



Signals in Plain Sight

2026
SPRING

Special Issue

Detected Signals of Changes
What is Happening in Nature?

Biodiversity Issue

When Spring Settles on Wildflowers,
Butterflies Choose Hampyeong

Bio News

Latest Research and
Patents

BiOWEBZINE

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The National Institute of Biological Resources (NIBR)
National Institute of Wildlife Disease Control and Prevention (NIWDC)

National Institute of Ecology (NIE)

Nakdonggang National Institute of Biological Resources (NNIBR)

Honam National Institute of Biological Resources (HNIBR)

A Joint Newsletter

Biowebzine is where the National Institute of Biological Resources (NIBR) under the Ministry of Environment, the National Institute of Wildlife Disease Control and Prevention (NIWDC), the National Institute of Ecology (NIE), the Nakdonggang National Institute of Biological Resources (NNIBR), and the Honam National Institute of Biological Resources (HNIBR) gather together and dream of a future of harmonious coexistence of all living things. Let us get useful information and knowledge about biodiversity, ecosystems, and wildlife diseases in Korea from Biowebzine!



A Joint Newsletter, Biowebzine

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Signals in Plain



n Sight

Detected Signals of Changes
What is Happening in Nature?

Nature has always talked to us.
But we have not listened closely to it.
Movements made a little faster.
Seasons that feel a little stranger,
and signals sent a little earlier.
What on Earth is happening in nature?
The 2026 Spring Edition begins with this question.



Plants are Disappearing Where Spring Stayed

Signals of Plant Distribution Transformed by Climate Change

1

Signals That Spring Sends First

Between the end of winter and the beginning of summer, new leaves sprout, and flowers bloom while responding to delicate changes in temperature, precipitation, and sunshine. Plants in spring are like signals from nature. Recent observation records and the NIBR's prediction research indicate that the signals are different from those in the past.

To understand how climate change affects plant distribution, the NIBR has conducted long-term prediction research on 1,008 species of plants distributed in Seoul's main mountains, including Gwanaksan, Namsan, Inwangsan, Bukhansan, and Suraksan. The research team analyzed whether the plants could keep their current habitats by 2100 under a climate change scenario. The result is clear: If greenhouse gas emissions are actively reduced, approximately 65% of plants can survive; however, if climate change remains unchecked, the survival rate drops to 40% or slightly more.

2

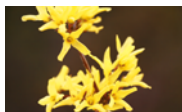
A Change in Plant Distribution Has Already Begun

Observational studies have shown that plant distribution changes forecast by prediction research are being realized. Plants commonly found in lowland areas have gradually disappeared or tend to migrate to relatively higher altitude areas or northern slopes. It has even been reported that some plants bloom more quickly or cannot bloom at all.

What is more worrisome is that Korean indigenous species and plants are extremely sensitive to climate change. *Forsythia saxatilis*, for example, is a plant native to Korea, meaning that it is distributed only in Korea. Even though it is a long-protected species, meaning that its habitats have been relatively well maintained, it has been reported that rising temperatures and changes in precipitation patterns are threatening the plant. In addition, analysis has also found that *Thalictrum actaeofolium*, *Lilium amabile*, *Urtica thunbergiana*, and *Juglans regia*, which are vulnerable to climate change, are the least likely to survive in the long term. In short, even protected species have been impacted by climate change.

However, some plants have expanded their habitats by quickly adapting to changing

Climate-sensitive species



Forsythia saxatilis



Thalictrum actaeofolium



Lilium amabile



Urtica thunbergiana



Juglans regia

The climate change observation and prediction research of the National Institute of Biological Resources (NIBR) clearly shows how climate change has transformed plant distribution in the spring. Among the detected changes are plants in the mountains and fields in Seoul migrating or disappearing and some not surviving. Let us look at the changes and signals that the spring plants are sending to us and think about the meaning of the changes in nature.

environments. For example, forsythia, dandelion, daisy fleabane and cosmos are likely to survive after experiencing climate change. Yet the problem is that nature could lose its variety in the meantime. Forests and fields where diverse plants once coexisted have been dominated by a small number of stronger species, and biodiversity has dramatically diminished.

3

Regional Biodiversity Gaps Become Widened

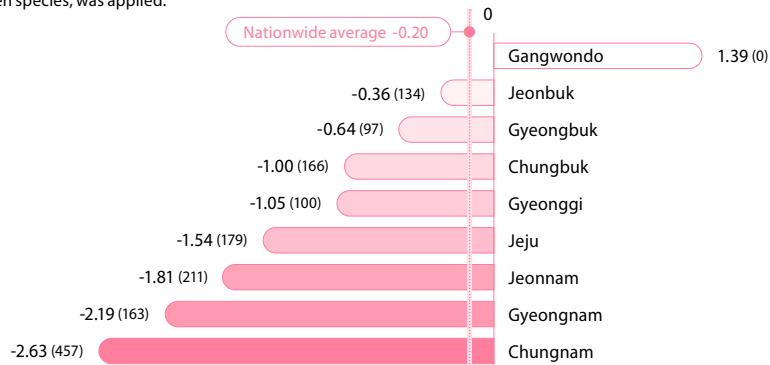
The NIBR predicted biodiversity changes by administrative district and showed that it is highly likely that almost every district will lose its biodiversity. Under a mid-level carbon neutrality scenario, Gangwondo was the only district where biodiversity would not decrease by 2050. In contrast, Chungcheongnamdo would lose as much as 2.63% of its biodiversity. Of the top 10 areas where phylogenetic biodiversity loss is expected to be the greatest, seven are in the Gyeonggido zone. Conversely, in the Gangwondo zone, only three districts are expected to experience biodiversity loss. In other words, areas with low temperatures and high altitudes, such as Gangwondo, are more favorable for plants to migrate. The research results will be used as basis data for investigating a wide range of plants vulnerable to climate change in the future and for preparing conservation measures. Signals of changes sent by spring plants suggest that nature has already entered a new phase.

Forecast on Biodiversity Changes by Administrative District

Source: NIBR (unit: %. The numbers in parentheses refer to the number of species to be reduced.)

※ A mid-level carbon neutrality scenario (SSP 2 – 4.5) from 2020 to 2050 was applied.

- Phylogenetic biodiversity, a biodiversity index that evaluates biodiversity by measuring the evolutionary distances between species, was applied.



If Movement Changes, Disease Emergence Timing Changes

An Infectious Disease Signal Interpreted by the Movement of Wild Birds

Changing Movement Patterns Result in Widespread New Diseases

The movement of wild birds is a critical clue for understanding the spread of infectious diseases, including avian influenza. With migratory birds launching continent-spanning journeys between breeding and wintering grounds, resulting in contact with other bird species, viruses can easily circulate.

In the past, wild birds migrated on a relatively regular basis so that diseases emerged intensively in certain seasons. Recently, however, climate change resulting in new habitat environments and fluctuating migration periods could affect where and when diseases occur. Some experts have even anticipated that the times when diseases spread into Korea could change and that emerging diseases could linger for longer periods.

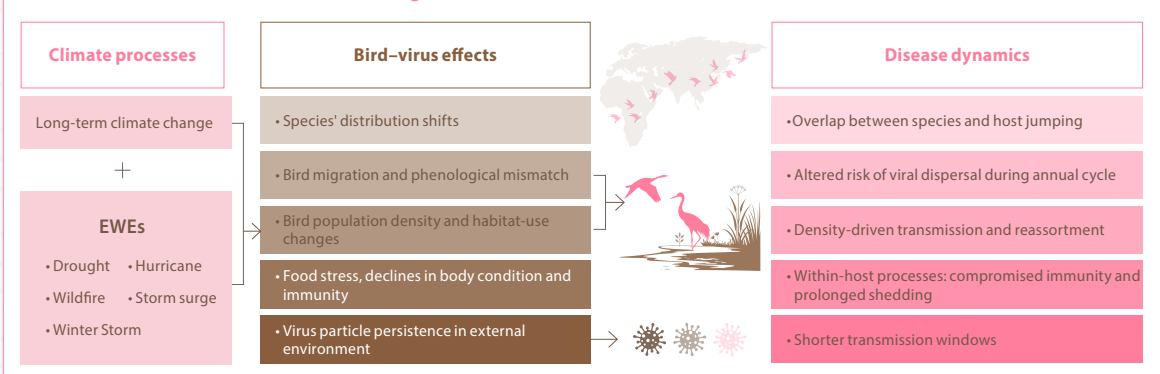
In particular, at some stopovers or specific wintering grounds, wild bird populations might become so large that the subsequent population density could result in virus exchanges and the expansion of areas where infectious diseases could enter Korea.

Signals of Infection Shown Before Birds' Movement

Recently, several cases of diseases that broke previous seasonal patterns have been reported globally. In the past, the occurrence of highly pathogenic avian influenza (HPAI), which spread internationally, was mostly concentrated in the winter season after certain migratory birds came into. However, in some European countries, HPAI has been confirmed, even in summer or early autumn, resulting in the mass mortality of wild birds in the summer. Thus, viruses are not only introduced during birds' migration seasons but could also remain and circulate among wild birds for a while, leading to the next epidemic.

The main culprit of such changes is the combination of global warming and changes in habitat environments. Due to rising winter temperatures, some bird species delay migration or remain in northern areas, thus increasing opportunities to maintain contact with each other. Furthermore, habitat environmental changes caused by human activities, including farmland expansion and artificial wetland development, can affect where and how long wild birds stay and increase population density in certain areas. Of course, factors related to wild birds cannot entirely explain the spread of infectious diseases.

How Climate Change Transforms Bird Migration and Disease Spread Patterns *Source: Prosser, et al., Nature microbiology, 2023



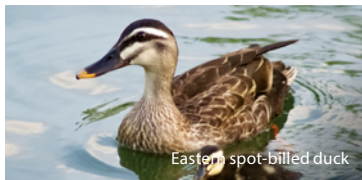
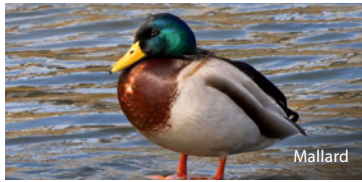
Even though the movement of wild birds is a natural phenomenon repeated every season, the routes and timing of the movement are significant signs of ecological changes and how infectious diseases spread. The National Institute of Wildlife Disease Control and Prevention (NIWDC) has analyzed wild birds' movement and disease test data and studied how recent changes in the movement pattern of migratory birds affect where and when infectious diseases, including avian influenza, occur. Let us learn how to determine the risk of infectious diseases from the signals of wild birds' movements.

Movement Data is Changing Infectious Disease Monitoring and Response Measures

The NIWDC analyzed wild birds' movement and disease test data together and studied the process of the spread of infectious diseases. Focusing on winter birds (e.g., waterfowl, such as birds in the anatine family), which are likely to naturally carry the AI virus, and analyzing the correlation with HPAI-occurrence areas in Korea, the NIWDC research team confirmed wild birds' activities in rivers near HPAI-infected farms and found that in some cases, the genotype of the virus found in wild birds was identical to that of poultry at farms. Even though establishing how the virus spreads between wild birds and poultry at farms is difficult, wild birds' movement data are significant for determining the spread that infectious diseases take.

Such changes have critical implications for disease response measures. Wild bird disease monitoring, which has primarily focused on a specific season, has expanded to consider migration routes, periods, and habitat use patterns. In particular, disease responses have developed from post-disease management to preemptive measures that predict the potential inflow of diseases. If risk predictions are made, and an early warning system based on wild birds' movement data is developed, disease responses can be more preemptive. Ecological information is crucial data for supporting public health and disease prevention policies, and the continuous monitoring of wild birds' movement is a solid foundation for preventing disease risks in the future.

Wild birds that are likely to naturally carry the AI virus



Movements of wild birds detected by tracking devices attached in Korea from 2024 to 2025

* A report on HPAI outbreak responses and their results in the 2024–2025 winter season by the NIWDC



When Did Nature Begin to Change?

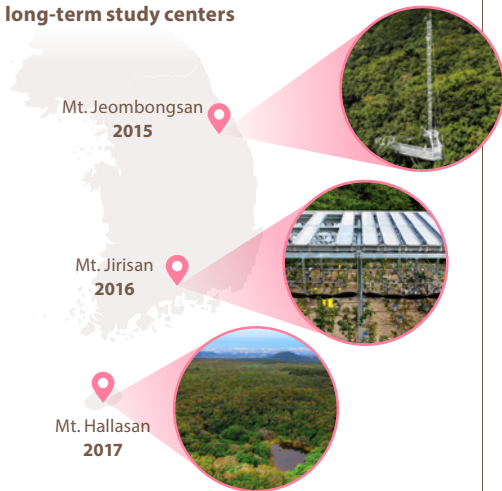
Small but Abnormal Signals Sent by Nature

The Earliest Changes Sent by Nature

Changes in ecosystems usually involve populations, locations, and timing. For example, the population of a species suddenly increases or decreases, or it is discovered where it is not supposed to live. Sometimes, plants sprout earlier or later. Such changes are signals that nature is adapting to environmental changes. However, to understand the signals, we must collectively consider what kind of environments the organism sensitively responds to, what it eats, and who its natural enemies are.

For example, plants inhabiting lower areas are found in sub-alpine areas, or and seasonal changes in plants become noticeably faster. As floods or droughts last longer, the amount of carbon absorbed by forests could decrease. When such changes continue, climate change is seen as affecting the ecosystems.

The NIE's primary national ecological long-term study centers



Numerical Data Do Not Tell Everything

In ecosystem research, small changes in numbers do not automatically lead to ecological changes. Statistical analyses from multilateral perspectives should be undertaken to confirm whether such changes are temporary or permanent. Ecosystems are complicated. For example, the population of moths could decrease for several years and then increase the next year, but we cannot directly tell that it is caused by changes in climate, food sources, or natural enemies. To do so, we should comprehensively consider the relationships among climate, environments, and species.

Ecosystem changes can proceed much slower than we believe. For instance, changes in trees could take more than one generation to occur. Since we may not notice any changes after a ten-year observation period, long-term observation is essential for ecological study.

Observation Research by Zone Based on the NIE's National Ecological Long-Term Study

Zone	Primary Centers	Major Research Areas	Observable Signals of Changes
Gangwon	Mt. Jeombongsan	Integrated observation of changes in climate, carbon, and organisms using ecological research towers	Forest energy flow, carbon circulation, and species
Jeolla	Mt. Jirisan	Artificial environmental experiments (e.g., droughts and rising temperatures) and regional ecological issues	Climate stress reaction, vegetation, and abnormality of urban trees
Jeju	Mt. Hallasan	Observation of phenological changes based on automatic weather systems and time-lapse techniques	Flowering timing, insect occurrence timing, and bird breeding timing

Nature does not change overnight. Changes in organisms living in forests, rivers, and mountains start small. The National Institute of Ecology (NIE) recorded when nature began to change through long-term observations in numerous locations. Let us look at how the signals sent by nature are found and why they are significant.

Research on Reading Signals of Changes More Accurately

Ecological observation results can differ based on who made them and how, when, and what methods were used. Several efforts have been made to decrease differences for example: Survey methods have been manualized, and regional research subjects have been aligned for a better understanding of overall changes in the Korean Peninsula. Through these efforts, one can not only confirm how climate-sensitive species move and feeding relationships among species change but also identify the misalignment of the timing of seasonal changes.

Observation devices have improved rapidly. For example, seasonal changes in plants can be automatically photographed hourly, and trees' growth and sap flow can be measured every minute. Researchers check bird movements and breeding periods using sound recording devices and nest boxes. Observatories for studying major ecosystems in Korea (five locations) equipped with automatic observation devices at the level of advanced countries (e.g., the United States and Australia) have also been constructed. In the observatories, a large observation tower and sensors which individual researchers cannot easily own will be installed. With a foundation for researchers to steadily obtain data and collaboration with researchers in various fields from home and abroad, ecological studies in Korea are expected to improve.

Long-term observations can affect policies. For example, researchers have monitored water quality and changes in plankton in Soyangho Lake for over 20 years and found that the water quality has dropped and the composition of plankton species has dramatically changed since cage culture was permitted. This observation confirmed that cage culture negatively affects ecosystems and, consequently, decisively helped ban it. In Mt. Hallasan, it was observed that moth species composition changed along with altitude. In addition, the decrease in the Korean fir population was found to be caused by long droughts. Such research is critical for understanding how climate change affects ecosystems.

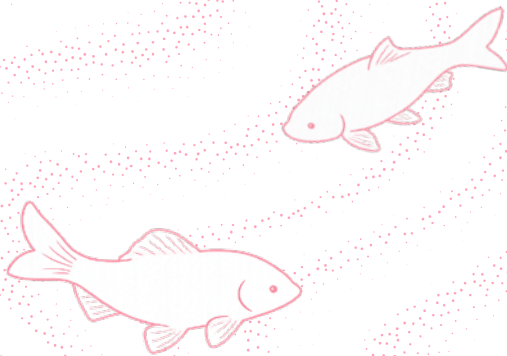
Our Attitude Toward How We Look at Nature

The current ecosystem is the output that living things surviving for millions of years have created. However, we human beings cannot fully understand how our ecosystem functions. What is more worrisome is that we do not know exactly how long Earth's ecosystem can last. Even though we live in a world where we can explore space, we still have a long way to go to fully understand the environments in which we live. Protecting mountains, rivers, and seas is essential. Thus, studies to understand the ecosystem and observe its changes have become increasingly important.

As Rivers Change, So Does the Future of Aquatic Life

How Climate Change Is Reshaping the Map of Freshwater Life

The Nakdonggang National Institute of Biological Resources (NNIBR) uses distribution data for 130 freshwater fish species and species distribution models to predict how freshwater life may change under climate change scenarios based on the Shared Socioeconomic Pathways (SSPs). The changes now being detected in rivers and streams offer clues to how climate change is reshaping the future of freshwater ecosystems.



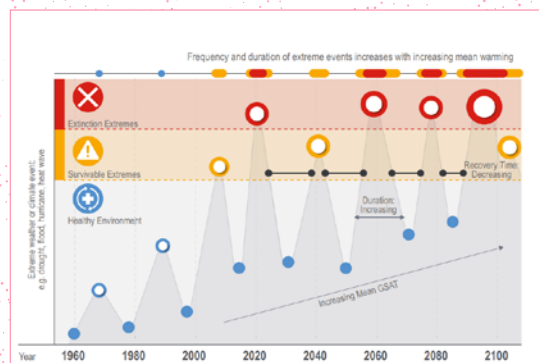
Climate change scenarios:

Climate change scenarios provide projections of future climate conditions based on greenhouse gas concentrations and climate model simulations. The Shared Socioeconomic Pathways (SSPs) were adopted by the Intergovernmental Panel on Climate Change (IPCC) and presented in its Sixth Assessment Report.

****Species distribution modeling (SDM):**

A method used to predict the potential occurrence of a species in a given area by analyzing species occurrence records together with environmental variables such as temperature and precipitation. In this study, the Maximum Entropy model (MaxEnt) was used to estimate changes in the potential distribution of freshwater fish species.

Climate change is one of the major environmental forces shaping where and how organisms live. According to the Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC) and analyses by the OECD, water temperatures are expected to continue rising, while extreme climate events such as heavy rainfall and drought are projected to occur more frequently and with greater intensity (Fig. 1). These changes may gradually weaken the capacity of biodiversity to recover from disturbances and to adapt to new environmental conditions.



(Fig. 1)

A conceptual illustration of how extinction risk is affected by changes in the frequency, duration, and magnitude of extreme weather and climate events

(Source: IPCC AR6 Working Group II Report, 2022)

Freshwater organisms are more easily affected by changes because they live in connected spaces, such as rivers, streams, and lakes, so that they move in relatively limited ranges and are fully exposed to changes in water temperature and flows. For this reason, shifts in the distribution of freshwater organisms are widely used as indicators that can reveal how climate change is affecting the environment. To scientifically analyze and predict these changes, the Nakdonggang National Institute of Biological Resources (NNIBR) has conducted research using long-term freshwater species distribution data. This research predicted the changes in the distribution of 130 species of freshwater fish in Korea for each pathway by applying species distribution modeling (SDM)**.

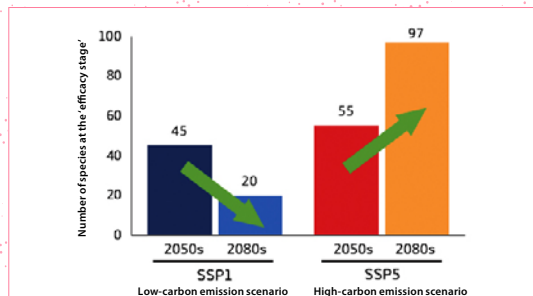


How Freshwater Fish Respond Differently Under Climate Scenarios

Among the various impacts of climate change on freshwater environments, changes in water temperature are often the most immediately noticeable. When the future distributions of 130 freshwater fish species were projected, the results showed that not all species responded in the same way. Some species were predicted to experience reductions in their distribution ranges, while others were expected to remain relatively stable or even expand into certain areas. These differences arise from variations in ecological traits and in how strongly each species depends on specific habitat conditions. In particular, species that rely on upper-stream environments tended to show larger changes in their projected distributions. This finding highlights that climate change does not affect all species in the same way.

Changes in Freshwater Fish Risk Levels Under Different Climate Change Scenarios

When the projected results under different climate change scenarios were applied to the International Union for Conservation of Nature (IUCN) Red List criteria (2023), the future risk levels of freshwater fish were found to vary substantially depending on carbon emission levels. Under the low-emission scenario (SSP1), 45 species were projected to experience reductions of more than 80% in their potential habitat ranges by the 2050s compared with current levels. By the 2080s, however, the number of such species was projected to decline to around 20 (Fig. 2).

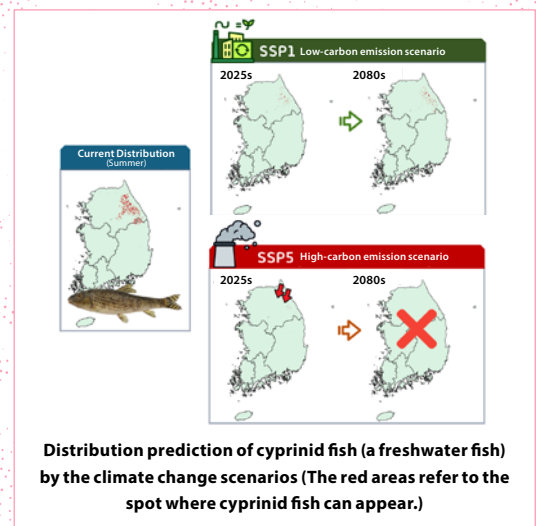


(Fig. 2)

Number of freshwater fish species classified as being at a "critical risk level" under different climate change scenarios (SSP1 and SSP5)

※ Critical risk level: freshwater fish species projected to experience reductions of more than 80% in their potential habitat ranges compared with current levels (IUCN, 2023).

However, under the high-emission scenario (SSP5)*, the number of species projected to fall into the critical risk category is expected to reach 55 by the 2050s and increase further to 97 by the 2080s. In particular, under the high-emission scenario in the 2080s, 48 species—including *Hemibarbus mylodon*, *Brachymystax lenok tsinlingensis*, *Acheilognathus signifer*, *Pseudopungtungia tenuicorpa*, *Gobiobotia brevibarba*, *Gobiobotia macrocephala*, *Rhodeus pseudosericeus* and *Ladislavia taczanowskii*—may potentially disappear from Korea. These results suggest that the level of greenhouse gas emissions could strongly influence both the magnitude and the pace of risks that freshwater fish are likely to face in the future.



* Scenarios describing possible future socioeconomic development pathways used to project greenhouse gas emissions and environmental changes under climate change.

A Future That Depends on Our Choices

This study highlights how climate change may reshape the spatial distribution of freshwater biological resources and suggests that the scale of distribution loss could vary significantly depending on greenhouse gas emission levels. These findings can serve as important baseline information for developing mid- to long-term policies aimed at the sustainable use and conservation of freshwater biological resources, as well as for responding to climate change. At the same time, long-term monitoring of freshwater fish distributions and continued comparisons of scenario-based projections will play a crucial role in detecting early signals of environmental change.

Investigating the Organisms of Islands on Climate Change Frontlines

Changing Species Distributions Amid Marine Environmental Changes

Where and how does climate change first reveal itself? The Honam National Institute of Biological Resources (HNIBR) has conducted observational studies and has analyzed how climate change transforms coastal and marine organism distributions. Changes in organisms observed on islands could be the first signals that the seas are sending us. Let us look at the tides and the meaning of the biodiversity changes observed on the climate change frontlines.

Islands—The First Places to Face Climate Change

Climate change does not occur everywhere simultaneously. Islands are suitable for rapidly detecting such changes. Since islands are directly affected more by marine than terrestrial environments, changes in water temperature and sea currents directly result in organism distribution. Thus, the HNIBR regularly observes biodiversity changes centered on island areas.

The surface sea water temperature around Korea has risen by 1.23 °C over the past 50 years, which is approximately 2.6 times higher than the global average rise (0.47 °C). This figure demonstrates that the seas around the Korean Peninsula are highly sensitive to climate change. Rising sea water temperature changes not only the movements and habitable areas of living organisms but also their propagation periods. Accordingly, the population of current native organisms has decreased, and an increasing number of subtropical organisms originated from warm seas have arrived simultaneously. Such changes can transform the structure of Korea's coastal ecosystem.



Underwater investigation





Southern warm-water fish

- *Chromis albicauda* (Hongdo, Gyeongnam)¹,
- *Apogon doederleini* (Geomundo)²,
- *Pomacentrus coelestis* (Yeoseodo)³

Fishes Are Moving as Seas get Warmer

Fish species respond to rising water temperatures and current changes relatively quickly. When water temperatures rise, habitable environments move north, which moves the distribution range of fish together. Since the Tsushima Warm Current has recently had a stronger influence on Korean coastal areas, it has been observed that marine heatwaves last longer. Consequently, the distribution range of the southern warm-water fishes has gradually expanded to Jeju, as well as to the coasts of the South and East seas. When water temperatures are relatively high from August to October, the inflow of southern warm-water fish, such as the Pomacentridae, Labridae, Apogonidae, and Chaetodontidae fish families, increases noticeably.

To determine whether such confirmed changes are a temporary phenomenon triggered by seasonal changes or part of long-term changes in the species have settled in the Korean coastal seas, continuous monitoring is required. In this regard, long-term data continuously obtained in the same coastal seas are critical for interpreting ecosystem changes. Only when various factors, such as appearance periods, population changes, growth, and the possibility of wintering, are comprehensively considered can we correctly understand the true meaning of the changes.

Direction of Changes in Ecosystem Read from Discovery of Unrecorded Species

For *Chaetodon selene* (discovered in the waters of Jwasarido) and *Acanthurus xanthopterus* (discovered in the waters of Geomundo), unrecorded fish species discovered and academically reported by the HNIBR that mostly inhabit tropical seas, it has been estimated that they were introduced to the Korean coastal seas with the Tsushima Warm Current. These two discoveries are representative observation cases of marine environmental changes that have resulted in the movement of living organisms and distribution changes. The discovery of new species serves as important data for confirming that the marine ecosystem structure has changed. The discovery of unrecorded species is a reference point for tracking ensuing changes. For example, with data such as whether the same species is repeatedly observed, whether they can grow and breed, and whether they can survive, even in the winter, it can be determined whether a species enters temporarily or permanently settles in domestic waters.




Recently discovered domestically unrecorded fish

- *Chaetodon selene*
(discovered in the waters off Jwasarido)⁴,
- *Acanthurus xanthopterus*
(discovered in the waters of Geomundo)⁵

The HNIBR plans to systematically establish the domestic distribution status of southern warm-water fish and conduct long-term observations focusing mostly on changes in distribution ranges by species and appearance periods, growth, and the possibility of wintering. Such observation will result in critical data for understanding how climate change affects marine ecosystems and predicts future changes.





4월 가족 교육 안내

- 같은 교육프로그램도 시간과 관람 교육 대상이 달라요! 연령에 맞추어 신청해주세요.
- 교육 대상 '유아와 보호자, 초등과 보호자'는 보호자가 함께 참여하는 수업입니다.
- 교육 신청: 국립생물자원관 누리집 > 통합예약시스템 > 개인교육 예약
- 교육 신청은 선착순 공석 발생 시 당일 현장접수. 접수인원 5인 미만 시 교육이 취소될 수 있습니다.

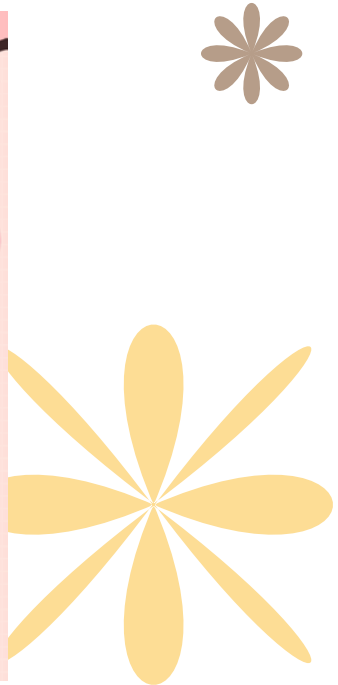
4월 17일 (토)

프로그램명 (강사)	주요 교육 내용	13:00-14:30	15:00-16:30
계구리의 할매하는 생태여행 (김순영)	계구리의 생물다양성을 알아보고, 계구리의 김소가 생물다양성에 미치는 영향을 알아봐요. (주요 활동) 계구리 표본 관찰, 생태마을 탐방(생태학교 만들기)	초등 저학년	초등과 보호자
꼭같이 알아 더 좋아 (박정혜)	국립생물자원관 주제관에 사는 식물들의 이름을 알아주고, 서로 다른 생김새를 비교하여 관찰력을 길러요. (주요 활동) 주제관 식물 관찰, 씨앗장식 만들기	유아와 보호자	초등 저학년

4월 25일 (토)

프로그램명 (강사)	주요 교육 내용	13:00-14:30	15:00-16:30
꽃들의 결혼식 (박정혜)	봄을 알리는 꽃과 나무를 관찰해요. 우리나라의 있는 특별한 화류식물을 만나고 결혼하기 식물의 소중함을 이해해요. (주요 활동) 꽃과 나무 관찰, 생물 에코백 만들기	초등과 보호자	초등 저학년
꽃뿔(색깔) 마인사 (박정혜)	4월 봄꽃의 특징을 이해하고, 알아들을 말풍제 시간 속 미세한 색 차이를 발견해요. (주요 활동) 꽃잎 채집 및 컬러를 탐방, 스티커인도글라스 제작	유아와 보호자	초등과 보호자

문의 032-900-7627~9, 7271 (평일 10시~17시, 점심시간 제외)



Spring Ecology Educational Programs for Families in April

National Institute of Biological Resources (NIBR)

Dates: April 17 and April 25, 2026

Venue: Saengsaengchaem Exhibition Hall at the NIBR, Seo-gu, Incheon

To celebrate April when Spring is in the air, the NIBR presents an ecology education program for all members of the family. This program on biodiversity and the change of seasons focuses on activities that encourage observing and experiencing nature. On April 17, two programs await us: "Ecological Trip with Frogs" and "Better to Be Different!" Participants will learn the characteristics and varieties of organisms while observing frog specimens, painting ecology artworks, exploring plants in the theme garden, and making a seed nest. Two other programs are

prepared for April 25: "A Flower's Wedding" and "Spring Flower (Color) Magician," consisting of observing flowers and trees that signal the arrival of Spring and discovering minute differences in nature's colors using color chips. In addition, participants can make a "biology eco-bag" and stained glass as well. The program registration will be available from March 25 (Wed), 9:00 AM to March 31 (Tue), 11:00 PM through the integrated reservation system on the National Institute of Biological Resources website, and applications will be accepted on a first-come, first-served basis.



NIE at Midnight, a Moment of Wilderness Captured on Camera

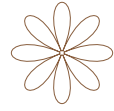
The NIE operates the “Ecorium,” a place where visitors encounter various plants and animals that inhabit the five climate zones on Earth. With more than 300 animal species and 5,000 plant species, it has become the NIE’s exemplary site for most visitors. However, we can see another side of the NIE from its outdoor space. What kinds of living things emerge after the site is closed? To respond to our curiosity, the NIE’s Nature Environment Investigation Team installed an unmanned automatic camera in the outdoor area to monitor

National Institute of Ecology (NIE)

Watch videos recorded by an automatic unmanned camera installed in the outdoor areas of the NIE

Link: <https://www.youtube.com/watch?v=0vyNvNVz8hI>

what happens after dark. The camera captures various species of animals roaming around the NIE at night. This means that the NIE is not simply an exhibition space but also serves as an actual ecological habitat. The videos portray another natural landscape unfolding without visitors in the outdoor space of the NIE. You can see more details in the videos.



“Fun-Fun Playground” Has Opened, A Place Where Children Can Learn About the Freshwater Ecosystem While Playing

The NNIBR created a playing and experiencing space for children, the Fun-Fun Playground, which officially opened on January 20, 2026. At the Fun-Fun Playground, visitors experience the freshwater ecosystem from the viewpoint of children. With motifs featuring freshwater organisms, including white-naped cranes, otters, flying squirrels, and *Coreoperca herzi*, the space was designed to connect children’s physical activities, sensory experiences, and ecological learning. The playground consists of four themed zones. In the first zone, “Nest Expedition with White-Naped

Nakdonggang National Institute of Biological Resources (NNIBR)

Fun-Fun Playground, a Playing and Experiencing Space for Children

Date: Year-round

Venue: NNIBR

Link: <https://www.youtube.com/watch?v=fE9KbLlhcoo>

Crane,” visitors can go up the climbing wall and down the slide. In the second zone, “Underwater Expedition with *Coreoperca herzi*,” visitors can dive into the ball pool and experience how the fish live. The third zone, “Hide and Seek with Otters,” presents an exploration of an otter’s cave, and in the fourth zone, “Flying in the Woods with a Flying Squirrel,” visitors enjoy the swing bridge and the net bridge. The NNIBR plans to develop the Fun-Fun Playground into an ecology experience space the whole family can enjoy, while the children learn about freshwater organisms.



Search for the Value of Island Organisms and Explore the Future

Honam National Institute of Biological Resources (HNIBR)

Field Expedition Program: Searching for Island and Coastal Bioresources: B. T. I. Youth Expedition

Dates: May–November 2026

Venue: Gohado, Mokpo

In 2026, the HNIBR will launch a field expedition educational program, B.T.I. (Bio Treasure Island) Youth Expedition, targeting biology clubs in middle and high schools. The B.T.I. Youth Expedition is a program in which participants, accompanied by bioresource experts, actually investigate and explore island and coastal bioresources, including birds, insects, plants, and mudflat organisms. Participating schools choose one target organism and investigate it for a year. Participating students conduct field studies on Gohado, survey the distribution of organisms and

their ecological traits, and prepare presentations on the results. By doing so, they can fully understand the importance and conservation value of biodiversity, and indirectly experience actual research fields while collaborating with researchers. This experience may help students in their future career decisions. The program consists of an orientation class, field surveys (three per year), and a meeting for results presentations, where the expedition teams who excel will receive awards.

When Spring Settles on Wildflowers, Butterflies Choose Hampyeong



Spring comes first to the fields, and butterflies are the first visitors. Let's take a trip to Hampyeong, where butterflies welcome us. In a landscape decorated with flowers, waters, and forests, let's walk slowly, following the pathways of the butterflies. Among the small flutters of butterflies that settle on wildflowers, you may come across the beginnings of spring that we have not yet noticed.



When Flowers Sway, Spring Arrives

When we visit and walk in nature in the early spring, we may meet a creature who is the first to move in the fields—a small flutter flowing on the wind which comes to us before the flowers bloom. Children do not fail to see the movement. “Look, there’s a butterfly!” That’s good enough. Our spring trip has already begun.

Butterflies are sensitive to seasonal changes. Only when all the conditions—temperature, sunlight, flowers, waters, and forest and field environments—are met do the butterflies appear. In other words, if you see butterflies somewhere, it means that the natural environment there is stable. Hampyeong, Jellanam-do, is a place where such changes are clearly evident. In the landscape of Hampyeong, when wild flowers bloom, waters flow, and forests are well formed, spring starts in the form of butterflies. That is why you can feel the spring in Hampyeong more vividly.

Walking in Hampyeong From the Butterflies’ Viewpoint

Flowers are not the only signal that butterflies follow. They linger only where there are plant larvae to eat, flowers where adult butterflies can get honey, sunny grassland, the edge of forests where they can escape the wind, and the wet soil near the water is perfectly damp. The spring landscape of Hampyeong naturally meets these conditions—grasslands with wild flowers, the Hampyeongcheon Stream flowing alongside, and ecological wetlands beside the stream—and the presence of forests and gentle hills nearby. The harmony of grassland, water, and forest provides suitable environments for insects to stay and thrive.

While walking along the roads, you may come across diverse forms of butterflies. Some fly over the fields, and some fly low, moving between the flowers. These differences depend not only on their species but also on how they live.



Landscape of Hampyeong with harmonious grassland, waters, and forest (Clipart Korea_Hampyeong's Landscape)



② Cabbage butterfly



① Tiger swallowtail



③ Drone fly

In Hampyeong, tiger swallowtails, cabbage butterflies, and old world swallowtails are frequently seen.

Other than butterflies, drone flies, ladybugs, and dragonflies can be observed.

Indigenous Butterflies Permeating the Spring of Hampyeong

The first and most frequently seen butterfly in Hampyeong is the tiger swallowtail. Because it has large yellow wings with black stripes, it can easily be seen from a distance. When spring begins, adult tiger swallowtails emerge from their overwinter pupae. Therefore, we often see them in early spring. In particular, tiger swallowtails frequently appear in grasslands where wildflowers and forests meet, providing plant larvae to eat and the right places for adults to live.

If you look more closely, you may also find cabbage butterflies. They are most commonly seen in fields and vegetable gardens. They are an important species that lives closely with humans. The white cabbage butterflies that emerge in spring are light colored and have relatively small wings. Their shape differs by season. In open fields, they fly fast and are frequently seen around rape flowers and wildflowers. When they alight, they disappear in the grass, but when they begin to fly again, we can easily see them. If we walk carefully, we might come across the old world swallowtail with red spots on its wingtips. Because it is not a common species, if you see one, your observation experience has been complete.

However, watching butterflies is only one part of the experience. There are other insects as well, exactly where butterflies abound. On the flowers, you may find a drone fly. It looks like a bee, but it is a kind of fly that is also involved in pollination. If you flip the leaves over, you may find ladybugs. They are predators that prey on aphids and help maintain the balance of the field ecology. Dragonflies are also frequently seen in the wetlands.

A Festival Starts Where Butterflies Live

Hampyeong, a favorable environment for butterflies, welcomes many visitors every spring. The Hampyeong Butterfly Festival is held around April–May every year. If you go to the festival, you will see the most vivid spring.

Hampyeong Expo Park, the festival site, is a space where grasslands, wetlands, trails, and forests come together naturally. Such environments are suitable settings not only for butterflies but also for various insects and small creatures. In Hampyeong Expo Park, you will find different flowers in each season, with butterflies flying freely above. The trails outside the park take us to the Hampyeongcheon Stream, rape flower colonies, and ecological wetlands. While strolling there, you might feel that you are not in a park but rather in nature itself. Therefore, the Hampyeong Butterfly Festival is not an event where you try to see many things rapidly; it is a place to linger and enjoy the season slowly.

Butterflies are sensitive to environmental changes. When conditions such as temperature, plant life, water, and sunlight change, they are the first to be affected. In this regard, the fact that butterflies appear in Hampyeong every year means that Hampyeong maintains these conditions well. Our memories of spring might be a day in Hampyeong, where flowers sway and butterflies alight.



Hampyeong Butterfly Festival held in Hampyeong Expo Park (Source: Hampyeong County Office)

A trip to See Butterflies That Starts in Hampyeong Leads to Other Places



©Photo by Kim Kwang-ok - Seoul Parks

Are spring butterflies found only in Hampyeong? In fact, butterflies are not confined to a specific region. However, the butterflies you encounter vary depending on the environment. Even within Korea, the butterflies you observe will vary slightly from one region to another.



Seoul Forest, Where You Can See Butterflies in the City

You can find butterflies in Seoul Forest right in the middle of Seoul. Especially in the Butterfly Garden, you can easily see diverse butterfly species, including the dragon swallowtail, the Chinese peacock butterfly, and the common grass yellow. This garden is special because it has been designed to display the life cycle of the butterfly from laying eggs, looking for food in its larval stage, and searching for flowers and plants as adult butterflies.



Suncheonman Bay, A Butterfly's Road to Connect Water and Field

In Suncheonman, Jeollanam-do, whose unique ecological environment connects water and fields, we can encounter various insects. However, the wetland, reed field, neighboring grassland, and farmland also provide favorable conditions for butterflies. In spring and early summer, butterflies are abundant around grasslands: Field-type butterflies such as the cloudless sulphur butterfly and cabbage butterflies frequently appear, and smaller species like Reverdin's blue are found in the grass.



©Korea Tourism Organization -Lee Gang-hui



Jeju, Where You Can See Butterflies Living in Different Climates

In Jeju, the butterflies we find are different again. As Jeju has warm climate conditions, butterflies flying from the south and Korea's indigenous butterflies live together. In Gotjawal Forest and in hilly and mountainous grasslands, common grass yellows and green-banded swallowtails are plentiful. Especially in areas where forest and grasslands meet, the smaller species like Reverdin's blue are frequently observed.

NIBR

**Movement Patterns
of Raccoon Dogs
Within Road
Networks: How
Urbanization
Increases Human-
Wildlife Contacts**

Rapid urbanization is expanding road networks worldwide, fragmenting wildlife populations, and disrupting their movement. For urban-dwelling species, this human-wildlife interface can create lethal hotspots and exacerbate human-wildlife conflicts. The NIBR research team studied the movement patterns and behavioral strategies of raccoon dogs (*Nyctereutes procyonoides*) in road networks using GPS tracking of 34 individuals across urban and rural areas. We examined differences in road-crossing tendencies, diel and annual patterns, microhabitat characteristics at crossing sites, and road selection strategies of urban and rural raccoon dogs. Urban individuals crossed roads more frequently than their rural counterparts, with crossing rates exhibiting a clear functional response to local road density. While diel crossing patterns were predominantly nocturnal and largely overlapped between habitat types, urban raccoon dogs exhibited more complex seasonal responses, including elevated daytime crossings and a pronounced peak in early August compared with the weaker rural peak in early November. Spatial models demonstrated that while environmental variables shaped the choice of road-crossing points in both settings, road-related elements emerged as additional influential factors in urban areas. Integrated step selection analysis revealed attenuated road avoidance in urban raccoon dogs, accompanied by sharper directional adjustments at crossings, suggesting compensatory risk-avoidance movement. These findings demonstrate a flexible and context-dependent road use of raccoon dogs, which enables persistence in urban areas but simultaneously increases the risk of human-wildlife conflicts. Incorporating such behavioral insights into urban planning and road management will be essential to mitigate collisions and foster coexistence.

Choi, Seoyun; Min, Kyunghae; Cho, Sujoo; Lee, Hyunsoo; Lee, Seung Min; Lee, Gun Joo; Hong, Yoonjee; Choi, Chang-Yong. Movement patterns of raccoon dogs within road networks: how urbanization increases human-wildlife contacts. *Landscape and Urban Planning*, 268, 105566.

NIWDC

**Exploratory Report
of Wild Boar
Surveillance and
Epidemiological
Course of African
Swine Fever
Outbreak: Case
in the Republic of
Korea from 2019 to
2023**

In October 2019, the first cases of African swine fever (ASF) were confirmed in wild boars in Korea. Since then, ASF has continued to spread throughout the country, particularly among wild boar populations, despite intensive efforts to contain the outbreak. This study assessed the results of current ASF surveillance in wild boars and identified various risk factors related to ASF outbreaks. Between September 2019 and June 2023, a total of 122,078 wild boar samples were submitted, with 3,135 testing positive for ASF infection. Among them, 90.6% were detected in carcasses. Within the carcass samples, ASF prevalence showed an increase from 5.98% to 37.15% through 2019 to 2023, respectively. Geographically, from the demilitarized zone, the region where ASF was first detected in wild boars, the disease has spread toward the east and south across the Baekdu mountain range. From the ASF-specific antibody assay, only two wild boars of 17,275 serum samples were seropositive. This is the first study presenting results and patterns of wild boar surveillance and ASF virus prevalence changes during 2019–2023 and provided basis data for establishing future control measures by presenting various spatial and anthropogenic factors that affect outbreaks.

Hwang, Jusun; Kim, Eunsol; Kim, Jeonghyuk; Kim, Jicheol; Kim, Yeonji; Lee, Sanggeun; Kim, Yongkwan; Cho, Hyunjun; Ji, Sungin; Kim, Jisoo; Lee, Sanghyun; Son, Kidong; Jheong, Weon-Hwa. Epidemiological progression of African swine fever and wild boar surveillance in the Republic of Korea (2019–2023). *Transboundary and Emerging Diseases*, 2025 December. DOI: 10.1155/tbed/3538366.

NIE

Distribution Characteristics and Management of *Sicyos angulatus* Communities in Riparian Ecosystems of Korea

The NIE conducted field surveys to investigate the long-term dynamics of *Sicyos angulatus* communities, an invasive introduced vine that threatens riparian biodiversity in Korea, to establish baseline information for effective management strategies. The surveys were performed from 2020 to 2024 at four sites along the Han and Nakdong Rivers. At each site, the distribution area, importance value, and Shannon–Wiener diversity index were measured. Results indicated that the distribution area of *S. angulatus* fluctuated across years and sites, with temporary declines followed by renewed expansion at some locations. Regardless of area changes, the species consistently increased in importance within plant communities, while species diversity declined, indicating the progressive simplification and homogenization of riparian vegetation. Non-metric multidimensional scaling (NMDS) ordination confirmed these structural changes and revealed significant effects of both year and site on community composition, confirming that *S. angulatus* drives structural shifts across temporal and spatial scales. These findings suggest that the ecological impact of *S. angulatus* extends beyond spatial expansion, encompassing increased dominance and the degradation of native plant diversity and resilience. Therefore, management strategies should address not only controlling its spatial spread but also restoring community structure through integrated removal, revegetation, and monitoring efforts.

Lee, Soo-In; Yu, Hyerin; Choi, Donghui. PNIE (Progress in Nuclear and Environmental Engineering) 2025; 6(Special): S59–S67. <https://doi.org/10.22920/PNIE.2025.6.Special.S59>

NNIBR

Composition for Promoting Skin Pigmentation or Improving Vitiligo Using *Hydrilla verticillata* Extracts

The NNIBR confirmed that *Hydrilla verticillata*, an indigenous freshwater plant readily found in rivers and reservoirs in Korea, produces excellent results in promoting synthesis of melanin, and applied for a patent on its use. Results of the research are expected to open a new chapter for improving vitiligo, a chronic autoimmune condition caused by climate change or genetic factors, and developing cosmetic-use tanning products. The research team analyzed melanin production mechanisms by treating *H. verticillata* extracts on melanocyte cell lines (B16F10) and confirmed that the expression of tyrosinase, a protein that plays a critical role in melanin production, TRP-1 and TRP-2 increased and melanin production was promoted. In particular, compared to α -melanocyte-stimulating hormone (α -MSH), the extracts showed more than twice the melanin production effect. This means that *H. verticillata* has significant potential as a functional material that can control skin pigmentation.

Jeong, Y.T., Hwang, B.S., Jeong, D.W., Choi, J.S., Kim, J.H., Kang, C.H., Kim, M.J., Hwang, Y., Oh, Y.T. Patent No. 10-2025-0180497.

HNIBR

Four New Compounds Originated from *Sedum takesimense* Nakai, a Specialty Plant of Ulleungdo, and Their Antioxidant, Anti-aging, and Antidepressive Effects

The genus *Sedum* is recognized for its diverse biological activities; however, the potential antidepressive properties of *Sedum takesimense* Nakai, along with their bioactive constituents, remain unexplored. Therefore, this study was conducted to profile the phytochemicals of *S. takesimense* Nakai and evaluate their antioxidant, anti-aging, and antidepressive potential in vitro. Through mass spectrometry-based component analysis, diverse polyphenol components and flavonoids were identified. Among them, four flavonoids were reported for the first time, to our knowledge. They were characterized through mass spectrometry, ultraviolet, electronic circular dichroism, and nuclear magnetic resonance analyses. The biological activity assay revealed that 70% ethanolic extracts of *S. takesimense* Nakai and four flavonoids exhibited significant antioxidant and lifespan-extending activities. Moreover, their aglycones—gossypetin and herbacetin—exhibited the potent and selective inhibition of monoamine oxidase-B. These findings suggest that gossypetin- and herbacetin-based flavonols, the main active compounds in *S. takesimense* Nakai, may be employed as lead structures in the development of functional food supplements or drugs to prevent diseases caused by aging and neurotransmitter imbalances.

Seong, Su-Hui; Yun, Bohyun; Kim, Jinho; Seo, Chan; Han, Seahee; Kim, Taesu; Kim, Boram; Lee, Ha-Nul; Im, Sua; Kim, Jungeun; Jung, Jimin; Choi, Kyung-Min; Jeong, Jin-Woo. Herbacetin and gossypetin glycosides from *Sedum kamschaticum* Fisch. & C. A. Mey. and *S. takesimense* Nakai, and their antioxidant, anti-aging, and monoamine oxidase inhibitory activities. *Phytochemistry*, 242: 114716. <https://doi.org/10.1016/j.phytochem.2025.114716/>

The NIBR Scientifically Revealed Two New Native Viper Snake Species

The NIBR announced confirmation of the discovery of two new indigenous viper snakes (*Gloydius brevicaudus*) among snakes inhabiting Korea, as a result of genetic and morphology analyses conducted on *Gloydius ussuriensis* inhabiting inland and island areas in Korea. The research was conducted as part of a study on the genetic diversity of animal resources from 2018 targeting 513 individuals of *G. ussuriensis* inhabiting inland and island areas nationwide. The study confirmed that individuals from Baengnyeongdo and Jeju were different native species, and they were designated *Gloydius ussuriensis baengnyeongensis* and *Gloydius ussuriensis jejuensis*, respectively. Genetic analysis showed that individuals from island areas, Baengnyeongdo and Jeju, are clearly distinguished genetically. Morphologically, while individuals from Baengnyeongdo have longer bodies and tails and more dorsal scales, those from Jeju have relatively fewer dorsal scales. Previously, three species of domestic viper snakes were known to be distributed in other countries as well. In this regard, this research is meaningful because it is the first case of scientifically revealing indigenous species among domestic reptiles. The research results will be registered in the National Species List of Korea.



Gloydius ussuriensis jejuensis



Gloydius ussuriensis baengnyeongensis

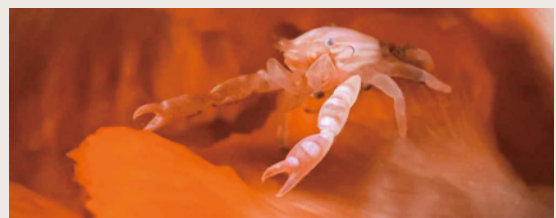
The NIBR Discovered a New Species and an Unrecorded Species of Invertebrates off the Waters of Jeju

The NIBR discovered one new *Upogebia* major species and one unrecorded *Pachycheles stevensii* species, whose domestic habitation was first confirmed in the coasts off Seogwipo, Jeju. This discovery, part of a 2025 survey and investigative research on invertebrates, occurred while investigating the sand slopes 40 meters under the waters off Moon Island, Seogwipo, Jeju, in April and August in 2025, in collaboration with a research team from Jeonbuk National University. The *Upogebia* major species discovered in August is in the genus *Austinogebia*, which is so far known to comprise eight species globally. It was confirmed as a new species because it clearly shows morphological and genetic differences from known species.

Species in the family *Upogebiidae* to which the species belongs, are known to dig holes in mud flats or marine sediment and inhabit them. Considering the distribution of the holes found at the site, the team estimated that several thousand individuals live there. The unrecorded *Pachycheles stevensii* species discovered in April was identified as *Porcellanella haigae*. It is known that a species in the genus *Porcellanella*, which has a symbiotic relationship with sea pen species, are filter feeders that use feathery mouthparts called setae to sweep plankton and organic particles. The species the team discovered was found between polyps of sea pens distributed in the sand slopes. The NIBR plans to conduct additional research to determine the habitat sizes and register them on the National Species List of Korea after publishing and reporting the results.



A new *Upogebia* major species in the genus *Austinogebia*



An unrecorded *Pachycheles stevensii* species *Porcellanella haigae*

Based on Joint Research, the NIWDC Strengthened the Safety Management of Urban-Type National Parks against Wild Boars

The NIWDC created a “Map for Safe Management of Wild Boar” using wild boar investigative research data and a scientific analysis technique based on a joint survey with the National Park Research Institute of the Korea National Park Service. By adopting the wild boar habitation condition survey, the map indicates potential appearance points and trails that need special attention, which were selected after analyzing areas with environments similar to the wild boars’ habitat, using AI machine-learning technology. Thus, a science-based wild animal safety management system was adopted to prevent accidents that are known to happen in urban-type national parks. According to the survey results, the habitat density of wild boar in the Bukhansan National Park has been decreasing—from 2.1 individuals/km2 in 2022, 1.9 individuals/km2 in 2023, to 1.6 individuals/km2 in 2024. This is a result of population control policies of the National Parks and local governments, and their on-site control efforts. The NIWDC stressed that visitors who discover the carcass of a wild boar should report it to relevant agencies to prevent the spread of African swine fever (ASF), and it has vigorously promoted measures directing visitors to observe safety rules to strengthen disease monitoring networks. It also plans to steadily advance science-based wild animal management systems, including wild animal disease monitoring, responding to zoonosis, and supporting visitor safety management policies.



Promotion poster of Map for Safe Management of Wild Boar

The NIWDC Laid the Foundation for Commercialization of a Domestically Developed ASF Vaccine by Conducting an Outdoor Clinical Test Abroad

The NIWDC conducted research and development for the commercialization of an African swine fever (ASF) vaccine and, in collaboration with the National Institute of Veterinary Research (NIVR), is proceeding with clinical tests to confirm whether the vaccine can stimulate antibody formation in outdoor pig farms in Vietnam. The aim of the experiment is to verify safety when candidate strains of vaccine are applied and to determine whether antibodies are formed in the on-site conditions. One NIWDC researcher explained, “The first target of outdoor clinical tests is to confirm that antibodies form properly when a candidate strain of vaccine is applied to 50 to 100 individuals,” adding, “The observation records so far have not found specific safety problems, just like in the lab experiment phase.” Since 2021, the NIWDC has developed candidates for an ASF vaccine together with domestic research institutes and relevant corporations, and has conducted research on the viruses selected on the final list that show excellent antibody formation capability and safety. The NIWDC plans to prepare on-site application measures, including oral vaccine development and establishing a capture-vaccination monitoring system that applies to nondomestic animals such as wild boars. In addition, based on the Third Master Plan for Control of Wild Animal Diseases (2026–2030), it will establish a phased management system for vaccine development, inoculation, and evaluation to contribute to preventing the spread of ASF and securing the stability of livestock disease control.



Collecting samples from pigs to test ASF vaccine
(Source: Yonhap news)

The NIE Installed an Automatic Weather System in Wondong Wetland and Started Wetland Research in Earnest Based on Communications Technology

By adopting an automatic weather system (AWS) established in Wondong Wetland, Yangsan-si, Gyeongsangnam-do, cutting-edge communications technology has been introduced to wetland field research. To celebrate World Wetlands Day (Feb. 2), the NIE installed an AWS in Wondong Wetland in collaboration with Korean Telecom (KT), which implemented the installation as part of its Environmental, Social, and Governance (ESG) collaboration project and announced that it will further scale up its wetland ecological research. Wondong Wetland is an ecologically valuable setting inhabited by Class I endangered species, including otters (*Lutra lutra*) and white-tailed sea eagles (*Haliaeetus albicilla*), and Class II endangered species, including *Pterygopleurum neurophyllum* (Maxim.) Kitag., *Viola raddeana* Regel, *Libellula angelina* Selys, *Falco subbuteo* Linnaeus, and *Prionailurus bengalensis*. The ecological importance of the wetland is further underscored due to its distinction as the last known natural habitat of *P. neurophyllum* in Korea. The installation of AWS is the first case of adopting KT-owned communications technologies in field studies of wetlands. The AWS allows the monitoring of weather environment information at all times, and the collected data are transferred in real time. When enough weather environment information has accumulated, it can be used for the analysis of wetland ecology changes and biodiversity conservation research. Specifically, it is anticipated that the data can be used for restoration research for *P. neurophyllum*, the consolidation of information about endangered species' habitats, and the selection of restoration locations.



AWS installation



Flower of *Pterygopleurum neurophyllum*, a Class II endangered species

The NIE Developed the World's First Illustrated Plant Book Using 3D Plant Modeling Technology

The NIE developed the world's first 3D modeling-based illustrated plant book, which shows actual plants in far greater dimensions. The book is an advanced version of previous illustrated plant books. It consists mostly of photos and illustrations that allow readers to see the structures and shapes of plants in three dimensions through 3D scanning technology based on artificial intelligence. As readers can observe specific structures of leaves and stems from diverse angles, more intuitive and in-depth learning will be possible. The 3D illustrated plant book has been distributed to elementary, middle, and high schools nationwide, and as it was offered free of charge to the general public through the NIE's website and online book stores—not just to teachers and students—to ensure that it can be widely used. It is therefore anticipated that it can expand beyond being strictly education material into areas such as digital-twin hands-on contents based on AR and VR, gaming, and virtual reality services. The 3D data constructed based on information of actual plants can also be used in various digital industry sectors, including creating ecology simulations in virtual space, immersive nature learning programs, and other interactive contents.



3D illustrated plant e-book

The NNIBR Catalogued the Biodiversity and Environmental Characteristics of the Hyporheic Zones of the Nakdonggang River for the First Time in Korea

The NNIBR conducted investigative and analytical research on biodiversity in the hyporheic zone from 2023 to 2025, which is the first comprehensive domestic investigation and analysis on biodiversity and habitat environments in the hyporheic zones of the Nakdonggang River. The term hyporheic refers to an ecotone where groundwater and surface water intermingle below sandbars or gravel layers of a river. It is known that, as the zone receives hardly any light and the water temperature is nearly constant, organisms from unique evolutionary processes exist, but to date, little has been studied in Korea. This research identified approximately 30 species of freshwater organisms in five phylums (Arthropoda, Annelida, Rotifera, Tardigrada, and Platyhelminthes). In particular, Bathynellidae and Pseudocrangonycidae show the typical characteristics of groundwater organisms (stygofauna)—degenerated eyes and pigments, as sensory organs adapt to lightless environments. Furthermore, the analysis of environmental factors of hyporheic zones showed that the size of soil particles and pore structures have a major influence on biodiversity. For example, while zones with sufficient pores show greater biodiversity, zones where fine sand is spread densely and pore structures are irregular tend to be limited as habitats. Based on these research results, the NNIBR created Korea's first standardized guideline for biodiversity investigation in hyporheic zones, developed equipment for collecting underwater organisms in hyporheic zones, and applied for a patent on it.

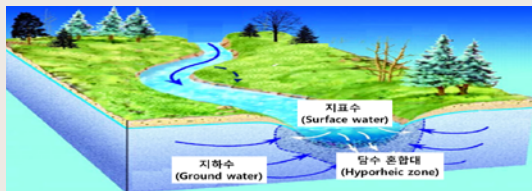


Diagram of hyporheic zones



Freshwater organisms inhabiting hyporheic zones (① Syncarida, ② Pseudocrangonyctidae, ③ copepods, ④ Oligochaeta)

The Freshwater Bioresources Culture Collection (FBCC) of the NNIBR Received Recognition from the KOLAS for Its Excellent Operation as an Accredited Biobank

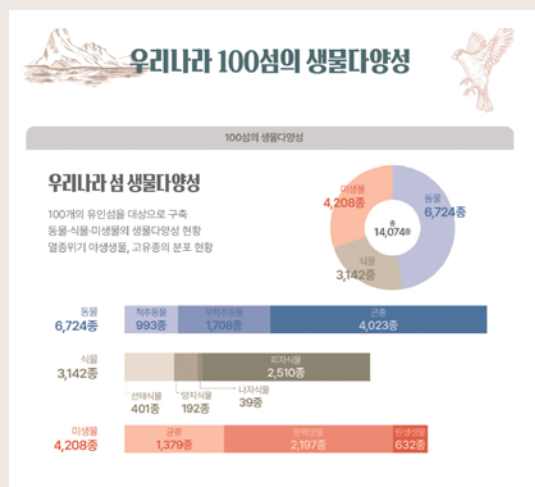
The NNIBR announced that its Freshwater Bioresources Culture Collection (FBCC) was once again recognized for its excellence in operation as an accredited biobank following the regular assessment conducted by the Korea Laboratory Accreditation Scheme (KOLAS). ISO 20387 Biobanking Accreditation is an international standard for operating biobanks designated by the International Organization for Standardization (ISO), which assesses whether management, preservation, and distribution processes comply with the technical and quality requirements. To affirm that accredited organizations maintain the standards consistently, the KOLAS conducts regular reviews every 18 months (the first assessment after accreditation is conducted within one year.) The FBCC received biobanking accreditation No. KBB-007 from the KOLAS in November 2024, and subsequent assessment reconfirmed that the FBCC has stably maintained the international level of a quality management system. The NNIBR plans to successfully maintain its accreditation and contribute to developing domestic and foreign bioindustries and strengthening the basis of utilization of bioresources by achieving accreditation in other areas.



Biobanking Accreditation by the KOLAS

The HNIBR Compiled and Published Five Years of Data about the Biodiversity of 100 Islands in Korea

The HNIBR made public a data compilation of the biodiversity of one hundred islands in Korea collected over five years beginning in 2021. For biodiversity conservation, the HNIBR conducted extensive investigation on the major taxa of animals, plants, and microorganisms of 20 manned islands selected every year, and identified endangered wild life or native species, laying the foundation for long-term investigations. The research confirmed 14,074 species (animal: 6,724, plant: 3,142, and microorganism: 4,208) for five years, accounting for approximately 23 percent of the number of species in the National Species List of Korea (approximately 61,000) and 63 percent of the 22,000 species on the list of species native to Korea's islands. In addition, 104 endangered wild species and 238 indigenous species were found, and 234 new and unrecorded species were discovered. The greatest number of endangered species were found on Heuksando, Socheongdo, and Baengnyeongdo, in that order, and many other indigenous species were discovered on Ulleungdo, Namhaedo, and Jindo. The HNIBR compiled the investigation's results into a dataset on the biodiversity of one hundred islands in Korea and made the information available to the public through its website.



Biodiversity in Korea's 100 Islands

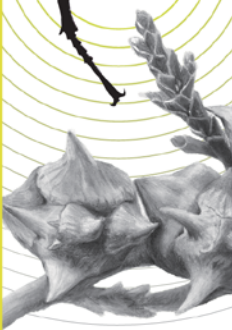
The HNIBR Discovered Critical Information Regarding Climate Change Strategies from Wild Oats, a Plant that Survives in the Harsh Environment of the Islands

The HNIBR, a government-affiliated institute under the Ministry of Climate, Energy, and Environment, announced that its study of *Avena Fatua L.* (wild oats), which grows along Korea's southwestern coasts, revealed distinct genetic differences among populations from different regions. The study aimed to examine how plants adapt to and survive climate change. Oats, the primary ingredient of oatmeal, are enjoyed by a growing number of people as a healthy and nutritious food and are increasingly important in global agriculture. However, in Korea, the number of oat varieties is limited, resulting in low genetic diversity and heavy reliance on imports. To examine genetic variation in oats, the research team studied *A. Fatua*, a crop wild relative (CWR) of oats. They collected *A. Fatua* from eight sites on the southwestern coasts of Korea, including Mokpo, Jindo, and Gunsan, and conducted genetic analyses using a genotyping-by-sequencing (GBS) technique. They identified 20,836 genetic variations and found that *A. Fatua* individuals collected on the southwestern coasts were largely divided into two genetic groups. Notably, individuals from Jindo differed genetically from those from other regions. This research provides important genetic information that can be used to develop new varieties of oats that are more resistant to insects and diseases and better suited to climate change.



Wild oats

빛 세밀화 으로 표현하다



2025. 10. 24. ^크

국립생물자원관 생생채움 기획전시실 II



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