

## Article

# Sustainable Island Communities and Fishing Villages in South Korea: Challenges, Opportunities and Limitations

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**Abstract:** Island communities and fishing villages in South Korea have been affected by changes in policy and environmental conditions. This paper presents an overview of and potential solutions to sustainability challenges confronting Korea's island communities and fishing villages. The paper is grounded in a review of the relevant Korean and international research literature. The paper identifies the following major challenges: climate change, overexploitation of and damage to marine resources, and sociocultural challenges. The paper recommends an integrated approach to sustainable development that involves building a cooperative system with the Korea Island Development Institute, focus on 'livable islands', encouraging in-migration to islands, improving island accessibility, and identifying and assessing island ecosystem services. The paper concludes that it is necessary to develop an integrated approach driven by institutional, policy, technological, and sociocultural innovation.

**Keywords:** climate adaptation; island communities; fishing villages; South Korea; sustainable development



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## 1. Introduction

Island communities and fishing villages in the Republic of Korea (hereafter, Korea) confront a series of critical environmental, economic, demographic, and social challenges but also have opportunities to benefit from new policy frameworks and institutions. This paper reviews and analyses the findings of scientific research concerning Korean island and coastal sustainability, drawing upon international research into pitfalls and best practices in island development. Emphasis is placed on interactions between environmental, sociocultural, and economic factors. The paper ultimately presents a set of research-based policy recommendations that can contribute to the sustainable development of Korea's island communities and fishing villages, with a focus on the needs of islanders themselves.

Island communities and fishing villages (hereafter, ICFVs) are treated separately by the Korean government, resulting in incoherence among the policies for managing them, despite their many shared attributes. Historically, ICFVs served as Korea's coastal frontier and supply centers for marine products. Their marine and island cultures can be seen as a form of 'eco-cultural heritage' and traditional ecological knowledge [1], which are vital for maintenance of communities and for producing future knowledge.

Amidst the impacts occasioned by global environmental change, urbanization and globalization, a paradigm shift is required for Korean ICFVs [2,3]. Korea's ICFVs are characterized by pre-modern living structures and socioeconomic systems, and they have failed to keep pace with the rapidly changing world. This presents challenges for their environmental, economic, social, and cultural sustainability. Too often, efforts to enhance island sustainability focus on island environments and economies without much attention to the needs of the people who live in these communities [4,5]. It is necessary to reconceptualize ICFVs as spaces for human lives and activities that are suited to the present era while also

preserving that which is important to islanders [6]. These efforts can be assisted by the development of new marine and island policies that address these communities' present and future needs.

## 2. Materials and Methods

This study is grounded in a review of the existing literature on the sustainability of islands, island communities, and fishing villages in Korea. On the basis of this literature, the paper presents an overview of the sustainability challenges confronting Korea's ICFVs. It then proposes an integrated approach to ICFV sustainable development, drawing upon both domestic and international literature.

Korea is a peninsular country connected to the Asian continent, but it is also an island country, including 3348 inhabited and uninhabited islands [7]. The coastal areas of the Korean Peninsula feature considerable topographic, cultural, and ecological diversity, with the West Sea, South Sea, and East Coast each having characteristic geographies [8] and each being affected by variations in ocean currents and tides.

Korea also includes one inhabited oceanic island, Jeju. Jeju's relatively large size and population make it an outlier among Korean islands. As such, although it shares many characteristics with Korea's smaller and coastal islands, it is not considered in the present study.

In 2018, Korea's national government passed the Islands Development Promotion Act (subsequently amended in 2020), which aims to renovate and expand infrastructure to improve the productivity, incomes, wellbeing, and living environments of islanders. The Islands Development Promotion Act also led to the establishment of 'Island Day', an annual national holiday to celebrate islands. All this has contributed to a gradual increase in interest in islands at the national level, with policy attention now being paid to island recreation and health services. Meanwhile, local governments are developing island tourism infrastructure construction projects, and tourist numbers are rising [3,9]. Increasing island tourism both plays a positive role in improving awareness of islands and helps support local economies. However, fishing and aquaculture remain the bedrock of most ICFVs in Korea.

Various policies have sought to support islands, including the construction of mainland-to-island and island-to-island bridges under the Islands Development Promotion Act. Other island development policies have sought to improve accessibility, and local governments have encouraged tourism and island regeneration, such as projects for renovating fishing villages and subsidizing passenger ferry travel [3]. These policies center on the needs of islanders, in contrast to earlier policies that supported projects conceptualized as supporting islands in an abstract sense, with little attention to whether it was primarily islanders or outsiders who benefited from them. However, such initiatives have been too little, too late for some islands with very small numbers of inhabitants (fewer than ten people), which have become uninhabited [10,11]. Even in many of Korea's larger ICFVs, depopulation trends are causing a hollowing out of communities, with the risk that they will slip into a vicious circle of decline. This emphasizes the need to develop alternative policies.

## 3. Results

### 3.1. Sociocultural and Environmental Challenges to the Sustainability of Island Communities and Fishing Villages in Korea

Sustainability involves overcoming or improving environmental, social, and economic vulnerabilities and risks (both internal and external) in order to pursue balanced development [12]. Although there is consensus that societies should aim for sustainable development, there is a lack of clarity as to how to render actionable and measurable this abstract and general concept [13,14]. Islands in particular sometimes become the focus of damaging sustainability discourses that end up reducing islander agency, for instance by pushing islanders to take responsibility for problems created by external actors, by casting islanders as helpless symbols or indicators of global change, and by encouraging conformity with mainland-oriented and dependency-deepening neoliberal development policies [15–21].

Thus, while it is uncontroversial to promote the sustainability of ICFVs, bearing in mind ecological carrying capacity, spatial limitations, and available resources, there remains a tendency for policy to be motivated by needs and desires coming from outside the ICFVs themselves. This does not always enhance the sustainability of islanders' lives, lifestyles, and livelihoods. Careful planning is required to prevent undesirable consequences such as the extraction of profits by individuals and companies based outside the ICFVs, damage to the ecological environment, and conflicts within the community caused by unbalanced external investment. The ecosystems that produce already-limited marine resources are threatened by rapid climate change, and island societies need to respond to both environmental challenges and the expectations of their undertaking certain kinds of adaptations [22].

This does not mean that ICFVs should not pursue sustainability; it does mean that care must be taken to keep islanders' needs at the center of discussions related to island sustainability and development. For example, island sustainable development does not need to be about introducing new economic systems but can involve reassessing and reinforcing existing positive attributes so they can be used to produce future value [23]. In a Korean context, sustainable ICFVs are fundamentally made possible by natural resources (including both marine life and tourism resources) obtained from the sea. The health of the marine ecosystem and wise use of biodiversity are critical for sustainability, but these cannot be assessed on their own, independent of the systems of traditional ecological knowledge that bind together sociocultural and environmental sustainability.

### 3.1.1. Climate Change

Traditional ICFV living conditions and industrial structures are vulnerable to changes in marine ecosystems and the physical deformation of island coasts caused by rising sea levels and seawater temperatures [24]. The recently released IPCC AR6 2021 (Sixth Assessment Report, Intergovernmental Panel on Climate Change) warns that, even with the greenhouse gas reduction plan agreed to in the Paris Agreement on Climate Change in 2015, the global heating point of 1.5 °C will be reached ten years earlier than predicted [25].

The most significant effects of recent rapid climatic warming on ICFVs can be grouped into three main categories: rising sea level, rising seawater temperature, changing weather patterns, and ocean acidification. Rising seawater temperature, combined with anthropogenic activities on the coast, affects plankton generation [26], disrupting the food chain not just locally but also in surrounding areas. Rising seawater temperature may result in the collapse of or significant shifts in marine ecosystems. In Korea, the bleaching of East Sea corals has already begun, and there is a continuing decline in major marine species, such as squid and pollack, which were commercially important fish stocks. Further research is needed to determine the precise effects of warming on West Sea fishery resources [27].

Rapid changes in seawater salinity caused by localized torrential rain and drought, along with rising seawater temperatures, are causing enormous damage to fish and shellfish farms, including abalone farms, especially in Korea's Southwest Sea and South Sea. According to the results of the Comprehensive National Survey on Marine Ecosystem, Cycle III (2015–2020) conducted by the Ministry of Oceans and Fisheries [28], marine line distribution patterns are changing due to rising seawater temperatures. Tropical-temperate mixed seaweed (red algae), which live in relatively warm seas compared to temperate seaweed (brown algae), emerged in all waters of Korea, and the number of fish directly affected by the Tsushima Warm Current increased by 18% over the course of the six-year study period. The waters of the Korean Peninsula are thus beginning to exhibit subtropical characteristics [28]. This necessitates changes in some traditional aquaculture systems [29,30], which have involved the production of fish, shellfish, and seaweed in a manner appropriate to a cool, temperate climate. If seawater temperatures continue rising, it will no longer be possible to maintain the ICFVs' traditional aquaculture systems, at least not without significant adaptations.

Sea level rise resulting from climate change may have a major impact on infrastructure and the built environment in ICFVs. Most ICFV seawalls and port and dock facilities are aging and in need of repair [31]. The national government's New Deal 300 Project for Fishing Villages (2019–2022) provides funding for local government regeneration projects, resulting in initiatives to improve island landscapes and the built environment of fishing villages [31]. Climate change will also result in changed directions, intensities, and patterns of typhoons, which will necessarily alter living and working conditions on and around the Korean Peninsula, particularly for islands in the southeast [32]. Combined with rising sea levels, this risks flooding in low-lying areas, the total inundation of wetlands, coastal erosion, severe storm surges, seawater intrusion into river estuaries and freshwater layers, tidal changes, changes in sedimentation type, and reduced light penetration to marine organisms [33–35].

Ocean acidification, which is linked with rising atmospheric CO<sub>2</sub> levels [36], is having an increasing (though site- and region-specific) impact on Korean coastal zones [37]. Acidification can both be worsened by and detrimentally affect certain aquaculture activities [38], while also threatening fishery resources [39].

Future infrastructure construction projects and livelihood initiatives related to ICFVs will need to be planned and monitored with climate change in mind and be accompanied by strategies for coping with and building resilience to climate change [40]. We thus propose that the New Deal 300 Project for Fishing Villages, which ends in 2022, is replaced by and developed into a project to support ICFV responses to climate change.

### 3.1.2. Overexploitation of and Damage to Marine Resources

Korea's ICFVs are strongly dependent on marine natural resources, including both fishery resources and tourism resources. Poorly thought-out tourism projects have, however, led to overdevelopment, placing marine and island resources at risk [41]. This is because of both direct environmental damage and damage to local cultural and economic systems, jeopardizing traditional ecological knowledge. Overfishing has likewise impacted fish stocks in Korean waters [42,43].

Marine pollution is also a problem. Marine pollution is caused by the flow of wastewater into the marine ecosystem, fall of airborne particulates, discharge of waste or oil from vessels, hot wastewater from various kinds of power plants, and other factors. These pollutants not only damage marine ecosystems but also destroy habitats, causing a decrease in marine biodiversity [44,45].

In April 2018, it was reported that concentrations of microplastics in sediments around Korea's Incheon Beach and Nakdong River were the second and third highest in the world respectively [46]. Analysis of coastal rubbish monitoring results in 2018 shows a high proportion of plastic waste (26,060 out of 31,931 pieces and 2586 out of 4399 kg in weight) [47]. Styrofoam aquaculture buoys used in the cultivation of laver, oysters, mussels, and sea squirts contribute significantly to plastic pollution, as does abusive use of traps and fishing nets in the Southwest Sea [48]. The ongoing COVID-19 pandemic has furthermore been accompanied by an increase in the use of disposable plastics in the region, heightening the seriousness of microplastic pollution on and near Korea's coasts. In addition to plastic waste, various marine wastes (including wood, metal, and glass) contribute to marine pollution. Most pollutants contaminating Korea's seas are discharged from land, but much fishing gear (including nets and buoys) is simply thrown away during fishing expeditions [49].

It is vital that fishing gear (including plastic aquaculture buoys, traps, and nets) be thoroughly controlled and supervised. There is an urgent need to develop and implement alternatives to plastic buoys as well as to move toward fishery practices that can maintain livelihoods while protecting marine ecosystems. Traditional ecological knowledge plays an important role in this. At the same time, there is a need for improved management of wastewater discharged from livestock farming, agriculture, and households in ICFVs.

### 3.1.3. Sociocultural Challenges

The environmental challenges confronting Korea's ICFVs are inseparable from socio-cultural factors. We focus on ICFVs, rather than 'islands' as such, in order to emphasize the human dimension: Maintenance of island communities, traditions, and cultures is becoming increasingly difficult in Korea, and these have value in and of themselves.

Many Korean ICFVs have rapidly aging populations. This is connected with wider demographic changes in Korea, but there is also a distinctive island element, as traditional livelihoods related to fishing and aquaculture are less attractive to younger generations, leading to emigration from smaller islands to larger population centers [50,51]. Some small islands have already become uninhabited, and others are being hollowed out demographically [2,3], occasioning significant economic difficulties [52].

Similar dynamics are present in island regions in many parts of the world [53–58]. The ability of islanders to pursue opportunities is not negative in and of itself, and it is important to avoid responding to island migrations and movements in a manner that reduces islander agency [59–61]. Aging populations and declining employment rates in Korean ICFVs nevertheless challenge the sustainability of existing industries and risk an irreparable loss of traditional ecological knowledge, due to the older generations' inability to transfer this knowledge to younger generations [51]. Modern industries, such as tourism, may offer alternative livelihoods to those young people who remain in ICFVs, but traditional ecological knowledge specifically is crucial to islanders' maintenance of cultural sovereignty [62] and thereby their ability to ensure that islanders benefit from island development.

Fishing and aquaculture are key to the economies of Korea's ICFVs, yet aging demographics and lifestyle changes have caused a precipitous decline in the proportion of ICFV populations employed in this industry. This nascent industrial collapse creates difficulties when it comes to managing and operating island tourism infrastructure, which is itself reliant on fishing culture, fishery products, and socially robust communities [63]. That is, fishing and aquaculture cannot simply be replaced by tourism in Korean ICFVs; the two industries are increasingly dependent upon one another.

In Korean ICFVs, islanders often work together in the collection and distribution of resources, such as coastal algae, and rely on traditional harvesting methods to ensure that the whole village can continue to use it while managing the collection sites [51]. Besides supporting communities as a whole, these kinds of traditional practices and traditional ecological knowledge are essential for safeguarding the ecosystem services on which islanders depend. However, research into ecosystem services tends to pay little attention to the role of traditional ecological knowledge [64], in part perhaps because ecosystem services approaches often take mainland perspectives. If traditional ecological knowledge is to form the basis for maintaining ecosystem services, it is necessary for ICFVs to achieve demographic balance in terms of younger and older age segments. Threats to the traditional ecological knowledge of Korean ICFVs are thus threats to island ecosystems and the services they provide, yet many policies targeted at ICFVs focus on growth, development, employment, and conservation in isolation from islanders' needs and practices.

### 3.2. *An Integrated Approach to the Sustainable Development of Island Communities and Fishing Villages*

Korea's fourth Ten-Year Comprehensive Island Development Plan is currently underway. The first such plan (1988–1997) encompassed 479 designated islands and had the goals of improving productive infrastructure, expanding incomes, and enhancing culture and welfare. These goals were pursued through efforts at regional comprehensive development, concentration of population centers on the main islands of archipelagos, developing island-specific features, and environmental conservation. Broadly speaking, the plan sought to address deficiencies in island standards of living.

The second plan (1998–2007), covering 410 islands, had the goals of accelerating balanced development and harmoniously developing marine culture and fishery resources.



This was pursued through the development of plans related to island types and locations (e.g., near-shore islands, isolated islands, densely clustered islands), comprehensive efforts to advance marine tourism, and attraction of private capital to particular island regions. There nevertheless occurred continual depopulation, and ICFVs fell ever further behind the national development trends, despite conscious efforts to close the gaps between island and mainland areas [65].

The third plan (2008–2017), including 372 islands, had the goal of creating attractive and livable islands. A collaborative master plan was developed, organized on the basis of island-specific features and with participation from islanders. Development plans were proposed for natural/ecological, cultural/experiential, and industrial/leisure resources. Investments were also made in the construction of bridges.

The current and fourth plan (2018–2027) encompasses 371 islands. The goals are to establish the foundations for high quality of life on islands, as living, inhabited territories as well as to develop islands as engines for national growth. Strategies include creating vibrant villages where islanders can live good, stable, and secure lives together; providing maritime transport that ensures basic rights of movement; constructing the basis for sustainable stay-type tourism; and fostering population concentration in central villages in order to improve service provision and residents' standard of living.

These four Ten-Year Comprehensive Island Development Plans bear witness to a growing realization within the national government that it is important to rediscover the value of islands as sustainable communities. However, because so many factors are involved in ICFV sustainable development, an integrated sustainable development strategy is necessary, one that reaches across government levels and areas and that is informed by research inside and outside Korea. As interest in marine recreation and island tourism demand increases, it is vital to establish policies and methods for protecting marine and island cultures and enhancing opportunities for islanders. This integrated approach requires both institutional and policy innovations.

### 3.2.1. Building a Cooperative System with the Korea Island Development Institute

Policies targeting Korea's ICFVs are currently developed and implemented by a range of national government bodies. This means both that national policies are incoherent and that there is a lack of national-level coordination of policy development by provincial and local governments.

Sustainable development of ICFVs should be planned, implemented, and carried out in a consistent and coherent manner. The Ministry of the Interior and Safety (MOIS) has recently taken moves to establish a Korea Island Development Institute (KIDI) in the city of Mokpo. Most of Korea's inhabited islands have up to now been managed by MOIS, while uninhabited islands have been managed by the Ministry of Environment (MOE). Various ministries and authorities (including the Ministry of Land, Infrastructure, and Transport (MOLIT); the Ministry of Culture, Sports, and Tourism; the Ministry of Science and Technology; the Cultural Heritage Administration; the Korea Forest Service; and the Korea Marine Environment Management Corporation) have carried out specific projects focused on inhabited and uninhabited islands. An integrated system is needed to join up these policies and provide consistent, research-based planning and support for islanders. KIDI, as the first national government body with an explicit focus on islands, will be well placed to research and plan advanced and adaptable policies for ICFVs.

Once it is established, KIDI should prioritize coordinating cooperation between the other ministries, agencies, institutions, and governmental bodies involved in ICFV development and management. Cooperation between KIDI (as an institution under MOIS) and MOE is absolutely vital for developing successful island policy. MOIS's focus is on inhabited islands, but the livelihoods of many islanders depend on the surrounding seas and uninhabited islands, which have traditionally been the preserve of MOE.

A joined-up and integrated approach to ICFV sustainable development could be used to expand Marine Protected Areas (MPAs) in order to protect fish stocks, in a manner that

is sensitive to islanders' needs and economic and environmental conditions in archipelagic systems. Inter-ministerial cooperation is needed to set up an integrated management system, linking existing MPAs (which are divided into areas for protecting wetlands, protecting marine organisms, protecting marine ecosystems, and protecting marine landscapes) with the protected areas of other administrative agencies (e.g., National Parks of the MOE and the Cultural Heritage Administration). The need for integrated management of the currently designated MPAs is heightened by the importance of a reasonable and fair Factual Survey on Uninhabited Islands, which the MOE has conducted since 2007, and for the management of uninhabited islands.

The same is true for the current comprehensive survey on marine ecosystems. It is necessary not only to survey the marine ecosystems of tidal flats, intertidal zones, and littoral seas separately but also to study and manage the marine primary producers that support life in all marine zones and to research overarching changes in marine ecosystems. The results should be linked with and analyzed in relation to data held by the Korea Meteorological Administration. We propose that the relevant Ministry of Economy and Finance (MOF) agencies (e.g., Korea Maritime Institute (KMI) or Korea Marine Environment Management Corporation) consider establishing a marine climate and environment management organization. We also recommend expanding the functions and scope of the Marine Biodiversity Institute of Korea so that scientists and policymakers can better predict changes in marine climate and ecosystems.

### 3.2.2. Focus on 'Livable Islands'

As discussed above, true sustainable development is only possible if the islanders and ICFVs themselves remain in focus. Environmental problems cannot be understood or addressed in isolation from traditional ecological knowledge and changes occurring within ICFVs.

Efforts should be made to identify and establish an island growth engine and advance it in a sustainable direction through the development of technologies that improve quality of life and generate added value with respect to Korea's inhabited and uninhabited islands [66]. It has been recommended that these efforts prioritize the following projects: (1) energy self-sufficiency on inhabited and uninhabited islands, (2) development of self-sufficient and resilient systems of ICFV aquaculture, (3) boosting of marine tourism and creation of base or hub islands that link inhabited islands to uninhabited islands, (4) development of a big data system for managing islands around the baseline of the territorial sea in response to climate change [67].

Korea's local governments are advancing their own projects related to island development, resulting in increased public awareness of islands. However, since the local government island projects are mainly aimed at tourism, it is unclear how well they address islanders' economic, health, cultural, and welfare needs. Projects to preserve and promote islanders' values and identities are urgently needed to maintain traditional ecological knowledge and ultimately enable ICFV sustainability. It is necessary to expand and enhance island infrastructure, residential environments, housing, and traffic rights in order to increase the livability of ICFVs.

As discussed in the report Planning and Research on the Development of Technology for Managing and Using Small Islands [66], enhancing islands' residential environments and taking special measures to prevent disasters are required in order to respond to sea level rises and extreme weather events. In addition, the national government, local governments, and islanders will have to work together to achieve sustainable fisheries and the preservation of marine ecosystems and biological resources, which form the basis for Korean ICFV economies. Ecosystem-based management is widely used globally as a model for conserving natural ecosystems and sustainable resource use [68]. More recently, however, community-based management models have emerged, taking a sociocultural and ecological perspective on managing islander livelihoods in fishing villages and marine pro-

tected areas. This is vital for maintaining the ecological uniqueness, traditional livelihoods, and traditional ecological knowledge of Korean ICFVs.

### 3.2.3. Encouraging In-Migration to ICFVs

As noted above, ICFVs are struggling with aging populations, high levels of outmigration, and low birth rates. It must also be acknowledged that there is in some respects increasing demographic diversity, with a rise in single-person households, returnees to fishing villages, and foreign workers. The conditions of the fishing industry make it difficult to attract young people to this kind of work, but the lack of labor is worsened by regulatory barriers, with traditional fishing communities preventing the inflow of new workers. The Fishery Cooperatives Act limits membership of fishery cooperatives to individuals who reside in or have their business based in the relevant designated district, yet it is difficult for those who are not already cooperative members to join fishing villages. Because it is up to each fishing village to set its own rules in this regard, prospective new members face difficulties in acquiring the necessary information in advance [63].

The Fishing Village & Fishing Port Association's General Centre for Relocation to Fishing Villages operates various programs to increase population growth and the inflow of young fishers and to assist local governments in developing regulations as well as operating 13 support centers for returnees to fishing villages. Initiatives include converting illegal fishing grounds into locally managed fishing grounds that could be sold to people relocating, thereby lowering barriers to entry; administrative and financial support for repairing vacant houses, support to cover moving expenses, and tax incentives; middle school and high school scholarships to attract young families; enhanced public medical services, including childbirth and healthcare incentives, and medical insurance for those working in farming and fishing; pension schemes for fishery workers and assistance to fishing households.

The first Comprehensive Plan for Supporting Relocation to Fishing Villages by the Support Centre for Relocation to Fishing Villages [69] states that the outflow of urban population (low growth, early retirement, etc.), inflow of fishing village population (high expected income, jobs, etc.), and demand for a return to fishing and rural ways of life are on the rise due to government policies and changes in the perceived values of different lifestyles. Nevertheless, compared with urban areas, fishing villages are still experiencing rapid population decline and aging due to underdeveloped settlement conditions (housing, education, culture, etc.). Around 6.3% of urban residents in Korea wish to move to rural areas. People relocating to rural areas in general tend to be middle aged and to move to places in which they lack local or regional connections. In contrast, people relocating to fishing villages in particular show a high proportion of individuals taking over family businesses and making contributions to the local economy.

The Comprehensive Plan for Supporting Relocation to Fishing Villages [69] includes the following three key tasks:

- Policies to support relocation to fishing villages that are adapted to the needs of each industry and region, strengthening support for young fishers' start-ups, and targeting support at those who re-enter the fishing village after a given period of absence.
- Encouraging the interaction of newcomers and long-term locals in fishing villages as a means of improving stability, widening the industrial scope of fishing villages, conducting surveys, and developing alternative sources of income such as fishing village guest houses.
- Enabling urban residents to relocate to fishing villages by expanding their opportunities for experiencing fishing village life in advance, developing a guidebook to assist in resettlement, constructing a consultative body for improving the governance system, lowering barriers to entry, and strengthening publicity about relocation opportunities.

It is proposed that the Post-New Deal Project 300 for Fishing Villages be expanded to support ICFVs, prioritizing encouraging in-migration by young people and returnees.



### 3.2.4. Improving Island Accessibility

Improving accessibility to islands is of paramount importance. There has been substantial research both domestically and internationally concerning how various transport modes and transport infrastructures affect island societies and economies [3,70–75].

Korea's local governments have recently implemented a range of assistance policies to improve ICFV accessibility, such as fare discounts and cargo support. In addition to this, it is vital that the relevant agencies under the MOF make every effort to address challenges confronting islanders and others (including tourists) related to traffic rights; navigation control in the event of sea fog, high seas, and other weather conditions; and a public service system for passenger ships [76]. In the aftermath of the 2014 Sewol Ferry Disaster, the MOF set forth key tasks with respect to safety management of coastal passenger ships. These involved the creation of new safety management systems, a paradigm shift in passenger transport services, the rationalization of safety management rules, and the normalization of a culture of marine safety. Improvements have already been made in terms of ports and ships, acquisition of meteorological data, and open discussions regarding passenger service provision. It is necessary though to reassess these key tasks and safety measures, revising them where they do not meet present needs in today's era of island travel.

In light of the increasing unpredictability of weather, it is vital to share accurate weather data, improve visibility observation equipment, enhance shipboard equipment, and improve crew member training, alongside efforts to build a consultative body to assist in unifying the regulatory system. In addition, the current Enforcement Rules of the Maritime Safety Act should be amended to ensure that captains are only permitted to depart during potentially dangerous weather conditions if their company and boat have passed certification. It is important to continually assess and adjust departures and sea routes, bearing in mind the overall rise in demand in islanders' and visitors' expectation regarding quality and reliability.

MOIS, MOLIT, and MOF are currently running ICFV-oriented projects, including MOF's New Deal 300 Project for Fishing Villages, that mostly target islands that are easily accessible from cities. Most local government island development projects, including those in Incheon, Jeollanam-do, and Chungcheongnam-do, are aimed at the tourism industry. In contrast, islands that are farther offshore and at the edge of the territorial sea (that is, outermost islands) remain a blind spot for these local government-supported projects. Extraordinary measures are needed to improve the built environments of these islands. Making these islands more accessible will not only strengthen ICFVs but also improve accessibility to Korea's vast marine territories.

### 3.2.5. Identifying and Assessing Island Ecosystem Services

Like other terrestrial ecosystems, island regions have service functions of supply, control, and culture and provide beneficial ecosystem services to people. Ecosystem services must be considered at the regional level, the archipelago or inter-island level, the island level, and the sub-island level [77]. When undertaking comparative analysis of islands at geographically similar latitudes, it is possible to identify similarities in their ecosystems and ecosystem services. People living on relatively small islands, particularly in archipelagic contexts, are generally more vulnerable in terms of environment, economy, and society.

ICFVs possess vulnerabilities related to their limited terrestrial resources, export-oriented economies, high reliance on strategic imports, remoteness, high transportation costs, openness to external shocks, and potentially high or comprehensive impact from extreme weather events and sea level rise exacerbated by climate change [78]. They are also vulnerable to domination by powerful economic and social forces [79,80]. Yet discourses of vulnerability are self-perpetuating: Vulnerability is at least in part produced through ascriptions of vulnerability, through assumptions about what island societies can and cannot achieve [81–84].

Efforts have been made to identify criteria for evaluating ecosystem services and ecological carrying capacity in small island contexts [77,78,85–89]. KIDI should set out to

systematically review the relevant international and domestic research on island ecosystem services and ecological carrying capacity in order to create a comprehensive assessment system that is applicable to Korea's inhabited and uninhabited small islands.

### 3.2.6. An Archipelagic Approach to ICFV Sustainable Development

When setting a policymaking trajectory for ICFV sustainable development, it is vital to determine the appropriate object for policy. Korean islands cannot be managed in isolation from the sea or from one another. ICFVs prosper when their residents develop cultures that are adept at making use of ecological and biological resources from the surrounding environment [90].

The report on A Study on the Utilization of Islands for the Effective Management of the Surrounding Seas conducted by the Korea Maritime Institute (KMI) recommends that island development and management be organized in accordance with the categorical features and functions of each island in order to create synergies and clustering advantages [91]. KMI suggests that, because small islands, whether inhabited or uninhabited, lack the capacity for the full range of social, economic, and environmental functions, each island should be designated in terms of a specific function and then developed in a cluster along with other nearby islands. Islands within clusters could be made more accessible through a shuttle-type ship transport system that connects the islands with one another. This represents a kind of archipelagic perspective that is attuned to the needs of ICFVs, for which solutions at the island scale alone may prove insufficient [92]. By prioritizing collective and networked development, opportunities for ICFV energy self-sufficiency, ecological conservation, and eco-tourism are enhanced. An archipelagic approach may require different kinds of technologies and policies than an approach focused on individual islands alone.

Increased accessibility leads to increased tourism and urbanization. Islands are not, however, merely tourist destinations or drivers of the national economy; they are also spaces that serve residents' needs and can support a range of industries. An archipelagic perspective can help assist in the development of different kinds of industries, livelihoods, and functions in different places, serving various ICFVs simultaneously. For example, islands often benefit from reputations as clean and natural places where positive traditional values are maintained. This can help raise the value of island-branded products and services, especially those from small-scale and ecologically friendly businesses [93,94]. Currently, most Korean islands are strongly reliant on the primary sector industries of agriculture, aquaculture, and fishing. The launching and maintenance of locally branded products and services is needed to encourage the integrated development of primary, secondary, and tertiary production on an archipelagic scale that leverages the unique values of a range of ICFVs and contributes to a circular socioeconomic system [23,90]. This also connects with the rising popularity of ecotourism. Local government projects aimed at tourism need to pay more attention to promoting complementary industries in a variety of island and marine spaces and ensuring the tourism development actually meets islanders' needs.

Part of this should involve developing and deploying technologies adapted to the needs of ICFVs. These technologies should utilize marine and island resources and be appropriately scaled for island and archipelagic contexts. They include information technologies, renewable energy, technologies that can reduce the need for imported goods, food safety and manufacturing technologies, and green fishing and aquaculture technologies. Islanders should take the lead in managing, disseminating, and improving the technologies. These technologies need not be expensive, imported, or difficult to source and maintain: Many of them will be technologies that can be produced and assembled locally.

It is necessary to think outside the confines of the individual island and instead consider how functions, services, and resources can be exploited across multiple islands and their connecting marine spaces. An archipelagic perspective can expand the prospects for intrinsic sustainable development and foster forms of ICFV sustainability that neither

rely upon excessive external investment and capital nor indulge in romantic ideals of island isolation and independence.

#### 4. Discussion and Conclusions

The previous section presented obstacles to sustainability confronting Korean island communities and fishing villages (climate change, overexploitation of and damage to marine resources, marine pollution, and sociocultural challenges) and then argued for an integrated approach to meeting these challenges (building a cooperative system with the Korea Island Development Institute, focus on ‘livable islands’, improving island accessibility, identifying and accessing island ecosystem services, and an archipelagic approach to ICFV sustainable development).

Sustainability is multifaceted and must be approached in a holistic manner. Part of the problem with Korea’s approach to island development in the past has precisely been its piecemeal nature: Different government bodies have targeted different parts of island and fishing village economies, societies, and geographies. For example, infrastructures designed for one industry have an effect on other industries: Tourism infrastructure such as hotels and rental accommodation may harm the viability of fishing livelihoods, and certain aquaculture and fishing practices may repel tourists, yet tourism provides a valuable market for fishery products, and local fishery products are important for attracting tourists. Climate change may contribute to flooding of coastal settlements, degradation of infrastructure, and altered prospects for aquaculture and fishing, all issues that are interrelated. Demographic challenges cannot be separated from livelihood issues, and the provision of new opportunities in one industry may lessen attractiveness of other industries, with complex results. Fishery cooperative regulations were designed to protect the rights of islanders and viability of local fisheries, but they increasingly risk hampering efforts to attract and retain new generations of fishery workers.

The most that can be said now is that no single policy can successfully address any one of these issues in a singular manner. The specific issues and narrow policy areas related to ICFV development cannot be managed in isolation, and sustainable solutions depend upon the maintenance of ICFV cultures and the traditional ecological knowledge they possess. It is thus unhelpful to pursue economic growth or industrial development on islands without considering the needs of existing ICFVs and their residents and without considering the embeddedness of islands and marine areas in complex archipelagic systems.

This paper has advocated an integrated approach. The recommendations here represent guidance for the directions in which Korea’s future ICFV policy should move: Until an integrated system of island research and policymaking has been established and put into operation, it will be impossible to design and enact holistic solutions. An integrated approach to ICFV sustainable development requires institutional, policy, technological, and sociocultural innovation. Doing things as they have always been done may produce negligible or poor improvement in sustainability.

The establishment of Island Day has helped raise public interest in islands, and the creation of KIDI may provide opportunities for a more comprehensive approach to ICFV sustainable development. However, because KIDI must conform with the wider policies of the MOIS, if integrated development is to succeed, special efforts will need to be made to harmonize MOIS and MOF island-related policies. Inter-ministerial cooperation is essential for the long-term sustainable development of Korea’s ICFVs.

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