



Inter-University Research Institute Corporation
National Institutes for the Humanities

Research Institute for Humanity and Nature

Prospectus 2019-2020



Contents

Message from the Director-General	2
RIHN Philosophy and Approach	4
Organizational Structure	5-7
Project Index	8-9
Research Projects	10-29
Core Projects	30-32
Completed Research	34-36
Current Feasibility Studies	38-42
Coordination	44-50
Collaboration	51
Facilities	52-53
Administrative Structure	54-56
A Brief History of RIHN	57
National Institutes for the Humanities	58-59
Access	60



Message from the Director-General

In the past 40 years or so, as a climate scientist, I have been devoted to research on 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 drastically been changing our planet by inducing “global warming” of the climate and degrading eco-systems. Particularly since the late 20th century, the impact of human activities has overwhelmed the entire earth, creating 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 devoted to this monumental issue by conducting diverse solution-oriented research under the mission of how human-nature interaction and relations ought to be. To achieve this mission, RIHN is committed to interdisciplinary research spanning the natural sciences,

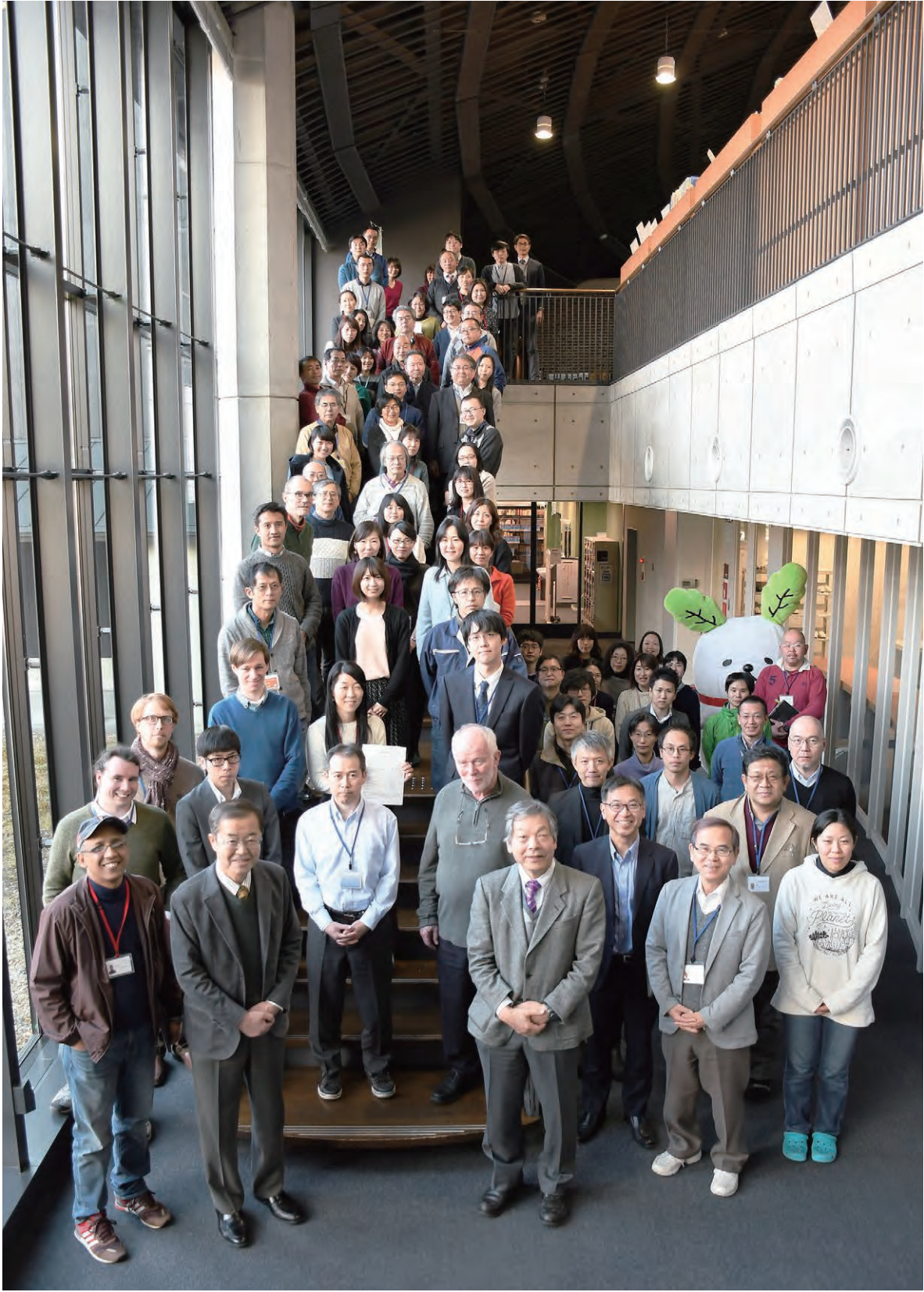
humanities, and social sciences, and in recent years, has shifted towards transdisciplinary research that involves collaboration with various stakeholders in society.

To effectively promote interdisciplinary and transdisciplinary research, in April of 2016 we launched a new research initiative by introducing three Research Programs, one Core Program, and the RIHN Center. With these new structures in place, we are now pursuing this initiative 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.

We are excited to implement these new research initiatives in 2019 and make progress on solutions to the many environmental challenges we face.

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

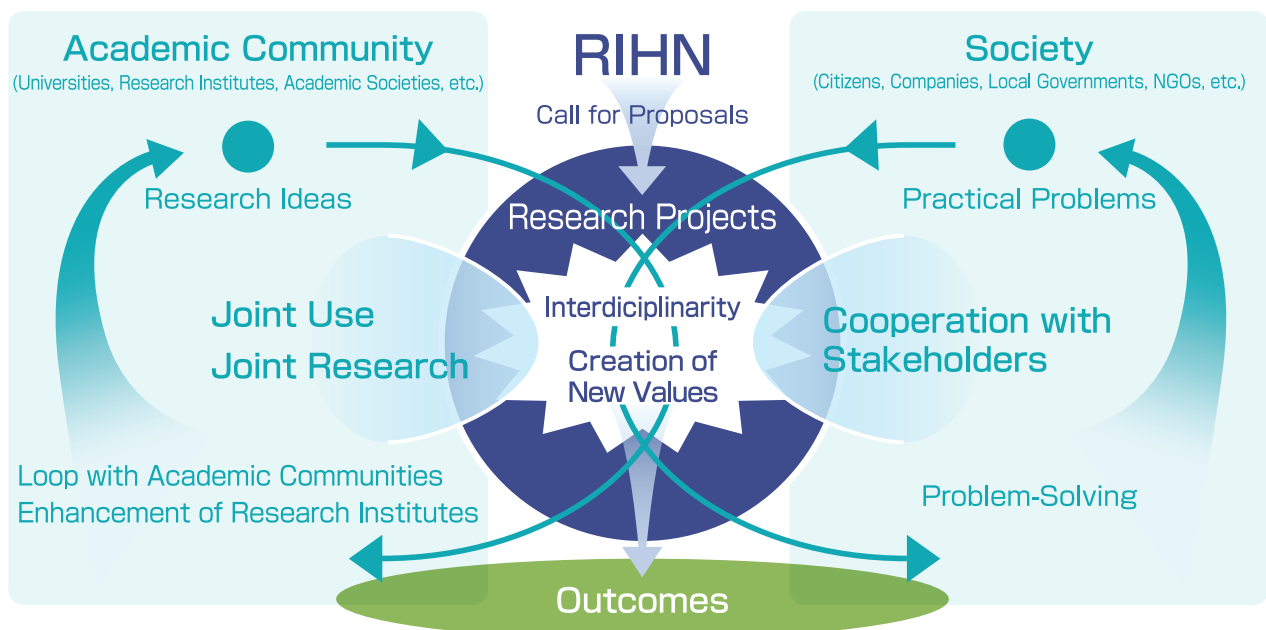
While other regions are not excluded, the primary geographical focus of RIHN research is on Asia. More broadly, RIHN strives to deploy an Asian perspective in its research on global environmental change

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.

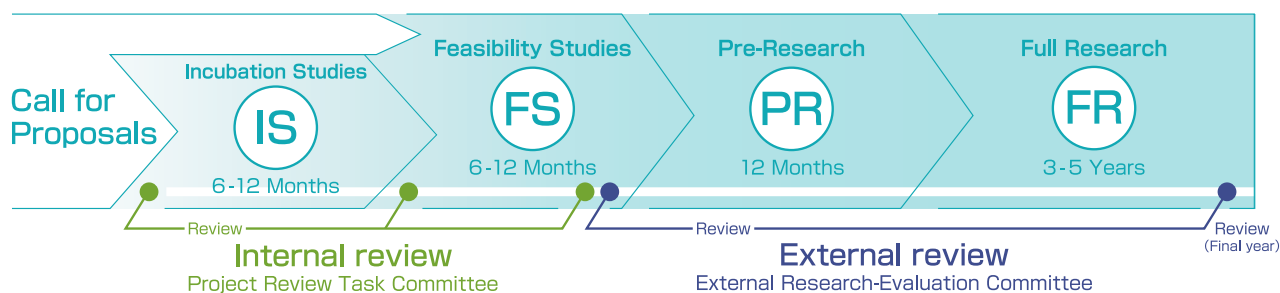
Program 2: Fair use and management of diverse resources

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.



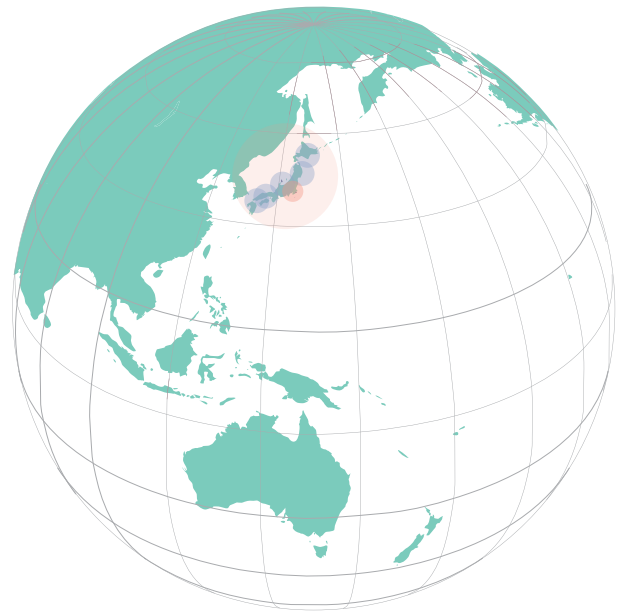
RIHN Center

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, public and user-specific 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.



Project Index



Research Program 1: Societal Transformation under Environmental Change SUGIHARA Kaoru 10-11

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

KOZAN Osamu 12-13

Research Fields : Indonesia, Malaysia

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

YOSHIDA Takehito 14-15

Research Field : Japan

Research Program 2: Fair Use and Management of Diverse Resources

NAKASHIZUKA Tohru 16-17

**Biodiversity-driven Nutrient Cycling and Human Well-being
in Social-Ecological Systems**

OKUDA Noboru 18-19

Research Fields : Japan, Philippines

**Mapping the Environmental Impact Footprint of Cities,
Companies, and Household**

KANEMOTO Keiichiro 20-21

Research Fields : World

Research Program 3: Designing Lifeworlds of Sustainability and Wellbeing

SAIJO Tatsuyoshi 22-23

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

Steven R. McGREEVY 24-25

Research Fields : Japan, Thailand, Bhutan, China

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

YAMAUCHI Taro 26-27

Research Fields : Zambia, Burkina Faso, Indonesia, Japan

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

SAKAKIBARA Masayuki 28-29

Research Fields : Sulawesi Island in Indonesia, ASEAN countries

Core Program

TANIGUCHI Makoto 30

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

TAYASU Ichiro 31

Research Field : Japan

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

KONDO Yasuhisa 32

Research Field : Japan

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 people's livelihood, by working closely with various stakeholders in local society in Asia. The project based in Sumatra's tropical peat swamp forest, under this program, has 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. Research also helps implement policies at local, national and international levels. This ongoing project, which cooperates with local universities, companies and officials, has already contributed to the development of regional and national policies to control peatland fires, which in recent years have become a significant environmental issue in Indonesia and beyond.

This program coordinates a variety of research projects along these lines, including another project on Eco-DRR under this program, in order to develop a perspective that helps direct research and social transformation in Asia.



Recent land development activities in some parts of tropical peatlands have led to unprecedented scales of forest fire incidents, which are a serious health threat to people in local areas and neighboring countries. This photograph shows a peatland fire in Tebing Tinggi Island, Riau Province, off the coast of Sumatra Island, Indonesia. It took approximately 10 days to extinguish the fire.



Program seminar at RIHN, January 18, 2019



Abandoned paddy fields located at the bottom of small valleys called “yatsu” in the Lake Inba area, Chiba Prefecture, Japan. Though rice farming was abandoned, they still have multiple functions including flood control, water purification and biodiversity conservation, which is the key feature of Eco-DRR (Ecosystem-based Disaster Risk Reduction).

Program Director **SUGIHARA Kaoru** RIHN

Trained in Japan (Doctorate at the University of Tokyo), I have held positions at the History Department of the School of Oriental and African Studies, University of London, the Center for Southeast Asian Studies, Kyoto University, the Graduate School of Economics, 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

Researchers

MASUHARA Naoki
YAMAMOTO Aya

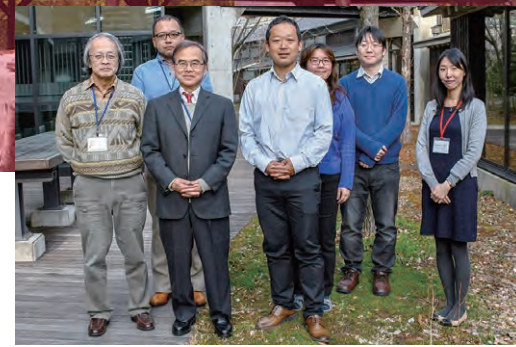
Senior Researcher
Research Associate



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

Project Leader **KOZAN Osamu** RHN/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 the 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. In order to address this dilemma, we also explore the transformability of peatland societies with trans-disciplinary approaches, in which we promote participation by villages 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



Photo 1 Social forestry workshop held in the village of Tanjung Leban (August 2018)



Photo 2 Drained peatland and oil palms in Pelalawan District (September 2018)

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 the 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 the 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 influences of haze on atmosphere, and the 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 across 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.

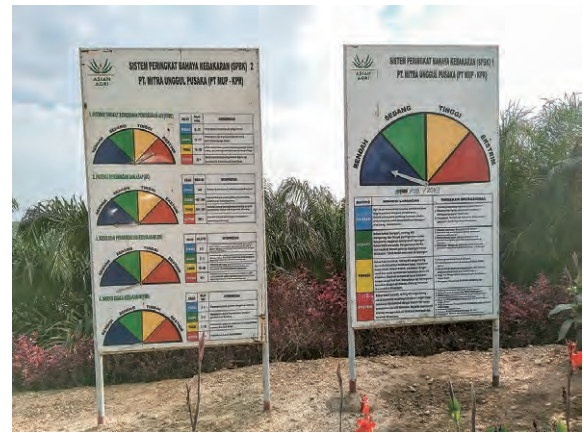


Photo 3 Signboards that show the degree of risk for peatland fire (September 2018)



Photo 4 Practice of planting indigenous trees for social forestry in the village of Tanjung Leban (August 2018)

Researchers at RIHN

KAJITA Ryosuke
OSAWA Takamasa
SHIODERA Satomi

Researcher
Researcher
Researcher/Kyoto University

YAMANAKA Manabu
KATSURA Tomomi

Researcher/Kobe University/JAMSTEC
Research Associate

Main Members

MIZUNO Kosuke
OKAMOTO Masaaki
ITOH Masayuki
SHIMAMURA Tetsuya
NAITO Daisuke

Kyoto University
Kyoto University
University of Hyogo
Ehime University
Kyoto University

KAWASAKI Masahiro
SATO Yuri
GUNAWAN, Haris
SABIHAM, Supiandi
DHENY, Trie Wahyu Sampurno

RIHN
Institute of Developing Economies, JETRO
Peatland Restoration Agency, Indonesia
Bogor Agricultural University, Indonesia
Indonesian Agency of Geospatial Information, Indonesia

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, we are increasingly faced with 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

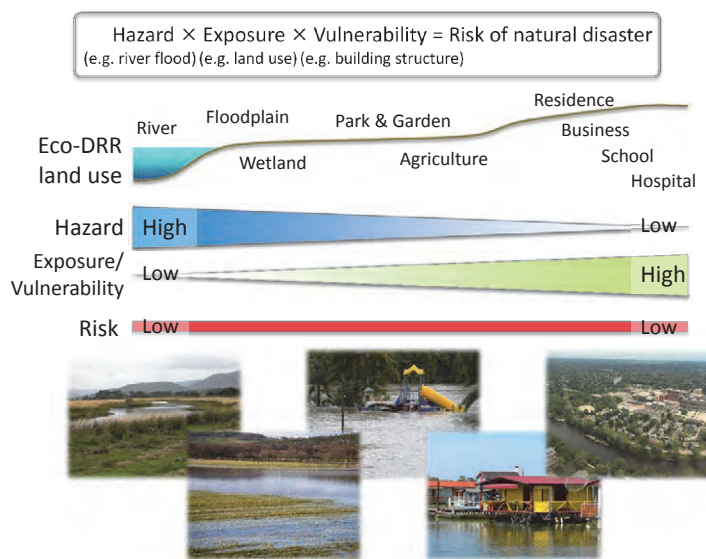


Figure 1 Ecosystem-based disaster risk reduction not only lowers disaster risks but also enhances benefits of ecosystem services by reducing the exposure of human activities in high-hazard locations and supporting human activities in low-hazard locations.

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 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 the risks of natural disasters in the present and the 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 scenario analysis and developing social and economic incentives of Eco-DRR

Together with local communities and governments, transdisciplinary platforms will be formed at research sites to deepen understanding of, discuss future options of, and build consensus around Eco-DRR approaches. Transdisciplinary scenario analysis under the conditions of climate change and declining population will be conducted. In addition, traditional and local knowledge

of disaster risk reduction will be inventoried and evaluated for multi-functionalities shared in the platform.

In collaboration with the insurance industry, a research forum will be formed to discuss the possibility and feasibility of industry-led contributions to and economic incentives for Eco-DRR. The research forum will also assess various laws and institutions in national and local governments related to disaster risk reduction and land use.

Recent results

The oriental white stork is an endangered bird species that once went extinct in Japan, and the reintroduction of this species has been progressed in Toyooka city and other places in Japan, emphasizing the need of conservation and restoration of its habitat. We explored the characteristics of the habitat by tracking individual birds by satellite, and found that paddy fields and adjacent forests are important component of the habitat. Comparing the habitat of oriental white stork with flood-prone areas demonstrated significant overlap between the two areas, suggesting that conservation and restoration of the habitat can lead to the reduction of flood disaster risk as well.

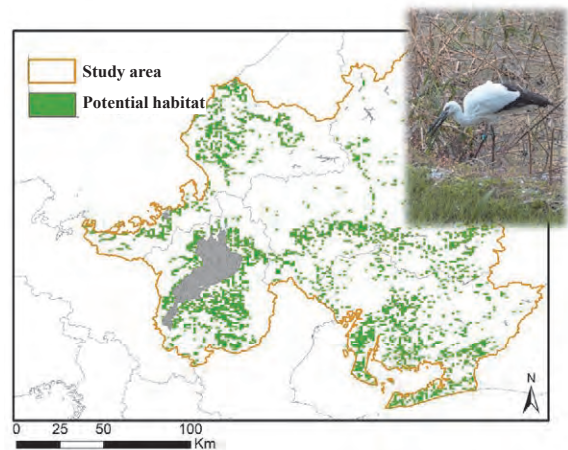


Figure 2 Map of the potential habitat of oriental white stork (green area) in central Japan.



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



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

Researchers at RIHN

HUANG, Wanhui
NAKAI Minami

Researcher
Research Associate

SENDA Masako
SHIMAUCHI Risa

Research Associate
Research Associate

Main Members

AKIYAMA Yuki The University of Tokyo
FUKAMACHI Katsue Kyoto University
FURUTA Naoya Taisho University / IUCN
HASHIMOTO Shizuka The University of Tokyo
ICHINOSE Tomohiro Keio University
MIYOSHI Iwao Kyoto Prefectural University
NISHIDA Takaaki Kyoto Sangyo University

NISHIHIRO Jun National Institute for Environmental Studies
SAITO Osamu United Nations University
SHIBASAKI Ryosuke The University of Tokyo
SHOUJI Tarou Toho University
TAKI Kentaro The University of Shiga Prefecture
UEHARA Misato Shinshu University
URASHIMA Hiroko MS&AD Insurance Group Holdings, Inc.

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 humanosphere 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. Internal Program discussions 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.

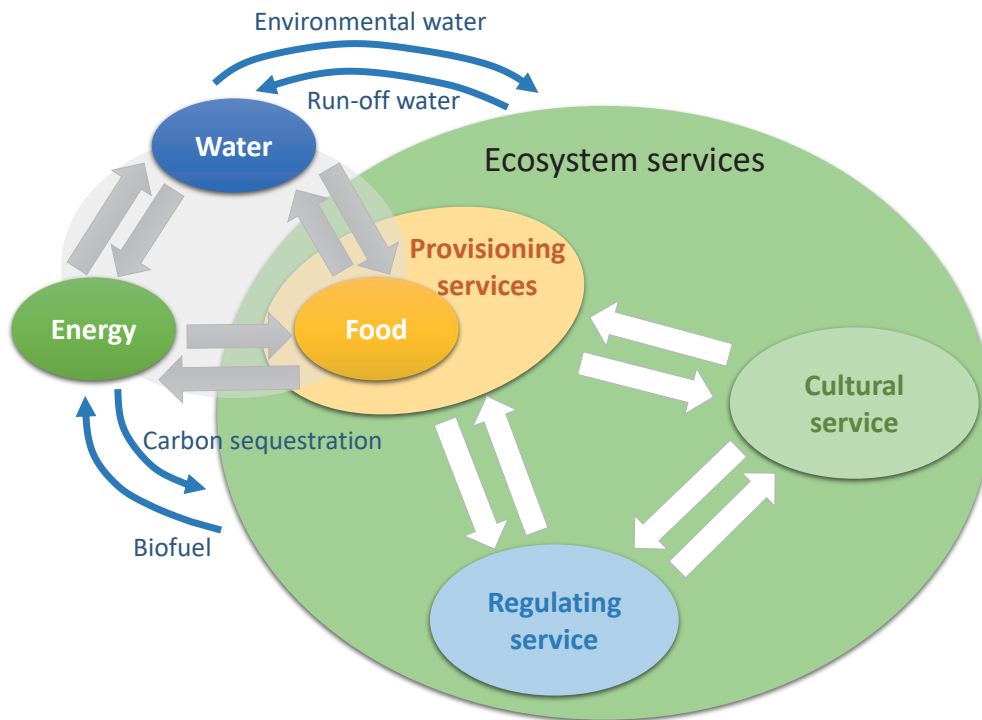
In 2018, we initialized a database of resource supply and demand in every prefecture in Japan in order to assist comparative and integrative analyses of research sites. One initial analysis of this database indicated that prefectural sustainability is related to population density. We would like to enhance this database's relevance as a decision-support tool at all levels, from the municipality- to the national-scale, and expand its ability to assess multiple resources.



Traditional agricultural landscape in Hanamaki, Iwate Prefecture, Japan



Land-use pattern in mountain area in Thailand



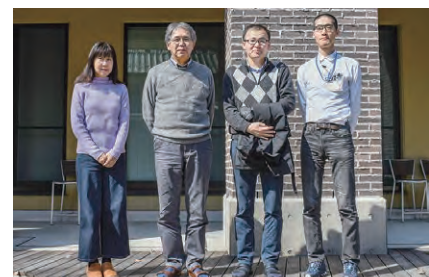
Nexus structure among water, energy, food, and ecosystem services

Program Director **NAKASHIZUKA Tohru** RIHN

Tohru Nakashizuka has studied forest ecology, biodiversity and ecosystem services at the Forestry and Forest Products Research Institute, Kyoto University as well as at Tohoku University. At RIHN, he is to study wise and fair use of diverse resources.

Researchers

KOBAYASHI Kunihiro Researcher
KARATSU Fukiko Research Associate



Biodiversity-driven Nutrient Cycling and Human Well-being in Social-Ecological Systems

Project Leader **OKUDA Noboru** RIHN

My specialty is ecology, the field of study concerned with the relationships between biodiversity and ecosystem functioning. One of ecology's central questions is why humankind should conserve biodiversity. As a member of the Center for Ecological Research at Kyoto University, I have approached this question by integrating different research fields related to biodiversity from gene to ecosystem. At present, I am developing a framework for adaptive watershed governance that allow new environmental knowledge to reconcile global, regional, and local ecological issues. I should also say that I love nature and humanity and how they come together very much!



Research background and objectives

Technological innovations in the use of nutrients, in particular nitrogen and phosphorus, have allowed global increases in population and economic prosperity in the Anthropocene. Overexploitation of nutrient resources, however, affects biogeochemical cycles and can lead to nutrient imbalances, eutrophication and loss of biodiversity. It is now recognized that the nutrient imbalances and biodiversity loss are prevalent in watersheds around the world, resulting in deterioration of ecosystem services in quality and quantity. These are considered global environmental issues, while their causes and effects vary among watersheds, in which there exist a variety of social issues specific to local communities.

Here we aim to develop a framework for adaptive watershed governance with two approaches (Fig. 1): a macroscopic approach to recognize and address environmental issues at the watershed level based on scientific knowledge; a microscopic social-cultural approach to empower local communities to achieve solutions of local issues.

Research methods

In adaptive watershed governance, stakeholders are involved in enhancement of biodiversity, nutrient cycling and well-being, according to our hypothesis that these are essential to the social-ecological health of watershed system and, like gears, also interdependently linked into community activities (Fig.1). We begin with action research to empower the communities for conservation of “familiar” nature, that is, natural phenomena of special significance to local life and livelihood. As conservation activities promote community sharing of cultural values of

familiar nature, community-based well-being is altered and reinforced by accumulation of bonding social capitals.

If such community activities enhance biodiversity and nutrient recycling, they may benefit stakeholders other than the community members in ways not easily registered by the local cultural values, but inspired by the social-ecological health of watershed. In disseminating such scientific knowledge to the public, our project will facilitate social involvement in conservation activities by non-community members who appreciate the value of social-ecological health. This shared awareness allows accumulation of bridging social capitals. As scientific knowledge is extensively shared among diverse stakeholders in the watershed, community members may gain institutional support from local governments. Integration of local and scientific knowledge further enhances community-based well-being, resulting in community empowerment.

To investigate this positive feedback process, we compare the consequences of watershed governance activities in two contrasting watersheds in Asia: the Lake Biwa Watershed (Japan) and the Laguna de Bay Watershed (Philippines). The former is an infrastructure-oriented society and the latter a high-nutrient loading society.

Research progress

We conducted synoptic research in order to visualize spatial patterns of biodiversity, nutrient cycling and subjective well-being in a whole catchment of Yasu River

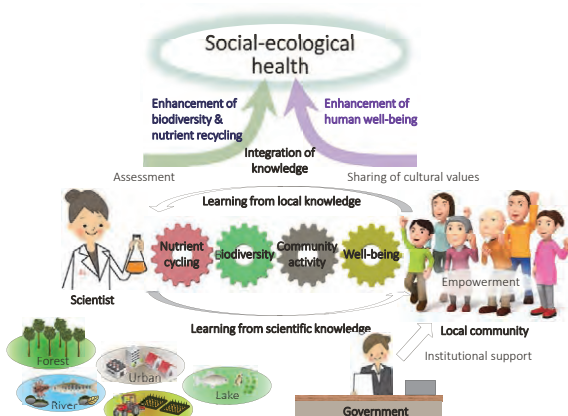


Figure 1 A conceptual schema of adaptive watershed governance



Figure 2 Action research with five focal communities in the Lake Biwa Watershed. Tree planting in upstream forests of Oh-hara (a), conservation of wetland biodiversity in terraced rice paddies of Kosaji (b), rehabilitation of habitat networks between a lake basin and rice paddies to facilitate fish spawning migration in Suhara (c), Conservation of lagoon landscape and rehabilitation of habitat networks between the lake basin and lagoons in Shina (d), Formation of a new community to recycle overgrown macrophyte debris in urban coastal areas (e; photo by INOUE Yasuo)

tributary to Lake Biwa. In parallel, action research has been practiced in five focal communities within the watershed (Fig. 2). In some communities, our social-cultural approach was effective in enhancing biodiversity, community-based well-being, and nutrient cycling (Fig. 3), whereas our action research is still in the process of building trust with other communities.

In the Silang-Santa Rosa sub-watershed of Laguna de Bay, urbanization has caused serious eutrophication and biodiversity loss in downstream areas. In this situation, it is difficult to restore stream environments through community conservation activities alone, and institutional and technological approaches to these issues may be required. We focused on groundwater as a key issue of common interest because all stakeholders depend on groundwater resources for their lives and livelihoods and are therefore highly concerned about groundwater overexploitation and pollution. Following our assessment of groundwater pollution, stakeholder workshops were held to discuss sustainable and fair use of groundwater resources (Photos 1a-b). A stakeholder assembly was co-organized with the watershed management council as a

step toward formation of a watershed forum as a platform for stakeholder involvement in watershed governance (Photos 1c-d).

We are also conducting action research to empower a mid-stream agricultural community to conserve a communal spring as an environmental icon of local groundwater. Its activities have been increasing with the organization of a conservation group. Comparison of watershed cases will allow us to summarize how social and ecological properties of watershed systems can affect applicability of our governance approach.

Perspectives

In developed societies, sewage treatment and tap water infrastructure systems have reduced eutrophication and improved comfort and convenience. Environmental consciousness of formerly familiar nature, however, has diminished. What kind of societal interactions with nature enhances human well-being? Is it enhanced by infrastructure? Our research seeks answers to these questions together with a variety of stakeholders.

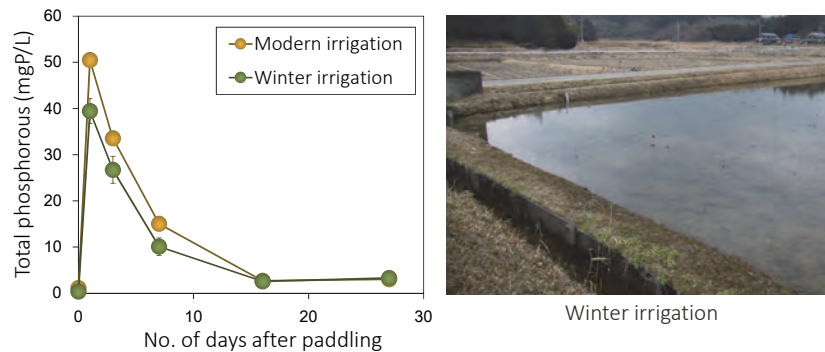


Figure 3 A lab experiment to compare temporal changes in total phosphorous concentrations in rice paddy waters after paddling (pre-planting field preparations) between modern and traditional winter irrigations. Phosphorous loading was significantly lower in the winter irrigation.



Photo 1 Workshops for a local community (a) and National Water Resource Board (b), and roundtable discussion (c) of the 1st Stakeholder Assembly (d) in the Silang-Santa Rosa sub-watershed.

Sub Leader

YACHI Shigeo

Kyoto University

Researchers at RIHN

IKEYA Tohru
ISHIBASHI Hiroyuki
ISHIDA Takuya

Researcher
Researcher
Researcher

UEHARA Yoshitoshi
WATANABE Kirie

Researcher
Research Associate

Main Members

IWATA Tomoya
BAN Syuhei
OSONO Takashi
TAYASU Ichiro

University of Yamanashi
The University of Shiga Prefecture
Doshisha University
RIHN

WAKITA Kenichi
ASANO Satoshi
SANTOS-BORJA, Adelina C.

Ryukoku University
Lake Biwa Environmental Research Institute
Laguna Lake Development Authority, Philippines

Mapping the Environmental Impact Footprint of Cities, Companies, and Household

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 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 decision-makers 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

Our findings are widely reported in the press, e.g. Scientific American, DailyMail, Newsweek, U.S. News, World Economic Forum, Kyodo News.

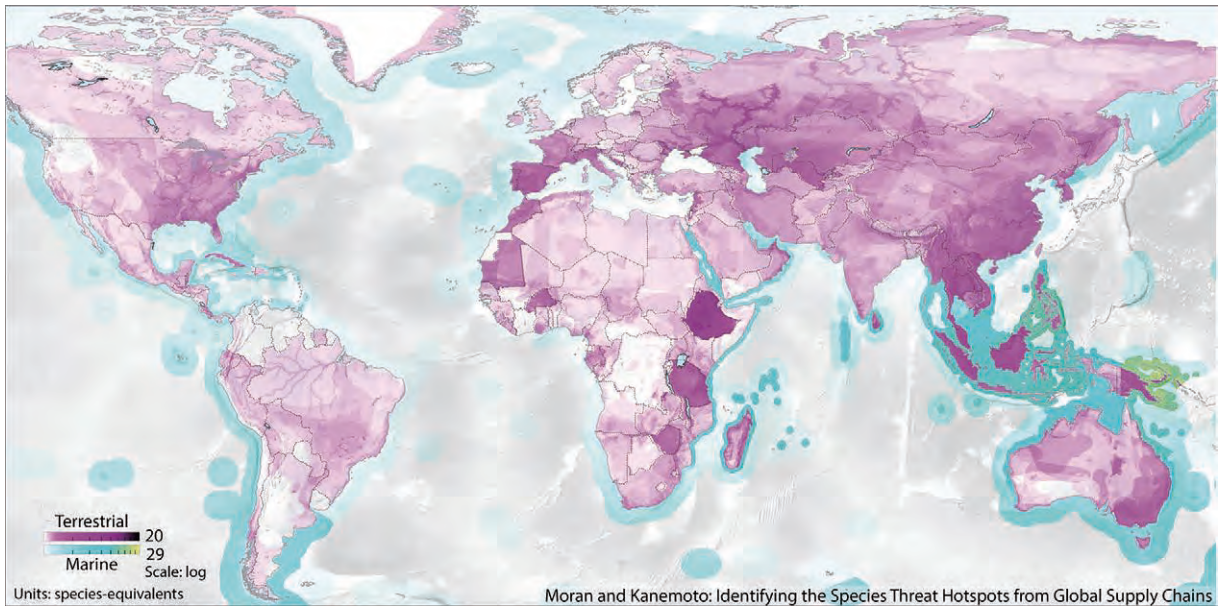


Figure 1 A map shows species-threat hot spots linked to consumption in Japan.

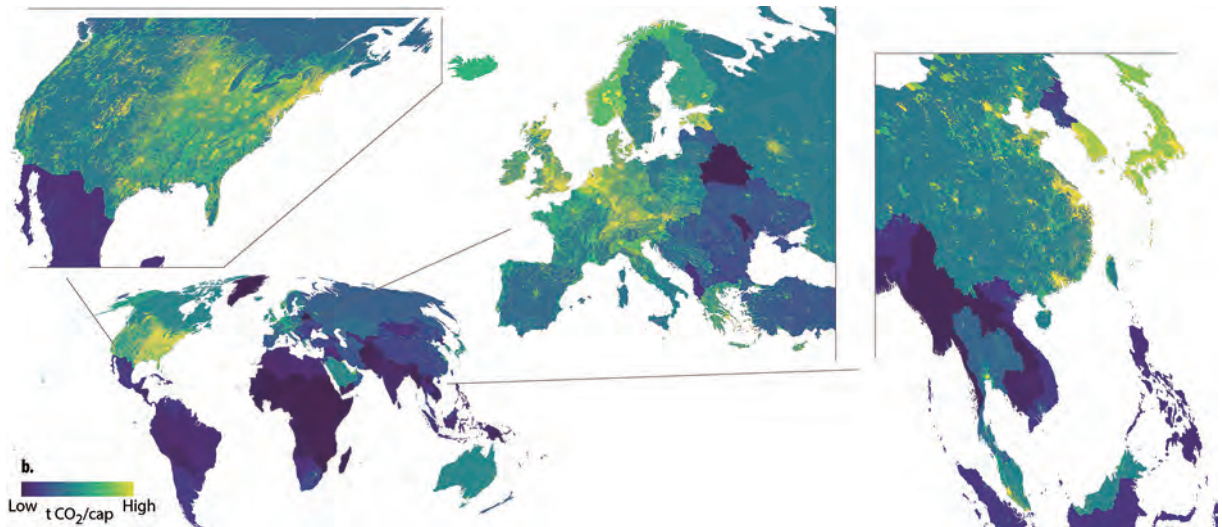


Figure 2 The carbon footprint of Asian cities.

Researchers at RIHN
NGUYEN, Tien Hoang
YAMADA Daiki

Senior Researcher
 Researcher

KATAFUCHI Yuya

Research Associate

Main Members

NAKAOKA Masahiro
NANSAI Keisuke
CHATANI Satoru
MATSUBAE Kazuyo
OHNO Hajime
MURAKAMI Shinsuke
SUGIHARA Soh
OKUOKA Keijiro
KAGAWA Shigemi
FUJII Hidemichi
SHIGETOMI Yosuke

Hokkaido University
 National Institute for Environmental Studies
 National Institute for Environmental Studies
 Tohoku University
 Tohoku University
 The University of Tokyo
 Tokyo University of Agriculture and Technology
 Nagoya University
 Kyushu University
 Kyushu University
 Nagasaki University

ITSUBO Norihiro
KONDO Yasushi
ASAYAMA Shinichiro
YAMAMOTO Yuki
SUH Sangwon
ODA Tomohiro
HERTWICH, Edgar
MORAN, Daniel
LENZEN, Manfred
VERONES, Francesca
GESCHKE, Arne

Tokyo City University
 Waseda University
 Waseda University
 Nagasaki University
 University of California, Santa Barbara
 NASA Goddard Space Flight Center
 Yale University
 Norwegian University of Science and Technology
 The University of Sydney
 Norwegian University of Science and Technology
 The University of Sydney

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.

The highlight of this year was the Program's session in World Social Science Forum 2018 at Fukuoka (Lifeworlds of Sustainability and Well-being in a Shrinking Japan). Both the FEAST Project and the Sanitation Value Chain Project research the ways in which depopulation is affecting the sustainability and well-being of those in rural Japan. At the same time, Japan's shrinking society represents an opportunity to reduce overall ecological impacts, rethink the values associated with well-being, and restructure economic interrelationships to align with reduced resource consumption. Peter Matanle (University of Sheffield), Steven McGreevy, Ken Ushijima (Sanitation), Yui Takase (Ibaraki University), and Christoph Rupprecht (FEAST) reported their research results. The output of this session will be a book from Springer.



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



Socialization of composting type toilet in Burkina Faso, Photo by ITO Ryusei

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.



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 (GHG emissions, resource overuse, pollution, soil fertility), loss of diversity (biological, cultural, knowledge), and deterioration of small-scale farming due to globalizing market forces. At points of consumption, over-reliance on globalized food flows limits consumer agency and decreases food security and sovereignty. The ways in which food is provided, consumed and governed need urgent change, but we lack understanding of how agrifood transitions emerge and take root, or of the role of existing and alternative institutions and policy, social practices, future visions, and economic arrangements, in advancing sustainable transitions.

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.

FEAST's process of co-design and co-production of



Photo 1 Visioning workshops with farmers, consumers, NPO, and government officials held in Kyoto City, February 2018 (bottom), backcasting group work output (upper left), and "food policy council simulator" game (upper right).

sustainable food systems seeks to challenge mainstream economic thinking on consumption and growth. 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. FEAST seeks knowledge and mechanisms that can redefine the notion of long-term food security.

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) knowledge of two intervention strategies: the social learning dynamics affecting execution and effectiveness of workshop-based consensus-building for collective food action; and the significance of new methods of market transparency (e.g. eco-labels, food impact smartphone apps) in food system change.

Progress to Date

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

The Ecological Footprint of Japan's food consumption was analyzed for all 47 prefectures and showed that imported animal feed and ingredients for processed foods comprised a significant portion of the overall impact. Urban Japanese prefectures and cities had a much higher

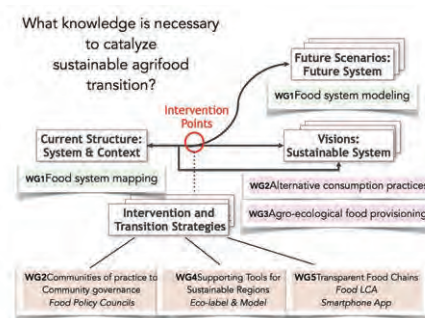


Figure 1 Diagram detailing how each FEAST working group is organized around the question of "What knowledge is necessary to catalyze sustainable agrifood transition?" Four kinds of knowledge are listed: 1) Current system and contextual knowledge; 2) Visions of sustainable future systems knowledge; 3)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

footprint than their rural counterparts (Figure 2). One way to reduce environmental impact from food consumption would be through increased local production via urban agriculture. Unfortunately, a study using satellite imagery to map both formal and informal urban agricultural land use change in Kyoto City found that agriculturally productive land decreased by 10% over the last 10 years to housing development (40% post-ag. use) and abandonment (28% post-ag. use), even though Kyoto is a shrinking city. These findings emphasize the need to intervene at the municipal level for policies that address food system sustainability.

Last year, six workshops were held across the four Japanese sites (Kyoto: 3, Kameoka: 1, Nagano: 1, Akita: 1) on a range of issues relevant to local food policy and the issues stakeholders felt were urgent and actionable, including rural futures and ideal future school lunches. These multi-method workshops utilized visioning, backcasting, role-playing, and gaming methods with local food-related actors and government officials and will be linked with future scenario modelling and local policy

Comparison of regional ecological footprint for food consumption (Japan)

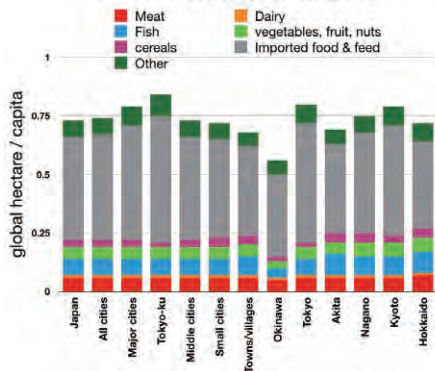


Figure 2 Comparison of regional ecological footprints for food consumption in Japan. Imported food and animal feed is most impactful, while regional differences in overall impact are evident.

proposals and plans. (Photo 1)

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. Work on urban bee-keeping found that low social awareness (and not pesticide use) is the main obstacle to keep bees in cities. (Photo 2)

In Bhutan, a front-runner of sustainable development in Asia, extensive interviews and surveys in three rural districts revealed wide-ranging changes in on-farm practices and food consumption patterns. Follow-up studies are underway in urbanizing districts to capture how Bhutan might develop its food system in a sustainable way. (Photo 3)

FEAST maintains research partnerships with the University of California at Berkeley, Royal University of Bhutan, Mahidol University, Shanghai Academy of Agricultural Science, as well as Kameoka and Noshiro Cities (Japan) and plans to partner with University of Utrecht next year.



Photo 2 Investigating informal food practices: fieldwork with urban hobby bee-keepers (upper left), seminar on bee-friendly cities (below)



Photo 3 Community and market fieldwork as well as household surveys in Bhutan.

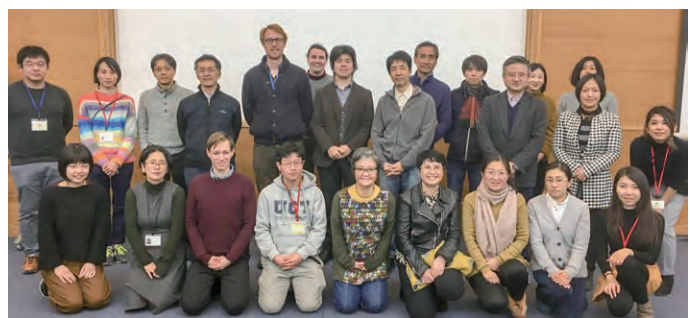


Photo 4 FEAST Project Annual Assembly held at RIHN 13-14 January 2019.

Sub Leader

TAMURA Norie Senior Researcher

Researchers at RIHN

RUPPRECHT, Christoph D. D. Senior Researcher
KOBAYASHI Mai Researcher
ODA Kimisato Researcher
OTA Kazuhiko Researcher

SHINKAI Rika Researcher
SPIEGELBERG, Maximilian Researcher
MATSUOKA Yuko Research Associate
KOBAYASHI Yuko Research Associate

Main Members

TSUCHIYA Kazuaki The University of Tokyo
HARA Yuji Wakayama University
AKITSU Motoki Kyoto University
TACHIKAWA Masashi Nagoya University
TANIGUCHI Yoshimitsu Akita Prefectural University
NAKAMURA Mari Nagoya Bunri University

TANAKA Keiko University of Kentucky, USA
SUDO Shigeto National Agriculture and Food Research Organization
SHIBATA Akira Ritsumeikan University
KISHIMOTO-MO Ayaka National Agriculture and Food Research Organization
INABA Atsushi Kogakuin University

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 sanitation 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) Peri-urban 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

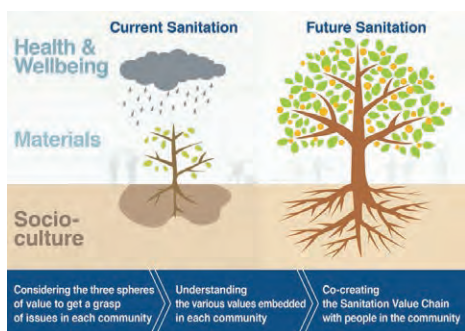


Figure 1 The concept of three values from the point of Co-creation (Figure by KATAOKA Yoshimi)

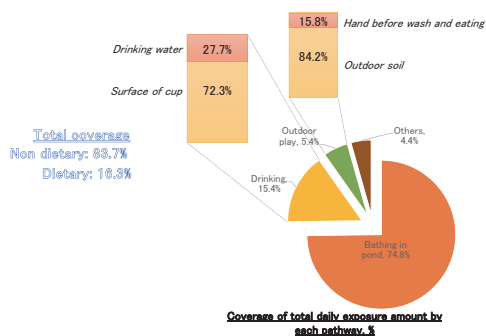


Figure 2 *E. coli* exposure pathways. Example of measurement in Bangladesh, From: Harada et al. (2017) Fecal exposure analysis and *E. coli* pathotyping: a case study of a Bangladeshi slum, International Symposium on Green Technology for Value Chains 23-24 October, 2017, Balai Kartini, Jakarta.

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) Establishment of “Children and Youth Club” and implementation of action research. In the peri-urban areas of Lusaka, the capital of Zambia, we established a group called *Dziko Langa* (My Community) and conducted action research. Children and youth drew pictures and took photographs of scenes considered as community problems related to sanitation, giving

explanatory narratives of their work (“Arts-based” and “PhotoVoice” approaches). The groups then held open sanitation exhibitions in their communities. Through these activities, we were able to clarify community sanitation challenges and to discuss problems with community residents.

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

1. We published the second volume of the international multi-disciplinary academic journal “Sanitation Value Chain”, (Figure 3) and an academic book “Resources Oriented Agro-Sanitation Systems: Concepts Business Model and Technologies” (Funamizu (ed.) 2018, Springer).
2. In Zambia, we organized an exhibition to showcase the results of the action research which we had done with our local youth group based in 2 communities in Lusaka, the capital city of Zambia. The exhibition attracted many people including residents and Members of Parliament elected in the study area. We set up an exhibition booth at ZAWAFE 2018 held in Lusaka. The exhibition was well received, and we were honored to receive a visit from Vice President of Zambia (Photo 1) (visiting of exhibition booths was based on special selection). In addition, the project leader, project members, and *Dziko Langa* held a 3 day Sanitation Festival, with the first day being a march officially opened by the Mayor of Lusaka.
3. In Burkina Faso, we have researched private companies and workers who remove fecal sludge in the capital city (Ouagadougou). Demand for removal of fecal sludge has been increasing along with the rapid population growth in Ouagadougou. It is also noted that the workers have developed a unique method of removing fecal sludge in the rural area (Kongoussi).



Figure 3 International academic Journal “Sanitation Value Chain” Vol.2 No.1



Photo 1 Action research in Zambia: Vice President of Zambia visited the *Dziko Langa* Exhibition Booth at ZAWAFE 2018 (Photo by NYAMBE, Sikopo P.)

Sub Leader
FUNAMIZU Naoyuki Murooran Institute of Technology

Researchers at RIHN

NAKAO Seiji Senior Researcher
HAYASHI Koji Researcher
SHIMIZU Takao Researcher

KIMURA Ayako Research Associate
HONMA Saki Research Associate

Main Members

ITO Ryusei Hokkaido University
USHIJIMA Ken Hokkaido Research Organization
IKEMI Mayu Sapporo International University
KATAOKA Yoshimi Hokkaido University
SANO Daisuke Tohoku University
NABESHIMA Takako Hokkaido University

FUJIWARA Taku Kochi University
HARADA Hidenori Kyoto University
INOUE Takashi Hokkaido University
SINTAWARDANI, Neni Indonesian Institute of Science (LIPI), Indonesia
NYAMBE, Imasiku Anayawa 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** Ehime University

Professor Masayuki Sakakibara is an earth scientist with multidisciplinary backgrounds of Geology, Petrology, Astrobiology, Geochemistry, Medical Geology, Geoengineering, and Remediation Engineering etc., currently working at Faculty of Collaborative Regional Innovation and Graduate School of Science and Engineering, Ehime University in Ehime Prefecture. His strong 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 the embryonic and early-childhood development of humans, and is extremely toxic to the human body. Mercury pollution is one of the most serious environmental issues and requires global action for its resolution. 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 3 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 has long been discussed. However, the behavioral patterns that make it difficult for those living

under chronically impoverished conditions to escape from those conditions are still not well understood (Sen, 1999; Banerjee and Duflo, 2011). The Minamata Convention on Hg is a global treaty established to protect human health and the environment from the adverse effects of Hg. The Convention addresses ASGM and the development of national plans to manage ASGM.

Research Objects

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

Methodology and research process

Our project will conduct the following research in ASEAN countries:

- a) Case studies on reduction of Hg pollution using a future scenario of ASGM in Indonesia and Myanmar
- Project members will (1) undertake environmental impact assessments; (2) study living conditions, cultures, history, and regional sociology; (3) cultivate or organize transdisciplinary communities of practice (TDCOPs) used



Figure 1 The Hg amalgamation process for getting gold in ASGM

(d) Theoretical and practical studies of the design, practical use, & evaluation of transformative boundary object (TBO), & cultivation, development process, & roles of transdisciplinary community of practice (TDCOP)

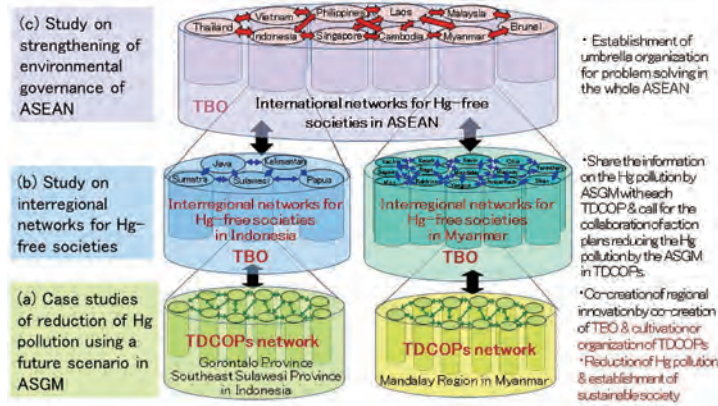


Figure 2 Whole structure of SRIREP project

by transdisciplinary boundary object (TBO); (4) co-create future scenarios; (5) co-design and co-produce with TDCOP members and other stakeholders; and (6) evaluate the progress of regional innovation through social and economic studies.

b) Study on interregional networks that aim to generate Hg-free societies in Indonesia and Myanmar

Study of interregional networks will be conducted in three steps: (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.

c) Study on improvements in environmental governance in ASEAN countries

Project members will study the principles and processes used for multilayer and cooperative environmental governance. They will also investigate to strengthen environmental governance of the ASEAN countries.

d) Theoretical and practical studies of the design, practical use, and evaluation of TBO, and cultivation, the development process, and roles of TDCOP

Project members will design TBOs and then use and evaluate them in order to cultivate the development processes of TDCOPs with the collaboration of key stakeholders at the study areas.

Expected goals of the project

Regional innovation will arise as a consequence of environmental and industrial innovations introduced with a transdisciplinary approach, including the development of a future scenario for 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.

Photo1 The 3rd international conference of the Transdisciplinary Research on Environmental Problems in Southeast Asia (TREPSEA2018)



Photo2 A TDCOP meeting on the valuable agriculture in Indonesia

Sub Leader

TANAKA Katsuya Research Center of Sustainability & Environment, Shiga University

Researchers at RIHN

KIMIJIMA Satomi

Researcher

KUANG Xiaoxu

Researcher

Win Thiri Kyaw

Researcher

Myo Han Htun

Research Associate

TAKEHARA Mari

Research Associate

Main Members

MATSUDA Hiroyuki

Yokohama National University

KASAMATSU Hiroki

Ehime University

SHIMAGAMI Motoko

Ehime University

MIYAKITA Takashi

Kumamoto Gakuen University

MATSUMOTO Yuichi

Kwansei Gakuin University

Fenty U. Puluulawa

State University of Gorontalo

Idham A. Kurniawan

Institut Teknologi Bandung

Basri

College of Health Sciences Makassar

Bobby

Network Activities Groups

Zahra R. Intansari

Indonesian Public Health Association

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.



13th core program meeting

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 the president of the Japanese Association of Groundwater Hydrology. 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

Researcher



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

Project Leader **TAYASU Ichiro** RIHN

Dr. TAYASU was Assistant Professor at RIHN (2002), Associate Professor at Kyoto University (2003), and is currently a Professor at RIHN (2014). His research focuses on isotope ecology and isotope environmental science.



This project investigates 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.

This study seeks to establish methodologies for the use of environmental traceability in environmental studies. A combination of quantitative and qualitative tools, including “Multi-Isoscapes”, (the use of multiple elements and isotope ratios together with GIS-based mapping techniques), social surveys, and workshops are deployed to investigate the role of environmental traceability in addressing environmental issues. We hypothesize that the role and perception of

traceability methods in transdisciplinary processes will differ among stakeholders and that the co-production of “Multi-Isoscapes” can act as an effective bridging tool for understanding and explaining variation in local environments. The ultimate objective of this research is to demonstrate the effectiveness of multi-isotopic information in solving global environmental issues.

Project research tests: (I) the effectiveness of the environmental traceability concept in environmental studies by comparing case studies in which isotopic methods were initiated by local government, citizen groups, and researchers; (II) the extent to which these different stakeholders hold different views of the concepts of food traceability and environmental traceability and the effectiveness of these concepts in communicating links between food production and consumption. Field research is taking 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.



Photo 1 Hongan-Shozu pond in Ono City, Fukui, recharged by ground water

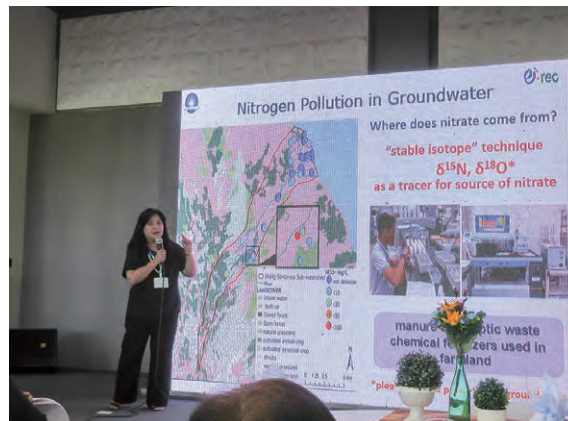


Photo 2 The multi-stakeholder workshop on the Silang-Santa Rosa Watershed in the Philippines, where we presented the results and used a questionnaire to study the effectiveness of our environmental traceability methodology

Researcher at RIHN

FUJIYOSHI Lei

Researcher

Main Members

NAKANO Takanori

RIHN / Waseda University

SHIN Ki-Cheol

RIHN

YABUSAKI Shiho

RIHN

KONDO Yasuhisa

RIHN

OKUDA Noboru

RIHN

MCGREEVY, Steven R.

RIHN

MORI Seiichi

Gifu Kyoritsu University

YOKOO Yoriko

Doshisha University

YAMADA Yoshihiro

SAKAI Motoya

TOKUMASU Minoru

OOMORI Noboru

OHKUSHI Ken'ichi

MITSUHASHI Hiromune

YOKOYAMA Tadashi

Kagawa University

Ono City Office

Saijo City Office

Oshino Village Office

Kobe University

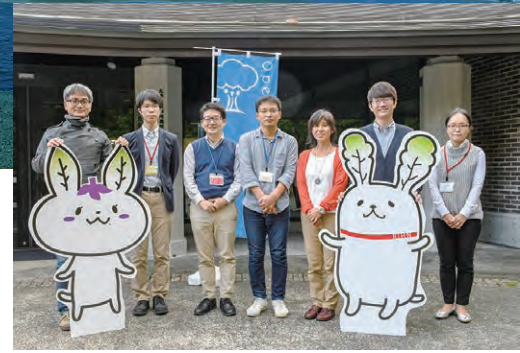
University of Hyogo / Museum of Nature and Human Activities, Hyogo

Hyogo Prefectural Ako School for Students with Special Needs

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

Project Leader **KONDO Yasuhisa** RIHN

Yasuhisa Kondo has worked for five years as an associate professor at the Information Resources Division of the RIHN Center. Originally, he studied archaeology and geographical information sciences (The University of Tokyo PhD 2010). 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 approach them, 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 actors. This Core Project, also called the Open Team Science (hereafter OpenTS) 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) discovering and sharing the goals that actors with different interests can tackle together (transcending); (2) considering ethical equity, with special attention to empowering marginalized (or “small voice”) actors; (3) developing fair data visualization based on the FAIR (findable,

accessible, interoperable, and reusable) principles; and (4) facilitating dialogue. Civic Tech can be applied as a holistic approach. It is an open governance approach in which civic engineers develop a solution to local issues by using open governmental data and information and communication technologies.

As a working hypothesis, the proposed methodology is assessed and improved in an iterative process through practical case studies of community-based participatory research projects for socio-environmental issues (the hypothesis-practice-assessment cycle), with special interest in developing a method to measure participants’ perceptual transformation.

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, 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.



A workshop held in the city on the shore of Lake Biwa with participation of research experts, civic engineers, municipality officers, local business people, and residents.



A graphic recording facilitates conversations during the workshop (graphic facilitator: Yuu Aruga).

Researcher at RIHN

NAKAHARA Satoe

Researcher

SUETSUGU Satoko

Research Associate

Main Members

KANO Kei
KUMAZAWA Terukazu
NAKASHIMA Ken'ichiro
ONISHI Hideyuki
OSAWA Takeshi

Shiga University/Social Dialogue Skills Laboratory
 RIHN
 Hiroshima University
 Doshisha Women's College of Liberal Arts
 Tokyo Metropolitan University

MIYATA Akihiro
NAKATSUKA Takeshi
OKUDA Noboru
SATO Kenichi
VIENNI BAPTISTA, Bianca

The University of Tokyo
 Nagoya University
 RIHN
 Kyoto Sangyo University/Hatenathon Lab
 ETH Zurich, Switzerland



Above: UEHARA Yoshitoshi, Silang-Santa
Rosa River, Philippines Bottom: IKEYA Tohru,
Phenology at RIHN, Kyoto, Japan

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 Tsugihiko	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

Societal Adaptation to Climate Change: Integrating Palaeoclimatological Data with Historical and Archaeological Evidences

Project Leader **NAKATSUKA Takeshi** RIHN

We have reconstructed the last 5000 years of climate variations in Japan and Asia using high-resolution paleoclimate archives such as tree rings, coral rings, old diaries, and sediments. Tree-ring cellulose oxygen isotope ratios have disclosed variations in summer precipitation (annual resolution) since the Jomon-era, by which we have elucidated climate variations behind Japanese history at all time scale from 1 to 1000 years. Comparisons of the paleoclimate data with paleographic and archaeological archives have been drastically improving our understanding of the climate-history relationship in Japan. Numerous works of literature on disasters like cold summer, flood and drought since the Ancient period have been confirmed paleoclimatologically. We have found a tight relationship between climate variations and socio-economic indices like agrarian production, prices of commodities and regional population in Medieval and Early Modern periods and the correspondence of village distribution and irrigation development to precipitation changes in the Prehistorical period. We have also developed a new dendrochronological method to date archaeological wood using oxygen isotope ratios for better chronological comparisons of climate change and the ways in which prehistorical people responded. By comparing the paleoclimate data with famine and war records, we have realized that multi-decadal large variations in temperature and/or precipitation bring serious negative impacts on human societies (Figure 1). Moreover, we have discovered the fact that multi-decadal climate variability is enhanced regularly at about 400-year intervals when simultaneous political regime shifts occur over wide areas including Japan and China, which suggests the importance of climate variations as a key factor of global history studies.

Although we have confirmed tight linkages between

climate and Japanese history, this was not the final goal. We can contribute to studies of global environmental issues in two ways besides making science-based predictions of future climate. One is to extract universal lessons from historical climate adaptations. Although past people often got into difficulties when they encountered the enhancement of multi-decadal climate variation, they eventually overcame it by modifying societal systems. We should learn from historical lessons to make new sustainable societies by overcoming difficulties such as enhancement of social inequality due to natural and social environmental changes. Our work also contributes to the issue of faithfully confronting the diversity of past people. As our sense of values is different from those of Pre-Modern people, values of future generations must be different from those of ours. To establish a “furable” society, one of RIHN’s aims, we should recognize how temporal change and value change are linked, so that we may understand the real sense and meaning of people and societies responses to climate variation.

We are editing six Japanese volumes and one English volume to synthesize project results as well as many original papers and books in the fields of paleoclimatology, history, and archaeology. We have already started a new inter-disciplinary research project on “reevaluation of calendar ages and climate-history relationship in the prehistorical Japanese archipelago using tree-ring oxygen isotope ratios” by collaborating with many archaeological investigators belonging to many local governments in Japan. A huge amount of paleoclimate data obtained in this project are to be used in the framework of historical big-data analyses on paleogeography and disaster prevention and reduction research for contemporary societies.

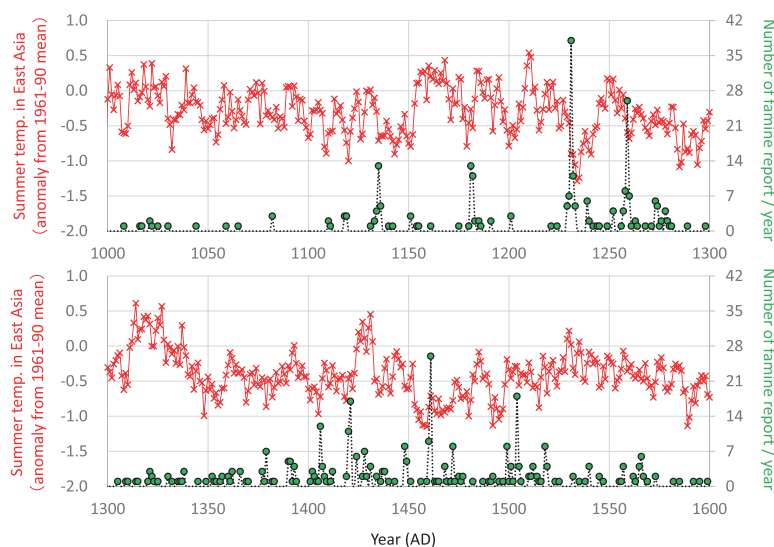


Figure 1 Variations in East Asia summer temperature (red: reconstructed from tree ring width database in Asian wide region) and famine reports in Japan (green: number of old documents from each year containing famine-words) during Medieval period.



Above: Maximilian SPIEGELBERG, Exploring Dochula, Bhutan

Bottom: NAKAHARA Satoe, A diving fisherman and his grandson, Mejjatto Islet, Marshall Islands. Local people believe that ocean currents carried the float to the islands from Japan after the March 2011 Tsunami.

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.



Above: KONDO Yasuhisa, Primeval window, Wadi Tanuf, Oman

Bottom: UEHARA Yoshitoshi, Interview Survey in Santa Rosa, Philippines

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

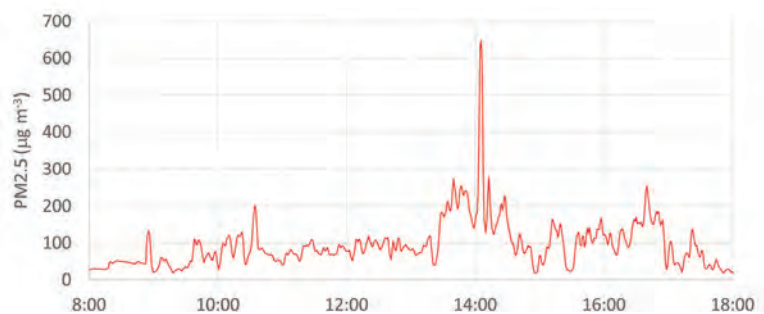
HAYASHIDA Sachiko, Nara Women's University

Area : North India

Human health in many developing countries, and especially India, is often threatened by declining air quality. This study tackles the issue of air pollution arising from large-scale burning of rice straw after harvest in the state of Punjab. Burning of rice straw in Punjab has been linked with significant air pollution in Delhi and surrounding regions. To address the problem, we will take an interdisciplinary approach and pursue a pathway of social transformation toward clean air, public health and sustainable agriculture.



A photo of straw burning taken at Ludhiana in the state of Punjab on November 2, 2018.



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 Photo 1. Note that the WHO guideline of 24-hours average criterion is 25 µg/m³.

FS | Strategic and Practical Transition Research to Establish City Energy Systems Sustainable for the Next 1,000 Years

KOBASHI Takuro, National Institute for Environmental Studies

Area : Kyoto, Shenzhen, San Diego

Using increasingly cheaper renewable energy, we aim to decarbonize urban energy systems and establish sustainable energy systems for the next 1,000 years. Taking Kyoto, Japan, Shenzhen, China, and San Diego, California as cases, we conduct research on techno-economic analyses, Future Design (FD), smart cities with culture and traditions, distributed energy systems, energy policy and institution, and sustainable culture, practice, and behavior. Working with citizens, policy makers, NGOs, industries, and researchers, we aim to realize urban energy transitions toward sustainable and livable cities by 2040.



Photo With researchers at China Development Institute in Shenzhen.

FS | Sustainable Urban Design Using Inclusive Wealth

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.



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

FS Humanities for the Environment: Developing a Cultural Approach to Environmental Knowledge

Daniel NILES, RIHN

Area : Japan, Thailand, California

This project takes a humanistic approach to the study of environment and environmental problems. Its central goal is to identify non-scientific bodies of environmental knowledge that have sustained communities for generations, centuries, and millennia, to describe the structure and quality of this knowledge, and derive lessons of its relevance to contemporary social-ecological challenges. Project research explores agro-ecosystems and food systems, medicinal knowledge, built environment, and traditional craft as expressions of relatively localized systems of environmental knowledge. It examines the ways in which such traditional forms of knowledge operate primarily in the cultural realm and yet are also essential to cultural and ecological persistence through time.

This project examines the links between material culture and landscapes from local actors' points of view. This graphic describes the links between forest landscape and ecology, quality of timber, techniques of kiln management, and use of high quality charcoal (known as binchotan) produced in Wakayama Prefecture, Japan.



FS Future Image of Living Sphere by Restructuring Sustainable Relation between Humans and Land

OKABE Akiko, Graduate School of Frontier Sciences, the University of Tokyo

Area : Informal settlements in Latin American countries

Informal settlements constitute an indispensable part of recent global socioeconomic world. While most discussion of improvements of their livelihoods has centered on securing tenure by consolidating property rights, this project focuses on the issue of 'possession' rather than property. It encompasses the re-evaluation of the indigenous ontological perceptions of the environment. The goal of this project is to demonstrate the potential of human-land relationships based on the perspective of 'Living Sphere Tenure Security' in real neighborhoods in Latin America. It does so with the subjective contribution of local people through participatory micro-practices as well as through alternative proposals to the local government plans and policies.



Micro-practice with local people to mitigate erosion by building piling walls in Barrio Cantera, an informal settlement with landslide risk in San Martín de los Andes, Argentina. October 2018.

CORE FS

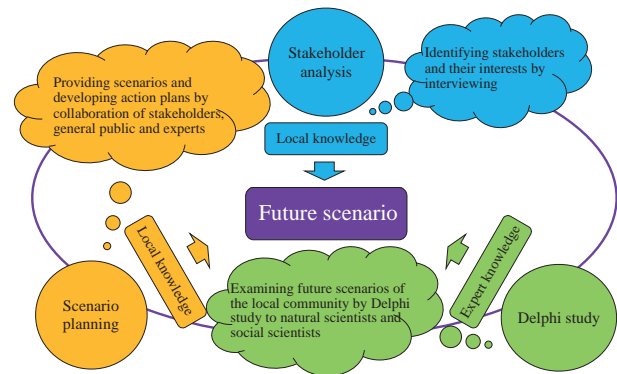
Development of the Methodology for the Integrated Future Scenario Building with Trans-disciplinary Approach

BABA Kenshi, Faculty of Environmental Studies, Tokyo City University

Area : Beppu, Hakone, and other local communities with groundwater or hot spring resources

As trade-offs within nexus issues of water-energy-food usually come along with scientific disputes, building a consensus among stakeholders using scientific evidence is required to realize a sustainable society. To this end, we try to develop a transdisciplinary methodology for integrated future scenario building. We intend to establish the methodology to improve science-based policy-making processes.

An Idea of Integrated Future Scenario Building with Trans-disciplinary Approach



CORE FS

Synthesis, Analysis, and Typology of TD Case Studies aiming at Solving the Global Environmental Problems

ONISHI Yuko, RIHN

Area : Global

Transdisciplinary methods (TD) are increasingly acknowledged as useful to addressing global environmental issues. TD research is undertaken together with stakeholders associated with the issues in various ways, so as to help identify the real causes, societal impacts, and measures that can realistically be implemented. However, TD research is currently exercised using a wide variety of definitions, processes and outcomes. We synthesize TD research by developing a database of case studies. We then analyze the case studies in order to develop a typology and identify regional characteristics and appropriate engagement processes according to societal backgrounds.



TD research database in development



Above: OSHIUMI Keiichi, Rainbow in the sea, Iwate, Japan
Bottom: KIMURA Aoi, Jungle in Maui, Hawaii



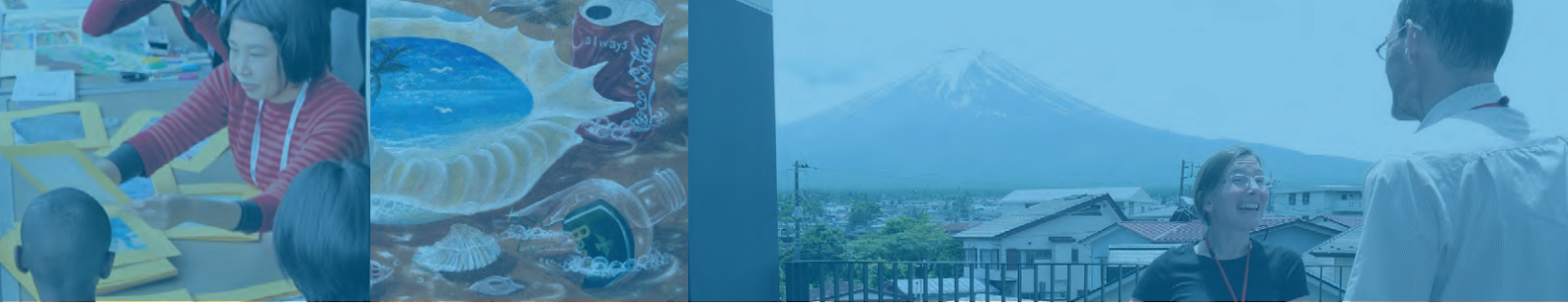
Coordination



Knowledge Networks

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





RIHN Invited Scholar Program & RIHN Visiting Research Fellow Program

Opportunities for Overseas researchers to Spend Time at RIHN

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

- The RIHN **Invited Scholar Program** enables overseas researchers to spend between one and three months at RIHN and to contribute to the development of the Institute's intellectual foundations and strategic directions. Invited Scholars are selected based on nomination by RIHN faculty members who act as their host. Invited Scholars are employed by RIHN during their stay and receive a stipend.

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



Science Communication

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

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

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



The 2018 recipients of the Earth Hall of Fame Kyoto Award were Ms. Christiana Figueres, diplomat and former executive secretary of the UNFCCC, Mr. Tetsuo Yamaori, religious scholar, and Mr. Ego Lemos, singer and environmentalist.

RIHN Public Seminars

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

"After rain comes fair weather"-Terrible but deep relationships between climate variation and Japanese history
8 June 2018

Ecosystem-based disaster risk reduction in the era of climate change
11 October 2018

Peatland exploitation and environment in Indonesia with the perspectives on the relation between Indonesia (natural resource rich and exporting country) and Japan (natural resource import and manufactured goods exporting country)
12 March 2019

RIHN International Symposium

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



Professor Shelia Jasanoff, of Harvard Kennedy School, giving the 2018 keynote address.

Humanities on the Ground: Confronting the Anthropocene in Asia
13-14 December 2018

Keynote Address
Risk and Responsibility in the Anthropocene
Shelia Jasanoff (Harvard Kennedy School)

RIHN Regional Community Seminars

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

Considering the lives and health of people from local and global viewpoints
30 June 2018, Department of Health Sciences, School of Medicine, Hokkaido University

Towards bee-friendly cities - co-creating urban futures
4 November 2018, Nakagyo Ward Office, Kyoto

Heritage for Future : Humanity and Nature in Hinokage, Miyazaki
23 November 2018, Hinokage Town Fukushikan, Miyazaki

Prosperity and futurability in social-ecological system of the Lake Biwa Watershed: five blessings of nursery rice paddy
2 December 2018, Lake Biwa Museum, Shiga

How did our ancestors confront the climate variations? - from Yayoi era to early modern era -
16 December 2018, Osaka Museum of History

Future design in Kyoto
27 March 2019, TKP Garden City Kyoto

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 2018 included:

Hayanon's science manga: To enhance academic outreach and communication

Hayanon, Hayanon's Science Manga Studio
14 May 2018

Humanity, nature, and our digital future Is the digital revolution a mere consequence of global warming?

Stéphane GRUMBACH, Professor, INRIA, RIHN Invited Scholar
18 September 2018

Water - Bloodstream of the biosphere

Malin FALKENMARK, Senior Advisor, Stockholm International Water Institute
12 October 2018

Japanese view of nature - Interdisciplinary dialogue on the "Nature and Humanity"

Augustin Laurent Pierre BERQUE, Retired Professor, EHESS, RIHN Invited Scholar
21 October 2018

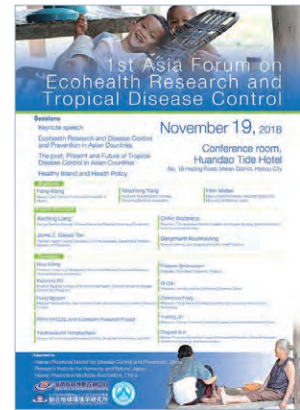
RIHN Book Series: Global Environmental Studies

RIHN has partnered with Springer Publishers to establish the Global Environmental Studies book series. Titles in the series reflect the full breadth of RIHN scholarship.



In order to enhance RIHN's international presence and stature, the International Publication Unit (IPU) plans and promotes RIHN non-Japanese language publications. The IPU supports academic writing of and publishing by RIHN researchers, while also working to promote RIHN's approach to global environmental studies in relevant international publishing entities.

Other Symposia



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 one hundred universities or research institutes within and outside of Japan have utilized our up-to-date isotope research facilities so far. We also organize an annual symposium on environmental isotope study in order to create a national and international research network for the next generation and support environmental isotope studies around the world.



Future Earth

The RIHN Center is actively engaged in the co-design of research development, and hosts the Regional Centre for Future Earth in Asia (www.futureearth.org/asiacentre/). The Centre supports the 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 Centre has convened a Regional Advisory Committee to accelerate the regional development of Future Earth and supported the launch of two Future Earth programs focused in Asia: Sustainability Initiative in the Marginal Seas of South and East Asia (SIMSEA) and Monsoon Asia Integrated Research for Sustainability – Future Earth (MAIRS-FE). The Centre also leads the development of a Knowledge-Action Network on the focal topic of “Systems of Sustainable Consumption and Production” (<http://www.futureearth.org/future-earth-sscp>).



The 18th Conference for the Science Council of Asia was organized around the theme of “Role of Science for Society: Strategies towards SDGs in Asia”. The Future Earth session discussed “Future Earth in Asia: Regional and National Perspectives”.



Future Earth Regional Engagement Workshop was organized which aimed to develop a strategy to strengthen engagement between Future Earth and its various constituent entities in Asia.



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/)

Environmental Education

RIHN 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.



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.



1st Asia Forum on Ecohealth Research
(Organized by Ecohealth Project and Hainan CDC, in Hainkou City, China, Nov, 2018)

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.



Installation art about food in Bhutan

Institutional Research Unit

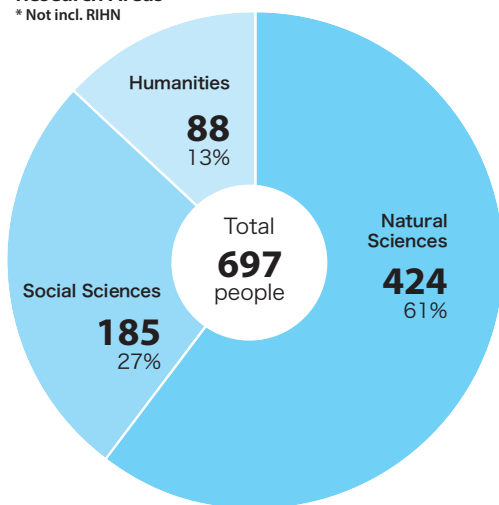
The Institutional Research Unit supports the RIHN Council of Research Strategy in developing and coordinating RIHN's international research, education, and coordination strategies. The IR Unit develops decision support tools for the Institute, analyzing current international research trends and methods,

developing new research evaluation indicators tailored to the evaluation of transdisciplinary research, managing institutional collaborations, and analyzing annual RIHN research achievements.

Collaboration

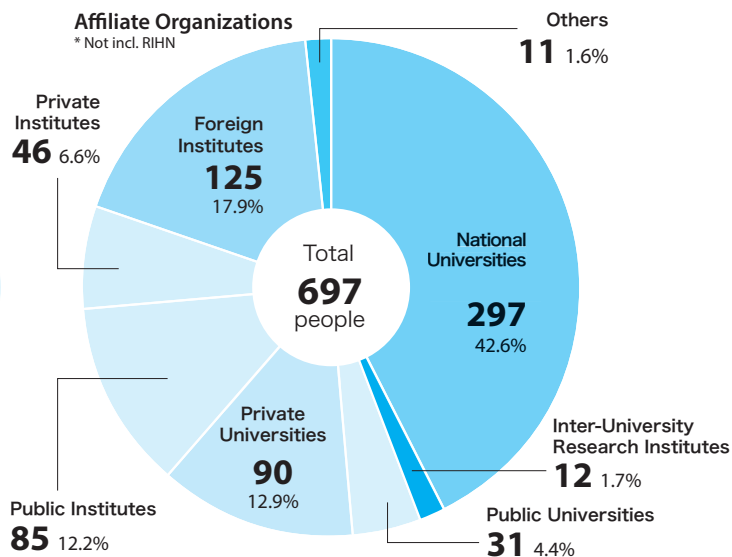
Research Areas

* Not incl. RIHN



Affiliate Organizations

* Not incl. RIHN



*As of March 31st, 2019

Collaboration in Japan *As of April 1st, 2019

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 Decision Science for a Sustainable Society, Kyushu 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

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 Rakuho High School
 Miyazaki Prefecture
 NHK Educational Corporation
 Noshiro City, Akita Prefecture
 Kyoto City, ICLIE Japan, Kyoto Environmental Activities Association
 Oshinomura, Yamanashi Prefecture
 Kyoto Institute, Library and Archives

International Collaboration *As of April 1st, 2019

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'Élevage

CHINA

East China Normal University
 Eco-environmental Protection Institute, Shanghai Academy of Agricultural Sciences
 Hainan Provincial Center for Disease Control and Prevention
 Peking University
 People's Government of Changzhou City

FRANCE

La Fondation Maison des Sciences de l'Homme

INDONESIA

The Agency of Peatland Restoration (Badan Restorasi Gambut)
 Indonesian Institute of Sciences
 Universitas Riau

LAOS

Lao Tropical and Public Health Institute, Ministry of Health

NETHERLANDS

Copernicus Institute of Sustainable Development, Utrecht University

OMAN

Sultan Qaboos University

PHILIPPINES

Laguna Lake Development Authority
 University of the Philippines Diliman
 University of Santo Tomas

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

Facilities

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

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

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



Management

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

Laboratories

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

Instruments

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



Main building



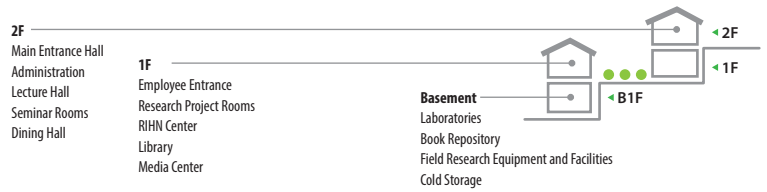
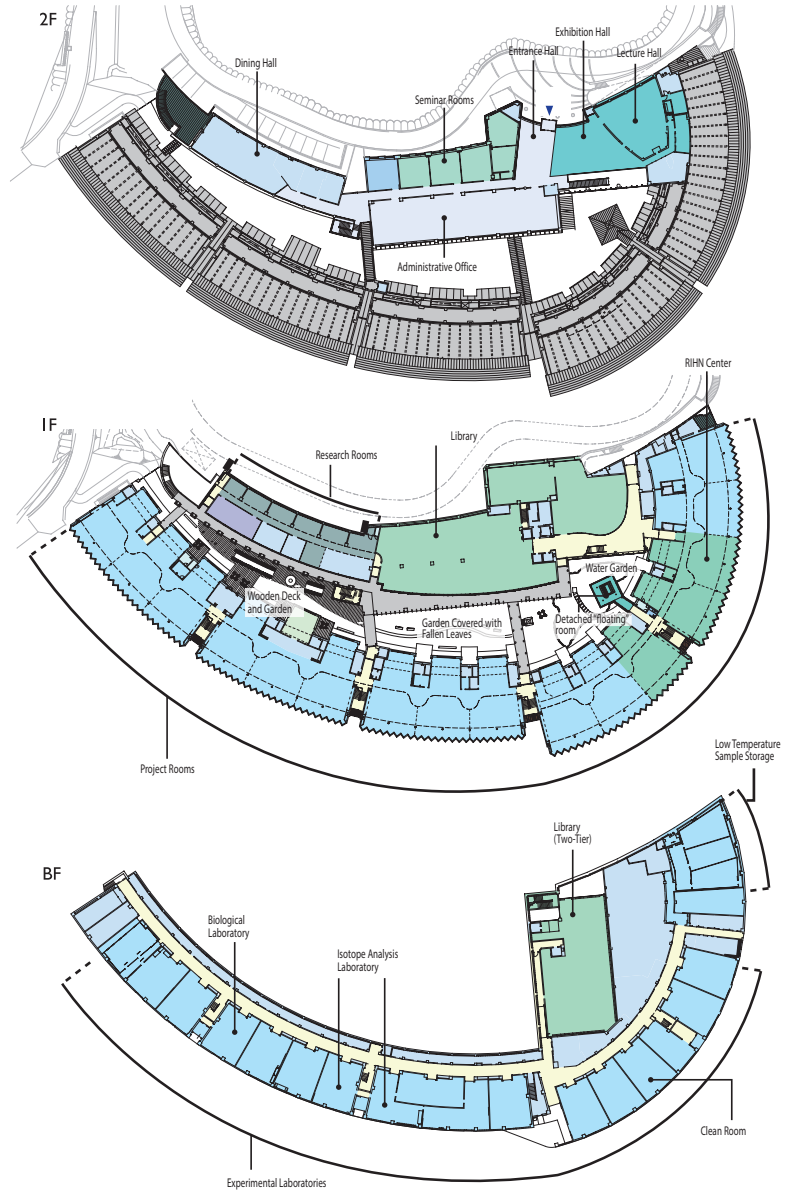
Main entrance hall



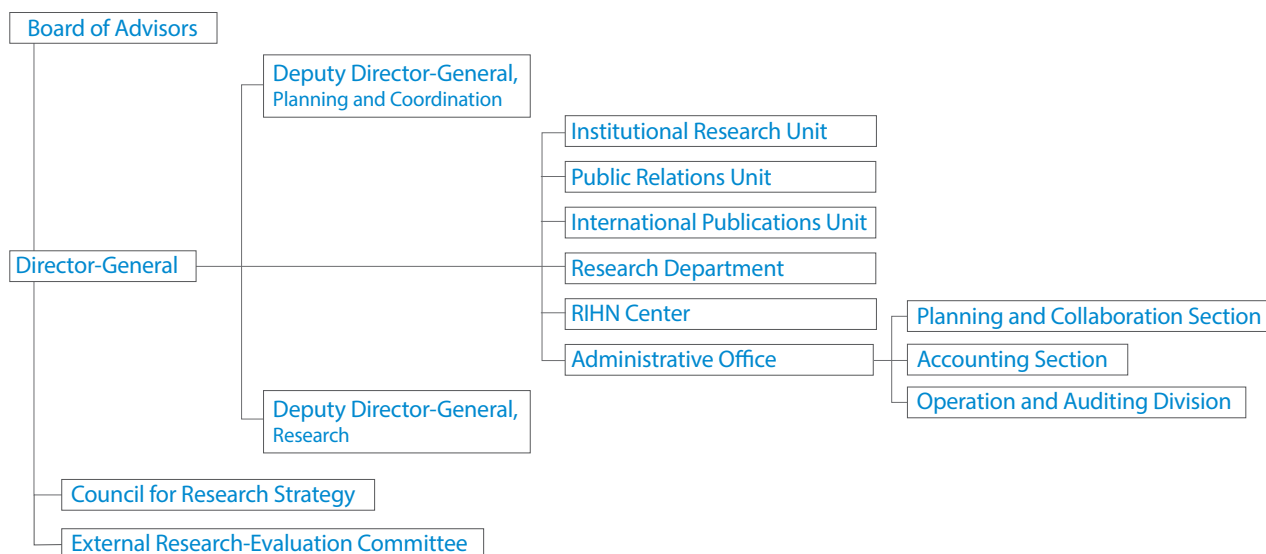
Laboratories



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



Administrative Structure



Financial Information

Budget

Income		(Fiscal Year 2019)
Category	Amount (Yen in thousands)	
Subsidy for Operation	1,486,426	
Self Revenue	15,842	
Total Earnings	1,502,268	

External Sources of Funding

External Sources of Funding		(Fiscal Year 2018)
Category	Amount (Yen in thousands)	
Fund for Promotion of Academic and Industrial Collaboration	101,429	
Grants-in-Aids for Scientific Research	94,160	
Donations for Research	9,885	



Boards and Committees

*As of June 1st, 2019

Board of Advisors

Oversees personnel, planning, administration and operation of the institute

<p>ASAOKA Mie President, Kiko Network IKEYA Kazunobu Professor, National Museum of Ethnology KADA Yukiko Former Governor of Shiga Prefecture / Former President, Biwako Seikei Sport College KANZAWA Hiroshi Professor Emeritus, Nagoya University KOIKE Toshio Director, Global Centre of Excellence for Water Hazard and Risk Management</p>	<p>KONO Yasuyuki Vice President, Kyoto University Professor, Center for Southeast Asian Studies, Kyoto University NIIKAWA Tatsuro Professor, Graduate School, Doshisha University NOE Keiichi Professor Emeritus, Tohoku University OTSUKI Kyoichi Professor, Faculty of Agriculture, Kyushu University</p>	<p>MALLEE, Hein Deputy Director-General, RIHN TANIGUCHI Makoto Deputy Director-General, RIHN NAKASHIZUKA Tohru Program Director, RIHN SAIJO Tatsuyoshi Program Director, RIHN SUGIHARA Kaoru Program Director, RIHN</p>	<p>TAYASU Ichiro Professor, RIHN ISHII Reichiro Associate Professor, RIHN KUMAZAWA Terukazu Associate Professor, RIHN</p>
--	---	---	---

External Research-Evaluation Committee

External review of research project proposals

Domestic

KAWABATA Zen'ichiro
Professor Emeritus, 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, Mounse 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
WADA Eitaro
Member of the Japan Academy / Professor Emeritus, Kyoto University

Overseas

BAI, Xuemei
Professor, Urban Environment and Human Ecology, Fenner School of Environment and Society,
Australian National University, Australia
BINDER, Claudia
Professor, Laboratory for Human-Environmental Relations in Urban Systems (HERUS), IIE - ENAC -
EPFL, Switzerland
LU, Yonglong
Research Professor and Co-Director, Research Center for Eco-Environmental Sciences, Chinese
Academy of Sciences, China
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.
VAN DER LEEUW, Sander
Professor, School of Human Evolution and Social Change / School of Sustainability, Arizona 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

Council for Research Strategy

Oversees research strategy, personnel, project, and evaluation system

YASUNARI Tetsuzo	Director-General	SAIJO Tatsuyoshi	Specially Appointed Professor	KUMAZAWA Terukazu	Associate Professor
MALLEE, Hein	Deputy Director-General	SUGIHARA Kaoru	Specially Appointed Professor	KATSUHIRA Hiroshi	Administrative Director
TANIGUCHI Makoto	Deputy Director-General	TAYASU Ichiro	Professor		
NAKASHIZUKA Tohru	Specially Appointed Professor	ISHII Reichiro	Associate Professor		

Senior Advisor

TACHIMOTO Narifumi

Emeritus Professors

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

RIHN STAFF

■ DIRECTOR-GENERAL	YASUNARI Tetsuzo
■ DEPUTY DIRECTOR-GENERAL (Planning and Coordination)	MALLEE, Hein
■ DEPUTY DIRECTOR-GENERAL (Research)	TANIGUCHI Makoto

ADMINISTRATIVE OFFICE

■ ADMINISTRATIVE DIRECTOR KATSUHIRA Hiroshi

■ PLANNING AND COLLABORATION SECTION

Head HIGASHI Hideaki
General Affairs and Planning
Subsection
 Head BIVONE Junko
 Clerk KOGISO Ayana
 Clerk MASUDA Maho
Personnel Subsection
 Head NAGATA Yukihiko
 Chief MIMOTO Natsumi
 Clerk MATSUKI Takeyuki
 Clerk NAGATA Satoko
International Affairs Subsection
 Head ZENIZUKA Rie

Collaboration Unit
 Head SAKAMOTO Kohei
Research Planning Subunit
 Head YUKI Toshitake
Cooperative Research Support Subunit
 Head SAKAMOTO Kohei
 Clerk SAWAMURA Takahiro
Information and Library Subunit
 Chief YAMASHITA Takayoshi

■ ACCOUNTING SECTION

Head KIMURA Makoto
 Deputy Head KITaura Toshiaki
Financial Planning Subsection
 Head TOJIMA Mitsuo
 Chief HONDA Takayuki
 Clerk KOHO Sayaka
Facility Management Subsection
 Head NAKAJIMA Kohei
 Chief ISHII Hiroya
 S.A.Specialist ZUI Zoujin
Accounting Subsection
 Head SHIBUYA Hiroyuki
Procurement Subsection
 Head HARUOKA Junichiro
 Clerk KARIYA Midori
 Clerk NAKANISHI Keita

■ OPERATION AND AUDITING DIVISION

Head KIMURA Makoto
Auditing Subunit
 Head TOJIMA Mitsuo
 Chief HONDA Takayuki

RESEARCH DEPARTMENT

Program Directors

NAKASHIZUKA Tohru	Forest Ecology, Biodiversity
SAIJO Tatyoshi	Future Design
SUGIHARA Kaoru	Economic History, Environmental History
TANIGUCHI Makoto	Hydrology

Professors

SAKAKIBARA Masayuki	Earth and Environmental Sciences
TAYASU Ichiro	Isotope Ecology, Isotope Environmental Science
YAMAUCHI Taro	Human Ecology

Associate Professors

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

Specialy Appointed Professors

NAKASHIZUKA Tohru	Forest Ecology, Biodiversity
SAIJO Tatyoshi	Future Design
SUGIHARA Kaoru	Economic History, Environmental History

Visiting Professors

BABA Kenji	Environmental Policy, Consensus Building
FUJII Shigeo	Water Environment and Sanitation, Micropollutants Contamination
HABU Junko	Environmental Anthropology, East Asian Archaeology
HAYASHI Hiroaki	Plant Nutrition and Fertilizer, Sustainable Development Studies

HAYASHIDA Sachiko	Atmospheric Environmental Science, Remote Sensing
ISHIKAWA Satoshi	Conservation Ecology, Global Fisheries Science
KANIE Norichika	Earth System Governance
KASUGA Fumiko	Food Safety Planning
KAWASAKI Masahiro	Atmospheric Chemistry
KUSAGO Takayoshi	Action-based Development Studies
MANAGI Shunsuke	Environmental Economics, Urban Engineering
MIZUNO Kosuke	Indonesian Area Research
NAKATSUKA Takeshi	Biogeochemistry, Paleoclimatology
OKABE Akiko	Architecture, Socio-cultural Environmental Studies
SHIBATA Akira	Rural Development, Biomass Carbonization
TANAKA Ueru	Agro-ecosystems Studies
YONEMOTO Shohei	History and Philosophy of Science

Visiting Associate Professors

ENDO Aiko	Marine and Coastal Policy, Fishery Economics
KIKUCHI Naoki	Environmental Sociology
KOBASHI Takuro	Climate Change, Renewable Energy
MOREAU, Yoann	Anthropology
TERADA Masahiro	History, Metahistory
WATANABE Kazuo	Area Studies

Senior Researchers

MASUHARA Naoki	Public Administration Studies and Energy Policy
NAKAO Seiji	Historical Anthropology
NGUYEN, Tien Hoang	Geoinformatics, Environmental Modeling and Mapping
RUPPRECHT, Christoph D. D.	Geography
TAMURA Norie	Natural Resource Management

Researchers

FUJIYOSHI Lei	Isotope Environmental Science
HAYASHI Koji	Ecological Anthropology
HUANG, Wanhui	Regional Environmental Studies, GIS
IKEYA Tohru	Aquatic Ecology, Environmental Science
ISHIBASHI Hiroyuki	Area Studies, Environmental Local History
ISHIDA Takuya	Forest Environmental Science
KAJITA Ryosuke	Area Studies
KIMIJIMA Satomi	Remote Sensing, Gender and Development Studies
KOBAYASHI Kunihiko	International Environmental Law
KOBAYASHI Mai	Environmental Sociology
KUANG Xiaoxu	Analytical Chemistry, Environmental Chemistry
LEE, Sanghyun	Agricultural Water Management
NAKAHARA Satoe	Cultural Anthropology, Peace Studies
ODA Kimisato	Landscape Architecture, Cultural Landscape

OSAWA Takamasu	Social Anthropology
OTA Kazuhiko	Japanese Environmental Ethics
SHIMIZU Takao	Archaeology, Ethnology
SHINKAI Rika	Cultural Anthropology
SHIODERA Satomi	Forest Ecology
SPIEGELBERG, Maximilian	Environmental Management
UEHARA Yoshitoshi	Ecology
Win Thiri Kyaw	Neurology and Clinical Pharmacology
YAMADA Taiki	Graph Theory, Optimal Transport Theory
YAMANAKA Manabu	Atmosphere-Hydrosphere Sciences

Research Associates

DOI Minako	KOBAYASHI Yuku	SUETSUGU Satoko
HONMA Saki	MATSUOKA Yuku	TAKEHARA Mari
KARATSU Fukiko	Myo Han Htun	WATANABE Kirie
KATAFUCHI Yuya	NAKAI Minami	YAMAMOTO Aya
KATSURA Tomomi	SENDA Masako	
KIMURA Ayako	SHIMAUCHI Risa	

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 Reiichiro
Communication and Production 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 Reiichiro	Theoretical Ecology
KONDO Yasuhisa	Archaeology, GIS, Open Science
KUMAZAWA Terukazu	Environmental Planning, Regional Informatics
NILES, Daniel	Geography
SHIN Kicheol	Petrology, Geochemistry, Isotope Geology

Assistant Professor

ONISHI Yuku	Biogeography, Macroecology
-------------	----------------------------

Specialy Appointed Associate Professor

LAMBINO, Ria	Environmental Governance
--------------	--------------------------

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

JIANG Hongwei	Human Ecology
---------------	---------------

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

KIM, Satbyul	Cultural Anthropology
--------------	-----------------------

Researchers

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	
OKA Masami	
OKAMOTO Takako	
UEDA Sachiko	
YASUDA Akiko	
YUZEN Natsuko	

Institutional Research Unit

HEAD TANIGUCHI Makoto

Members of Unit

TAYASU Ichiro	YAMAUCHI Taro	KANEMOTO Keiichiro	KONDO Yasuhisa	KUMAZAWA Terukazu
---------------	---------------	--------------------	----------------	-------------------

Specialy Appointed Assistant Professor

WAKAMATSU Hisanori

International Publications Unit

HEAD SUGIHARA Kaoru

Members of Unit

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

Public Relations Unit

HEAD MALLEE, Hein

DEPTUTY HEAD HIGASHI Hideaki

Members of Unit

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

Specialy Appointed Specialist

TERAMOTO Shun

Research Associate

KIMURA Aoi

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 Corporations National Institutes for the Humanities (NIHU)

<http://www.nihu.jp/>

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

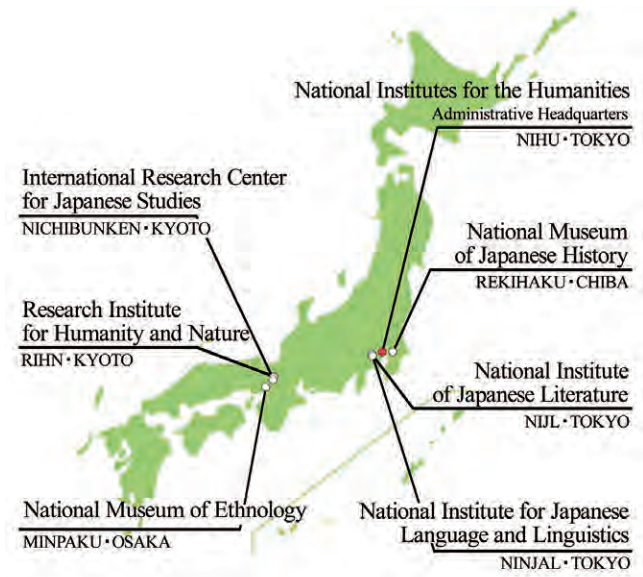
- REKIHAKU: Constructing Integrated Studies of Cultural and Research Resources, and Renovating Sharing Infrastructures of Research Resources in Japanese History and Culture
- NIJL: Project to Build an International Collaborative Research Network for Pre-modern Japanese Texts
- NINJAL: A New Integration 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 of the 19th Century in Europe through Research and Use
 - Research, Conservation and Utilization of the Marega Collection Preserved in the Vatican Library
 - Survey, Study and Use of the Japan-related Documents and Artifacts in North America
 - Coordination between Projects to Make Effective Use of Research Results



The NIHU Headquarters and six Inter-University Research Institutes



The four Inter-University Research Institute Corporations

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

English Resource Guide for Japanese Studies and Humanities in Japan.

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.

33rd: "Rediscovery of History in Kagoshima: For New Perspectives of Regional Culture," Sep, 2018

34th: "Studying the Region with the People: Methods for Utilizing Cultures of the Region in Japan and Taiwan," Nov, 2018

35th: "Sound that Connects the Middle East to Japan: Exploring Human Coexistence in Global Society through Music," Mar, 2019

Industry-Academia Collaborations

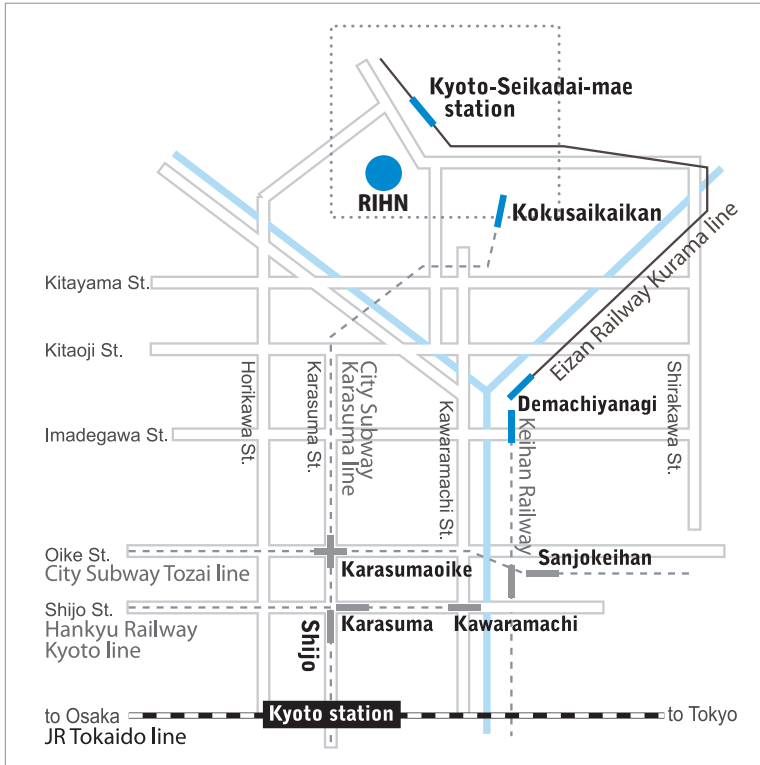
NIHU collaborates with industry and other partners to give back its fruits of research to society.

Joint symposium with Ajinomoto Foundation for Dietary Culture

Joint lecture with Otemachi Academia

Joint symposium with Japan Foundation

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.

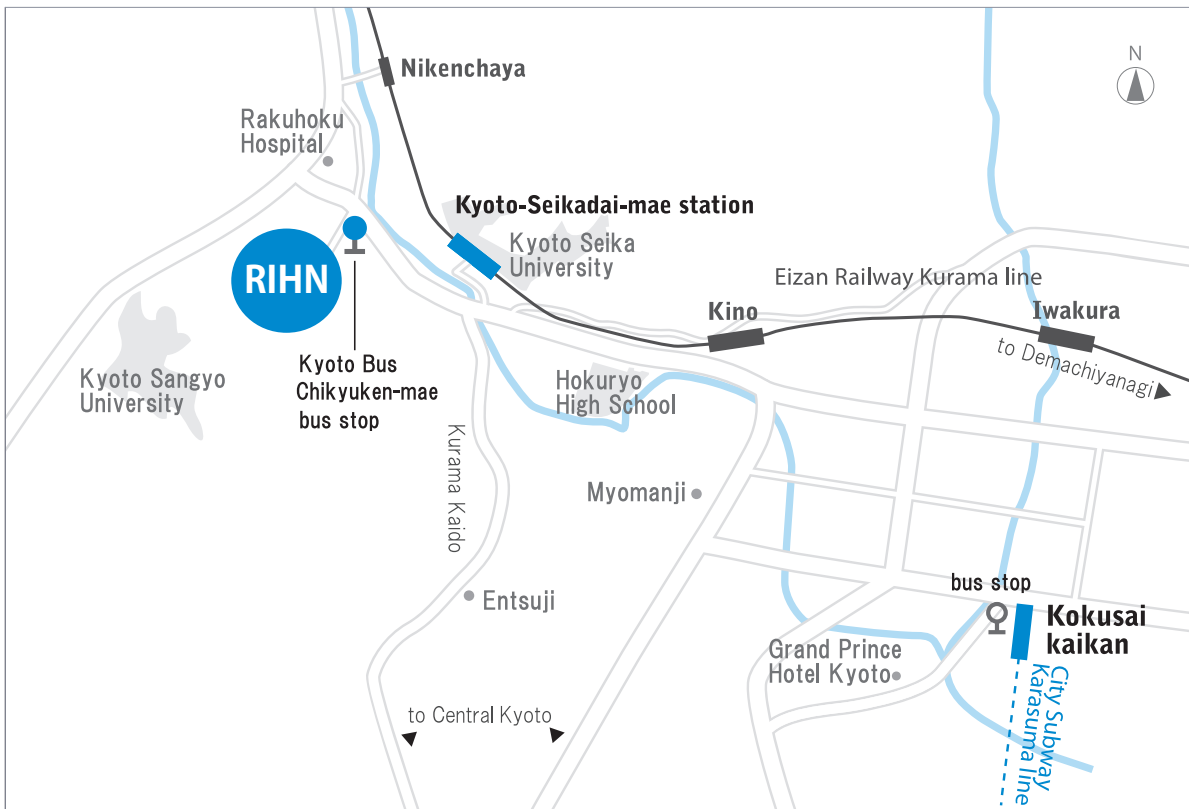
RIHN is at the base of the hill on your left.

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 2019-2020

Managing Editor: MALLEE, Hein

Designed by OKAZAWA Rina

Front Cover photo:

Over the ocean, Mejjatto Islet, Marshall Islands

Photo by NAKAHARA Satou

Back Cover photo:

Farm working, Islamabad, Pakistan

Photo by HIGASHI Hideaki

Flying over RIHN in the autumn sky

Photo by WATANABE Kazuo



Inter-University Research Institute Corporation
National Institutes for the Humanities
**Research Institute for
Humanity and Nature**

457-4 Motoyama, Kamigamo, Kita-ku, Kyoto
603-8047, JAPAN

TEL. +81-75-707-2100
FAX. +81-75-707-2106

kokusai@chikyu.ac.jp
www.chikyu.ac.jp

ISSN 2185-8055
June 2019

© RESEARCH INSTITUTE FOR HUMANITY AND NATURE

