



Korea Environmental Policy Bulletin

Establishment of the National Institute of Biological Resources (NIBR)

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Summary

Ministry of Environment (MOE) opened the National Institute of Biological Resources (NIBR) to support the sound management and conservation of biological resources and to train new taxonomists. The institute currently houses approximately 1.35 million collections and can store up to 11 million in total. About 60 taxonomists are conducting research projects, including the compilation of lists of Korean species, flora and fauna, as well as molecular phylogenetic analyses, development of climate change adaptation solutions, and so on. In addition, the institute is publicizing the importance of biodiversity conservation and its use through various exhibitions and education programs for visitors. The institute aims to grow into a leading Northeast Asian institution through biodiversity research and international cooperation.

I. The Establishment of the NIBR

1. Background

In addition to its beautiful natural environment, the Republic of Korea has been blessed with an abundance of extraordinary plants and wildlife. It is important to pass this rich biological diversity onto future generations, and to contribute to its conservation and sustainable use.

Biological diversity, or rather, biological resources have been the basis for human civilization and have since become the source of bioindustry; one of the most important high-tech industries of the 21st century. The economic value of biological resources every year is roughly three trillion dollars. That corresponds to about 5% of the world's GDP. The amount of biological resources secured and used in a country represents its power and international competitiveness.

Since the 18th century, the United Kingdom, France, and other developed countries endeavored to collect, classify, secure, acclimate, and use biological resources from around the world. Expeditions to the Korean peninsula started in the late 19th century by other countries such as America, Japan, and the United Kingdom; however, the surveys and researches by Korean authorities were not enough.

The Convention on Biological Diversity, launched in 1992, recognizes the sovereign right of each nation over its biological resources. The convention also offers periodic supervision to help make detailed lists of native species within member nations. In order to settle the taxonomic impediment, a Global Taxonomy Initiative (GTI)

was drawn up during the 6th Conference of the Parties in 2002. Implementation of the GTI includes training taxonomists, establishing institutions where they work, and initiating projects.

In 1994, Korea joined the Convention on Biological Diversity and to properly implement the convention, Ministry of Environment established the NIBR.

2. Establishment process

In 1994, Ministry of Environment conducted a feasibility study on the necessity, proper locations, and budget needs of the new institution. Former President Kim Dae-jung suggested it as an election pledge in 1997, and the decision to construct the NIBR was finalized in 2000. Through legislation of the Protection of Wild Fauna and Flora Act in February 2004, the legal basis of the NIBR was established. The construction began in 2004 and was completed in 2007. The National Institute of Biological Resources began operations in March of 2007, and the official opening ceremony was held on October 10th.

3. Mission

The missions of the NIBR are to 1) establish an efficient conservation and management system for national biological resources, and secure Korea's sovereign rights to the biological resources; 2) build infrastructure to support the biotechnology industry and enhance national

competitiveness; and 3) increase public awareness on biodiversity and the importance of biological resources, and train future researchers through exhibitions and education programs.

4. Organization, personnel, and facilities

The organization of the NIBR includes two departments (Planning and Exhibition Department, Biological Resources Research Department), eight divisions, and 102 regular personnel including sixty-one researchers.

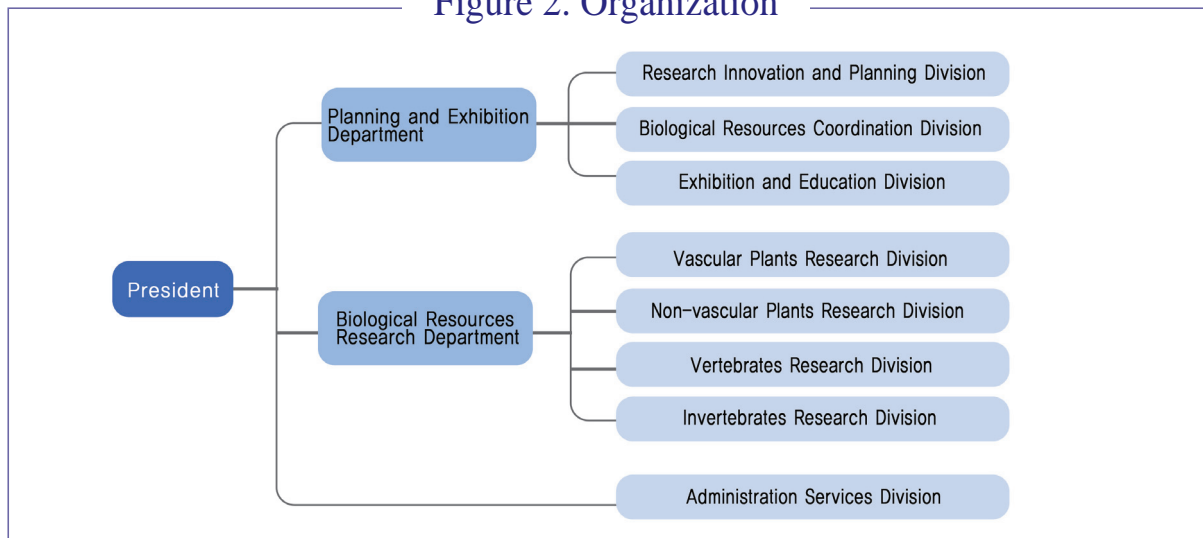
The Planning and Exhibition Department is in charge of the planning and coordination of researches, exhibitions, and education. The Biological Resources Research Department is in charge of research activities.

The institute is located on 67,000 m² of reclaimed land, 30km west of Seoul. Major facilities include Collection and Research Building (20,387 m²), Exhibition and Education Building (6,211 m²), Greenhouse and Animal Facilities (1,126 m²), Experimental Garden (4,810 m²), and Wildflower Garden (4,810 m²).

Figure 1. The NIBR Buildings



Figure 2. Organization



II. Vision and Activities

1. Vision and development strategy

1.1 Vision and goal

The vision of the NIBR is the preservation and management of national biological resources. To achieve this vision, the following six goals were set to :

- 1) collect, preserve, and manage biological resource collections;
- 2) conduct surveys and research on biological resources;

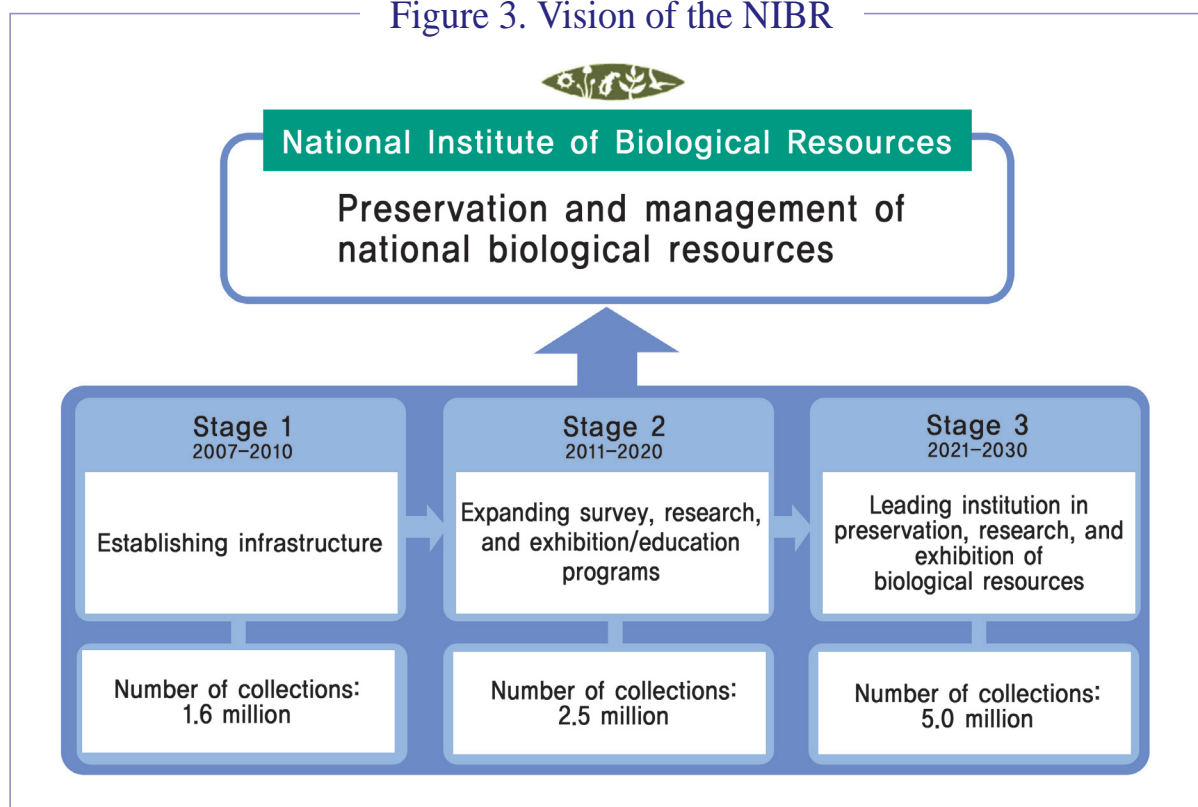
- 3) provide support to the biotechnology industry;
- 4) strengthen the research cooperation
- 5) present elegant exhibition and viewing services; and
- 6) strengthen education on biological resources.

1.2 Development strategy

• **Stage 1: Establishing infrastructure (2007-2010)**

During this stage, the institute aims to position

Figure 3. Vision of the NIBR



itself as a scientific authority for biological resources collection and researches.

Major tasks of the NIBR are to preserve 1.6 million collections, to initiate research projects, to employ talented researchers, and to conduct exhibitions and create education programs.

- **Stage 2: Expanding researches and programs (2011-2020)**

In this stage, the institute aims to become a Northeast Asian research hub for biological resources. Major tasks include compiling 2.5 million collections, establishing a Northeast Asia research network, opening an overseas research branch, and establishing the National Biological Resources Network (NBN).

- **Stage 3: Leading institution (2021-2030)**

After stages one and two are complete, the institute hopes to upgrade itself as an internationally leading research institute for biological resources. Major tasks of the NIBR at this stage will include the maintenance of five million collections, construction of a research center for integrated classification, and the establishment of outstanding exhibition/education programs.

2. Activities

2.1 Preservation and management of collections

Many of the biological collections from the first

half of the 20th century were lost during the Korean War. After the War, Korean scholars worked hard to restore representative collections of Korean fauna and flora through government supported activities. Since 1986, the Ministry of Environment has supported various surveys for wildlife protection and monitoring, with duplicate collections from the surveys kept at the National Institute of Environmental Research (NIER).

In total, the NIBR took charge of 1.35 million collections, including 1.06 million from NIER and about 29 thousand collections donated by retired researchers and private museums.

With a total area of 6,446 m², the collections preservation facilities are the largest in Asia. Comprising 17 major storage areas for preserved specimens, fresh tissues, and genetic materials from plants, fungi, algae, lichen, invertebrates, and vertebrates, the storage facilities have a maximum capacity of over 11 million specimens.

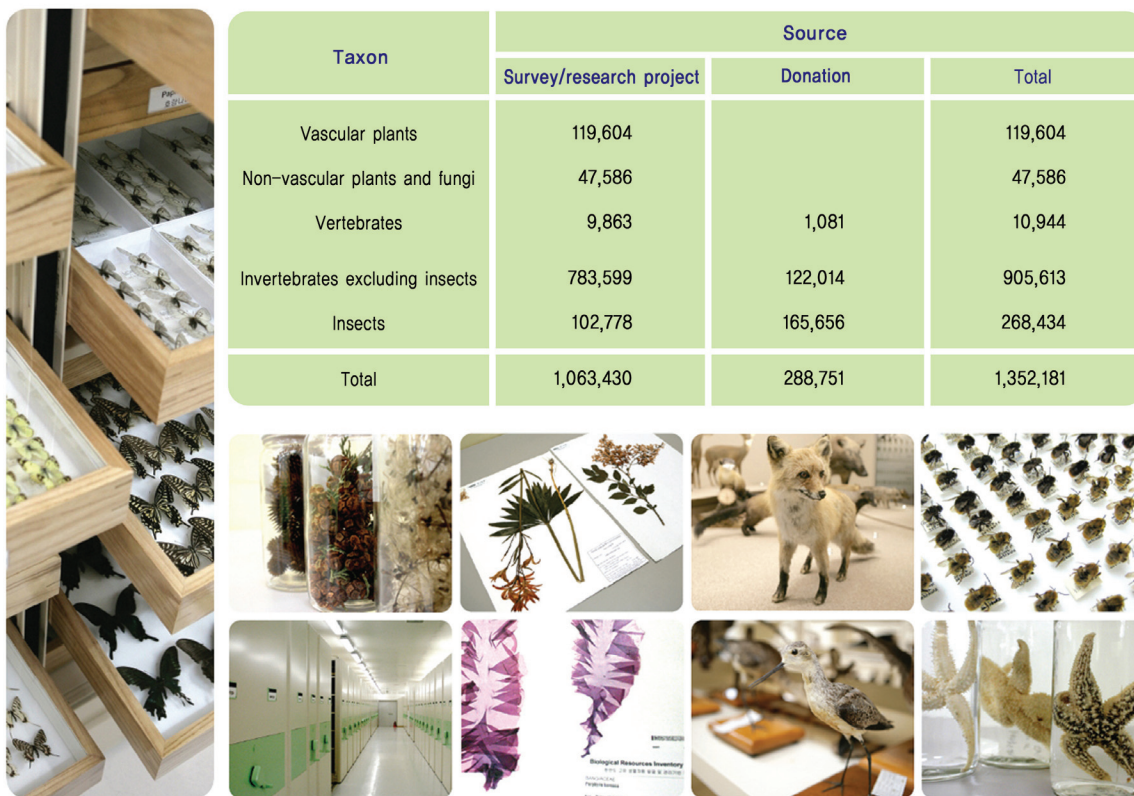
The storage areas are equipped with custom-designed compactor units, automatic climate control systems, UV-free lighting, and halon gas extinguishing systems.

The institute also has facilities to make and process a number of specimens. These include specimen preservation rooms for vascular plants, non-vascular plants, vertebrates, invertebrates, and insects; a drying room; a specimen loan processing room; photography and image processing room; and a fumigation room.

Figure 4. Status of the Collections

The number of specimens housed at NIBR as of December, 2007

Taxon	Source		
	Survey/research project	Donation	Total
Vascular plants	119,604		119,604
Non-vascular plants and fungi	47,586		47,586
Vertebrates	9,863	1,081	10,944
Invertebrates excluding insects	783,599	122,014	905,613
Insects	102,778	165,656	268,434
Total	1,063,430	288,751	1,352,181



2.2 Surveys and researches

Various surveys and research projects are being conducted in order to secure, preserve, and manage Korea's national biological resources. There are three project fields, including surveys and collection management, research of biological resources and inventory making, and climate change adaptation and biodiversity conservation.

Sixty-one scientists at the NIBR actively conduct various surveys and research projects on biological resources. They are also responsible for

collections management and collaborating with the Exhibition and Education Division regarding public programs.

In addition to the collection storage facilities, the institute has 18 state-of-the-art laboratories and other research support facilities for conducting both basic and applied research on biological resources. The laboratories are equipped with facilities required to conduct various fields of research on biological resources, those pertaining to morphology, anatomy, phytochemistry, and molecular systematics and genomics.

Table 1. Major Research Projects

Research fields	Major projects
Survey and collection management	<ul style="list-style-type: none"> · The survey of indigenous biological resources of Korea · The survey of threatened and/or important taxa in strategic regions · The optimization and standardization of the storage and management process of biological resources collections
Research of biological resources and inventory making	<ul style="list-style-type: none"> · The compilation of a national list of indigenous species of the Korean peninsula · The inventory and management of endemic species of Korea · The documentation of type and voucher specimens of indigenous species of Korea · Systematic studies of important taxa in Korea · Molecular phylogenetic analyses of major Korean taxa
Climate change adaptation and biodiversity conservation	<ul style="list-style-type: none"> · The conservation and restoration of biodiversity in the Korean peninsula · Long-term studies on changes in the biogeographical characteristics of the Korean peninsula · The survey and conservation of endangered species · The monitoring and management of wildlife

2.3 Exhibition and education

Exhibitions at the NIBR are focused on the diversity and characteristics of Korean native species. Nearly 4,600 specimens, representing 985 endemic or indigenous species are currently on display. Of these, the thick-billed murre (*Uria lombia*), the band-billed crane (*Porzana paykullii*), and the rufous-bellied woodpecker (*Dendrocopus hyperythrus*) are the only collections known to exist in Korea. Since its official opening, approximately 145,000 (19,000 per month) people have visited the exhibitions.

Permanent exhibitions are on display in exhibition halls 1 and 2, and the Gotjawal Conservatory. Diversity among the native species of Korea (exhibition hall 1) is systematically displayed according to the five-kingdom system of life, which encompasses the kingdoms Monera, Protista, Fungi, Plantae, and Animalia.

In particular, the mammal collection is the nation's largest, and has 22 native mammal species on display, including the rarely seen wild fox. In addition, specimens and photographs of 221 endangered species recognized by the MOE are on display in order to alert the public of the

urgent need to conserve biodiversity.

Major ecosystems are recreated as highly detailed dioramas in exhibition hall 2. The forest ecosystem diorama represents the typical temperate deciduous forest commonly found in Korea. The river/lake ecosystem diorama displays a vast array of species, including fish, birds, plants, insects, and other invertebrates, interacting with one another in their natural habitat. The marine ecosystem diorama is a recreation of the sea floor near Dok-do Island in the East Sea.

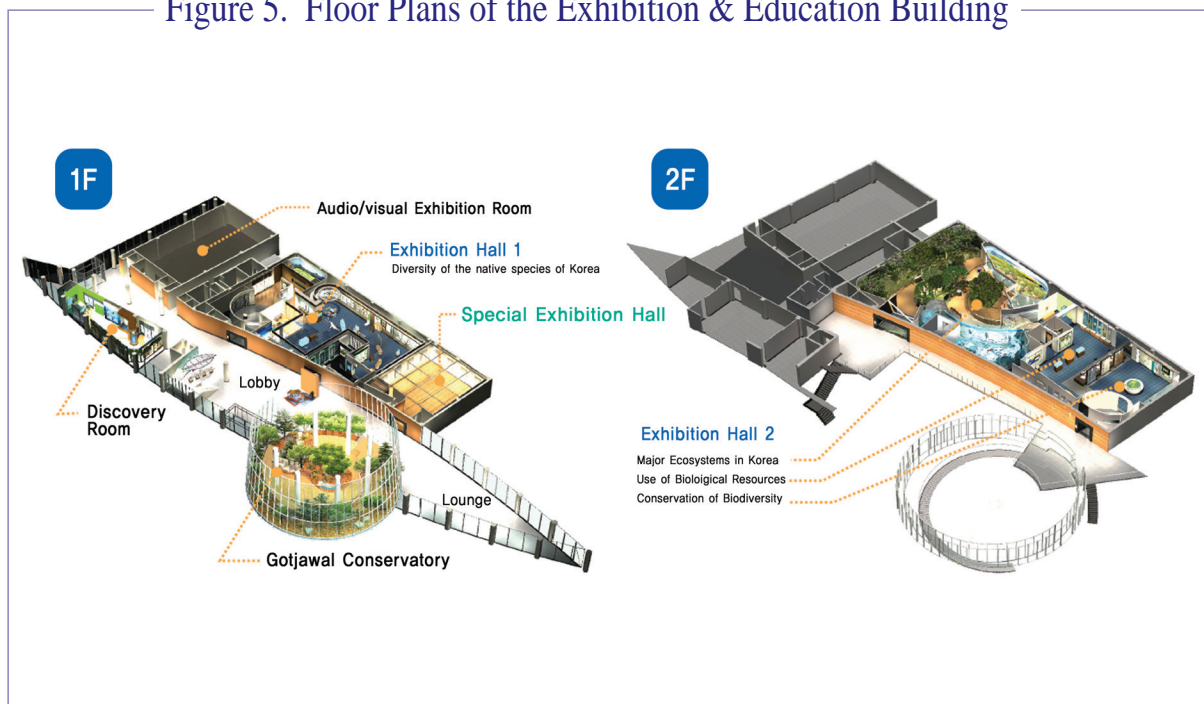
The use of biological resources and the conservation of biodiversity are also on display in exhibition hall 2. The exhibition is intended to promote public awareness of the importance of biological resources and their sustainable use.

The Gotjawal Conservatory is an interesting

exhibition which represents the subtropical vegetation of Korea. Gotjawal is a term used in Jeju Island, which refers to the mid-slope regions, typically volcanic rock, streams, and the broad-leaved trees of Mt. Halla. The exhibition recreates this environment, housing the subtropical broad-leaved vegetation of Mt. Halla at mid elevation.

Special exhibitions are introduced three or four times a year. "The egg - New birth and beginning" was held to commemorate the opening the NIBR. In succession, there were two special exhibits held in the first half of 2008. One was "Insects at Jiri Mountain", which showed 3000 insects collected in the Jiri Mountain region. The other special exhibit, titled the "Taeon oil spill accident" documented the environmental destruction caused by the 2007 oil spill.

Figure 5. Floor Plans of the Exhibition & Education Building



In addition, the institute provides educational programs for the general public, future researchers, and professionals. The institute has a range of education programs related to biological diversity and resources for pre-school children, students, families, and adults which promote public awareness on the importance of biological resources.

To train future researchers and professionals, the institute has cooperative educational programs with universities and related research institutes, teacher training courses, and docent training programs.

Exhibitions and education have, for the most part, been conducted inside the building, but in the future the institute will hold activities outside. A 34,000 m² wetland adjacent to the NIBR will be used as a place for learning wetland life through direct and actual experiences.

2.4 Supporting biotechnology industry

At present, it is important to secure and utilize the biological resources that are essential for the growth of the bio-economy. One of the major functions of the NIBR is to provide support to biotechnology industries, including source materials and/or information about wild species.

In this regard, the NIBR's current projects include the genetic evaluation of important biological resources and the establishment of a DNA bar coding system. These projects include the analyses of the genome, population genetics, and DNA bar coding of resource materials. For

these reasons, the institute is equipped with a liquid-nitrogen preservation facility, a cell recovery facility, seed storage, and a seed germination facility.

2.5 Research cooperation

Ministry of Environment and the NIBR are promoting "the flora and fauna of Korea" project (2006-2014) which integrates all taxonomic information from the Korean Peninsula. Contributions to the project are being provided by almost every Korean taxonomist, and the project is expected to become standard data for the study of Korean biological resources.

The institute cooperates with biological resources agencies inside and outside of Korea. The NIBR established consultative relationship with 32 domestic agencies on biological resources as of May 2008. The institute also signed MOUs with the Consortium for Barcode of Life (CBOL), Kunming Botanical Garden in China, and the Far Eastern Branch of the Russian Academy of Sciences (FEBRAS). The institute also has a program for specimen exchange, exhibition, and professional training with the National Museum of Natural History (Smithsonian Institution) and Missouri Botanical Garden in the United States.

In the future, the institute hopes to promote biological resources exchange and research with other Asian countries including China, Russia, and Malaysia.

III. Evaluation and Prospect

1. Evaluation

Compared to developed countries, research activities for biological resources in Korea still leave much to be desired. For example, developed countries such as United Kingdom, France, Sweden, Russia, and United States support major herbaria, which preserve more than five million collections each. Still, there is no institution like them in Korea.

These biological resources research institutions are managing programs to secure valuable biological resources from all over the world. In addition, they train taxonomists, analyze and store biological resources, and support commercial uses.

Now that the NIBR, with 1.35 million collections and 100 staff, has been established as a subsidiary organization of Ministry of Environment in Korea, it is hoped that Korea will increase its efforts to do the same.

2. Prospect

In the future, the institute aims to preserve and secure the biological resources of Korea and its adjacent regions, contributing to the development of biological resources related industries. The institute aims at preserving 5 million collections by 2030. By utilizing biological resources, the institute would be able to position itself as a high-class research institute covering from traditional taxonomy to next-generation molecular phylogenetics.

The exhibitions and education programs play an important role at the NIBR. The institute is located just west of Seoul, the capital city of Korea. The institute is well suited to provide exhibition and education services for students, amateurs, young taxonomists, and other visitors and to raise awareness on biodiversity and biological resources.

Moreover, it is hoped that the institute can extend its activities by exchanging materials, information, techniques, and professionals through bilateral cooperation with foreign research institutions. Over the long term, overseas offices should be setup in countries with mega-biodiversity. Furthermore, in order to conserve biodiversity and prepare for climate change adaptation in the Korean peninsula, it is very important to conduct research exchanges with North Korea.

Recently, plans for other biodiversity-related institutions scheduled to open in 2012 are underway in Korea. They include the National Institute of Ecological Research and Conservation (NIERC) promoted by the Ministry of Environment and the National Institute of Marine Biological Resources (NIMBR) of the Ministry of Land-Transport and Marine Affairs. NIERC is the institute for ecosystem research, especially with regard to climate change and adaptation measures, and NIMBR is the institute for marine biodiversity research. Therefore, scholars at NIBR and the two new institutes should cooperate mutually in order to preserve the biodiversity of Korea and nearby regions.

Construction Plans for NIERC and NIMBR

Diverse oceanic life inhabits the Yellow Sea, but it is encountering serious dangers because of rapid economic growth in the region, overfishing, and indiscriminate dumping.

The Korean government recently withdrew a plan to build an industrial complex in Seocheon County, Chungcheongnam-do, and is instead promoting the establishment of NIERC and NIMBR as alternatives. These projects will not only help preserve the ecosystem of the Yellow Sea, they will help ensure the sustainable future of Seocheon county region.

NIERC is expected to conduct research on ecosystem changes caused by climate change and ecosystem restoration. The institute will support the sustainable development of Seocheon by conducting exhibitions, education programs, and promoting ecotourism. Major facilities include a future ecosystem research facility, large-scale greenhouse, field ecosystem exhibition, endangered species conservation facility, eco-science education center, and an ecotourism facility.

NIMBR aims to conduct systematic surveys of marine biological resources and to establish a management system for the marine ecosystem. Major facilities will include collections preservation and research building, exhibition and education building, culture building, and a guest house. NIMBR will contribute to efforts to develop the region by promoting tourism in Seocheon region.

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