



Inter-University Research Institute Corporation  
National Institutes for the Humanities

# Research Institute for Humanity and Nature

Prospectus 2021-2022



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## Message from the Director-General

Most human beings have benefited greatly from modern civilization. If we continue down the current civilizational path, however, weather and water-related natural disasters will intensify, ecosystem degradation and loss of biodiversity will increase, and human livelihood, health, and safety will be at ever-greater risk. Modern civilizations have incessantly expanded the scale of production and consumption, but at nature's expense, and humans are both the perpetrators and victims of this path of development. The Covid-19 pandemic clearly shows the result, as it was caused by ever-expanding global human activities.

New technological fixes will not offer fundamental solutions to such complex problems, unless human lifestyles also change to achieve harmonious relationships with nature on Earth. For the last 20 years RIHN has conducted research with the awareness that the roots of global environmental problems are found in human culture. Based on the results of our past projects, it is time for us to promote new practical research.

Cultural diversity is based on the diversity of nature. However, nature forms ecosystems in which regions are connected through the circulation of materials and energy, while cultures insist on their uniqueness and are sometimes in conflict. Solutions to global environmental problems therefore depend on connecting cultures through common environmental ethics. Great traditions of Eastern environmental wisdom and experience still

exist, as do those of other regions; their valuable insights can help to break the deadlock in modern science and capitalism. It is for this reason that RIHN undertakes interdisciplinary research spanning the natural sciences, humanities, and social sciences, and in recent years, has evolved towards transdisciplinary research seeking to expand the kinds of knowledge that are considered valid in scientific inquiry.

RIHN has recently established three Research Programs, one Core Program, and the RIHN Center to promote such research. We have enhanced collaboration within the institute, across the diverse research community linked to RIHN research projects, and with society in general. RIHN also collaborates with the international research platform Future Earth, which aims to integrate global environmental change research and contribute to the United Nations Sustainable Development Goals. As part of this effort, RIHN hosts the Future Earth Asian Regional Centre to strengthen research collaboration and capacity building across the region.

We will strive to expand these activities in the coming years, and implement new research initiatives in the search for solutions to the many environmental challenges of our planet.

YAMAGIWA Juichi

Director-General  
Research Institute for Humanity and Nature



## RIHN Philosophy and Approach

Environmental problems now confront human communities at all scales. Despite extensive research carried out the disciplines, however, many environmental problems remain unresolved. There is therefore need to go beyond partial descriptions of discrete environmental problems in search of holistic understandings of their underlying causes and integrated approaches to their solutions.

The Research Institute for Humanity and Nature is a national research institute established by the Government of Japan in 2001. As a member of the National Institutes for the Humanities, RIHN research starts from the premise that environmental problems are rooted in human culture and societal values. RIHN's goal is to seek concepts, theories and mechanisms that enhance human quality of life in direct relation to environmental conditions and ecological processes. RIHN research therefore involves a normative dimension, as it asks what the relationship between humanity and nature ought to be. To this end, RIHN solicits, funds, and hosts integrative research projects investigating environmental change problems in specific settings. Research projects are undertaken by interdisciplinary teams at RIHN, working together with partner institutions and communities in Japan and abroad.

RIHN promotes the co-design and co-production of research, in which societal actors are directly involved in defining environmental problems and developing new research approaches and potential solutions.

RIHN research is increasingly transdisciplinary in that it seeks to redefine the role of science in society, improve dialogue between different traditions of knowledge, and stimulate new multi-actor local, national and international collaborations. This approach draws from

the natural and social sciences, arts and humanities, and engineering and design.

Environmental science cannot be conducted or applied uniformly to the world. RIHN science is informed by lived social practices and communal values, especially as found in Asia. The most populous region of the world, Asia is essential to any global sustainability. At the same time Asia is home to many examples of long-term cultural-ecological continuity whose significance to contemporary environmental challenges is still largely unstudied. RIHN depends on long-established research networks in Asia and contributes to transdisciplinary initiatives in the region, including by serving as host of the Regional Centre for Future Earth in Asia.

RIHN research is guided by the following three objectives:

- Conduct research that analyzes the interaction between humanity and nature and critically examines the sustainability of human societies, based on past RIHN research and international literature and experiences
- Apply research results to solve real-world sustainability problems
- Promote solution-oriented research on environmental challenges that is co-designed and co-produced in close collaboration with societal stakeholders

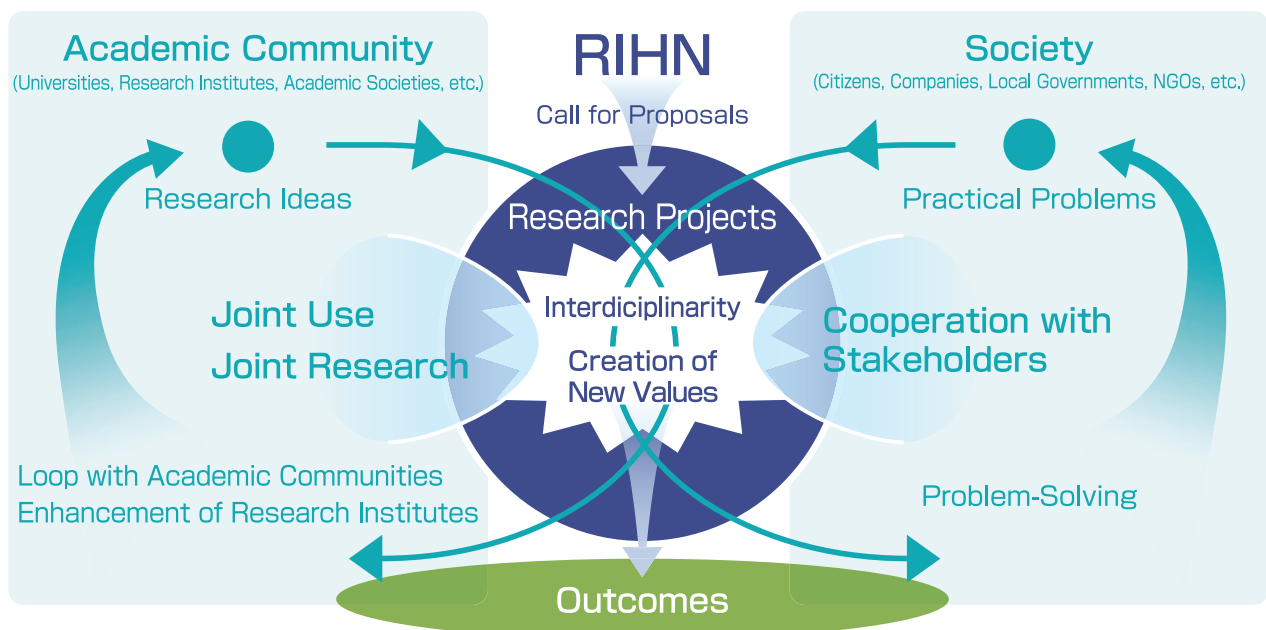
While other regions are not excluded, the primary geographical focus of RIHN research is on Asia. More broadly, RIHN strives to deploy an Asian perspective in its research on global environmental change.

## Organizational Structure

RIHN is a project-based institute, with research projects lasting from five to seven years. New research projects are publicly solicited. Initial proposals ideas are gradually developed through several stages into fully-fledged projects; they are finally evaluated by an international external review committee. At this point, the proponent joins the RIHN community as a faculty member of the Institute. Individual project include a core team of researchers based at RIHN and a much larger network of partners at research institutions throughout Japan and abroad.

## RIHN Research Programs

RIHN research projects are organized into three programs, each of which is organized around central themes identified in RIHN's Phase III Medium-Term Plan (to be revised in 2021). Along with the RIHN in-house Core Program, each program is home to multiple projects that carry out research in line with its broad research agenda. The bundling and integration of projects within the programs facilitates synthesis of research results and strategic planning. Programs are subject to annual review by the External Research Evaluation Committee (see RIHN Project Trajectory on pages 6 & 7). RIHN endeavors to improve its research by making good use of the review results while also respecting the independence of each Program.



### Program 1: Societal transformation under environmental change

This program aims at providing realistic perspectives and options to facilitate the transition to a society that can flexibly respond to environmental changes caused by human activities such as global warming and air pollution, as well as to natural disasters.

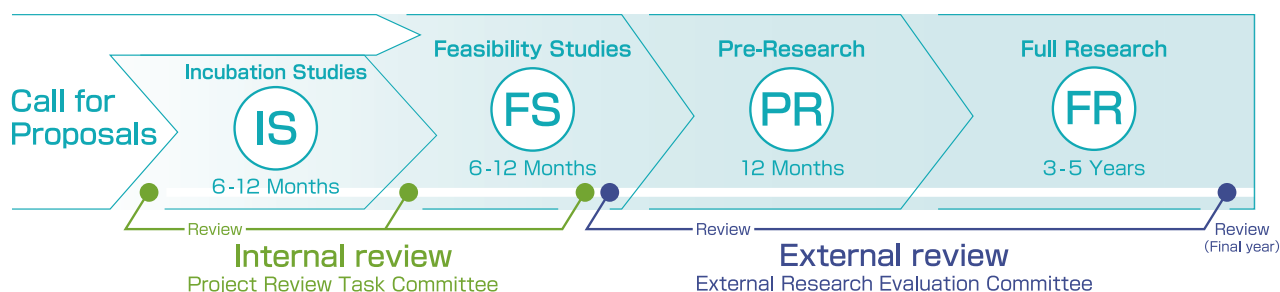
### Program 2: Fair use and management of diverse resources

Taking tradeoffs into account, this program provides multifaceted options to stakeholders involved in production, distribution, and consumption of resources, in order to realize fair use, optimal management, and wise governance of diverse natural resources including energy, water and ecological resources.

### Program 3: Designing lifeworlds of sustainability and wellbeing

Our “lifeworlds” are composed of the physical spaces and socio-cultural spheres of our everyday lives. They are continually reproduced, reimagined, and evolving through an interactive and reflexive relationship with society, culture, and nature. Program 3 proposes research aimed at illuminating reciprocal linkages between diverse rural and urban lifeworlds and contributing to the solution of sustainability problems by working with various societal partners such as governments, companies, and citizen groups. Special emphasis is placed on envisioning sustainable futures that improve wellbeing and gauging their feasibility.

## RIHN Project Formation



**Incubation Studies (IS)** are proposed by individual researchers to the RIHN Project Review Task Committee. If approved, the researcher is granted seed money to prepare a proposal for Feasibility Study.

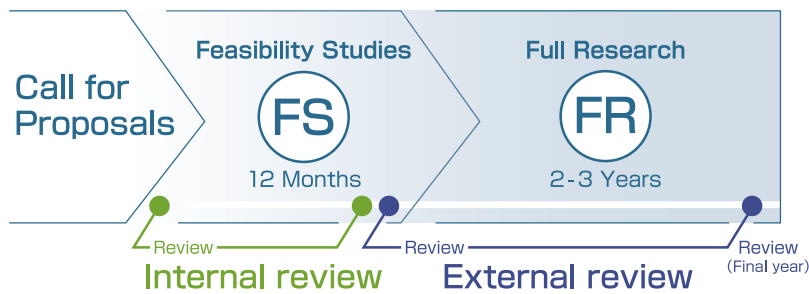
**Feasibility Studies (FS)** allow the study leader a period to develop a proposal for Full Research. If approved, the project proceeds into a transitional **Pre-Research (PR)** period in which the project leader formally assembles the team, establishes MOUs necessary for collaboration with other institutions, and makes other preparations to enable Full Research.

**Full Research (FR)** lasts from three to five years. It typically involves a research team at RIHN and concurrent activity with collaborators overseas, several periods of field study, workshops and presentations, and outreach or communication with relevant communities. FR projects are evaluated by the External Research Evaluation Committee at the beginning (selection), mid-term and the end (final evaluation).

## Core Program

Based on the mission of RIHN and in order to realize the strategies and policies formulated by the Council for Research Strategy, the Core Program undertakes research on an ongoing basis. During Phase III, the Core Program will develop concepts and methodologies to solve global environmental problems in collaboration with society.

## Core Project



## RIHN Center

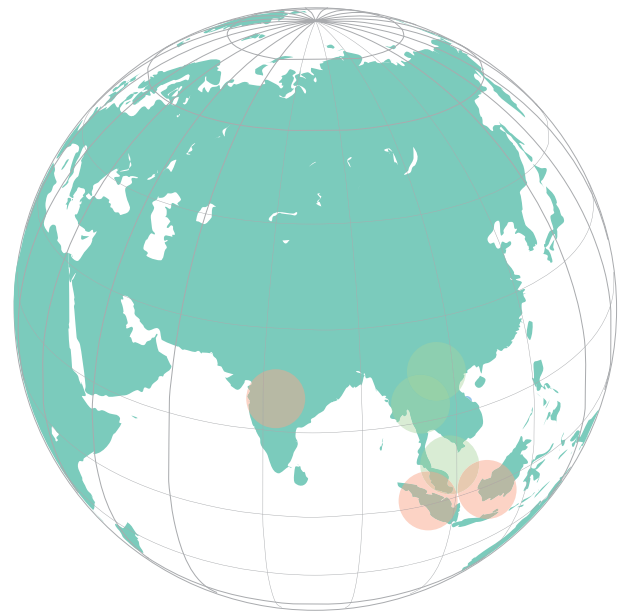
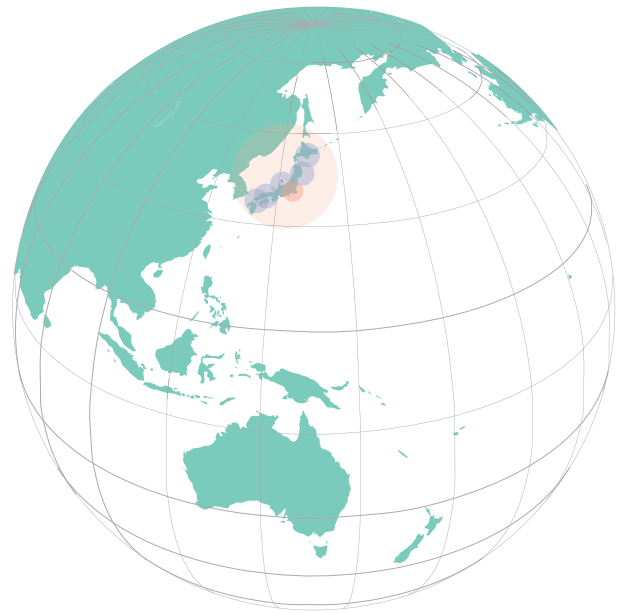
The RIHN Center provides the foundations for RIHN collaborative research and surrounding activities. Its five divisions manage and operate the laboratories and the information systems of the Institute, and facilitate scientific and public communication, networking and capacity building. Faculty in the center also engage in research related to Center and Institute goals. The RIHN Center works closely with the Core Program and Research Programs by providing tools, facilities, and methods. It also collaborates with the wider academic community in support of RIHN's role as a joint-use Inter-University Research Institute, and engages a broad range of societal stakeholders in problem-solving research processes.

The RIHN Center consists of five divisions. The Laboratory and Analysis Division develops and maintains the laboratory facilities necessary for research and fieldwork. The Information Resources Division maintains the RIHN research databases and archive. The Communication Division develops a variety of communication strategies linking RIHN research to academic and public communities. The Collaboration Division facilitates internal and external research networking. The Future Earth Division engages with the international Future Earth initiative and hosts the Regional Center for Future Earth in Asia.





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## Research Program 1

# Societal Transformation under Environmental Change

This program aims at providing realistic perspectives and options to facilitate the transformation towards a society that can flexibly respond to environmental changes caused by human activities such as global warming and air pollution, as well as to natural disasters. To demonstrate the significance of global environmental sustainability for human society, we need to make intellectually explicit the links between environmental change on the one hand, and social issues such as livelihood, inequality, social security and conflict on the other, and reinforce understanding of these links in the real world.

The Program follows two lines of inquiry. The first conducts research on Asia's long-term paths of social and economic development in relation to climate change and environmental history. Such studies offer historical understandings of the human-nature interface. For example, postwar development of the industrial complex along Asia's Pacific coast was made possible by the combination of imported fossil fuels and utilization of rich local resources of land, water and biomass. Urban and industrial development in the region produced both rapid economic growth and severe environmental pollution and degradation (see Figure 1). By the beginning of this century the more global set of issues such as global warming, loss of biodiversity as a result of tropical deforestation and marine plastic waste were added (see Figure 2). It is important to recognize the causes and consequences of these historical processes in their own light, as well as for their significance to future societal change and policy deliberations.

The Program's second line of inquiry examines the kinds of motivations that affect peoples' livelihoods and seeks social transformation of norms and institutions by working closely with various stakeholders in local society.

The peatland project in Sumatra identified four principal kinds of motivations—local livelihood, profit of local farmers and agricultural and industrial enterprises, local and centrally-based governance, and conservation measures implemented by governments, NGOs and international institutions—and examines how they can be best coordinated to promote sustainability at the village level. Photo 1 captures the peatland fire, a source of severe environmental problems and health hazards. Meanwhile, the ecosystem-based disaster risk reduction project investigates the potentiality of ecosystem services to address natural disaster risks in Japan, where population decline creates additional dimensions to this issue, which are becoming relevant in other Asian countries. Photo 2 shows a traditional Japanese device which serves for flood control and preservation of ecosystem services. Another project on Punjab, India, studies how to prevent stubble burning, a result of the introduction of a compressed double cropping calendar after the Green Revolution, which caused pressure on water and land, as well as air pollution and health hazards. Air pollution travels far and wide, and exhibits multiple connections of environmental issues on a large scale. Figure 3 reveals the remarkable impact of near nation-wide lockdowns as a result of the COVID-19 on atmospheric nitrogen dioxide concentrations.

As a whole, Program 1 attempts to capture the temporal and spatial depths of such research projects, and to create a framework and vision for their analysis.



Figure 1

The environmental burden imposed by the high-speed growth model  
Urban pollution in Japanese (and later Asian) cities



Figure 2

The environmental burden imposed by the high-speed growth model  
From urban pollution to global environmental problems



Photo 1 :  
A drone view of tropical peat fires, Pelalawan district, Riau Province, Indonesia. Photo taken on September 13th, 2019.

Photo 2 :  
Kasumi-tei (open levee), a traditional measure against riverine flood, remaining in the Kitagawa River (Fukui Prefecture). Many open levees still exist in this river and perform multiple functions including flood control and supporting biodiversity and ecosystem services in the watershed. Photo taken in September 2020.

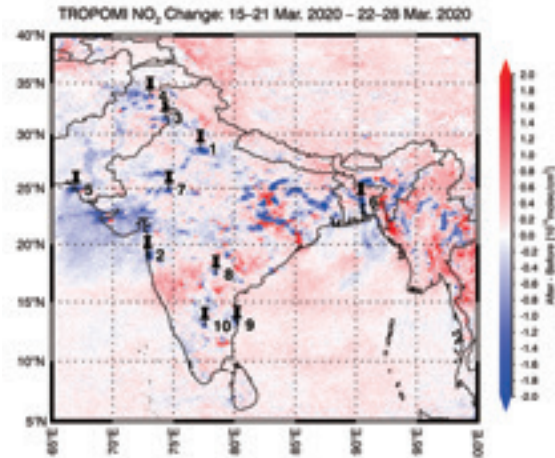


Figure 3 :  
Changes in nitrogen dioxide concentrations before and after lockdown in India, observed with satellite sensor (TROPOMI). Areas marked blue show a decrease, those marked red an increase. Pinned spots indicate major cities: 1. Delhi; 2. Mumbai; 3. Lahore; 4. Islamabad; 5. Karachi; 6. Dhaka; 7. Chittorgarh; 8. Hyderabad; 9. Chennai; and 10. Bangalore. See also pages 16-17.



Program Director **SUGIHARA Kaoru** RIHN

Trained in Japan (Doctorate at the University of Tokyo), I have held positions at the Faculty of Economics of Osaka City University, the History Department of the School of Oriental and African Studies, University of London, the Graduate School of Economics of Osaka University, the Center for Southeast Asian Studies, Kyoto University, the Graduate School of Economics of the University of Tokyo, and the National Graduate Institute for Policy Studies (Japan). My research concerns the history of intra-Asian trade, labour-intensive industrialization and the economic and environmental history of Monsoon Asia in long-term perspective. I am currently working on the historical interpretation of decarbonization.

Researchers

**YAMAMOTO Aya** Research Associate  
**IWASAKI Yumiko** Research Associate

# Toward the Regeneration of Tropical Peatland Societies: Building International Research Network on Paludiculture and Sustainable Peatland Management

Project Leader **KOZAN Osamu** RIHN/Kyoto University

Osamu Kozan has conducted hydro-meteorological observation and hydrological modelling in Asia. Based on field observation data, he developed hydrological land surface models considering actual water management in the Huai River basin in China and the Aral Sea Basin in Central Asia and developed a forecasting model of snowmelt-flood in the Lake Biwa basin, Japan. He has been conducting integrated natural and social science research on peatland society in Riau province and action research on peatland rehabilitation since 2008. He is continuing research on the effects of peatland fires and the accompanying air pollution on the local community.



## Necessity of the study

Peat swamp forests are found throughout Southeast Asia, especially Indonesia, and contain massive stores of carbon and water. Over the last two decades, these swamps have been intensively exploited in order to create commercial acacia and oil palm plantations. As these commercial tree species cannot grow in swamps, peatlands have been drained, creating extensive areas of dried peatlands that are extremely vulnerable to fire.

In 2015, peatland fires burned 2.1 million hectares of forest in Indonesia, affecting 45 million people. A half million people suffered from upper respiratory tract infections, and thousands of people, especially children, were afflicted with asthma. The government responded to this disaster by mobilizing the army, punishing people who set fires, and refusing to issue new peatland development permits. These measures were urgently needed, but provided only short-term relief. The public has demanded longer-term and more sustainable measures, such as rewetting and reforestation of peatlands, activities also promoted by this project since 2012. The government of Indonesia established the Peatland Restoration Agency in January 2016, and declared that two million hectares of degraded peatlands would be restored by 2019.

The objective of this research project is to use action research to generate solutions to peatland degradation and related fire and haze in tropical regions. The project seeks to identify and implement alternative practices in collaboration with local people, academics, governmental

offices and officials, NGOs, and international organizations. The project conducts multidisciplinary research in order to clarify the entire process of peatland degradation. We especially focus on three topics: A) History of development; B) Peat environment; and C) Climate change. Each topic sheds light on the cyclical series of social and environmental phenomena related to the process of peatland degradation. We study the vulnerability and transformability of each key subject in order to develop innovative peatland restoration activities that are useful to tropical peatland societies.

## Research methods and objectives

Peatland ecosystems are vulnerable to rapid state-changes. We explore their vulnerability with scientific methods, analyzing the socio-economic history of peatland societies, monitoring greenhouse-gas emissions in various types of peatlands, and tracking historical change in the amount of rainfall and significance of haze. Damage due to human disturbance is not completely reversible, however, and it is also necessary to consider what level of activity is consistent with sustainable development of the local economy.

In order to address this dilemma, we use transdisciplinary approaches to explore the transformability of peatland societies. We promote village participation in peatland restoration activities and suggest effective policies to administrators, arrange effective applications of paludiculture and social forestry, and use weather radar to identify potential fire outbreaks.



Explaining how to use the GPS logger in Lantau Baru village (Pelawan District, 30 November 2020)

This research thus supports the future potential of peatland-based societies, the phasing out of monoculture production activity, the development of paludiculture, and the enlargement of protected peatland areas.

### Achievements to date

Project researchers first introduced the practice of rewetting and reforestation in peatland areas in Bengkalis District, Riau Province in 2010. This experimental site has attracted significant attention especially since 2015, when fire and haze became very serious in the area. Along with project-led international seminars, the site has significantly enhanced public awareness of rewetting and forestation to promote peatland regeneration.

We signed Memoranda of Understanding with the Peatland Restoration Agency of Indonesia and Riau University to conduct action research on peatland restoration. Our project has created action plans based on these MOUs and begun to implement a restoration program in which social forestry programs are designed to strengthen the land rights of people on degraded state

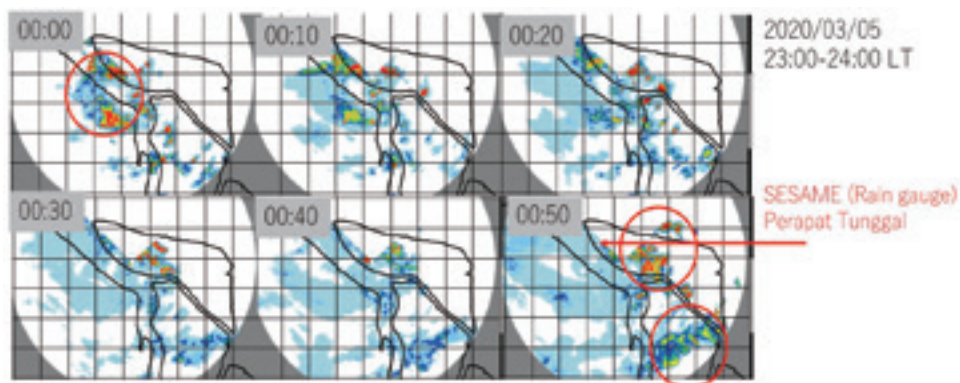
lands. In addition, continuous monitoring of green-house-gas emissions from peatlands, the influence of haze on atmosphere, and seasonal changes of local rainfall, allows us to clarify the influences on, and processes of, peatland degradation.

### Publications

*Catastrophe and Regeneration in Indonesia's Peatlands: Ecology, Economy and Society* was published by the National University of Singapore Press in 2016. This volume provides interdisciplinary field-based and historical analyses of peatland degradation through examination of the survival motives of local people, the profit motives of companies, and the conservation motives of government and NGOs. The book showcases the potential solution of rewetting and reforesting “the people’s forest”. The book has been reviewed in various media, including leading international academic journals. Our project will continue to build on this research in order to develop new insights on tropical peatland management.



Fish survey in the village of Lantau Baru (Pelalawan District, January 2020)



Movement of rainfall area analyzed by small weather radar (Bengkalis District, 5 March 2020)

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# Research and Social Implementation of Ecosystem-based Disaster Risk Reduction as Climate Change Adaptation in Shrinking Societies

Project Leader **YOSHIDA Takehito** RIHN/The University of Tokyo

Takehito Yoshida is an ecologist and limnologist who studies diversity and complexity of organisms and ecosystems from the viewpoints of adaptation and system dynamics, and explores human-nature interactions and sustainability in local communities in Japan. Trained in Kyoto University (PhD) and Cornell University (postdoc), he was a member of the faculty at the University of Tokyo at Komaba before assuming joint appointments at RIHN and the University of Tokyo.



## Outline of the project

Globally, the rate of natural disaster occurrence has been increasing, partly due to contemporary climate change, and adaptation to natural disaster risks is increasingly important to the sustainability of human societies. At the same time, many societies are experiencing shrinking populations. Ecosystem-based Disaster Risk Reduction (Eco-DRR) takes advantage of the multi-functionality of ecosystems and biodiversity, including their capacity to mitigate natural disasters while providing multiple ecosystem services, and population decline provides ample opportunity for implementing Eco-DRR. Our project will develop practical solutions for implementation of Eco-DRR by visualizing natural disaster risks, evaluating multi-functionality of Eco-DRR solutions, conducting transdisciplinary scenario analysis, examining traditional and local knowledge of disaster risk reduction, and collaborating with the insurance industry and other sectors.

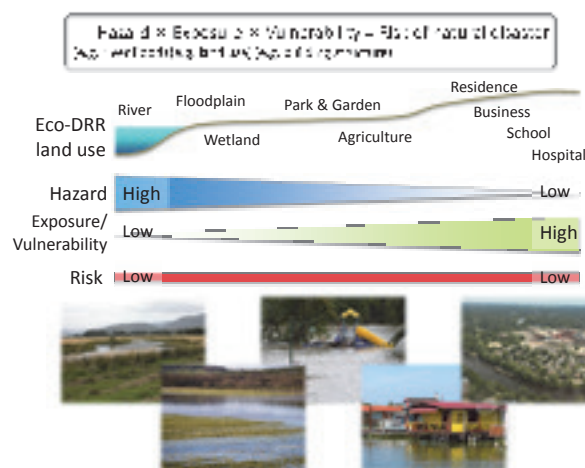
## Background and goals

Climate change impacts natural and human systems, and these impacts are projected to intensify in the future. Our project focuses on reducing risk and developing management strategies related to natural disasters. The risk of natural disasters results from the interaction between a

climate-related hazard, and the exposure and vulnerability of human activities (Fig. 1), so that adaptation to natural disaster risk can be realized by reducing exposure (e.g. by improving land use) and vulnerability to hazards.

Hard-engineering natural disaster countermeasures have target safety levels below which natural disasters can be prevented. Although these countermeasures are effective if the hazard level of natural disaster is below the target safety level, societies increasingly face situations in which hazards exceed safety levels, resulting in devastating natural disasters. Eco-DRR approaches focus on lowering the exposure of human activities to natural hazards, so reducing, if not preventing, associated losses and damages. Eco-DRR approaches, meanwhile, take advantage of the multi-functionality of ecosystems, complementing conventional approaches to natural disaster management, even though the effectiveness and multi-functionality of Eco-DRR is not yet clearly and quantitatively understood.

The population of Japan increased substantially over the last century, increasing the risk of and public exposure to natural disasters. Recently, however, the population is aging and shrinking, leading to the abandonment of farmlands, houses and decreases in other intensive land uses, a challenging circumstance that nevertheless provides an opportunity for improving land use. Evaluating past natural disaster risks in both expanding and shrinking population contexts therefore provides valuable



**Figure 1** Ecosystem-based disaster risk reduction not only lowers disaster risks but also enhances benefits of ecosystem services by reducing the exposure of human activities in high-hazard locations and supporting human activities in low-hazard locations.

information of adaptation strategies considered in Japan as well as in other countries.

Given this background, the ECO-DRR project sets two main goals. First, it develops methodologies to evaluate Eco-DRR multi-functionality and assess Eco-DRR by comparing multi-functionality in the past, present and future. Secondly, the project supports Eco-DRR implementation through transdisciplinary collaborations with local communities, governments, insurance industry and other stakeholders.

### Research objectives

Three research components contribute to achieve the above two goals.

(1) Visualizing risks of natural disasters in present and past

Exposure and vulnerability to different natural disasters is analyzed, and societal risk is evaluated and visualized with risk maps of the present and past. Modeling risk for different exposure scenarios will contribute to future Eco-DRR assessments and plans.

(2) Evaluating and modeling multi-functionality of Eco-DRR

Provisioning, regulating, and cultural ecosystem services will be evaluated, and their spatial distribution will be modeled in relation to population and land use. The model will be used to evaluate the ecosystem services associated with different land use scenarios.

(3) Transdisciplinary approaches for implementing Eco-DRR in society

Together with local stakeholders, transdisciplinary platforms will be formed at each of the local research sites by taking advantage of existing platforms.

Transdisciplinary platforms will deepen mutual understanding, promote discussion of future options, and build consensus regarding the use of Eco-DRR. Multi-functionality of Eco-DRR at each local site will be evaluated and research outcomes will be shared with local stakeholders using our transdisciplinary platform. In



Photo 1 Mikatagoko area in Fukui Prefecture, one of the research sites.

addition, traditional and local knowledge of Eco-DRR will be inventoried and evaluated for multifunctionality so that the benefits of traditional and local knowledge can be shared with the general public.

In collaboration with insurance industry, a research forum will be formed to discuss the possibility and feasibility of insurance industry contributions to economic incentives of Eco-DRR. Various laws and institutions in national and local governments related to disaster risk reduction and land use will be assessed in the research forum as well.

### Recent results

As the project turns the halfway point, we have been working on disseminating the results of the research and actions we have conducted in collaboration with diverse stakeholders. Traditional and local knowledge in the Matsuura River in Saga Prefecture was compiled as a booklet. We have compiled a technical report on Eco-DRR and green infrastructure in collaboration with practitioners from six consulting companies. In addition, a booklet introducing advanced overseas examples of finance and insurance for implementing Eco-DRR, a guide to the management of the Yatsu landscape, which exists in many places in the Lake Inba watershed (Chiba Prefecture) and has a variety of functions, and a film and booklet introducing the relationship between nature and people at the foot of Hira Mountains (Shiga Prefecture) were published. All of these materials are available free of charge through the RIHN website.



Figure 2 Booklets published in 2020 summarize the results of our research and actions. E-books and PDFs are available for free from the RIHN website.



Photo 2 Hira mountains and their base area in Shiga Prefecture, one of the research sites. Photo courtesy of MATSUI Kimiaki.

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Specially Appointed Assistant Professor

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**FURUTA Naoya**  
**HASHIMOTO Shizuka**  
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**NISHIDA Takaaki**

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Kyoto University  
Taisho University / IUCN  
The University of Tokyo  
Keio University  
Kyoto Prefectural University  
Kyoto Sangyo University

**NISHIHIRO Jun**  
**SAITO Osamu**  
**SHIBASAKI Ryosuke**  
**SHOUJI Tarou**  
**TAKI Kentaro**  
**UEHARA Misato**  
**URASHIMA Hiroko**

National Institute for Environmental Studies  
The Institute for Global Environmental Strategies  
The University of Tokyo  
Pacific Consultants Co., Ltd.  
The University of Shiga Prefecture  
Shinshu University  
MS&AD Insurance Group Holdings, Inc.



# An Interdisciplinary Study toward Clean Air, Public Health and Sustainable Agriculture: The Case of Crop Residue Burning in North India

Project Leader **HAYASHIDA Sachiko** RIHN/Nara Women's University

Dr. Sachiko Hayashida is an atmospheric scientist who has many achievements of research on stratospheric ozone depletion, air pollution and greenhouse gases. She received the Horiuchi Award from the Japan Meteorological Society in 2002. From 2005-2008 she was a member of the Science Steering Group of the Stratospheric Processes And their Role in Climate (SPARC) within the World Climate Research Programme (WCRP). From 2010-2018 she was a committee member of the International Commission on Atmospheric Chemistry and Global Pollution (ICACGP), a special commission within the International Association of Meteorology and Atmospheric Sciences (IAMAS). She is currently a president of the Remote Sensing Society Japan (RSSJ).



## Problem

This study addresses air pollution caused by large-scale post-harvest burning of rice-straw in October and November in the states of Punjab and Haryana in North-West India (Figure 1). The burning causes severe air pollution in the surrounding areas, most notably in the Delhi-National Capital Region. Some evidence suggests that crop-residue burning negatively affects air quality over the entire Indo-Gangetic Plain (IGP), demonstrating the potential negative impact of changing agricultural practices on regional air quality, affecting public health and well-being of hundreds of millions of people.

## Background

Historically the Indian Punjab region, a semi-arid zone with low precipitation, was not suitable for intensive cultivation. Traditional agriculture in the region consisted of a combination of cultivating wheat and raising livestock (cattle). Development of irrigation canals during the British colonial period transformed the region into a granary. In the 1960s, the area became the seat of the so-called "Green Revolution", and played a central role in producing food for the populous nation. In the 1970s, most of the region adopted a double-cropping system of wheat and rice. However, this cultivation practice required farmers to sow wheat seeds immediately after the rice harvest. While traditional hand-harvest allowed cropping of rice stalks near ground-level, recently increasing use of combine harvesters leaves large quantities of stubble in field. Farmers are forced to quickly burn this crop residue (stubble and stalk) in order to prepare for wheat seeding in the short period between late October and early November. Winds in this season shift to the northwest, often blowing smoke from stubble burning to Delhi-NCR, markedly affecting air quality there. Actually, however, the cause and effect relationship between stubble burning in the Punjab region and worsening air pollution in Delhi has not yet been established quantitatively. This lack of definitive quantitative evaluation is principally due to the poor state of the air pollution monitoring network in the region. Unfortunately, many farmers of the Punjab region are reluctant to acknowledge their own actions as the cause of air pollution in Delhi, and there is also some disagreement among academic researchers as well.

## Project Structure & Research Plan

This project utilizes observational data and model

simulations in order to provide a scientific examination of the connection between stubble burning in Punjab and severe air pollution in Delhi. Based on this scientific understanding, we will pursue a pathway of social transformation toward clean air, public health and sustainable agriculture. We will organize three working groups to approach stakeholders; all working groups will examine various measures to raise awareness regarding farmer/community behavior relevant to air pollution, as well as that of other stakeholders and government.

## Project progress in 2020

### Questionnaire survey in all districts in the state of Punjab

We carried out the questionnaire survey in all 22 districts of the state of Punjab, under the contract with the Center for International Projects Trust (CIPT), a non-profit organization in India. Two villages per district and 50 households per village were selected, representing a total of 2,200 households. Surveys gathered information on household financial status, agricultural practices, health awareness, and so on. Even in the midst of the spread of COVID-19, the CIPT was able to carry out surveys of all 2,200 households in FY2020. The questionnaire also included information on rice stubble burning. Because individual farmers may fear punishment for certain agricultural practices, in order to gain further information we also conducted direct interviews with village representatives.



Figure 1 Map of India with marks of the states of Punjab and Haryana.

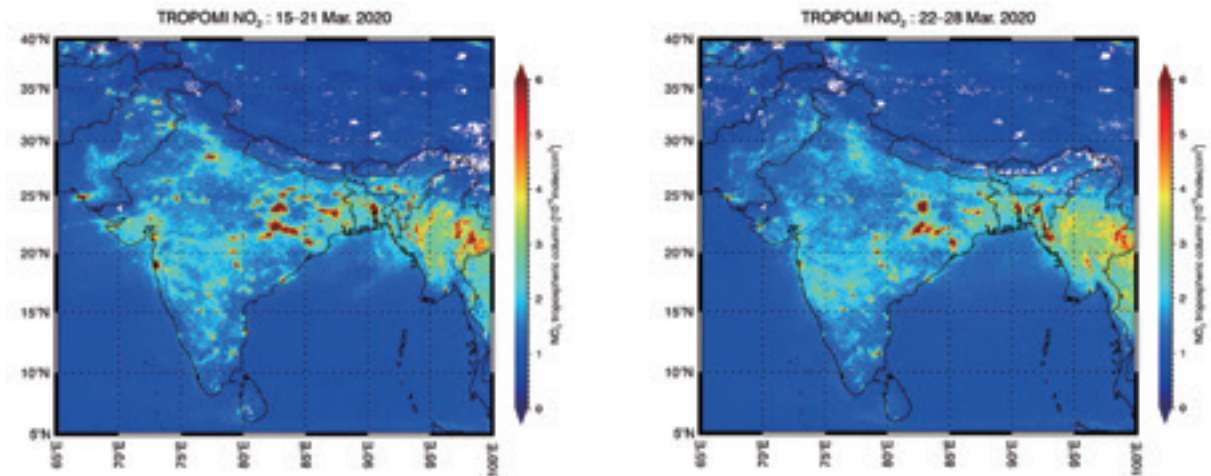


Figure 2 Nitrogen dioxide concentrations observed with satellite sensor (TROPOMI) just before lockdown (left) and after lockdown (right) in India.

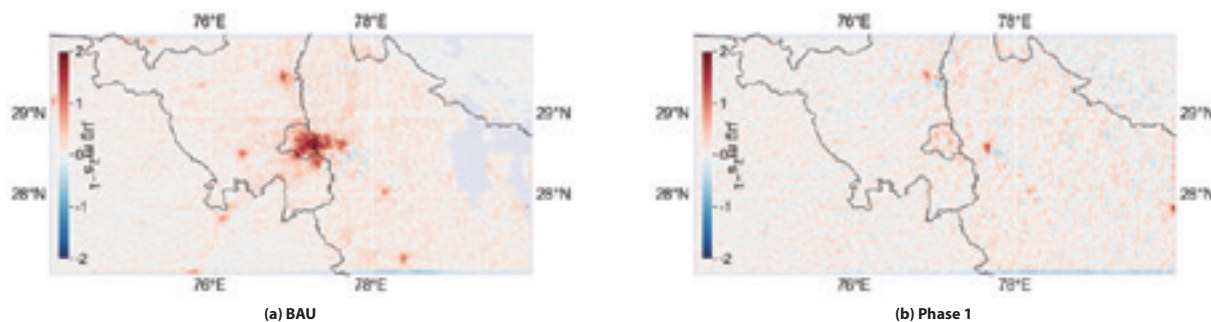


Figure 3 Estimated NOx emission in 2020 during (a) BAU (business-as-usual), and subsequent lockdown-phase (Mar. 22-Apr.14). Emissions from urban areas with dense roads and buildings and from power plants are shown in red.

### Temporary improvements in air pollution in Delhi as a result of COVID-19 lockdown

On March 25, 2020, a nationwide lockdown was implemented in India. As a result, the skies above Delhi-NCR, which has been cited as the most heavily-polluted city in the world, turned blue (See Aakash Newsletter: “Clean Air and Imagined Sustainability: The case of India” [https://www.chikyu.ac.jp/rihn\\_e/covid-19/topics.html#topics1](https://www.chikyu.ac.jp/rihn_e/covid-19/topics.html#topics1)). An urgent and intensive research mission named “DELHIS (Detection of Emission change of air pollutants: Human Impact Studies)” was therefore initiated on 1 April 2020, with the help of WG2 to investigate this abrupt change in air pollution. Semi-weekly meetings were held for four months, resulting in the publication of three peer-reviewed papers as of March 2021. Figure 2 shows the changes in the NO<sub>2</sub> concentrations observed by TROPOMI, during the periods of 15–21 March 2020 (before the lockdown: left) and 22–28 March 2020 (after the lockdown: right). By comparing NO<sub>2</sub> concentrations before and after the lockdown,

anthropogenic nitric dioxide (NO<sub>2</sub>) emissions were also quantitatively estimated (Misra et al., 2021, Figure 3).



A scene of burning rice straw captured in Ludhiana district, Punjab, on Nov. 2, 2018.

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## Research Program 2

# Fair Use and Management of Diverse Resources

Global environmental problems are inter-related. Studies concentrating on single issues are therefore often not effective and consideration of the links between multiple resources involving stakeholders is essential. Recently, the nexus structure linking energy, water and food production has become a prominent area of study, but truly sustainable societies require more comprehensive understandings of the ecological resources that provide ecosystem services and cultural resources. The production, circulation and consumption of resources should be discussed in relation to a range of spatial scales, and stakeholders should be involved in these discussions. Sustainable use of resources requires fair and wise management systems as well as indices capable of managing these processes.

Many existing socio-economic or human behavioral systems must be converted or transformed into new systems capable of addressing the special qualities of renewable natural resources, as these qualities have sometimes been externalized from conventional economics. Asia is experiencing rapid change in economy, urbanization and population, though traditional techniques for sustainable resource management, associated with the relatively rich human sphere and cultural background in this region also survive. Study of this long-standing Asian experience of resource use may offer important observations about sustainability in general.

RIHN research projects have accumulated information and suggestions necessary to this transformation in resource management, though gaps remain. Program Two therefore explores wise and fair management systems capable of addressing multiple resource-uses by multiple stakeholders, in multi-spatial scales. We encourage new project proposals including those by innovative young scientists addressing such novel and under-examined subjects. Program research should also address the social conditions that support transformation of values and human behavior, as they should also inform new indices and institutions for fair resource management.

In 2019, we enlarged our database of resource supply and demand in Japan to the municipality level, with particular emphasis on ecosystem services. The database could be utilized to assist comparative and integrative analyses of research sites. One initial analysis of this database indicated that prefectural sustainability is related to population density. Some of these results were presented in the chapter "Evaluating local sustainability, including ecosystem services provided by rural areas to cities to promote bioeconomy" (The Bioeconomy Approach, Routledge 2020). It is also useful to consider the inter linkages among the resource use sustainability, which could be developed to address SDG targets.



Traditional agricultural landscape in Hanamaki, Iwate Prefecture, Japan



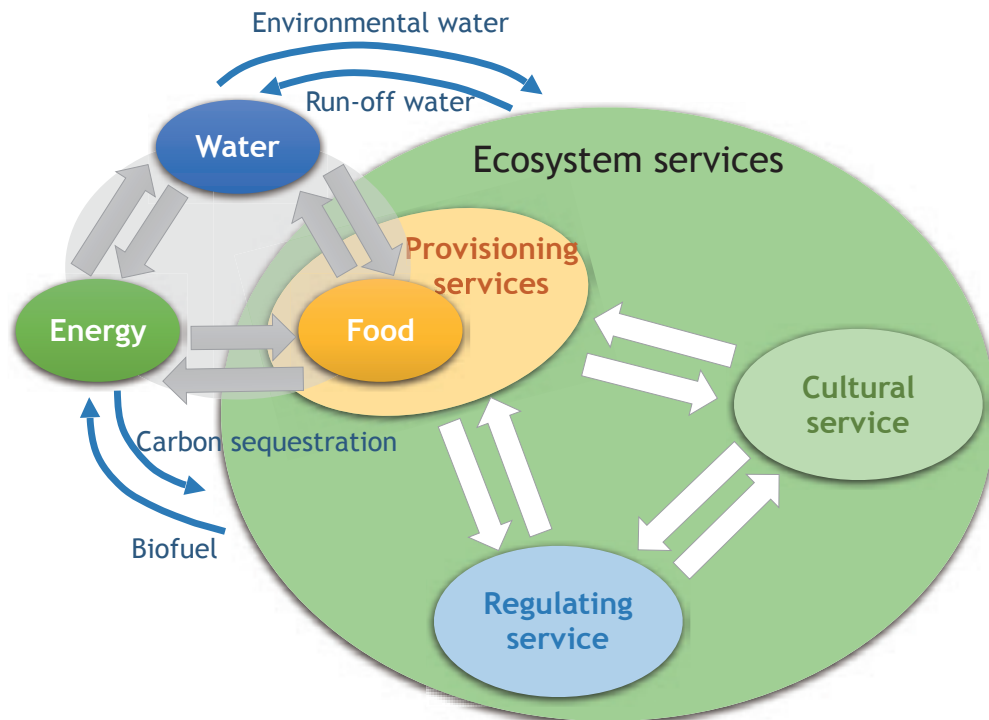
Land-use pattern in mountain area in Thailand



Water flow in upstream of Iwaki River, Japan



Solar power generation in Chiba Prefecture, Japan



Nexus structure among water, energy, food, and ecosystem services



Acting Program Director **Hein MALLEE** RIHN

Hein MALLEE is a social scientist with a Ph.D. from Leiden University, the Netherlands. His work was initially concerned with migration and related policies in China, but as he started working in international development, he became involved in projects on rural development, natural resources management and poverty alleviation in China and Southeast Asia. The dominant theme in this work was local people's involvement in and rights to resources. He has been a professor at RIHN since March 2013 and a deputy director-general since April 2018. He is also the director of the Regional Center for Future Earth in Asia.

Researchers

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# Mapping the Environmental Impact Footprint of Cities, Companies, and Households

Project Leader **KANEMOTO Keiichiro** RIHN

I am an Associate Professor of Research Institute for Humanity and Nature. Before that, I was a Lecturer of Institute of Decision Science for a Sustainable Society at Kyushu University and Faculty of Economics and Law at Shinshu University. From 2009 - 2011, I was a visiting research fellow at Integrated Sustainability Analysis, the University of Sydney. I received my Ph.D. in 2014 from Tohoku University. In 2018, 2019, and 2020, I was named a Highly Cited Researcher in the field of Cross-Field by Clarivate Analytics.



## Abstract:

A recent study in Nature showed that up to a third of biodiversity loss is driven by trade, and a body of other studies have identified the same pattern for GHG emissions, air pollution, and other environmental ills. Many environmental impacts worldwide are ultimately driven by consumption in developed countries. Considerations of remote responsibility, ecological footprint, and scope 3 emissions are now a standard part of the environmental policy discussion at many levels, from the UNFCCC to individual businesses and households.

Providing better information to buyers and decisionmakers can be a powerful way to reduce environmental pressures worldwide. The life-cycle analysis (LCA) and supply chain analysis tools (multi-regional input-output (MRIO) models) used to analyze these remote effects in detail have benefited from significant advances in the past years, with improving models and, more recently, the link of economic models to spatial (GIS) maps that locate more precisely how global supply chains link to particular emissions and biodiversity hotspots.

However, while existing work sketches out the broad picture, it still falls short of being detailed enough to help with many specific decisions. Existing supply chain analyses operate at the resolution of countries and broad economic sectors. In practice decision-makers at these levels often only have limited effective economic and judicial power. Many individuals, businesses, and local governments are seeking to reduce their total environmental footprint, but existing models are either too coarse resolution to be truly useful or require expensive and time-consuming modifications to be useful for informing specific decisions.

Unlike most studies, which focus on environmental emissions and international trade, this is the first study to clarify the effect of global supply chains on environmental impacts. Further, in addition to countries and regions, we will estimate the environmental footprint of cities, companies, and households. The proposed project would be a major contribution and can be expected to be of high interest to businesses, policymakers, NGOs, sustainability consultants, and researchers around the world. The project

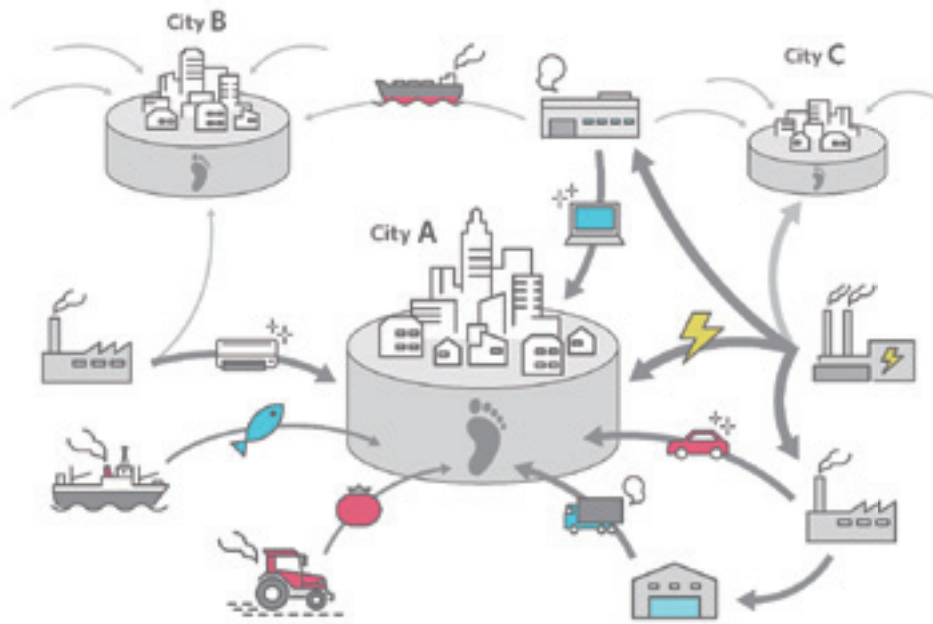
team has deep experience in supply chain analysis and environmental impact assessment.

## Results:

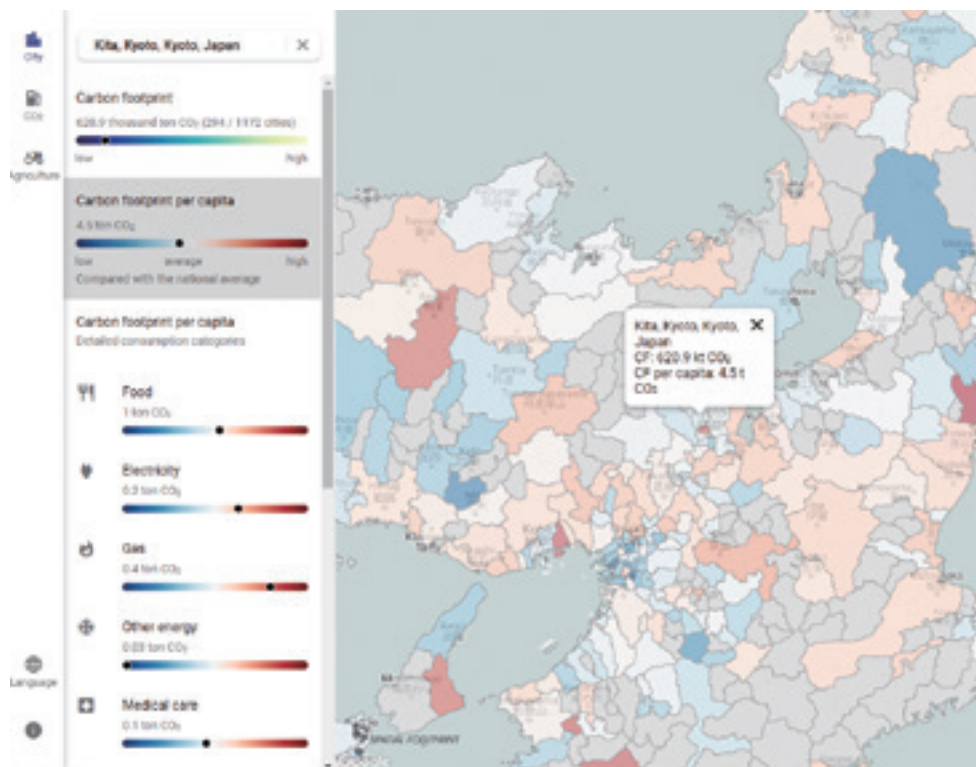
In 2018, we estimated the carbon footprint of 13,000 cities. Globally, we find carbon footprints are highly concentrated in a small number of dense, high-income cities and affluent suburbs. 100 cities drive 18% of global emissions. In most countries (98 of 187 assessed), the top three urban areas are responsible for more than one-quarter of national emissions.

In 2019, we identified five key results about Japanese food diet from the Japanese carbon footprint (CF) household study. First, differences in household demographics (age and sex) do not explain variation in household food CF. Second, regional differences in food-related CF exist, but these are not the main explanatory factor of household differences. Third, household income and savings are weakly correlated with food-related CF. Fourth, there is 1.9 times higher in food CF between the mean household in the lowest and highest quartile. Finally, meat consumption is almost identical across the four quartiles, and it is rather consumption of fish, vegetables, confectionary, alcohol, and restaurants that differentiates high and low CF households.

In 2020, we estimated carbon footprint of Japanese and Indian cities. In the Indian study, we show the eradication of extreme poverty does not conflict with ambitious climate change mitigation in India. However, our analysis suggests CF reduction policies within India need to target high-expenditure households, as they are responsible for nearly seven times more carbon emissions than low-expenditure households (living on \$1.9 consumption a day). In the Japanese study, we construct household CF inventories for 1172 Japanese cities using detailed consumer expenditure data and a Japanese domestic multi-regional input-output (MRIO) model. We identify the consumption activities which city policymakers can target to reduce CF. We observe a strong concentration of household CF in a few cities in Japan: 40% of the total Japanese CF is driven by 143 cities.



The concept figure of the environmental footprint of cities.



The webpage screenshot of the carbon footprint cities

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# Fair for whom? Politics, Power and Precarity in Transformations of Tropical Forest-agriculture Frontiers

Project Leader **Grace WONG** RIHN

Grace Wong is a natural resource economist. Over the past two decades, her research has largely converged on assessing social, economic and ecological trade-offs in changing tropical environments at the interface of development and conservation processes. She has worked extensively throughout Southeast Asia and Latin America, and more recently in Sub-Saharan Africa. Her current research is on the politics and governance of forest and ecosystem services in dynamic social-ecological systems, with particular focus on issues of power, gender, intersectionality and equity.



Throughout the tropics, forest-agriculture frontiers dominated by diverse swidden mosaics are being converted to homogenous landscapes of commodity agriculture. Despite being labeled as “development”, smallholders in these landscapes often benefit less than local elites and external investors in frontier transformations, reflecting underlying politics, institutional and power structures around forests and land-use tenures.

FairFrontiers applies inter- and transdisciplinary approaches to ask: *whose interests drive transformations of forest-agriculture frontiers, who benefits and who is made precarious? What are possible policy options that can deliver ecologically sustainable and socially equitable outcomes?*

To address these research questions, the project is organized into 5 modules. The first will carry out critical discursive analyses of the different framings of development in forest-agriculture frontiers; the second and third modules will examine how bundles of ecosystem services and well-being are changing in frontiers; the fourth module will apply transdisciplinary approaches with co-production of knowledge on, and inclusion of diverse and local narratives of sustainable futures; and the fifth

module will carry out integrative and comparative analyses across modules, scales and countries (see Project Structure). The analytical framework is built on theories of power and everyday politics, social and environmental justice and ecosystem services. Together, these approaches support the advancement of theory and methods for assessing equity, ecosystem services and wellbeing, and identification of the enabling and hindering conditions for more equitable and sustainable development pathways for the millions of people who still depend on these diverse landscapes for their wellbeing.

M1: The political discursive framing of development in forest-agriculture frontiers

M2: Ecosystem service bundles in changing forest-agriculture frontiers

M3: Well-being bundles in forest-agriculture frontiers: local communities negotiating, navigating, and adapting to change

M5: Integrative and comparative analyses

M4: Communications, engagement and co-production of knowledge

FairFrontiers project structure



Forest-agriculture frontier in Laos



Above: KONDO Yasuhisa, Reading the height, Wadi Tanuf, Oman

Bottom: YOSHIDA Takehito, The Inokuchi cylindrical diversion tank for irrigation, Shiga, Japan



## Research Program 3

# Designing Lifeworlds of Sustainability and Wellbeing

More than 60% of the world's population resides in Asia and over a third of global economic activity occurs there. Asia is comprised of an incredible diversity of cultures, histories, societies, economies, livelihoods, and ecologies. Asia is also affected by myriad global and local environmental issues, such as population increase, air, water, soil, and coastal pollution, increasing greenhouse gas emissions, and biodiversity loss. The region is also affected by growing wealth disparity, social isolation, rising levels of poverty, and the disappearance of traditional cultures and knowledge. The combination of migration between the countryside and cities, rural depopulation, and urban concentration is accompanied by rapid socio-cultural change, over-exploitation of resources, and deterioration of natural environments. Both urban and rural lifeworlds are disintegrating rapidly.

In reconstructing the lifeworld concept and highlighting the reciprocal linkages between rural and urban spaces, Program 3 designs lifeworlds of sustainability and wellbeing and co-creates concrete pathways for their realization. Program research is based on the diverse world-views and accumulation of experience of human-nature co-existence. Latent socio-cultural elements such as livelihood styles, lay knowledge, conflict resolution strategies, and the vitality of the people themselves, can be called upon to address contemporary problems and to help chart a course toward possible future societies. Program 3 builds upon such experience and knowledge of human-nature interaction to propose concrete changes needed to achieve a sustainable society.

The transformations and frameworks leading to sustainable urban and rural lifeworld design will also entail fundamental shifts in existing economic systems, markets, and political decision-making systems. Rather than investigating top-down approaches to system change, Program 3 works with local residents, government officials, companies, citizen groups and other stakeholders to propose sustainable alternatives and gauge their feasibility. In order to avoid the risk of developing proposals that are only applicable to specific regions or sites, Program 3 will aim for research results that are generalizable while also retaining the diversity at the heart of local lifeworlds and wellbeing.

Intergenerational and intragenerational equity is an important issue in designing a sustainable society. Shibly Shahirier, a new researcher in the program, has found in a field experiment in Bangladesh that inequality can be greatly improved if people with power in the current generation think about current and future issues as imaginary future people. Stimulated by these results, at the Think 20 Summit, a preparatory meeting for the G20, the Program Director proposed that current world leaders be asked to act as imaginary future presidents and prime ministers of the world concerned to control carbon and nitrogen emissions, for example, which will place a heavy burden on future generations. Unfortunately, this proposal was not adopted, but the idea still stimulates Program research, including in the forthcoming volume *Future Design x Philosophy* (Keiso Shobo Publishers).



The diversity of fruits and vegetables for sale at the market in Kanchanaburi reflect Thailand's changing society



An activities of transdisciplinary community of practice in Hayahaya village of Gorontalo Province, Indonesia



Action research in Zambia. The Vice-President of Zambia visited the Sanitation Project's booth at the Zambia Water Forum and Exhibition (ZAWAFE) 2018. Photo by NYMBE, Sikopo P.



Program Director **SAIJO Tatsuyoshi** RIHN

Tatsuyoshi Saijo specializes in designing social systems that promote sustainability and equity without inhibiting individual incentive. His interest is in developing the field of "Future Design", one that links the happiness and wellbeing of current generations to that of future generations.

Researchers

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Researcher

# The Sanitation Value Chain: Designing Sanitation Systems as Eco-Community-Value System

Project Leader **YAMAUCHI Taro** RIHN/Hokkaido University

Taro Yamauchi is a professor at the Faculty of Health Sciences, Hokkaido University. He has a B.S., a M.S. and a Ph.D. in health sciences from the University of Tokyo. He does intensive fieldwork in hunter-gatherer societies, rural villages, and urban slums in developing countries to understand the lifestyle and health of local populations and adaptation to living environments. His research interests also include sanitation and participatory action research involving local children, youth and adults. He is vice president of the International Association of Physiological Anthropology (IAPA) and an executive member of the International Society for the Study of Human Growth and Clinical Auxology (ISGA).



Sanitation generally refers to facilities and services for the safe disposal of human urine and feces. Sanitation systems are essential for promoting public health, preventing environmental pollution, conserving ecosystem functions, and recycling resources. The question of how to handle the waste of 10 billion people is therefore highly relevant to the global environment. The UN Millennium Development Goals Report 2015 reported that 2.4 billion people are still using unimproved sanitation facilities, including 946 million people who practice open defecation. Sanitation in the developing world has not been improved dramatically, and it still has high under-five mortality and poverty rates.

The world's population is estimated to reach approximately 10 billion in 2050, and this population growth will happen mostly in developing countries. At the same time, depopulation and aging are increasing, especially in the rural areas of the developed world, and the financial capability of many local governments—which are key agents in the management of sanitation systems—is getting weaker. The conventional approach based on technology and building toilets is not sufficient to address sanitation issues. A holistic model that includes collaboration with local communities in sanitation is necessary.

## How we think about sanitation

Sanitation has three components: health and wellbeing, materials (technology and economy), and socio-culture. Inadequate sanitation is harmful to physical and mental health, and sanitation is based on technology that promotes an appropriate material cycle. Sanitation technologies entail costs of introduction and maintenance, but they can create benefits by turning human waste into compost or other useful materials. Sanitation is also based on cultural assessments of what is “clean” or “dirty”, so the operation of a sanitation system requires a social framework. As a complex of health and wellbeing, materials, and socio-culture, we propose the Sanitation Triangle as a holistic model (Figure 1).

Based on the Sanitation Triangle, project research will uncover the values embedded in societies and cultures and co-create the Sanitation Value Chain by cooperating with various actors related to the sanitation system. We envisage that the Sanitation Value Chain system will improve the health and wellbeing within the community.



Figure 1 The Sanitation Triangle Model.

## Goals of the project

The goals of this research project are to: 1) propose the concept of Sanitation Value Chain in relation to both developing and developed countries; 2) design several pilot studies demonstrating the significance of societal, academic, and professional involvement in the co-creation of this value chain; and 3) contribute to the establishment of a new interdisciplinary academic foundation on sanitation.

## Research topics for achieving the goals

- Topic-1 Life: Field surveys examine cultural values and norms regarding human excreta, and reevaluates the sanitation system in relation to residents' lives.
- Topic-2 Technology: We identify prerequisites of sanitation technologies and reevaluate the value that sanitation will bring. In addition, based on the sanitation value chain we develop new sanitary technologies relevant to local values and conditions.
- Topic-3 Co-creation: We identify key stakeholders and describe the value structures of people and communities, and analyze the hierarchy and structure of stakeholders' value chains and evaluate their affinities. We demonstrate the co-creation process of the sanitation value chain.
- Topic-4 Visualization: In order to co-create the value chain, it is necessary to communicate research results to actors and stakeholders. Utilizing resources and institutional collaborations of RIHN, we will develop methods and communicate research outcomes using various media.

## Research sites

The project is performing field studies at four sites: 1) Rural areas in Ishikari River Basin, Hokkaido; 2) Rural areas of Burkina Faso; 3) Urban areas in Indonesia; and 4) Peri-urban areas in Zambia.

## Achievements in FR studies

- (1) Toilet for recycling resources. We have developed functioning toilet technologies necessary for the sanitation value chain by making urine in the urban area valuable as fertilizer. These are the “Toilet that can concentrate urine” and “Toilet that can make phosphorus fertilizer”.
- (2) Tracking propagation of pathogens. Pathogenic bacteria propagate through various routes. We have developed a molecular biological method of tracking this propagation. In the case of Bangladesh, we found that the most important route of pollution is bathing, and the contamination of drinking cups is more important than of the water itself (Figure 2).
- (3) Detecting the risk factors relating to WASH (water, sanitation, and hygiene). We surveyed handwashing and health of elementary school students in the “slum” area of Bandung, Indonesia. Risk factors of stunting and diarrhea are gender (boy), drinking tap water rather than tank water, using an open storage container of drinking water, low household income, and not using towels after hand washing. The risk factors for fecal *E. coli* attached to children’s hands are gender (boy), inadequate hand-washing and use of soap, and other inhygenic practices.
- (4) In Zambia, we organized two workshops with local children and youth groups to promote good sanitation and hygiene. Group members measured fecal contamination around their living environments and then created visualizations of this invisible contamination, improving awareness of the problem and facilitating discussion of improvement (Photo 1). Second, participants took pictures of the places thought to be a problem for community sanitation. These images were recomposed into videos that facilitated community communication.

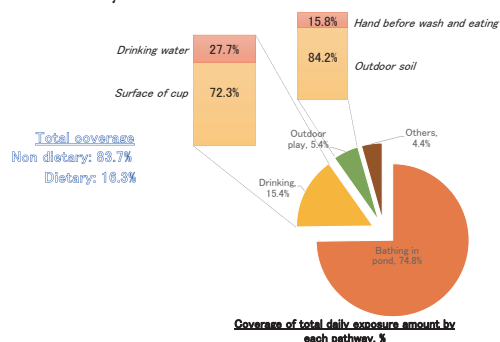


Figure 2 *E. coli* exposure pathways. Example of measurement in Bangladesh from Harada et al. (2017) Fecal exposure analysis and *E. coli* pathotyping: a case study of a Bangladeshi slum, International Symposium on Green Technology for Value Chains 23-24 October, 2017, Balai Kartini, Jakarta.



Photo 1 Workshop in Zambia: Collecting samples and processing (photo by KATAOKA Yoshimi)

- (5) Meta-research of our project were conducted. We published a paper describing and analyzing the embarrassment and trial of a cultural anthropologist who entered our inter-disciplinary project. We also recorded and analyzed how interdisciplinary communication is performed at the intersection of the humanities and sciences, such as in our project meeting discussions. We use these recordings to promote interdisciplinary communication in our project.

## Notable achievements in FY2020

1. We edited and published the international journal “Sanitation Value Chain” (ISSN: 2432-5066). We have revised the Aims & Scope of the journal to provide young researchers in developing countries with opportunities to publish their research results, and in FY2020, we published Volume 4, Numbers 1, 2, 3, and the proceedings of an international online symposium (Volume 5, Number 1) (Figure 3).
2. We held frequent webinars with overseas counterparts and conducted an international online symposium (SVC2020) and remote field surveys.
3. We organized our field practices and methodologies such as visualization and meta-research to theorize inter- and trans-disciplinary research.



Figure 3 International academic journal Sanitation Value Chain, 4 (1, 2, 3) and 5 (1).

### Sub Leader

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# Co-creation of Sustainable Regional Innovation for Reducing Risk of High-impact Environmental Pollution

Project Leader **SAKAKIBARA Masayuki** RIHN/Ehime University

Professor Masayuki Sakakibara is an earth scientist with multidisciplinary backgrounds: Geology, Petrology, Astrobiology, Geochemistry, Medical Geology, Geoengineering, and Remediation Engineering. He is currently also working at the Faculty of Collaborative Regional Innovation and Graduate School of Science and Engineering, Ehime University. His interest in environmental pollution led him to conduct intensive fieldworks and activities to reduce mercury pollution and poverty problems in artisanal and small-scale gold mining (ASGM) areas in Indonesia and Myanmar. He takes responsibilities of international conferences and seminars such as Transdisciplinary Research on Environmental Problems in Southeast Asia (TREPSEA) and Transdisciplinary Research and Practice for Reducing Environmental Problems (TRPNP), which focus on transdisciplinary research and practice, as well as development of various regional innovations for the reduction of environmental pollutions in ASEAN countries.



## Research Background

Mercury (Hg) is an extremely toxic metal and a particular threat to human embryonic and early-childhood development. Recent investigation by the United Nations Environment Programme (UNEP) has highlighted the enormity of Hg pollution in developing countries. ASGM produces 15-20% of the global gold market and is responsible for 37% of global Hg emissions, as mercury amalgamation is a cost-effective and widely used method to extract gold from ore. Around 15 million people, including 4-5 million women and children, participate in ASGM activities in more than 70 countries. Even though the Minamata Convention was established to protect human health and the environment from the adverse effects of Hg, ASGM activities are often associated with poverty and cannot be solved by ratification of international treaties or NGO activities alone.

## Research Objectives

The objectives of our project are to: 1) understand the link between poverty reduction and environmental management in ASGM areas; 2) establish a process for constructing sustainable societies through regional innovations in ASGM areas; and 3) strengthen environmental governance in ASEAN countries.

## Methodology and research process

We have been conducting transdisciplinary research and practice in collaboration with mining communities, key stakeholders (SHs) of public and private organizations, and researchers of local universities, etc. (Figure 1). This work emphasizes:

- a) Case studies on reduction of Hg pollution using a future scenario of ASGM in Indonesia and Myanmar. Case studies include: 1) studies of living conditions, culture and history; 2) environmental and health impact assessments, and socioeconomic assessment; 3) co-creation of future scenarios with key stakeholders; 4) identification of transformative boundary objects (TBOs); 5) organization of transdisciplinary communities of practice (TDCOPs) using TBOs; 6) co-design and co-production of transformative learning and practice; 7) social implementation research; and 8) evaluation of the progress of regional innovation (Figure 2).
- b) Study of interregional networks that aim to generate Hg-free societies in Indonesia and Myanmar.
- c) Study of improvements in environmental governance to address Hg pollution in ASEAN countries.
- d) Theoretical and practical studies of the design, practical use, and evaluation of TBOs and TDCOPs in study areas.

## Expected goals of the project

Regional innovation will arise as a consequence of environmental and industrial innovations introduced with a transdisciplinary approach, including the development of a future scenario for a Hg-free society, transformative learning and practice, and developments of TDCOPs. By strengthening environmental governance, which consists of multiple layers of co-operative organizations, we will also develop a route through which the problem of global environmental Hg pollution can be resolved.

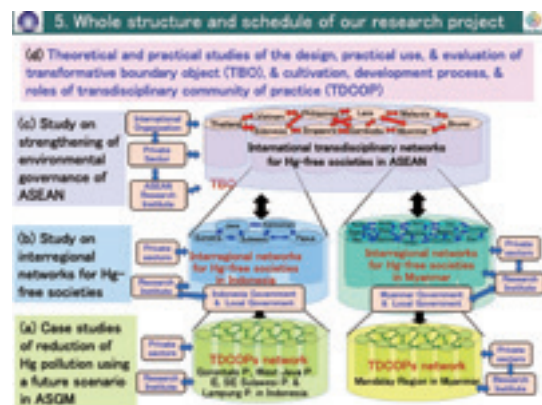


Figure 1 Structure of SRIREP project

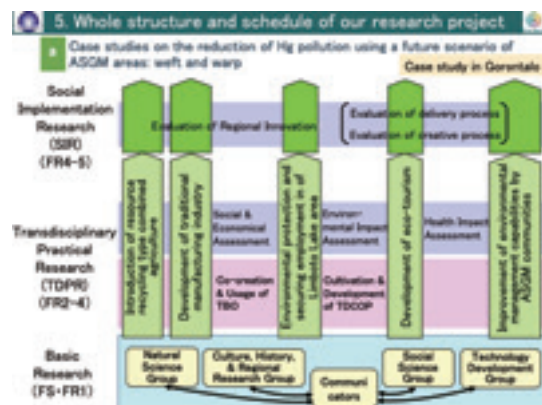


Figure 2 Structure and schedule of the case studies in Gorontalo, Indonesia.

## Progress and Achievements

a) Case studies have been completed in Gorontalo, West Java, Southeast Sulawesi, and Lampung in Indonesia in collaboration with Gorontalo State University, Lampung University, and Mandalay Region in Myanmar in collaboration with the Environmental Conservation Department of the Ministry of Natural Resources and Environmental Conservation (MONREC) and a local NGO. In Gorontalo, in August 2019 and February 2020 we examined social-economic conditions in the ASGM areas and rural livelihoods of fishermen and farmers in non-ASGM areas. We found that poverty is a major issue in both areas. We organized four TDCOPs: “KTK (Kampung Tangguh Kesehatan; Healthy village)”, “Karawo Research Group”, “Natural Fiber Research Group”, and “Geo Cafe Gorontalo” to conduct co-design and co-production of transformative learning and practice according to the future scenarios (Figure 3).

In Thabeikkyin Township, Mandalay Region, preliminary environmental and health impact assessments were conducted in ASGM areas in February 2020 (Photo 1). ASGM miners with a longer duration of mining activity demonstrated decreased lung capacity. Remote medical examination of the mining community has been established since December 2020.

b) In the study on interregional networks, we held the 1<sup>st</sup> and 2<sup>nd</sup> Japan - ASEAN medical seminars in Indonesia, in 2019 and then we also held the 3<sup>rd</sup> and 4<sup>th</sup> medical seminars (webinars) in October 2020 and January 2021. In total, these seminars included 600 attendees from both Indonesia and Myanmar, and were conducted in collaboration with private and public organizations, and the Japan Association for the United Nations Environmental Programme (JAU) (Figure 4. Flyer of the 4<sup>th</sup> medical seminar held in January 2021).

c) In the study on improvements in environmental governance in ASEAN countries, the UNEP Global



Figure 3 Availability and progress of TDCOPs established in the case study of Gorontalo, Indonesia.

Environment Information Exhibition and the 2<sup>nd</sup> TRPNP (ASEAN-Japan Meeting Point of Collaboration by Stakeholders and Researchers for Reducing Environmental Problems in ASEAN Countries) were held in Myanmar in December 2019.

d) Reflecting on our research processes to date, our theoretical analyses indicate that environmental problems require a comprehensive problem-solving approach that includes the creation of new knowledge through the integration of local and scientific knowledge. We note that enthusiastic participants in the TDCOPs can become catalysts for initiating dialogue among stakeholders. Finally, we find that well-designed TDCOP activities can stimulate stakeholders to practice interactive and transformative learning.



Photo 1 Health impact assessment of ASGM miners in Mandalay Region, Myanmar in February 2020; assessment of the lung capacity in ASGM miners using a portable spirometry.

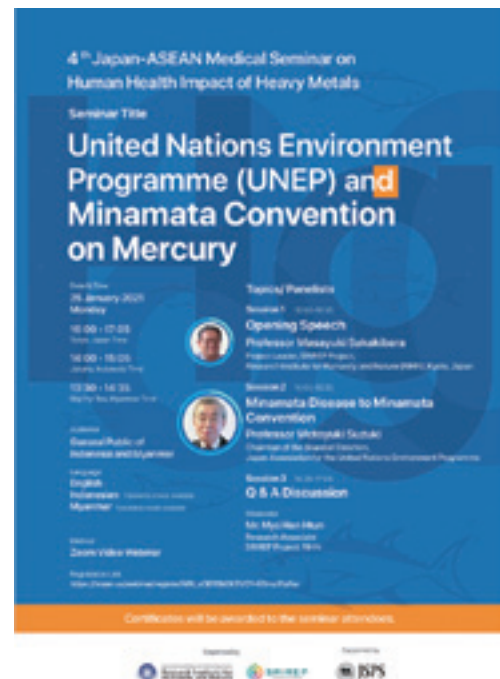


Figure 4 Flyer of the 4<sup>th</sup> Japan - ASEAN Medical Seminar on the Human Health Impact of Heavy Metals

### Researchers at RIHN

**KIMIJIMA Satomi** Researcher  
**KUANG Xiaoxu** Researcher  
**WIN THIRI KYAW** Researcher

**MYO HAN HTUN** Research Associate  
**TAKEHARA Mari** Research Associate

### Main Members

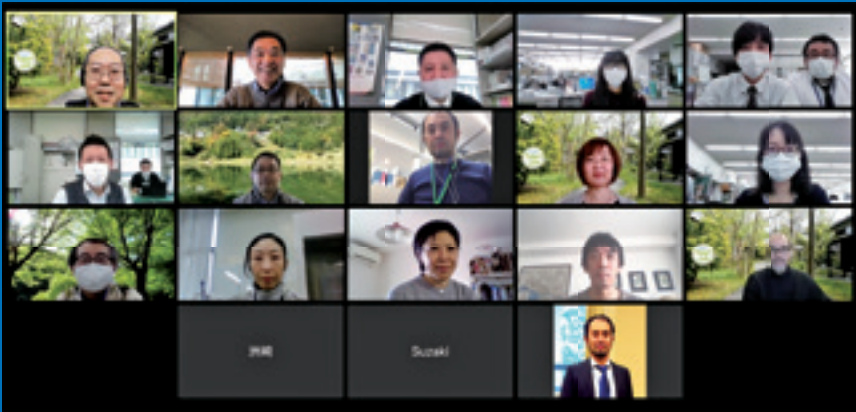
**MATSUDA Hiroyuki** Yokohama National University  
**KASAMATSU Hiroki** Ehime University  
**SHIMAGAMI Motoko** Ehime University  
**MIYAKITA Takashi** Kumamoto Gakuen University  
**MATSUMOTO Yuichi** Kwansai Gakuin University  
**KOMATSU Satoru** Nagasaki University  
**ISA, Ishak** State University of Gorontalo

**JAHJA, Mohamad** State University of Gorontalo  
**ABDURRACHMAN, Mirzam** Institut Teknologi Bandung  
**KURNIAWAN, A. Idham** Institut Teknologi Bandung  
**ARIFIN, Bustanul** Lampung University  
**ISOMONO, Hanung** Lampung University  
**BASRI** College of Health Sciences Makassar  
**BOBBY** Network Activities Groups

# Core Program

The Core Program develops concepts and methodologies for transdisciplinary research to solve global environmental problems in collaboration with society. Core projects develop comprehensive and systematic concepts and methodologies for transdisciplinary research, which are widely applicable to global environmental issues, and accessible to related stakeholders.

Core projects produce conceptual and methodological frameworks together with RIHN research projects, based on individual methods, techniques, and tools from the divisions in the RIHN Center. Core projects collaborate with research projects, building on the case studies developed by these projects, and develop comprehensive and systematic methodologies beyond an individual research program or project. Core projects also deliver completed concepts and methodology to research programs and projects, the RIHN center, and related stakeholders.



Core Program online meeting (Feb. 2, 2021)



Program Director **TANIGUCHI Makoto** RIHN

Professor Makoto Taniguchi is a hydrologist and a deputy Director-General at RIHN. He received a Ph.D. from Tsukuba University, Japan, in 1987. He is currently a steering committee member of Future Earth Nexus Knowledge Action Network. He has worked on water-related projects around the world, especially in Asia, authoring or co-authoring over 170 peer reviewed articles and eight books, including [Groundwater and Subsurface Environment](#), [The Dilemma of Boundaries](#), and [Groundwater as a Key for Adaptation to the Changing Climate and Society](#) (all from Springer Press).

Researcher

**MIURA Tomoko**

Research Associate

# Methods and Tactics to Foster Knowledge Co-creation: A Practical Framework for Implementing Transdisciplinary Research

Project Leader **ONISHI Yuko** RIHN

Yuko Onishi holds a Ph.D. in environmental science from the University of Oxford (UK). Before joining RIHN, she worked for the Food and Agricultural Organization of the United Nations (FAO) and later worked for the National Institute for Environmental Studies (Japan). She is a member of the Regional Centre for Future Earth Asia.



It is increasingly acknowledged that transdisciplinary research methods (TD) are useful in research projects on global environmental problems for which science alone cannot provide a definite solution. However, many researchers have pointed out that the theoretical concepts on ideal TD processes are extremely difficult to apply in practice. This project aims to identify a practical framework for TD research. The practical framework consists of methods and tactics for fostering knowledge co-creation, identified from the current TD practices implemented throughout the world, as well as from knowledge and perspectives of experienced TD researchers and stakeholders. In order to make sure that the proposed framework is useful, the project uses the above results for capacity building and will revise our framework as necessary.

The project consists of the following three components:

- 1) TD Landscape (literature reviews, collection and analysis of case studies)
- 2) Lessons learned (researcher and stakeholder experiences)
- 3) Capacity/network building (lectures and website)

Under a component of TD landscape, this project analyses

the international research landscape surrounding TD research. It examines similar research approaches, such as participatory approach and action research, and seeks to establish a new definition of TD research and project design (methods, tools and approaches) for fostering knowledge co-creation in relation to different types of environmental issues.

In addition to this survey of international TD literature, the project carries out in-depth studies with researchers and stakeholders in TD projects at RIHN and other institutes. The project carries out in-house workshops as well as interviews and workshops at existing project field sites. Focused study with researchers seeks to develop a novel and unique methodology for knowledge generation based on personal experiences and to identify tips and tactics to enhance stakeholder engagement in TD research. Investigation with stakeholders seeks to reveal the effects of TD projects on stakeholders and communities, which are the premise of TD projects, but largely overlooked in current project evaluation. With this combination of global and focused investigations, the project seeks to synthesize the TD research experiences so far and share the information to the next generation researchers and practitioners of co-creation project.



TERRA School 2019 (TD School Co-organized by RIHN and Regional Centre for Future Earth in Asia)

#### Researchers at RIHN

**KOO, Bonjun**  
**KUIPERS, Rob**

Researcher  
Research Associate

**LAMBINO, Ria**  
**OKAMOTO Takako**

Specialy Appointed Associate Professor  
Research Associate

#### Main Members

**KIKUCHI Naoki**  
**OH Tomohiro**  
**NISHIMURA Takeshi**

Kanazawa University  
Sanyo Gakuin University

**RAMPISELA, Agnes**  
**GASPARATOS, Alexandros**

Faculty of Agriculture, Hasanuddin University  
The University of Tokyo



## Completed Research



When a project moves to Completed Research (CR) status, the contract with RIHN is concluded. Research teams disperse to university research, teaching, and other duties. Project publications and other communications and contributions may follow for several years. At RIHN, each project forms part of the institute's heritage; project results and data are entered into the RIHN archives upon which future RIHN projects may be formulated.

Fiscal Year Completed	Leader	Research Project
2006	HAYASAKA Tadahiro	Emissions of Greenhouse Gases and Aerosols, and Human Activities in East Asia
	KANAE Shinjiro	Global Water Cycle Variation and the Current World Water Resources Issues and Their Perspectives
	WATANABE Tsugihiro	Impact of Climate Changes on Agricultural Production System in the Arid Areas
	NAKAWO Masayoshi	Historical Evolution of the Adaptability in an Oasis Region to Water Resource Changes
	YACHI Shigeo	Multi-Disciplinary Research for Understanding Interactions between Humans and Nature in the Lake Biwa-Yodo River Watershed
2007	FUKUSHIMA Yoshihiro	Recent Rapid Change of Water Circulation in the Yellow River and Its Effects on Environment
	ICHIKAWA Masahiro	Sustainability and Biodiversity Assessment on Forest Utilization Options
	AKIMICHI Tomoya	A Trans-disciplinary Study on Regional Eco-History in Tropical Monsoon Asia: 1945-2005
2008	SEKINO Tatsuki	Interaction between Environmental Quality of the Watershed and Environmental Consciousness: With Reference to Environmental Changes Caused by the Use of Land and Water Resource
	TAKASO Tokushiro	Interactions between Natural Environment and Human Social Systems in Subtropical Islands
2009	SHIRAIWA Takayuki	Human Activities in Northeastern Asia and Their Impact on Biological Productivity in the North Pacific Ocean
2010	TANIGUCHI Makoto	Human Impacts on Urban Subsurface Environments
	YUMOTO Takakazu	A New Cultural and Historical Exploration into Human-Nature Relationships in the Japanese Archipelago
	SATO Yo-Ichiro	Agriculture and Environment Interactions in Eurasia: Past, Present and Future - A ten-thousand-year history
2011	KAWABATA Zen'ichiro	Effects of Environmental Change on the Interactions between Pathogens and Humans
	KUBOTA Jumpei	Historical Interactions between Multi-Cultural Societies and the Natural Environment in a Semi-Arid Region in Central Eurasia
	OSADA Toshiki	Environmental Change and the Indus Civilization
	UCHIYAMA Junzo	Neolithisation and Modernisation: Landscape History on East Asian Inland Seas
	UMETSU Chieko	Vulnerability and Resilience of Social-Ecological Systems
2012	OKUMIYA Kiyohito	Human Life, Aging and Disease in High-Altitude Environments: Physio-Medical, Ecological and Cultural Adaptation in "Highland Civilizations"
	SAKAI Shoko	Collapse and Restoration of Ecosystem Networks with Human Activity
	MOJI Kazuhiko	Environmental Change and Infectious Disease in Tropical Asia
2013	HIYAMA Tetsuya	Global Warming and the Human-Nature Dimension in Siberia: Social Adaptation to the Changes of the Terrestrial Ecosystem, with an Emphasis on Water Environments
	NAWATA Hiroshi	A Study of Human Subsistence Ecosystems in Arab Societies: To Combat Livelihood Degradation for the Post-oil Era
	KADA Ryohei	Managing Environmental Risks to Food and Health Security in Asian Watersheds
2014	MURAMATSU Shin	Megacities and the Global Environment
2015	KUBOTA Jumpei	Designing Local Frameworks for Integrated Water Resources Management
2016	HABU Junko	Long-term Sustainability through Place-Based, Small-Scale Economies: Approaches from Historical Ecology
	SATO Tetsu KIKUCHI Naoki	Creation and Sustainable Governance of New Commons through Formation of Integrated Local Environmental Knowledge
	ISHIKAWA Satoshi	Coastal Area-capability Enhancement in Southeast Asia
	TANAKA Ueru	Desertification and Livelihood in Semi-Arid Afro-Eurasia
2017	ENDO Aiko	Human-Environmental Security in Asia-Pacif Ring of Fire: Water-Energy-Food Nexus
2018	NAKATSUKA Takeshi	Societal Adaptation to Climate Change: Integrating Palaeoclimatological Data with Historical and Archaeological Evidences
2019	OKUDA Noboru	Biodiversity-driven Nutrient Cycling and Human Well-being in Social-Ecological Systems
	TAYASU Ichiro	Proposal and Verification of the Validity of Isotope Environmental Traceability Methodology in Environmental Studies
2020	Steven R. McGREEVY	Lifeworlds of Sustainable Food Consumption and Production: Agrifood Systems in Transition
	KONDO Yasuhisa	Information Asymmetry Reduction in Open Team Science for Socio-environmental Cases

# Lifeworlds of Sustainable Food Consumption and Production: Agrifood Systems in Transition

Project Leader **Steven R. McGREEVY** RIHN

Over the course of the FEAST project, the evidence we gathered pointed to one conclusion: dramatic changes are needed in the food system and in society at large if we are to live sustainably. We need new values, radically different ways of provisioning our societies, and economic models that reject the logics of growth and embrace sufficiency.

Major findings from the FEAST project:

- The ecological footprint of Japan's food consumption is dominated by imported and processed foods. Food consumption by urban and aged populations has a larger footprint than that of rural peoples. A decentralized food system that supports local production for local consumption will shrink food footprints and make food systems more sustainable. At the same time, agricultural land in urban areas is being paved over to make new housing developments, even though Japan's population is shrinking, leaving millions of homes unoccupied. Integrated agricultural and urban/suburban land use policy is desperately needed.
- Sustainable food policy involves multiple government departments and sectors of the economy. Agricultural production, distribution, public health, tourism, environmental concerns, technology and business, education, city planning—all of these areas are related to food. The challenge is to integrate these elements to produce coherent and effective food policies. Current governance structures correspond to sectoral and narrow departmental structures; they are inadequate to the challenges of sustainability. In FEAST, we partnered with diverse local stakeholders to create food policy councils able to address the challenges of developing integrated food policy.
- Food production must shift away from industrial, monoculture, large-scale operations towards more robust agroecological approaches. Agroecological production is based on ecological principles and

- protects nature and the living creatures, for example bees, that enable food production. Japan urgently requires regulations on neonicotinoid insecticides already restricted in the EU yet found in >60 'household products' sold in Kyoto City, with a focus on avoiding both negative impacts on ecosystems and farmers' livelihoods. Agroecological farmers have high autonomy and produce highly diverse organic crops. Support systems for new farmers in Japan are quite generous financially, but farmers are pushed into industrial agriculture and training programs for sustainable and organic agriculture are not available.
- Informal food practices, such as gardening, food sharing, hunting and foraging, and rearing small livestock, will play a critical role in creating regional, distributed, and sustainable food systems. These informal food practices improve community food security and resilience, as well as sense of well-being and physical and mental health.
- In workshops on the future of food and agriculture, Japanese citizens indicated their interest in more leisure time for working in the garden, cooking, and enjoying food. They also indicated widespread support for local production for local consumption in schools, restaurants, and community kitchens.

Download 'Ecokana', the FEAST app that explores the environmental, social, and health impacts of the food you eat! With information on close to 1,800,000 food products, you can learn more about how food consumption affects nature and society, and push food companies to make our food system more transparent.

FEAST project research and collaboration with food stakeholders in Japan will continue into the future through the formation of the FEAST NGO. We hope to continue to develop food policies with local stakeholders that make our food systems more sustainable and resilient.



Kyoto, Kamogawa River in the year 2050. A post-growth food system in which nature and people flourish. (credit: © 2021 AOI Landscape Design, Yoshida Aoi)



Ecokana app UI. Download the app via the QR code! Android on the top. iPhone on the bottom.

# Information Asymmetry Reduction in Open Team Science for Socio-environmental Cases

Project Leader **KONDO Yasuhisa** RIHN

## Backgrounds and Objectives

Environmental deterioration can result from defective interactions between human society and nature. It is often perceived as a wicked problem that has no clear-cut solution. Such a problem cannot simply be solved by research experts. Rather, it requires collaborations with experts from different domains (interdisciplinary research) as well as practitioners such as governments, funding bodies, industry, non-profit organizations, and members of civil society (transdisciplinary research) to solve the problem. Therefore, such solution-oriented research projects are always completed by a team of two or more experts in an interdependent fashion.

However, this team format is often disrupted by asymmetric information, knowledge, wisdom, value, socio-economic status, and power among the above-mentioned actors, as well as by different historical and geopolitical contexts. To reduce (rather than solve) such socio-psychological asymmetry to enable more effective community-based research on socio-environmental issues, this CORE Project, also called the Open Team Science Project, developed an adaptive and abductive methodology in which working hypotheses were continuously improved by assessing practical case studies. At the completion of the project, the methodology was summarized in the form of the following Open Team Science Method as a self-checklist of socio-environmental practice research.

## The Open Team Science Method

Conceptually, we interlinked open science, as an open scientific knowledge production system, with boundary

spanning as an essence of transdisciplinary research to transform in-between spaces into shared epistemic living spaces. This can be practically achieved through our Open Team Science Method (1) guaranteeing ethical equity with special attention to empowering marginalized (or “small voice”) actors; (2) building trust by guaranteeing transparency (i.e., traceability and synchronousness) in the research process; (3) facilitating dialogue and synlogue (a conversation in which individual speakers seamlessly succeed one another’s speech); and (4) discovering and sharing the platform on which actors with different interests and thoughts can jointly tackle (transcend) specific problems or issues, where necessary (Figure 1).

## Outputs, Outcomes, and Future Directions

This project academically explored a new dimension of open science for and with society. The Open Team Science Method was published in a Japanese book (環境問題を解く *Dissolving Environmental Problems*) for general readers, a concept paper in *Current Opinion in Environmental Sustainability*, three case reports in international academic journals, four opinion papers in Japanese academic journals, and two Japanese newspaper commentaries, among other media.

The Open Team Science Method is a working hypothesis to be further improved. To make this method a new academic norm of open science with and for society, we will continue developing and disseminating the Open Team Science Method after completion of the CORE project.

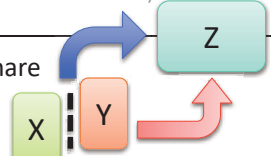
<p><b>Ethical Equity</b></p>	<ul style="list-style-type: none"> <li>• Is our project <b>inclusive</b> (anyone can join &amp; leave at any time)?</li> <li>• Do we empower and encourage marginalized (or “small voice”) actors to participate?</li> <li>• Do we eliminate socio-economic inequities?</li> </ul>
<p><b>Visualization &amp; Transparency</b></p>	<p>Do we guarantee transparency of the process of research through visualizing and sharing them widely?</p> <ul style="list-style-type: none"> <li>• <b>Traceability</b> and <b>synchronousness</b> may build and warrant <b>trust</b>.</li> <li>• Was informed consent made with local actors?</li> <li>• Is the process of research made transparent, with respecting the intent of local actors?</li> </ul>
<p><b>Dialogue &amp; Synlogue</b></p>	<p>Do we facilitate mutual conversation to understand other views and conditions? → Psychological safety → <b>Trust</b></p> <ul style="list-style-type: none"> <li>• Synlogue in Asian contexts (Chen 2020 after Mizutani 1983)</li> </ul>
<p><b>Transcend</b></p>	<p>Do we build a platform to perceive and share problems from multiple viewpoints?</p> <ul style="list-style-type: none"> <li>• Multipaths are allowed</li> </ul> 

Figure 1: The Open Team Science Method as a self-checklist

## Current Feasibility Studies

Feasibility Studies are based on proposals solicited annually by RIHN from the research community at-large. If approved by the Project Review Task Committee, lead researchers are granted seed funding in order to develop their proposal for Full Research. FS status can be maintained for no longer than two years.

FS/PR

### Adaptive Governance of Multiple Resources based on Land-Sea Linkages of the Water Cycle: Application to Coral Reef Island Systems

SHINJO Ryuichi, University of the Ryukyus

Area : Japan, Palau, Indonesia

Natural resources in small islands have been affected by global and local processes, human activities and related impacts. This research project explores how to strengthen adaptive governance of multiple resources in tropical and subtropical western Pacific coral reef

islands by integrating natural science research on land-sea resources linked by water cycle with those examining biological and cultural diversity and natural resource governance focusing on norms, institutions, processes and local-global linkages.



Student participation in an action research event in Southern Okinawa, Ryukyu Islands.



Research Framework.

**FS Sustainable Ecosystem Approach for the Healthy Society**

**OKABE Kimiko**, Forestry and Forest Products Research Institute

Area : Japan and Cambodia

Biodiversity loss, land use change, and climate change are exposing societies to new pathogens. In order to reduce the risk of emerging zoonoses, it is necessary to take measures that are appropriate to the ecological and social factors of the region. In this study, we focus on the balance between ecosystem conservation and infectious disease control, and explore behavioral changes that can reduce the risk of newly emergent zoonoses due to human-ecosystem interactions.



The goal of the ecosystem approach is to explore how society can maintain appropriate relationships with natural ecosystems. It analyzes species interactions across ecosystems, and provides insight on appropriate behavioral changes.

**FS Traditional Food Preservation and Cache Using Freezing Environment**

- Transformation and Heritage of “Food Life History” of the North under the Global Environmental Shift -

**SAITO Kazuyuki**, Japan Agency for Marine-Earth Science and Technology

Area : Alaska (USA), Siberia (Russia), Hokkaido and Honshu (Japan)

This project explores the “Food Life History”, or FLH, of cold storage practices utilized by communities in Siberia and Alaska to preserve traditional foods. In the past few decades, underground caches have been failing due to natural and social changes. This project will combine objective investigations and community-based participatory collaborations in order to better understand the transformation of FLH associated with the changes in traditional cold-storage practices, and to design and propose sustainable/desirable future practices.



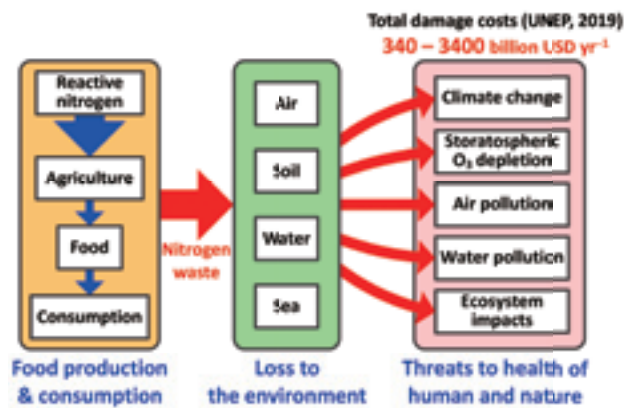
Problem setting scheme of the project

**FS** **Towards Sustainable Nitrogen Use Connecting Human Society and Nature**

**HAYASHI Kentaro**, National Agriculture and Food Research Organization

Area : Japan, Asia, and Global

Food production and consumption unintendedly causes nitrogen (N) pollution that threatens ecosystems and human health. This feasibility study will develop a research plan to elucidate unknowns in the dynamics of the nitrogen cycle and quantify the impacts of N loss to the environment. Project research will design a transdisciplinary framework to evaluate the benefits and threats of N use and the effects of specific control measures, including behavioral change, that can address the N issue in sustainable food systems.



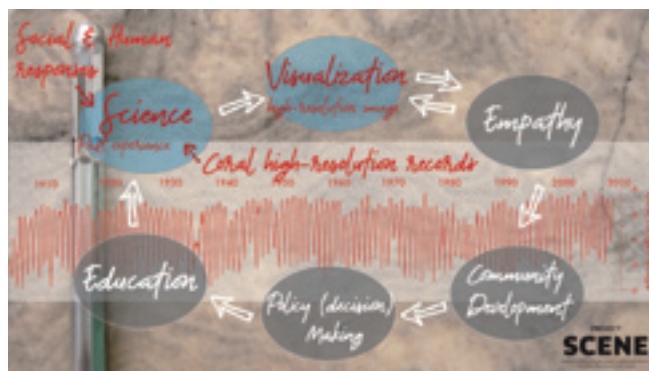
Nitrogen input to the food system as fertilizer induces a variety of environmental impacts threatening the health of humans and nature.

**FS** **Influence of Global Environmental Changes and Regional Catastrophic Events on Social Vulnerability**

**WATANABE Tsuyoshi**, Hokkaido University

Area : Kikai-jima, Amami Islands, Polynesia, Asia

Climate change has profoundly affected terrestrial and marine ecosystems, human migration, settlement, human lifestyle, and civilization. Recent economic development, population growth, and globalization could trigger societal vulnerability, perhaps leading to simplifying lifestyles. This research compares high-resolution coral records with archaeological-historical records to reconstruct historical global climate change and catastrophic environmental events that influenced past social vulnerability. Project research will estimate the impact of future environmental change on human society and suggest sustainable frameworks and lifestyles.



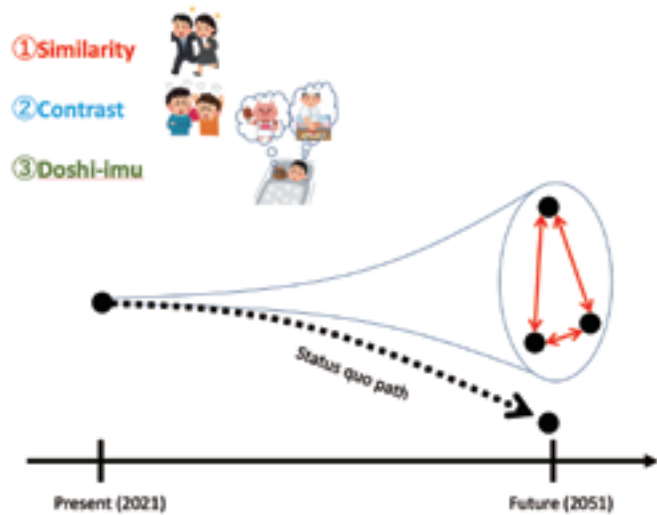
The cycle of scientific knowledge to societal implementation adopted in this study

## Development of a Future Design Methodology for the Multi-level and Pluralistic Implementation of Sustainable Visions

NAKAGAWA Yoshinori, Kochi University of Technology

Area : Kochi Prefecture, Japan.

This study investigates how different visions (i.e., desirable future states), generated by imaginary future generations using the methodology of Future Design, can co-exist, in the sense that individuals with different visions have the potential to make a consensus regarding the current options (i.e., regarding what must be done by the present generation). Our ultimate research goal is to realize a state where stakeholders create their own multi-level visions (e.g., from national to municipal ones), taking the perspective of the future generations, which may not be consistent with one another, by means of which the society as a whole can gradually make progresses in a sustainable manner.



Individuals taking the perspective of the future generations in specific future states may be able to make consensus regarding the present generation's options in at least three different scenarios: (1) similarity; (2) contrast; and (3) dosho-imu (literally "to dream different dreams in the same bed").



## Coordination

### Knowledge Networks

RIHN maintains a wide national and international research network, and utilizes various modes of collaboration with national and international research institutions. In addition to establishing the MOUs necessary to facilitate research collaborations, RIHN also provides opportunity for overseas researchers to contribute directly to the RIHN research community as either Invited Scholar or Visiting Researcher.



## RIHN Invited Scholar Program & RIHN Visiting Research Fellow Program

### Opportunities for Overseas Researchers to Spend Time at RIHN

RIHN has established two programs to enable overseas researchers to spend several months at the Institute, engaging in research and interacting with other RIHN researchers. The basic idea is that such visits benefit both the researcher and the Institute. The programs are open to researchers based outside of Japan (including those with Japanese nationality) and researchers based in Japan with a nationality other than Japanese. Candidates for both schemes are selected competitively.



- The RIHN **Invited Scholar Program** enables overseas researchers to spend between one and three months at RIHN and to contribute to the development of the Institute's intellectual foundations and strategic directions. Invited Scholars should be widely recognized in their fields and able to provide a strategic overview of the relevance of their disciplinary or interdisciplinary studies to RIHN's engagement in global environmental studies. Invited Scholars are selected based on nomination by RIHN faculty members who act as their host. Invited Scholars are employed by RIHN during their stay and receive a stipend.

- The RIHN **Visiting Research Fellow Program** brings overseas researchers to the Institute for periods of two to six months to engage in specific research in the context of one of the RIHN Programs, Projects or RIHN Center Divisions. Visiting Fellows are not employed by RIHN, but their travel, accommodation and daily expenses are covered by an allowance. Visiting Fellows are selected based on applications from the candidates themselves. RIHN faculty members act as hosts during the stay and candidates are required to identify and consult with potential hosts before applying.



## Science Communication

As a national research institute, RIHN is expected to conduct exemplary science. It also must communicate its research agenda and results to the public and contribute to public awareness and discussion of contemporary environmentalism. A number of public symposia, seminar series, and publications are designed to reach specialist and general audiences. Recent activities and publications include:

### The Earth Forum Kyoto and the Earth Hall of Fame Kyoto Award

The Earth Forum Kyoto invites world-renowned experts and activists to discuss the environmental and cultural bases of more responsible human societies. The Earth Hall of Fame Kyoto Award is given to those who have made exemplary contributions to the protection of the global environment. Organizers of the event are the International Institute for Advanced Studies, the Kyoto International Conference Center, and RIHN.

The 2019 recipients of the Earth Hall of Fame Kyoto Award were Ms. Mary Robinson (Former President of Ireland, Former UN High Commissioner for Human Rights) and IPCC (Intergovernmental Panel on Climate Change). The 2020 event was cancelled due to Covid-19, and the 2021 event is now under consideration.



### RIHN International Symposium

An annual symposium at RIHN exploring the key concepts of RIHN Research Programs.

RIHN 15th International Symposium was held via Zoom, while active discussions were conducted simultaneously via Slack. With adjustments to the symposium schedule to accommodate different time zones, this shift to digital platforms allowed many more people to participate in the symposium as speakers, and expanded the international audience considerably.



### Transitioning Cultures of Everyday Food Consumption and Production: Stories from a Post-growth Future

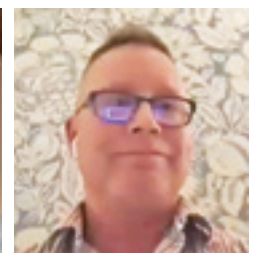
13-16 January 2021

#### Keynote Address

Overcoming the Problem Bias – Researching and Learning Sustainable Food Economy Solutions  
Arnim WIEK (Arizona State University)

Limits, Degrowth and Environmental Justice  
Giorgos KALLIS (Universitat Autònoma de Barcelona)

Food Journeys: Encounters that Engender Empathy across Difference  
Michael CAROLAN (Colorado State University)



## RIHN Public Seminars

Public seminars are held throughout the year at RIHN or in the city center. Due to Covid-19, in 2020 it was impossible to hold any events for the general public.

## RIHN Seminars

This seminar series is oriented towards researchers at RIHN, inviting a wide range of visiting scholars to present their most current research. Seminars in 2020 were largely conducted via digital platforms, and included:

### Developing Transdisciplinarity for Sustainable Livestock Farming: A Cross-Fertilization of Concepts and Methodologies, with a Practical Application for the Water-Energy-Livestock Nexus

Cyrille RIGOLOTT, RIHN Visiting Research Fellow/UMR Territoires  
7 October, 2020

### Our Earth: A Planet Created by Life. Rethinking of "How Human-Nature Relation Ought to Be?"

YASUNARI Tetsuzo, RIHN  
6 November, 2020

### Another Asian Drama: Growth, Resource Use and the Responsibility for Global Sustainability

SUGIHARA Kaoru, RIHN  
11 December, 2020

### Is There Something Like a Kyoto (RIHN) "School" of Transdisciplinarity? Impressions from a Three Months Investigation

Cyrille RIGOLOTT, RIHN Visiting Research Fellow/UMR Territoires  
15 December, 2020

### Thinking About Human Evolution and Culture from Primatological Viewpoints

YAMAGIWA Juichi  
25 December, 2020

### Human-Environmental System: From Local to Global Sustainability

Chuluun TOGTOKH, RIHN Invited Scholar/Institute for Sustainable Development, National University of Mongolia  
6 January, 2021

### Future Design: Bequeathing Sustainable Natural Environments and Sustainable Societies to Future Generations

SAIJO Tatsuyoshi, RIHN  
19 January, 2021

### Living on the Planet of Water

TANIGUCHI Makoto, RIHN  
12 February, 2021

### How We Can Solve the Issues on the Fair-Use of Multi-Resources with Multi-Stakeholders

NAKASHIZUKA Tohru, Tohoku University  
26 February, 2021

### Sustainable Development for People and Planet

Chuluun TOGTOKH, RIHN Invited Scholar/Institute for Sustainable Development, National University of Mongolia  
11 March, 2021

## RIHN Regional Community Seminars

RIHN Regional Community Seminars take place in, and address specific environmental issues pertaining to, a particular part of Japan. Due to Covid-19, in 2020 it was impossible to hold any events for the general public.

## Other Events



**4th APSAFE Symposium** Supporting Sustainable Food Systems: Quality Food and Ethical Consumption  
December 3 - 16 2020  
ONLINE Individual Presentation via Slack & Google Meet  
Keynote Speech via Google Meet  
We cordially welcome researchers, students, policy makers, community activists, and practitioners! **Admission Free!**

Presentation and Discussion via Slack | 2 Weeks for Networking Opportunities | New Knowledge and Ideas on Food Ethics

Rebuilding and restructuring food production methods is inevitable if we hope to make food systems more sustainable. New technologies in agriculture, aquaculture, animal husbandry, and food processing have many potentials, and research results from various perspectives such as agroecology, resilience, human-animal relationships, degrowth, gender, and food sovereignty have many visions for future. However, none of them are a panacea. To tackle the wicked problems of the food system in each place, we need a platform for transdisciplinary mutual learning. We hope that APSAFE 2020 will be one of those opportunities to create such platform.

<https://www.apsafe2020.online/>

3 Opening Plenary  
Karl O. Thompson, *Human-Natural Coevolution*

3-16 Individual Presentation  
Keynote Speech  
Paul & Thompson *Resilient Agroecology*, **Wai Chi Chang** *Resilient Food Systems*, **Steven McCreary** *Research Institute for Humanity and Nature*, **Mimi Lam** *University of Bristol*

16 Closing Plenary



**食の未来**  
2020年 11月9日(月) 13:15~20:15  
つくば市役所  
コミュニティ・青年センター(つくば市役所12  
(京成つくば駅南口徒歩1分・1車線))

**食ベトーク (食と環境についておしゃべりしよう)**  
**つくばから食と環境を考える**

食料生産は必要不可欠な要素です。しかし、私たちの食生活は気候変動や水不足、食料不安などの課題に直面しています。食料生産と環境の両方を同時に実現するために、持続可能な食料の生産と消費について考えます。

環境に配慮した持続可能な食料の生産と消費を促進し、食料不安や食料安全保障を確保するためにできることを一緒に考えてみましょう。

**プログラム**

- 開会挨拶・趣意説明
- 特別発表(環境情報 農業環境政策研究センター)
- おいしい食と環境について
- 基調講演(筑波大学)
- 地域内の食に関する考え方のグループワーク
- ロスを生かす食(おしゃべり)
- 食料不安(食料安全保障)
- 持続可能な食料についてのグループディスカッション
- 閉会

※ 新型コロナウイルスの感染拡大防止のため、オンライン開催となる可能性があります。

**定員30名**(応募多数の場合は抽選)  
下記のウェブサイトからお申し込みください  
申し込み締め切り: 10月15日(木)

イベントウェブサイト  
<http://www.apsafe2020.jp/>  
event/lat/2020/09/12/2328.html

主催: 環境情報 農業環境政策研究センター  
共催: つくば市、総合環境政策研究所

幹事: 環境情報、若い食文化、農業環境政策研究センター、環境政策研究センター、環境政策研究センター  
〒305-8604 茨城県つくば市南台3-1-3  
E-mail: toba-tohku@ml.affrc.go.jp



**The 1st Workshop**  
**Food Life History of the North:**  
*Traditional and Current Issues in Preservation/Storage Practices Using Natural Freezing Energy in Japan, Siberia, and Alaska*

Dates and Times:  
Day 1: Siberia and Japan Sessions  
Nov 12 Thu 12:00~17:10, JST/Yakutsk (Nov 11 Wed 18:00~23:10 AKST)  
Please register in advance for the meeting to receive the Zoom link  
<https://alaska.zoom.us/join/register/1Zwtf-ivpkiE9R/AsnYhJNjOG4grof1XlC>

Day 2: Alaska Session  
Nov 13 Fri 9:00~13:00, JST/Yakutsk (Nov 12 Thu 15:00~19:00 AKST)  
Please register in advance for the meeting to receive the Zoom link  
[https://alaska.zoom.us/join/register/1ZAkceupzkiHtyn63\\_jipH6ub55j0c1s2](https://alaska.zoom.us/join/register/1ZAkceupzkiHtyn63_jipH6ub55j0c1s2)

Contact Kazuyuki Saito for further information  
ksaito@jamstec.go.jp

An underground cache near Yakutsk

## Environmental Isotope Study

As an Inter-University Research Institute Corporation, RIHN maintains state-of-the-art laboratories, with a central emphasis on stable-isotope analysis.

In 2012, RIHN established the “Environmental Isotope Study” cooperative research program that promotes understanding of the utility of stable isotope analysis in contemporary environmental studies and enables collaboration with researchers from other universities and research institutes. RIHN's laboratories are widely used by external researchers and students, and more than one hundred universities or research institutes within and outside of Japan have utilized our up-to-date isotope research facilities so far. We hold an annual training course in August, and organize an annual symposium on environmental isotope study in December in order to create a national and international research network for the next generation and support environmental isotope studies around the world.

From 2020, we started a follow-up project (Post Core Project) entitled “Applied research platform based on environmental traceability” to apply the methodology to environmental research, collaborating with various stakeholders.

The tenth symposium was held online under the COVID-19 pandemic.

## Future Earth

RIHN hosts the Future Earth Asia Regional Center (<https://asiacenter.futureearth.org/>), that supports development of Future Earth in the region, helps connect researchers and other stakeholders, and facilitates the formation of regionally relevant and credible governance structures for the initiative. The Center has convened a Regional Advisory Committee to accelerate the regional development of Future Earth and collaborated in supporting various Future Earth programs focused in Asia: Monsoon Asia Integrated Research for Sustainability – Future Earth (MAIRS-FE), Sustainability Initiative in the Marginal Seas of South and East Asia (SIMSEA) and Health Investigation and Air Sensing for Asian Pollution (Hi-ASAP). The Center supports the Knowledge-Action Network on “Systems of Sustainable Consumption and Production” (<https://sscp.futureearth.org/>), hosts the TERRA School, a course on Transdisciplinarity for Early career Researchers in Asia and facilitates Science-Based Pathways for Sustainability initiatives in the region.



TERRA School participants went through lectures and interactive group works using Miro and other online platforms. On the last day of the program, each group presented a proposal for a transdisciplinary research project.



Future Earth Asia Regional Centre Website: A map of the Future Earth Community in Asia has been developed. This map shows people and institutions in the region that are actively engaged in Future Earth activities. (<https://asiacenter.futureearth.org/>)

The Future Earth KAN-SSCP International Mini Conference “COVID-19 and Sustainability Transitions” was held online on 27 May 2020. More than 150 researchers and practitioners participated from all over the world.

## Environmental Education

This unit promotes environmental education for public school students from primary to secondary levels. It coordinates school tours to RIHN, where students visit laboratories and research project workspaces, and can speak directly with lab technicians and scientists of many different disciplines and specializations. It also conducts teacher-training activities in order to convey updated perspectives and methods in environmental science.

The practice of environmental education also stimulates RIHN to revisit its own practices in global environmental science. Environmental education therefore plays an important part in RIHN's mission to work with different social actors—from individual students and teachers, to entire schools and school districts, and beyond—to develop knowledge that enhances public understanding of and engagement with the contemporary environment.



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## RIHN Open House

Each summer RIHN holds an annual Open House in which RIHN research rooms and laboratories are opened to the public. Research projects and Institute staff develop games and exercises for both children and adults in order to invite creative thought about contemporary environmental issues. The RIHN Open House has proven particularly attractive to families with young children, with up to 900 people from the surrounding community participating on average each year. In 2020 it was impossible to hold an open public house under corona conditions, so the Open House was held online for the first time. Though it was a challenge to reorganize the event for virtual platforms, RIHN has turned the pandemic conditions into the opportunities to have gained valuable experience in the new approaches to community engagement required.



## Ecohealth

### New Development of Ecohealth Research in Asia

This project is a collaboration with the National Museum of Ethnology and the National Institute of Japanese Literature, supported by the National Institutes for the Humanities. It adopts an Ecohealth approach that places human health in a wider ecosystem context and explores the linkages among livelihoods, food and subsistence, ecological environment and demographic and social change in Asia.

Through historical examination of concepts of health in East Asia and contemporary fieldwork in communities in Laos, China and Japan experiencing rapid demographic change, the project aims to move beyond disease-oriented understandings to a holistic and positive appreciation of health in specific contexts and places.



2nd Asia Forum on Ecohealth Research  
(Organized by NIHU Multidisciplinary Collaborative Project Ecohealth Research, Hainan Provincial Center for Disease Control and Prevention, Eco-health & Human Ecology Committee, the Ecological Society of China in Hainkou City, China, Nov 2019)

## Interactive Communication Initiative

This NIHU-RIHN initiative seeks to improve environmental communication through creative visualization projects. It uses transdisciplinary methods to develop a range of visualization exercises and techniques, including videos and exhibitions, that improve bi-directional communication

about the nature of environmental problems. Visualizations thus provide an opportunity to improve the methods of transdisciplinarity, and to co-design sustainable futures based on a holistic understanding of people, societies, and the natural environment.



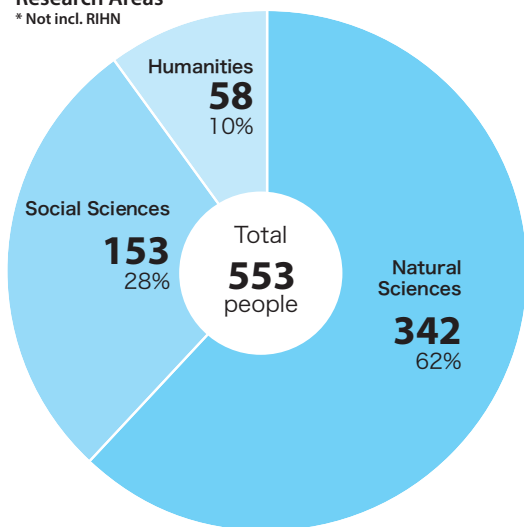
A model of a school lunch of the year 2050 (courtesy of Maximilian SPIEGELBERG).



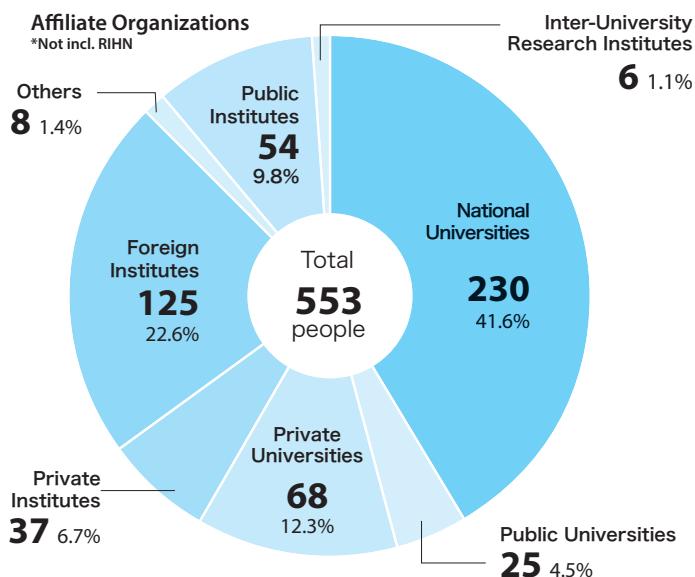
A short movie titled *Mountains, Water and People* (courtesy of YOSHIDA Takehito and Mikhail LYLOV)

## Collaboration

**Research Areas**  
\* Not incl. RIHN



**Affiliate Organizations**  
\*Not incl. RIHN



\*As of March 31st, 2021

### Collaboration in Japan \*As of May 1st, 2021

#### Research Institutions

Graduate School of Environmental Studies, Nagoya University  
 Doshisha University  
 Nagasaki University  
 Kyoto Sangyo University  
 Tottori University of Environmental Studies  
 Kyoto University  
 Center for Environmental Remote Sensing, Chiba University  
 Institute of Nature and Environmental Technology, Kanazawa University  
 Faculty of Engineering, GI-CoRE, Faculty of Health Sciences, Research Faculty of Agriculture, Hokkaido University  
 Graduate School of Arts and Sciences, The University of Tokyo  
 Graduate School of Life Sciences, Tohoku University  
 Faculty of Collaborative Regional Innovation, Ehime University  
 Kyoto Seika University  
 The Institute of Statistical Mathematics  
 Nara Women's University  
 University of the Ryukyus

#### Municipal Governments and Other Agencies

Saijo City (Emime Prefecture)  
 Kyoto Municipal Science Center for Youth  
 Food and Agricultural Materials Inspection Center (FAMIC)  
 Ono City (Fukui Prefecture)  
 Kameoka City (Kyoto Prefecture)  
 Kyoto Prefectural Hokuryo Senior High School  
 Kyoto Prefectural Rakuho Senior High School  
 Miyazaki Prefecture  
 Noshiro City (Akita Prefecture)  
 Kyoto City, ICLIEI Japan, Kyoto Environmental Activities Association  
 Kyoto Institute, Library and Archives  
 Oshino Village (Yamanashi Prefecture)  
 Kyoto Prefecture, Kyoto City

### International Collaboration \*As of May 1st, 2021

#### AUSTRIA

International Institute for Applied Systems Analysis

#### BHUTAN

College of Natural Resources, Royal University of Bhutan

#### BURKINA FASO

l'Association des Jeunes pour la Protection de l'Environnement et d'Elevage

#### CAMEROON

Association Tam-Tam Mobile mutcare  
 Association Okani

#### CHINA

East China Normal University  
 Hainan Provincial Center for Disease Control and Prevention,  
 Hainan Provincial Preventive Medicine Association  
 Peking University

#### GERMANY

Institute for Advanced Sustainability Studies

#### INDONESIA

Indonesian Institute of Sciences  
 Institut Teknologi Bandung  
 Research Center for Biology, Indonesian Institute of Sciences  
 The State University of Gorontalo  
 Universitas Riau  
 University of Lampung

#### LAOS

Lao Tropical and Public Health Institute, Ministry of Health

#### MYANMAR

Network Activities Group  
 Ministry of Natural Resources and Environmental Conservation,  
 Environmental Conservation Department

#### NETHERLANDS

Copernicus Institute of Sustainable Development, Utrecht University

#### OMAN

Sultan Qaboos University

#### SWEDEN

Stockholm Resilience Centre at Stockholm University

#### UNITED STATES OF AMERICA

University of California, Berkeley

#### ZAMBIA

University of Zambia



## Institutional Research Unit

The Institutional Research (IR) Unit supports the RIHN Council of Research Strategy in developing and coordinating RIHN's research, education, and coordination strategies. The IR Unit collects and analyzes a wide range of data relating to research results, research quality, research organization, education and capacity building,

contribution to society and international collaboration and dissemination. Based on this, the IR Unit develops decision support tools for RIHN, analyzing current research trends and methods, and developing new research evaluation indicators tailored to the evaluation of interdisciplinary and transdisciplinary research.

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## Public Relations Unit

The Public Relations (PR) Unit supports the dissemination and sharing of RIHN research methods and results. In collaboration with RIHN researchers, it engages the general public in a range of public events, including the RIHN Open House. It runs the RIHN website and social media, and issues press releases and organizes press conferences. The PR Unit also produces a range of publications,

including the RIHN Prospectus and Newsletter, as well as two book series in Japanese for specialized and general public audiences. In fostering a lively two-way communication between the research community and the general public, the PR Unit strives to contribute to the RIHN identity and to the maintenance of an open institute.

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## International Publications Unit

The International Publications Unit (IPU) promotes non-Japanese language publications that convey RIHN's approach to contemporary environmental research in high-visibility fora. RIHN has partnered with SpringerNature and established the Global Environmental Studies book series. Titles in the series reflect the full breadth of RIHN scholarship and, with the help of the IPU, one new volume

has been published in 2021 and there is more to come. The IPU also has special interest in the journal *Global Sustainability* (Cambridge University Press), with two RIHN professors, as Section Editors, in charge of the collection of "Humanities and Global Sustainability". In addition, it helps promote the journal's connections with Asia.



Above: ABE Ken-ichi, Waiting for a flock of sheep, Cévennes, France

Bottom: WIN THIRI KYAW, Health assessment: Checking "Babinski reflex" to a miner, Myanmar

## Facilities

Research rooms on the RIHN campus are designed to provide a sense of openness. The design concept is to allow implemented projects to be loosely interconnected as they occur in one large curved space 150 meters in length. The facilities help external researchers as well as RIHN research staff to meet one another, since they are designed with the maximization of shared use in mind. At the center of the main building, a library and computer room are located for the convenience of many users, and three common rooms are provided for casual discussions. On the basement floor, a cluster of fully functional laboratories has been designed with emphasis on convenience for shared use, as with the research rooms.

The separate RIHN House is a guesthouse. The assembly hall and a dining lounge located to the left of the house entrance serve as meeting spaces for the RIHN staff as well as for guests.

Appropriately for an institution researching the global environment, RIHN is housed in a tile-roofed building suited to the Kyoto landscape, where as many as possible of the trees already on the site have been retained. Lighting and air-conditioning also employ the latest designs to minimize the building's impact on the environment. The design has won acclaim, receiving awards from the Illumination Engineering Institute of Japan, the Japan Institute of Architects, the Green Building Award from MIPIM Asia, and the Architectural Institute of Japan.



### Management

RIHN researchers work across the breadth of global environmental studies. If the diverse knowledge they produce is the warp, then the unifying weft is provided by field measurement, laboratory analysis, data and information management, and academic and social communication of research progress and results. In maintaining and supporting RIHN research capacity to collect and analyze data and to communicate research in numerous professional and public fora, the RIHN Center enhances our collaborative research around the world and contributes the kind of integrated knowledge that can solve global environmental problems.

### Laboratories

RIHN research projects are multi-disciplinary and multimethod; in common they share the need for high quality physical observation and chemical and biological analysis of the surface environments of the earth. As a national institute, RIHN houses eighteen basement laboratories designed to address this need. There are state-of-the-art laboratories dedicated to microscopic, DNA and stable isotope analysis. Additional facilities include two fieldwork preparation rooms for storage and maintenance of observational and sampling equipment, three low-temperature rooms for organism and ice core storage, three incubator rooms for storage of organisms requiring specific temperatures, and a clean room in which samples can be processed in a contamination-free environment.

### Instruments

RIHN research projects conduct a variety of studies around the world and collect a diverse range of samples that contain valuable information that will help illuminate human-nature interactions. Stable isotope and DNA data in particular can give very precise descriptions of how materials and species interact, change, and move through time and space. In addition to maintaining state-of-the-art laboratories, the Laboratory and Analysis Division of the RIHN Center continues to develop new methods of data analysis and application. In conducting this research in collaboration with RIHN projects, universities and affiliated institutions throughout Japan, the division enhances the sophistication of experimental techniques and exchange of research information, and promotes the shared use of facilities.



Main building



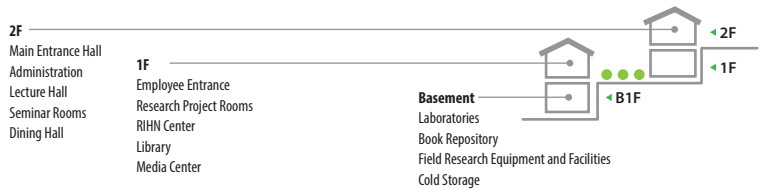
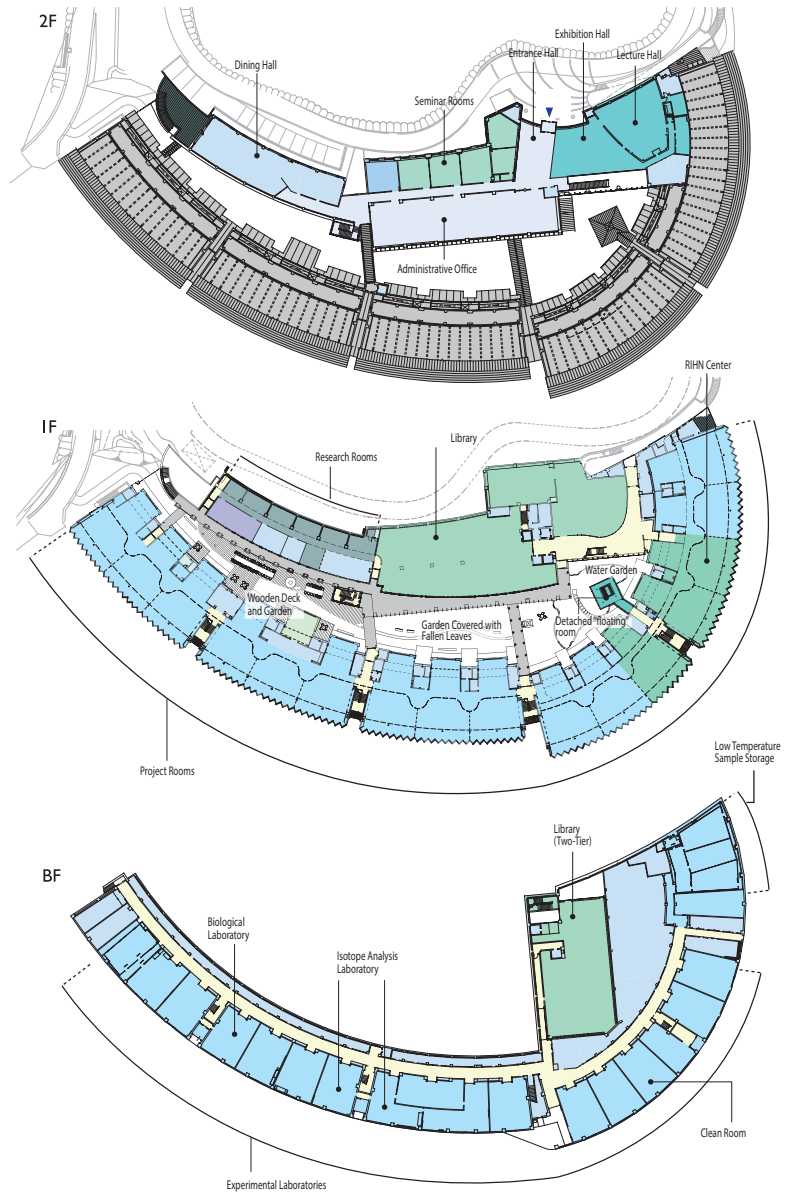
Main entrance hall



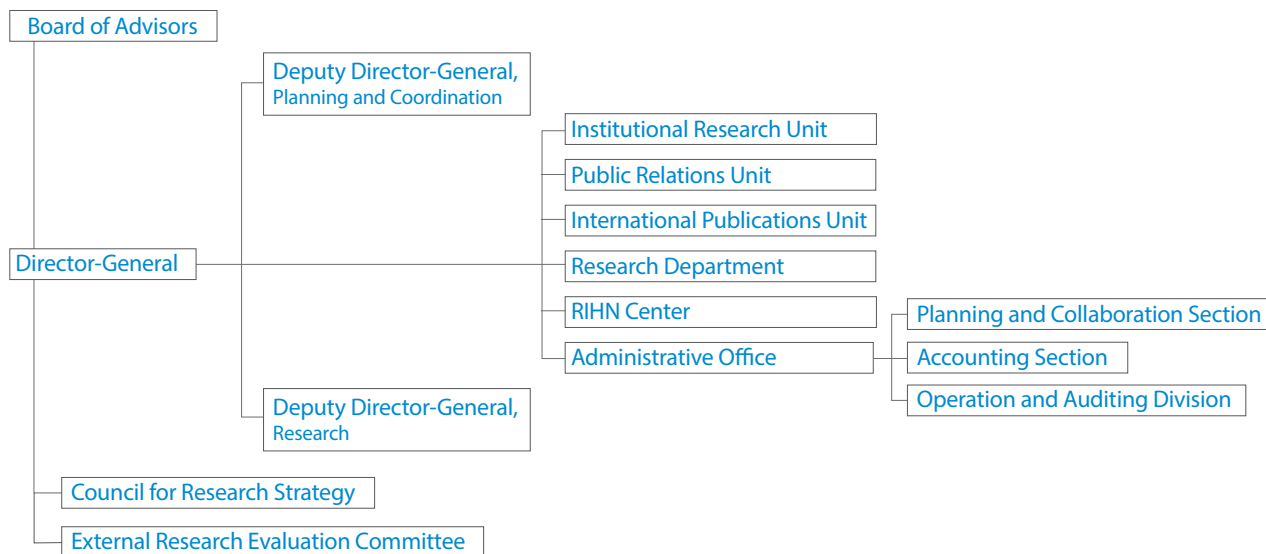
Laboratories



The RIHN House with one-, two-, and three-bedroom apartments for guest researchers and their families.



## Administrative Structure



## Financial Information

### Budget

Income		(Fiscal Year 2021)
Category	Amount (Yen in thousands)	
Subsidy for Operation	1,437,271	
Self Revenue	20,169	
<b>Total Earnings</b>	<b>1,457,440</b>	

### External Sources of Funding

External Sources of Funding		(Fiscal Year 2020)
Category	Amount (Yen in thousands)	
Fund for Promotion of Academic and Industrial Collaboration	17,608	
Grants-in-Aids for Scientific Research	65,130	
Donations for Research	9,548	



# Boards and Committees

\*As of June 1st, 2021

## Board of Advisors Oversees personnel, planning, administration and operation of the institute

ASAOKA Mie	President, Kiko Network/Lawyer	TAKENAKA Chisato	Emeritus Professor, Nagoya University
IKEYA Kazunobu	Professor, National Museum of Ethnology	MALLEE, Hein	Deputy Director-General, RIHN
KADA Yukiko	A Member of the House of Councilors Former Governor of Shiga Prefecture	TANIGUCHI Makoto	Deputy Director-General, RIHN
KOBAYASHI Tadashi	Emeritus Professor/Specially Appointed Professor, Osaka University/ Director-General, Research Institute of Science and Technology for Society, Japan Science and Technology Agency	SAIJO Tatsuyoshi	Specially Appointed Professor, RIHN
KONO Yasuyuki	Vice President, Kyoto University	SUGIHARA Kaoru	Specially Appointed Professor, RIHN
NAGAO Seiya	Professor, Center for Southeast Asian Studies, Kyoto University	TAYASU Ichiro	Professor, RIHN
NIIKAWA Tatsuro	Director, Institute of Nature and Environmental Technology, Kanazawa University	OKADA Saeko	Associate Professor, RIHN
	Emeritus Professor, Doshisha University		

## External Research Evaluation Committee External review of research project proposals

### Domestic

HARUYAMA Shigeko  
Emeritus Professor, Mie University  
KONDO Akihiko  
Professor, Center for Environmental Remote Sensing, Chiba University  
SUMI Akimasa  
Project Professor, The University of Tokyo Institute for Future Initiatives / Emeritus Professor, the  
University of Tokyo / Former President, National Institute for Environmental Studies  
TANAKA Masaru  
Director, Mouno Institute for Forest-Sato-Sea Studies / Emeritus Professor, Kyoto University  
TODA Takao  
Chief Operating Officer, Okinawa Institute of Science and Technology Graduate University  
YUMOTO Takakazu  
Director, Primate Research Institute, Kyoto University

### Overseas

BAI, Xuemei  
Distinguished Professor, Urban Environment and Human Ecology, Fenner School of Environment and  
Society, Australian National University, Australia  
CHABAY, Ilan  
Head of Strategic Science Initiatives and Programs; Scientific Project Leader of the Knowledge,  
Learning, and Societal Change Alliance (KLASICA) and Global Sustainability Strategy Forum (GSSF)  
Projects Institute for Advanced Sustainability Studies e.V. (IASS) Potsdam, Germany / Adjunct  
Professor, School of Sustainability, Arizona State University, U.S.A.  
LU, Yonglong  
Chair Professor, Xiamen University, China  
NAGENDRA, Harini  
Director, Research Centre Professor of Sustainability, Azim Premji University, India  
ROMERO LANKAO, Patricia  
Senior Researcher, Center for Integrated Mobility Sciences, National Renewable Energy Laboratory  
(NREL), U.S.A. / Institute Research Fellow, Mansueto Institute for Urban Innovation, University of  
Chicago, U.S.A.  
SHRIVASTAVA, Paul  
Chief Sustainability Officer, The Pennsylvania State University/ Director, Sustainability Institute/  
Professor, Management and Organization, Smeal College of Business, U.S.A.  
WONG, R. Bin  
Distinguished Professor of History, Department of History, University of California, Los Angeles, U.S.A.  
ZHANG, Shiqiu  
Professor, College of Environmental Sciences and Engineering, Peking University, China

## Council for Research Strategy Oversees research strategy, personnel, project, and evaluation system

YAMAGIWA Juichi	Director-General	SAIJO Tatsuyoshi	Specially Appointed Professor	OKADA Saeko	Associate Professor
MALLEE, Hein	Deputy Director-General	SUGIHARA Kaoru	Specially Appointed Professor	MIZUI Yoshitake	Administrative Director
TANIGUCHI Makoto	Deputy Director-General	TAYASU Ichiro	Professor		

### Senior Advisor

TACHIMOTO Narifumi  
YASUNARI Tetsuzo

### Emeritus Professors

NAKANISHI Masami	AKIMICHI Tomoya	MOJI Kazuhiko	NAKASHIZUKA Tohru
WADA Eitaro	KAWABATA Zen'ichiro	KADA Ryohei	YASUNARI Tetsuzo
HIDAKA Toshitaka	OSADA Toshiaki	NAKANO Takanori	
NAKAWO Masayoshi	TACHIMOTO Narifumi	SATO Tetsu	
FUKUSHIMA Yoshihiro	SATO Yo-ichiro	KUBOTA Jumpei	

### Honorary Fellow

VAN DER LEEUW, Sander Ernst

## RIHN Staff

- Director-General
- Deputy Director-General (Planning and Coordination)
- Deputy Director-General (Research)

YAMAGIWA Juichi  
MALLEE, Hein  
TANIGUCHI Makoto

## Administrative Office

- Administrative Director MIZUI Yoshitake

### ■ Planning and Collaboration Section

Head KOBAYASHI Hiromi

**General Affairs and Planning Subsection**

Head ZENIZUKA Rie

Specialist FUJIKAWA Takeshi

Clerk NAKAOHJI Yu

Clerk KIDO Takayoshi

Clerk KOGISO Ayana

Clerk KOHO Sayaka

Clerk NAKANISHI Keita

**Personnel Subsection**

Head TANINAKA Kiyohisa

Chief MIMOTO Natsuko

Clerk NAGATA Satoko

Clerk NAKANISHI Keita

**International Affairs Subsection**

Head FUJIKAWA Takeshi

### Collaboration Unit

Head SAKAMOTO Kohei

**Research Planning Subunit**

Head BIVONE Junko

Clerk SAWAMURA Takahiro

**Cooperative Research Support Subunit**

Head SAKAMOTO Kohei

Chief YOSHINO Akiko

Clerk DOI Mizuki

**Information and Library Subunit**

Head OTA Yuko

### ■ Accounting Section

Head SAITOU Hiroshi

**Financial Planning Subsection**

Head TSUJIMURA Hanako

Clerk KARIYA Midori

Clerk SUZUMURA Junko

**Facility Management Subsection**

Head ISHII Hiroya

S.A.Specialist SUGIMOTO Takahiro

S.A.Specialist ZUI Zoujin

**Accounting Subsection**

Head HONDA Takayuki

Chief HISAMURA Shizuka

**Procurement Subsection**

Head HARUOKA Junichiro

Clerk KIMURA Aoi

### ■ Operation and Auditing Division

Head KIMURA Makoto

**Auditing Subunit**

Head TSUJIMURA Hanako

Clerk KARIYA Midori

## Research Department

### Program Directors

MALLEE, Hein	Social Science
SAIJO Tatsuyoshi	Future Design
SUGIHARA Kaoru	Economic History, Environmental History
TANIGUCHI Makoto	Hydrology

### Professors

HAYASHIDA Sachiko	Atmospheric Environmental Science, Remote Sensing
SAKAKIBARA Masayuki	Earth and Environmental Sciences, Transdisciplinary Research
SHINJO Ryuichi	Petrology and Mineralogy, Isotope Geochemistry
YAMAUCHI Taro	Human Ecology

### Associate Professors

KANEMOTO Keichiro	Industrial Ecology, Environmental Economics
KOZAN Osamu	Hydrology
WONG, Grace	Forest and Natural Resource Economics, Development Studies
YOSHIDA Takehito	Ecology

### Assistant Professor

ONISHI Yuko	Biogeography, Macroecology
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### Specially Appointed Professors

SAIJO Tatsuyoshi	Future Design
SUGIHARA Kaoru	Economic History, Environmental History

### Specially Appointed Assistant Professors

AIBA Masahiro	Forest Ecology
YAMANAKA Manabu	Atmosphere-Hydrosphere Sciences

### Visiting Professors

EMORI Seita	Future Projections and Risk Studies of Climate Change
FUJII Shigeo	Water Environment and Sanitation, Micropollutants Contamination
HABU Junko	Environmental Anthropology, Historical Ecology
HAYASHI Hiroaki	Plant Nutrition and Fertilizer, Sustainable Development Studies
HAYASHI Kentaro	Biogeochemistry, Soil Science
KANIE Norichika	Earth System Governance
KASUGA Fumiko	Food Safety Planning
KAWASAKI Masahiro	Atmospheric Chemistry
KUSAGO Takayoshi	Action-based Development Studies
MIZUNO Kosuke	Indonesian Area Research
NAKAGAWA Yoshinori	Future Studies, Qualitative Research
NAKATSUKA Takeshi	Biogeochemistry, Paleoclimatology
OKABE Kimiko	Insect Ecology, Biodiversity
OKUDA Noboru	Ecological Science
SAITO Kazuyuki	Climate System, Geocryology
SHIBATA Akira	Rural Development, Biomass Carbonization
TERADA Masahiro	Environmental Humanities, History/ Meta-history

### Visiting Associate Professors

KAWANO Motoko	Comparative Political Economy, Comparative Area Research of Natural Resource Industries
KIHARA Hirota	Energy Policy, Social Psychology
MASUHARA Naoki	Public Administration Studies and Energy Policy
MCGREEVY, Steven R.	Environmental Sociology
OTA Kazuhiko	Japanese Environmental Ethics
SHIMIZU Takao	Archaeology, Ethnology
WATANABE Kazuo	Area Studies
WATANABE Tsuyoshi	Environmental Earth Science, Coral Reef Environmental Earth Sciences

### Senior Researchers

KAJITA Ryosuke	Area Studies
LEE, Jemyung	Regional Informatics, Rural Planning
NGUYEN, Tien Hoang	Geoinformatics, Environmental Modeling and Mapping
OSAWA Takamasa	Social Anthropology

### Researchers

FAHMI, Muhamad	Bioinformatics, Molecular Evolution
FARABI-ASL, Hadi	Energy System Analysis
HAYASHI Koji	Ecological Anthropology
HUANG, Wan Hui	Regional Environmental Studies, GIS
KATAFUCHI Yuya	Econometrics, Applied Econometrics
KIMIJIMA Satomi	Area Studies
KOBAYASHI Kunihiro	International Environmental Law
KOO, Bonjun	Urban Management, Disaster Risk Management
KUANG Xiaoxu	Chemistry and Chemical Engineering
MURAO Rumiko	Area Studies, Anthropology
SHAHRIER, Shibly	Future Design
SHIRAI Yuko	Human Ecology, Livelihood Systems Study
WIN THIRI KYAW	Neurology and Clinical Pharmacology

### Research Associates

ARAKI Hikaru	NAKAI Minami
HONMA Saki	SENDA Masako
IWASAKI Yumiko	SHIMAUCHI Risa
KARATSU Fukiko	TAKATA Naoko
KATSURA Tomomi	TAKEHARA Mari
KIMURA Ayako	YAMAKAWA Ayano
KUIPERS, Rob	YAMAMOTO Aya
MIURA Tomoko	YASUTOMI Natsuko
MYO HAN HTUN	

## RIHN Center

### Director

MALLEE, Hein

### Deputy Director

TAYASU Ichiro

### Heads of Divisions

Laboratory and Analysis Division	TAYASU Ichiro
Information Resources Division	KUMAZAWA Terukazu
Collaboration Division	ISHII Reichiro
Communication Division	ABE Ken-ichi
Future Earth Division	MALLEE, Hein

### Professors

ABE Ken-ichi	Ecological Anthropology
MALLEE, Hein	Social Science
TANIGUCHI Makoto	Hydrology
TAYASU Ichiro	Isotope Ecology, Isotope Environmental Science

### Associate Professors

ISHII Reichiro	Theoretical Ecology
KONDO Yasuhisa	Archaeology, GIS, Open Science
KUMAZAWA Terukazu	Environmental Planning, Regional Informatics
MATSUMOTO Tae	Educational Technology
NILES, Daniel	Geography
SHIN Ki-Cheol	Petrology, Geochemistry, Isotope Geology

### Assistant Professor

ONISHI Yuko	Biogeography, Macroecology
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### Specially Appointed Associate Professor

LAMBINO, Ria	Environmental Governance
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### Research Fellow, NIHU Center for Transdisciplinary Innovation (Ecohealth)/ Specially Appointed Assistant Professor

JIANG Hong-Wei	Human Ecology
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### Research Fellow, NIHU Center for Information and Public Relations/ Specially Appointed Assistant Professor

KIM, Satbyul	Cultural Anthropology
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### Senior Researcher

TAMURA Norie	Natural Resource Management
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### Researchers

MIMURA Yutaka	Architectural History, Urban History, Historical GIS
SHIMADA Nahoko	Study of Ecological Thought
SODA Katsuya	Forced Migration Studies
TAKANO Shinya	Isotope Hydrology
YABUSAKI Shiho	Isotope Hydrology
YOSHIMIZU Chikage	Biogeochemistry

### Research Associates

FUCHIGAMI Yuriko	OKA Masami	OTOGAWA Mari	YUZEN Natsuko
KURATA Junko	OKAMOTO Takako	UEDA Sachiko	
NISHIWAKI Aki	OTANI Michitaka	YASUDA Akiko	

## Institutional Research Unit

### Head

TANIGUCHI Makoto

### Deputy Head

ISHII Reichiro

### Members of Unit

KUMAZAWA Terukazu  
OKADA Saeko  
KOBAYASHI Hiromi

### Specially Appointed Assistant Professor

WAKAMATSU Hisanori

### Specially Appointed Specialist

YAMASHITA Hitomi

## Public Relations Unit

### Head

MALLEE, Hein

### Members of Unit

ABE Ken-ichi  
KIM, Satbyul  
KUMAZAWA Terukazu  
KOBAYASHI Hiromi

### Associate Professor

OKADA Saeko

### Chief

NAKAHOJI Yu

### Specially Appointed Specialist

TERAMOTO Shun

### Research Associate

KIMURA Aoi

## International Publications Unit

### Head

SUGIHARA Kaoru

### Members of Unit

MALLEE, Hein  
ABE Ken-ichi  
NILES, Daniel  
WONG, Grace

### Research Associate

SUGIMOTO Hayato

## A Brief History of RIHN

- 1993 — Prime minister's advisory panel on the Global Environment in 21st Century launched
- 1995 — "On the Promotion of Global Environmental Studies" published by The Science Council of Japan
- 1997 — Report "On the core research institute for Global Environmental Studies" published by MEXT (Ministry of Education, Culture, Sports, Science and Technology)
- 2001 — RIHN Established on the Kyoto University campus  
— HIDAKA Toshitaka, Director-General
- 2002 — RIHN relocated to the former Kasuga Primary School  
— The 1st RIHN Forum
- 2004 — RIHN becomes a member of the National Institutes for the Humanities  
— The 1st RIHN Public Seminar
- 2005 — The 1st RIHN Area Seminar
- 2006 — RIHN relocates to current facilities in northern Kyoto  
— The 1st RIHN International Symposium
- 2007 — TACHIMOTO Narifumi appointed as the second Director-General  
— The Center for Coordination, Promotion and Communication established  
— First research projects concluded
- 2008 — The 1st Collaborative Symposium with the International Research Center for Japanese Studies
- 2009 — The Earth Forum Kyoto and Earth Hall of Fame Kyoto Award established
- 2010 — Core Research Hub established  
— The RIHN Encyclopedia of Global Environmental Studies published
- 2011 — RIHN 10 year anniversary and publication  
— GEC-Japan network established
- 2013 — YASUNARI Tetsuzo appointed as the third Director-General  
— The Center for Coordination, Promotion and Communication reorganized into the Center for Research Development and the Center for Research Promotion
- 2014 — Selected as Regional Center for Future Earth in Asia
- 2016 — 3 Research Programs and Core Program established and RIHN Center reorganized
- 2021 — YAMAGIWA Juichi appointed as the fourth Director-General  
— RIHN 20 year anniversary and symposium





## Inter-University Research Institute Corporation National Institutes for the Humanities (NIHU)

<https://www.nihu.jp/en>

NIHU carries out research on the human sciences and aims to create new value systems that will genuinely enrich our lives. NIHU is one of the four inter-university research institute corporations in Japan. It consists of six inter-university research institutes that specialize in humanities research. Each of the institutes is deeply involved in foundational research in their field as both domestic and international research centers. The six institutes interact in a complementary fashion and carry out research that transcends the frameworks of traditional disciplines. They also cooperate with other research organizations domestically and internationally in their attempt to identify and solve modern day issues.

### Research and Communications

In 2016, two new centers, the Center for Transdisciplinary Innovation (CTI) and the Center for Information and Public Relations (CIP) were established to improve governance at NIHU.

The two Centers promote international collaborative research by building a research network around the six institutes. At the same time, the Centers communicate their research globally and are committed to developing next generation scholars.

### Center for Transdisciplinary Innovation (CTI)

CTI strengthens mutual cooperation between the six institutes and leads NIHU's Transdisciplinary Projects that collaborate with universities and research institutions in Japan and overseas.

#### **NIHU Transdisciplinary Projects**

##### **Institute-based Projects**

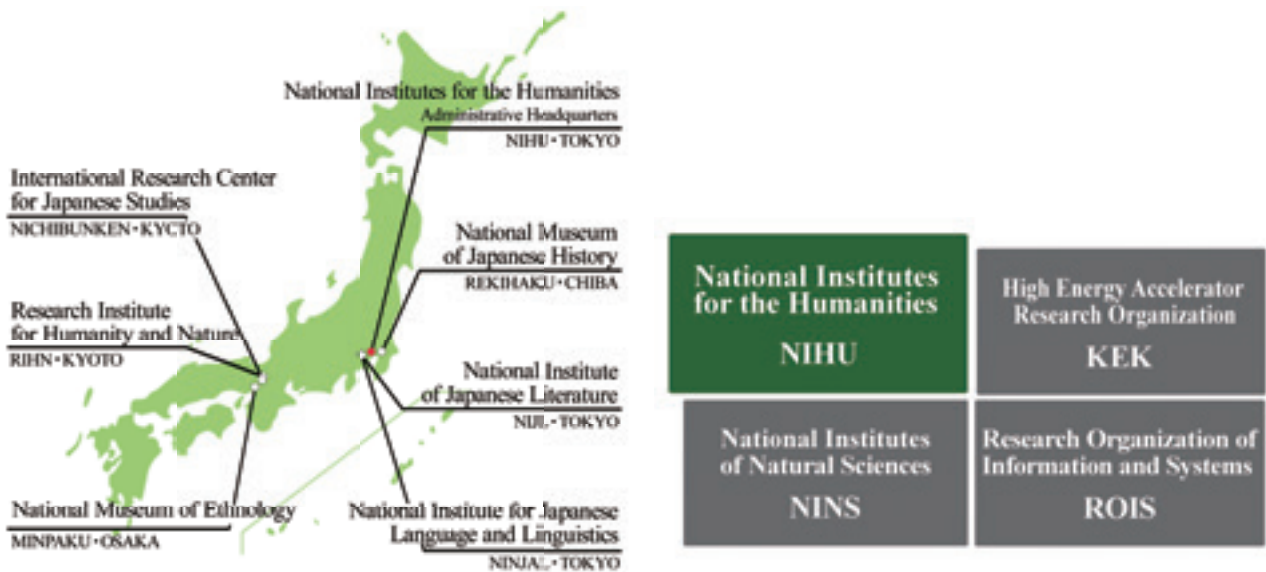
- REKIHAKU: Constructing Integrated Studies of Cultural and Research Resources, and Renovating Sharing Infrastructures of Research Resources in Japanese History and Cultures
- NIJL: Project to Build an International Collaborative Research Network for Pre-modern Japanese Texts
- NINJAL: A New Integration of Japanese Language Studies based on Diverse Language Resources
- NICHIBUNKEN: Historical and International Research into Popular Culture to Pursue New Images of Japan
- RIHN: Transformation towards Sustainable Futures in Complex Human-Nature Systems in Asia
- MINPAKU: Info-Forum Museum for Cultural Resources of the World

##### **Multidisciplinary Collaborative Projects**

- Change of Local Communities and Reconstruction of Community Cultures after Disasters in Japanese Archipelago
- Rethinking Eco-health in Asia
- Development of a Field of Comprehensive Bibliographical Studies from an Interdisciplinary Perspective

##### **Network-based Projects**

- NIHU Area Studies
  - Northeast Asia Modern Middle East South Asia
- Japan-related Documents and Artifacts Held Overseas: NIHU International Collaborative Research and Utilization
  - Insights into Japan-related Overseas Artifacts and Documents from 19th-century Europe, Research and Use: Developing the Foundation for International Collaboration in Transmitting Japanese Culture
  - Research, Conservation and Utilization of the Marega Collection Preserved in the Vatican Library
  - A Survey, Study and Use of the Japan-related Documents and Artifacts in North America: Socio-historical Approach to 'Modern Overseas Material Informatics'
  - Coordination between Projects to Make Effective Use of Research Results



Four inter-university research institute corporations, and six inter-university research institutes specializing in humanities.

### Center for Information and Public Relations (CIP)

CIP consolidates data related to human cultures by gathering information and research results from researchers affiliated with NIHU, and important documents and materials from the archives of the six institutes. The materials are made available to the public.

#### Advanced Collaboration Systems

nihuINT <https://int.nihu.jp/?lang=en&>

Comprehensive search engine for databases operated by the six NIHU institutes as well as other organizations.

#### Research Resource Databases and Publications

NIHU Repository

Cloud-based NIHU repository giving users comprehensive access to research papers from the six NIHU institutes.

Researcher's Profile <https://nrd.nihu.jp/search?m=home&l=en>

Comprehensive database containing information on researchers throughout NIHU.

Portal site for Japanese Studies [https://guides.nihu.jp/japan\\_links](https://guides.nihu.jp/japan_links)

English Resource Guide for Japanese Studies and Humanities in Japan.

NIHU Magazine [https://www.nihu.jp/ja/publication/nihu\\_magazine](https://www.nihu.jp/ja/publication/nihu_magazine)

A bilingual (Japanese and English-language) publication that covers topics such as the latest research trends, results and activities at NIHU.

#### NIHU Symposiums

NIHU organizes symposiums for the general public in order to share the comprehensive human culture related research resources and results it has accumulated.

#### Industry-Academia Collaborations

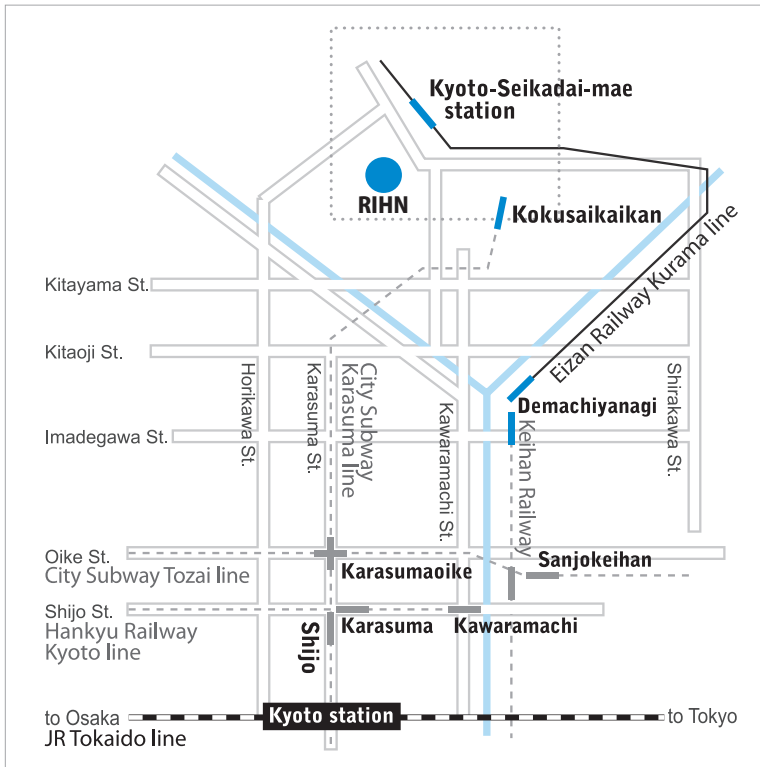
NIHU collaborates with industry and other partners to give back its fruits of research to society.

Joint symposium with Ajinomoto Foundation for Dietary Culture –“Food sustainability: Exploring the nature of diet geared to the future” (recorded)

Joint lecture with Otemachi Academia

Joint symposium with the Japan Forum for the Cultivation of Insight from the Humanities

## Access



### By City Subway

From Kyoto Station, take the Karasuma Line to Kokusaikaikan Station (the last station), and transfer to Kyoto Bus.

### By Kyoto Bus

From Kokusaikaikan Station, take bus No. 40, 50 or 52 to Chikyuken-mae.

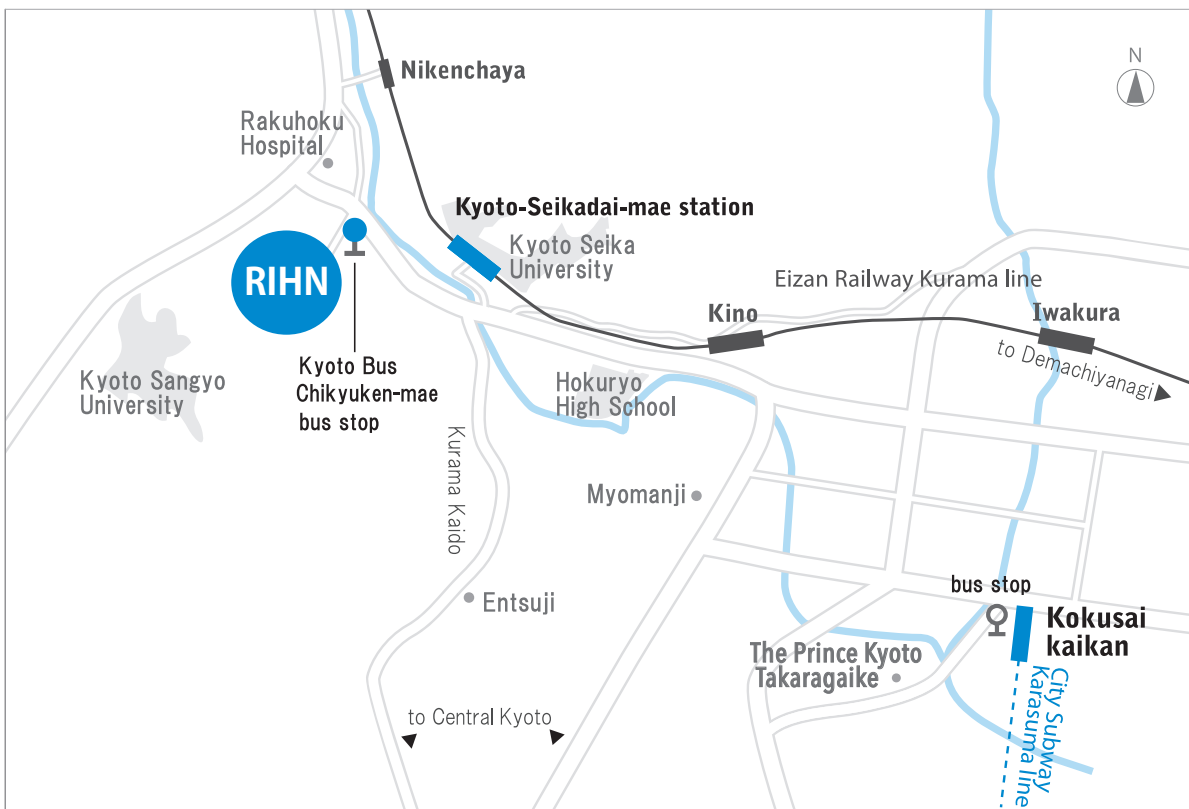
RIHN is at the base of the hill on your left.

### By Eizan Railway

From Demachiyanagi Station in Kyoto City, take the Kurama Line.

Get off at Kyoto-Seikadai-mae Station.

RIHN is a 10-minute walk from the station.



### RIHN Prospectus 2021-2022

Managing Editor: Daniel NILES

Designed by OKAZAWA Rina

#### Front Cover photo:

Disappearing Limboto Lake, Indonesia

Photo by KIMIJIMA Satomi

#### Back Cover photo:

Missing Emissions - Brick Kilns, Lucknow, India

Photo by Prakhar MISRA

Flying over RIHN in the autumn sky

Photo by WATANABE Kazuo



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