

Inter-University Research Institute Corporation  
National Institutes for the Humanities

# Research Institute for Humanity and Nature

Prospectus 2014 – 2015





## Contents

|                                   |       |
|-----------------------------------|-------|
| Message from the Director-General | 2     |
| A Brief History of RIHN           | 4-5   |
| Project Index                     | 6-7   |
| Research Structure                | 8-9   |
| Project Research                  | 10-25 |
| Completed Research                | 26-32 |
| Current Feasibility Studies       | 33-35 |
| Research Coordination             | 37    |
| Science Communication             | 38-39 |
| Research Facilities               | 40-41 |
| RIHN-China & Future Earth         | 42    |
| Research Collaboration            | 43    |
| Administrative Structure          | 44-46 |
| Access                            | 47    |



## Message from the Director-General

The Research Institute for Humanity and Nature (RIHN) was established in April 2001 by the Government of Japan with the goal of promoting integrated research in the field of global environmental studies. RIHN's objective is to define how the interplay between human beings and Earth phenomena is the very source of environmental problems. Environmental degradation can be manifest as abnormality in this dynamic interplay between humanity and nature. RIHN thus attempts to go back to the drawing board and redefine such interactions from a global perspective, with due consideration given to regional characteristics and historical contexts. Based on the environmental knowledge gained through elucidation of interactions between humanity and nature that goes beyond existing frameworks of academic disciplines, RIHN research should propose innovative solutions to human-environmental problems.

RIHN is also part of the National Institutes for the Humanities, an inter-university research institute corporation. In order to promote futurability initiatives, which were suggested as part of Phase II of RIHN's medium-term targets and plans that began in fiscal 2010, a Core Research Hub was established within the Center for Research Development (CRD) so that research efforts can be further stimulated and integrated. In October 2010, research findings during the first decade were compiled in the RIHN Encyclopedia of Global Environmental Studies. Fiscal 2012 saw the launch of a

project to create a network-based repository of project data that, it is hoped, will facilitate RIHN's contributions to the solution of global environmental problems. In a bid to expand RIHN's functions and roles as an inter-university research institute, a full-fledged interactive base is being developed that may be used among universities and research institutes around the country. More recently, in fiscal 2013, a new system was introduced whereby RIHN collaborates with universities and other bodies to conduct joint research based on partnership agreements.

At present, Japan is joining forces with other countries to promote an international initiative called Future Earth, which is designed to create a sustainable global community through integrated global environmental studies. Accordingly, The Future Earth Unit was set up in October 2013, in the hopes that RIHN will make substantial progress as an institute of the forefront of global environmental studies.

I sincerely hope that this RIHN Prospectus will help you to deepen your understanding of these endeavors and achievements.

安成 哲三  
YASUNARI Tetsuzo

Director-General  
Research Institute for Humanity and Nature



Breezeway between buildings



Project rooms



Two views of the RIHN building and site in the north of Kyoto



## 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  
—5 FR projects implemented  
—The 1st RIHN Forum
- 2003 —5 Research Axes developed  
—3 FR projects implemented
- 2004 —RIHN becomes a member of the National Institutes for the Humanities  
—2 FR implemented  
—The 1st RIHN Public Seminar
- 2005 —1 FR implemented  
—The 1st RIHN Area Seminar
- 2006 —RIHN relocates to current facilities in northern Kyoto  
—3 FR implemented  
—The 1st RIHN International Symposium





- 2007 —TACHIMOTO Narifumi appointed as the second Director-General  
—The Center for Coordination, Promotion and Communication established  
—Research Axes redefined as five Research Domains  
—RIHN-China established  
—5 FR implemented First research projects concluded



- 2008 —3 FR implemented  
—The 1st Collaborative Symposium with the International Research Center for Japanese Studies



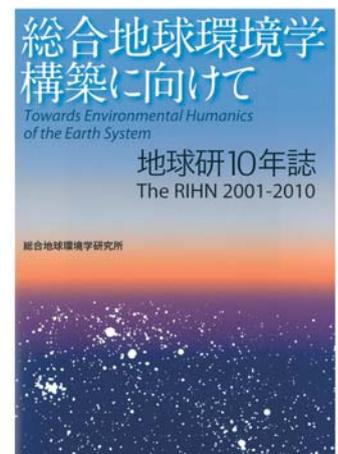
- 2009 —The Earth Forum Kyoto and Earth Hall of Fame Kyoto Award established  
—2 FR implemented

- 2010 —Core Research Hub established  
—The RIHN Encyclopedia of Global Environmental Studies published  
—1 FR implemented

- 2011 —RIHN 10 year anniversary and publication  
—2 FR implemented, including the first initiative-based project  
—GEC-Japan network established

- 2012 —3 FR implemented

- 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  
—1 FR implemented



- 2014 —2 FR implemented



# Project Index

Most RIHN research projects are conducted within one of five research domains that reflect 'root metaphors' with significance beyond single disciplines or fields of study.

## Full Research (FR)

### Circulation

Circulation projects investigate the cycling of energy and matter on the Earth's surface in relation to human activity.

|      |   |                                    |       |
|------|---|------------------------------------|-------|
| C-08 | <b>Megacities and the Global Environment</b>                                | MURAMATSU Shin                     | 10-11 |
| C-09 | <b>Designing Local Frameworks for Integrated Water Resources Management</b> | KUBOTA Jumpei<br>Dorotea RAMPISELA | 12-13 |

### Diversity

Diversity projects describe and analyze the formation, maintenance and functions of biological and cultural diversity in specific environments.

|      |  |                  |       |
|------|--|------------------|-------|
| D-05 | <b>Coastal Area Capability Enhancement in Southeast Asia</b> | ISHIKAWA Satoshi | 14-15 |
|------|--|------------------|-------|

### Resources

Projects in this domain examine global environmental issues related to the use and conservation of natural resources.

|      |  |                               |       |
|------|--|-------------------------------|-------|
| R-07 | <b>Desertification and Livelihood in Semi-Arid Afro-Eurasia</b>  | TANAKA Ueru                   | 16-17 |
| R-08 | <b>Human-Environmental Security in Asia-Pacific Ring of Fire: Water-Energy-Food Nexus</b>                      | TANIGUCHI Makoto<br>ENDO Aiko | 20-21 |
| R-09 | <b>Long-term Sustainability through Place-Based, Small-scale Economies: Approaches from Historical Ecology</b> | HABU Junko                    | 22-23 |

### Ecohistory

Ecohistory projects take historical approaches to the study of circulation, diversity, and resources.

|      |  |                   |       |
|------|--|-------------------|-------|
| H-05 | <b>Societal Adaptation to Climate Change: Integrating Palaeoclimatological Data with Historical and Archaeological Evidences</b> | NAKATSUKA Takeshi | 24-25 |
|------|--|-------------------|-------|

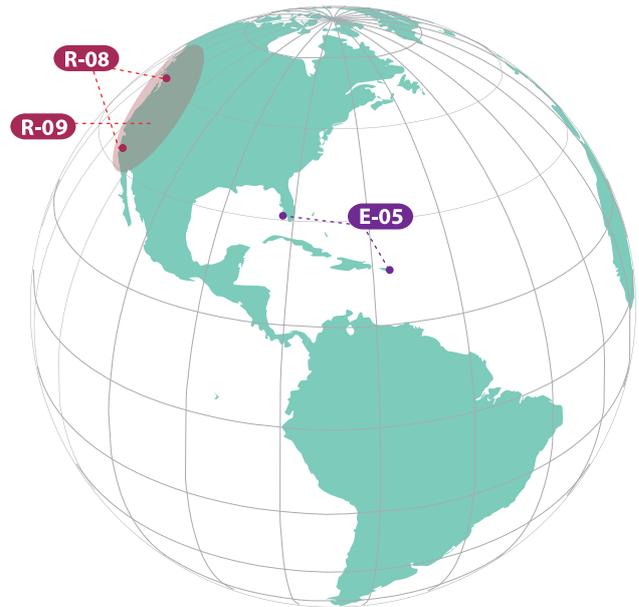
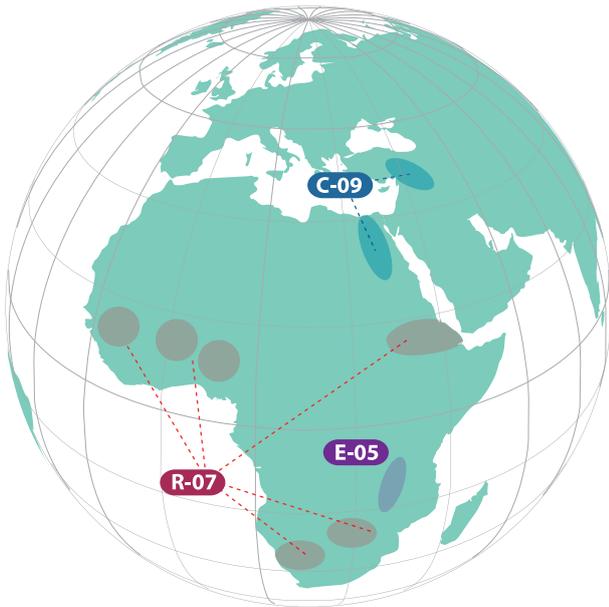
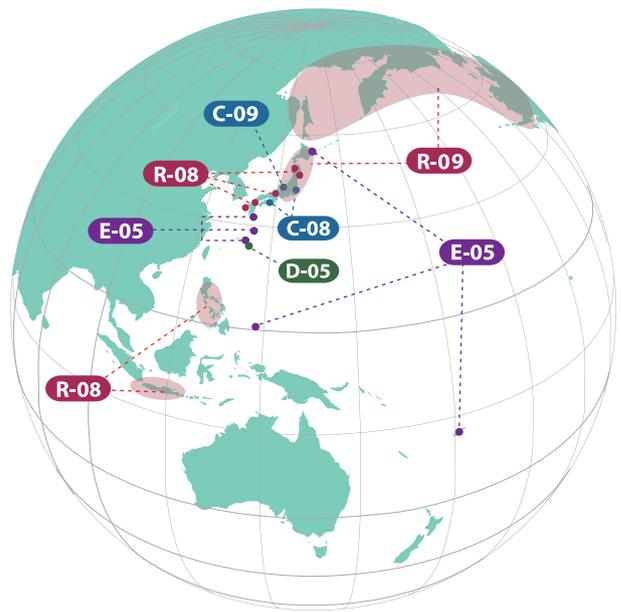
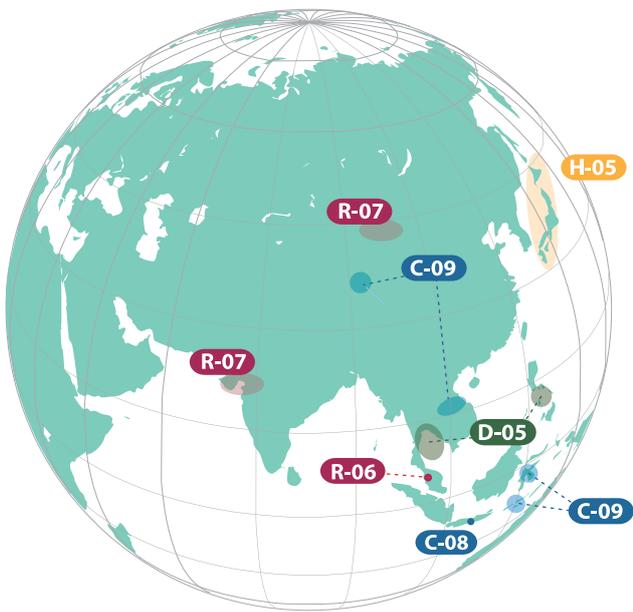
### Ecosophy

Ecosophy projects examine the specific social and environmental contexts in which environmental problems occur, their linkages to social and material phenomena in other places, and the conceptual models used to describe such interconnection.

|      |   |                             |       |
|------|---|-----------------------------|-------|
| E-05 | <b>Creation and Sustainable Governance of New Commons through Formation of Integrated Local Environmental Knowledge</b> | SATO Tetsu<br>KIKUCHI Naoki | 18-19 |
|------|---|-----------------------------|-------|

## Completed Research (CR)

|      |  |                  |    |
|------|--|------------------|----|
| C-07 | <b>Global Warming and the Human-Nature Dimension in Siberia: Social Adaptation to the Changes of the Terrestrial Ecosystem, with an Emphasis on Water Environments</b> | HIYAMA Tetsuya   | 30 |
| D-03 | <b>Human Life, Aging and Disease in High-Altitude Environments: Physio-Medical, Ecological and Cultural Adaptation in "Highland Civilizations"</b>                     | OKUMIYA Kiyohito | 27 |
| D-04 | <b>Collapse and Restoration of Ecosystem Networks with Human Activity</b>  | SAKAI Shoko      | 28 |
| R-04 | <b>Environmental Change and Infectious Disease in Tropical Asia</b>  | MOJI Kazuhiko    | 29 |
| R-05 | <b>A Study of Human Subsistence Ecosystems in Arab Societies: To Combat Livelihood Degradation for the Post-oil Era</b>  | NAWATA Hiroshi   | 31 |
| R-06 | <b>Managing Environmental Risks to Food and Health Security in Asian Watersheds</b>  | KADA Ryohei      | 32 |





## Research Structure

RIHN's objective is to conduct integrative research on key areas of interaction between humanity and nature. RIHN solicits, develops, funds, and hosts research projects lasting from between three to five years. Projects conduct high quality basic research; they are always multi-disciplinary and based on multiple methodologies. All projects are subject to a rigorous course of internal and external review.

At RIHN we seek concepts, theories and mechanisms capable of describing and enabling transformation of human-environment interactions. 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 local, national and international collaborations in the design and production of knowledge concerning key social and environmental problems.

Research projects are conducted within one of three structures, as shown in the figures below. Individual collaboration (formerly domain-based) projects are proposed by Japanese or international researchers. Proposals are developed over the course of 1-3 years (the periods of Incubation- and Feasibility-Study shown below), before entering 3-5 years of Full Research.

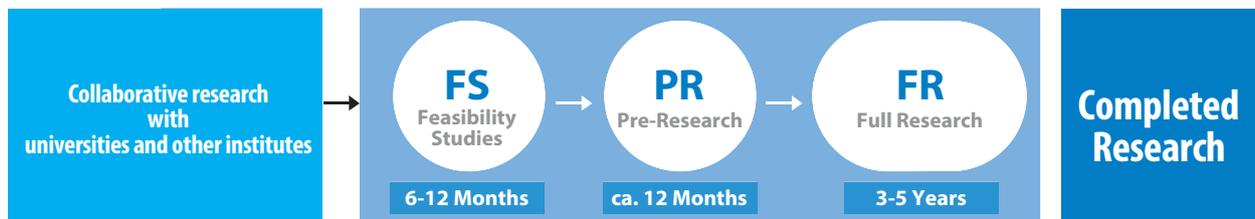
### Individual Collaboration Projects





Institutional-collaboration projects are designed to facilitate close collaboration between RIHN and other leading institutes of environmental study in Japan. They are based around complementary use of institutional resources so as to facilitate novel research questions and techniques. They also proceed to Full Research directly from the period of Feasibility Study.

### Institutional Collaboration Projects



Initiative-based project proposals are generated within the institute itself. These proposals are formulated through a structured process of internal reflection of the strengths and weaknesses in current and past RIHN research as well as ongoing institute engagement with key emerging themes in international research. Initiative-based projects begin as Feasibility Studies and then proceed to 3-5 years of Full Research.

### Initiative-based Projects



# Megacities and the Global Environment

Project Leader **MURAMATSU Shin** RIHN

After engaging in research on the history of Asian architecture and urban history at the Institute of Industrial Science, the University of Tokyo, I came to the Research Institute for Humanity and Nature. It is my aspiration to contribute to the improvement of the global environment through perspectives I have developed from a macro viewpoint of the world history of cities, which compares and analyzes cities throughout the world, and a micro viewpoint on the latent potential of urban and architectural ("naka-naka") heritage that will lead to improvement in general architectural practices at the local environment level.



## Why are we doing this research?

When we consider global environmental problems, cities are often deemed to be "perpetrators" that consume massive amounts of resources and generate various forms of waste. At present a large number of megacities with populations in excess of 10 million have emerged in non-Western tropical regions of the world. Poverty and environmental deterioration are conspicuously evident in these enormous cities, which are also extremely susceptible to the effects of global environmental problems. At the same time, however, people living in cities have been among the first people in society to express concern about the local environment and global environment. As a person whose study of the history of architecture and cities spans decades, I commenced this project with researchers hailing from a wide array of academic fields including landscape, urban history, history, environmental economics, ecology and urban planning in efforts to find answers to questions such as 'Are cities friends of the environment?' and 'Is pursuit of the environment and economics incompatible with the pursuit of happiness?'

## What are we doing, and where?

As the main field of our research, we chose greater Jakarta, the capital of Indonesia, where economic growth is robust at present. Like Japan, it is situated in the East-Asian monsoon region. Moreover, the people there make a living by cultivating rice, and the way of life and customs have similarities to those in Japan. On the other hand, the kinds

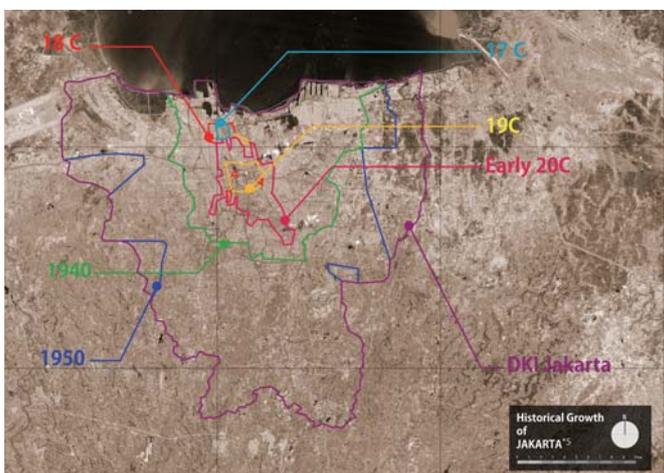
of phenomena occurring in this enormous megacity that stretches out over more than 100 kilometers in all four directions are quite diverse. Moreover, it is not clear what kind of impact these phenomena are having not only on the local environment and global environment but also on the lives of people (Figure 1). Against this backdrop, we have been conducting cooperative research on the natural environment (heat, biodiversity, floods, etc.), the artificial environment (various types of buildings), and people's awareness and lifestyle, etc. from various viewpoints. In our local activities, we have been mutually sharing knowledge not only with researchers from the University of Indonesia, Bogor Agricultural University, and the Indonesian Institute of Sciences but also with local architects and residents mainly through dialog. At the same time, we have also been attempting to mutually apply knowledge gained in Jakarta and results obtained from observations of other megacities based on comparison of 18 megacities in regions throughout the world.

## What we have learned thus far

Using a city sustainable index (CSI) that simultaneously compares a city's impact on the environment, its social impact, and the benefits derived from that city, we analyzed 18 megacities throughout the world and determined that not one of the 18 megacities qualifies as "a friend of the earth" at present (Photo 1). Of these cities, however, Jakarta has a relatively mild impact on the environment, and if it makes some adjustments to avoid the pitfalls of other megacities, it has the potential to pave the way for a brighter future.

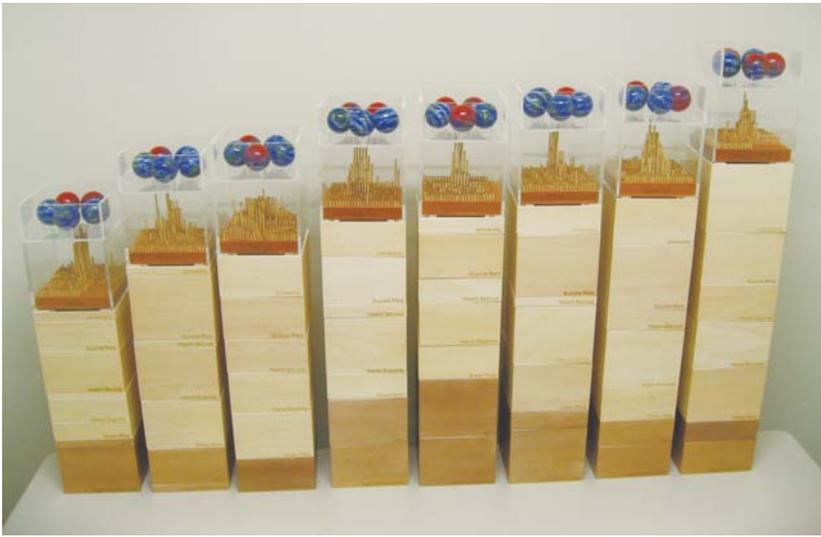
To enable megacities of the least developed countries to achieve a soft landing in the future, the megacities in those countries must endeavor to achieve economic growth commensurate with their needs. If they fail to do this, the growing awareness of the environment in those cities will be extinguished.

Envisioning Jakarta in the future in the year 2050, we needed to make a proposal for urban living that would have little impact on the environment and improve the comfort and convenience of the people living there. To do



**Figure 1 Expansion of Greater Jakarta**

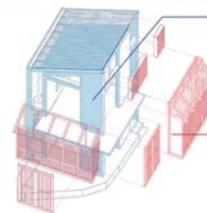
Greater Jakarta has grown from the 17th century Dutch colony of Batavia to a megacity with a current population of 27 million.



**Photo 1 City Sustainable Indicator (CSI)**  
 Production of a model for exploring sustainable cities targeting 18 megacities (Tokyo, Jakarta, Seoul, Mumbai, Sao Paulo, Mexico City, Manila, Delhi, Cairo, Kolkata, Osaka-Kobe, Shanghai, Buenos Aires, New York, Los Angeles, Karachi, Dhaka, Moscow). When the city's impact on the environment is excessive, the globe above the model turns red. The rectangular-shaped wooden tube below indicates benefits from cities, and at present it shows 12 indicators. The thicker the tube, the greater the benefits.

this, we first had to take into consideration the tropical monsoon climate and characteristics of the land where the city is located with its expanding rice-producing areas, and carefully examine the history of the city that has changed over the years. A look at the expansion of Jakarta, a city that began developing during the colonial period of the 20th century, shows that there are many high-density residential areas on the outer fringes where many people of low income live. In the outer fringes where the city is also expanding, rice paddies and storage reservoirs are being filled in to make way for development. We are currently proposing dwellings suitable for the characteristics of areas there (Photo 2).

As the city grew, the rice paddies and reservoirs that had been developed until then were filled in. The effects of cool breezes generated by rice paddies that were once in those places and the functions performed by living creatures such as dragonflies and the existing ecology there have been incorporated into our proposal for new residential areas (Photo 3).



**Durable building frames**  
 Limitation of freedom on the structure of building frames improves ventilation and acquisition of daylight, and the structure of building frames with limited freedom can be applied to other environments.

**Dynamic outer shell**  
 Fluid, adjustable elements of these structures can be freely modified through optional extension or alteration by residents.

**Photo 2 Design Proposal for High-density Settlement in Jakarta**  
 Working in cooperation with local residents, we actually proposed very comfortable living arrangements with little impact on the local environment.

### The message we wish to convey

Understanding how cities are connected to the global environment and determining how to propose methods that will be of benefit are both difficult and challenging propositions in our research. Nevertheless, cities are already home to half of the world's population and are set to expand further in the future. Therefore, if we fail to make a contribution to the global environment, we will be forced to pay a hefty price later. Our aspiration is to present the results of our research in a manner that is easy for all people to understand so that not only specialists and urban administrators but also all people will fully understand and own these issues. Likewise, we want to present the results of our research in a way that people will see the advantages to be gained for themselves and we also want to involve them in efforts to improve their environment.



**Photo 3 Proposal for a Rural Residential Area at the Front Line of Urban Expansion**  
 We have been proposing pleasant, comfortable residential areas with heat island control, preservation of biodiversity, and flood mitigation effects previously provided by rice paddies.

#### Sub Leader

**HAYASHI Kengo** RIHN

#### Core Members

**OKABE Akiko** Chiba University  
**KAGOTANI Naoto** Kyoto University  
**KATO Hironori** The University of Tokyo  
**SHIMADA Ryuto** The University of Tokyo  
**FUKAMI Naoko** Waseda University  
**MURAKAMI Akinobu** University of Tsukuba

**MORI Koichiro** Shiga University  
**YAMASHITA Yuko** Hitotsubashi University  
**YAMADA Kyota** Kyoto University  
**MCGEE, Terry** University of British Columbia, Canada  
**ELLISA, Evawani** University of Indonesia, Indonesia

# Designing Local Frameworks for Integrated Water Resources Management

Project Leader **KUBOTA Jumpei** RIHN

Professor Kubota earned a doctorate in forest hydrology from Kyoto University (1987). He has served as assistant professor at Kyoto University (1987-1989), and assistant professor (1989-1996) and associate professor (1997-2002) at Tokyo University of Agriculture and Technology. He joined RIHN in 2002, and now directs the Center for Research Development and the RIHN-China initiative. His major research fields are hydrology, water issues in arid regions, and human adaptation to societal and environmental changes.

Co-Project Leader **Dorotea RAMPISELA** RIHN

Dorotea Rampisela earned a doctorate in forest hydrology from Kyoto University (1992). She was previously senior lecturer at Hasanuddin University (1982-2013). She joined RIHN in Jan 2014. Her major research fields are hydrology, focusing on watershed management and relocation of people related to dam construction. She established an NGO and for the last ten years has conducted participatory research with water users association for irrigation water management.



## Background and objectives

The concept of Integrated Water Resources Management (IWRM) was first proposed in the 1990s in order to recognize and coordinate the many stakeholders and sectors involved in effective water resources management. Despite several decades of development, there are still difficulties implementing IWRM in local communities and in effectively assessing the influence of human activities on water resources. While IWRM has focused on integrating the sectors and organizations governing water resources, it has not typically been able to incorporate demands from local water users or taken account of their cultural or historical backgrounds. This has resulted in a lack of flexibility from the supply side. As a consequence, new frameworks or guidelines have been requested in the field of local-to-regional water resources management.

The objective of this project is to propose knowledge structures and functions of water resources management to local-level stakeholders who play the essential role in adapting IWRM into society. The project also assesses the influence of local patterns of water use and systems of water resources management on the dynamics of global water resources. The research therefore involves considerable exchange between the scientific evidence of water cycles in particular places and the wide range of stakeholders involved in water management and use. The project's goals are to develop cooperation between science and society in order to stimulate the co-creation of desirable local water resource management.

## Research areas and methods

In order to accomplish the goals of the project, we have established several study sites in Indonesia, Turkey, Egypt and Japan. Cases in Indonesia and Turkey give us a geographical and hydrological contrast between humid and semiarid to arid regions experiencing increasing demand of water resources associated with rapid economic growth. The Japanese case presents interesting contrast as it shows steady or decreasing demand for water resources. Project researchers have surveyed the management structures reflecting the relationship between water users in each area and observed important

background hydrological and socio-economic dynamics.

Project research puts special emphasis on the sites in Indonesia and Turkey as they present a simple hydrological contrast between humid and arid regions, while their historical and cultural differences offer comparative examples of water management structures. We have been developing a GIS system to analyze land-use change indicated by satellite observations in relation to other important conditions such as areas affected by flooding and drought. At the same time, we conduct uncertainty assessment and parameter sensitivity analysis on the global water resources prediction using a global-scale hydrological model. We held stakeholder meetings in field study areas in order to promote mutual understanding of how different actors perceive water-related problems and seek new ways of establishing proper water resources management. Both the hydrological model and GIS system are utilized as information-sharing tools in stakeholder workshops.

## Progress to date

In Indonesia, field surveys in Subak, Bali have indicated a recent organizational transition as public policies have shifted water management from autonomous to cooperative unions. Stakeholder meetings were held in Bali and South Sulawesi in 2013. Most of the participants reported problems that have recently arisen between Subak members and outsiders, such as water pollution caused by illegal waste dumping and illegal constructions on irrigation canals. Because the Subak population is made up of farmers, it is difficult to handle these problems and participants realized the necessity of communication beyond the normal scale of Subak governance. In South Sulawesi, a lack of communication among water managers was clearly identified in the stakeholders meeting in which almost a hundred of leaders of farmers, water managers, governmental supervisors participated. After this meeting, we have supported further autonomous discussion among water managers.

In Turkey, we have identified similar problems in water management, such as information disparities and unclear responsibilities in spite of privatization. At the

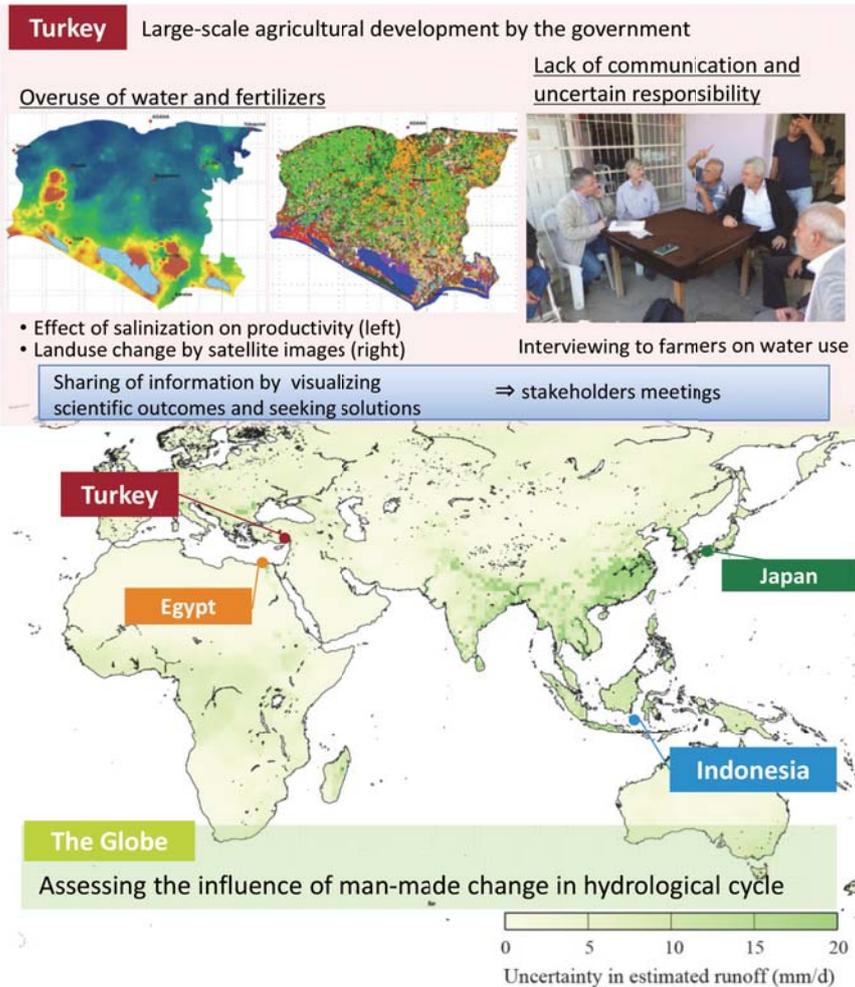


Figure 1 Progress of the project at a glance. The map in the center features indicates the uncertainty indicated by a model predicting water runoff, on which the key elements of research problems and findings in the case study sites on water resources management are featured. Deeper green color signifies higher uncertainty, i.e. difficulty in estimating water resources. We hereby figure out the significance to develop the model considering uncertainties of estimation. Local-level co-creation of knowledge between science and society in the context of global freshwater use will be realized so as to develop transdisciplinary integration of water resources management.

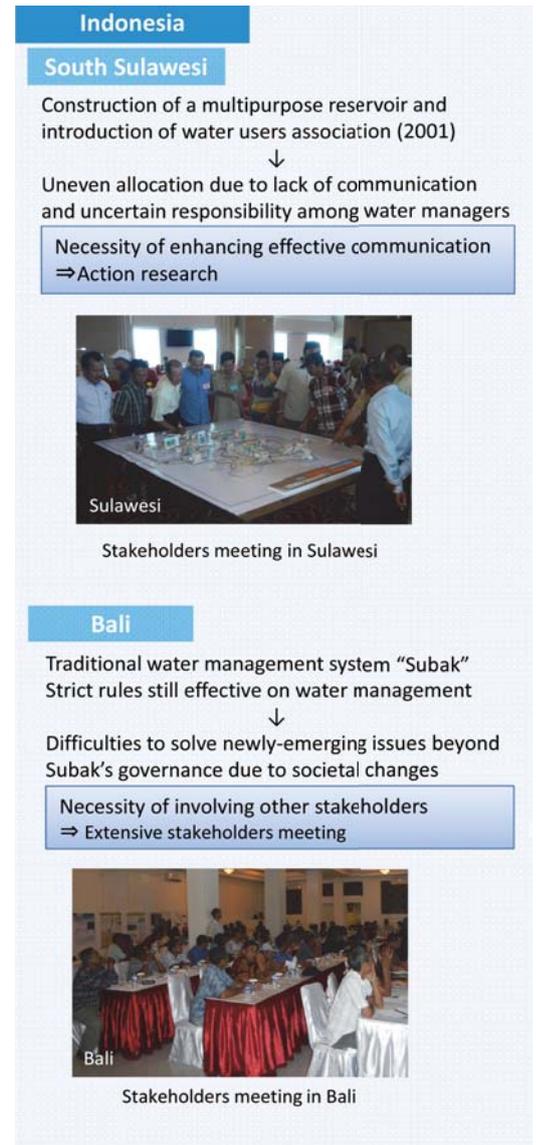


Figure 2 The results of stakeholders meetings in Indonesia areas

same time, surveys on river flow status, drainage water quality, and land use have revealed that excessive use of irrigation water and chemical fertilizer was responsible for degradation of watershed environment and land productivity. Two stakeholder meetings are planned for enhancing communication and mutual understanding among stakeholders. These meetings, in addition to providing important opportunities for stakeholders to jointly address key problems in local water management, also allow project researchers to analyze changes in stakeholder behavior and decision-making processes as we further develop the methodologies of transdisciplinary investigation.

Core Members

- AKÇA, Erhan** Adiyaman University, Turkey  
**AKIYAMA Michio** The University of Shiga Prefecture  
**BERBEROĞLU, Suha** Çukurova University, Turkey  
**ÇULLU, Mehmet A.** Harran University, Turkey  
**HAMASAKI Hironori** Nagasaki University  
**KAGAMI Haruya** Kanazawa University  
**MIZUTANI Masakazu** Utsunomiya University  
**NAKAGAMI Ken'ichi** Ritsumeikan University

- NAGANO Takanori** Kobe University  
**NAITO Masanori** Doshisha University  
**SETIAWAN, I. Budi** Bogor Agricultural University, Indonesia  
**TAKAMIYA Izumi** Kinki University  
**NAKAMURA Kimihito** Graduate school of Kyoto University  
**TAKARA Kaoru** Kyoto University  
**TAMURA Ulara** Japan Society for Promotion of Science (Kyoto University)

# Coastal Area Capability Enhancement in Southeast Asia

Project Leader **ISHIKAWA Satoshi** RIHN

Satoshi Ishikawa has researched population genetics of aquatic animals and conservation, and rural development through fisheries improvements and human capacity building in Asia and Pacific areas. He conducted surveys in Southeast Asian countries, PNG and Pacific Islands. He got bachelorship on Fisheries Science from National Fisheries University Japan, Master of Arts and Science from Hiroshima University, and Dr. of Agriculture from the University of Tokyo.



## Background

Coastal area ecosystem services are indispensable for rural people, but are also easily damaged by human use. Many coastal areas with high biodiversity and biological productivity are located in tropical zones of developing countries, as is the case in Southeast Asia. In such areas, ecosystem services, local livelihood and culture are closely related, but no clear research methods have been established to evaluate coastal ecosystem health in relation to human uses and needs. Conservation actions usually target particular resources, and resource management methods commonly used in temperate regions tend to target single ecologies and commercial resources, with little consideration of how multiple ecologies and livelihood strategies overlap in culturally diverse contexts, and so they cannot be easily applied to tropical coastal areas. This project aims to create new interdisciplinary and transdisciplinary research methods that clarify the potentials for harmonization between conservation and rural development in tropical coastal zones.

## Project Framework

This project develops a holistic concept of “Area-Capability” to permit consideration of socio-ecological dynamics and tradeoffs in rural coastal development. The concept is designed to allow transdisciplinary approaches to the study of the relationships between human and nature as a target for sustainability in order to facilitate transdisciplinary approach. Interdisciplinary field surveys are conducted in order to assess the value of each. Natural science methods identify key factors maintaining ecosystem health and services, or what we call ecosystem capability. Social and anthropological methods are used to describe patterns of resource use and how they may be linked to improvements in local livelihoods, or social and human capability. Action research is based on collaboration with local people and governmental institutions. In combination, such considerations can serve as a guide for sustaining biocultural diversity in tropical coastal area development.

This project is based on the joint research efforts of Southeast Asian Fisheries Development Center (SEAFDEC), Faculty of Fisheries of Kasetsart University, the University of the Philippines Visayas (UPV), and Japanese researchers who are members of the RIHN project. Aklan State University and Eastern Marine Fisheries Research and Development Center of Department Fishery, Thailand, are active participants as well.

### Multi-Functions of Ecosystem services and Multi-Utilizations in coastal area

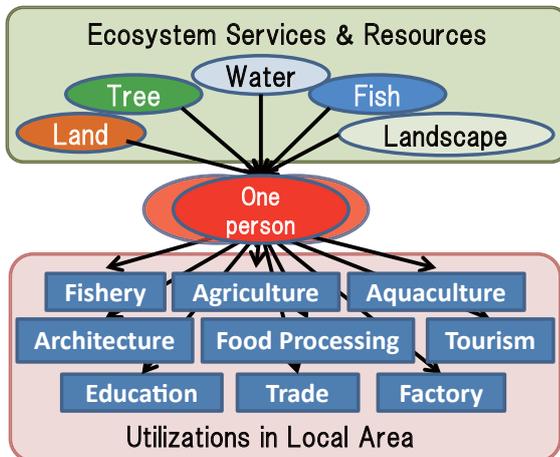


Figure 1 Complicated utilization of coastal resources and ecosystem services in tropical zone



Figure 2 Main research sites

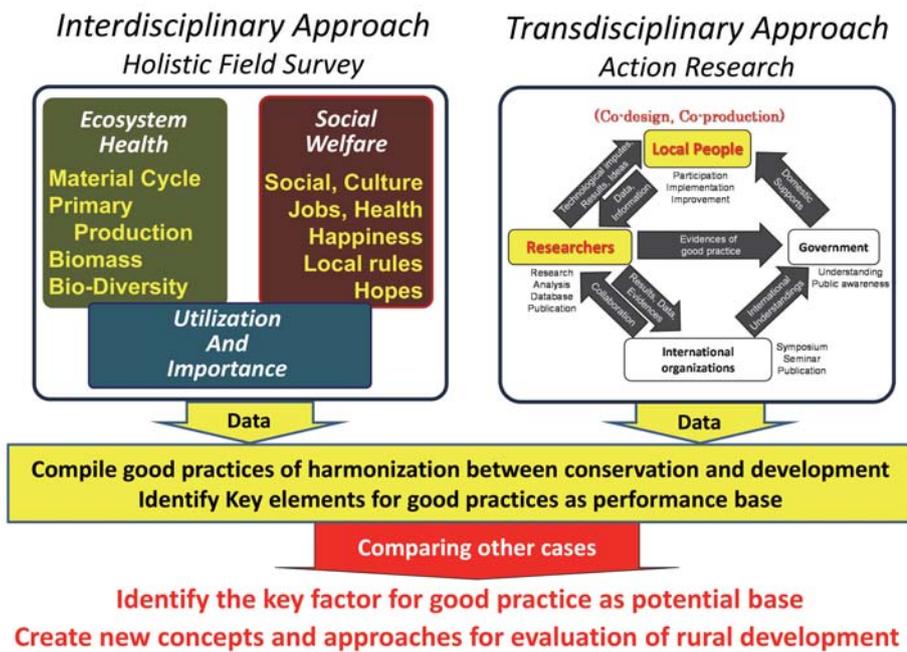


Figure3 Framework of the Area-capability project



Photo 1 Community-based set-net fishery in Rayong, Thailand



Photo 2 Community market managed by set-net fishery group

### Future tasks

With full research underway since 2012, we are examining coastal area resources, ecosystem services and communities in the Rayong area of Thailand, Panay Island in the Philippines, and Ishigaki Island and Mikawa Bay in Japan. Local ecosystem primary productivity, material cycles, and food webs will be analyzed. The project will also examine the present state, fluctuation, and migration of important biotic resources, developing equipment for such measurement as necessary. Social research will investigate related economic activities, including distribution and pricing mechanisms, working conditions, local culture and customs as they inform livelihood strategies, and health and disaster measures and resilience. A set-net fishery and the sale of seafood by local fishery groups will be researched in the Rayong area of Thailand, as will a fish farming enterprise in Batan Bay, Philippines, in order to describe the full effect of such endeavors on local environments and livelihoods, and to better inform effective resource management in these areas.

In total, this project aims to clarify the most salient local issues and constraints and opportunities that define the area capability of the coastal tropical regions under study. Continual feedback of such data within the project



Photo 3 Group photo from a project joint seminar held in Thailand 2013

will deepen dialogue with local people and governmental institutions and is expected to improve project research and support ecologically sound local and regional development.

#### Core Members

**KONO Yasuyuki** Kyoto University  
**KUROKURA Hisashi** The University of Tokyo  
**IKEMOTO Yukio** The University of Tokyo  
**ARIMOTO Takafumi** Tokyo University of Marine Science and Technology  
**MIYAMOTO Yoshinori** Tokyo University of Marine Science and Technology  
**MIYATA Tsutomu** National Research Institute of Fisheries Science  
**YAMADA Yoshihiko** Tokai University  
**YOSHIKAWA Takashi** Tokai University  
**MUTO Fumihito** Tokai University  
**KAWADA Makito** Chukyo University

**MATSUOKA Tatsuro** Kagoshima University  
**EBATA Keigo** Kagoshima University  
**MOTOMURA Hiroyuki** Kagoshima University Museum  
**AMORNIYAKRIT, Taweekiet** Southeast Asian Fisheries Development Center  
**ALTAMIRANO, Jon P.** Southeast Asian Fisheries Development Center  
**MUNPRASIT, Ratana** Department of Fishery, Kingdom of Thailand  
**TUNKIJJANUKIJ, Suriyan** Kasetsart University, Thailand  
**KAERNERN, Methee** Kasetsart University, Thailand  
**BABARAN, Ricardo** University of the Philippines Visayas, Philippines  
**FERRER, Alice J. G.** University of the Philippines Visayas, Philippines

Kagoshima University  
 Kagoshima University  
 Kagoshima University Museum  
 Southeast Asian Fisheries Development Center  
 Southeast Asian Fisheries Development Center  
 Department of Fishery, Kingdom of Thailand  
 Kasetsart University, Thailand  
 Kasetsart University, Thailand  
 University of the Philippines Visayas, Philippines  
 University of the Philippines Visayas, Philippines

# Desertification and Livelihood in Semi-Arid Afro-Eurasia

Project Leader **TANAKA Ueru** RIHN

Ueru TANAKA obtained a Doctorate in Agriculture from Kyoto University (1997). He has previously worked as lecturer of Jomo Kenyatta College of Agriculture and Technology, Kenya (1983–1987), assistant professor in the Faculty of Agriculture, Kyoto University (1990–1999), associate professor in the Graduate School of Agriculture, Kyoto University (1999–2002), associate professor in the Graduate School of Global Environmental Studies, Kyoto University (2002–2011), and since 2012 is honorary professor of Hue University (Vietnam). His major fields of interests are agronomy, indigenous livelihood systems, desertification, and rural development support in West Africa, Southern Africa, India and Southeast Asia.



## Research backgrounds, objectives and study areas

Desertification is a complex phenomena related to land degradation and poverty, especially in sub-humid, semi-arid and arid areas. As shown in Figure 1 (a case in the Sahel, West Africa), population and human activities increased, resulting in the exploitation of land resources. Desertification is primarily caused by activities related to basic human survival and daily livelihood, such as cropping, animal husbandry, and gathering of fuel wood (Fig. 2). Efforts to mitigate or solve desertification do not often take account of such causes. This may be one of the major reasons why desertification remains a serious problem despite commitments from the international community, including the United Nations Convention to Combat Desertification (1994), to address it.

This project's objectives are: 1) to deepen understanding of the socio-ecological characteristics of targeted areas in Semi-Arid Afro-Eurasia; 2) to design and verify some practical techniques or approaches effective for desertification control in the context of rural development support; and 3) to propose and implement some techniques and approaches to desertification control and rural development, paying special attention to vulnerable people.

Project research takes place in the Sahel of West Africa (Burkina Faso, Niger and Senegal), Northeast Africa

(Sudan), Southern Africa (Namibia and Zambia), South Asia (India) and East Asia (Mongolia and, hopefully, China), as shown in Figure 3, where socio-ecological condition and land resources are degraded due to demographic pressure and uncertain socio-economic conditions happened under extreme weathers.

## Research activities

Major research activities are 1) Innovation of practical techniques for desertification control and improvement of household economy, 2) Extension of verified techniques, e.g. fallow-bans system, contour lines of Andropogon and extension method incorporated with social network survey, and 3) Studies on vulnerable people, as well as 4) local livelihood systems, e.g. agro-pastoral system, adaptation strategy to climatic and economic fluctuation, Islam in rural development context in West Africa. In Southern Africa, studies on 1) Monitoring of soil degradation and recovery processes, e.g. changes of nutrient status and organic matters under different farming practices and 2) Resilience of agro-pastoral system, e.g. behavior of grazed animals and its impact on land resources, conflict between cultivators and pastoralists, and socio-ecological adaptation are implemented. In South Asia and East Asia, 1) Resilience of agro-pastoral systems, e.g. coping behavior of local people in the years of crisis and 2) Inventory of indigenous farming techniques, knowledge and tools and 3) Re-appraisal of traditional dry-farming techniques are focused.

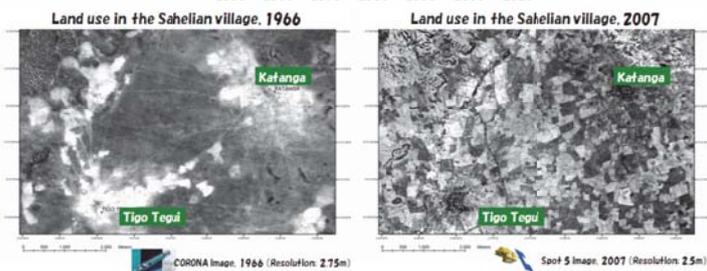
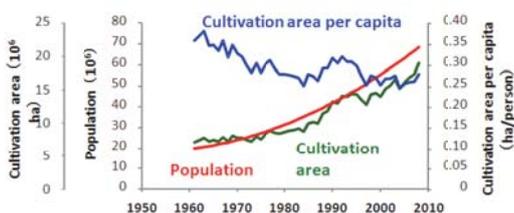


Figure 1 Increase of human impact in the Sahel, West Africa



Figure 2 Causes of desertification

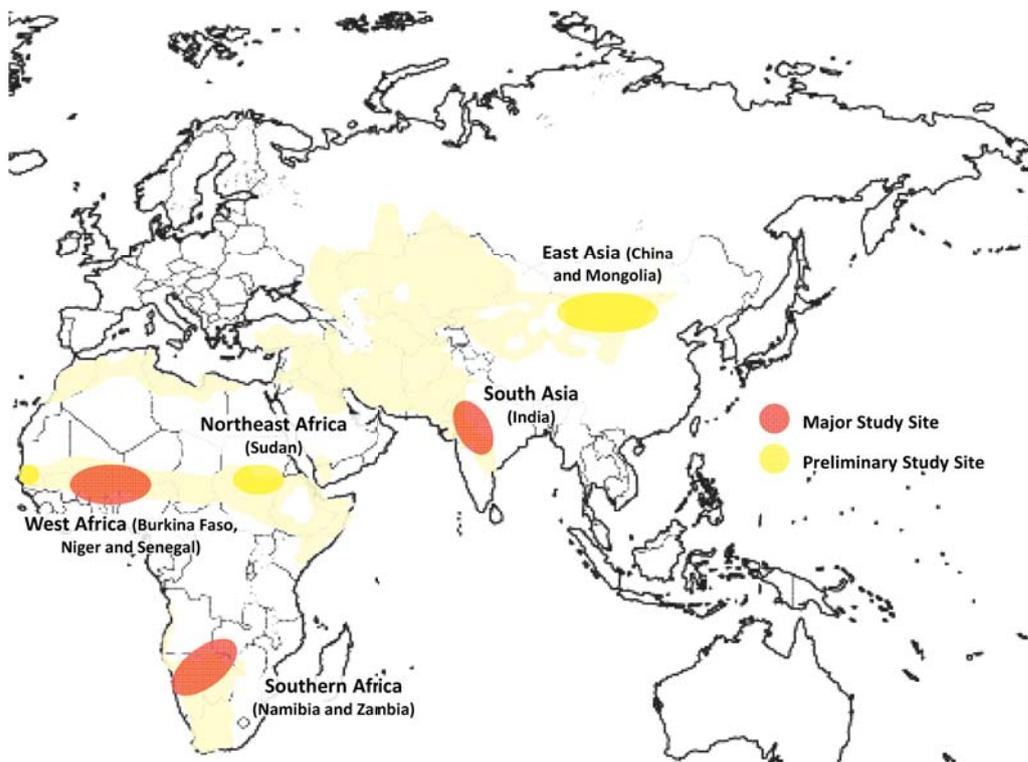


Figure 3 Study sites in Semi-Arid Afro-Eurasia

### Progress to date

#### Design of practical technique with local people

Many techniques have been introduced to control desertification to date, but unfortunately most are not adopted by local people. New techniques, however scientifically sound and rational, may not match the needs and situation of local people if they are too expensive or require too much time or labor. Some techniques are highly dependent on materials and machinery from outside that may not be locally available.

Together with volunteer villagers in Niger and Burkina Faso, we designed an alternative technique using local materials and indigenous knowledge to control soil erosion and increase household income. The technique is called “Contour lines of Andropogon” as shown in Figure 4. Andropogon (*Andropogon gayanus* Kunth) is a wild perennial grass found everywhere in the Sahel and utilized as a material to construct granaries and housing. The plant stalk and woven mats are sold in local markets, and the income is sometimes equivalent to the price of 1 to 2 months of grain for consumption. When used to control soil erosion, the plant is transplanted to a pit with manure, an indigenous technique known as “Zai”. Manure application to the wild grass, a newly adopted practice, increases plant productivity and harvest of stalk. Planting along the contour line reduces soil erosion by intercepting surface run-off water. This technique is also helpful for vulnerable people, such as elders and widows, who have no land or compete with the others to collect wild Andropogon. This is a typical example of designing a



Figure 4 Contour lines of Andropogon designed with local people

practical technique, which satisfies desertification control and improvement of local livelihood, combined with indigenous knowledge, locally available materials and experiences of outsiders.

### Future tasks

We make comparative studies on 1) Adaptation strategies in agro-pastoral systems between high/low population areas, tropical/temperate climate regions, and cultivation/pastoral system” and 2) Possibility of technology transfer, e.g. land use systems, restoration of degraded land, farming tools and soil management practices in Africa and Asia.

#### Sub Leader

**ISHIMOTO Yudai** RIHN

#### Core Members

**SHINJO Hitoshi** Kyoto University

**IKAZAKI Kenta** Tokyo Metropolitan University

**KOBAYASHI Hirohide** Kyoto University

**NAKAMURA Hiroshi** Global Environmental Forum

**MIURA Rei-ichi** Kyoto University

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**DEORA, K. P. Singh** Institute of Rajasthan Studies, India

**MIYAZAKI Hidetoshi** RIHN

**SHIMIZU Takao** RIHN

**SASAKI Yuko** RIHN

**TESHIROGI Koki** RIHN

**ENDO Hitoshi** RIHN

# Creation and Sustainable Governance of New Commons through Formation of Integrated Local Environmental Knowledge (ILEK project)

Project Leader **SATO Tetsu** RIHN

Professor Tetsu Sato studied the ecology of cichlid fishes of African lakes for 20 years. Throughout his career, including as Conservation Director of WWF Japan and professor of Nagano University, he focused on creating knowledge bases for community-based management of natural resources. He also led a project to create a network of local scientists producing Integrated Local Environmental Knowledge.

Co-Project Leader **KIKUCHI Naoki** RIHN

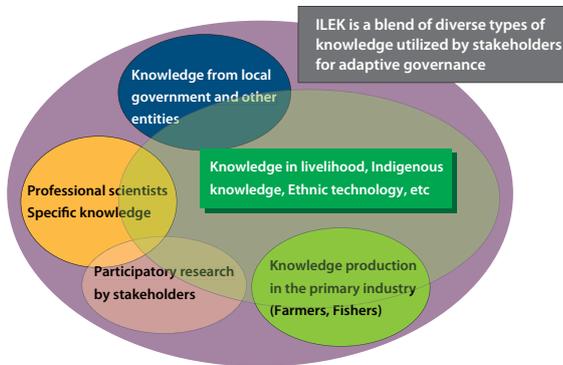
Professor Naoki Kikuchi has been working at the Hyogo Prefectural Homeland for Oriental White Stork as a residential researcher on environmental sociology regarding restoration of the Oriental White Stork. His transdisciplinary research focuses on solutions of environmental problems from the perspectives of local stakeholders.



## Research objectives

Local ecosystem services have deteriorated all over the world for various reasons. Ecosystem services should be managed as new commons by collaboration of various stakeholders, both within and from outside the communities. In order to create and sustainably manage such commons, the formation and circulation of local knowledge systems deeply embedded in real local settings is desperately needed. Integrated Local Environmental Knowledge (ILEK, Fig. 1), a novel concept of local knowledge blending scientific as well as various types of knowledge systems among stakeholders, is produced, circulated and utilized in diverse cases of local research and actions to support adaptive changes toward sustainability of local communities.

Our project aims to clarify mechanisms to facilitate production and circulation of ILEK and dynamic changes of social systems to propose ILEK-based adaptive governance mechanisms of local communities. We also seek mechanisms for multi-scale governance of global environment problems, primarily by analyzing formation of multi-scale knowledge bases created as knowledge flows and is mediated by bilateral translators who promote the circulation of knowledge between knowledge producers and users, both within local communities and across global, regional and local scales (Fig. 2). Through the transdisciplinary integration of these research results, we aim to design “science for/with society” and “society making full use of science” for bottom-up solutions of global environmental problems.



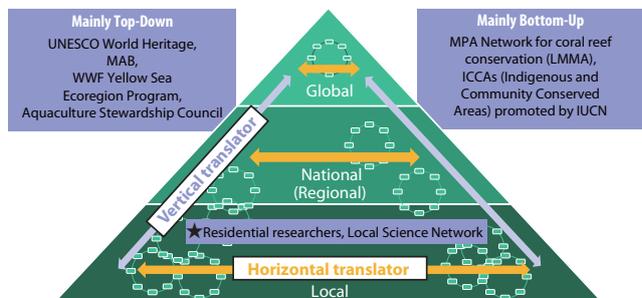
**Figure 1 Structure of ILEK**

Production and circulation of ILEK is not exclusively performed by professional scientists. Rather, it is often produced and circulated by diverse actors in local communities, including skilled workers in primary industries, local government officials, local companies and NGOs, most of them being knowledge users at the same time. ILEK is formed and utilized through dynamic interactions among different actors/stakeholders in local communities, integrating scientific research and local knowledge production in daily livelihood and culture among local stakeholders.

## Main results to date

We have selected 61 case study sites from past and ongoing RIHN projects as well as other examples of diverse production of local knowledge in order to accumulate and analyze ILEK production mechanisms (Fig. 3). Project members belonging to the case study group are deeply involved in each local community and conduct participatory research. These researchers also conduct meta-analysis in order to integrate diverse case study results in collaboration with the Theory and Modeling and Multi-scale Analysis groups to understand ILEK production and sustainable adaptive governance mechanisms leveraged by ILEK. Nine case study sites and two cases of multi-scale translators have been selected to conduct social experiments so far, including the Shiraho community in Ishigaki Island (Japan), Sarasota Bay in Florida (USA), Karapinar area (Turkey), Lake Malawi National Park (Malawi), and the Japan Biosphere Reserve Network as a multi-scale translator case. Initial design of social experiments for these cases has been completed to verify focused hypotheses.

Residential researchers live in local communities, and in contrast to visiting researchers from outside the communities, they conduct transdisciplinary research as local stakeholders and so also are involved in producing ILEK. Bilateral knowledge translators promote circulation of ILEK among scientists and diverse knowledge users by evaluating and transforming scientific knowledge from the viewpoints of knowledge users, and by translating



Each scale level has characteristic networks of knowledge producers and users, and bilateral knowledge translators facilitate both horizontal and vertical translation of knowledge. Analysis of framing and knowledge flow across the scales will clarify multi-scale governance systems.

**Figure 2 Hypothetical framework of multi-scale analysis**

This framework is used to analyze the role of bilateral knowledge translators in supporting knowledge flow and adaptive governance across different scales, from local to global.



📍 : East Asia team, 📍 : EU/North America team, 📍 : Developing Country team

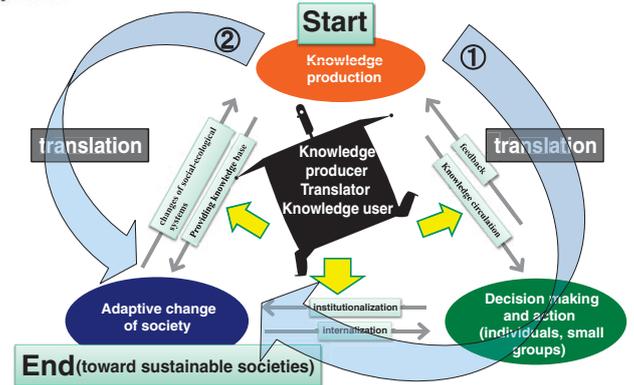
**Figure 3 Case study sites of the ILEK project**  
Sixty one project case study sites are grouped into East Asia (32), EU and North America (12), and Developing Countries (17) teams. Project members are embedded in each case study site as a residential/visiting researcher or a bilateral translator to collaborate with various local stakeholders in producing and utilizing ILEK. Web GIS and other techniques are currently developed to categorize case study sites using natural and social-ecological indices for meta-analysis and integration.

knowledge among stakeholders into scientific language.

We constructed a conceptual model of ILEK-based adaptive governance focusing on functions of these important actors of local communities (ILEK Triangle, Fig. 4), and identified four hypothetical categories of important drivers of adaptive societal changes promoted by ILEK production and circulation, namely “create and visualize values”, “collaborate with diverse actors (local and multi-scale)”, “provide options and opportunities”, and “appropriate translation”. In-depth interview protocols and questionnaire were developed in 2013, and preliminary analyses of interviews with various actors playing important roles in knowledge production, circulation and utilization (32 cases, 37 interviewees) suggested drivers categorized to “collaborate with diverse actors” playing significant roles especially in Japanese cases. The Theory and Modeling Group researchers are making efforts to integrate various outputs of case studies, and conduct multi-scale analyses in collaboration with empirical scientists and stakeholders using mathematical modeling and computer-assisted discourse analysis to understand ILEK-based adaptive governance mechanisms.

### Future research plan

We are currently moving forward to elaborate the analytical framework of ILEK-based adaptive governance using the ILEK Triangle and social experiment protocols to verify focused hypotheses derived from meta-analyses of diverse case studies from the world. In order to understand ILEK functions in the real-life adaptive governance systems in local communities, interactions between science and various types of local knowledge production must be incorporated to the research processes by co-design of research and co-production of knowledge with



**Figure 4 Conceptual model of adaptive governance (ILEK Triangle)**  
The ILEK Triangle model is composed of an interactive system of three important elements of ILEK-based adaptive governance (knowledge production, decision making and action, and adaptive societal change), driven by knowledge producers, knowledge users and translators. The pathways to achieve ILEK-based adaptive governance are postulated in this model with two different processes starting from knowledge production resulting in adaptive societal changes via changes in individual decisions and actions, or directly influencing formal and informal institutions and human networks.

stakeholders. This transdisciplinary approach to promote intensive interactions, feedbacks and mutual learning among residential/visiting researchers, bilateral translators, and diverse stakeholders is the core of case studies, social experiments, meta-analyses and integration in the ILEK project. We will strengthen the transdisciplinary approach both in local case studies and abstract meta-analysis processes by designing stakeholder workshops to take place in 2014 and 2015. Social experiments starting in 2014 and further development of meta-analyses and modeling methodologies will contribute to production of solution-oriented research outputs to support ILEK-based bottom-up solutions of diverse global environmental problems.

#### Core Members

|                         |                                  |
|-------------------------|----------------------------------|
| <b>MIYAUCHI Taisuke</b> | Hokkaido University              |
| <b>NIITSUMA Hiroaki</b> | Tohoku University                |
| <b>TOMITA Sho</b>       | Tohoku University                |
| <b>SUGA Yutaka</b>      | The University of Tokyo          |
| <b>MATSUDA Hiroyuki</b> | Yokohama National University     |
| <b>SAKAI Akiko</b>      | Yokohama National University     |
| <b>MAKINO Mitsutaku</b> | Fisheries Research Agency, Japan |
| <b>TOKITA Kei</b>       | Nagoya University                |
| <b>YUMOTO Takakazu</b>  | Kyoto University                 |
| <b>YAMAKOSHI Gen</b>    | Kyoto University                 |
| <b>SHIMIZU Mayuko</b>   | Ryukoku University               |
| <b>YANAKA Shigeru</b>   | Tottori University               |

|                              |   |
|------------------------------|---|
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| <b>YANAGI Tetsuo</b>         | Kyushu University   |
| <b>KAKUMA Shinichiro</b>     | Okinawa Prefecture Fisheries Development and Extension Center |
| <b>KAMIMURA Masahito</b>     | WWF Japan Coral Reef Conservation and Research Centre         |
| <b>CROSBY, Michael P</b>     | Mote Marine Laboratory, Sarasota, Florida, USA                |
| <b>CASTILLA, Juan Carlos</b> | Pontificia Universidad Católica de Chile, Chile               |
| <b>NAKAGAWA Chigusa</b>      | RIHN  |
| <b>TAKEMURA Shion</b>        | RIHN  |
| <b>OMOTO Reiko</b>           | RIHN  |
| <b>MIKI Hiroshi</b>          | RIHN  |
| <b>KITAMURA Kenji</b>        | RIHN  |

# Human-Environmental Security in Asia-Pacific Ring of Fire: Water-Energy-Food Nexus

Project Leader **TANIGUCHI Makoto** RIHN

Professor Makoto Taniguchi is a hydrologist. He has worked on global studies of groundwater as a leader of the UNESCO GRAPHIC Project "Groundwater Resources Assessment under the Pressures of Humanity and Climate Change", as Vice President (2007-2011) of the International Committee of Groundwater of IAHS under IUGG, and as national representative (2007-present) of IAHS. He is also an editor of the books "Subsurface Hydrological Responses to Land Cover/Use Changes", "Land and Marine Hydrogeology", "The Dilemma of Boundaries" and "Groundwater and Subsurface Environments".

Co-Project Leader **ENDO Aiko** RIHN

Associate professor Aiko Endo studies the economics of fisheries as well as coastal and marine policy. She has taken interdisciplinary and multi-sectoral approaches to Integrated Coastal Management (ICM) in coastal areas in Japan and has experience in projects which made national policy proposals. Her research theme is to find the proper governance structure linking local, national, regional, and global to solve the environmental issues through interdisciplinary and transdisciplinary research with co-design and co-production.



## Research objectives and background

Climate change and economic development are increasing pressure on water, energy and food resources, presenting communities with difficult tradeoffs and potential conflicts among these resources. Therefore, the water-energy-food nexus is one of the most important and fundamental global environmental issues facing the world. As water is the central matter within this cluster, we will focus on the inherent tradeoffs between water and food, and water and energy. For the purposes of this project, we define human-environmental security as the joint optimization between human and environmental security as well as the water-energy and water-food connections. To optimize governance and management within these inter-connected needs, it is desirable to increase human-environmental security by improving social management of the water-energy-food nexus. In this research project, we intend to establish a method to manage and optimize human-environmental security of the water-energy-food nexus. We base our approach on the viewpoint that it is important for a sustainable society to increase human-environmental security and decrease vulnerability by optimizing the connections within the critical water-energy and water-food clusters.

We will take a regional perspective on these global environmental problems. The geological and geomorphological conditions in our proposed study area are heavily influenced by the so-called Pacific Ocean "Ring of Fire". Within these areas, including Japan and Southeast Asia, the hydro-meteorological conditions are dominated by the Asia monsoon. The populations that live under these natural conditions face elevated risk and potential disaster, while also benefitting from positive ecological goods and services. There are therefore tradeoffs and conflicts within the water-energy-food nexus, as well as among various stakeholders in the region.

The objective of this project is to maximize human-environmental security (minimize the risk) by choosing policies and management structures that optimize water-energy-food connections in Asia-Pacific region. We define the joint security approach as optimized policy for both critical water clusters. Optimal policies will develop joint security approaches for human-environmental security in the coastal region of the Ring of Fire, including stakeholders and decision-makers.

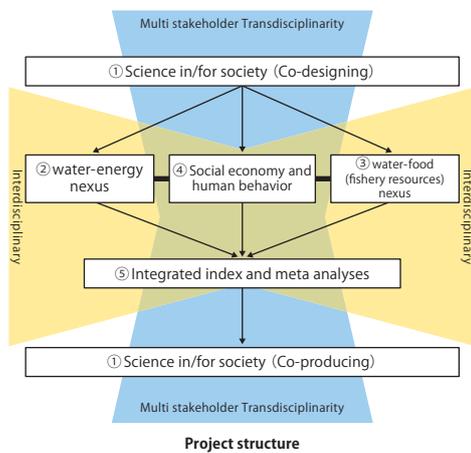
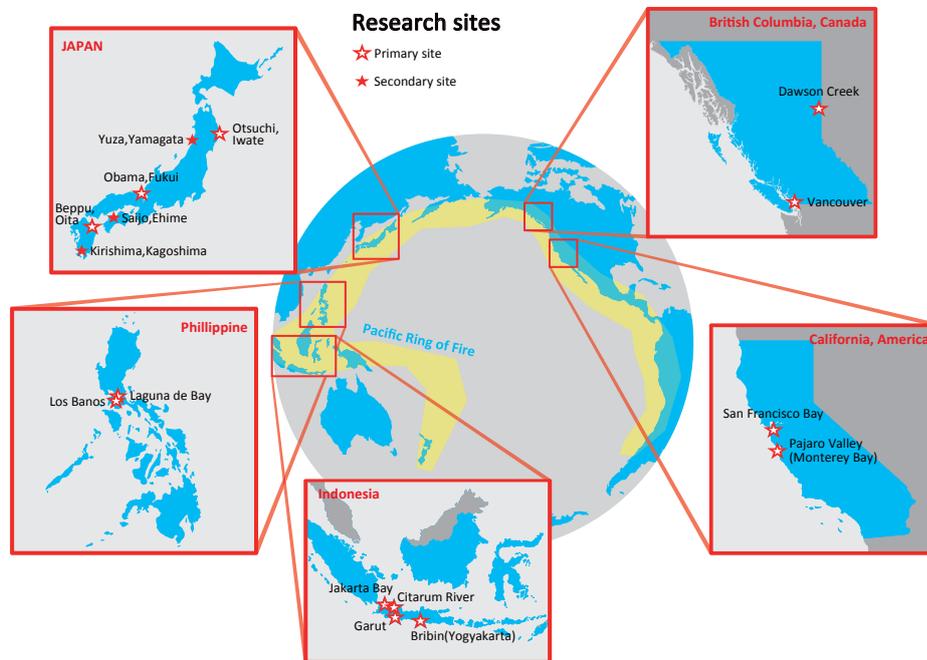
## Research methods and structures

The project integrates interdisciplinary and transdisciplinary research with co-design and co-production (Future Earth, 2013) and science in/for society. Horizontal integration with different issues and sectors, and vertical integration from local, national, regional to global scale are also targeted. Five interdisciplinary approaches will be used: (1) Environmental governance, science in/for society, and co-design/co-production approaches; (2) Biophysical measurements/analyses (water-food nexus) using geochemical, coastal oceanographic, geophysical, hydrologic, and ecological techniques to evaluate linkages between land and ocean; (3) Biophysical measurements/analyses (water-energy nexus) using satellite, geophysical, geochemical, and hydrogeological techniques to evaluate linkages between water and energy; (4) Social measurements/analyses (water-energy-food nexus) using community surveys, cost-benefit/efficiency analysis, and environmental valuation from socioeconomic, anthropology, psychology, and behavioral-science methodologies; and (5) Development of integrated indicators/indices and network analyses of feedback from stakeholder meeting/workshops.

## Research activities and findings

In the first year of the research at local scale, stakeholder analyses have been conducted through four stakeholder meetings and interviewing for establishing co-design framework in Obama city of Fukui prefecture. Regarding the water-food nexus, the new parameter such as thoron isotope has been identified to examine the spatial distribution of submarine groundwater discharge (SGD) in Beppu Bay of Oita prefecture, which is a habitat of the Shiroshita flatfish. This establishes thoron isotope as one of the potential indicators for the environmental flow of nutrients from land to the ocean in coastal ecosystems.

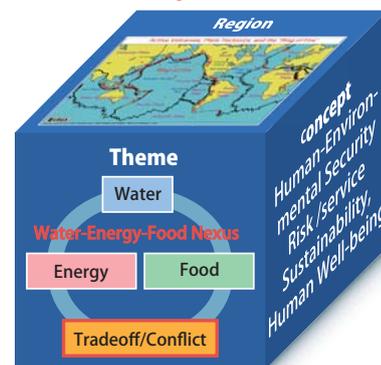
As for the water-energy nexus, research to solve potential conflicts and tradeoffs between (1) geothermal energy developments/hot spring power generations and hot spring water, (2) geothermal energy and groundwater, and (3) small hydropower generation and environmental flow, have been implemented. The framework construction and selection of indicators to create an integrated index for human environmental security of the water-energy-food



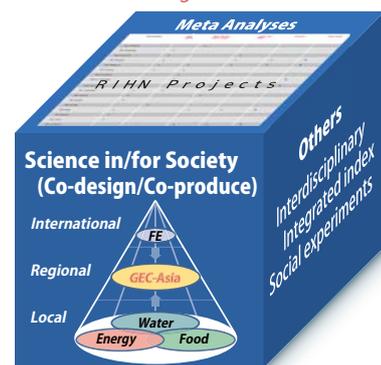
### RIHN initiative project

- (1) Integration of RIHN projects results
- (2) Co-design / co-production (design science)

### Contents of integration



### Methods for integration



nexus have been also developed.

On the other hand, at the regional scale, stakeholders for water-energy-food nexus have been identified following the Future Earth category for co-production. Horizontal and vertical integration between stakeholders from local, national, and regional to global scale is also a future target.

### Expected results

1. Suggested guidelines to increase environmental security and reduce conflicts related to the water-energy-food nexus.
2. Recommendations for decreasing coastal vulnerability related to the separate governance of land and oceans.
3. Policy and governance structure recommendations for improved water management.
4. Suggestions for sustainable environmental management of the water-energy-food nexus in the Asia-Pacific region.

### Core Members

|                           |   |
|---------------------------|---|
| <b>FUJII Masahiko</b>     | Hokkaido University                         |
| <b>SHOJI Jun</b>          | Hiroshima University                        |
| <b>BABA Kenshi</b>        | Hosei University                            |
| <b>OHSAWA Shinji</b>      | Kyoto University                            |
| <b>TAHARA Daisuke</b>     | Fukui Prefectural University                |
| <b>KAWAMURA Tomohiko</b>  | The University of Tokyo                     |
| <b>DELINOM, Robert M.</b> | Indonesian Institute of Sciences, Indonesia |

|                              |   |
|------------------------------|---|
| <b>ALLEN, Diana M.</b>       | Simon Fraser University, Canada                     |
| <b>SIRINGAN, Fernando P.</b> | University of the Philippines Dilliman, Philippines |
| <b>GURDAK, Jason</b>         | San Francisco State University, USA                 |
| <b>MASUHARA Naoki</b>        | RIHN  |
| <b>YAMADA Makoto</b>         | RIHN  |
| <b>OH Tomohiro</b>           | RIHN  |

# Long-term Sustainability through Place-Based, Small-scale Economies: Approaches from Historical Ecology

Project Leader **HABU Junko** RIHN

Born in Kawasaki City, Japan, Junko Habu received her BA (1982) and MA (1984) from Keio University in Tokyo and PhD (1996) from McGill University in Montreal. She is the project leader of the Small-Scale Societies Project and a Professor at RIHN, and also a Professor of Anthropology at the University of California, Berkeley. As an environmental archaeologist, she has excavated a number of prehistoric Jomon sites and historic Edo period sites in Japan and conducted fieldwork in North America. Her books include *Ancient Jomon of Japan* (Cambridge University Press, 2004) and *Evaluating Multiple Narratives* (Springer 2008, co-edited with Fawcett and Matsunaga).



## Objectives and Background

This project examines the importance of place-based, small-scale and diversified economies for the long-term sustainability of human societies. Our working hypothesis is that a highly specialized subsistence strategy can support a larger community for a short period, but a decrease in subsistence and food diversity makes the subsistence system and its associated community more vulnerable in the long-run. Archaeological, historical and paleoenvironmental studies will be used to test this hypothesis. To link these studies with the present discussion of the scale and methods of alternative food systems, ethnographic and ecological studies of contemporary small-scale food systems and communities will be conducted. In combination, studies of the past and present will point to the future, as research process also involves collaborative design of ecologically sound and equitable food systems.

We realize that there are many additional factors that affect the dynamics among subsistence/food diversity, the scale of a food production system, and its long-term sustainability. Some of the key factors include the mobility of people, goods and information, sociopolitical inequality and technological developments (see Figure). Climate change is another important factor when considering the mechanisms of long-term culture change. Accordingly, correlations among these factors will also be examined when testing the main hypothesis listed above.

## Global environmental problems addressed by this project

Global environmental problems addressed by this project include soil and water contamination, loss of biodiversity and long-lasting damage to ecosystems. The development of large-scale monoculture with a large amount of chemical pesticide and fertilizer has resulted in serious soil and water contamination and the destruction of ecosystems. Meanwhile, the prevalence of aquaculture by large corporates has caused water pollution as a result of the overuse of chemicals. In addition, overharvesting small fish for feeding farm fish has caused serious damage to marine ecosystems. To mitigate these problems, local and national governments and international organizations typically impose regulations, but they do not always provide fundamental solutions. As an alternative bottom-up

approach, this project examines the past and present practice of place-based, smaller-scale food production systems, evaluates their advantages and limitations and explores their future potentials.

## Geographic focus

Our regional focus is the North Pacific Rim. In particular, we have identified northern Japan, with its solid archaeological record and its importance in contemporary food production, as the core area of our field research. The west coast of North America, with rich traditions of ethnographic and ecological investigation as well as active contemporary food/agriculture movements, will provide comparative case studies. These two regions share a number of characteristics in common, including climate, vegetation, fauna, and a high level of seismic activity. There are also cultural ties with historical depth as a result of the migration of anatomically modern humans after the late Pleistocene. Historically, the abundance of small-scale economies supported by marine food exploitation (e.g. salmon and herring) and intensive nut-collecting also characterize these two regions.

## Research methods

The project consists of three research groups, each with several sub-projects.

**Longue-Durée Group:** Archaeological, historical, and paleoenvironmental studies will be used to test project

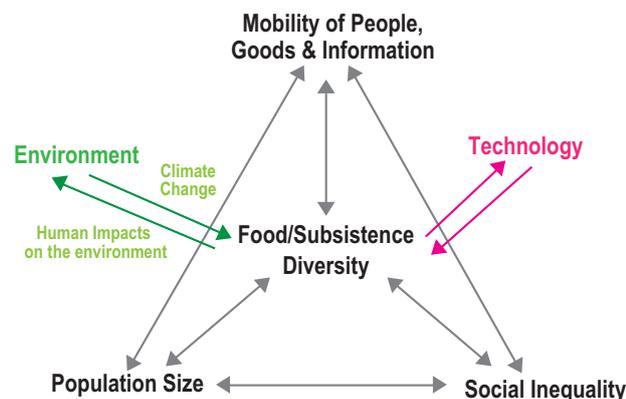
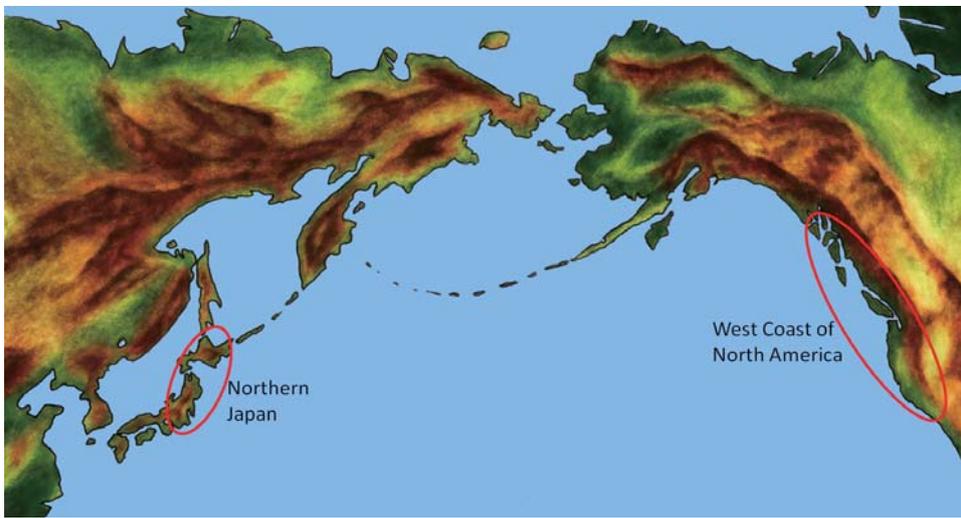


Figure Mechanisms of Long-term Culture Change



Map Main Research Areas

hypotheses. Correlations between subsistence/food diversity, scale of production, community size, and other key factors (see Figure) will be examined.

**Contemporary Society Group:** Ethnographic and sociological studies of small-scale communities and small-scale food production systems will be conducted to understand the complex inter-relationships among cultural and natural contributors in contemporary urban and rural settings. Chemical and scientific studies of the human impacts on the environment will also be conducted.

**Implementation, Outreach and Policy Proposal Group:** Insights obtained from our research will be used to develop programs for promoting place-based, small-scale and diversified food production and public outreach programs, and to make policy suggestions.

### Achievements during the FS phase

**Longue-Durée Group:** Preliminary analysis of prehistoric Jomon data in northern Japan indicates a significant decrease in subsistence diversity and a rapid population increase at around 5000 years ago, followed by a drastic population decrease at around 4500 years ago or slightly later. In order to examine causes, conditions and consequences of these changes, paleobotanical and zooarchaeological analyses, GIS analysis of regional settlement patterns, lithic analysis, residue analysis of pottery, and climate change studies are currently in progress. Research plans for comparative studies include archaeological analysis of prehistoric and historic hunter-gatherers in northern California and the Northwest Coast area.

**Contemporary Society Group:** As a pilot study, ethnohistorical and ethnographic research of small-scale



Photo Archaeological Excavation of a Middle Jomon Site in Aomori Prefecture

fishing communities in the Miyako Bay and Hei River drainage (Iwate Prefecture) in northern Japan was conducted. In addition, ethnographic studies of small-scale farmers in Fukushima and Miyagi Prefectures have been conducted to collect first-person, primary data about the challenges faced by families and small-scale communities in the areas affected by the 3.11 triple disasters. For Coastal North America, archival and preliminary field research of small-scale farmers, fishing industries and indigenous communities were conducted.

**Implementation, Outreach and Policy Proposal Group:** Preparations for this research group are still at their nascent stage. Discussions for the following sub-projects are in progress: 1) Eco-literacy project with a focus on cherry salmon at the Hei-River area, 2) collaboration with small-scale farmers in the 3.11 disaster area, including vegetable oil producers in Tochigi and Fukushima, and 3) urban farmer field schools in collaboration with educational programs in UC Berkeley.

#### Sub Leader

**WEBER, Steven** Washington State University, USA

#### Core Members

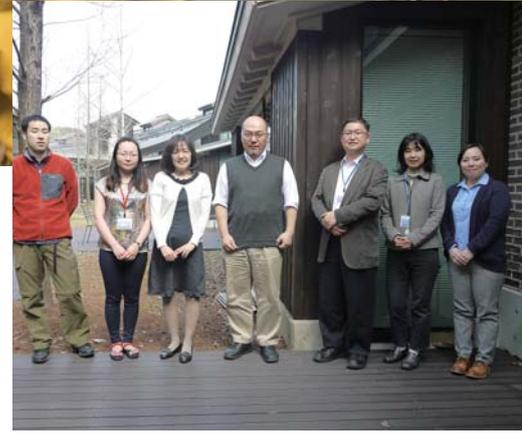
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**SASAKI Tsuyoshi** Tokyo University of Marine Science and Technology  
**NAITO Daisuke** Center for International Forestry Research, Indonesia  
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**YONEDA Minoru** The University of Tokyo  
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**FITZHUGH, Ben** University of Washington, USA  
**LIGHTFOOT, Kent** University of California, Berkeley, USA  
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**SAVELLE, James** McGill University, Canada  
**SLATER, David** Sophia University  
**ADACHI Kaori** RIHN  
**OISHI Takanori** RIHN  
**KUSAKA Soichiro** RIHN  
**HAMADA Shingo** RIHN  
**TAKEHARA Mari** RIHN

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

Project Leader **NAKATSUKA Takeshi** RIHN

Professor Nakatsuka's specialties are palaeoclimatology and isotope biogeochemistry. Since his early career as a graduate student, he has been using nitrogen isotopes to study long-term variations of climate and its impacts on oceanic biogeochemical cycles. Recently, he changed his main research area from oceans to land and focused on using tree-ring oxygen isotopes to examine the relationship between climate change and human history. Investigating periodicity of climate during last two millennia in Japan and the world, he now hypothesizes that past human societies were often damaged by multi-decadal climate variations as they were caught in a cycle of over-adaptation and subsequent collapse.



## Background and objectives

When global warming causes many difficulties in our society, how can we adapt to the change? Remarkable recent progress in palaeoclimatology has elucidated the fact that large climate variations often underlay epochs of human history. How did our ancestors address such change in the past? Human history must include many examples from which we can extract common lessons relevant to contemporary global environmental change. The research target of this project is Japanese history from the prehistorical Jomon era to the present. First, we reconstruct past climate variations in Japan and Asia at annual or seasonal time resolutions for last three millennia, using up-to-date palaeoclimatological methods to identify outstanding periods of climate changes. Then we use historical and archaeological approaches to investigate how local societies reacted to the climate change in order to clarify common sociocultural characteristics of societies that are tolerant or vulnerable to changes in climate.

## Research methods

In this project, past climate variations are reconstructed by various proxies, such as tree rings (Photo 1), coral rings, ice cores, lake and marine sediments, and historical weather records, and compared with historical documents and archaeological archives. There are three reasons why we have chosen Japan as the main research area in this project. First, Japan is located at northeastern rim of the Asian summer monsoon, where small changes in monsoon dynamics might have significantly affected paddy rice cultivation on which Japanese sustenance has historically depended. Second, due to the historically high literacy rate and long-lasting family system in Japan, innumerable historical documents dating back to the 8<sup>th</sup> century are preserved in both private and governmental sectors. Third, rapid land developments during last several decades have provided us of precise archaeological records at numerous excavated sites all over Japan. In addition, a palaeoclimatological tool (tree-ring cellulose oxygen isotope ratio) particularly useful in the Asian monsoon region has been developed recently to reconstruct summer precipitation important for rice paddy cultivation.

## Remarkable results

So far, we have been using many living trees, buried logs, old architectural wood and archaeological wooden artefacts from around Japan in order to analyze tree-ring oxygen isotope ratios during the last four thousand years in annual time resolution. Figure 1 shows the time-series obtained in central Japan using Hinoki cypress trees. Annual resolution of past climate data enable us to confirm whether there are direct relations between extreme climate conditions and special paleographic events, and to discuss how periodicity of climate variations influences people's livelihood. Figure 1 illustrates that multi-decadal (20-50 years) hydroclimate variability enhanced at about 400 year intervals might have underlain major political regime shifts in Japanese history, such as the ends of Yayoi and Kohun era, and the medieval upheaval period. We are now investigating how people in the past reacted to those large climate fluctuations, using various historical documents and archaeological archives.

## Final goal

Because the relationship between climate and society is one of the most mysterious subjects remaining in history and archaeology, this project must have the potential to substantially improve our understanding of Japanese history. The most important hypothesis in this project is that society, vulnerable to climate changes, must be vulnerable to environmental changes, too. Although the sources of "past climate change" are completely different from those of "present global environmental problems", both kinds of change might have the same structure in the context of social adaptation. Therefore, the final goal of this project is to conduct detailed examinations of societal adaptation to past large-scale climate change in order to propose adaptation strategies to environmental change in the present.

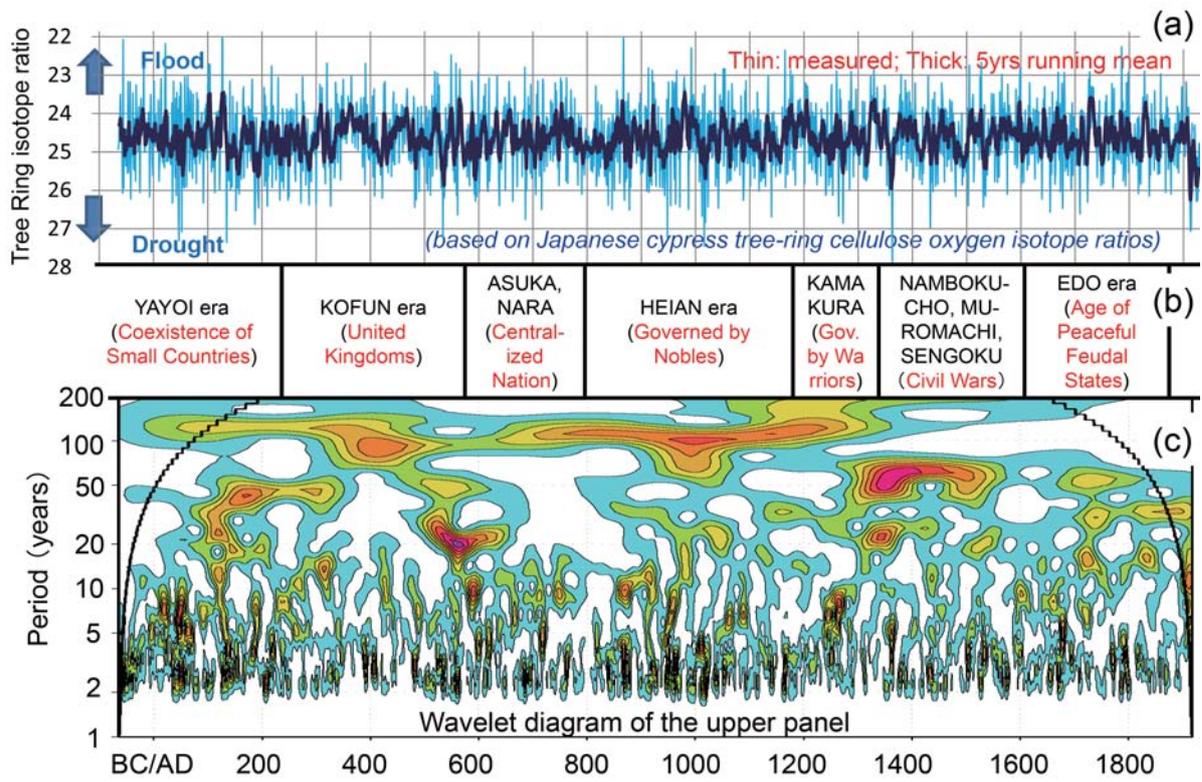


Fig.1: Historical variation of summer precipitation in central Japan recorded by tree-ring cellulose oxygen isotope ratios of Hinoki cypress trees (a), Division of Japanese history (b) and wavelet diagram of the upper panel (c), where warm color indicates larger fluctuations.



Photo 1 Collection of tree-ring cores from giant Hinoki cypress trees in Taiwan



Photo 2 Various tree-ring disks applied to reconstruct past climate variations

Sub Leader

**SANO Masaki** RIHN

Core Members

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**HIGAMI Noboru** Aichi Prefectural Center for Archaeological Operations  
**TAMURA Noriyoshi** Beppu University  
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**ITO Keisuke** RIHN  
**MURAKAMI Yumiko** RIHN

## Completed Research

When a project moves to CR (Completed Research) 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 and are assessed in the final post-evaluation, two years after formal project conclusion. At RIHN, however, 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              | No   | Research Project  |
|-----------------------|---------------------|------|---|
| 2006                  | HAYASAKA Tadahiro   | C-01 | Emissions of Greenhouse Gases and Aerosols, and Human Activities in East Asia   |
|                       | KANAE Shinjiro      | C-02 | Global Water Cycle Variation and the Current World Water Resources Issues and Their Perspectives  |
|                       | WATANABE Tsugihiro  | R-01 | Impact of Climate Changes on Agricultural Production System in the Arid Areas   |
|                       | NAKAWO Masayoshi    | H-01 | Historical Evolution of the Adaptability in an Oasis Region to Water Resource Changes   |
|                       | YACHI Shigeo        | E-01 | Multi-Disciplinary Research for Understanding Interactions between Humans and Nature in the Lake Biwa-Yodo River Watershed                                      |
| 2007                  | FUKUSHIMA Yoshihiro | C-03 | Recent Rapid Change of Water Circulation in the Yellow River and Its Effects on Environment   |
|                       | ICHIKAWA Masahiro   | D-01 | Sustainability and Biodiversity Assessment on Forest Utilization Options  |
|                       | AKIMICHI Tomoya     | R-02 | A Trans-Disciplinary Study on Regional Eco-History in Tropical Monsoon Asia: 1945-2005  |
| 2008                  | SEKINO Tatsuki      | E-02 | Interaction between Environmental Quality of the Watershed and Environmental Consciousness  |
|                       | TAKASO Tokushiro    | E-03 | Interactions between Natural Environment and Human Social Systems in Subtropical Islands  |
| 2009                  | SHIRAIWA Takayuki   | C-04 | Human Activities in Northeastern Asia and their Impact on Biological Productivity in the North Pacific Ocean  |
| 2010                  | TANIGUCHI Makoto    | C-05 | Human Impacts on Urban Subsurface Environments  |
|                       | YUMOTO Takakazu     | D-02 | A New Cultural and Historical Exploration into Human-Nature Relationships in the Japanese Archipelago   |
|                       | SATO Yo-ichiro      | H-02 | Agriculture and Environment Interactions in Eurasia: Past, Present and Future   |
| 2011                  | KAWABATA Zen'ichiro | C-06 | Effects of Environmental Change on the Interactions between Pathogens and Humans  |
|                       | KUBOTA Jumpei       | R-03 | Historical Interactions between Multi-Cultural Societies and the Natural Environment in a Semi-Arid Region in Central Eurasia                                   |
|                       | OSADA Toshiki       | H-03 | Environmental Change and the Indus Civilization   |
|                       | UCHIYAMA Junzo      | H-04 | Neolithisation and Modernisation: Landscape History on East Asian Inland Seas   |
|                       | UMETSU Chieko       | E-04 | Vulnerability and Resilience of Social-Ecological Systems   |
| 2012                  | OKUMIYA Kiyohito    | D-03 | Human Life, Aging and Disease in High-Altitude Environments: Physio-Medical, Ecological and Cultural Adaptation in "Highland Civilizations"                     |
|                       | SAKAI Shoko         | D-04 | Collapse and Restoration of Ecosystem Networks with Human Activity  |
|                       | MOJI Kazuhiko       | R-04 | Environmental Change and Infectious Disease in Tropical Asia  |
| 2013                  | HIYAMA Tetsuya      | C-07 | 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      | R-05 | A Study of Human Subsistence Ecosystems in Arab Societies: To Combat Livelihood Degradation for the Post-oil Era  |
|                       | KADA Ryohei         | R-06 | Managing Environmental Risks to Food and Health Security in Asian Watersheds  |

# Human Life, Aging and Disease in High-Altitude Environments: Physio-Medical, Ecological and Cultural Adaptation in “Highland Civilizations”

Project Leader **OKUMIYA Kiyohito** RIHN

This project explored new perspectives regarding how people live in high-altitude environments where oxygen levels are low and natural resources are limited. We focused on aging problems and lifestyle-related diseases because we regard these as manifestations of global environmental issues in the human body. Project research also aimed to clarify the meaning of “highland civilization”, defined by human ecological, physiological, and cultural adaptations to high-altitude environments, and to describe how recent changes in lifestyle have affected quality of life (QOL) among the elderly. Based on these observations, we also proposed a model of human-nature interactions appropriate for highland civilizations. Study sites were selected from four areas in the Himalaya-Tibet region: the Ladakh region in India, the Arunachal Pradesh State in India, Khaling in Bhutan, and the Qinghai Province in China, each of which has distinct ecological and socioeconomic conditions.

## Results

Human ecological and cultural adaptations in highland environments were characterized as maximal and sustainable utilization of limited but diversified natural resources, flexible management for disasters notwithstanding inherent social-ecological vulnerabilities, and a simple life with modest virtues. Human-environmental relationships were studied in three ecologically distinct zones in Himalaya-Tibet region: a forest in Arunachal Pradesh and Bhutan, the Ladakh oasis, and the grasslands of Qinghai. In Arunachal Pradesh, for example, the distribution of vegetation, ethnic groups, subsistence-related lifestyle patterns and recent change, and alien plant invasion were described from 200 to 4000 meters of altitude. Our survey of rural-to-urban migration suggested that local residents increasingly seek better education and medical service as well as the higher

cash income provided by non-agricultural activities. This change in human-environment relationships, caused by various factors from local to global, uniformly resulted in the rise of lifestyle-related disease such as hypertension and diabetes. The “Himalaya model of lifestyle-related diseases” and “diabetes acceleration model” were developed to describe these trends. The background association of diabetes with high hemoglobin and oxidative stress was viewed as a trade-off with hypoxic adaptation associated with aging in highland environments.

## Research communication

In Ladakh and Bhutan, we contributed to the design of health care systems for elderly people and described the negative effects of new lifestyle-related diseases. Grassroots international workshops involving local residents, researchers, and medical officers were conducted in Arunachal Pradesh and Bhutan in order to discuss regionally appropriate development pathways in relation to QOL of elderly highlanders.

The project has published extensively, including: “Aging, diseases and health in the Himalayas and Tibet from medical, ecological and cultural viewpoints: studies on Arunachal Pradesh, Ladakh, and Qinghai”; “Pastoral nomadism, pastoral transhumance, and sedentary pastoralism-from the fields of Mongolia, Tibet, the Himalayas and the Andes” (in Japanese); “Himalayan Study Monographs (No. 15)” (in Japanese); “Ladakh: Ecology, Disaster, and Health”; and several chapters in a forthcoming volume on Ecohealth in the RIHN Book Series and two additional books are currently in preparation. Seminars were held every month by the project while in CR phase on the theme “The wisdom of the aged: Learning from the high-altitude elderly”; and publication of a series on field-practices are also currently in preparation (see Photo).



**Nomads on Changthang plateau in Ladakh (4700 m alt).**

This elderly pastoralist had recently suffered the loss of his wife, but his mental health was maintained because of his important role of looking after his livestock every day, including shifting location ten times/year, along with other pastoralists of his village. Comparative analysis with elderly of Japan indicated that the prevalence of depression in high-altitude people was relatively low in spite of severe livelihood conditions (Ishikawa 2010, 2013).

# Collapse and Restoration of Ecosystem Networks with Human Activity

Project Leader **SAKAI Shoko** Kyoto University

Most ecosystems on the planet have been seriously degraded by human activities and are now in critical condition. We still do not have a clear perspective on solving these problems, however, owing to the complexity of ecosystems and human societies and their interactions (what we refer to as the Ecosystem Network). The goals of this project are to promote understanding of the environmental problems associated with managing ecological resources and to contribute to their solution using the concept of the Ecosystem Network.

In this project, we address two tangible environmental problems under contrasting ecological settings: grasslands in Central Asia (Mongolia), and tropical rainforests in Southeast Asia (Sarawak, Malaysia). In Mongolia, we focus on the degradation of pastures. For thousands of years, many people in Mongolia have lived by nomadic herding on the grasslands. In recent decades, however, the number of livestock—especially goats for the export of cashmere—has increased rapidly, causing degradation of pastures and hindering sustainable nomadism.

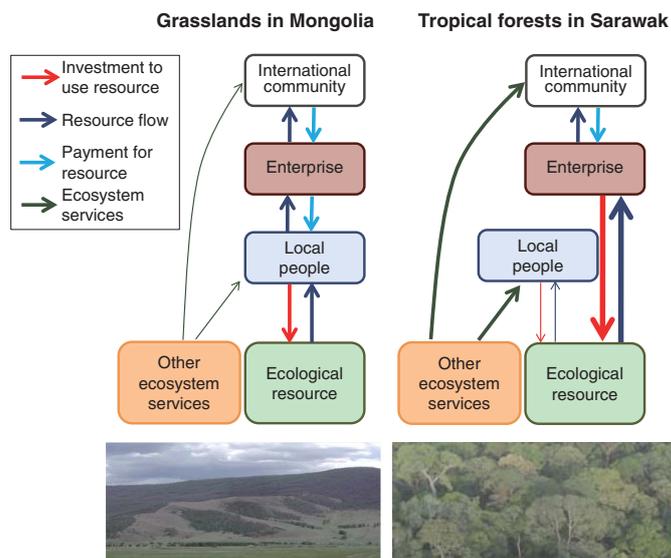
In Sarawak, we focus on the loss and degradation of forests. Local ecosystems have undergone dramatic changes during the last 100 years: land use has shifted from small-scale agriculture by indigenous people to logging of natural forests as a source of timber for export, and then to the development of oil-palm plantations. The expansion of these plantations has brought about a sharp decline in biodiversity and ecosystem components essential to indigenous people.

We identified differences between the Ecosystem Networks in Mongolia and Sarawak, which stem from different ecological characteristics of the ecosystems and ecological resources. Because of these differences, the appropriate policies and institutions would also differ. In Mongolia, there is potential for sustainable management via a negative feedback mechanism to suppress the overuse of pastures, since the degradation of ecological resources and other ecosystem services directly affects the users. For sustainable management, it is therefore essential to identify factors that weaken feedback mechanisms and to implement policies and institutions that enhance such feedback. In contrast, feedback does not act to suppress overuse in Sarawak, where the main users are enterprises. In this case, sustainable management requires policies to introduce feedbacks or restrict the intensity of resource use.

The results of the project showed that network structures that are likely to lead to environmental problems or ecosystem network restoration depend on the ecological characteristics of the specific system and resources.

## Research in both Sarawak and Mongolia is comprised of three core stages:

- (1) Identification of Ecosystem Network structures underlying the problems. We first propose hypothetical ecosystem network structures and then confirm and evaluate these links through field surveys, remote sensing, literature surveys, and modeling. This stage will provide insight into the factors that cause and accelerate environmental problems and the barriers to their resolution;
- (2) Scenario analyses. We construct multiple scenarios for each case study and estimate land cover and network structures for each scenario based on the results obtained from (1). We then evaluate the predicted ecosystem and social status using various indices;
- (3) Implications for ecosystem conservation from the ecosystem network perspective. By comparing the case studies of Mongolia and Sarawak, we correlate the ecological characteristics of the ecosystems or ecological resources with the structure of the ecosystem network and the associated environmental problems.



Ecosystem networks of Mongolia and Sarawak simplified for comparison. Mongolian herders use pastures to feed livestock, and their products are sold to the market through companies and enterprises. In Sarawak, timber is harvested and palm oil is produced directly by enterprises. Ecosystem services provided by tropical forests are more highly valued by international markets than those of grasslands are.

# Environmental Change and Infectious Disease in Tropical Asia

Project Leader **MOJI Kazuhiko** Nagasaki University

The RIHN Ecohealth Project examined the relation between endemic infectious diseases of significance to public health and ecosystem and societal transformation. Project research was guided by the hypothesis that the health profile of a human population is a product of the social ecological system, and as a consequence, environment and health (and society more broadly) should not be studied in isolation from one another. Instead, the idea of ecohealth recognizes their interactions. From this viewpoint, the ecohealth of each social ecological system is unique, and strategies to promote good health and its supportive environment should be unique for each locality. This integrative, transdisciplinary perspective is very different from the conventional model of universal health.

## Lao P.D.R.

In Lao P.D.R., the project collaborated with the Ministry of Health, Ministry of Education, National Institute of Public Health (NIOPH), Savannakhet Provincial Health Department, District Health Offices, as well as numerous health centers and communities. We studied liver fluke infection in the lowland area of Savannakhet Province in relation to development of wet rice field and irrigation systems. In the mountainous area of the same province, where ethnic minority peoples cultivate upland rice paddies, we studied malaria in relation to forest degradation. A trans-border malaria study was conducted among villages on both sides of the Laos-Vietnam border, where we found a large difference in malaria incidence. The project established two Health and Demographic Surveillance Systems (HDSS) and one mobile-phone network in the province, both of which will continue to produce ecohealth data after conclusion of the project and so to elucidate the relation between social-ecological transformation and a population's health profile.

## Progress in 2013-2014

The 7th Laos National Health Research Forum (NHRF) was held in Vientiane in October 2013 as a part of the project's first year of CR activity. The results of the project were presented and further study plans for achieving the Millennium Development Goals (MDGs) and preparing for Sustainable Development Goals (SDGs) were discussed. We emphasized the importance of community-based ecohealth promotion and education to reduce the environmental and behavioral risk exposures to pathogens as well as harmful non-communicable factors, such as indoor pollution. We find that capacity building of village health volunteers is a critical element for the success of such endeavors. At the national level, strengthening health service systems should lead to universal health coverage, especially in the areas of curative medicine, immunization, and child delivery. Here there are two important factors. Providers must build the

capacity of their health center and district staff, as well as provide good governance and management of the health system. Second, social registration of residents is essential for universal health care. A Health and Demographic Surveillance System (HDSS) is a kind of social experiments for social registration and personal identification, and the continuing improvement of HDSS data collection, protection, and analysis is important. We continue to work in these areas in the CR period.

Following the NHRF, the opening ceremony of the Sepon Village Health Volunteer Training Center was conducted at Sepon Inter-District Hospital, Savannakhet Province. The center was constructed with support from the Japanese Government's Official Development Grant Assistance for Grassroots Human Security Projects and also benefited from the corporate social responsibility activity of Hitachi Ltd. working in collaboration with the Savannakhet Provincial Health Office. Our project members will continue to promote ecohealth capacity building of local health workers and volunteers at the training center, while also collaborating in ecohealth research activities for which we recently received the Laos Friendship Medal.

## Vietnam, Bangladesh, and Yunnan, China

In Vietnam, Bangladesh, and Yunnan, China, RIHN Ecohealth Project research activities continue by new sources of funding. We are maintaining the network and good relations in the field of ecohealth both nationally and internationally. The RIHN EcoHealth Learning Group was established in 2013 in order to identify new research projects. The J-EcoHealth (Japanese Association for Ecology and Health) was established in Hue, Vietnam at the meeting of the DIAS-GRENEei EcoHealth Project in December 2013. Progress in ecohealth research will be presented at the EcoHealth 2014 conference to be held in Montreal, Canada.



The 7th Laos National Health Research Forum (NHRF), at the National Institute of Public Health (NIOPH), Vientiane, October 2013

# Global Warming and the Human-Nature Dimension in Siberia: Social Adaptation to the Changes of the Terrestrial Ecosystem, with an Emphasis on Water Environments

Project Leader **HIYAMA Tetsuya** Nagoya University

The extent of Arctic summer sea ice, especially in the Eurasian continent side, has been decreasing. Global warming is a partial cause. Cyclones have appeared frequently in summer in the region, bringing much precipitation to Siberia in particular. Meteorological data revealed high rates of summer precipitation in the upper and middle parts of the Lena River Basin from 2005 to 2008 and in 2012.

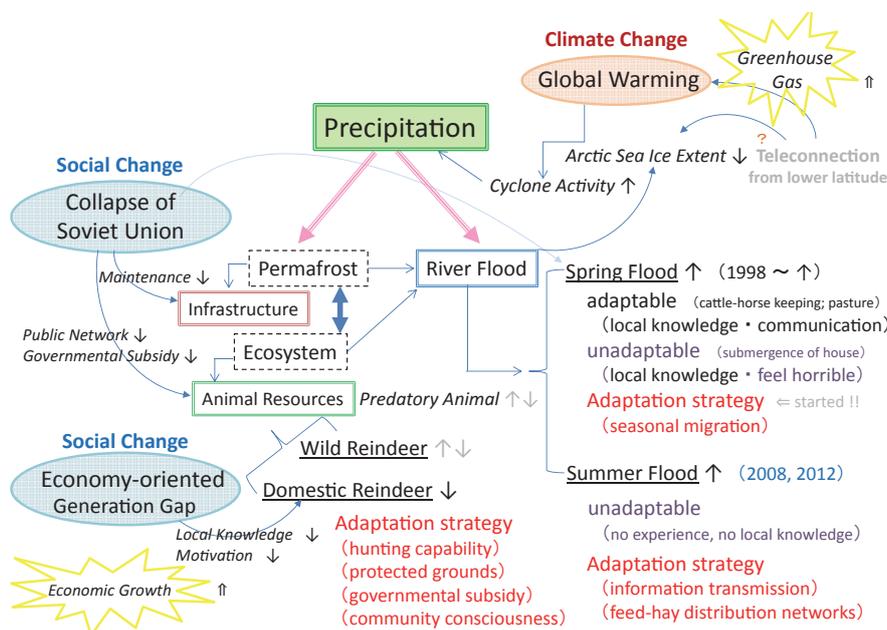
Summer river flooding around Yakutsk, capital city of the Sakha Republic of the Russian Federation, has become a problem, severely damaging local agriculture and pastoralism. On the contrary, the spring thaw along the Lena River typically causes river ice flooding, which can be severe when low winter temperatures are followed by gradually increasing spring temperatures. Such spring floods have caused severe damages to local residents living along the river in almost every year since 1998.

Our project investigated local people's perceptions and local governmental adaptation strategies for both spring- and summer-river flooding. Interestingly, spring flooding has been recognized as beneficial except when it causes damages to villages along the river. This is because spring floods bring nutrient-rich water to the river islands on which the farmers cultivate pastures for cattle and horses. Summer river flooding, on the contrary is seen as a hazard, because it submerges the pasture completely in summer, and prevents getting of hay for cattle and horses. Village relocations were adopted as one of the adaptation strategies to prevent damages from spring floods. Because local people prefer to live along the river on which their subsistence depends, they agreed, with government support, to migrate seasonally. There have been no

similar adaptations to summer flooding, however. Based on our observations and analysis, we intend to promote sustainable subsistence activities in the region by proposing strategies to facilitate information transmission and improvement of feed-hay distribution networks that can aid in adaptation to spring and summer river flooding.

We also investigated how animal keepers and hunters have adapted to social-environmental changes in the region. Interviews with keepers of domestic reindeer revealed that current climate change has not severely damaged their operations. Careful management of the microhabitats of domesticated reindeers has allowed them to successfully adapt to climate change even though they were severely affected by social changes follow the collapse of the Soviet Union. We also documented the migration routes of wild reindeer, tracking them with an ARGOS satellite system, in order to understand their seasonal behavior. Similar to reindeer populations in North America and North Europe, Siberian reindeer have a summer breeding season, winter hibernating season, and other migration seasons. Because recent climate changes degrade reindeer moss in winter, the birthrate and weight of reindeers has tended to decline. Establishment of protected winter hibernating grounds would therefore help to protect wild reindeer populations. In order to preserve the practice of keeping reindeer, one of the very important subsistence activities in Siberia, governmental subsidies should be provided to keepers of reindeers and to hunters of carnivores.

We intend to inform our Russia counterparts of our analysis and recommended adaptation strategies so that they can be considered by local governments and peoples.



**Human - nature interactions in Siberia.** The left-hand side shows reindeer-related subsistence activities and right-hand side indicates river flood impacts to the local residents. In the lower part of the figure, adaptation strategies are proposed for both issues.

# A Study of Human Subsistence Ecosystems in Arab Societies: To Combat Livelihood Degradation for the Post-oil Era

Project Leader **NAWATA Hiroshi** Akita University

## Research objectives and background

Japan and the oil-rich countries of the Middle East have put excessive pressures on the Earth's energy, water, and food resources. In prioritizing their own economic prosperity, these countries have exploited irreplaceable resources, such as fossil fuel and fossil water. Schemes to plant alien species have also placed stress on local ecosystems. Such practices have increased social and economic differences among the peoples of the Middle East at a time when the region faces a turning point in modern oil-based industrialization. The current fossil fuel-based interdependencies must be transformed into new relations that can support viable future societies.

Our project was focused on human subsistence ecosystems, namely life-support mechanisms and self-sufficient modes of production (hunting, gathering, fishing, herding, farming, and forestry) with low energy resource consumption. Based on our results, we proposed a scientific framework for strengthening subsistence productivity and rehabilitating daily life in Arab societies in the post-oil era.

## Study outcomes

### 1) Publication of ten volumes of Arab Subsistence Ecosystems in Japanese

Camels, date palms, dugongs, mangroves, and coral (reefs) are believed to be the keystone species of Arab human subsistence ecosystems (social ecosystems). These species support diverse communities and their extinction could lead to the disappearance of other species and human communities. The survival of these species is likely to depend on the wise use of ecotones, socio-ecological niches in the arid Middle East environment (Nawata 2010). The ten volumes of Arab Subsistence Ecosystems were published to describe our results on the following: 1) interrelationships between humanity and nature; 2) date palms, 3) mangroves, 4) the alien species mesquite, 5) camels, 6) coral reefs, 7) dugongs, 8) sorghum and millet, 9) motivated practitioners and local communities, and 10) is the modern human really a keystone species?

### 2) The Surviving in the Desert exhibit at the National Museum of Nature and Science

The exhibition *Surviving in the Desert: Strategies of Humans, Plants, & Animals* ran at the National Museum of Nature and Science, Tokyo, from November 2013 to February 2014. Research results and materials collected in this project were on display. The exhibition organized twenty-seven gallery talks, symposia and lectures to communicate with Japanese citizens. More than one hundred thousand visitors visited the exhibit, demonstrating a significant public interest in the project's findings on contemporary environmental problems.

### 3) Feedback from Japanese citizens regarding the post-oil era

A RIHN book series volume titled *Human Resources and Engineering in the Post-Oil Era: A Search for Viable Future Societies in Japan and Oil-Rich Countries of the Middle East* was edited by the Project Leader and Project Researcher, based on feedback from Japanese citizens on the post-oil era, after attending three RIHN Open Seminars for the public on "How will you live without oil?" presented between 2009 and 2011 (Ishiyama & Nawata eds. 2013). One book review said: "This book took the initiative in examining renewable human resources and engineering to get ready for the post-oil era" (June 5, 2013, Environment Newspaper).

### 4) Publication of the Arab Subsistence Monograph series in multiple languages

In order to increase the availability of scientific knowledge and provide universal and equitable access to scientific data and documents, we made our results accessible to local and national decision-makers by reporting the results in English, the common language of the scientific community, and in Arabic, French, English, and Kiswahili, the languages of the communities in the study region, in the first volume *Exploitation and Conservation of Middle East Tree Resources in the Oil Era* (Nawata, Ishiyama & Nakamura, 2013).

### 5) Research implementation through development projects in Arab societies

The results of the study were applied as part of the Japan International Cooperation Agency project "Capacity Development Project for the Provision of Services of Basic Human Needs in Kassala" (2011–2013) in cooperation with the Sudan University of Science and Technology. Based on joint Japanese and Sudanese research, we organized a training course on mesquite management and utilization for outreach workers. The results were immediately presented at an international conference and published in an academic book (Mendez-Vilas ed. 2012).



Project Publication

# Managing Environmental Risks to Food and Health Security in Asian Watersheds

Project Leader **KADA Ryohei** Shijonawate Gakuen University

This research project examines the impact of ecological hazards, such as flood, soil erosion, and water pollution, on the inter-relationships of food production and public health in Southeast Asian watersheds. Field research is conducted in the Santa Rosa sub-watershed of the Laguna Lake region of the Philippines. Laguna de Bay is one of the largest fresh-water lake in Asia, and its water resources are utilized for agriculture, manufacture, aquaculture, potable water, water transport, and leisure. The region is highly populated and variegated, containing rich ecological resources that are threatened by rapid land use changes, urbanization and industrialization. In many dimensions it is therefore representative of the challenges facing other watersheds in Southeast Asia.

The project has four principal objectives. First, it documents the current levels and pathways of heavy metal, chemical, and organic pollution of Laguna Lake. Second, it investigates the health profile of local residents, the quality of their diet, as well as their perception of food risks. Third, it analyzes the impacts of land use change in the Laguna Lake area on water and material cycles, including sedimentation and groundwater level and quality. Finally, it prepares alternative policy options with the potential to improve environmental quality for sustainable development in the region.

## Transdisciplinary Approach

Project research teams are comprised mainly of researchers from RIHN, University of the Philippines, Yokohama National University, Shiga University, University of the Ryukyus, and Ehime University. These researchers work in collaboration with stakeholders such as the Laguna Lake



Laguna de Bay stakeholders and Community Forum 2013

Development Authorities (LLDA), local government units, fishermen's unions, and health workers. Our studies have not just investigated environment and human behavior in the region but also have engaged stakeholders more broadly in the question of how best to coexist with the environment.

Major project findings include the following: 1) Urban development and industry in the western region and upstream open garbage disposal could be sources of pollutants, indicating the close linkage of environmental degradation and food-health security; 2) Lead (Pb) was identified as prevalent pollutant causing chronic poisoning of local children, as it is known to negatively affect brain and bodily functions; and, 3) Payment for ecosystem services, when appropriate, should involve a flexible payment mechanism to ensure the cost-effectiveness of resource conservation programs. In response to such findings, the "Yaman ng Lawa" ("Blessings of the Lake") Program, a community-based social action research program was established in 2012 in order to assess how stakeholder participation improves fishery and water resource management, waste control, and public health.

## Toward Collective Action in Resource Management

The *Yaman ng Lawa* Program follows the common resource management idea promoted by E. Ostrom. Such participatory, community-based watershed social action can combat environmental degradation and protect local fish habitat and health of fisheries. Through this participatory approach, we could collect and arrange local knowledge (see Figure). For our transdisciplinary study and activities, RIHN was awarded "Diwa ng Lawa" ("*Spirit of the Lake*") honors by LLDA, the Philippine Government.

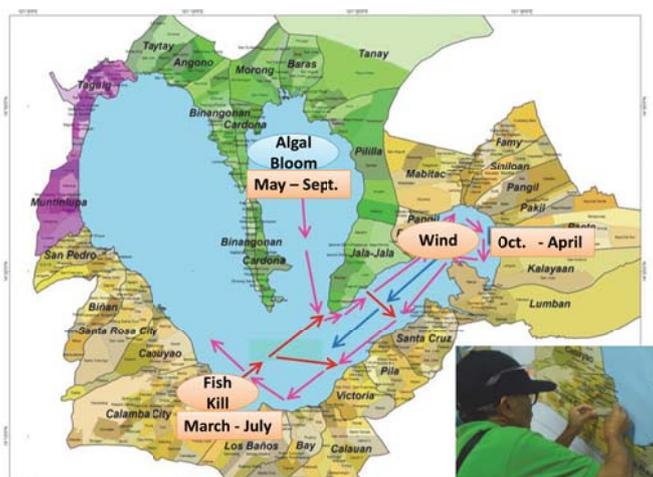


Figure Community-drawn Bio-Signal Map: seasonal changes in algal bloom, fish kill and wind directions

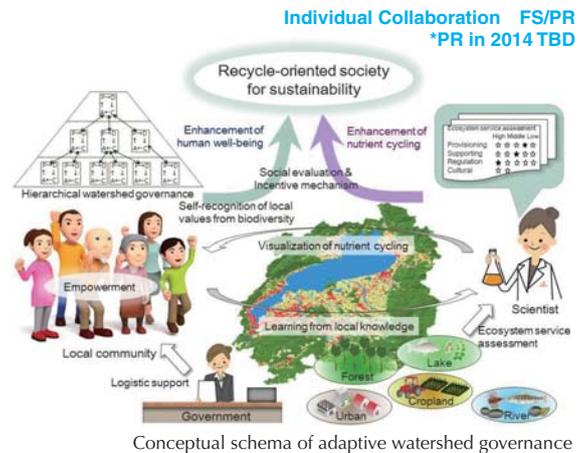
# Current Feasibility Studies

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

OKUDA Noboru, Kyoto University

To solve the current nutrient imbalance associated with local and global environmental issues, this project develops a transdisciplinary framework of adaptive watershed governance that can link nutrient cycling and human well-being, and so improve social involvement in biodiversity conservation and environmental restoration, facilitating sustainable socio-ecological systems. It also establishes new methods to evaluate how biodiversity contributes to restoration of natural nutrient cycles and provides a variety of services and values that inspire citizens to practice community-based conservation activities.

Area : Watersheds in Asian developing and developed countries



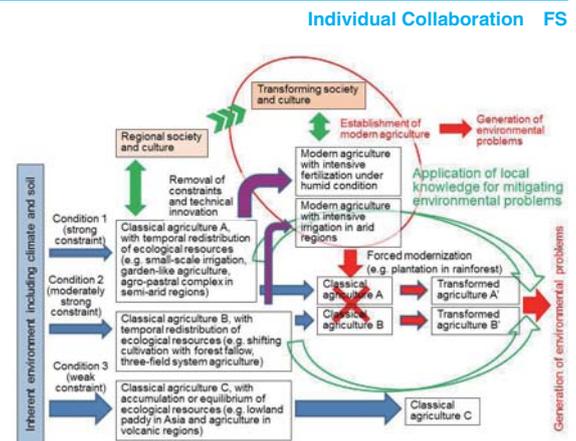
Individual Collaboration FS/PR  
\*PR in 2014 TBD

## Integrating Environmental Wisdom in Local Agriculture: Overcoming Environmental Degradation Associated with the Rapid Expansion of Global Agriculture

FUNAKAWA Shinya, Kyoto University

This research aims to integrate the environmental wisdom embedded in local agriculture in order to mitigate or slow rapid environmental degradation related to the expansion of global agriculture. Project research firstly documents local knowledge in traditional agriculture in relation to different natural constraints in resource utilization, while also describing the current patterns of agriculture-caused environmental degradation. The second step clarifies the traditional ecological and technical measures that can counter environmental degradation while also seeking conceptual frameworks that can incorporate broader environmental values into agricultural production. We hypothesize that these approaches will be easily incorporated into contemporary agriculture because such ecological and technical tools are original to traditional societies.

Area : Indonesia, Tanzania, Laos, Kazakhstan, Brazil, Japan and others



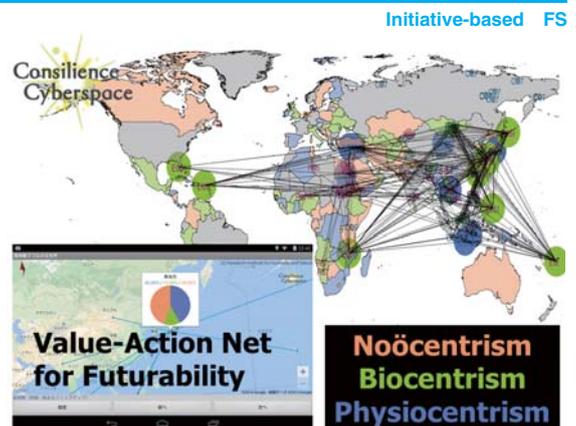
Individual Collaboration FS

## Co-development of Environmental Perception-Yielding Omniform Network towards Living with Chemical Imbalance Manifested as Environmental Risks in the Anthropocene in Peace

HANDOH Itsuki C., RIHN

We aim to examine and design environmental norms and governance to live with 'Chemical Imbalance Manifested as Environmental Risks in the Anthropocene (CHIMERA)' in peace. CHIMERA encompasses transboundary environmental problems such as chemical pollution and global warming, and the fears and benefits of chemicals have forced humanity to take very anthropocentric adaptations, namely environmental litigations and formulations of international regulations. Largely using our Android/iOS app, 'Value-Action Net for Futurability', we develop and practice Environmental Perception-Yielding Omniform Network (EPYON), to which global monitoring and modelling of CHIMERA and its associated environmental litigations, movements, laws, and values are integrated. This will be the first real test for a wide spectrum of stakeholders (including more than 100,000 app users) to co-create novel global environmental values and to inaugurate unprecedented, global-scale societal transformation towards futurability.

Area : Globe



Initiative-based FS

Our Android/iOS app, 'Value-Action Net for Futurability' is a terminal to 'Consilience Cyberspace', a cyber platform embodying a co-creation between science and society towards a unity of knowledge for futurability that helps identify the environmental values and perception network transformation among a large indefinite number of stakeholders.

### Rebuilding Local Communities through the Creation of Local Standards and Reconstruction of the Theory of *Fudo*

KAJITANI Shinji, The University of Tokyo

Individual Collaboration FS

This project will investigate the possibility of pluralistic society by discovering and shaping *local standards*, i.e. specific local values, which have far-reaching generality. For this purpose, we utilize the method of *philosophical dialogue*, where people can recognize the differences among themselves while having empathy for each other. We hope to rebuild local communities by creating *local standards* and to link our practice with the reconstruction of Watsuji Tetsuro's theory of *Fudo*.

Area : Japan (Kyoto, Kumamoto, Fukushima, etc.) and East Asia



OCICA, a new brand of jewelry made in a stricken area after the 2011 Tohoku earthquake. We consider it a good model for our project, which attempts to create local standards through the collaboration among dialogue, survey and design. (photo: NOSIGNER)

### Designing Sustainable Agriculture and Forestry after Fukushima Accident

KANEKO Nobuhiro, Yokohama National University

Individual Collaboration FS

Our lives are supported by the global economy, and food is no exception. Agriculture in the Fukushima area has been seriously affected by the Fukushima nuclear accident. Actions taken to control radio cesium crop contamination were very successful, but consumers still hesitate to purchase foods produced in Fukushima. Chemical fertilizers used in intensive farming systems reduce micronutrients such as zinc and selenium, and as a consequence crops produced under such

Area : Japan, Indonesia, Madagascar

management regimes are not always good for human health. Is it therefore possible to compare the risks posed by radiological contamination with those of intensive farming?

This project examines cropland nutrient pool and budgets and evaluates radio cesium contamination of food. Comparing conventional, organic and conservation farming methods, we will propose the scale of system that allows farmers and consumers to maintain effective nutrient cycling and reliable relationships.

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

Steven R. MCGREEVY, RIHN

Initiative-based FS

How can we create ecologically and socially sustainable agrifood systems? Since we all eat, we are all stakeholders in the circumstances and outcomes of the systems that provide us with food. We argue that sustainable food consumption practices can act as a vehicle to elicit changes in the larger infrastructures of food provisioning, expanding the available range of sustainable food choices and transitioning regimes toward greater sustainability and resilience. This project aims to facilitate this transitional process and to co-design/co-produce more sustainable agrifood systems by realizing concrete collective-action, society-oriented outcomes together with various stakeholders, including food producers, distributors, retailers, government officials, citizen-consumers, and scientists.

Area :Japan, North America, South East Asia, China, Australia



A farmers' market in Japan

### Toward the Regeneration of Tropical Peat Land Societies: Establishment of an International Research Network and Proposal of its Future

MIZUNO Kosuke, Kyoto University

Institutional Collaboration FS

This project focuses on global environmental issues relating to tropical peat swamp forest, a very fragile ecological system with huge amounts of carbon and water. The purpose of this project is to offer perspectives for the "futurability" of tropical peat land society by discussing and implementing appropriate, concrete methods to conserve and utilize the peat swamp. Project research pays marked attention to the ecological and social characteristics of the particular area and local peoples, and reflects such information in the proposal.

Area : Tropical peat swamp forests and degraded area in Southeast Asia



Photo1 Fire at the dried degraded peat land. Dried peat land is vulnerable to fire. Even abandoned cigarette butts can start fires there.



Photo2 Tree planting at dried degraded peat land at Riau province, Indonesia. Local people and research team members gather around a recently planted indigenous species.

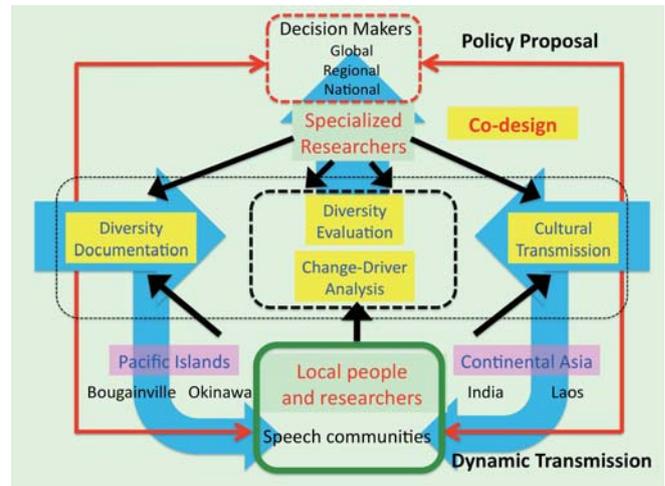
## Biocultural Diversity in the Asia-Pacific: Towards Dynamic Transmission of Traditional Ecological Knowledge

ONISHI Masayuki, RIHN

Individual Collaboration FS

This project will improve understanding of the relationships between biological diversity and cultural diversity in the diversity hotspots of the Asia-Pacific Region. Project research will document and analyze the traditional ecological knowledge systems that provide the key interface between these twin realms of diversity. The project has been co-designed by researchers and local people, and will include documentation of diversity, production of an integrated multidisciplinary database, and analysis of the drivers of change from environmental and social perspectives. In bringing project findings to decision makers at the national, regional and global levels of governance, the project will contribute to development of dynamic models of biocultural heritage transmission that will lead to the improvement of local lives and the maintenance of local ecosystems.

Area : The Asia-Pacific region, including, Sikkim/North Bengal/ Jharkhand (India), Laos, Okinawa, and Bougainville (Papua New Guinea)



Conceptual Framework of the Project

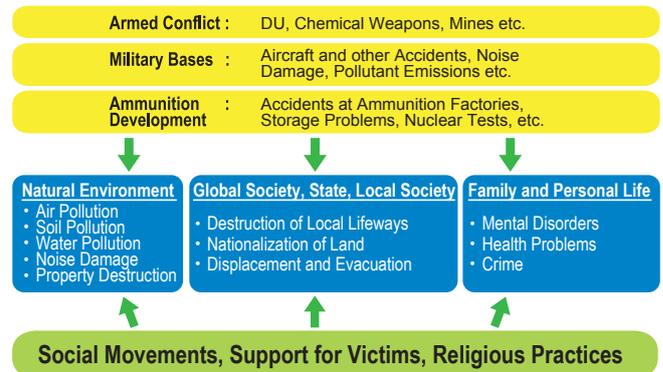
## A Transdisciplinary Study of Military Environmental Problems

TANAKA Masakazu, Kyoto University

Individual Collaboration FS

The project will analyze the environmental consequences of military activities in Japan and Korea on local residents, exploring local social movements and their proposals for preserving environments and building peace. Our approach is transdisciplinary, but we will use fieldwork to grasp local perspectives and will share our findings through documentary films as well as academic papers. Through our research we hope to achieve a better understanding of the environmental issues related to military activities as well as to establish reliable relationships with local persons that will permit more comprehensive studies and systematic endeavors in the near future.

Area : Japan and other areas



Environmental issues related to the military

## Understanding "Securitization of Nature": History, Mechanism and Impact to Society and Nature

UBUKATA Fumikazu, Okayama University

Individual Collaboration FS

In this study we conceptualize the recent emergence of carbon market as a process of "securitization of nature"; an advanced version of the "commodification of nature". Taking examples of various commercialization processes, especially politico-economic frameworks (i.e. emissions trading and REDD-plus) designed to establish "low-carbon" societies, this study explores the historical origin and mechanism of "securitization", as well as the impact of such schemes on society and nature. Methodologically, we synthesize the following four levels of research: knowledge, technology, policy, and actual impact.

Area : Laos, Cambodia, Indonesia, and Japan



Vanishing Tropical Forest in Southeast Asia. Deforestation is believed to be a significant source of carbon emission. (Sarawak, Malaysia, 2008)



## Research Coordination

Research at RIHN is facilitated by two units, the Centers for Research Development (CRD) and Promotion (CRP).

The CRD consists of four units. The Planning Unit is chiefly responsible for establishing RIHN's long term vision and organizing fundamental committees, including those related to project evaluation and personnel affairs. The Initiative Framework Unit serves as a cross-cutting mechanism to capture and synthesize key contributions of individual- and institutional-collaboration projects and to develop new research projects within RIHN (the 'initiative-based' projects). The Collaboration Nexus Unit facilitates the internal and external research networks. The Future Earth Unit coordinates RIHN engagement with the international Future Earth initiative.

The Center for Research Promotion (CRP) is divided into three units. The Survey and Analysis Unit develops and maintains the laboratory facilities necessary for research and fieldwork (see page 40). The Informatics Unit builds the databases and archives supporting ongoing research. Finally, the Communication and Production Unit determines how communication regarding RIHN research, processes and outcomes should be established with academic, public and user-specific communities (see pages 38-39).





## 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 2013 recipient of the Earth Hall of Fame Kyoto Award was Dr. MIYAWAKI Akira, Director of Japanese Center for International Studies in Ecology (JISE) and Emeritus Professor of Yokohama National University.

### RIHN Forum

The RIHN Forum is usually held at the Kyoto International Conference Center and is open to the general public. Since 2004 the proceedings were published as books intended for a general audience.

**Our Global Environmental Research for Humanity,**  
29 June 2013

### RIHN International Symposium

An annual symposium at RIHN describing the key findings of concluding RIHN research projects.



Prof. Dr. Heinz Gutscher, Professor Emeritus of Social Psychology at the University of Zurich, giving the 2013 keynote address

**Risk Societies, Edge Environments: Ecosystems and Livelihoods in the Balance**  
23-25 October, 2013

### RIHN Public Seminars

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

**Living a nature you know as yourself** 15 February, 2013

**Transdisciplinary Science Supporting Sustainable Community Development : Goals of ILEK Project**  
24 April, 2013

**Daily Life in Rural Areas**  
— **The Reality of Wild Beast Damage and Protection Mesures**  
21 June, 2013

### RIHN Area Seminars

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

**Co-creation of well-being: Commons**  
13 October, 2012, Fujiyoshida civic hall, Fujiyoshida, Yamanashi



### 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 2011 included:

#### Breakthroughs in EcoHealth and Trans disciplinary Research through Participatory Public Policies in Laguna Lake Watersheds in the Philippines

Jamie Galvez Tan, Professor, University of the Philippines College of Medicine /President of Health Futures Foundation, Inc./RIHN Visiting Research Fellow  
5 July 2013

#### Reflection on Cultural & Morphological Sustainability

Johannes Widodo, Associate Professor, Department of Architecture School of Design and Environment, National University of Singapore/RIHN Visiting Research Fellow  
26 July 2013

#### Water Ethics: A Values Approach to Solving the Water Crisis

David Groenfeldt, Director, Water-Culture Institute/RIHN Visiting Research Fellow  
3 October 2013

#### Understanding Mesquite Risk Dilemma and Sophism in Sudan

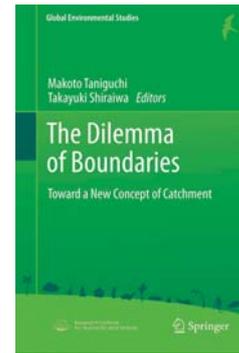
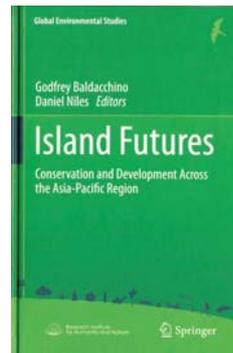
Mahgoub Suliman Mohamedain, Assistant Prof. at College of Forestry and Range Science, Sudan University of Science and Technology (SUST)/RIHN Visiting Research Fellow  
12 November 2013

#### Environmental Humanities and a Transdisciplinary Response to Global Environmental Change. The experience of the Rachel Carson Center for Environment and Society.

Robert Emmett, Director of Academic Programs, Rachel Carson Center for Environment and Society  
3 December 2013

### RIHN Book Series: Global Environmental Studies

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



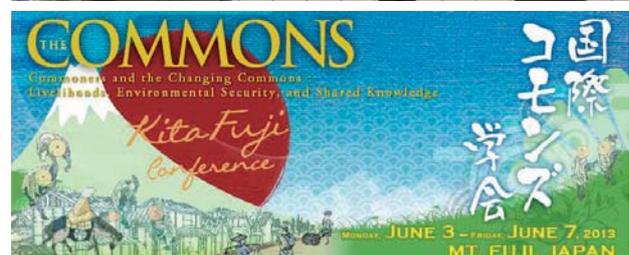
### Other publishing



The Humanity and Nature Newsletter presents short articles in Japanese describing recent developments and discussions at the institute as well as emerging stories from the field. It is published six times a year in editions of 3000.

### The 14th Global Conference of the International Association for the Study of the Commons

RIHN was co-organizer of the 14th Global Conference of the International Association for the Study of the Commons (IASC), which took place 3-7 June 2013 on the common lands located on at the base of the grand slope of Mt. Fuji. Fuji-san was an undeniable presence throughout the conference, surprising to see again and again looming above the conference venues, events, and city streets in all its majestic stature and silence. The first IASC conference to be co-organized by commoners and take place on common lands, the conference attracted over 400 participants from 57 different countries, and involved a full complement of plenary and paper sessions, workshops, field trips, performances, and other events. By all accounts it was a great success, with many participants thrilled at the chance to experience small-town and semi-rural Japan and learn of the rich history of the commons there. Thousands of local people contributed to the conference as direct participants in academic sessions and in many other ways that lent the conference a special human touch.



## Research 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 Center for Research Promotion 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 Survey and Analysis Unit continues to develop new methods of data analysis and application. In conducting this research in collaboration with RIHN projects and universities and affiliated institutions throughout Japan, the division enhances the sophistication of experimental techniques and research information and promotes the shared use of facilities.



Main building



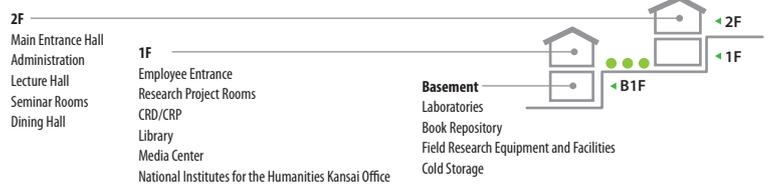
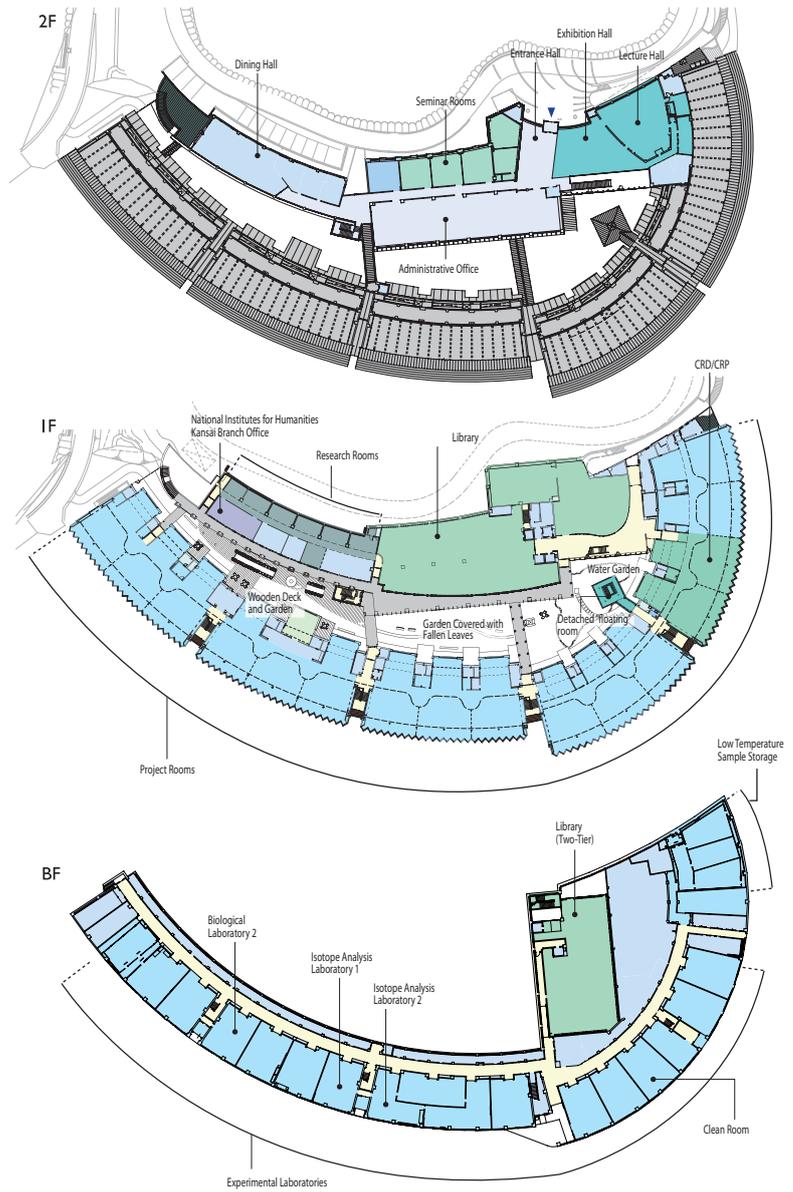
Main entrance hall



Basement laboratories

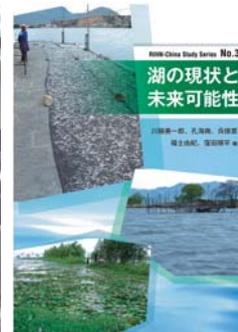


The RIHN House with one-, two-, and three-bedroom apartments for guest researchers and their families.



## RIHN-China

As one of the research hubs of the National Institute for the Humanities' Center for the Promotion of Area Studies, RIHN conducts the Research Initiative for Chinese Environmental Issues, a key node for promoting environmental studies on China and networking scholars concerned with environmental issues there. A RIHN-China Newsletter is published in Japanese and Chinese. RIHN-China also supports a series of symposia, held in both China and Japan, on critical environmental topics in China and East Asia. In 2013-14, among other activities, RIHN-China hosted a workshop entitled "Urbanization, Health and Social-welfare in East Asia". RIHN-China members also attended the 3rd Lecture on Global Environmental Studies at Peking University. Also, we are pleased to announce that "Our Lakes: From the Present towards a Future Perspective" was published as volume number 3 in the RIHN-China Study Series.



Photos (counterclockwise from top):

- The International Symposium on "Urbanization, Health and Social Welfare in East Asia". RIHN, July 2013.
- The 3rd Lecture on Global Environmental Studies at Peking University in March 2014.
- RIHN-China Study Series No.3 "Our Lakes: From the Present towards a Future Perspective"

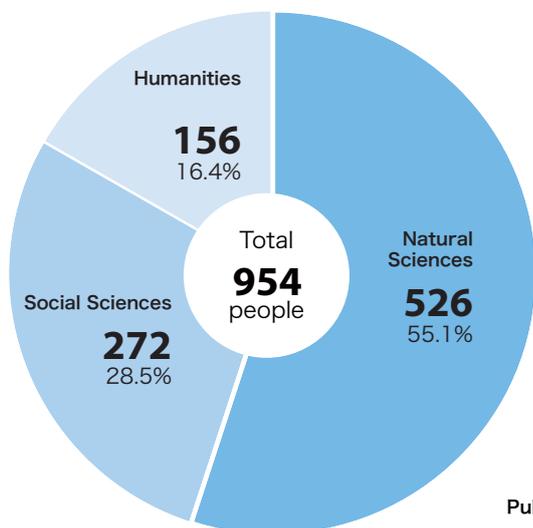
## Future Earth

Future Earth is a 10-year international research initiative that will develop the knowledge for responding effectively to the risks and opportunities of global environmental change, and for supporting transformation towards global sustainability in the coming decades (see: [www.icsu.org/future-earth](http://www.icsu.org/future-earth)). While mobilizing scientists around the world, the initiative will strengthen partnerships with policy-makers and other stakeholders to provide sustainability options and solutions as part of its agenda of co-design and co-production of research. Future Earth is structured around three main themes: Dynamic Planet, Global Development and Transformation towards Sustainability. The RIHN Future Earth Unit in the Center for Research Development aims to support and promote Future Earth activities, in particular in Asia. It is expected that RIHN will play a key role in promoting co-design and co-delivery of Future Earth research in Asia, initially by facilitating networking among stakeholders and establishing a platform for sharing knowledge, data, and methodologies for integrated research for humanity and nature.

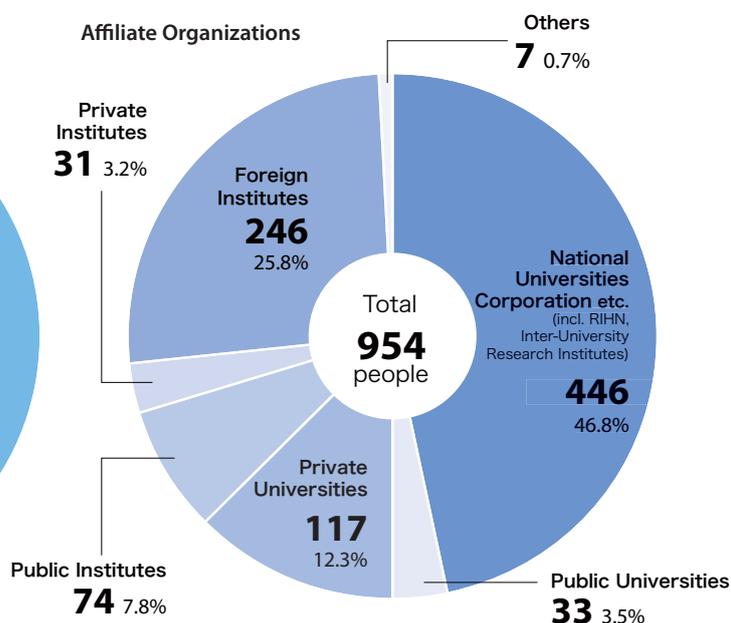


## Research Collaboration

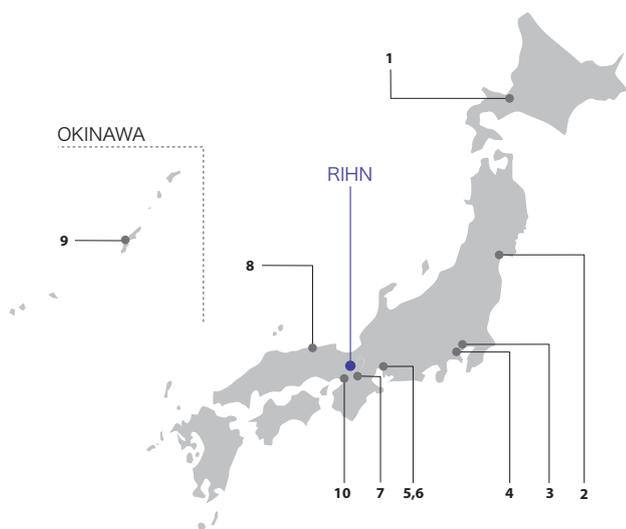
Research Areas



Affiliate Organizations



\*As of March 31st, 2014



### Collaboration in Japan

1. Institute of Low Temperature Science, Hokkaido University
2. Graduate School of Science, Tohoku University
3. Institute of Industrial Sciences, the University of Tokyo
4. Graduate School and Research Institute of Environment and Information Sciences, Yokohama National University
5. Hydrospheric-Atmospheric Research Center, Nagoya University
6. Graduate School of Environmental Studies, Nagoya University
7. Center for Ecological Research, Kyoto University
8. Arid Land Research Center, Tottori University
9. Tropical Biosphere Research Center, University of the Ryukyus
10. National Museum of Ethnology

## International Collaboration

Memoranda of Understanding and Research Cooperation Agreements (As of March 31st, 2014)

### ALGERIA

Centre National de Développement des Ressources Biologiques

### BANGLADESH

International Centre for Diarrhoeal Disease Research

### CHINA

East China Normal University  
Peking University  
Yunnan Health and Development Research Association

### EGYPT

National Water Research Center (NWRC)

### FRANCE

La Fondation Maison des Sciences de l'Homme

### INDIA

Institute of Rajasthan Studies, JRN Rajasthan Vidyapeeth  
Maharaja Sayajirao University of Baroda

### INDONESIA

Bogor Agricultural University  
Hasanuddin University  
Indonesian Institute of Sciences  
Universitas Indonesia  
The Center for International Forestry Research

### LAOS

National Agriculture and Forestry Research Institute  
National Institute of Public Health, Ministry of Health

### MONGOLIA

Institute of Geoecology, Mongolian Academy of Science  
Institute of Meteorology, Hydrology and Environment and Ministry of Nature and Green Development

### NAMIBIA

Ministry of Agriculture, Water and Forestry

### NIGER

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), West and Central Africa  
L'organisation Nigeriennes Des Educateurs Novateurs

### PHILIPPINES

University of the Philippines Visayas

### RUSSIA

Far Eastern National University  
Institute for Biological Problems of Cryolithozone  
Institute of Humanitarian Research and the Problems of the Northern Minority Peoples  
The Melnikov Permafrost Institute of Siberian Branch of the Russian Academy of Sciences

### SOUTH KOREA

Institute of Islands Culture

### SUDAN

Red Sea University  
Sudan University of Science and Technology

### SWEDEN

The Sven Hedin Foundation

### THAILAND

Faculty of Fisheries, Kasetsart University  
Rice Department, Ministry of Agriculture and Cooperatives  
The Southeast Asian Fisheries Development Center

### TURKEY

Adiyaman University  
Çukurova University  
Harran University

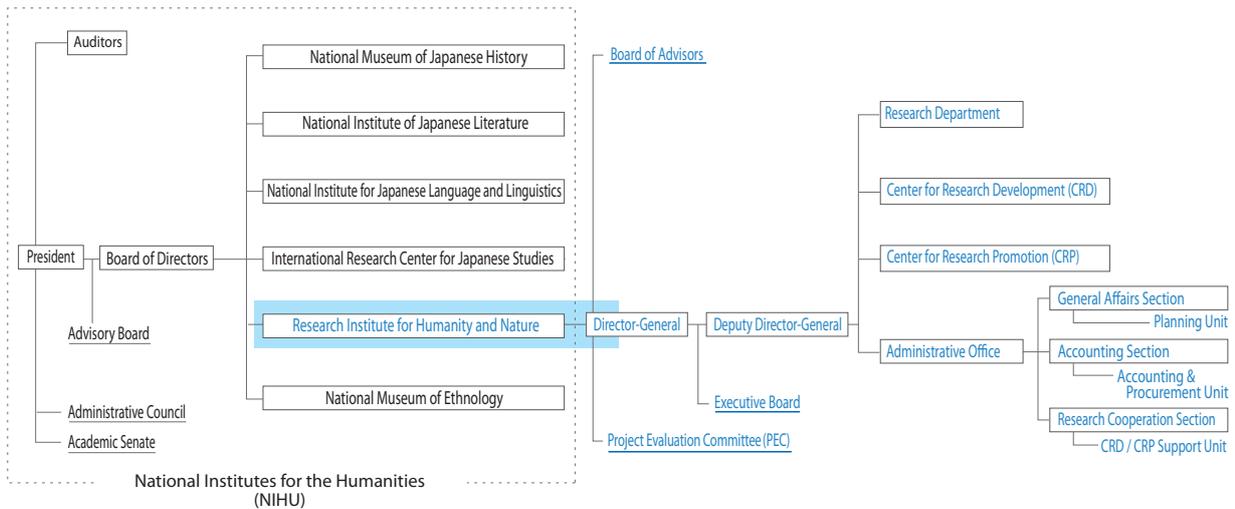
### UNITED STATES OF AMERICA

Mote Marine Laboratory  
University of the Virgin Islands  
The University of California, Berkeley

### ZAMBIA

Zambia Agricultural Research Institute, Ministry of Agriculture and Livestock

## Administrative Structure



## Financial Information

### Segmental Financial Information (Fiscal Year 2012)

#### Operating Expenses

| Category                        | Amount (Yen in thousands) |
|---------------------------------|---------------------------|
| Operating Expenses              | 1,938,282                 |
| Inter-University/Joint Research | 1,094,987                 |
| Outsourced Studies              | 99,167                    |
| Outsourced Operations           | 44,974                    |
| Personnel                       | 699,153                   |
| General Management              | 155,959                   |
| Financial Expenses              | 43,356                    |
| <b>Total Expenses</b>           | <b>2,137,598</b>          |

#### Operating Income

| Category                  | Amount (Yen in thousands) |
|---------------------------|---------------------------|
| Subsidy for Operation     | 1,885,514                 |
| Contract Operations, etc. | 47,883                    |
| Donations                 | 10,957                    |
| Others                    | 175,448                   |
| <b>Total Earnings</b>     | <b>2,119,805</b>          |

Operational Balance 17,793

#### External Sources of Funding

(Fiscal Year 2012)

| Category  | Amount (Yen in thousands) |
|---|---------------------------|
| Fund for Promotion of Academic and Industrial Collaboration | 49,263                    |
| Grants-in-Aids for Scientific Research                      | 108,850                   |
| Donations for Research                                      | 5,848                     |

\* Fund for Promotion of Academic and Industrial Collaboration is the sum of contract research expenses.



# Board and Committees

\*As of April, 2014

## Board of Advisors

■ Oversees personnel, planning, administration and operation of the institute

FUJIOKA Ichiro  
President, Kyoto Sangyo University  
IKEYA Kazunobu  
Professor, Department of Cultural Research, National Museum of Ethnology  
KANZAWA Hiroshi  
Professor, Graduate School of Environmental Studies, Nagoya University  
KONO Yasuyuki  
Director, Center for Southeast Asian Studies, Kyoto University

NOE Keiichi  
President-appointed Extraordinary Professor, Institute of Liberal Arts and Sciences, Tohoku University  
OTSUKI Kyoichi  
Professor, Faculty of Agriculture, Kyushu University  
SUGIHARA Kaoru  
Professor, National Graduate Institute for Policy Studies  
WASHITANI Izumi  
Professor, Graduate School of Agricultural and Life Sciences, the University of Tokyo

KUBOTA Jumpei  
Deputy Director-General, RIHN  
Director, CRD, RIHN  
Program Director, RIHN  
MALLEE, Hein  
Program Director, RIHN  
NAKATSUKA Takeshi  
Program Director, RIHN  
SATO Tetsu  
Deputy Director-General, RIHN  
Program Director, RIHN  
TANIGUCHI Makoto  
Program Director, RIHN

## Project Evaluation Committee (PEC)

■ External review of research project proposals

### Domestic

KOIKE Isao  
Inspector General, University of the Ryukyus / Professor Emeritus, the University of Tokyo  
KOIKE Toshio  
Professor, School of Engineering, The University of Tokyo  
MIYAZAKI Koji  
Executive Director, Tokyo University of Foreign Studies  
MORIOKA Masahiro  
Professor, School of Humanities and Social Sciences, Osaka Prefecture University  
NAKAMURA Masami  
Professor, Edogawa University / Former Senior Staff Writer, Editorial Bureau, Nihonkeizai Shimbun Inc.  
NAKANISHI Hisae  
Professor, Graduate School of Global Studies, Doshisha University  
WADA Eitaro  
Professor Emeritus, Kyoto University/ Professor Emeritus, Research Institute for Humanity and Nature/  
Professor Emeritus, Siberian Division of the Russian Academy of Science  
YASUOKA Yoshifumi  
External Auditor, Research Organization of Information and Systems

### Overseas

CHEN, Deliang  
Professor, Department of Earth Sciences, University of Gothenburg, Sweden  
CHUN Kyung-soo  
Professor, Department of Anthropology, Seoul National University, Korea  
KLEPPER, Gernot  
Professor, Kiel Institute for the World Economy, Germany  
LAURANCE, William F.  
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RANDALL, Roland  
Life Fellow, Girton College, University of Cambridge, UK  
SCHOLZ, Roland  
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VAN DER LEEUW, Sander  
Dean, School of Sustainability, Arizona State University, USA

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## RESEARCH DEPARTMENT

### Program Directors

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MALLEE, Hein  
NAKATSUKA Takeshi  
SATO Tetsu  
TANIGUCHI Makoto

### Professors

HABU Junko Environmental Anthropology, Historical Ecology, East Asian Archaeology  
Hydrology  
KUBOTA Jumpei Architectural History, Urban History  
MURAMATSU Shin Biogeochemistry, Paleoclimatology  
NAKATSUKA Takeshi Local Environmental Studies,  
SATO Tetsu Conservation Ecology  
TANIGUCHI Makoto Hydrology

### Associate Professors

ENDO Aiko Marine and Coastal Policy, Fishery Economics  
ISHIKAWA Satoshi Conservation Ecology, Global Fisheries Science  
KIKUCHI Naoki Environmental Sociology  
TANAKA Ueru Agricultural Studies  
RAMPISELA, Dorotea Soil and Water Management

### Visiting Professors

FUNAKAWA Shinya Environmental Agronomy  
HIMIYAMA Yukio Geography  
KANEKO Nobuhiro Soil Ecology  
MATSUOKA Shunji Environmental Economics and Policy  
MIZUNO Kosuke Area study on Indonesia  
MORI Soichi Science and Technology Policy,  
Global Sustainability  
NAKAGAMI Ken'ichi Environmental Economics and Policy  
NAWATA Hiroshi Cultural Anthropology  
ONISHI Masayuki Linguistics, Language Education  
TANAKA Masakazu Cultural Anthropology  
YONEMOTO Shohei History and Philosophy of Science

### Visiting Associate Professors

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KANIE Norichika Earth System Governance  
NAITO Daisuke Southeast Asian Area Study,  
Political Ecology  
OKUDA Noboru Ecology  
OKUMIYA Kiyohito Field Medicine  
SHIRAIWA Takayuki Glaciology  
UBUKATA Fumikazu Southeast Asian Studies  
UCHIYAMA Junzo Environmental Archaeology,  
Landscape History

### Visiting Research Fellows

MUNIANDI, Jegadeesan Agrarian Change, Land Use Dynamics and Migration  
SALAENOI, Jintana Marine Biotechnology  
TRAFALGAR, Rex Ferdinand Mallare Fisheries Science

### Senior Project Researchers

H-05 SANO Masaki Paleoclimatology

### Project Researchers

C-08 HAYASHI Kengo Southeast Asian Architectural History, Urban History  
C-08 MATSUDA Hiroko Southeast Asian Architectural History, Urban History  
Hydrology  
History, Urban History, GIS  
C-08 MEUTIA, Ami Aminah Soil Science  
C-08 MIMURA Yutaka Urban Planning, GIS  
C-08 UCHIYAMA Yuta Soil Science  
C-09 HASHIMOTO (WATANABE) Satoko Environmental Sociology  
C-09 SEKINO Nobuyuki Global Fishery Sciences  
D-05 OGATA Yuka Agricultural Systems  
D-05 OKAMOTO Yuki Area Studies  
D-05 WATANABE Kazuo Coral Reef Ecology  
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R-07 ENDO Hitoshi

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E-05 OMOTO Reiko Geography, Food Studies,  
Social Network Analysis

### Project Research Associates

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C-09 KATO Hisaaki  
C-09 KOYAMA Masami  
D-05 MUTO Nozomu  
R-07 KIHIRA Tomoe  
R-08 HONDA Hisami  
R-08 OKAMOTO Takako  
R-08 TERAMOTO Shun  
R-09 TAKEHARA Mari  
H-05 XU Chenxi  
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Collaboration Nexus Unit TANIGUCHI Makoto  
Planning Unit KUBOTA Jumpei  
Future Earth Unit TANIGUCHI Makoto

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KUBOTA Jumpei Hydrology  
MALLEE, Hein Social Science

### Associate Professors

HANDOH Itsuki C. Earth Systems Science, Mathematical Modeling  
TAKAGI Akira Fisheries Science, Molecular Ecology

### Assistant Professors

MCGREEVY, Steven Robert Rural Sustainable Development  
ONISHI Yuko Environmental Science

### Research Fellow, NIHU Center for Area Studies / RIHN Initiative for Chinese Environmental Issues (RIHN-China)

FUKUSHI Yuki Modern Chinese History

## Center for Research Promotion (CRP)

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Survey and Analysis Unit ISHIKAWA Satoshi  
Informatics Unit SEKINO Tatsuki  
Communication and Production Unit ABE Ken-ichi

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NAKANO Takanori Isotope Environmental Studies

### Associate Professors

KONDO Yasuhisa Archaeology, GIS  
NILES, Daniel Geography  
SEKINO Tatsuki Information Science  
TERADA Masahiro History, Museum Anthropology

### Assistant Professors

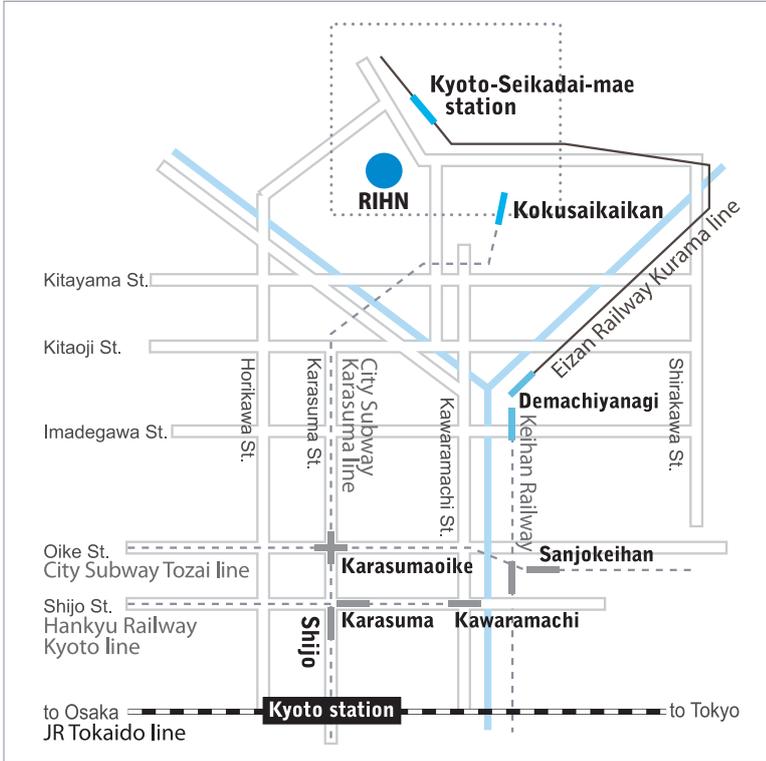
KUMAZAWA Terukazu Environmental Planning, Regional Informatics  
SHIN Kicheol Petrology, Geochemistry, Isotope Geology  
YASUTOMI Natsuko Meteorology, Climatology

### Visiting Professor

AKIMICHI Tomoya Integrated Area Study



# Access



## By City Subway

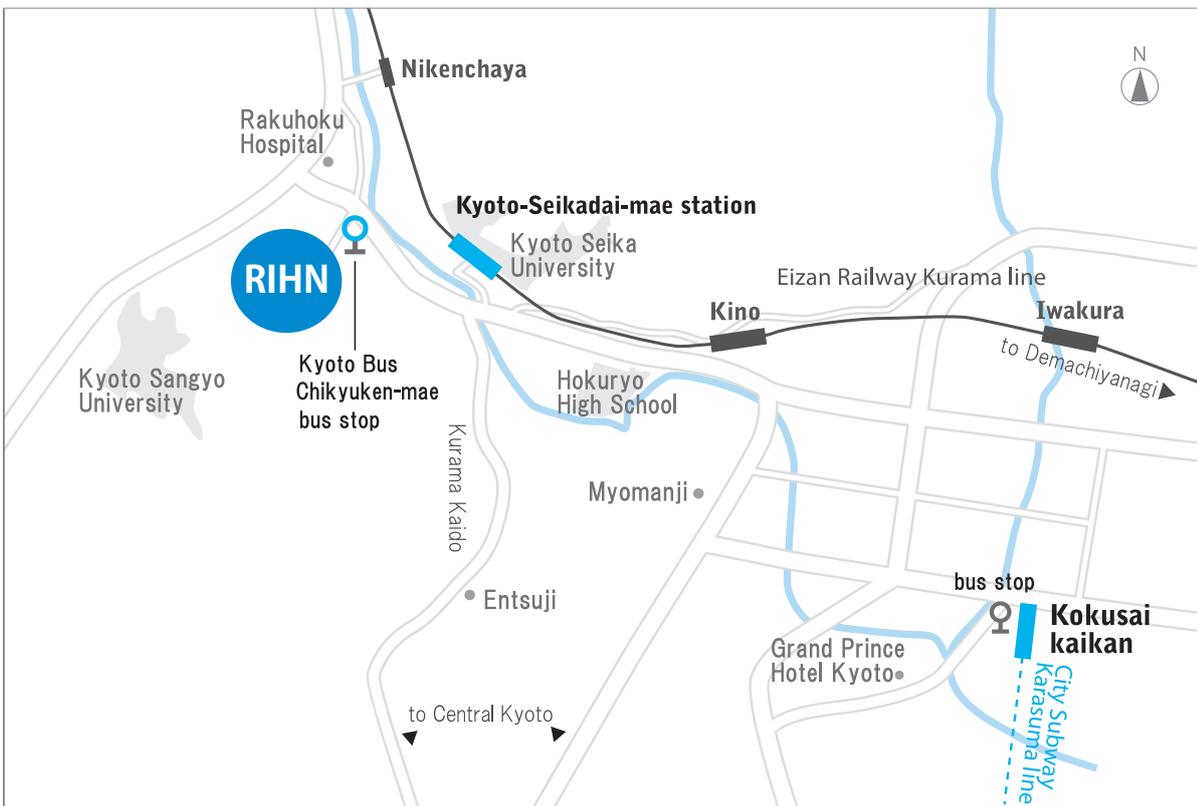
From Kyoto Station, take the Karasuma Line to Kokusaikaikan Station (the last station), and transfer to Kyoto Bus.

## 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.



**Front Cover photo:**

Khom loi Photo by OSHIUMI Keiichi

**Back Cover photo:**

Finally, reached the Thar Desert, India  
Photo by MIYAZAKI Hidetoshi

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