Biodiversity Division

National Institute for Environmental Studies, Japan

ver. Jul. 2021

National Institute for Environmental Studies, Japan Fifth Five-Year-Plan (2021-2025)

April 2021 marks the beginning of our fifth five-year plan. NIES established eight strategic research programs for this plan' s term and will pursue them in an integrated manner that transcends individual fields.

"Harmonization with Nature Research Program" led by our division, conducts research and technological development on the conservation measures of biodiversity and the sustainable use of ecosystem services, which are essential for establishing a society in harmony with nature.

Recent research results

June 15, 2021
Discovery of new photoreceptors that sense three types of light—adaptation to light environments of microalgae widely found in the ocean—

June 3, 2021
Dissolved oxygen in lakes declining due to rising water temperatures and degrading water quality — A warning from long term observations of 393 lakes worldwide—

March 29, 2021
Land alteration by solar power facilities—Mapped the area of 8,725 facilities and clarified the characteristics of the installed locations.—

Research results
http://www.nies.go.jp/biology/en/pr/press.html

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Biodiversity Division contributes to the establishment of a society in harmony with nature.

Strategic Research Program

Harmonization with Nature Research Program

We conduct research and technological development on the measures for conservation of biodiversity and the sustainable use of ecosystem services, which are essential for establishing a society in harmony with nature.

Through these activities, we aim to mainstream biodiversity and promote transformative change, such as behavioral change, and to improve natural capital by synergizing the conservation and sustainable use of biodiversity. We will also contribute to the Post-2020 Global Biodiversity Framework of the Convention on Biological Diversity, the next National Biodiversity Strategy and Action Plan, and the regional circular and ecological sphere from the viewpoint of sustainable use of regional resources.

PJ1 Sustainable ecosystem management strategies for a society with a declining population
PJ2 Management of ecological risk causative factors that threaten biodiversity and human society
PJ3 Biological responses, acclimations, adaptations, and resiliencies to environmental changes
PJ4 Research on problem solving using ecosystem functions
PJ5 Integrated research for balancing conservation and utilization of biodiversity and behavioral change

Policy-Oriented Research

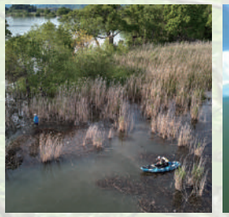
Collaborative Research Core on Biodiversity

NIES will promote the formation of a research core for the observation and assessment of biodiversity, and enhance cooperative research networks with other organizations within and outside NIES to accumulate and analyze information related to biodiversity, including biological distribution. This will contribute to the formulation of goals for the conservation and sustainable use of biodiversity and to the understanding of the degree of achievement of these goals.

Policy-Oriented Research

Conservation of native fishes in Lake Biwa basin

The Lake Biwa Branch Office in Shiga Prefecture, which is a joint laboratory under the Regional Environment Conservation Division and the Biodiversity Division, will work with the Ministry of the Environment and Shiga Prefecture to conserve the water quality and ecosystem of Lake Biwa and its watershed.



Intellectual Research Infrastructure Development

Long-term lake monitoring

We have been monitoring water quality and freshwater organisms, such as phytoplankton, zooplankton, and benthic macroinvertebrates, of Lake Kasumigaura over 40 years. We also develop new monitoring methods, analyze long-term changes in water quality and aquatic communities, and identify the factors related to these changes.

Intellectual Research Infrastructure Development

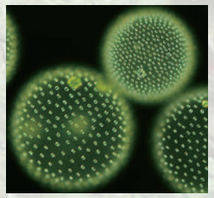
Development of biodiversity and ecosystem databases

Biodiversity information accumulated through research has been compiled into databases and made available on our websites.

Intellectual Research Infrastructure Development

Preservation of biological resources

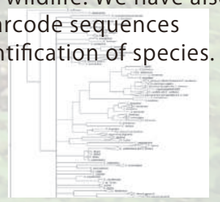
Since 2002, we have cryopreserved tissues and viable cells of domestic endangered animal species in liquid nitrogen for the purpose of scientific research for biodiversity conservation and for providing the access to the materials by current and future generations. We also collect, maintain, and distribute microalgal strains and endangered algal strains.



Intellectual Research Infrastructure Development

Genome analysis and DNA barcoding

We will promote whole-genome analysis of organisms related to environmental problems and analyze the genetic diversity obtained from environmental DNA or wildlife. We have also obtained and released DNA barcode sequences for identification of species.



Elucidation of mechanism

Conservation and Sustainable Use of Biodiversity
Realization of a society in harmony with nature

Assessment Prediction

Construction of conservation measures

We conduct our research in collaboration with various programs of our institute.

Environmental Emergency and Resilience Research Program
Climate Change Adaptation Research Program
Co-design Approach for Local Sustainability Research Program
Climate Crisis Research Initiative
Global Environmental Monitoring Center for Global Environmental Research
Social Dialogue and Co-production Office

Facilities

Ecosystem Research Field

This facility is used for experiments using a relatively small-scale experimental field and greenhouses. Experiments are conducted with tropical trees, herbaceous plants (e.g., toads and morning glories), agricultural crops (e.g., rice), and insects (e.g., honeybees) to study the effects of environmental changes on the ecosystem.

Biotron

This facility is positioned as a basic research tool for conducting research on the effects of changes in the global environment on living organisms and ecosystems. A wide range of impact assessment experiments is possible by controlling environmental factors such as temperature, humidity, gas concentration, and light.

Environmental Specimen Time Capsule Building

This facility is equipped with a system that allows long-term cryopreservation of specimens by maintaining a cryogenic environment using liquid nitrogen vapor (temperatures below 160 ℃). We have been preserving the cells and tissues of endangered wildlife species.

Microbial Culture Collection

This facility maintains and cryopreserves subcultures of microalgae, protozoans, and endangered algae. We have contributed to environmental research by distributing them to researchers within and outside the institute for various purposes.

Environmental Genomics laboratory

With the development of genome science, it has become possible to sequence whole genomes of endangered species and trace amounts of DNA in the environment. These data will be useful for environmental conservation. The Environmental Genomics Laboratory maintains equipment (e.g., next-generation sequencers) and a clean environment to conduct experiments for analyzing small amounts of DNA to support environmental genome science research.

Database / Tool

Invasive species of Japan

This is a searchable database that contains information on the main invasive alien species in Japan.

Lake Kasumigaura Database

This database provides water quality and aquatic organism data of Lake Kasumigaura, which has been monitored for more than 40 years since the establishment of NIES.

Lake Biwa Underwater-video Archive: from a Carp's-eye view

This database archives underwater videos filmed in Lake Biwa using carp-mounted video-loggers. The videos provide valuable information about the nature of fishes and other organisms inhabiting the lake.

Genome database

NIES provides draft whole genome sequences of mainly endangered species in FASTA format, as research outcomes from the Project for the Promotion of Environmental Genomics Studies.

Tropical Coastal Ecosystems Portal (TroCEP)

A website that provides information on tropical coastal ecosystems, such as world maps and lists of mangrove species.

Biodiversity Web Mapping System (BioWM)

BioWM contains mapping systems for GBIF occurrence data (specimen and observation records) and research data provided by NIES.

Collaborative activities

Cooperation with Japan Committee for IUCN

IUCN-J and NIES signed a basic agreement on July 16, 2013, to cooperate and promote efforts to conserve biodiversity.

Sango (Coral) Map Project

We academically support activities to clarify the status of corals in Japan based on information from divers and other sources.

Public Relations

Tours of NIES ＊Suspended for FY2021

Tours of NIES can be arranged based on applications in advance. Visitors can take a tour of facilities such as the Environmental Specimen Time Capsule Building.

NIES Open House ＊Online only in April and July 2021

NIES holds open houses in April and July, during which the facilities of the institute are open to the public.

Public Symposium ＊Online only in August 2021

The NIES holds a public symposium annually in June. At the symposium, we introduce a range of our research results on global environmental issues.