



NIHU

Inter-University Research Institute Corporation  
National Institutes for the Humanities



# Research Institute for Humanity and Nature

Prospectus 2020-2021



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## Message from the Director-General

In the past 40 years or so, as a climate scientist, I have devoted myself to research on the Asian monsoon climate, including ecosystem-climate interaction, and anthropogenic impacts on climate. As part of my international activities, I have also been involved in the Inter-governmental Panel on Climate Change (IPCC). Through these academic experiences, I can confidently say that we human beings have been drastically changing our planet by inducing “global warming” of the climate and by degrading eco-systems. Particularly since the late 20th century, the impact of human activities has overwhelmed the entire earth, ushering in a new geologic era called “the Anthropocene”.

Obviously, an essential and urgent challenge for humanity today is how to achieve a harmonious relationship with nature on earth. Since its establishment in 2001, RIHN has been committed to this monumental issue by conducting diverse solution-oriented research under the overarching question of how human-nature interaction and relations *ought* to be. To achieve this mission, RIHN undertakes interdisciplinary research spanning the natural sciences, humanities, and social sciences, and in recent years, has evolved towards transdisciplinary research that involves collaboration with various stakeholders in society.

To effectively promote interdisciplinary and transdisciplinary research, in April of 2016 we established a new research structure by introducing three Research Programs, one Core Program, and the RIHN Center. With these new structures in place, we are now pursuing our research through enhanced collaboration within our institute, across the diverse research community, and with society in general. To enhance international activities of RIHN, we are also collaborating with the international research platform Future Earth, which aims to integrate global environmental change research for achieving global sustainability including contributing to the United Nations Sustainable Development Goals. As part of this, we are hosting Future Earth Asian Regional Centre to strengthen research collaboration and capacity building across the Asian countries.

We are excited to implement these new research initiatives and make progress on solutions to the many environmental challenges we face, including various new issues related to the current COVID-19 pandemic.

安成 哲三  
YASUNARI Tetsuzo

Director-General  
Research Institute for Humanity and Nature



## RIHN Philosophy and Approach

For several decades, researchers have attempted to find solutions to the environmental problems that now confront human communities at all scales, but despite extensive research in individual disciplines, many environmental problems have remained unresolved. There is therefore a need to go beyond partial descriptions of discrete environmental problems towards holistic understandings of the underlying causes of these problems and for 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 and it is part of the National Institutes for the Humanities. RIHN research starts from the premise that environmental problems are rooted in human society, culture, and values. The goal of RIHN is to seek concepts, theories and mechanisms capable of describing and enabling transformation of human-environment interactions. This implies that RIHN research involves a normative dimension, driven by questions such as what the relationship between humanity and nature ought to be like. 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, partner institutions, and societal stakeholders in Japan and abroad.

We at RIHN believe that research ought to contribute to the search for solutions to real-world problems and, therefore, we promote a co-design and co-production approach where researchers and societal actors join hands in exploring problems and developing new framings and possible 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 needs to draw on multiple, diverse perspectives from a range of disciplines including the natural and social sciences, arts and humanities, and engineering and design.

Science cannot be uniformly applied to the world but should instead enable solutions to social-environmental problems that are informed by lived social practices and communal values. RIHN research is developed globally, but with Asia as a core focus area. Not only is Asia's impact on global development increasingly conspicuous, but at the same time it is also home to many examples of long-term cultural-ecological continuity that need to be understood in terms of their own significance to regional dynamics. RIHN research crucially depends on long-established networks in Asia and contributes to transdisciplinary initiatives in the region, among others by hosting 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

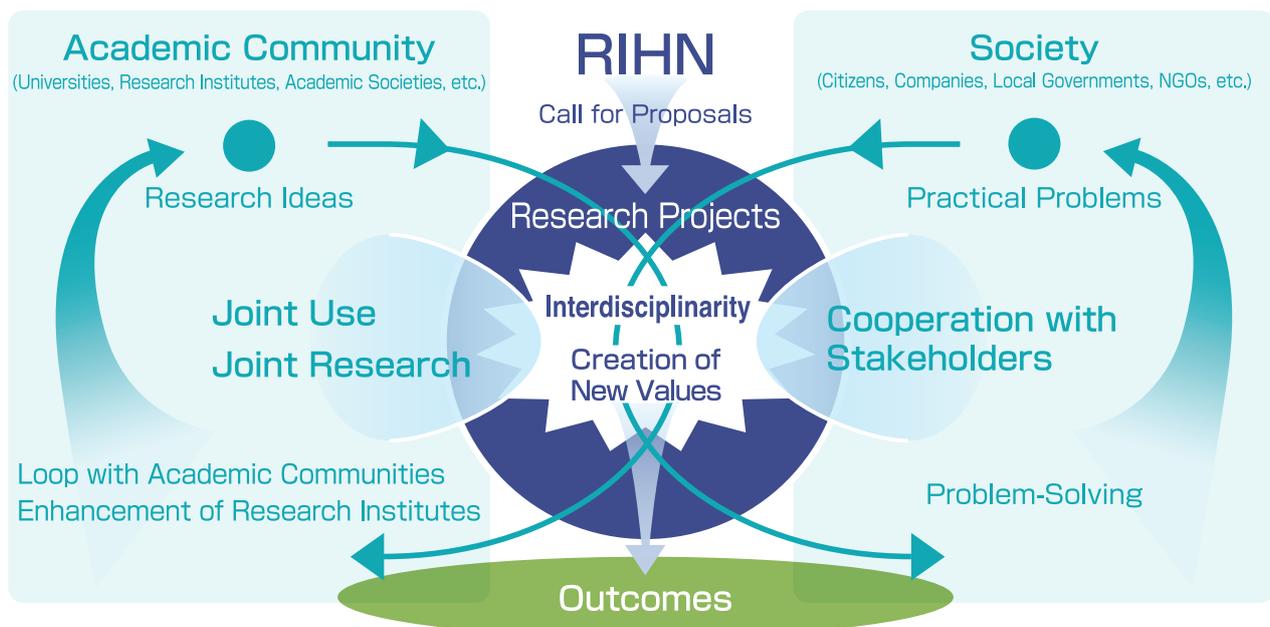
While other regions are not excluded, the primary geographical focus of RIHN research is on Asia. More broadly, RIHN strives to deploy an Asian perspective in its research on global environmental change.

## Organizational Structure

RIHN is fundamentally a project-based institute, with projects alternating through a 5-7-year cycle. Identification of ideas for projects happens through public solicitation. Through a process of evaluation and selection that includes “incubation” and “feasibility” stages, these ideas are gradually developed into fully-fledged projects and only get officially underway after evaluation by an international external review committee. At this point, the proponent joins the RIHN community by becoming a staff member of the Institute. In most cases projects run for five years. They include a core team of researchers based at RIHN and a much larger network of partners at research institutions throughout Japan and abroad.

## RIHN Programs

RIHN research is organized into Programs and Projects rather than pre-existing academic disciplines or domains. Three Research Programs and one Core Program are each home to multiple projects that carry out research in line with the Program’s broad direction. The bundling and integration of Projects within the Programs facilitates synthesis of research results and allows for strategic planning of research. 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.



## Research Programs

Research Programs are organized around three themes identified in the Phase III Medium-Term Plan. In addressing environmental problems, technological and institutional developments are important, but RIHN recognizes that these need to build on the foundation of people's awareness, value systems and culture. The programs collaborate closely with society in developing and proposing options that contribute to the transition of society.

### 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.

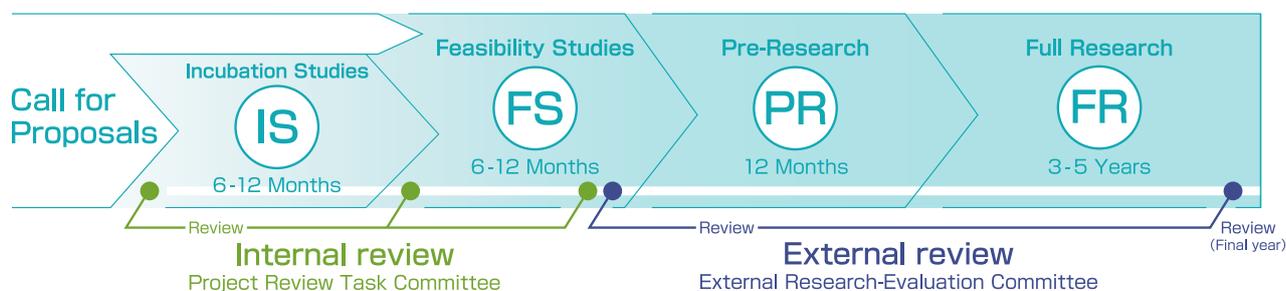
### Program 2: Fair use and management of diverse resources

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



**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.

In the transitional **Pre-Research (PR)** period, 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 to 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



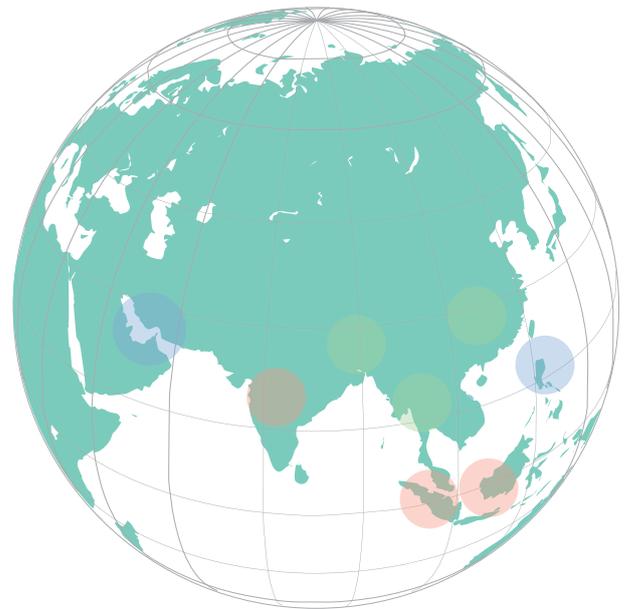
## RIHN Center

The RIHN Center provides the foundations for collaborative research and activities at RIHN. Its five Divisions manage and operate the laboratories and the information systems of the Institute, and facilitate communication, networking and capacity building. Center faculty also engage in research in pursuing the goals of the Center. Collaboration is fundamental to the operation of the RIHN Center: it 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 fundamental significance of global environmental sustainability for human society, we need to make intellectually explicit the links between environmental change and natural disasters 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. RIHN's Societal Transformation under Environmental Change research program contributes to this task.

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 at times severe environmental pollution and degradation. 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.

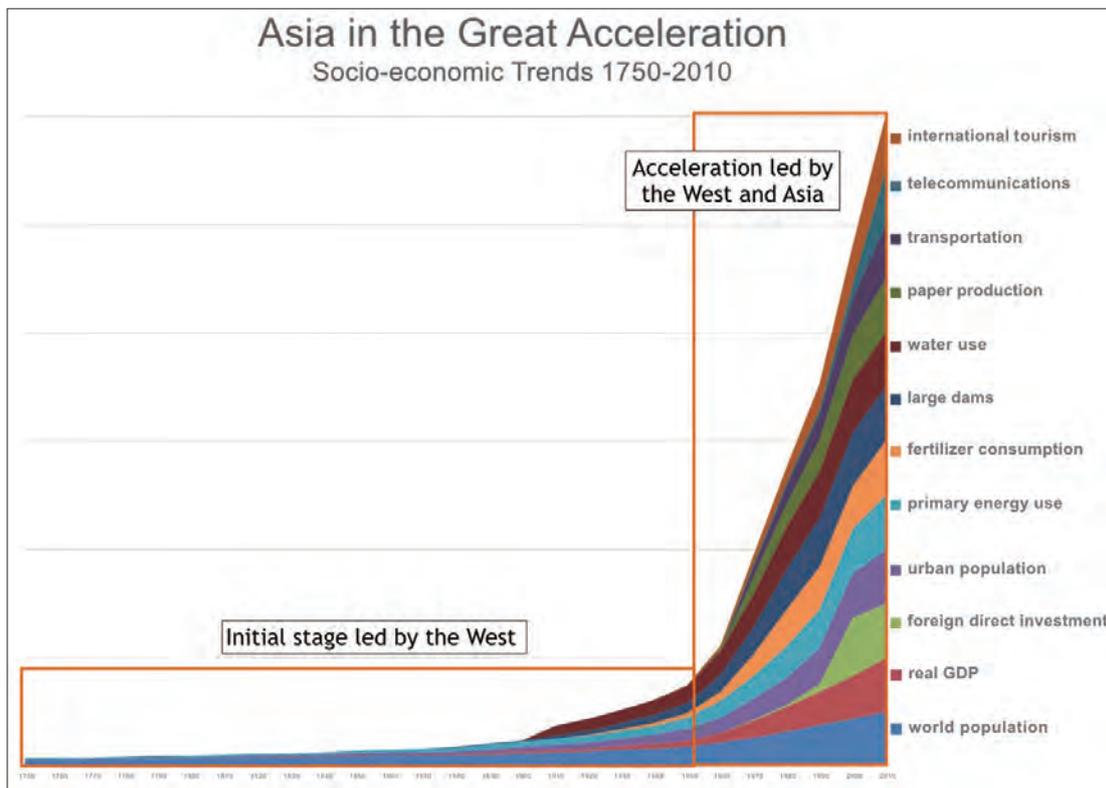
The Program's second line of inquiry examines the kinds of motivations that affect peoples' livelihoods and seeks social transformation of norms and institutions by working closely with various stakeholders in local society. The project on Sumatra's tropical peatlands identified four principal kinds 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. Another project on Punjab, India, studies how to prevent stubble burning accompanying the introduction of a compressed double cropping calendar after the Green Revolution, causing pressure on water and land, as well as air pollution and health hazards. Meanwhile, the ecosystem-based disaster risk reduction project investigates the potential of various ecosystem services to address natural disaster risks in Japan, where population decline creates additional dimensions to this issue, which is or could become relevant in many other Asian countries.



'Hyakken-tsutsumi', located at Otsu City, Shiga Prefecture. An approximately 180m-long stone-built prevention wall, which was constructed in the Tokugawa period, taking five years and eight months.



International Workshop on Resource Nexus and Asia's Great Transformation, 11th March 2019



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 and labor-intensive industrialization in the last two centuries. I am currently working on the economic and environmental history of Monsoon Asia in long-term perspective. I also act as Vice-Chair of the Future Earth Committee of the Science Council of Japan.



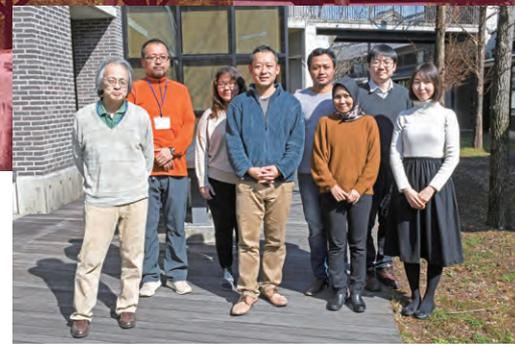
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- IWASAKI Yumiko** Research Associate

# 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 Lake Biwa basin. He has been promoting an integrated natural and social science study on peatland society in Riau province and conducting 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 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 generate

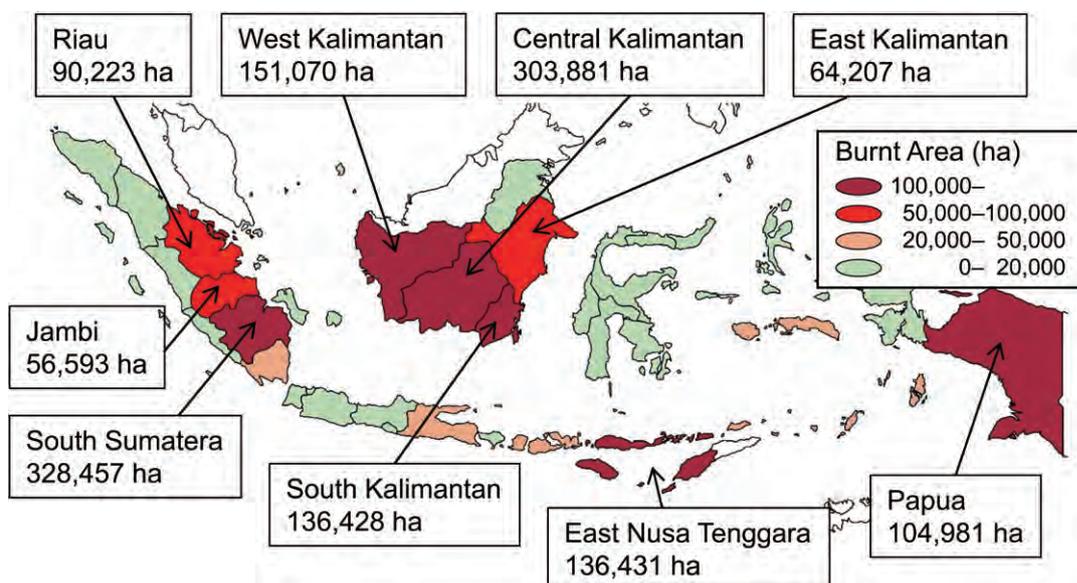
solutions to the current crisis of peat degradation and related fire and haze in tropical regions through action research. The project seeks to identify and implement alternative practices in collaboration with local people, academics, governmental offices and officials, NGOs, and international organizations.

The project conducts multidisciplinary research in order to clarify the entire process of peatland degradation. We are especially focusing on the 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 vulnerability and transformability of each topic in order to bring innovative peatland restoration activities to tropical peatland societies.

## Research methods and objectives

Peatland ecosystems are vulnerable. 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 from human disturbance is not completely reversible, however, and it is also necessary to consider sustainable development of the local economy.



Total burnt area in Indonesia in 2019. Source: Ministry of Environment and Forestry website (SiPongi-KLHK). Data retrieved on 7 January 2020.



Questionnaire survey on peatland use and awareness in Lantau Baru village (Pelalawan District, 18 November 2019)

In order to address this dilemma, we also use trans-disciplinary 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.

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 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. Along with project-led international seminars, the site has significantly enhanced public awareness of the potential for rewetting and forestation to regenerate peatland.

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

In addition, as a result of the continuous monitoring of green-house-gas emissions from peatlands, the influence



Weather radar installation (Bengkalis District, 12 February 2020)



Cooperation in shooting for NKH TV program "Magafire" at the Giam Siak Kecil-Bukit Batu Bioserve (Bengkalis District, 14 October 2019)

of haze on atmosphere, and seasonal changes of local rainfall, we are clarifying 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 inter-disciplinary 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.

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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

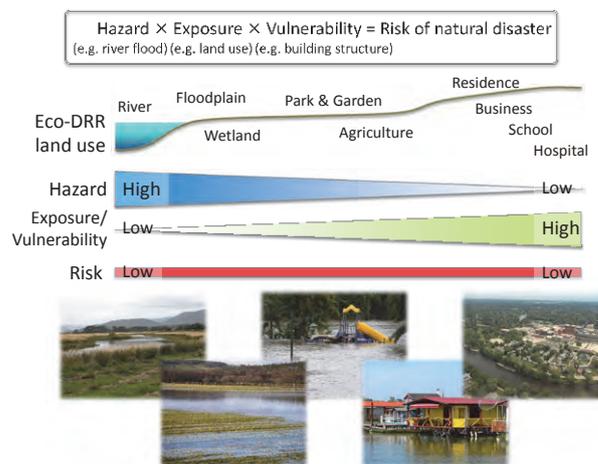
Globally, the rate of natural disaster occurrence has been increasing, partly due to contemporary climate change, and adaptation to natural disaster risks is increasingly important to the sustainability of human societies. At the same time, many societies are experiencing shrinking populations. Ecosystem-based 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 is 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 hazard levels 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, so complementing conventional approaches to natural disaster management, although the effectiveness and multi-functionality of Eco-DRR is not yet clearly and quantitatively understood. Japan's 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. The population of Japan increased substantially over the last century, increasing the risk of and public exposure to natural disasters. Evaluating past natural disaster risks



**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.

therefore provides valuable 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

The exposure and vulnerability associated with different natural disasters will be analyzed, and the risks evaluated and visualized as risk maps of the present and past. Modeling risk for the 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 for 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. This transdisciplinary platform 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



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

local stakeholders using our transdisciplinary platform. In addition, traditional and local knowledge of Eco-DRR will be inventoried and evaluated for the multi-functionality so that the benefits of the 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

At several local research sites, the traditional and local knowledge of Eco-DRR,

including the history of land use management, flood and landslide control measures built during the Edo period, management of shelter woods around houses, etc. have been collected. This traditional and local knowledge of Eco-DRR will be made accessible to the general public by publishing a series of booklets

in Japanese. The first of the series was published in the summer of 2019 in print as well as e-book which is freely available at the RIHN website, and an English version is forthcoming.



Figure 2 The first book of the series "Traditional and local knowledge of Eco-DRR in Japan", available for free from the RIHN website (in Japanese).



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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**AIBA Masahiro**

Specially Appointed Assistant Professor

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# 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 long history 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. 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 insufficient 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, 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 in Delhi. 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 due to the poor state of the air pollution monitoring network in India compared to those in developed nations. 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 will utilize observation 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, and as well as that of stakeholders and government (Figure 1).

Working Group 1: Agro-Economics, Human Geography, Cultural Anthropology, and Agricultural Science

Working Group 2: Atmospheric Science and Remote Sensing

Working Group 3: Epidemiology and Public Health

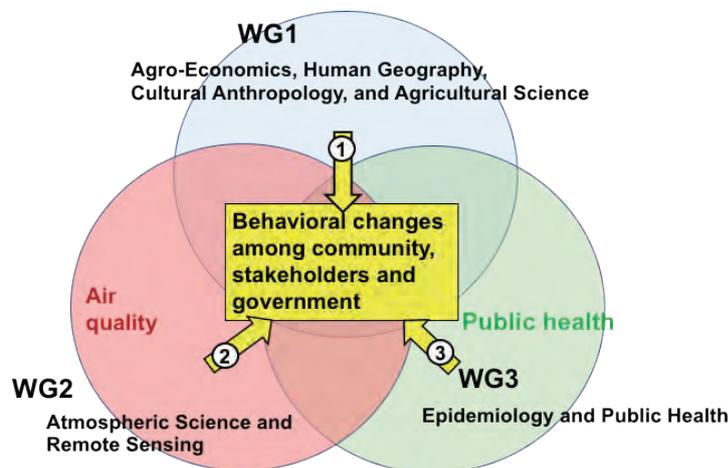


Figure 1 Structure of the project

of straw. In the first year of the project, we will conduct a survey across the entire state of Punjab based on voter lists. The results of the survey will allow to conduct intensive interviews assessing the traditional cultural background of farming, labor availability and impact of subsidies on farmer and community decision making. In parallel, we will examine both technical and socioeconomic advantages/disadvantages for straw management. We will examine several options for use of straw and suggest how they may lead to new agricultural practices, products and markets.

**Working Group 2: Atmospheric Science and Remote Sensing**

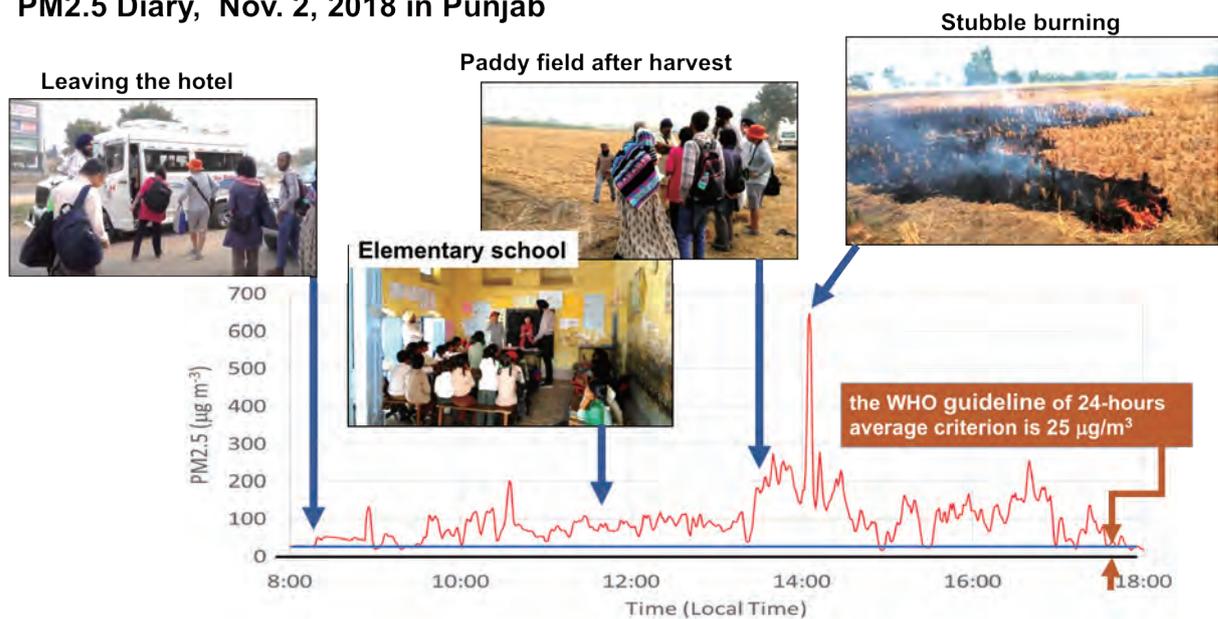
The mission of Working Group 2 is to utilize observations and model simulations in order to quantify the effects of stubble burning in Punjab on air quality of Delhi-NCR. As monitoring data are sparse in Punjab, we will set up

a network of several hundred compact instruments to monitor ambient PM2.5 and prepare refined estimate of inventory emissions from stubble burning. This data, combined with satellite measurements covering wider part of the IGP, will allow model simulations for extended analysis. In the later years of the project, PM2.5 distribution will be transmitted on smartphones via newly developed apps.

**Working Group 3: Epidemiology and Public Health**

Working Group 3 will conduct a health education class on “Air and Health” to increase awareness of local residents’ health. In parallel, members will examine children and women’s symptoms and test their pulmonary function. The advantage of our research plan is that we can estimate individual PM2.5 exposure using compact PM2.5 monitoring instruments. Figure 2 is an example of PM2.5 exposure taken in Punjab on Nov. 2, 2018.

**PM2.5 Diary, Nov. 2, 2018 in Punjab**



**Figure 2** Time series of PM2.5 values that were exposed to the project PI when visiting Punjab on November 2, 2018. The sudden increase of PM2.5 at 14:00 is corresponding to her encounter with a straw burning shown in the figure. Note that the WHO guideline of 24-hours average criterion is 25 µg/m<sup>3</sup>.

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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. 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



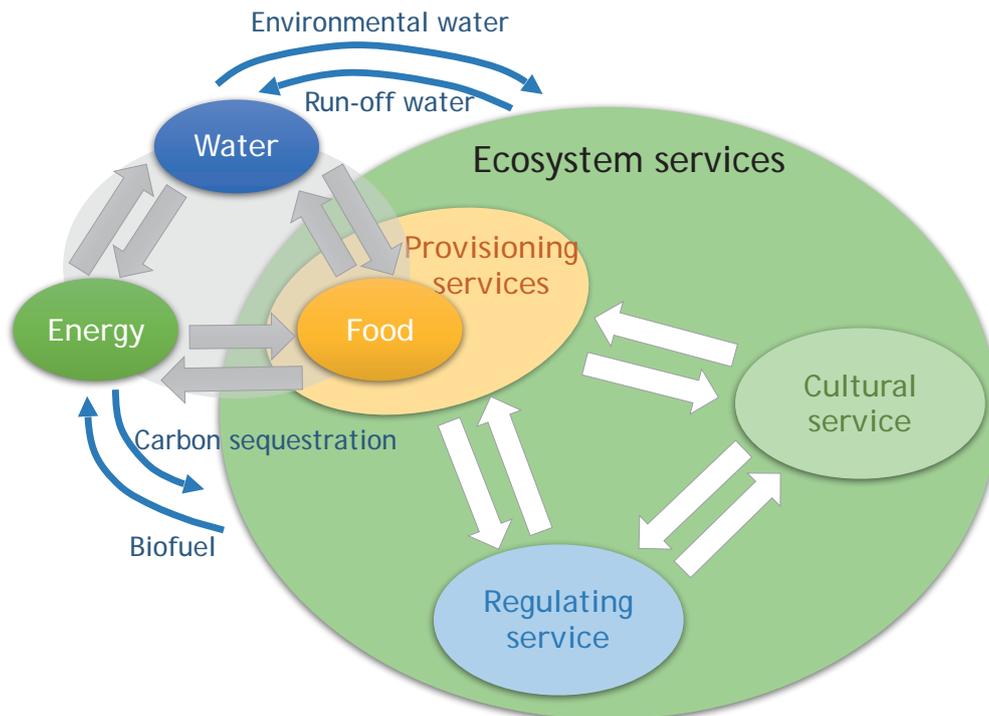
Land-use pattern in mountain area in Thailand



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 both in China and in Southeast Asia. The dominant theme in this 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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**KARATSU Fukiko** Research Associate



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

Project Leader **KANEMOTO Keiichiro** RIHN

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. My main research interests are in Industrial Ecology, Environmental Economics, Input-Output Economics (multi-region, environment), and Networks. I developed Eora multi-region input-output database with Manfred Lenzen, Daniel Moran, and Arne Geschke. I am a member of the editorial board of Journal of Economic Structures. In 2018 and 2019, I was named a Highly Cited Researcher in the field of Cross-Field by Clarivate Analytics.



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.

## Carbon footprint of cities

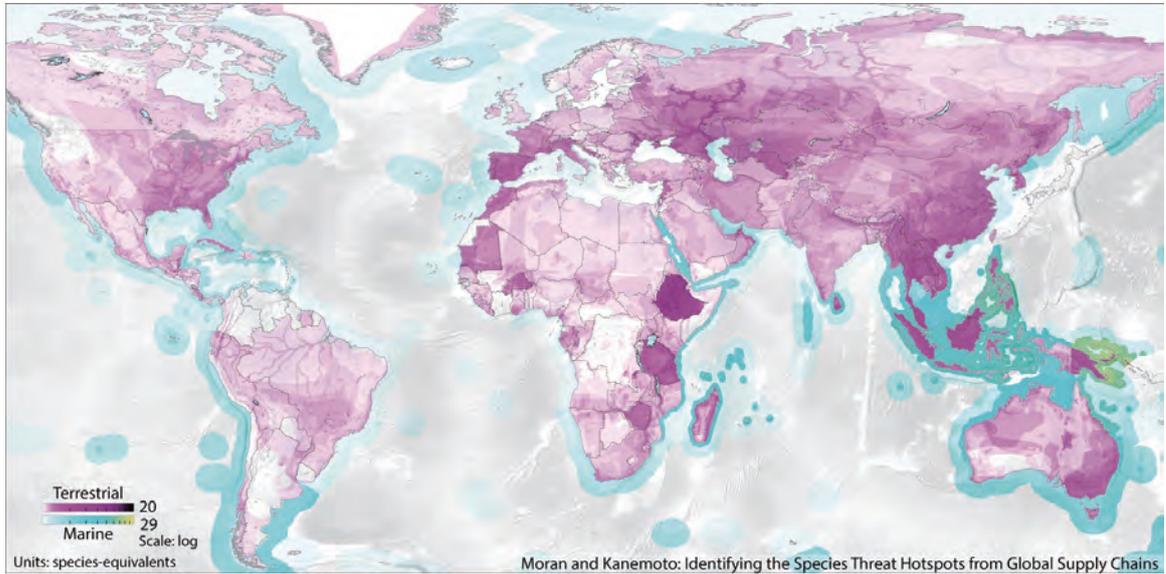
In 2018, we estimated the carbon footprint of 13,000 cities.

Key findings are the following:

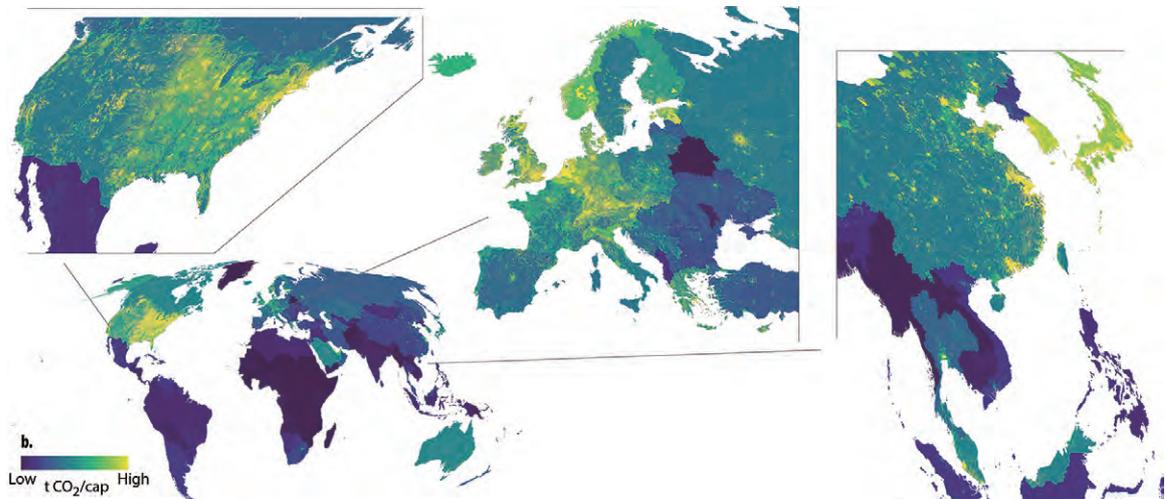
- Globally, carbon footprints are highly concentrated in a small number of dense, high-income cities and affluent suburbs
- 100 cities drive 18% of global emissions
- In most countries (98 of 187 assessed), the top three urban areas are responsible for more than one-quarter of national emissions
- We define cities as population clusters, but in practice mapping footprints to local jurisdictional bounds is complex
- 41 of the top 200 carbon-intensive cities are in countries where total and per capita emissions are low (e.g. Dhaka, Cairo, Lima). In these cities, population and affluence combine to drive footprints at a similar scale as the highest income cities
- For large and high-income cities, their total Scope 3 footprint is much larger than the city's direct emissions
- Radical decarbonization measures (limiting nonelectric vehicles; requiring 100% renewable electricity) can induce substantial emissions reductions beyond city boundaries. In wealthy, high-consumption, high-footprint localities such measures may require only a small investment relative to median income, yet accomplish large reductions in total footprint emissions
- Local action at the city and state level can meaningfully affect national and global emissions

## Carbon footprint of households: The case of food diet

We identified five key results. 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.



A map shows species-threat hot spots linked to consumption in Japan.



The carbon footprint of Asian cities.

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## 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.

As a consequence, 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. These 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 these experiences and knowledges 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 will work 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 retain the diversity at the heart of local lifeworlds and wellbeing.

How we engage with our stakeholders is very important in promoting transdisciplinary research. It seems that there are many abstract principles, but when applying them to the field, it is difficult to connect them to a concrete way of doing things. For this reason, we have started the "How to Engage Citizens in Practice Discussion" Meeting with people who have relations with stakeholders. This discussion has allowed us to slowly see the "rules" of concrete practices. One of the goals of our practice is to shift the way citizens think about and live towards sustainability, and we are slowly learning how to design such systems. At the same time, we are conducting an ecological footprint project to measure energy consumption and greenhouse gas emissions in our research buildings and travel.



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 has visited the Sanitation project's booth of 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 generation to that of future generations.

Researchers

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Researcher



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

Project Leader **Steven R. MCGREEVY** RIHN

Steven R. McGreevy is an environmental sociologist (Kyoto University Ph.D. 2012) and associate professor at RIHN. He has a background in agriculture, rural sustainable development, and environmental education. His research focuses on novel approaches to rural revitalization that utilize local natural resources, sustainable knowledge dynamics, sustainable agrifood and energy transition, and the relinking of patterns of food consumption and production in local communities



## Research Background

Agrifood systems in Asia face a myriad of sustainability challenges related to declining environmental health, loss of food diversity, and the deterioration of small-scale farming. On the consumption side, over-reliance on globalized food flows limits consumer agency, decreases food security, and impacts health. How do we respond to these challenges? Rather than furthering efforts to maintain existing food systems, FEAST research is line with complete food system transformation, and aims for re-imagining and re-creating regional, small-scale food systems designed for a post-growth world and food lifeworlds that re-value food as a commons.

## Research Overview and Objectives

The FEAST project takes a transdisciplinary approach to explicate the reality of, and potential for, sustainable agrifood transition in Asia. Individual field sites are located in Japan, Thailand, Bhutan, and China. Taking a lifeworld perspective, we analyze patterns of food consumption, the socio-cultural significance of food practices, and the potential of consumer-based agency to change deeply held cultural notions and regional food systems. We also develop structural descriptions of the food system, by mapping national, regional, and local production, distribution, and consumption contexts. In combining socio-cultural and structural descriptions of the relationships between production and consumption, we are able to conduct visioning workshops with stakeholders and initiate food citizenship-oriented experiments and actions. In engaging the public in structured debate of societal relationships with food and nature, our project

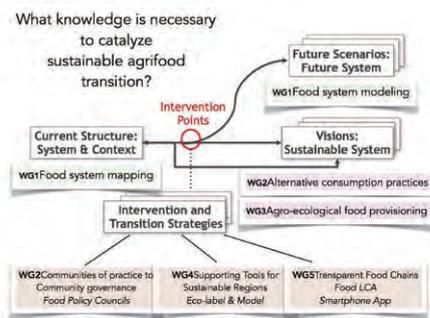
reorients consumers to consider themselves as citizens and co-producers of the foodscapes on which they depend. Finally, FEAST seeks knowledge and mechanisms that can redefine the notion of long-term food security at the regional scale.

FEAST Working Groups will produce four types of knowledge relevant to catalyzing agrifood transitions (Figure 1). These are: 1) contextual knowledge of contemporary national, regional, and local food systems (production, distribution, and consumption); 2) co-produced visions of alternative food consumption and production practices and corresponding municipal level transition plans identifying research, education, and policy needs; 3) modeling- and scenario-based knowledge supporting deliberation and planning processes; and 4) and knowledge related to intervention strategies— such as niche incubation, social learning and market transparency— on the execution and effectiveness of workshop-based consensus building toward collective action and market-oriented information- providing tools (eco-labels, food LCA smartphone app)

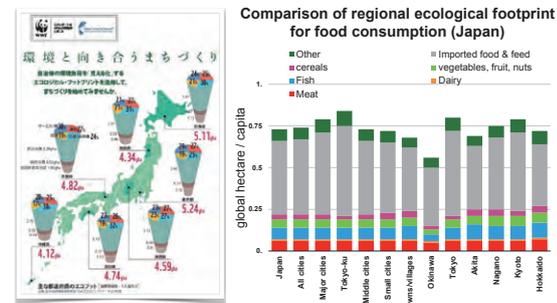
## Progress to Date

Over the past year, FEAST has made progress on several areas of research.

FEAST partnered with WWF Japan and the Global Footprint Network to feature research on prefectural and municipal level Ecological Footprints in Japan—an informational booklet aimed at municipal officers shows that urban cities and prefectures have a much larger footprint than their rural counterparts. Imported animal feed and ingredients for processed foods comprised



**Figure 1** Diagram detailing how each FEAST working group is organized around the question of “What knowledge is necessary to catalyze sustainable agrifood transition?” Four kinds of knowledge are listed: 1) Current system and contextual knowledge; 2) Visions of sustainable future systems knowledge; 3) Future system scenario knowledge; and 4) Knowledge associated with intervention and transition strategies.



**Figure 2** WWF Japan and Global Footprint Network booklet <https://www.wwf.or.jp/activities/data/20190726sustainable01.pdf> (left). Comparison of regional ecological footprints for food consumption in Japan. Imported food and animal feed is most impactful, while regional differences in overall impact are evident (right).

a significant portion of the overall impact, further strengthening the need for region-based production and municipal level interventions and policies that address food system sustainability (Figure 2).

Expanding sustainable food production will require scaling up successful models and new farmers. The potential for scaling up agroecological production in Japan was investigated with colleagues from UC-Berkeley to evaluate how “lighthouse farms” act as models for territorial development (Photo 1). An assessment tool is being developed for wide-spread use.

Over 20 meetings, workshops, and events were held in Kyoto, Kameoka, and Nagano to catalyze civic food networking and co-design food policy measures. In Kyoto, a new food policy council is active through these efforts. In Nagano, ideal future school lunches were envisioned in Obuse Town and plans are being made to input results from the visioning process into the general policy planning process. The need for culturally-specific approaches to civic food policy development that center on concepts of social



Photo 1 Fieldwork with Prof. Miguel Altieri and Dr. Clara Nicholls from UC-Berkeley.



Photo 2 Visioning workshops with farmers, consumers, NPO, and government officials held in Obuse Town, March 2019 (bottom), school lunch vision graphic recording (upper left), and Food Policy Council Kyoto logo (upper right).

expectation and “side-to-side” pressure are unique to Japan (Photo 2).

FEAST is also investigating informal food practices (hobby gardening, seed sharing, urban foraging, gathering edible wild plants, etc.), how they form informal food systems and their relationship with well-being and sustainable lifestyles. This work will be featured in a book scheduled to be released next year (Figure 3).

In Thailand, urban food futures are being explored through envisioning future food practices with stakeholders in Bangkok. Ideal ways of eating out, home cooking, and purchasing food were developed and policy-action plans were created in backcasting workshops (Photo 3).

FEAST maintains research partnerships with the Copernicus Institute of Sustainable Development at Utrecht University, University of California- Berkeley, Royal University of Bhutan, Mahidol University, Shanghai Academy of Agricultural Science, as well as Kameoka and Noshiro Cities (Japan).

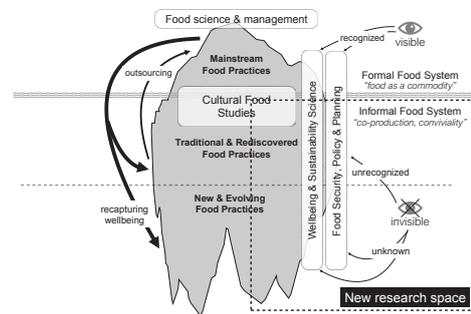


Figure 3 Conceptual framework to investigate the definition and interaction of formal and informal food system and practices represented as an iceberg.



Photo 3 Urban food future workshops held in Bangkok, December 2019. Six future scenarios were evaluated and policy & action plans were backcasted as a means to initiate transitions.



Photo 4 FEAST Project Annual Assembly held at RIHN January 12-13, 2020.

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

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

Prof. 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 society, 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 the provision of facilities and services for the safe disposal of human urine and feces.

UN Millennium Development Goals Report 2015 reported that 2.4 billion people are still using unimproved sanitation facilities, including 946 million people who are still practicing open defecation. The developing world 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.

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.

## Working hypotheses of the research

The project investigates the following hypotheses:

Hypothesis 1: Current sanitation problems are caused by a dissociation between the value which is provided by the sanitation system and the values of the individual people and/or the community of the people.

Hypothesis 2: Sanitation technologies cannot work well without a social and institutional support system. The mismatch between prerequisites of technologies and local characteristics additionally complicates sanitation issues.

## Key concept — Sanitation Value chain as a solution

The project proposes a new concept, the Sanitation Value Chain, which has the following dimensions:

1) Places the values of people and community in the center of discussion, and prepares the sanitation system to correspond to this value chain; 2) Designs the sanitation system by focusing on direct incentives for individual users and communities; 3) Recognizes a sanitation system as an integrated system with social and technical units; 4) Designs the sanitation system by making a good match between social characteristics and prerequisites of technologies.

## 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:** By field survey, we learn about the values of people and the norm for human excreta, and reevaluate the sanitation system in relation to the residents lives.
- Topic-2 **Technology:** We identify prerequisites of sanitation technologies and reevaluate the value that sanitation will give us. In addition, we develop new sanitization technology to make use of the value chain by understanding the values of people and local conditions.
- Topic-3 **Co-creation:** We identify stakeholders and describe the value structures of people and communities, and analyze the hierarchy and structure of stakeholders' value chain 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 make efforts to communicate research results to actors and stakeholders. Utilizing resources and institutional collaborations of RIHN, we will develop a method to express and transmit 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) Periurban areas in Zambia.

## How we think about sanitation

We involved multidisciplinary experts and have created a framework of understanding to capture sanitation problems as not only material cycling, but as a whole of the

value of sanitation in health and wellbeing, materials, and socio-culture (Figure1). Based on the framework, we will uncover 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 Sanitation Value Chain system will improve the health and wellbeing within the community.

### 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. We surveyed the handwashing and health of the elementary school students in the “slum” area of Bandung, Indonesia. Risk factors of stunting and diarrhea are

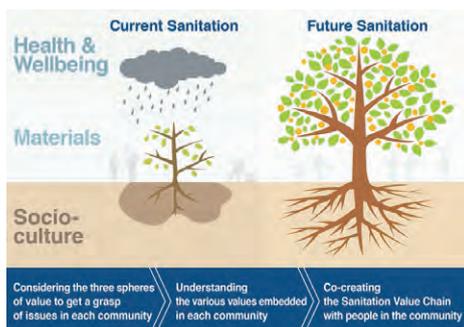


Figure 1 The concept of three values from the point of Co-creation (figure by KATAOKA Yoshimi)

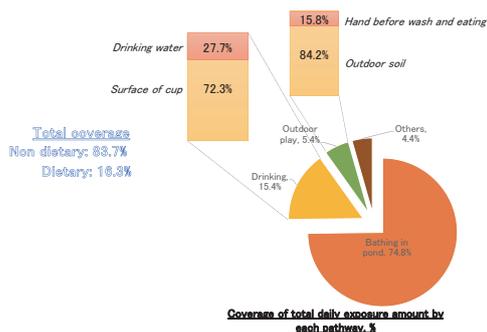


Figure 2 *E. coli* exposure pathways. Example of measurement in Bangladesh from Harada et al. (2017) Fecal exposure analysis and *E. coli* pathotyping: a case study of a Bangladeshi slum, International Symposium on Green Technology for Value Chains 23-24 October, 2017, Balai Kartini, Jakarta.

boy’s behavior, 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 boy’s behavior, inadequate hand-washing and using soap, and the practice based on inadequate hygiene knowledge.

### The notable achievements (New achievements in FY2018, special remarks)

1. We published the third and fourth volumes of the international journal *Sanitation Value Chain* (Figure 3).
2. In Zambia, we organized two workshops with local children and youth groups to promote good sanitation and hygiene. First, group members measured fecal contamination around their living environments. In creating visualizations of this invisible contamination they became aware of the problem and were able to discuss ways for its improvement (Photo 1). Second, they took pictures of the places thought to be a problem for community sanitation. These images were recomposed into videos that facilitated community communication.
3. Meta-studies 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 fusion of humanities and sciences, such as the discussions of the meetings of our project. We use these recordings for promoting interdisciplinary communication in our project.



Figure 3 International academic Journal *Sanitation Value Chain*, 3(1).



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

Sub Leader

**FUNAMIZU Naoyuki**

Muroran Institute of Technology

Researchers at RIHN

**NAKAO Seiji**

Specially Appointed Assistant Professor

**HAYASHI Koji**

Researcher

**SHIRAI Yuko**

Researcher

**KIMURA Ayako**

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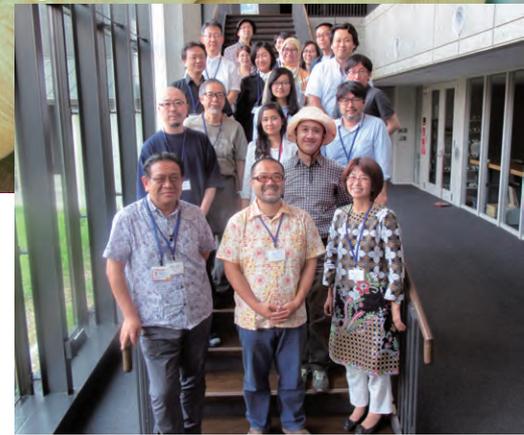
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University of Zambia, Zambia

**LOPEZ ZAVALA, Miguel Angel**

Instituto Tecnológico y de Estudios Superiores de Monterrey, Mexico

# 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 of Geology, Petrology, Astrobiology, Geochemistry, Medical Geology, Geoengineering, and Remediation Engineering. He currently works at the Faculty of Collaborative Regional Innovation and Graduate School of Science and Engineering, Ehime University. His interest in environmental pollution led him to intensive fieldwork and activities to reduce mercury pollution and poverty problems in artisanal and small-scale gold mining (ASGM) areas in Indonesia for over eight years, work conducted with students, scientists, researchers, and various stakeholders from Indonesia, ASEAN countries, and Japan. Professor Sakakibara is also responsible for international conferences and seminars such as Transdisciplinary Research on Environmental Problems in Southeast Asia (TREPSEA) and Transdisciplinary Research and Practice for Reducing Environmental Problems (TRPNEP), which focus on transdisciplinary approaches to 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 a toxic metal that seriously threatens human embryonic and early-childhood development, and is extremely toxic to the human body. Mercury pollution is a serious environmental issue requiring global action. Recent investigation by the United Nations Environment Programme (UNEP) has highlighted the enormity of Hg pollution in developing countries and the associated harmful effects on human health and ecosystems. One of the main causes of Hg pollution is ASGM, in which Hg is used as the traditional method of amalgamation to extract gold from the ore rock. This activity is responsible for 37% of global anthropogenic Hg environmental emissions. This method of amalgamation is quicker, simpler, and more cost effective than alternative methods, and is widely used in many ASGM communities. According to data from the UNEP, ASGM produces 15-20 % of the global gold market. Almost 15 million people, including about 4-5 million women and children, participate in ASGM activities in more than 70 countries. The Hg pollution generated during ASGM indirectly affects more than 100 million people worldwide. ASGM activities are also sources of social problems, such as land tenure issues, social instability such as migration, and conflict between residents. The vicious cycle related to poverty and environmental degradation in developing countries is well known. Even though the Minamata Convention was established to protect human health and the environment from the adverse effects of Hg, mercury emissions are still increasing rather than decreasing. The global mercury related environmental pollution from ASGM, which is caused by poverty, cannot be solved by ratification of international treaties or NGO activities alone.

## Research Objects

The objectives of our research 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

Our project members have been conducting transdisciplinary research and practice in collaboration with mining communities, local residents, key stakeholders

of public and private organizations and associations such as senior officials and staff of local and central government, key persons of companies, researchers of local universities, members of NGO, NPO, and others. This work emphasizes:

- Case studies on reduction of Hg pollution using a future scenario of ASGM in Indonesia and Myanmar which includes: (1) environmental impact assessments; (2) studies of living conditions, culture, history, and regional sociology; (3) cultivation or organization of transdisciplinary communities of practice (TDCOPs) used by transdisciplinary boundary object (TBO); (4) co-creation of future scenarios; (5) co-design and co-production with TDCOP members and other stakeholders; and (6) evaluation of the progress of regional innovation through social and economic studies.
- Research on interregional networks that aim to generate Hg-free societies in Indonesia and Myanmar which include: (1) construction of an exchange platform for information and collaboration on the management of Hg; (2) improvement of organizational and communication capacities; and (3) strengthening the communication policy with local and central governments.
- Research on improvements in environmental governance of ASEAN countries through the principles and processes used for multilayer and cooperative environmental governance for solving global mercury pollution.
- Theoretical and practical studies of the design, practical use, and evaluation of TBO, as well as the promotion, development, and roles of TDCOP in study areas. (Figure 1)

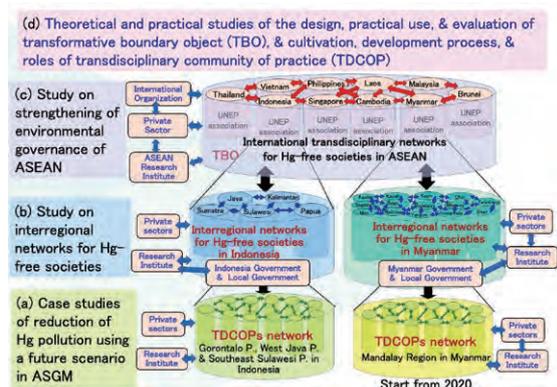


Figure 1 Whole structure of SRIREP project



## 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 an Hg-free society, the co-creation and practical application of TBOs, and the mobilization of TDCOPs. By strengthening environmental governance, which consists of multiple layers of co-operative organizations, we will also develop a route via which the problem of global environmental Hg pollution can be resolved.

## Progress and Achievements

During FR1, members of SRIREP project carried out several dialogs, fieldworks, and research activities with various stakeholders and key stakeholders in mining communities, local universities, and public and private organizations in both Indonesia and Myanmar.

Case studies have been completed largely in Gorontalo province. The resulting data show that air and water have been contaminated due to mercury exposure related to waste water from ASGM in the region. Further studies regarding mining community livelihood and value-added composite agriculture in non-polluted areas, as well as workshops are being conducted as transdisciplinary practice research for poverty reduction for the next fiscal year, especially in both Gorontalo, Sulawesi and Bandung, West Java (Figure 2). Some villages of the southern Bandung region of West Java have voluntarily discontinued their ASGM activities as a result of two TBO-based dialogues. (Photo 1)

In Indonesia, to study the establishment of interregional networks for a mercury-free society, two medical seminars on human health impact of heavy metals were held in May 2019. They included approximately 210 participants, including health care professionals, scientists, and researchers, including medical scientists from Japan and local universities and medical-related associations of Makassar City and Gorontalo City. Medical workshops were conducted, including information on Minamata disease, and the local experience of and concerns related to the current challenges of heavy metals intoxication was discussed.

In order to study improvements in environmental governance in ASEAN countries, dialogs meetings between SRIREP members and key stakeholders were conducted in 2019. In December 2019, the UNEP Global Environment Information Exhibition was co-organized with the Japan Association for UNEP in Yangon, Myanmar, in collaboration with some private sector actors. The 2<sup>nd</sup> ASEAN - Japan Meeting Point of Collaboration by Stakeholders and Researchers for Reducing Environmental Problems in ASEAN Countries was held in Nay Pyi Taw,

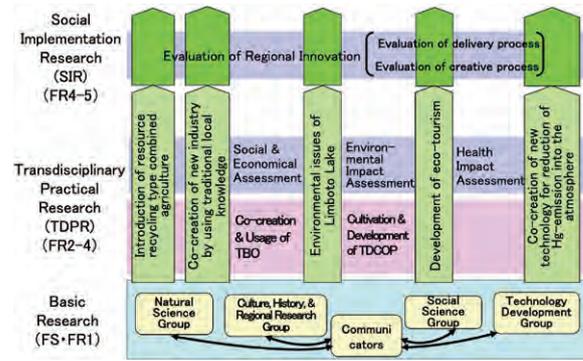


Figure 2 Whole schedule of the case study in Gorontalo Province, Indonesia



Photo 1 Workshop and fieldwork activities with local researchers at some ASGM areas



Photo 2 Attendees Union Minister of MONREC, officials, researchers and scientists, students, NGO and NPO members from Myanmar, Japan, Nepal, and ASEAN countries at TRPNP2019 Nay Pyi Taw Seminar.

the capital of Myanmar, in collaboration with universities of Japan and six ASEAN countries (Brunei Darussalam, Indonesia, Malaysia, Myanmar, Thailand, Vietnam, Nepal, and Ministry of Natural Resources and Environmental Conservation (MONREC). About 280 attendees, including researchers and scientists, senior officials and key stakeholders from Myanmar ministries, universities, NGO, and private companies attended the seminar. (Photo 2)

Dialog meetings, workshops, and stakeholder seminars are intended to establish future collaborations, multi-tier environmental governance for making the future scenarios with key-stakeholders based on the back-casting method, creating TBOs, TDCOPs, and policies, strengthening of environmental governance of ASEAN, and constructing mercury-free society networks and sustainable societies through regional innovations.

### Researchers at RIHN

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Researcher

**KUANG Xiaoxu**

Researcher

**WIN THIRI KYAW**

Researcher

**MYO HAN HTUN**

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Research Associate

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**JAHJA, Mohamad**

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**ABDURRACHMAN, Mirzam**

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**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 (Apr. 2, 2020)

Program Director **TANIGUCHI Makoto** RIHN

Prof. Dr. 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 the vice president of the International Association of Hydrogeologists and a Steering Committee member of Future Earth Nexus KAN. He has been working on water-related projects around the world, in particular Asia, authoring or co-authoring over 170 peer reviewed articles and 8 books including "Groundwater and Subsurface Environment", "The Dilemma of Boundaries" and "Groundwater as a Key for Adaptation to the Changing Climate and Society".

Researcher

**LEE, Sanghyun**

Assistant Professor



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

Project Leader **KONDO Yasuhisa** RIHN

Yasuhisa Kondo has worked for six years as an associate professor at the Information Resources Division of the RIHN Center. His academic background is archaeology and geographical information sciences (Ph.D. 2010 The University of Tokyo). He is currently interested in open science, participatory action research, and transdisciplinary research promotion for environmental archaeology and socioenvironmental cases. He is also coordinating an archaeological mission to Oman.



## Backgrounds and Objectives

Social issues caused by environmental deterioration present complex and multidimensional problems for science. To address such wicked problems, solution-oriented research has involved research experts from different domains (interdisciplinarity) and also practitioners such as governments, funders, industries, non-profit organizations, and civil members (transdisciplinarity). However, such team science is often disrupted by asymmetric information, knowledge, wisdom, value, socio-economic status, and power among above-mentioned actors. This Core Project develops a methodology to reduce (rather than dissolve) such socio-psychological asymmetry for the sake of more efficient transdisciplinary (TD) collaboration.

## Methodology

To develop the methodology, this project interlinks the concept of open science, as an open scientific knowledge production system, with a TD approach to boundary spanning by transforming in-between spaces into “our” epistemic living spaces. Technically, boundary spanning can be achieved by a combination of (1) considering ethical equity with special attention to empowering marginalized (or “small voice”) actors; (2) building trust by securing transparency in the research process, by applying the FAIR (findable, accessible, interoperable, and reusable)

Principles for research data and information for instance; (3) facilitating dialogue; and (4) discovering and sharing the goals that actors with different interests can tackle together (transcend) where necessary. Civic Tech can be applied as a holistic approach, in which civic engineers develop a solution to local issues by using disclosed data and information and communication technologies. This proposed methodology is cyclically assessed and improved through practical case studies, with special interest in developing a method to measure participants’ perceptual transformation through interventions.

## Expected results

At the completion of the project, we expect to establish the OpenTS methodology by successfully interlinking open science and TD theories, with new knowledge about effective (and ineffective) combinations of visualization and dialogue tools such as graphic recording, and with qualitative and quantitative methods to measure the effect of boundary spanning.

The project has two major interfaces of social outputs. The Research Group will make suggestions for national and international open science policies, while the Practice Group will contribute to community-based policymaking and social startups for the sustainable waterweed recycling in Lake Biwa and built heritage management in Oman.



Graphic recording during the workshop in Otsu, Shiga (February 2020).



On-site experiment of the *Biwapoint* local electric acknowledgement system at the occasion of waterweed cleaning on the shore of Lake Biwa.

Researcher at RIHN

**NAKAHARA Satoe**

Researcher

**SUETSUGU Satoko**

Research Associate

Main Members

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**ONISHI Hideyuki**  
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 Doshisha Women's College of Liberal Arts  
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**OKUDA Noboru**  
**OTA Kazuhiko**  
**SHIMIZU Junko**  
**VIENNI BAPTISTA, Bianca**

The University of Tokyo  
 Kyoto University  
 RIHN  
 Tama Art University  
 ETH Zurich, Switzerland

# 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 four components:

- 1) Research design
- 2) Tips and tactics (Researcher experiences)
- 3) Project Reflection (Stakeholder experiences)
- 4) Capacity building

Under a component of research design, 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 RIHN's TD research experiences and describe its relation to international trends.



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

Researcher at RIHN  
**OKAMOTO Takako**

Research Associate

Main Members  
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**OH Tomohiro**  
**NISHIMURA Takeshi**

Kanazawa University

Sanyo Gakuen University

**LAMBINO, Ria**  
**RAMPISELA, Agnes**  
**GASPARATOS, Alexandros**

RIHN  
Faculty of Agriculture, Hasanuddin University  
The University of Tokyo



KIMIJIMA Satomi, Clove Spice Garden, Indonesia

## 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
	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
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-Pacific 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



# Proposal and Verification of the Validity of Isotope Environmental Traceability Methodology in Environmental Studies

Project Leader **TAYASU Ichiro** RIHN

This project investigated environmental traceability as a key concept for solution of environmental problems. Stable isotope ratios of elements, together with concentrations of elements, can trace the flow of matter and chemicals through the environment, better describe ecosystem structure and conditions, and appraise the chemical profiles of food products. Spatio-temporal variation of multiple isotope ratios can be used to study Earth systems operating at local to global scales. This information can serve as an important decision-making tool for local people considering water, food and environmental security, all of which are fundamental for the sustainability of human society.

We conducted two studies to evaluate the validity of “environmental traceability methodology” for environmental studies: 1) effectiveness of the environmental traceability concept, and 2) applicability to the food traceability. For question 1, we asked of the effective points of the methodology to solve environmental problems using a survey by questionnaire and a workshop among stakeholders. Field research took place in Japan at sites in Ono City, Fukui; Otsuchi Town, Iwate; Saijo City, Ehime; Oshino Village, Yamanashi; the Chikusa river watershed, Hyogo; Lake Biwa and surrounding watershed in Shiga; as well as in the Laguna de Bay and surrounding watershed in the Philippines. Questionnaire results indicated that certain types of stakeholder showed special appreciation for the information obtained from the environmental traceability methodology:

- a) people who are generally involved in the object of conservation (groundwater or river depending on the study sites);
- b) people who have high concern about the information obtained from the environmental traceability methodology; and
- c) people who showed high level of understanding about the explanation of the environmental traceability methodology in the symposium at each study site.

For question 2), we tested if the “environmental

traceability” authentication by multi-isotope methods were more effective in communicating production conditions and building trust. We focused on food labels and made a web-based questionnaire online survey (N=10,000) of consumers in Japan, the USA, Germany, China and Thailand. We selected four food items that were previously detected by isotopic analysis to be falsely labeled. We set the sources of label information assured by farmer’s photograph, by government institutions, by producer association, by scientific experts (including in isotopic methods), and by consumer reputation. Results showed that the expert labels based on scientific analysis were highly trusted regardless of food type or country and suggested that expert labels might play an important role as trusted sources of information in the global food system.

Although causal relationships are complicated in global environmental issues, we consider the environmental traceability methodology is valid to tackle environmental issues by sharing scientific information obtained from the methodology with various stakeholders. To disseminate the knowledge and experience, we established an internet website to serve as a platform that shares and develops the environmental traceability methodology. As a transdisciplinary context, we use the results obtained from our project research, and all the finding of Laboratory and Analysis Division in RIHN, including the cooperative research on “Environmental Isotope Study”. The website will continue to connect providers of the environmental traceability methodology with potential users.



A schematic flow of the project in Oshino Village, Japan



The internet website we established to serve as a platform that shares and develops the environmental traceability methodology (a case in Oshino Village).

## 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

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

**Grace WONG**, Stockholm Resilience Centre, Stockholm University

Area : Cameroon, Democratic Republic of Congo, Laos, Myanmar, Malaysia (Sabah & Sarawak)

In many parts of the tropics, forest-agriculture frontiers dominated by diverse swidden landscapes are rapidly being converted to increasingly homogenous landscapes of commodified agriculture. Often labeled as “development”, these transformations have not generated desired social-ecological outcomes and often do not fairly benefit smallholders in these landscapes. Our research thus aims to examine the power relations, politics of forest and land use, and local agency underlying transformations in forest-agriculture frontiers, and assess options for more sustainable and equitable development.



Forest-agriculture frontier in Laos

**FS** **An Ecology of Care Approach to Neurological Disorders: Toward a Comprehensive Model for Care Embedded in a Biosocial Milieu**

**NISHI Makoto, Kyoto University**

Area : Cameroon, Japan, Sri Lanka, Uganda

“Ecology of care” is a framework for multidisciplinary research and practice to address health issues closely related simultaneously to biological and social milieus. This research project focuses on epilepsy and dementia as two common neurological diseases. It aims to understand knowledge, technologies, and values as factors that determine the quality of life of individuals and families affected by these diseases in various ecological and social settings. Livelihood, disease burden, care relationships, and social conflicts are among the major areas of concern.



Farmers engaged in farming activity in a village in northern Uganda which was recently affected by an epidemic of epilepsy.

**FS** **Metacognitive Interventions on Social Actors to Enable the Transition Toward a Sustainable Society**

**NAKAGAWA Yoshinori, Kochi University of Technology**

Area : Pokhara City, Kathmandu

Due to financial difficulties, many developing countries are poorly managing wastes, and this is causing environmental degradation and public health problems. By taking the perspective of the future generation, the present society may regret this prioritization and the lack of creativity in addressing waste management and other policy goals. The present study aims to investigate whether and why a metacognitive strategy may improve waste management in Nepal.



One scene of a picture-story developed by this project to share the reality of environmental degradation in Sisdol landfill site, Kathmandu City, Nepal.

**FS | Developing Inclusive Wealth with Clarifying Mechanism of Social Value Formation and Application to Sustainable Policy Design**

**MANAGI Shunsuke, Kyushu University**

Area : Japan and other countries

In the arena of global environmental policy, the past several decades have seen some major accomplishments in setting goals. At the onset of 2016, the United Nations ushered in a very ambitious list of goals to be achieved by 2030. The 17 Sustainable Development Goals (SDGs) include the elimination of poverty and hunger, realization of gender equality and reduction of social inequalities, as well as peace, justice, and new institutions and partnerships. The 13th goal of SDGs is devoted to “Take urgent action to combat climate change and its impacts.” Accordingly, the Paris Agreement was reached at the COP21 on 12 December 2015, and entered into force in the next year. In particular, the Agreement determines that all countries put an effort to limit global temperature rise to 2 degrees Celsius at most.

This ambitious target-oriented approach to tackling environment and development challenges is commendable in many ways. It serves to share the

status of the topic with a wide audience on the globe. Moreover, the goals may facilitate local regions in the “downscaling” of global goals, leading to local initiatives to complement global solutions. We build on the past achievements of Inclusive Wealth Report (IWR), but extend the analysis both in depth and breadth. In particular, our target is to develop a theory of how the idea of inclusive wealth can be put into general practice. Application came already introducing increase in IW to be the target of Hisayama city at Fukuoka, Japan. We provide national reports to other countries and intend to cooperate with other region too.



Inclusive wealth concept: physical capital + human capital + natural capital = inclusive wealth

**FS | Adaptive Governance of Multi-Resource based on Land-Sea Linkage of Water Cycle: Application to Coral Reef Island System**

**SHINJO Ryuichi, University of the Ryukyus**

Area : Japan, Palau, Indonesia

People in tropical-subtropical small islands have lived with limited environmental resources. Recent increases in island populations, tourism, and changes in land-use and social structure have modified water and other environmental resources, thereby affecting coastal ecosystems (e.g., coral reef system). Small islands are also vulnerable to global climate change. For sustainable development on islands, our project aims to investigate multi-resource adaptive governance based on land-sea linkage of water cycle in coral reef island system.



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

**CORE FS** | **Tackling Wicked Problems: Co-creating Serious Games as Transdisciplinary Methods to Solve Socio-Environmental Challenges**

**OTA Kazuhiko, RIHN**

Area : Previous RIHN projects and sites

This proposal creates serious games for TD research addressing environmental and social issues, and develops an underlying methodology to this end. In addition to collaborating with various practitioners using games, the accumulated results of the project will be expressed in the form of a "serious game network." By the end of this Core Project, some of the research results of RIHN will be turned into games, and there will be attractive learning tools for researchers participating in TD research and citizens who want to collaborate.



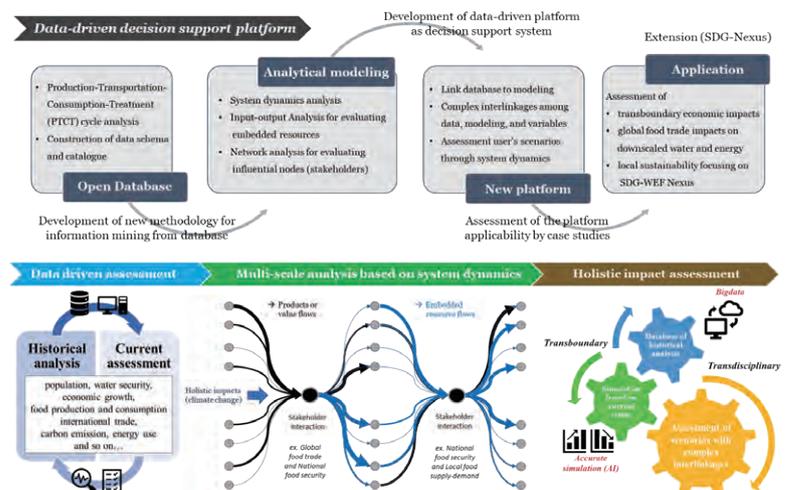
Board game based on the theme of "Tragedy of the Commons". Created by citizens who participated in game jam at RIHN.

**CORE FS** | **Development of Data-driven Decision Support Platform Based on Sustainable Life Cycle Assessment of SDGs Nexus**

**Sanghyun LEE, RIHN**

Area : Japan and Global

Stressors, including climate change, socio-political, economic, and population pressures, challenge sustainable resource management, which are in fact, non-stationary, highly interlinked, and increasingly unpredictable. Accordingly, we need to understand the interaction among resources, management, and multi-scale interaction, in addition to the holistic impacts of stakeholder's actions. The aims of this study are to 1) study new methodologies to analyze the multi-scale impact assessment in the context of complex trade-offs and synergy in SDGs-Nexus; 2) develop a data-driven decision support platform for assessing user scenarios; and 3) assess the applicability of the platform through transboundary and transdisciplinary case studies.



The data-driven decision support system comprising database, multi-scale analysis, and holistic impacts

## 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 Research Fellow.



## 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 Research Fellows are not employed by RIHN, but their travel, accommodation and daily expenses are covered by an allowance. Visiting Research 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).



### RIHN International Symposium

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

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#### Fair Use of Multiple Resources in Cross-Scale Context 11-12 July 2019

##### Keynote Address

Steering toward Sustainability: Cross-scale Interactions, Behavioral Mechanisms, and the Idea of Optimality

Oran R. YOUNG (Bren School of Environmental Science & Management, University of California, Santa Barbara)

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Professor Oran R. Young, of Bren School of Environmental Science & Management, University of California, Santa Barbara, giving the 2019 keynote speech.

## RIHN Public Seminars

Public seminars are held throughout the year at RIHN or in the city center.

**Bon Appetit, Afrique!**  
**Life/Gastronomic Worlds of Mali and Burkina Faso Make us Think About Future of Our Region and Globe**  
 21 June 2019

## 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 2019 included:

**Establishing, Quantifying and Monitoring Connectivity in Hydrological Systems Using Stable Isotope**  
 J. BOWEN, Professor, University of Utah  
 30 May 2019

**Using Plurisecular Trajectories of the Hydrosystems to Improve River Management**  
 David ESCHBACH, JSPS Postdoctoral Fellow / METIS Laboratory, Sorbonne University  
 13 November 2019

## RIHN Regional Community Seminars

RIHN Regional Community Seminars take place in, and address specific environmental issues pertaining to, a particular part of Japan.

**How to Develop Business Models for Sustainable Society**  
 18 July 2019, Graduate School / Faculty of Engineering, Hokkaido University

**Regional Revitalization Through GIAHS: Dialogue Between Generations**  
 12 November 2019, Morotsuka Junior High School, Miyazaki

**Linking Ecosystem Networks with Fun for Nature Conservation and Social Bonding**  
 22 December 2019, Lake Biwa Museum, Shiga

**Sustainable Food and Agriculture can Open a New Future for Kameoka City**  
 19 January 2020, Galleria Kameoka, Kyoto

**Waterweed in Lake Biwa: Towards a Civic Participatory Environmental Governance**  
 8 February 2020, Collabo Shiga 21

## Other Events

**「よもぎちゃん」**  
 2019年11月14日(水) 18:00  
 会場 豊洲かきとと伝承館

**脱炭素社会の実現に向けて**  
 2019年 5月11日(土) 10:30-18:00  
 国立京都国際会館 アネックスホール

**アフリカの地域の人びとと研究者のサニテーション**  
 2019年 8月27日(火) 13:00-14:30  
 パシフィック横浜 Annex F204

**アフリカ文化の深淵に迫る**  
 2019年 12月1日(日) 開場 12:30 開演 13:00  
 京都精華大学 本館 11-417

**ごはんの深福さん**  
 2019年11月28日(木)  
 会場 豊洲かきとと伝承館

**Urban Land Teconnection and Sustainability**  
 2019年6月28日(金)  
 13:00-16:30  
 総合地球環境学研究所 セミナー室304

**Seeing the knowledge**  
 21 October 9:00-10:00 / 22 October 9:30-10:00  
 総合地球環境学研究所 セミナー室304

**FEAST**  
 2019年11月28日(木)  
 会場 豊洲かきとと伝承館

## 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.



## Future Earth

RIHN hosts the Future Earth Asia Regional Center (<http://www.futureearth.org/asiacentre>), 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 launching 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” (<http://www.futureearth.org/future-earth-sscp>) and hosts the TERRA School, a course on Transdisciplinarity for Early career Researchers in Asia.



TERRA School participants on fieldwork in an organic farm in Kameoka December 2019.



Dynamic face-to-face interaction of participants during the seminar on Why Systems of Sustainable Consumption and Production is essential to achieving the SDGs. The session had virtual participation as well. February 2020



Regional Centre for Future Earth in Asia Website  
A map of the Future Earth Community in Asia has been developed on the website. This map shows people and institutions in the region that are actively engaged in Future Earth activities. ([www.futureearth.org/asiacentre/](http://www.futureearth.org/asiacentre/))

## 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 in an average year.



## 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 initiative aims at developing a new methodology of environmental studies based on interactive methods of research visualization. For this purpose, this initiative supports the translation of RIHN project research activities and outcomes into graphical forms and exhibitions.

Such diverse modes of communication increase the sophistication and accessibility of RIHN's transdisciplinary research dedicated to the co-creation of regionally- and culturally-sensitive societies closely linked to nature.



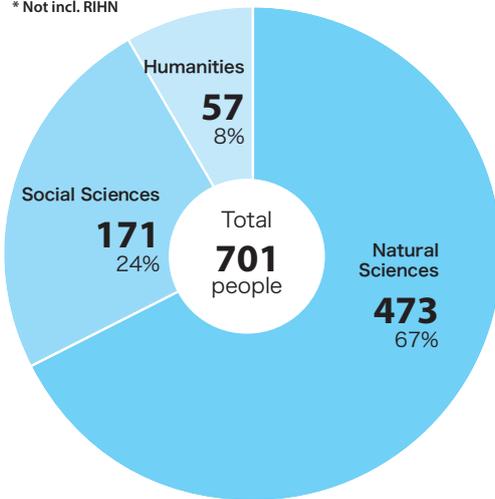
A self-reflection of the activities of 'Dziko Langa', a child-youth sanitation club in Zambia, by digital storytelling with youth members and a local artist. (October 2019).



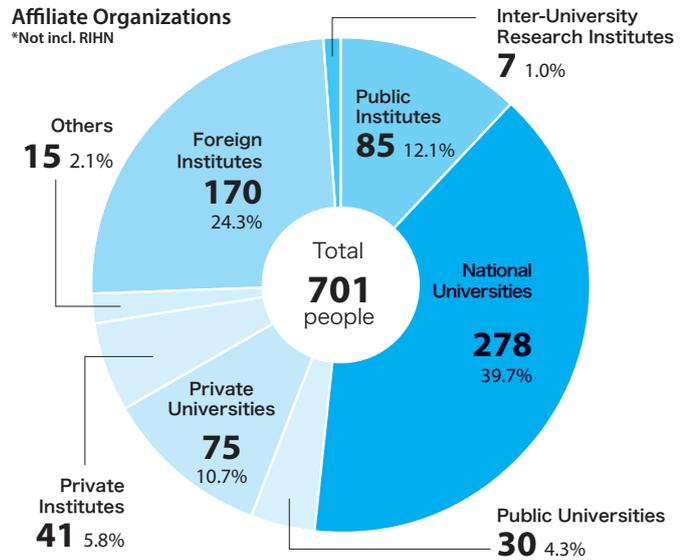
Serious Board Game Jam 2019 (September 2019), a two-day workshop to create board games on dining with mixed teams of college students, creators, civic members, and researchers.

## Collaboration

### Research Areas \* Not incl. RIHN



### Affiliate Organizations \*Not incl. RIHN



\*As of March 31st, 2020

## Collaboration in Japan \*As of April 1st, 2020

### 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

### Municipal Governments and Other Agencies

Saijo City, Ehime 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 Rakuohku Senior High School  
 Miyazaki Prefecture  
 NHK Educational Corporation  
 Noshiro City, Akita Prefecture  
 Kyoto City, ICLEI Japan, Kyoto Environmental Activities Association  
 Kyoto Institute, Library and Archives  
 Oshinomura, Yamanashi Prefecture

## International Collaboration \*As of April 1st, 2020

### 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

### CHINA

East China Normal University  
 Eco-environmental Protection Institute, Shanghai Academy of Agricultural Sciences  
 Hainan Provincial Center for Disease Control and Prevention  
 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

### NETHERLANDS

Copernicus Institute of Sustainable Development, Utrecht University

### OMAN

Sultan Qaboos University

### PHILIPPINES

University of the Philippines Diliman

### SWEDEN

The Sven Hedin Foundation

### THAILAND

Faculty of Social Sciences and Humanities, Mahidol University  
 Rice Department, Ministry of Agriculture and Cooperatives

### 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 results and information about the Institute's approach to research. In collaboration with RIHN researchers, it reaches out to the general public through events such as the Citizens' Seminars, Regional Collaborations Seminars, and the RIHN Open House; through the RIHN website and social media; and by issuing press releases and organizing press conferences. The PR

Unit also issues a range of publications including the RIHN Prospectus, Newsletter, and two book series, one for specialized audiences and one for the general public. By fostering a lively two-way communication with the research community and the general public, the PR Unit strives to contribute to the crystallization of a RIHN identity and to the maintenance of an open institute.

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## International Publications Unit

The International Publications Unit (IPU) supports planning and promoting RIHN non-Japanese language publications that enhance RIHN's international presence and stature. RIHN has partnered with Springer Nature Publishers to establish the Global Environmental Studies book series. Titles in the series reflect the full breadth of RIHN scholarship. IPU members are also involved as Section

Editors in the journal *Global Sustainability* (Cambridge University Press) and are responsible for the open-ended collection of "Humanities and Global Sustainability" in the journal. The works of IPU bear out RIHN's approach to solution-oriented research, namely the transdisciplinary study that helps transformation of human-environment interaction.



Above: OTANI Michitaka, Children in Phnom Penh, Cambodia

Bottom: SHIMIZU Takao, Grain Warehouse, Burkina Faso

## 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



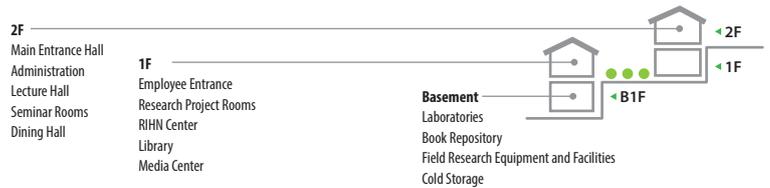
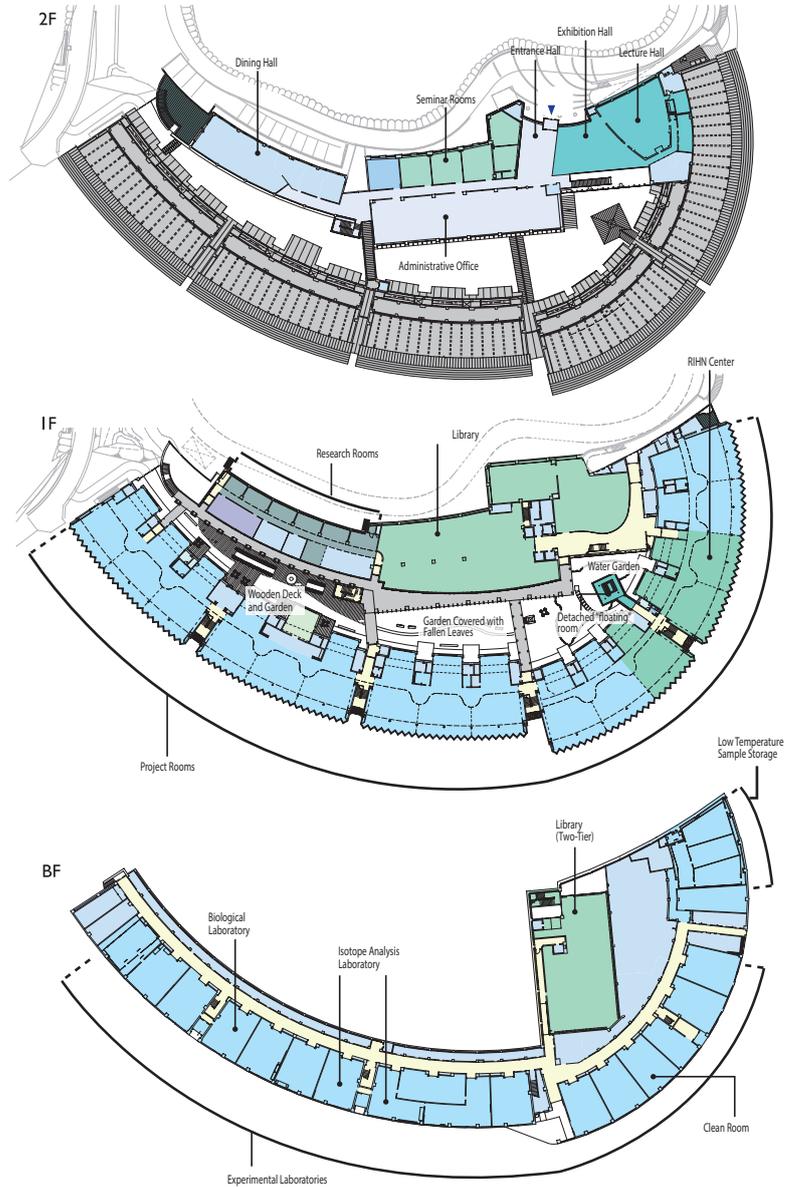
Main entrance hall



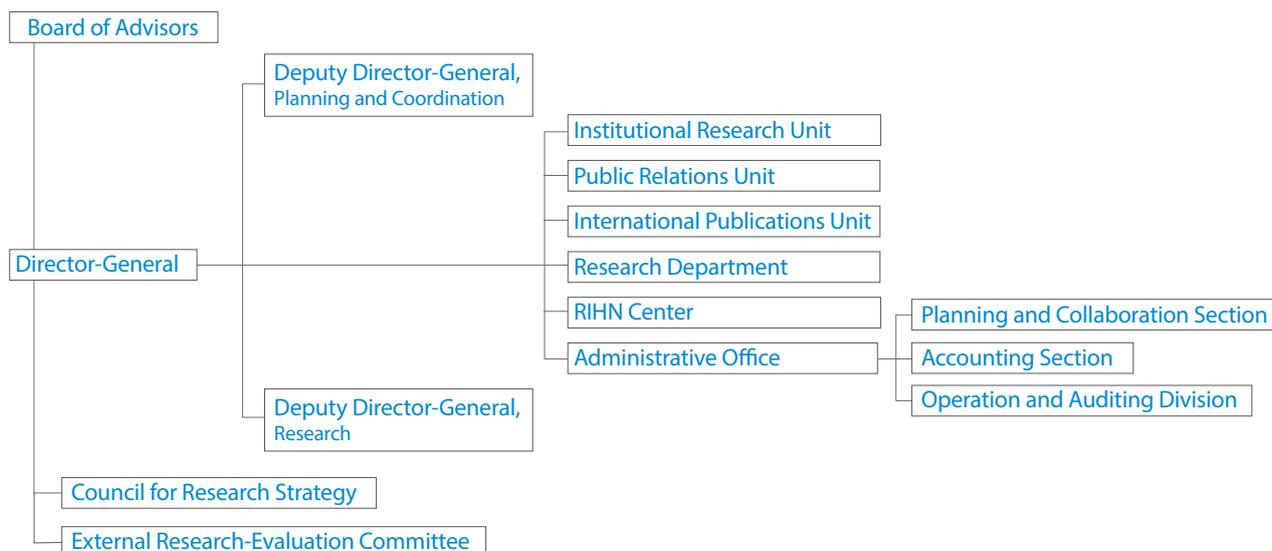
Laboratories



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



## Administrative Structure



## Financial Information

### Budget

Income <span style="float: right;">(Fiscal Year 2020)</span>	
Category	Amount (Yen in thousands)
Subsidy for Operation	1,436,463
Self Revenue	19,379
<b>Total Earnings</b>	<b>1,455,842</b>

### External Sources of Funding

(Fiscal Year 2019)	
Category	Amount (Yen in thousands)
Fund for Promotion of Academic and Industrial Collaboration	73,256
Grants-in-Aids for Scientific Research	68,520
Donations for Research	10,210



# Boards and Committees

\*As of July 1st, 2020

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

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

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

<i>Domestic</i> KAWABATA Zen'ichiro Emeritus Professor, RIHN KONDO Akihiko Professor, Center for Environmental Remote Sensing / Department of Environmental Remote Sensing, Division of Earth and Environmental Sciences, Graduate School of Science and Engineering, Chiba University SUMI Akimasa Project Professor, The University of Tokyo Institute for Future Initiatives / Professor Emeritus, the University of Tokyo / Former President, National Institute for Environmental Studies TANAKA Masaru Director, Mouno Institute for Forest-Sato-Sea Studies / Professor Emeritus, Kyoto University TODA Takao Vice President for Human Security and Global Health, Japan International Cooperation Agency UCHIBORI Motomitsu Emeritus Professor, The Open University of Japan / Emeritus Professor, Hitotsubashi University YUMOTO Takakazu Director, Primate Research Institute, Kyoto University	<i>Overseas</i> BAI, Xuemei 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 Research Professor and Co-Director, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, China NAGENDRA, Harini Professor of Sustainability / Member of Curriculum and Pedagogy Committee / Member of Research Council, Azim Premji University, India ROMERO LANKAO, Patricia Senior Research Scientist, Transportation and Hydrogen Systems Center, 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 / Director, Sustainability Institute / Professor, Management and Organization, Smeal College of Business, The Pennsylvania State University, 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
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## Council for Research Strategy Oversees research strategy, personnel, project, and evaluation system

YASUNARI Tetsuzo MALLEE, Hein TANIGUCHI Makoto	Director-General Deputy Director-General Deputy Director-General	SAIJO Tatsuyoshi SUGIHARA Kaoru HAYASHIDA Sachiko	Specially Appointed Professor Specially Appointed Professor Professor	TAYSU Ichiro OKADA Saeko MIZUI Yoshitake	Professor Associate Professor Administrative Director
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## Senior Advisor

TACHIMOTO Narifumi

## Honorary Fellow

VAN DER LEEUW, Sander Ernst

## Emeritus Professors

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

■ Director-General	YASUNARI Tetsuzo
■ Deputy Director-General (Planning and Coordination)	MALLEE, Hein
■ Deputy Director-General (Research)	TANIGUCHI Makoto

## Administrative Office

■ Administrative Director MIZUI Yoshitake

### ■ Planning and Collaboration Section

Head HIGASHI Hideaki

#### General Affairs and Planning Subsection

Head ZENIZUKA Rie  
Chief NAKAOHJI Yu  
Clerk KOGISO Ayana  
Clerk KOHO Sayaka

#### 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

#### Information and Library Subunit

Chief YAMASHITA Takayoshi

### ■ Accounting Section

Head SAITOU Hiroshi  
Deputy Head SHIGEMITSU Kazuo  
Specialist SUNADA Akinobu

#### Financial Planning Subsection

Head TSUJIMURA Hanako

#### Facility Management Subsection

Head ISHII Hiroya  
S.A.Specialist ZUI Zoujin

#### Accounting Subsection

Head HONDA Takayuki

#### Procurement Subsection

Head HARUOKA Junichiro  
Clerk KARIYA Midori

### ■ Operation and Auditing Division

Head KIMURA Makoto  
Specialist SUNADA Akinobu

#### Auditing Subunit

Head TSUJIMURA Hanako

## 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  
 YAMAUCHI Taro Human Ecology

### Associate Professors

KANEMOTO Keichiro Industrial Ecology, Environmental Economics  
 KONDO Yasuhisa Archaeology, GIS, Open Science  
 KOZAN Osamu Hydrology  
 MCGREEVY, Steven R. Environmental Sociology  
 YOSHIDA Takehito Ecology

### Assistant Professors

ONISHI Yuko Biogeography, Macroecology  
 OTA Kazuhiko Japanese Environmental Ethics  
 LEE, Sanghyun Agricultural Water Management

### Specially Appointed Professors

SAIJO Tatsuyoshi Future Design  
 SUGIHARA Kaoru Economic History, Environmental History

### Specially Appointed Assistant Professors

AIBA Masahiro Forest Ecology  
 NAKAO Seiji Historical Anthropology

### Visiting Professors

FUJII Shigeo Water Environment and Sanitation, Micropollutants Contamination

HABU Junko Environmental Anthropology, Historical Ecology  
 HAYASHI Hiroaki Plant Nutrition and Fertilizer, Sustainable Development Studies  
 KANIE Norichika Earth System Governance  
 KASUGA Fumiko Food Safety Planning  
 KAWASAKI Masahiro Atmospheric Chemistry  
 KUSAGO Takayoshi Action-based Development Studies  
 MANAGI Shunsuke Environmental Economics  
 MIZUNO Kosuke Urban Engineering  
 NAKATSUKA Takeshi Indonesian Area Research  
 SHIBATA Akira Biogeochemistry, Paleoclimatology  
 SHINJO Ryuichi Rural Development, Biomass Carbonization  
 YONEMOTO Shohei Petrology and Mineralogy, Isotope Geochemistry  
 History and Philosophy of Science

### Visiting Associate Professors

ENDO Aiko Marine and Coastal Policy, Fishery Economics  
 NAKAGAWA Yoshinori Qualitative Research, Future Design  
 NISHI Makoto Medical Anthropology  
 OKUDA Noboru Ecological Science  
 SHIMIZU Takao Archaeology, Ethnology  
 TERADA Masahiro Environmental Humanities, History/Meta-history  
 WATANABE Kazuo Area Studies  
 WONG, Grace Forest and Natural Resource Economics, Development Studies

### Senior Researchers

FRY, Jacob Redman Computational Sustainability, Environmental Economics  
 MASUHARA Naoki Public Administration Studies and Energy Policy  
 NGUYEN, Tien Hoang Geoinformatics, Environmental Modeling and Mapping  
 RUPPRECHT Christoph D. D. Geography

TAHERZADEH, Oliver Ahrash Environmental Economics, Global Food System  
 TAMURA Norie Natural Resource Management  
 YAMANAKA Manabu Atmosphere-Hydrosphere Sciences

### Researchers

FARABI-ASL, Hadi Energy System Analysis  
 HAYASHI Koji Ecological Anthropology  
 HUANG, Wan Hui Regional Environmental Studies, GIS  
 KAJITA Ryosuke Area Studies  
 KATAFUCHI Yuya Econometrics, Applied Econometrics  
 KIMIJIMA Satomi Area Studies  
 KOBAYASHI Kunihiko International Environmental Law  
 KOBAYASHI Mai Environmental Sociology  
 KUANG Xiaoxu Chemistry and Chemical Engineering  
 LEE, Jemyung Regional Informatics, Rural Planning  
 MISRA, Prakhar Environmental Remote Sensing, Land Cover Change Modelling  
 NAKAHARA Satoe Cultural Anthropology, Peace Studies  
 ODA Kimisato Landscape Architecture, Cultural Landscape  
 OSAWA Takamasa Social Anthropology  
 SHAHRIER, Shibly Future Design  
 SHINKAI Rika Cultural Anthropology  
 SHIODERA Satomi Forest Ecology  
 SHIRAI Yuko Human Ecology, Livelihood Systems Study  
 SPIEGELBERG, Maximilian Environmental Management  
 WIN THIRI KYAW Neurology and Clinical Pharmacology  
 YAMADA Taiki Graph Theory, Optimal Transport Theory

### Research Associates

ARAKI Hikaru KIMURA Ayako SHIMAUCHI Risa  
 HONMA Saki KOBAYASHI Yuko SUETSUGU Satoko  
 ITO Takafumi MATSUOKA Yuko TAKATA Naoko  
 IWASAKI Yumiko MYO HAN HTUN TAKEHARA Mari  
 KARATSU Fukiko NAKAI Minami YAMAMOTO Aya  
 KATSURA Tomomi SENDA Masako

## 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

### Specially Appointed Associate Professor

LAMBINO, Ria Environmental Governance

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

JIANG Hong-Wei Human Ecology

### Research Fellow, NIHU Center for Information and Public Relations/ Specially Appointed Assistant Professor

KIM, Satbyul Cultural Anthropology

### Researchers

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

### Research Associates

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

## Institutional Research Unit

Head TANIGUCHI Makoto

### Members of Unit

TAYASU Ichiro KUMAZAWA Terukazu  
 YAMAUCHI Taro OKADA Saeko  
 KANEMOTO Keichiro NAKAO Seiji  
 KONDO Yasuhisa

### Specially Appointed Assistant Professor

WAKAMATSU Hisanori

## Public Relations Unit

Head MALLEE, Hein

Deputy Head HIGASHI Hideaki

### Members of Unit

ABE Ken-ichi MCGREEVY, Steven R.  
 YOSHIDA Takehito KIM, Satbyul  
 KUMAZAWA Terukazu

Associate Professor OKADA Saeko

Chief NAKAOHJI Yu

Specially Appointed Specialist TERAMOTO Shun

Research Associate KIMURA Aoi

## International Publications Unit

Head SUGIHARA Kaoru

### Members of Unit

YASUNARI Tetsuzo  
 MALLEE, Hein  
 ABE Ken-ichi  
 NILES, Daniel

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



## 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**

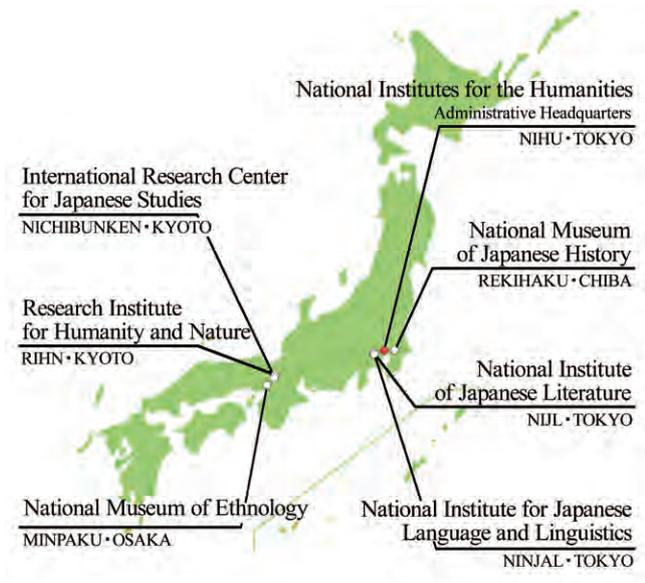
- REKIHAKU: Constructing Integrated Studies of Cultural and Research Resources, and Renovating Sharing Infrastructures of Research Resources in Japanese History and Cultures
- NIJL: Project to Build an International Collaborative Research Network for Pre-modern Japanese Texts
- NINJAL: A New Integration 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.

36th: "Exhibiting Japan Abroad: Exploring the Significance of the 'KIZUNA: Japan | Wales | Design Exhibition,'" Oct, 2019

37th: "Boundaries of the 'natural' and 'supernatural'" Nov, 2019

38th: "Worlds of History Opened Up by Computers: Considering the Digital Humanities," Jan, 2020

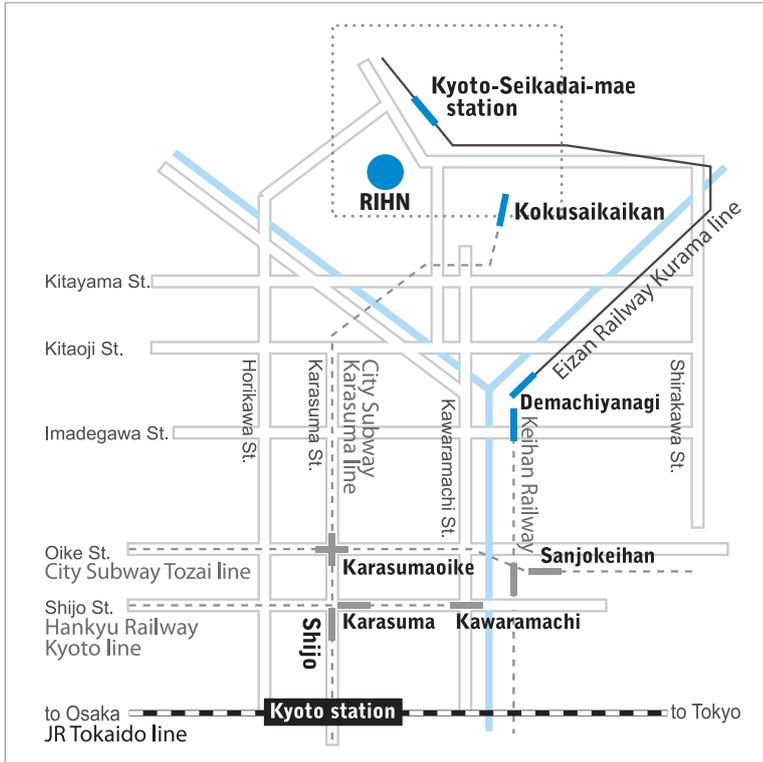
#### Industry-Academia Collaborations

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

Joint symposium with Ajinomoto Foundation for Dietary Culture

Joint lecture with Otemachi Academia

## Access



### By City Subway

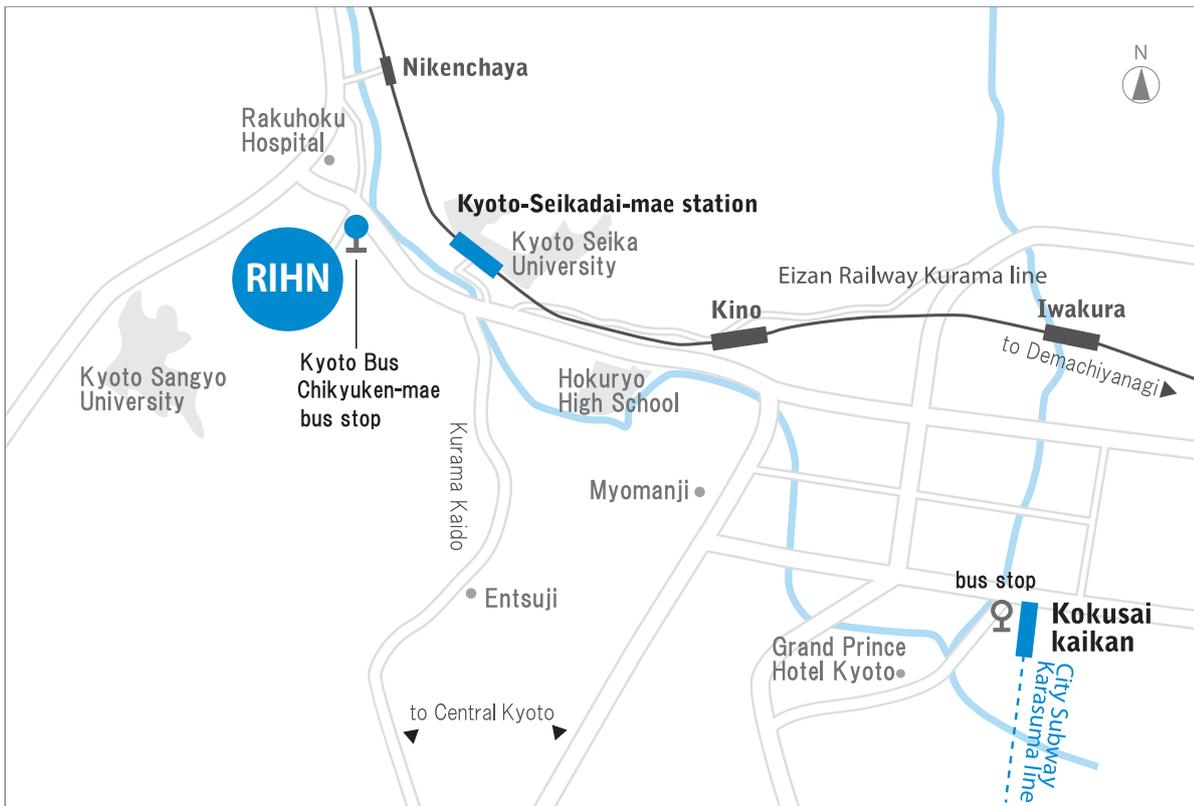
From Kyoto Station, take the Karasuma Line to Kokusaikaikan Station (the last station), and transfer to Kyoto Bus.

### 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 2020-2021

Managing Editor: MALLEE, Hein  
Designed by OKAZAWA Rina

### Front Cover photo:

Manual Drying Process of Paddy Grain,  
Pegu Region, Myanmar  
Photo by MYO HAN HTUN

### Back Cover photo:

Bountiful Sea, Sumatra, Indonesia  
Photo by ABE Ken-ichi

Flying over RIHN in the autumn sky  
Photo by WATANABE Kazuo



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