its western and southern coasts. The majority of these islands fall under the category of tidal-flat islands. More to the point, one of the main geographical and topographical characteristics of Korean islands is that they are surrounded by tidal flats. Therefore, Korean islands boast ecologically and biologically unique characteristics, as well as diversity, that set them apart from islands in other areas. Tidal flats are a virtual treasure trove where one can find various marine organisms. Local residents have been able to adjust to their environment by making use of the organisms found in tidal flats and the characteristics of islands. This has led them to create a unique island and maritime culture. To this end, the study of island culture requires not only an astute understanding of the ecological basis, biological process and human activities which become the background for cultural creation, but also of the interactions between these elements. Korea's island culture was created amidst a unique maritime environment characterized by the achievement of spatial harmony between the tidal flats and islands. This cultural structure can be expected to continue for as long as the balance in terms of the ecosystem is preserved. © 2012 Institution for Marine and Island Cultures, Mokpo National University. Production and hosting by Elsevier B.V. All rights reserved.

Introduction

Islands are not isolated in either a biological or ecological manner. Islands are open spaces surrounded by water. The perceived isolation of islands is nothing more than a notion rooted in man's process of ecological adaptation. As cultural diffusion is the result of man's adaptation to the natural environment, the unique cultural diversity of a certain region can be seen as a reflection of its natural environment. To effectively

understand the culture of a region, it is necessary to consider its natural environment, such as its geology, topography, and ecology (Beller et al., 1990; Maffi and Woodley, 2010; Wu, 2011). While the ecological environment of oceans and islands was seen by inland society as places for adventures and conquest, it provided resources essential to the life and culture of residents in coastal areas. Furthermore, while peninsulas were regarded by island people as pathways to inland areas, inland people viewed them as a source of the resources (e.g. vessels and food) needed to conquer the distant seas and islands. To this end, the lifestyle of man at sea was dependent on the eco-geographic characteristics of the islands and peninsulas which connected the island and inland areas (Hong, 2011b). The behavioral patterns associated with man's adjustment to a specific ecological environment have led to the creation of various life cultures. The cultural behavior of man on islands and oceans not only has its roots in the desire to make use

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of the ecological environment, but also greatly influenced the mutual-evolution of organisms and man (Brown et al., 2005).

As such, the ecological environment of islands and oceans and the cultural behavioral patterns of man can be regarded as being intricately intertwined with one another. However, contrary to the Okinawa islands in Japanese Archipelago, Italian and Greek islands in the Mediterranean, Malay Archipelago in Indonesia, and the Aleutian islands in Alaska, very few eco-cultural studies related to the ocean or humanities-based reviews of the environmental history of Korea, a peninsular country surrounded by the sea on three sides that is made up of over 3,400 islands (Dadohae), have been conducted. The ecological complexity created by interactions between man and nature, and the balance between, and diversity of, ecology and culture which emerged during the process of environmental adaptation have either been expanded and reproduced as the chain linking together islands, peninsulas, and inland areas, or have been extinct based on the peninsula effect. This can be perceived from the vantage point of the history of the maritime environment or from the island bio-geographic viewpoint. Korea's Dadohae culture is a broad cultural space that can be used to better comprehend the endless ecological behaviors of man vis-à-vis the ocean (Hong, 2011a).

Historical materials and relics have made it amply clear that the proper use of island resources has been closely related to the survival of island residents (Berkes et al., 2000; Hess, 1990). Easter Island has been identified as a prime example of man's reckless use of resources, recklessness which led to the destruction of the local culture and the extinction of human life on the island. Meanwhile, although the Mediterranean countries of Greece and Italy, Middle Eastern nation of Lebanon, and England were heavily forested countries in the past, their thickly wooded forests disappeared amidst the construction of vessels used for the purpose of maritime wars and colonial rule. Anthropological studies and a look at ecological history have left us well aware that the national traits of countries with forests and deserts, as well as their lifestyles and cultures, are clearly different from those of other nations. As such, an understanding of the ecology of islands becomes the scale that is used to measure their future cultural legacy. The development of a rationale for the past and current environments that is based on indigenous knowledge regarding the uses of the natural environment and biological resources of islands and the study of the influences of man on the environment should be the main items on the agenda when it comes to overcoming the ecological crisis which mankind currently faces on this island known as earth. Landscape ecology and eco-geology are characterized by a sense of consilience which allows them to simultaneously connect man's land use with ecosystems both in the past and present, with the cultural spaces created within the broad spatial scope that exists between regions (Delcourt and Delcourt, 1992; Nassauer, 2005; Hong et al., 2007; Wu, 2011). Landscape ecology and eco-geological based studies on islands both at home and abroad have to date proved unsatisfactory. Of particular importance has been the relative absence of joint exchanges with those engaged in the field of humanities. It is essential at the academic level that consilience-based studies on the interactions between man and nature based on the ecological culture of islands and peninsulas be conducted. Such an

approach based on the past and present will enable us to better predict the future of the eco-environment.

Generally speaking, islands are viewed as being characterized by isolation. However, on the other hand, islands also play the role of a cultural filter that sifts through the various heterogeneous cultures emanating from the outside via maritime routes, and also serve as the ecological membrane through which selective communication with the inland areas becomes possible. The theory of island biogeography maintains that depending on geological characteristics such as their distance from inland or peninsula areas, distance from other islands, size and shape, islands can in effect serve as the source or sink of organisms (MacArthur and Wilson, 1967). The diffusion of culture can also be viewed from the ecological standpoint. This is closely related to not only simple humanities-based suppositions, but also the cultural diffusion and conveyance of indigenous knowledge. For the most part, Shinan-gun in Jeonnam Province is made up of tidal-flat islands. The islands attached to Heuksan-myeon boast more unique cultural and ecological characteristics than the other islands in Shinan-gun. Meanwhile, the islands along the Dadohae area in Shinan-gun boast clear differences depending on whether they are surrounded by the 'ocean' or 'tidal-flats' (Fig. 1). The indigenous knowledge of islands becomes different, changes, and evolves in accordance with the environments that surround them. One can apply ecological suppositions as part of a humanities-based introspection on the cultural differences between 'islands surrounded by the ocean' and 'islands surrounded by tidal-flats', and this even though we may be talking about the same island.

Given the characteristics of islands such as Hong Kong in Asia and Hawaii in the Pacific Ocean, as well as of many islands in the Mediterranean and Aegean Sea, one cannot simply conclude that all islands are characterized by isolation. In addition, islands such as Wando island, which was home to Cheonghaejin, have a history of serving as a source of culture and resources. Isolation allows islands to create unique cultures. It also makes possible the exchange of such cultures via the sea. We can see how the destiny of islands and mankind was shaped by the manner in which the people who populated isolated islands such as Easter island, Hawaii, and the Galapagos Islands in the Pacific Ocean used the resources of these islands. The conservation and sustainable use of the limited resources associated with the natural environment and land in Korea's Dadohae area is predicated on the holding of an in-depth discussion on the types of roles required. The Dadohae area near Shinan-gun was recently designated as the UNESCO Shinan Dadohae Biosphere Reserve (SDBR) (Lee et al., 2010; Hong, 2011a). Korea may very well be the last place where maritime organisms in tidal flats are collected using bare-handed fishing techniques. The process of catching octopuses does not end with the collecting of these marine organisms, but also involves the mixing of the organic matters in the tidal-flats. In other words, it is a process that heightens the functional cycle of the ecosystem. This can only be rendered possible through the process of consilience as well as humanities-based suppositions that allow us to perceive the coexistence and coprosperity of cultural diversity and biodiversity in spaces such as the sea, tidal flats, forests, waterways, and islands.



Fig. 1 Landscape of tidal-flat islands in Southwestern Korea. Bigeum-do Island of UNESCO Shinan Dadohae Biosphere Reserve (SDBR). Salt field was made of buried small islets. Waterway of tidal flat (called *Gaetgol*) is like a man' lung (Photo taken by Shinan Gun).

The necessity of island studies

Did historical bodies such as the *Jiphyeonjeon* (The Hall of Worthies) and *Gyujeonggak* (The Royal Library) conduct any studies on islands and oceanography and island and maritime culture in the past? Surrounded by the sea on three sides, Korea is a peninsular country which boasts 3,400 habited and uninhabited islands and an abundance of maritime resources. The influence of the notion of *Sadae* (Serving the Great) emanating from China ensured that the development of the humanities in Korea was carried out from a vantage point that was heavily inland-centric. Furthermore, the influence of Japanese imperialism made it such that the inherent characteristics of peninsula culture could not be expressed. The simple truth is that these influences continue to hold considerable sway within the fields of Korean humanities and sociology, and that it is difficult to completely ignore them. Under these circumstances, the islands and coastal areas which make up the peninsula have been regarded as appendages to the mainland (end of the world) and ignored by those in the field of humanities, where they have been treated as a trivial topic. During the Three Kingdoms Era, maritime powers (Baekje and Silla) were the ones who created the inland culture, and their ability to project their marine power internationally led them to exercise an influence in both the East Asian and Arabic regions. However, the decline of maritime power during the Joseon eras occasioned by the *policy* of evacuating island inhabitants and Korea's eventual adoption of a seclusion policy led to a general disregard amongst the political powers that be of the importance of islands and oceans in the development of

human culture. However, the Greek civilization which originated from the Aegean Islands was diffused to the world through the Persian Gulf. Thereafter, during the Middle Ages, the development of the humanities was carried out centering on island and maritime countries such as Spain, Italy, Portugal, and England. The basic background of the humanities, including the history and culture, developed by these empires during the Middle Ages was their 'maritime' nature. At the dawn of the 21st century special attention is being paid to the expansion of Chinese and Japanese marine power, especially as pertains to the Korean peninsula. As such, 'islands and maritime areas' remain one of the main policy items on the agenda of strong powers, including Korea, in the 21st century. In his book, *<What is history?>*, Edward Hallett Carr defined history as "an unending dialogue between the past and present." One can better predict the flow of our uncertain present and future by looking back at past history. The humanities revolve around the search for and expression of man and the environmental problems that surround man, with the focus being on human activities as viewed from the spiritual and cultural aspect. That being said, the role of the humanities in terms of the study of peninsular Korea's 'islands and maritime environment' is to provide a hint to the chain of human history which was lost in the past, and to serve as the standard tool with which to evaluate the relative value of inland-centered humanities studies. In addition, the use of the oceans and islands that constitute the natural resources of a peninsula country such as Korea can help the latter to achieve a new chapter for a *hallyu* (Korean wave) culture that has seemingly reached its inherent limitations, a chapter that is

Table 1 Environmental and historical characteristics of island and coastal areas in Korea (adopted from Hong, 2011b).

Region	Case island	Historical characteristics	Cultural characteristics	Ecological characteristics
West Sea region	Ganghwa, Wido, Seonyudo, Heuksando, Jindo, and Gageodo	<ul style="list-style-type: none"> • Bridgehead in Korea–China trade • Site of conflicts with imperial powers such as the Hideyoshi invasions of 1592 • Potential for North and South Korean exchanges to activate the fishery industry after reunification 	<ul style="list-style-type: none"> • Gateway for historical and cultural exchanges with China • Development of rural culture 	<ul style="list-style-type: none"> • Ria coast and significant difference between ebb and flow • World-class tidal area, migratory bird sanctuary, plants on tidal flats, and benthic organisms • Habitats for wild animals and plants (sea otters and orchids, etc) • Changes in the ecosystem caused by large-scale reclamation projects • Serve as estuarine ecosystems for the major rivers
	< Tidal cultural zone > Tidal flat-island-coastal mosaic			
South Sea and Jeju Island region	Odongdo, Geomundo, Seukdo, Wando, Bogildo, Geojeodo, and Jeju Islands	<ul style="list-style-type: none"> • Trade hub during the Three Kingdoms Era (Cheonghaejin) • Exchanges with Japan (倭) 	<ul style="list-style-type: none"> • Gateway to mainland culture • Development of various species of fish and food culture • Folk culture of the southern provinces 	<ul style="list-style-type: none"> • Marshes, migratory bird sanctuary, and evergreen broad-leaved forest habitat • Home of the biggest <i>Camellia japonica</i> forest
	< Transboundary region of island and maritime culture > Transboundary sphere connecting the east and west cultural and ecosystem zone			
East Sea region	Euleungdo and Dokdo Islands	<ul style="list-style-type: none"> • Competing claims to Dokdo by Korea and Japan • Frictions in the Pacific Rim (Russia, Japan and North Korea) 	<ul style="list-style-type: none"> • Linked to highlands in Korea • Development of fisheries and mountainous village culture 	<ul style="list-style-type: none"> • Simple coastline • Changes in the current and increase in the sea surface temperature caused by global warming • Emergence of problems within the marine ecosystem such as the changes in fish species and emergence of the so-called albinic phenomenon
	< Pacific Rim zone > Marine resources from the East Sea and the value of peace			

based on eco-cultural suppositions. Humanities-based studies on the islands and maritime environment will determine the width and depth of the flow of the new *hallyu* culture.

The targets of humanities-based studies are man and human activities such as the process through which man adapts to the environment. Korea's maritime area is divided into the West Sea (*seohae*), South Sea (*namhae*), and East Sea (*donghae*). However, when viewed from the standpoint of the behavioral patterns of the humans who make a living in these maritime areas, it becomes evident that each boasts different features. The reasons for this diversity can be traced back to the geological features, topography, ecological environment of each maritime area, and the traditional culture which was spawned based on these elements (Table 1). The West Sea (*seohae*) consists of ria coasts and broad tidelands. The topography of the Korean peninsula is such that while the eastern side is characterized by high elevation, the western one boasts low elevation (*donggo seojeo*). As a result, the major rivers flow into the West Sea and large-sized estuaries are developed there. The loess produced in the Yellow River, Yangtze River and Bohai Bay and the organic matters from the rivers flowing through the Korean peninsula meet in the West Sea to create a unique tidal flat ecosystem (Hong et al., 2010). The people living along the West Sea have used these rivers and tidelands as their basis of production and homes. Trade with China prospered based on the use of waterways (current). Korea's major port cities have been located along the West Sea. To this end, practitioners of regional studies on the West Sea area have had access to an abundance of humanities-related study materials with which to hold discussions from the tideland cultural zone standpoint, including on such elements as land mosaics, tidelands, estuaries, ports, tidal currents and tides.

The East Sea (*donghae*) has a gentle coastline. The blue ocean and beaches attract many tourists to this area. In particular, the fact that the major mountains which make up the *Baekdu daegan* (a mountain range and watershed-crest-line which runs through most of the length of the Korean peninsula), namely Mt. Seolak, Mt. Odae, and Mt. Taebaek, are linked to the Eastern coast makes it possible for people to simultaneously enjoy walks in the forest and beaches. The presence of deciduous forests in the deep mountains, pine forests near the sea, valleys and lagoons, and sandy beaches can be regarded as the topographical characteristics of the East Sea. While the ria coasts along the West and South Seas created a diverse and elaborate maritime culture, the gently-layered coasts of the East Sea created the simple yet profound behavioral patterns of its land-based denizens. The east coast of Korea was used as an outpost during the struggle for power between Russia and Japan, a struggle which eventually ended with Japan's actualization of its dream to invade the continent and colonize the Korean peninsula. The east coast should extend its reach and move beyond the narrow Northeast Asian zone bound by Japan and Russia to become a part of the wider Pacific Rim.

The South Sea is both an independent island and maritime cultural zone and an eco-cultural contact space where the tideland cultural zone of the West Sea meets the Pacific Rim zone of the East Sea. Although there are many arguments amongst scholars such as geologists, historians and environmentalists on how to divide the spatial areas of the South Sea, it is regarded that the South Sea incorporates the characteristics of

the two other zones. Although not comparable to the West Sea in terms of the number of islands, the South Sea is nevertheless home to relatively big islands such as Geojedo Island and Namhae Island. While Jeju Island belonged to the South Sea from an eco-geological standpoint, some scholars have, considering the long cultural homogeneity that exists there, classified Jeju Island as part of the Southwestern zone. The South Sea area was where the Samhan (Mahan, Jinhan and Byeonhan) kingdom, which was the first iron-culture based kingdom in Korea, was established and this before the establishment of the Silla and Gaya Kingdoms. It is also the place where the colonial view of history exemplified by notions such as the *Imna ilbonbu* or *Mimana Nihonbu* (任那日本府説, Japan's claim to have controlled the southern part of the Korean peninsula) originated. The South Sea area can be regarded as a symbol of the theory of heteronomy theory which argues that the developmental process of Korean history was from the ancient era onwards carried out amidst consistent intervention and oppression by foreign powers. The majority of the wars at sea involving the Korean peninsula also featured Japan.

On the other hand, Korea was also involved in political, cultural, and trade relations with Japan through the *Joseon Tongsin* (diplomatic delegation to Japan). The Korean peninsula also served as a cultural corridor from Mainland China to the Japanese islands. Meanwhile, Tsushima Island and Iki Island played the role of the bridge through which this culture was conveyed. The cities and islands along the South Sea (*namhae*) have increasingly turned their gaze toward the outside world, a phenomenon that is exemplified by the holding of the Expo Yeosu. The denizens of the South Sea area of Korea have expressed their desire for expand their horizon and engage in exchanges of maritime culture with other maritime countries such as the Philippines, Indonesia and Malaysia as well as other nations in East Asia and the Pacific. This can be perceived as a diffusion of *hallyu* culture from another standpoint, one which should be rooted in the unique humanities-based field of study associated with the Korean peninsula known as islands and oceanography.

The ideal direction for eco-cultural research on islands and oceanography should be one that is based on the selection of a research sphere that effectively divides broad spaces based on factors such as historicity, ecological paradigms, cultural adjacency, and exchanges, rather than depending on artificial administrative districts as is currently the case.

Humanities of island: agenda of humanities Korea (HK) project

The West Sea (*seohae*) boasts ria coasts and the majority of the islands in this area can be characterized as tidal flat islands. In the southwest area, including Shinan-gun, tidelands began to develop from long ago via Bohai Bay in China and the Kuroshio Current. Many islands have been buried by tidal flats. The natural ecological characteristics of these tidal flats and islands are the result of man's adaptation to the local environment. Interdisciplinary studies should be conducted to reveal the mutual relationship between the natural resources and human life on islands and in maritime areas. To this end, the study of the management, classification of types, and social characteristics of the effects of human life on the natural ecology resources of tidal flat islands, with the main focus being on the UNESCO

Table 2 The direction of island culture study in the past and the inheritance and development as the Humanities Korea (HK) project agenda.^a

Direction of the HK project agenda on the study of island eco-culture		The goal of the study
Expansion of space and perception	The characteristics of island and marine organisms and their relationship with human life	<ul style="list-style-type: none"> • Discern the ecological characteristics of islands & oceans, and marine organisms based on humanities-based suppositions • Starting point for the use of maritime ecological resources and ecoculture
	Spatial perceptions of humans' environmental adaptation to the main ecosystems on islands and maritime areas	<ul style="list-style-type: none"> • Understand the formation process of island spaces and humans' environmental adaptation to the environment
	Regional activation measures based on the use of the eco-resources on islands and maritime areas and interdisciplinary studies	<ul style="list-style-type: none"> • The diffusion of ecoculture between islands and oceans and between islands and the application of peninsular effects • The eco-cultural network between islands • Communications between the Dadohae and peninsula, and the consilience of eco-humanities • Environmental adaptation and eco-marine networks • Peninsula, island/Dadohae of exchanges, and the filtering of communications

^a K Project refers to a project which offers support for research institutes engaged in the humanities. Supported by the National Research Foundation, it is geared towards the long-term development of the study of humanities. The Institution for Marine & Island Cultures, Mokpo National University has since 2009 implemented the agenda, "Humanities of Island – Switch of space recognition paradigm in the history of civilization".

Shinan Dadohae Biosphere Reserve (SDBR), from an interdisciplinary standpoint can be regarded as one which seeks to reflect the geographical and topographical characteristics of tidal flat islands. As part of the Humanities Korea (HK) project, education programs linked to fishing villages and regional resources have recently been conducted in conjunction with efforts to activate tidal flat islands (Table 2).

The main targets of this research in Korea are the islands of Heuksan-myeon, Ulleungdo, and Dokdo. It is expected that as these islands are geographically isolated by the sea, the distribution of biodiversity in these islands will be very different from those of regions nearer to the peninsula. The great distance ensured that few cultural exchanges were carried out between the islands. It is important to collect materials and conduct investigations on the eco-geology of these isolated islands, the distribution patterns of biodiversity, and currents, and to compare with case studies conducted abroad. In particular, in the case of isolated islands, it is necessary to consider the diffusion of biodiversity, conveyance of the indigenous knowledge needed to use the biodiversity, and the cultural diversity (food and construction) in a consilience manner (Hong, 2011a).

The interpretation of man's spatial use and environmental adaptation based on a consideration of isolated islands, the adjacent peninsula and the mainland can be perceived as the core method through which to comprehensively understand the island eco-culture in the Dadohae area (Hong, 2010). Based on theories rooted in landscape ecology and bio-geology, such as the peninsula effect and edge effect, basic discussions on how the eco-culture was conveyed and diffused through the Dadohae-peninsula-mainland network should be conducted. Furthermore, it is necessary to interpret the unique spaces associated with the Dadohae and peninsula from an eco-geological standpoint. In particular, the fact that the Dadohae area along the southwest coast was transformed into

land when the sea level fell during the Ice Age ensured that the area in effect played a key role as the main path for human migration during the prehistoric era. In this regard, it is necessary to collect and provide the materials needed for interdisciplinary research on the archeological and natural environment, resources, and ecosystem of the West Sea, and to implement a humanities integration process based on a joint field study.

The South Sea (*namhae*) boasts marine ecological characteristics that differ from those of the West Sea (*seohaehae*). Compared to the West Sea, the South Sea features fewer tidal flats areas and types of tidal-flat islands. However, the South Sea is closely related to the West Sea from an eco-cultural standpoint. The South Sea is an adjacent zone in terms of island and maritime culture, and one that lies between the tideland cultural zone of the West Sea and the Pacific Rim zone of the East Sea. It is also an adjacent space where the east-west cultural and ecological zones meet. In terms of climatic zones, the South Sea (*namhae*) area belongs to the temperate region. The region features the only indigenously formed *Camellia* habitation in Korea, as well as a mixture of deciduous broadleaved and evergreen broadleaved vegetation. From the standpoint of landscape ecology, there is a need to conduct a study on areas that feature both deciduous broadleaved and evergreen broadleaved vegetation. The advanced development of the quaternary strata that included the shell mound in the South Sea region, as well as in the West Sea area, renders this area appropriate for the study of human migrations and the settlement process during the prehistoric era. It is necessary to, based on the relevant forest culture, conduct a comparison of the adjacent spaces within the ecosystem zone and the humanities and ecology-based exchanges that took place with the east and west cultural zones (Hong and Kim, 2007; Kim and Hong, 2009).

The study of the use of forests as eco-tourism resources can provide important materials with which to interpret environ-

mental adaptation from the standpoint of man's use of the spaces and resources found in island and coastal environments. As the South Sea region had played the role of passage to South China and the southern area of Japan since the prehistoric era, significant amounts of archeological remains can be expected to be found in this area. As such, it is necessary to consider both the ancient environment of the islands in the South Sea area as well as human interactions at the time.

Considerations for ecological communications of island

Expansion of spatial awareness

While most of the pertinent studies on the ecological environment in Korea have focused on the inland areas of Korea, very few such studies have been conducted that have had islands and maritime regions as their subject matter. The interactions between man and the natural environment on islands and in maritime regions are expected to be different from those that take place in inland areas. To this end, the conduct of a study on the heretofore spatially excludes islands and maritime regions can be regarded as being of marked significance. In addition, although previous studies related to the ecological environment were carried out in a manner that focused on the present, the present study revolves around on the past environment, thus making it possible to consider the three-dimensional ecological environment in a chronological manner. Eco-geology and island bio-geology, both of which fall under the category of classic learning, provide important basic theories in terms of the study of landscape ecology. These fields have recently provided a temporal and spatial point of contact with which to interpret cultural and natural resources in a spatial manner using spatial methods that are based on geographical information systems. The spatial scope of the HK Project mainly involves the Dadohae and the maritime regions of Korea to which the peninsula is connected. The main agenda should if necessary include the Asian, Pacific and European regions. The project should in particular focus on China and Japan. This is because not only do they represent core countries in Northeast Asia, but the ports of these neighboring countries have long been part of Korea's international trade marine routes.

Generally speaking, islands are usually rendered as dots, the links between islands, as well as between islands and peninsulas as lines, and between islands-peninsulas-inland areas as planes in the study of islands. The present study will be carried out in the Dadohae area situated in the southwest region of Korea. Moreover, rather than being based on the individual standpoint of islets, the study will, by separating human behavioral patterns, environments, and ecological resources at the maritime region level, be based on the consilience standpoint of archipelagos. As far as the natural environment of the past as one of the causes of temporal and spatial formations on islands and in coastal areas is concerned, the study should be conducted based on both historical and geographical materials as well as ancient ecology. Meanwhile, the study of environmental changes in the modern era should be carried out based on landscape ecology and eco-geology methods of analyzing land uses within broad ecosystems and physical spatial structures. Furthermore, as far as the fields requiring ecological knowledge and an understanding of natural science and the bio-environment are concerned, it is important to ensure that

an interdisciplinary joint study be conducted based on direct and indirect information exchanges and joint investigations. While the HK project should be divided into individual studies, interdisciplinary studies involving other fields should be conducted in conjunction with the temporal and spatial interactions between man and nature on islands and in maritime areas. Successful results can be achieved through the conduct of smooth interdisciplinary studies and the adoption of a comprehensive approach that involve other fields of study. Three important elements should be retained with regards to the study methods. First, an interdisciplinary study through which knowledge and information can be shared based on direct investigations, albeit based on different themes, of the interactions between man and nature and the environment of islands should be employed. Second, a consilience method which helps foster a better understanding of the humanities environment based on eco-cultural knowledge and information such as the interactions between the nature and man uncovered based on tangible and intangible resources and bibliographies, as well as indigenous knowledge of the environment, should be introduced. Third, based on investigations conducted abroad of areas similar to the Dadohae area in Korea, literature reviews, and seminars with specialists, the basic materials for Korea's future Grand Island design can be secured.

Consilience between ecological suppositions, natural science and humanities

Comprehensive study measures can be drawn up that allow various fields to come together to discuss one theme. As far as the theme of the diffusing of the indigenous knowledge pertaining to the environmental adaptation of man and natural resources on islands is concerned, the connectivity of ecological and humanities-based suppositions can be regarded as being akin to the two sides of a coin brought together under the keyword 'human'. To this end, an interdisciplinary study on man's dynamic adaptation activities vis-à-vis the environment of islands will be conducted. Here, such results should be perceived as being attainable through organic studies involving the fields of literature, folklore, history, sociology and ancient anthropology (Maffi and Woodley, 2010). The results of this study, which will be broken down into various stages, will lead to a new renaissance of Korean humanities in the form of the reproduction of islands and maritime regions as *hallyu* cultural contents. In addition, the consilience of academic fields can be achieved through a trans-disciplinary approach that brings together natural sciences, the humanities and digital information. In other words, its aim is move beyond academic borders by conducting joint studies and bringing about an eco-functional 'integrated humanities' that is based on natural communications.

The international competitiveness of industrial humanities and indigenous knowledge

There is a need to improve the life environment in the Dadohae area. More to the point, there is a need to adapt to changes in the national climate such as the rise in the sea level occasioned by climate change, and the change in the agricultural and fisheries basis caused by environmental changes. At this point, it is necessary to actualize a low carbon Dadohae area through, in

keeping with the green growth policy, the introduction of eco-energy in the region, the securing of green spaces, and ecologically-friendly construction (Hong et al., 2007). As such, there is an absolute need to develop an industrialized system which is in keeping with the development of a vision for new growth engines and development strategies, the activation of local economies and the advent of balanced regional development. However, the characteristics of the Dadohae region make it such that the economy, societal and cultural systems of large cities cannot be introduced, and that such development cannot be pursued. There is a need to establish a strategy that makes use of the inherent strengths and weaknesses of the Dadohae region. These include its ecology, isolation, limited nature of resources, cultural uniqueness, and regionality (Hong, 2010).

The tidal flats found in the islands and salt pans of the Dadohae area in Jeonnam Province can be regarded as boasting international competitiveness. However, as these items have yet to be specialized in a manner that helps to improve the life of local residents, there is a need to conduct studies which can help to industrialize such resources by improving their existing characteristics and developing new ones. Such a method can not only help to strengthen their international competitiveness, but can also ensure that they will be actively used in conjunction with the tourism and health industries (Table 3). Factors such as high energy costs, the advent of an aging society in urban areas, increased desire to improve the quality of life, nostalgia for traditional culture, pursuit of healthy lifestyles, change in the quality of tourism as a result of the rise in income, increase in the demand for foreign tourists due to internationalization, and the change in the national perception of islands and oceans, have only served to further heighten the need to develop a response in conjunction with the Dadohae region. The development of the balance between tradition and modernity, balance between nature and advanced technology, and development based on culture will become important aspects of development in the 21st century.

Conclusion: pursuing the sustainability of islands based on ecology and culture

Some of the motives that have been identified in terms of the projected applications for the UNESCO Shinan Dadohae Biosphere Reserve (SDBR) are the achievement of regional

development as well as regional environmental conservation through culture. The presence of certain traditional cultural elements show that human life continued within an ecosystem; moreover, it is possible to draw up cultural plans to actualize environmental conservation and development in the future.

Above all, the traditional vocations of the residents of the Dadohae region, namely fishing and the collection of marine products can be regarded as having an inherent cultural value. The simple tools, collection and fishing implements, social system, and indigenous knowledge which have been conveyed to the present have all played a highly efficient role in the securing of the resources needed for survival and the preservation of an ecological balance by ensuring minimum human intervention in the natural process. Given these facts, any ecosystem approach designed to rightfully identify the Dadohae region must include man and culture within the overall ecosystem. Sustainable development measures can be implemented in the Dadohae region by creatively using these cultural elements as an implement with which to address current and future environmental problems and meet ecological, economic, and cultural requirements in a balanced manner. The UNESCO Shinan Dadohae Biosphere Reserve (SDBR) was established to emphasize the uniqueness of the natural ecosystem and culture of this area, to maintain the natural ecosystem and human life, and to achieve sustainable development (Table 4).

Korea's fisheries and aquaculture-related scientific technology has reached the level where it is now possible to revive the unique ecosystem of a regional community and to use such an ecosystem in an environmentally-friendly and ecological manner. Even from the cultural standpoint, the human resources, social and cultural conditions needed to entrench ecological fisheries and aquaculture can be established through governmental and non-governmental organizations efforts to emphasize traditional cultural elements and revive residential structures and norms. However, the exploitation of resources occasioned by modern culture and economic motives has ensured that this has yet to come to pass. In the case of the Dadohae region, the designation of the UNESCO Shinan Dadohae Biosphere Reserve (SDBR) will provide an important opportunity to induce environmentally-friendly, ecological resources management and human economy development and to establish a sustainable cultural ecosystem. The UNESCO Shinan Dadohae Biosphere Reserve (SDBR) will become a global

Table 3 Changes in lifestyles.

	Traditional life style	Non-ecological life style	Ecological life style
Value awareness	Perpetuate stability Circulation Wholeness	Short-term growth, non-circulation Partial reasonableness Fetish worship	Co-prosperity between man and nature based on ecological perceptions
Life goals and tasks	Assurance of basic life resources	Increase of physical resources level	Use of natural (regional) resources/ effective use of imported resources
Life tools	Use of regional resources Hand-made tools	Dependence on imported resources	Use of natural (regional) resources/ effective uses of imported resources
Life behaviors	The mutual relationship of life environments as pertains to life behaviors	Division of life environment	Life environment related perceptions and behaviors

Table 4 The concept of island policy to actualize the sustainability of islands and the direction thereof.

Major theme	Study direction
Basic research regarding island economies	<ul style="list-style-type: none"> • Research on the basic policy pertaining to the sustainable development of islands • Research on the basic policy pertaining to tourism and culture • Research on the use of intangible knowledge resources for the development of island economies
Sustainable development based on the autonomous decision making of island residents	<ul style="list-style-type: none"> • Research on the organic integration of ecosystems-social systems-ideological (knowledge) systems (thoughts of specialists and cultural thoughts of residents) • Research on the roles of indigenous knowledge in terms of the organic integration of ecosystem-social system-ideological (knowledge) systems • Research on educational policy that is in keeping with the mutual consulting and decision making of residents, administrative agencies and NGOs as well as the resident/citizen culture
The interrelationship between the regional identity and maritime ecotourism	<ul style="list-style-type: none"> • Development of a humanities policy that applies island-ocean-coastal symbiotic ecosystem to ecotourism • Comparative research on inherited culture and the use of ecological knowledge abroad

model for cultural theory-based conservation and development. This is because it is an area where not only have human life and culture coexisted for a long period of time, but also a region where a future-oriented and sustainable ecosystem, as well as culture and economy, can be established. To attain these ends, the following research directions were identified and the detailed implementation plans will soon be established.

Foods obtained from the sea and tidal flats such as fish, shellfish, marine plants (seaweed etc) and salt can be regarded as the sources of nutrients such as protein, vitamins, and minerals that are essential to the survival of man. The potential for environmentally-friendly and ecological development possibilities is heavily dependent on how the economic structure through which these resources are obtained, distributed and consumed is established. The characteristics of the Dadohae region, which boasts a wide diversity of fish due to its many islands, various geographical features and seawater ways, and the geological basis, such as tidal flats, needed to contain ample nutrients, as a potential source of various types of marine food resources should be highlighted. In addition, the strengthening of the regional uniqueness of marine products and environmental-friendliness is predicated on the development of programs that help to strengthen the locality of fish types, environment, and fishing techniques. In terms of distribution, there is a need to establish a cooperative structure that brings together fishermen, distributors, and consumers. Such a structure would help ensure the reliability and economic value of marine products, and also promote environmental conservation and environmentally-friendly fishing methods amongst residents based on the purchasing activities of consumers.

Making use of the greater desire amongst citizens for social and cultural activities, programs should be drawn up that would allow this cooperation system to function, based on the relevant economic activities, as a sphere for social and cultural activities amongst the participants. It is essential that an

'ecological knowledge and technology system' which can perceive the environmental capacity and make possible the sustainable generation and maintenance of resources based on the principle of circulation and feedback of ecosystem be established. To this end, there is a need to put in place an 'ecosystem management and resources production system' that is based on ecological knowledge which consists of indigenous and general knowledge. While peninsulas serve as a passageway for goods headed out to sea, islands are stepping stones through which peninsulas can be entered from the sea. As such, islands and peninsulas have served as communication corridors and venues for interaction amongst people and the exchange of goods. The Dadohae area is home to not only ample shellfish, seaweed, and fish, but also sea salt. The sea salt products produced in the Dadohae region, and in particular in Shinan-gun, are based on a natural production system that joins together sea water, the earth in tidal flats, and the sun.

The nutrients contained in seawater and tidal flats also play a role in the crystallization process of salt. While salt can be produced in the Dadohae area based on such natural processes, the installation of an artificial carpet at the bottom of salt pans to ensure that the salt does not mix with the earth in tidal flats has resulted in impeding such natural interactions. In this regard, the designation of the UNESCO Shinan Dadohae Biosphere Reserve (SDBR) should be seen as an opportunity to restore traditional methods or develop new technologies which can maintain the naturalness needed to produce truly unique regional salt products. Furthermore, a cooperative management system, which makes possible sustainable production amongst residents based on the environmental-friendly production, processing, and distribution of salt, marine products using salt (salted foods), marine plants (lavar, kelp, and seaweed), and the aqua-cultured fish and shellfish, should also be established. There are also plans to implement a 'Dadohae cultural project' that would help estab-

lish a socio-cultural system capable of heightening the civic awareness of marine products.

The application of not only traditional production resources but also natural environmental resources such as tidal flats, yellow ocher, and vegetation to the environment/cultural goods and life environment industry (earth and water from tidal flats, indigenous plants, resort and therapy products, green energy using wind power, construction of *hanok* (Korean traditional houses) introducing new sources of renewable energy), based on advanced production methods raises the potential for the development of future environment-based industries which can simultaneously develop products and production base has been further heightened. To this end, it becomes imperative to hold discussions on the role of humanities-based studies in the bringing together of residential activities and industrial processes.

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