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National Institutes for the Humanities

Research Institute for Humanity and Nature

Prospectus 2013–2014



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Message from the Director-General

The Research Institute for Humanity and Nature was established in April 2001 by the Government of Japan to promote integrated research in the field of global environmental studies. As a national institute, RIHN solicits, develops, hosts, and funds fixed-term research projects on pressing areas of interaction between humanity and nature. RIHN thus promotes coordinated, problem-centered, context-specific, and multi-dimensional science. RIHN projects can last from three to five years; they are always multidisciplinary and employ multiple methodologies, and they are supposed to offer solutions to the problems under study. This is not an easy task, but it is a necessary one and our science must address it.

As I assume my position as Director-General I should acknowledge my debt and gratitude to those who have worked so diligently to make RIHN what it is today. RIHN's founding Director-General, Professor Hidaka (2001-2007), presided over the establishment of this innovative institute more than ten years ago, and I note that his generosity and wisdom is still remembered fondly by many today. My immediate predecessor, Professor Tachimoto (2007-2013), has advanced the institute tangibly in several key areas, especially in strengthening its internal capacity to promote synergies between existing research projects and in linking RIHN research more closely to important current initiatives in international environmental studies.

If the fruits of my colleagues' labors have been many, so have those of the many fine researchers who have joined them at RIHN over the years. As of 2013 RIHN has now completed twenty-two research projects, each of which has established important research networks in order to make important contributions in its area of specialization. I should note that in 2010-11 RIHN synthesized and published the key research findings and contributions of its first decade as The RIHN Encyclopedia of Global Environmental Studies. A second volume, *Towards Environmental Humanics of the Earth System: The RIHN 2001-2010*, summarized the institute's first decade of experience and looked forward to future prospects.

As Director-General it is my privilege, and my burden, to further such efforts. I would like to reaffirm RIHN's commitment to conduct first-quality research and to make substantial contributions to the growing international efforts to address the linked social and environmental problems that we face as individuals, communities, nations, species, and planet. As always, your continued cooperation, support, and guidance are greatly appreciated.

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

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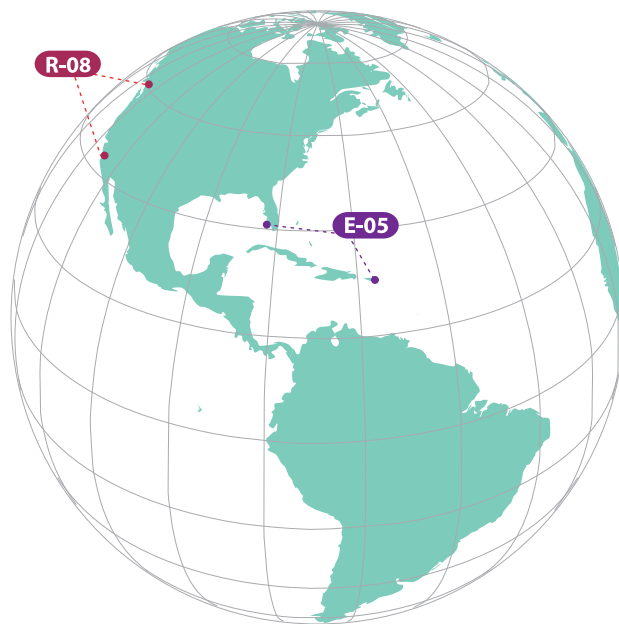
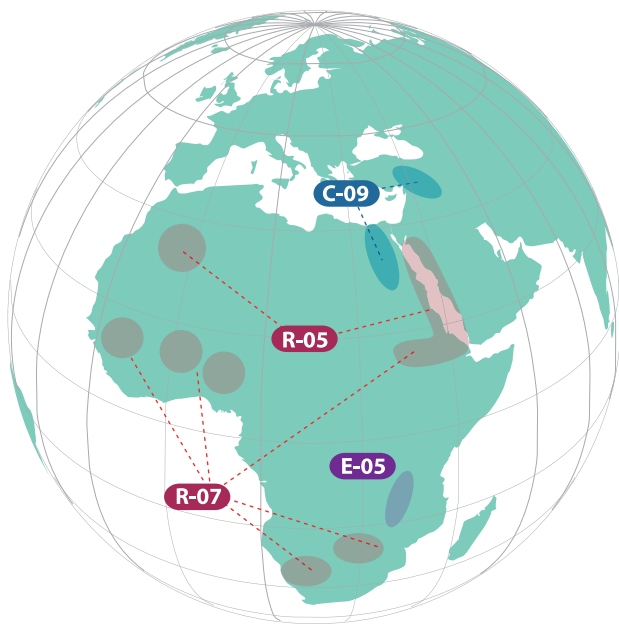
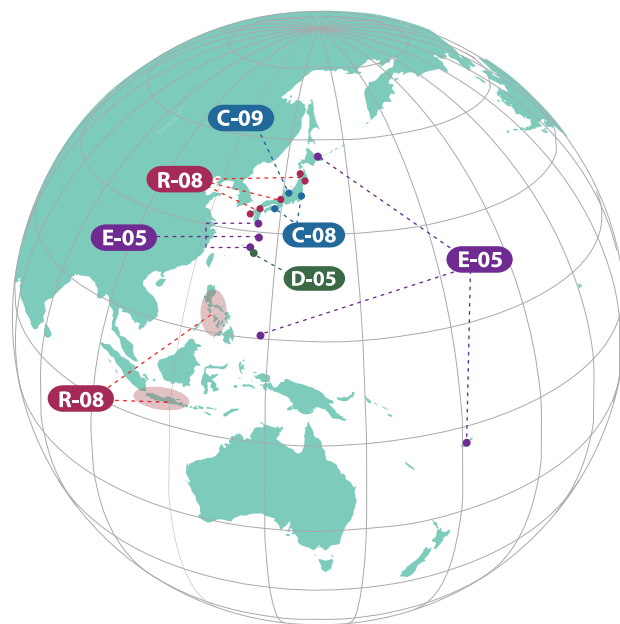
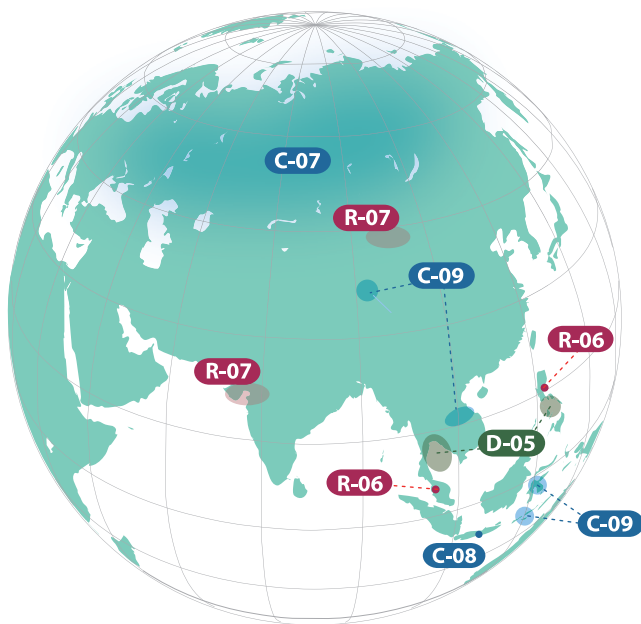
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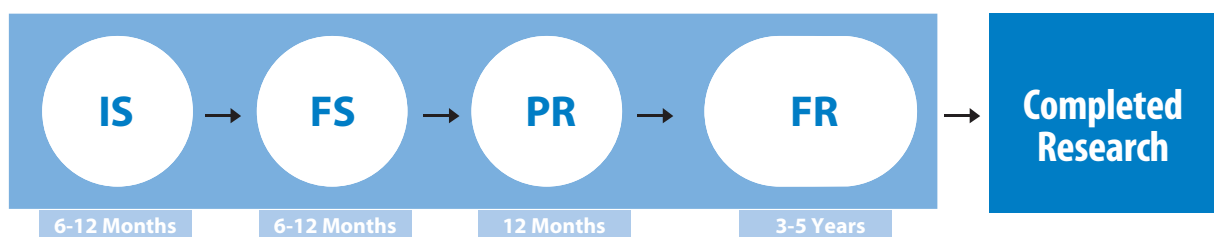
Philosophy and Structure

The Research Institute for Humanity and Nature is a national research institute established by the Government of Japan in 2001. RIHN's objective is to conduct integrative research on key areas of interaction between humanity and nature. RIHN solicits, 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.

There is an ever-increasing need for accurate and flexible knowledge of the world around, for coordinated, problem-centered, context-specific, and multi-dimensional science. Such knowledge should cross disciplinary boundaries and encompasses novel units of analysis and so correspond to the real dynamism of ecological processes and their intersections with human activity and institutions at multiple levels.*

At RIHN we seek concepts, theories and mechanisms capable of describing and enabling transformation of human-environment interactions. We use the term *futurability*, a translation of a Japanese word combining the ideographs for 'future' and 'potential', to express the wide range of possibility in future development. Similarly, 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 two structures. **Domain-based projects** conduct basic research within one of five research domains that reflect 'root metaphors' with meaning beyond single disciplines or fields of study: Circulation, Resources, Diversity, Ecosophy and Ecohistory. The thematic focus of each domain is described in the introduction to its respective project pages.



* Niles, D. and N. Tachimoto. 2012. *Science and the experience of nature*. RIHN Working Paper No. 2. RIHN: Kyoto.



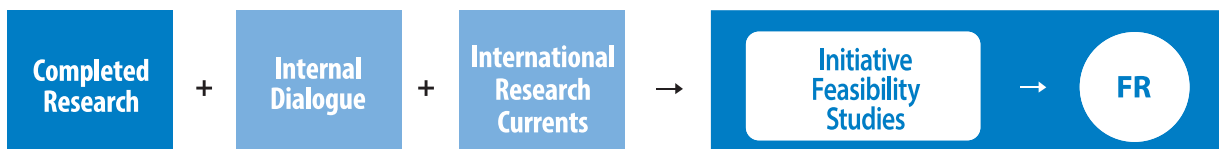
How should human societies act to enhance ecological integrity and improve human well-being in tandem, now and in the future? This is not simply a matter of defining the appropriate science and policy. Indeed, science and policy are liable to remain ineffectual unless they draw on deeper waters.*

After 10 years of domain-based research, the **Center for Research Development (CRD)** was developed to achieve two related goals.

First, the CRD is to enhance RIHN's capacity to benefit from its current and completed research projects. The CRD therefore actively facilitates dialogue and interaction between research projects and domains, encouraging critical reflection on key themes in international environmental research in relation to ongoing project objectives and completed project results.

Second, the CRD's Initiative Framework Unit is to facilitate new research proposals emerging from such internal dialogue. These **RIHN Initiative projects** advance RIHN research beyond the fields of the descriptive sciences and into the realm of **design science**. Informed by international trends in transdisciplinary research, design science should propose solutions to social-environmental problems that are informed by lived social practices and values and that increase human societal flexibility and capability.

Initiative projects therefore emphasize the co-design and co-production of knowledge. In their scope and methodologies, initiative-based projects stimulate dialogue between different realms of observation, action and aspiration, generating new understanding of the causes of, and possible solutions to, environmental problems.



The challenge of addressing environmental change in a proactive manner, and offering effective mitigations or sensible adaptations, brings one face-to-face with human culture. Empirical understandings of environmental change must be brought directly into dialogue with human experience as inhabitants of, and agents in, perpetually changing environments.

Our subject is always ultimately *humanity in the midst of a dynamic, yet changeable nature*.*



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

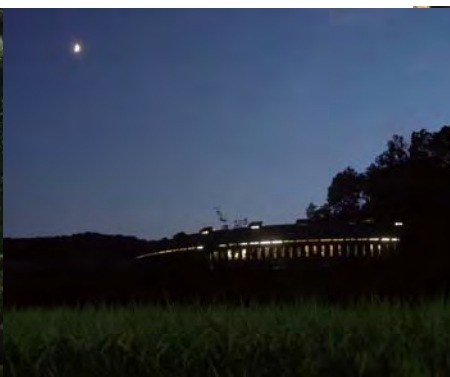
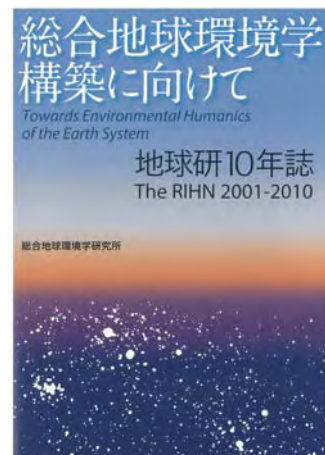
- RIHN 10 year anniversary and publication
- 2 FR implemented, including the first initiative-based project
- GEC-Japan network established

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



Circulation Program

TANIGUCHI Makoto | Program Director

What is circulation and how does it relate to global environmental problems? Two concepts of circulation are considered in this program. One is the circulation of energy and matter at the earth's surface. Matter includes air, water, chemical components and the living organisms they contain. Such circulations of energy and matter are caused by solar radiation absorbed by the earth's surface systems. In a broad view, the migration of humans around the planet can be considered as a kind of circulation, as can the great amount of material people move from place to place. Circulation describes large-scale spatial and temporal movements that in small-scale may look like flows. The critical issue in regards to global environmental problems is that current change in the biogeochemical circulations that sustain the biosphere is so sudden; it may be irreversible, though this is difficult to predict, as it depends in part on human thought, action and culture.

The recurrent interaction between humanity and nature can also be considered as a kind of circulation. Through economic and technological development, and through its sheer numbers, humankind has gradually transformed the surface of the planet. It has altered existing environments and created wholly new environments, which have in turn become new sites of human-environmental interaction in which new societies have emerged.

Individual research projects in the RIHN Circulation Program are conceptualized and carried out within the above conceptual framework. They cumulatively improve human understanding of the ceaseless motion that composes the biosphere.

Completed Research	Leader	Title
C-06	KAWABATA Zen'ichiro	Effects of Environmental Change on the Interactions between Pathogens and Humans
Full Research	Leader	Title
C-07	HIYAMA Tetsuya	Global Warming and the Human-Nature Dimension in Siberia
C-08	MURAMATSU Shin	Megacities and the Global Environment

Effects of Environmental Change on the Interactions between Pathogens and Humans

Project Leader **KAWABATA Zen'ichiro** RIHN

The rapid spread of emerging infectious diseases is a serious global environmental problem that threatens not only humans, wildlife, and livestock worldwide, but also induces economical loss and collapse of ecosystems. This project aimed to verify the hypothesis that human mediated environmental degradations cause and spread infectious diseases by studying Koi herpesvirus (KHV) disease (Photo) as a model. Based on the analyses of environment–pathogen–human interactions, we also tried to suggest ways to prevent or minimize the emergence and communication of infectious diseases, and to enhance social ability to cope with them.

Project achievements

Analysis of the links between lakeshore degradation, KHV, and human activity in Lake Biwa, Japan allowed partial verification of the hypothesis that anthropogenic alterations of the environment facilitate outbreaks and spread of infectious diseases. A conceptual model we developed of the environment–pathogen–human linkage derived from KHV disease in Lake Biwa helped us to understand the causes of other cases of infectious disease, such as schistosomiasis in Kenya, fish diseases in the Pin River at Chaing Mai, Thailand, and Legionella disease, MRSA, Norovirus disease, and nontuberculous mycobacteria disease in Japan.

Contributions to global environmental studies

We discovered that there is an important environmental component to infectious disease. While pathological studies inform effective disease treatment, the study of the interactions between pathogen, host and human actions that may create or alleviate 'fertile' disease environments is necessary for prediction and prevention of new disease outbreaks.

We found that since the outbreak of KHV disease in

Lake Biwa was first documented, KHV is now found throughout the lake ecosystem, including in plankton and sediment, in many lagoons and ponds, as well as in almost all the rivers of Japan. This finding indicates that it is impossible to eliminate KHV directly, and that instead it is necessary to practice precautionary environmental management to eliminate 'fertile' disease environments. In order to reduce future outbreaks of infectious disease, it is necessary to understand links between environments, pathogen, host, and humans in addition to the 'natural' behaviors of pathogen and host.

The finding that anthropogenic environmental changes mediate disease outbreaks and spread led us to consider how interactions between pathogens and humans can be modified for long-term societal benefit. From the view point of human ethics, we suggest that humans often have responsibility for outbreaks and spread of infectious disease.

Dissemination of the research results for a worldwide research network

We shared our research methods and results and our concept of infectious diseases as 'environmental disease' with international and national academic communities and society. Project findings were introduced to academic communities in a general paper, more than 30 specific papers on environment–pathogen–human linkages, 10 edited special articles, and six project-organized international conferences, as well as through invited lectures at universities in several Asian countries. These activities formed the base of an international alliance of researchers studying environmental disease while also promoting activities that can help address infectious disease worldwide.



Carp killed by KHV disease, Lake Biwa, 2004
by Masatomi Matsuoka [2010] In: The RIHN Encyclopedia of Global Environmental Studies, Koubundou, p. 284.

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** RIHN

Professor Hiyama's specialties are ecohydrology and hydrometeorology. He is interested in vulnerability assessment of shallow groundwater, especially in permafrost regions affected by global warming. He is also interested in atmospheric boundary layer (ABL) meteorology and terrestrial-climate interactions, especially energy/water/carbon exchanges. Eastern Siberia is the most important region for his field research, and he has conducted field observations of the ABL over several regions including Eastern Siberia for around twenty years.



Global warming will likely transform Siberian environments. Early evidence indicates that water and carbon cycles are undergoing rapid change, with potentially grave impact on Siberian flora and fauna. Human inhabitants, who have adapted to great changes in social structure and environment in the past, will be forced to adapt again, but to a cascading series of environmental changes whose dimensions are understood only in outline. The Lena River Basin in Eastern Siberia, which is covered in larch forest but receives little precipitation, is our main research area. The area is an ideal setting in which to study the effects of climate warming, as the forest-permafrost symbiosis is extremely susceptible to abnormal variations in temperature and precipitation. This project uses multiple satellite and surface systems to track changes in water and carbon cycles and the cryosphere, and to assess their likely interactions and significance for human inhabitants of the region. The project is jointly conducted by Japanese and Russian universities and research institutes.

This research project takes natural and social science perspectives on three aspects of climate-associated environmental change. It is designed to: 1) describe current variation in water and carbon cycles and predict likely variation in the near future; 2) make field observations of the effect of carbon and hydrologic variability in Eastern Siberian landscapes, and identify key exchanges or driving forces; and 3) examine the capability of the multi-ethnic Siberian peoples, and their distinct social economies, to adapt to predicted change in their climate and terrestrial ecosystems.

Project research has emphasized four main research areas

1) Permafrost-ecosystem modeling

Flux and hydro-meteorological observations were operated with the help of JAMSTEC and Russian institutes from the beginning of this research project up to now. It was found

that high precipitation in the middle part of the Lena River Basin from 2005 to 2008 (Fig. 1) has led to tremendous changes in surface conditions. The changes observed include deepening and moistening of the active layers (Fig. 2), hindrance to tree growth, and the expansion of water surface due to floods. Such over-moistening condition of forest soil made larch trees to wither around the monitoring station. However satellite data analyses revealed that such tree withering was in progress only on a spot-scale.

Based on the field observation data, we have been revising our model of surface soil freezing-thawing processes in order to better represent heat, water, and carbon fluxes in permafrost ecosystems. Here we were particularly concerned with the surface soil layer, in which we now see increased thawing depth and surface soil moisture, and an increase of net primary production. It was detected that annual maximum thawing depth (AMTD) gradually increased (deepened) on a decadal scale.

Such terrestrial water storage increases in the Lena River Basin derived increases in river base flows during the open water season (Fig. 3). It was indicated that over the 1950–2008 period basin-scale AMTD has been increasing at average rates of roughly 1 cm a^{-1} .

2) Adaptation ways of keepers and/or hunters of reindeers to social-environmental changes

Interviews with keepers of domestic reindeer revealed that current climate change has not severely damaged their operations. It appears that so far they have been able to successfully adapt to changes in climate, especially in the Eastern Siberia. This might be related to resilient use of microhabitat of the domesticated reindeers around the camping site of the keepers. While on the contrary, they were severely impacted by social changes following the collapse of the Soviet Union (Fig. 4).

We are also interested in documenting the migration routes of wild reindeer and establishing whether these are

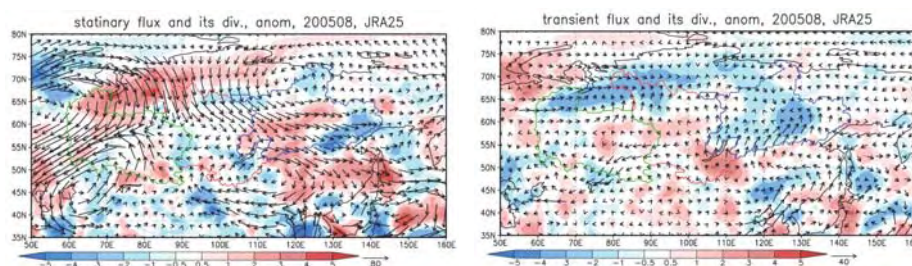


Figure 1 Atmospheric water vapor transport in August 2005 over the Siberia

Arrows in the left figure show stationary flux and those in the right one are the transient flux. Water vapor convergence is indicated in blue and the divergence is in red for both figures.

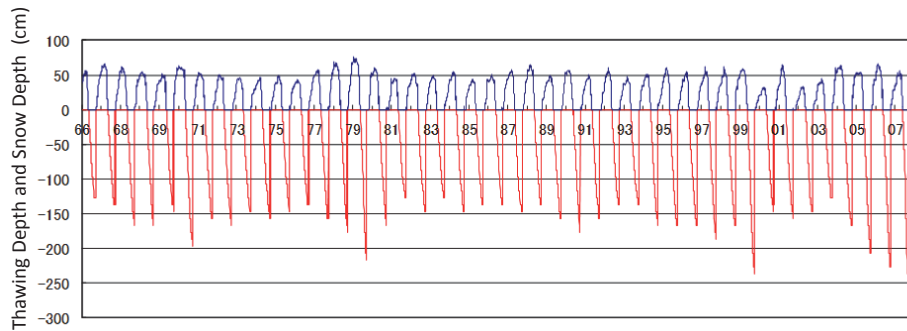


Figure 2 Time series of estimated snow depth (above 0 cm) and soil thawing depth (below 0 cm) at our larch forest site, located at the middle part of the Lena River Basin

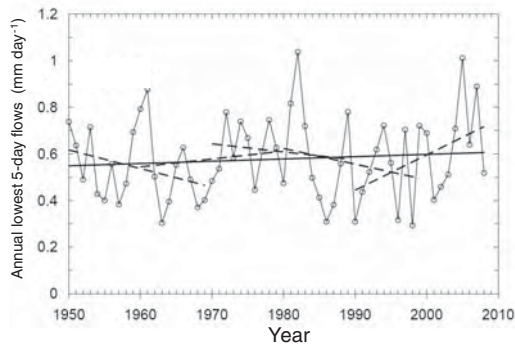


Figure 3 Evolution of the annual lowest river flows of the Aldan River in Eastern Siberia. The long straight line represents the regression over the period of record 1950–2008. The shorter straight line segments are the regressions over the periods 1950–1969, 1960–1979, 1970–1989, 1980–1999, and 1990–2008.



Figure 4 Interannual change in numbers of domestic reindeer in the Sakha Republic (right axis) and the three sub-regions (left axis) from 1980 to 2010

changing in relation to new environmental conditions. We successively tracked routes of eight wild reindeers using an ARGOS satellite system. MODIS satellite data showed that reindeer have moved along rivers and through zones of better vegetation, while avoiding increasingly common forest fires (Fig. 5). Migration distance was similar to those documented in North America and North Europe. We also found similar diurnal change in the migration behavior of wild reindeer.

3) Flood impacts

Using archival sources and remotely sensed data, we were able to make a detailed historical description of changes in annual spring ice-jam floods of the Lena River. Interestingly, spring ice-jam floods have been recognized as beneficial, except in the case of ice-jam floods which can severe damage villages along the Lena River. The benefit of spring flooding is that it delivers nutrient rich water to the river islands on which the farmers cultivate pastures for domesticated horses and cattle. When it occurs, summer river flooding, however, is a hazard as it submerges the pasture for a long duration.

We also found that increased flooding disrupts cold-weather transport via ordinarily frozen rivers and warm-weather transport over land. As result we note that Northern communities are increasingly remote and difficult to access, and have begun to study disaster vulnerability, prevention and adaptation in such areas.

4) Socio-cultural adaptations

We are describing local minority peoples' social-cultural adaptations to environmental and social changes. It became clear that traditional knowledge, social networks, money, and (in the case of North America) technology, were key factors affecting adaptive capacity to climate change. In the case of Eastern Siberia, we found additional adaptations, such as 'working with what's available, and doing without what isn't'. Interestingly, in the case of Siberia, we found that public support systems, remnants of the Soviet era, are increasingly replaced by personal networks.

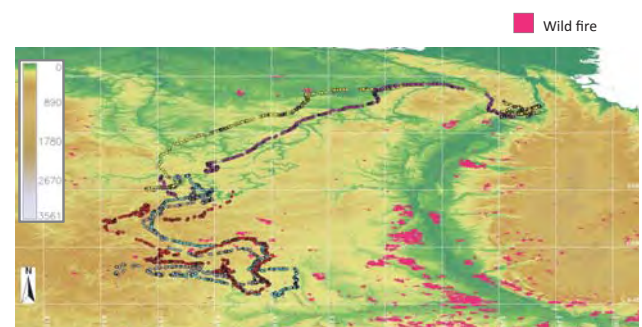


Figure 5 Tracking routes of eight wild reindeer detected using ARGOS satellite system from August 2010 to February 2011. The routes are drawn on a topographical map. Areas of wild fire are also shown.

Sub Leader

FUJIWARA Junko RIHN

Core Member

YAMAGUCHI Yasushi Nagoya University
OHTA Takeshi Nagoya University
TAKAKURA Hiroki Tohoku University
SUGIMOTO Atsuko Hokkaido University
YAMAZAKI Takeshi Tohoku University

OKUMURA Makoto Tohoku University
TATSUZAWA Shirow Hokkaido University
SAKAI Toru RIHN
SHIMIZU Hiromi RIHN

Megacities and the Global Environment

Project Leader **MURAMATSU Shin** RIHN

Professor Muramatsu researches East Asian architectural history and urban history. At the same time, he has turned his attention to historic and urban preservation and to environmental literacy education about children's living environments (Minicity). His books include *Shanghai: The City and Its Architecture*, *Addicted to China*, and *Keeping an Elephant*. He is editor of *Asian Architectural Studies* and *The Shibuya Heritage*.



Why are we doing this research?

In the 20th century, megacities (cities with a population of more than 10 million people) arose for the first time in human history – a new and amazing phenomenon. Their behavior has produced environmental problems on a global scale (e.g., global warming) as well as local environmental problems (urban vulnerabilities). At the same time, megacities are expected to be greatly affected by such problems. Moreover, many megacities are appearing in developing countries located in non-Western, temperate, tropical, monsoon regions: that is, in places where methods of controlling cities have not necessarily matured. In grappling with these front-line problems related to the global environment, we also hope to be able to obtain some ideas for dealing with the problem of urban shrinkage that is now occurring in Japan and elsewhere.

What are we doing, and where?

As this project's main field of study, we chose the megacity of Jakarta, the capital of Indonesia, where economic growth is currently booming. The phenomena accompanying the city's growth are exceedingly diverse. The area of the capital region is enormous, covering more than 100 km². The suburbs are spread out, and high-rise buildings stand one next to the other. Former rural areas have been swallowed up by the city, and high-density, traditional communities within the city have changed form while continuing to exist. Factories and commercial districts have also been constructed one after another. In these, not just artificial environments but also diverse communities

have been established, and the natural environment exists in a multiplicity of forms. For this project, our goal is to work together with the University of Indonesia, Bogor Agricultural University, and the Indonesia Institute of Science to observe and measure and thereby deduce the relationships between global and local environments. We also will propose a model for megacities in the year 2050. At the same time, we are thinking about micro-design and everyday experience. In addition, we are doing comparative fieldwork on the living environments in the 17 megacities that exist in various regions of the world.

What we want to communicate

Three years have passed since the project began. Counting from the preparatory stage, it is seven years in total. Experts from various academic disciplines—ecology, urban planning, history, environmental economics, environmental climatology, hydrology, and others—are cooperating to research a single giant city, generating a dynamism that is not only exciting but also produces a series of nail-biting worries. The gap between the disciplines in their research attitudes, methods and evaluative standards is much wider than was expected. Nevertheless, we are proud of the fact that even at this intermediate stage, the method (based on certain characteristics of the urban environment) by which we integrate various urban factors while analyzing this giant city “under high magnification” and which we also apply to the other 17 megacities, and the city sustainability index (CSI) which we use to compare and evaluate megacities, have already yielded unprecedented results. Moreover, the design proposals which have resulted from cooperation between the University of Indonesia and Japanese students in Jakarta's high-density communities, and which are intended not only for university education but also to enlighten community residents, have achieved significant results as well.

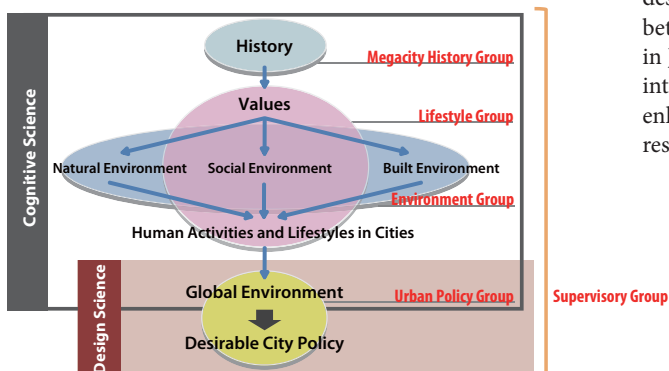


Figure 1 Project flow and research organization

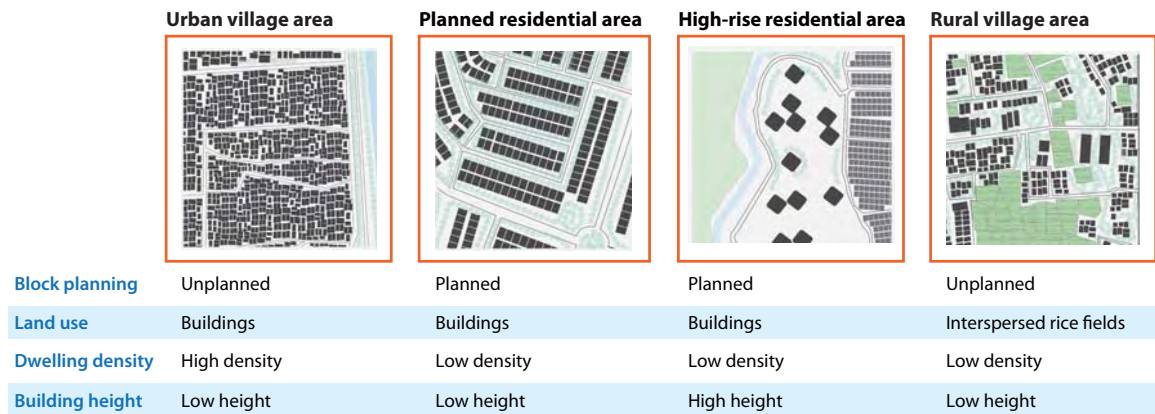


Figure 2 Four characteristics of the urban environment



Photo 1 City sustainability index (CSI)

A model constructed to investigate the sustainability of 17 megacities (Tokyo, Jakarta, Seoul, Mumbai, Sao Paulo, Mexico City, Manila, New Delhi, Cairo, Kolkata, Osaka-Kobe, Shanghai, Buenos Aires, New York, Karachi, Dhaka, and Moscow). With blue indicating the city's environment, red its economy and green its society, this model shows how indicators will increase as each element grows. Individual indicators can be removed from the model, allowing a simple comparison and evaluation to be made of the individual elements.



Photo 2 Design intervention in Cikini (a high-density community in the city)

What we want to do from here on

Two years remain in the project. However, unforeseen results, different from those hitherto, are likely to occur. This can also be expected from the fact that the various teams members are endeavoring to integrate their diverse academic disciplines. From the start, this research has focused not only on achieving a Megacity Scenario 2050 and a megacity GIS, but also on understanding the middle-class living environments that are expanding in various cities, on undertaking a novel effort that uses the Internet to offer proposals able to improve people's urban environmental literacy, and on how humanistic knowledge and art can contribute to city, town and village environments (artificial environments, natural environments and social environments). Hereafter we will continue to plant new seeds, and we will do our utmost to reap a full harvest by the end of the project.



Photo 3 An interactive website that recognizes middle-class living environments and offers proposals

Sub Leader

HAYASHI Kengo RIHN

Core Member

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

Diversity Program

SATO Tetsu | Program Director

Humanity and nature have evolved together. Nature is the source material of human perception and culture, and nature's rich diversity—both biotic and abiotic—has nurtured cultural diversity. Yet nature has been transformed through human activity: it is both source and subject.

Biological diversity composes the planet as we know it; it is the foundation of all society and human reliance on it is unquantifiable. Meanwhile, cultural diversity, including ideas, languages, technologies, ways of living and systems of belief, has been passed through the generations, and has enriched human quality of life and understanding of the biosphere. In acknowledging this role of cultural diversity we recognize the basic human rights to safe, healthy, fulfilling lives, peace of mind and just social systems, for these are the essential conditions in which people can live with hope and pride.

In historical context, the current loss of cultural diversity can be seen as part of a large-scale process that threatens biological diversity on Earth, and as an expression of humankind's relationship with nature since the last century. Humanity faces a situation in which the cultures responsible for today's global environmental problems are excluding from the world those that have historically embraced "wise use" of, and harmony with, nature.

The RIHN Diversity Program describes and analyzes the formation, maintenance and functions of biological and cultural diversity in various environments. It seeks to identify ways to re-vitalize the idea and practice of "wise use" of nature—to prevent exhaustion of resources and preserve ecosystem services—in order to enhance human well-being and ecological integrity.

Completed Research	Leader	Title
D-03	OKUMIYA Kiyohito	Human Life, Aging and Disease in High-Altitude Environments
D-04	SAKAI Shoko	Collapse and Restoration of Ecosystem Networks with Human Activity
Full Research	Leader	Title
D-05	ISHIKAWA Satoshi	Coastal Area Capability Enhancement in Southeast Asia





Human Life, Aging and Disease in High-Altitude Environments: Physio-Medical, Ecological and Cultural Adaptations 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 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 in highland civilization. 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.

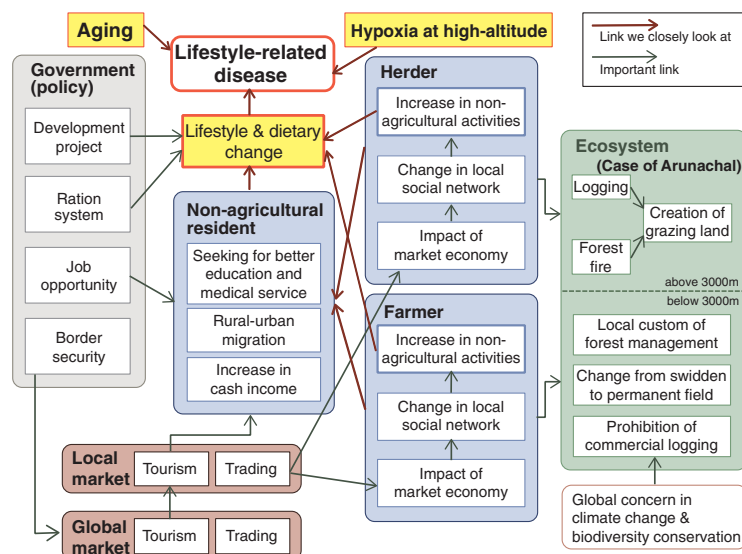
Results

Ecological and cultural adaptation in highlands was 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-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 relationship, caused by various factors from local to global, uniformly resulted in the rise of lifestyle-related disease such as hypertension and diabetes (Figure). 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 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: “Ecology of life, aging and disease: Living in Tibet/ Himalaya”; (in Japanese) “Ecology of life, aging and disease Vol.2: Living in Himalaya / Andes” (in Japanese), “Mysterious Land: nature of Assam Himalaya and Tibetan society” (in Japanese), “Health in high-altitude environment: interaction between hypoxic adaptation and recent lifestyle change” (in Japanese), “Andes, Himalaya and Mongolia: People living with domestic animals”, “The Study of Mādhyamika Philosophy: Dar ma rin chen Bhāsyā and Busshitogan of Bodhicharyavataṛa” (6 volumes), “Report of heavy rain disaster in Ladakh”. Four additional books are currently in preparation. Project researchers have published 201 peer-reviewed scientific papers in Himalayan Study Monographs (No. 8-14) or other journals, and convened four international symposia or workshops.



Increased lifestyle-related disease caused by non agricultural activities, aging and trade off of hypoxic adaptation

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.

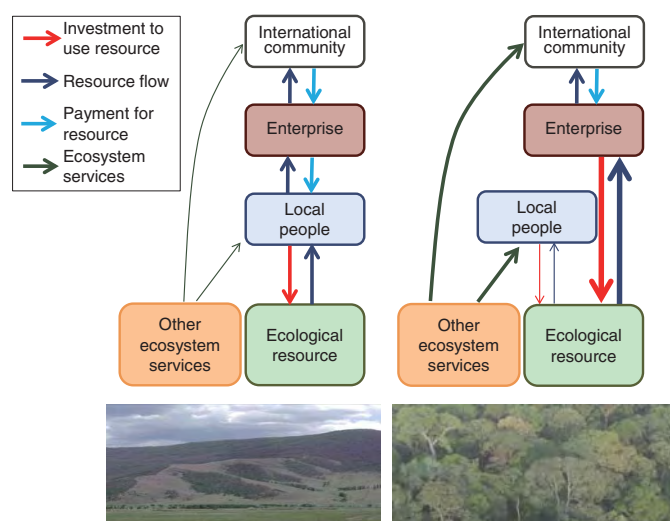
The results of the project showed that network structures that are likely to lead to environmental problems or ecosystem network restoration depend on the ecological characteristics of the specific system and resources.

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.

Grasslands in Mongolia

Tropical forests in Sarawak



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.

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 at 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

There is growing concern for marine ecosystems and resources. Coastal area ecosystems in particular have been deteriorating rapidly, as they are often affected by environmental change and intensive human activity both on land and at sea. This interdisciplinary project investigates the complexity of coastal ecosystem health in relation to human use in tropical Southeast Asia.

Coastal area ecosystem services are indispensable for rural people, but also easily damaged by human use. Many coastal areas with high biodiversity and biological production 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. 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 cannot be easily applied to tropical coastal areas.

Project Framework

This project develops a holistic concept of area capability to permit consideration of the socio-ecological dynamics and tradeoffs in rural coastal area development. 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. Field 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.

The concept of area capability was presented at the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security Towards 2020 (June 2011, Bangkok), and at seminars in the Philippines of researchers from Kagoshima University, Research Institute for Humanity and Nature, UPV and SEAFDEC in 2011 and 2012. These events have allowed us to develop the concept in dialogue with members of local institutions and fishery departments in ASEAN countries, as well as in the Food and Agriculture Organization, World Wildlife Federation, among others.

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. Through this collaboration, we can realize “area capability” and to generate a new approach toward rural development based on the harmonization between ecosystem health conservation and improvement of local people’s quality of life. .

Future tasks

With full research underway since 2012, we will examine coastal area resources, ecosystem services and

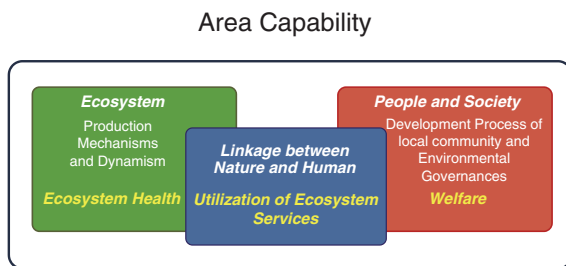


Figure 1 Conceptual Diagram of Area Capability

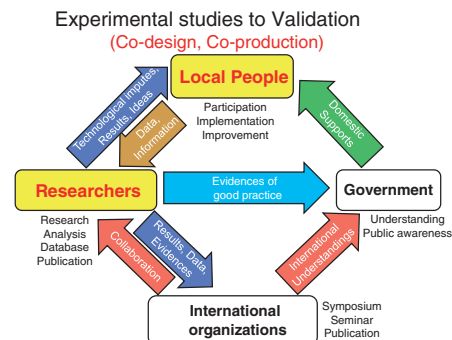


Figure 2 Framework of collaboration activities



Photo 1 Set-net in Rayong



Photo 2 Community market managed by set-net fishery group



Photo 3 Intensive fishery in Batan Bay in Philippines

communities in the Rayong area of Thailand, Panay Island in Philippines, and in Ishigaki Island and Mikawa Bay, 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, and will develop equipment for such measurement as necessary.

Social research will investigate 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, constraints and opportunities that define the area capability of coastal tropical regions. A process of continual feedback of such data will deepen dialogue with local people and governmental institutions and is expected both to improve project research and support ecologically sound local and regional development.



Photo 4 Group photo at Joint Seminar held in Philippines 2012

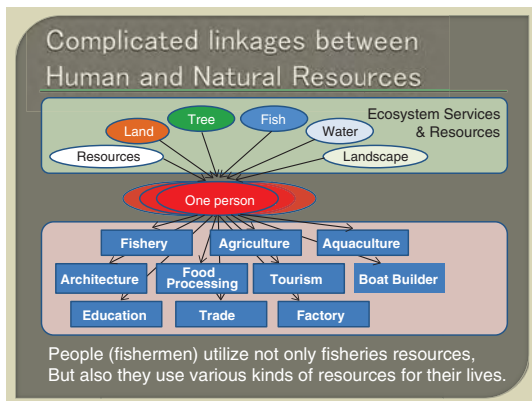


Figure3 Utilization situation of coastal resources in developing areas

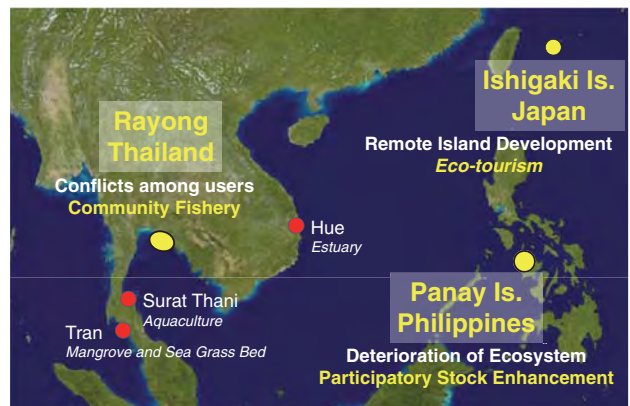


Figure 4 Main target areas

Sub Leader

TAKAGI Akira RIHN

Core Member

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
PORNPATIMAKORN, Somnuk Southeast Asian Fisheries Development Center
ALTAMIRANO, Jon P. Southeast Asian Fisheries Development Center
MUNPRASIT, Ratana Department of Fishery, Kingdom of Thailand
TUNKIJANUKIJ, Suriyan Kasetsart University, Thailand
KAEWNERN, Methée Kasetsart University, Thailand
BABARAN, Ricardo University of the Philippines Visayas, Philippines
FERRER, Alice J. G. University of the Philippines Visayas, Philippines

Resources Program

KUBOTA Jumpei | Program Director

The Resources Program examines global environmental issues related to the use and conservation of natural resources. Human beings have always made use of and changed the environments in which they live. Such change occurs as people appraise the qualities of the plants, animals, waters and soils that surround them, and develop the tools that allow them to make use of their surroundings. Perception and use of resources is therefore related to the individual or society's immediate needs for survival and their knowledge of the natural world. Resource use is also guided by cultural preferences originating from individual tastes and belief systems, as well as societal preferences resulting from a peoples' collective sense of its place and role within the larger world.

Human innovation in the natural world has led to the domestication of plants and animals and the control of water and energy. Paradoxically, humanity's great advances in environmental knowledge and resource control have led to environmental problems of unprecedented scale. Overall, humanity appears to be consuming many resources and taxing many ecosystems at a pace beyond their capacity of renewal or absorption.

Excessive resource use cannot simply be explained as a result of population or economic growth. Instead we must look to the roots of the interactions between humanity and nature. Identifying solutions to contemporary resource problems requires close attention to specific human-environmental interactions, for there are great disparities between and within individual societies that prevent equal access to the benefits of local and global environments. Projects in the Resources Program examine how human livelihoods are directly affected by natural resources and seek solutions that will positively affect communities and the global environment.

Completed Research	Leader	Title
R-03	KUBOTA Jumpei	Historical Interactions between Multi-Cultural Societies and the Natural Environment in a Semi-Arid Region in Central Eurasia
R-04	MOJI Kazuhiko	Environmental Change and Infectious Disease in Tropical Asia
Full Research	Leader	Title
R-05	NAWATA Hiroshi	A Study of Human Subsistence Ecosystems in Arab Societies
R-06	KADA Ryohei	Managing Environmental Risks to Food and Health Security in Asian Watersheds
R-07	TANAKA Ueru	Desertification and Livelihood in Semi-Arid Afro-Eurasia



Historical Interactions between Multi-Cultural Societies and the Natural Environment in a Semi-Arid Region in Central Eurasia

Project Leader **KUBOTA Jumpei** RIHN

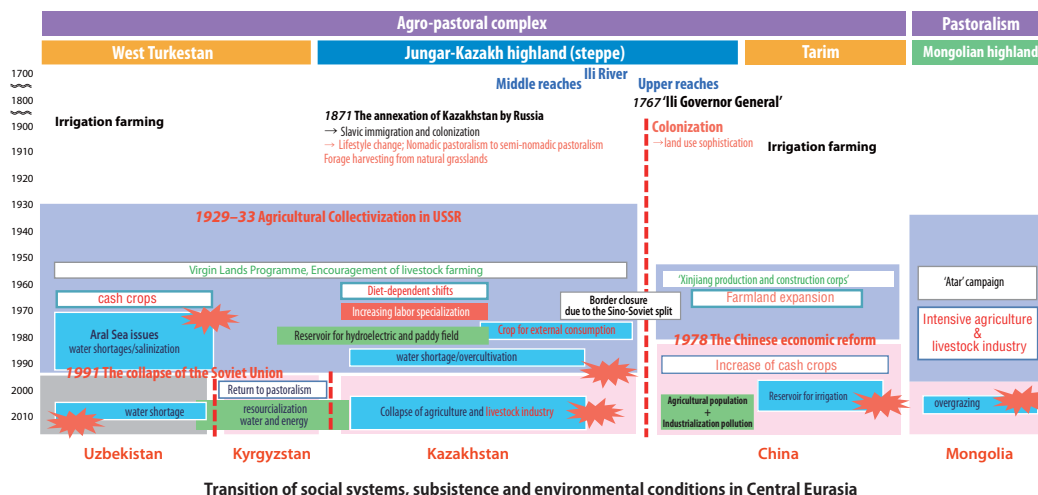
Human beings have continually strived to adapt to changes in the environment. This project combined analysis of historical documents, archaeological remains and natural proxies such as ice cores, lake sediment samples, and tree rings in order to describe the history of adaptations by human beings to both environmental and societal changes in arid to semi-arid regions of Central Eurasia. Project research focused particularly on use of natural resources in order to provide some historical depth to contemporary discussion of global environmental problems.

The project reconstructed climate change in the area over the past one thousand years. Temperature and precipitation data indicated that the period from AD1000 to AD1500 was warm and dry, while the Little Ice Age (LIA), from 1500 to 1850 was cold and wet. We also estimated two important factors relating agriculture to nomadic activities, namely, river flow and distribution of grassland. The long-term trend of river flow corresponds well with the reconstructed lake level of Lake Balkhash, indicating that lake levels decreased from the 10th to 13th century. A chronological database describing the rise and fall of settlements indicates a clear change in the distribution pattern of agricultural settlements in the Syr Darya Delta from the 13th to 15th centuries. The change in settlement pattern is associated with shifting river courses which are also associated with severe decline of the Aral Sea lake level in the 13th to 15th centuries.

The warm and dry climate in early medieval times might have accelerated the development of agricultural and trading activities, and consequently contributed to the flourishing of the area, especially oasis cities in the Syr Darya basin of western Turkestan from the 7th to 13th centuries. The cold and wet climate in the LIA might be associated with the decline of oasis cities and increase of nomadic activities of the period, as nomadic population groups and place-names identified in historical documents show that nomadic groups expanded their activities

in the new grasslands in the 17th and 18th centuries. Such cultural and ecological shifts demonstrate that ecosystems in Central Eurasia have wide range of natural variation, but also have fluctuated due to climate change. Social flexibility, such as high mobility and subsistence complex patterns were major ways of adaptation to this environment. Also, societal mobility sometimes reduced societal conflicts.

After a long transition marked by the rise and fall of various ethnic groups and countries, a secure and definite border divided the region between Russia and Qing in the 18th century. The people of the area experienced a great change in their lifestyle, caused by the introduction of modern agriculture. The settlement policy and collectivization of the agricultural sector from 1929 triggered social confusion in Kazakhstan, resulting in the loss of a large number of nomadic populations. Under the “transformation of nature” ideology of the Soviet Union, Kazakhstan was forced to become one of the major crop production areas in the Soviet Union, causing excessive development, which ignored environmental capacity and exerted significant impact on the area. In addition, these development policies were applied in a fashion that ignored and destroyed traditional social systems. In particular, the new production system, including the division of labor, together with the migration of skilled peoples from other countries as leaders for collective farms, prevented the accumulation of agricultural knowledge, and also caused the loss of traditional knowledge of nomadic pastoralism and its subsistence complex. Moreover, societal confusion caused by the collapse of the Soviet Union implies that societal flexibility in the area could be a very important factor in the resilience of society to both natural and societal impacts. This is one of the keys to understanding contemporary environmental issues in Central Eurasia.



Environmental Change and Infectious Disease in Tropical Asia

Project Leader **MOJI Kazuhiko** RIHN

Today we may naturally think that environment and health are important in themselves and in relation to one another. We may know instinctively that they are positively linked, that good health is sustained by sound environments. This knowledge is not to be taken for granted, however. Human health and hygiene improved dramatically in the 20th century, and so has the global environment deteriorated. Life expectancy has increased dramatically in the developed countries in particular, but so has the developed world's ecological footprint. According to the dominant 20th century model of health and development, development was described as the solution for ill-health and poor hygiene. As humanity now risks crossing important environmental thresholds, the limitation of this model is increasingly apparent. As we look into the 21st century, we need to develop a model of health and environment and/or ecosystem that is as valid at the global level as it is at the local. We even need to create a concept of health that can identify and address the full significance global environmental change.

The RIHN Ecohealth Project was conceived in order to improve understanding of the relation between endemic infectious diseases that significantly impact public health and the environments and ecosystems in which they are found. Project fieldwork was conducted in tropical monsoon Asia, especially Laos P.D.R., Vietnam, Bangladesh, and China in which project researchers established important collaborations with governmental and non-governmental organizations (Fig. 1).

This range of research partners allowed identification and examination of critical health/environment contexts and nexus in the region. In the lowland plains of Savannakhet Province, Laos, we studied liver fluke infection in relation to the recent development of wet rice fields and irrigation systems (Fig. 2). In the mountainous

area of the same province, where ethnic minority people live by cultivating upland paddies, we examined malaria incidence in relation to forest degradation. A trans-border examination of malaria among villages along the Laos-Vietnam border documented a significant discrepancy in the incidence of malaria, which seems to be linked to forest cover of each country. The project established two Health and Demographic Surveillance Systems (HDSS) and one mobile-phone network for rural health workers in the province. These systems will continue to produce the prospective ecohealth data necessary to elucidate the relation between ongoing social-ecological transformations and the health profile in Laos.

Project findings were published in numerous academic fora, just as they were communicated to appropriate offices of public health policy and practice. If we are to synthesize a single key finding, it is that the health profile of a human population is a product of the social-ecological system; it can more helpfully and accurately be understood as *ecohealth*. Human health should therefore not be studied in isolation from its environmental and social contexts. From this viewpoint, one can see that ecohealth in each social-ecological system is unique and that strategies adopted to promote it should be designed specifically for each locality. The concept of ecohealth therefore differs significantly from the conventional, medical-oriented, universal view of health, which relies on universally-defined goals and strategies rather than those designed for individual peoples and settings. The concept of ecohealth should allow health workers at all levels of practice and policy to better define their goals and conceive of their interventions. It should improve quality of life in the diverse and complex social-ecological settings of tropical Monsoon Asia just as it helps us to pursue the universal goal of sustainable health for all.

Lao P.D.R.

National Institute of Public Health (NIOPH)
Savannakhet Provincial Health Department

Vietnam

JSPS AA Science platform program for forest malaria
Khanh Phu Malaria Research Project (MCNV)

Bangladesh

International Centre for Diarrheal Disease Research, Bangladesh (ICDDR, B)
Bangladesh Ministry of Health and Family Welfare
Institute of Allergy and Clinical Immunology, Bangladesh (IACIB)

Yunnan, China

Yunnan Health and Development Research Association (YHDRA)
Yunnan University
Chinese Center for Disease Control and Prevention (CDC)

Figure 1 International Counterparts of the RIHN Ecohealth Project

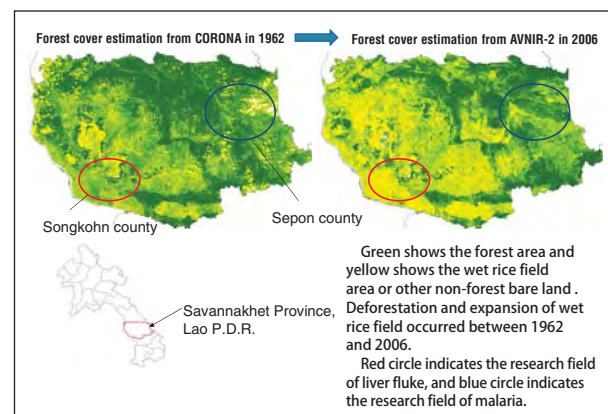


Figure 2 Land Cover Change of Savannakhet Province, Lao P.D.R. between 1962 and 2006. Deforestation accelerated as lands have been converted to paddy fields.

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

Project Leader **NAWATA Hiroshi** RIHN

Hiroshi NAWATA received his Ph.D. in Human and Environmental Studies (Cultural Anthropology) at Kyoto University (2003). He was assistant professor at the Division of Comprehensive Measures to Combat Desertification, Arid Land Research Center, Tottori University (2004-2007). His major fields of interests are camel pastoral systems, Muslim trading networks, and indigenous (traditional) knowledge for rural development in the Middle East and Africa.



This project examines life support mechanisms and self-sufficient modes of production among Arab peoples who have survived in dryland environments for more than a millennium. Using the research results, we will propose a scientific framework to strengthen subsistence productivity and combat livelihood degradation in local Arab communities in preparation for the post-oil era.

Background and Objectives

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 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. This pattern of development has increased social and economic differences within the Middle East just as the region faces a turning point in modern oil-based industrial development. Fossil fuel-based interdependencies must now be transformed into new relations that can support viable future societies.

This project focuses on human subsistence ecosystems of the region: low energy-intensity life-support mechanisms and modes of production, such as hunting, gathering, fishing, herding, farming, and forestry. In doing so it also reflects on the role of advanced technologies in economic development, and measures adopted thus far to combat desertification. Field research investigates keystone species, ecotones, and traditional knowledge and examines the sustainability of subsistence economies under site-specific conditions.

Research Methods and Organization

Field surveys are conducted in semi-arid lands between the Nile River and the Red Sea in Sudan, with the Red Sea



Figure 1 Field survey areas and research themes

coast, Butana area, and Nile River areas as the main survey areas. Additional surveys will be conducted at the Sinai Peninsula in Egypt, the Red Sea coast in Saudi Arabia, and a Saharan oasis in Algeria. We will compare keystone species, ecotones, and traditional knowledge and examine differences in the sustainability of subsistence economies under site-specific conditions (Fig. 1).

We will develop and implement our study of human subsistence ecosystems around three main areas: 1) comprehensive measures to control the alien invasive species mesquite; 2) assessment of the environmental effects of development programs in coastal zones of the arid tropics to prevent the emergence of new environmental problems; and 3) sharing of research results to support local decision making.

Our research method combines two main approaches: (1) analysis of subsistence ecosystems, focusing on keystone species such as camels, date palm, dugong, mangrove, and coral reefs; and (2) examination of the sustainability and fragility of Arab societies, focusing on the ecotones such as wadi beds, riverbanks, mountainsides, and seashores.

The members of this project include social and natural scientists, members of local NGOs and project managers, who are divided into four study groups: 1) Alien invasive species control group, 2) Coastal zone environmental impact assessment group, 3) Support for local decision making group, and 4) Local ecosystems comparative studies group (Fig. 2).

Major Achievements

Suggestions for resource management in Marine Protected Areas (MPAs) through studies on fishing culture and behavioral characteristics of dugongs

The local people have historically depended on sea products (fish, shellfish, dugong, dolphin, and sea turtles) for their diet in unique coastal ecosystem of the arid tropics: coexistence of mangrove forests (dominant species: *Avicennia marina*) and coral reefs and complex relationship of the both. On the other hand, the coastal zones presents a large development frontier, therefore, it may also lead to environmental degradation such as destruction of mangrove forests, coral reefs, and seagrass beds and releasing highly concentrated saline water into the sea. In order to suggest frameworks for a new environmental assessment with community participating for prevention of global environmental problems, we have conducted multi-principal studies focusing on mangroves, coral reef, camels, dugongs, and fishing culture in the coastal areas of Sudan,

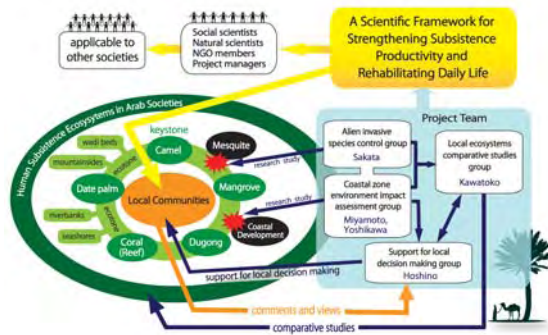


Figure 2 Research methods, approaches, and organization

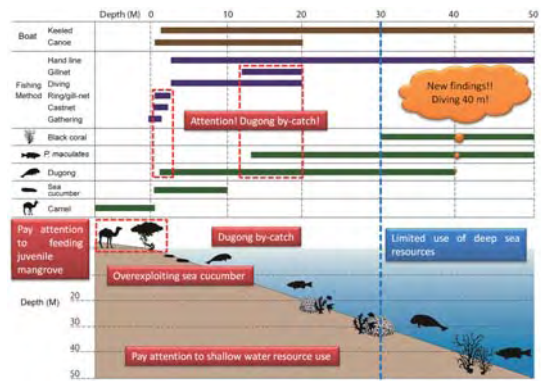


Figure 3 Actual situation of coastal resource use in Dugonab Bay in Sudan

Egypt, and Saudi Arabia, surrounding the Red Sea.

We have conducted surveys on fishing culture in Dugonab Bay in one of the MPAs in Sudan and have found that the local fishermen were catching fishes based on accurate recognition of their subsistence space and detailed understanding of ecology of the target fish. The fishermen find 77 fishing grounds accurately by using both maps and marine charts. Besides, it was suggested that fishing restriction due to harsh environmental conditions such as strong winds for half a year and hot temperature in summer may control over harvesting of the marine resources. On the other hand, there is a growing concern about over fishing of sea cucumbers which are coastal stationary species that inhabit shallow waters, because they are easily taken and traded at high price. It is also concerned that mangrove trees are used for processing the sea cucumbers.

Biologging studies of dugongs revealed behavioral characteristics of their space use. Dugongs stayed in the shallow waters less than 4 m for more than 96 % of their time, sometimes showing rapid dives down to 40 m. Strong site fidelity was also suggested because the animal repeatedly visited a specific feeding ground. Vocal communication is expected to be revealed by further analysis.

Most of the fishing grounds and the dugong habitats in Dugonab Bay did not overlap. It was shown that by catch of the dugongs in gill nets can be avoided by time-spatial segregation of fishermen and dugongs (Fig. 3).

We clarified precautions for development and resource management prior to waves of public projects and development. Accumulation of academic data by this project contributes to concrete input of framework and contents of

management of MPA, and at the same time, it can be used as reference for assessment of environmental impact in the whole area of Red Sea and also coastal areas of arid tropics.

Future Activities

Challenges for the last year of this project is to present a persuasive contention by connecting the particular factual data and integrate the result of analysis for “Human subsistence ecosystems in Arab societies”. We will reveal human subsistence ecosystems in the seaside such as relationship between mangrove, coral reef, camels, dugongs, and fishing culture through our previous studies, and by comparing trees (wild species: *A. marina*, cultivated species: date palm, and alien invasive species: *Prosopis*), we will reevaluate them as new resources for energy and food. These research results will be exhibited as “Surviving in the desert (tentative)” at National Museum of Nature and Science. Last year, we have compiled a book “Human resource development and manufacturing in the post-oil era: Pursuit for a future vision of Japan and oil-producing countries” (RIHN book series, Showado) and volume 1 and 2 of multilingual books (in Arabic, English, French, and Swahili) as Arab Subsistence Monograph Series (Shoukadoh). We will also compile a series of books in Japanese “Human subsistence in Arab” (10 volumes, Rinsen Book Co.), and a book “Knowledge for sharing water in the desert (tentative)” (National Museum of Nature and Science, Tokai University Press) to conclude the study results and pass them on to the local society.



Photo1 Interview surveys with local fishermen (Sudan)



Photo2 Sea cucumbers are collected and dried in the sun (Sudan)



Photo3 A local fisherman and a dugong with biologging equipments (Sudan)

Sub Leader

ISHIYAMA Shun RIHN

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Managing Environmental Risks to Food and Health Security in Asian Watersheds

Project Leader **KADA Ryohei** RIHN

Professor Kada joined RIHN as leader of the Food and Health Risk Project in July 2010. He also teaches at the Graduate School of Environment and Information Sciences, Yokohama National University since 2007. From 2001–2004 he served as Policy Research Coordinator at the Policy Research Institute, Ministry of Agriculture, Forestry and Fisheries (PRIMAFF), Japan. For nearly 25 years he researched and taught agriculture and food policy at Kyoto University, and also held posts at Kasetsart University in Thailand and the University of Wisconsin–Madison. He received his Ph.D. from the University of Wisconsin–Madison in 1978.



The general objective of this research is to critically study how ecological risks such as floods, soil erosion and water pollution impact the sustainable linkage between agricultural & aquatic foods and public health, from social, natural, and medical science perspectives, in the watershed area of Southeast Asia. In particular, research has been conducted very intensively at Sta Rosa Watershed of the Laguna Lake region in the Philippines, a highly populated and variegated region in which rich ecological resources are threatened by rapid land use changes, urbanization and industrialization. This study site is expected to be representative of the challenges facing many other watersheds in Southeast Asia. Our major research framework is from upstream to downstream (Fig. 1).

There are four principal objectives: 1) to document the current levels and pathways of heavy metals and other chemical and organic pollution in the aquatic resources of Laguna Lake; 2) to investigate the health condition of local residents and their perception of food risks; 3) to analyze the impacts of varied land use changes in the Laguna Lake area on water and material cycles, including impacts on sedimentation, groundwater level and its quality; and 4) to prepare alternative policy options to improve environmental quality for sustainable development.

Research methods and organization

As shown in Fig. 2, the following five research teams are comprised mainly of researchers from RIHN, Yokohama National University and University of the Philippines; they work in collaboration with government agencies such as

the Laguna Lake Development Authorities (LLDA) and local government units.

- 1) Environmental Risk Assessment Team identifies the exact sources of, and factors responsible for, particular pollutants in the food chain.
- 2) Terrestrial and Socio-Economic Evaluation Team explores how market- and non-market-based instruments can be used to improve water quality, food security and public health.
- 3) Health Risk Evaluation Team describes human nutrition, history of disease, and life expectancy in the region, especially in relation to socio-economic dynamics.
- 4) Payment for Ecosystem Services (PES) Team investigates the design of ecosystem service payment programs, including the potential support for regional agroecologies.
- 5) GIS-based Risk Mapping Team supports the entire research project by creating a spatially-explicit database of key variables associated with risk in the food chain.

Achievements in FRI-2 and the remaining research subjects:

The major research outcome in its first and second year of the Full Research can be summarized as follows:

Environmental Risk Assessment Team performed heavy metal analysis for multiple samples including water, sediment and plants collected from Laguna Lake and its watershed. Our data collectively suggest anthropogenic origins for heavy metals such as lead, but natural origin related to volcanic activity is also plausible especially for

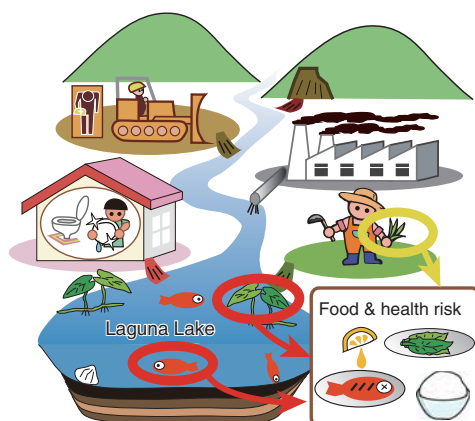


Figure 1 Working hypothesis: From upstream to downstream

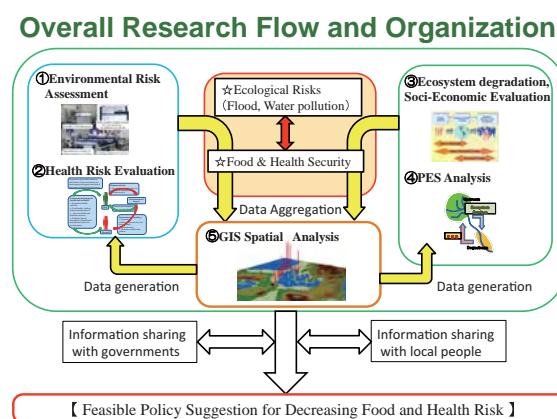


Figure 2 Overall research flow and organization



Photo1 Photo of flooding in the Laguna lakeshore region (August, 2012) local people used to repeated flooding.



Photo2 Field photo of lake survey using sediment sampler

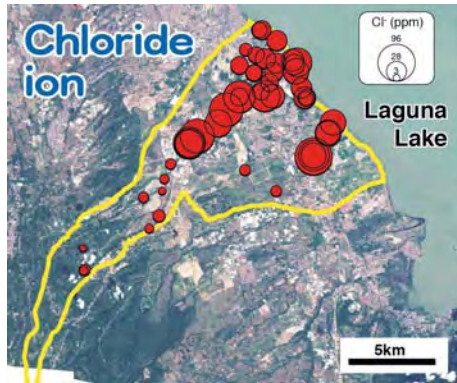


Figure 3 Chloride ion concentration map for river water in the Santa Rosa sub-watershed. The concentration markedly increases in the mid-stream (industrial area).

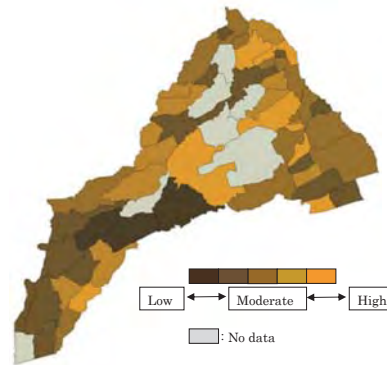


Figure 4 Flood Disaster Resiliency Barangay Map in Santa Rosa subwatershed by Built Environment Index;(calculated by Access to water, Waste disposal & sanitation, Electricity, Road network, Housing and land use).

arsenic. In the next step, the pathway of anthropogenic heavy metals from source through route to exposure would be traced by analyzing lead isotope compositions of the multiple samples (Fig. 3).

Terrestrial and Socio-Economic Evaluation Team computed diversity indices and revealed that plant and wildlife diversity in the sub-watershed was greatly reduced with land use change from forest to built-up and residential areas. The socio-economic team conducted the household survey across the study areas in the Silang-Sta. Rosa sub-watershed and found the wide-spread experience of food insecurity among the poor. This can be attributed to factors such as large family size, low income and nature of household income sources. Another field survey was conducted in the Langat River Basin, Malaysia, and examined the linkage of water pollution and food-health insecurity.

Health Risk Evaluation Team conducted a series of cross-sectional analytic studies to determine the relationship between specific exposures of interest (nutrition, exposure to environmental pollutants; water, sanitation, etc.) and certain health outcomes (acute and chronic disease, common medical complaints, levels of food security, general health and neurological status and cognitive development). Moreover, qualitative researches were conducted on such areas as dietary diversity, multi-stakeholder historical perspectives on changes in the

variety, quantity and quality of lake produce.

Payment for Ecosystem Services (PES) Analysis Team started to investigate PES program to achieve sustainable watershed management by estimating the farmer's opportunity cost of participating in the PES and adopting agroforestry. There is a significant variation in farmers' opportunity cost of PES participation, which suggests that PES should have certain kind of flexible payment mechanism to ensure cost-effectiveness of the program.

GIS Risk Analysis Team have conducted the aggregation of sampling and questionnaire data to the spatial data map; and then created new analytical indices serving as a platform to be used by other research teams in order to complete the GIS risk analysis. Fig. 4 is one of such outcomes, showing the Barangay resilience profile in Santa Rosa subwatershed.

The project is now in the final year of 3 years' Full Research period. Combining the field work, laboratory experiments, interviews and discussions with stakeholders as well as household, farm, and biomedical surveys, each team's research results will be integrated for the discussion of watershed management. The Yamang ng Lawa (Blessing of the Lake) Project will promote and evaluate community-based watershed management. With the feedback from and discussion with the local stakeholders, this research project will challenge a real transdisciplinary approach.

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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 Collage 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 honorary professor of Hue University (Vietnam, 2012 -). His major fields of interests are agronomy, indigenous livelihood systems, desertification, and rural development assistance 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 in sub-humid, semiarid and arid areas. Semi-arid Afro-Eurasia is recognized as one of the front-line of desertification, a problem related both to climatic conditions and basic human survival and daily livelihood activities, such as cropping, animal husbandry, and gathering of fuel woods. Desertification remains a serious problem in the region despite commitments from the international community, including the United Nations Convention to Combat Desertification (1994), to address it. This project identifies the socio-ecological characteristics of, and adaptation strategies related to, desertification in several study areas, re-examines techniques and approaches to desertification control and rural development assistance, and seeks feasible and practical integrative or holistic solutions to encourage improved livelihood security for people living in such uncertain and fragile environments.

Project research takes place mainly in the Sahel of West Africa (mainly Burkina Faso and Niger), Southern Africa (Namibia and Zambia), and Northwest India (Fig. 1), where socio-ecological condition and land resources are degraded due to demographic pressure and uncertain socio-economic conditions and rainfall. With progress, several additional study areas, perhaps in the other parts of West Africa (Senegal), Northeast Africa (Sudan) and East Asia (China and Mongolia), will be considered.

In the 2013 prospectus, we highlight some progress obtained through the studies in West Africa.

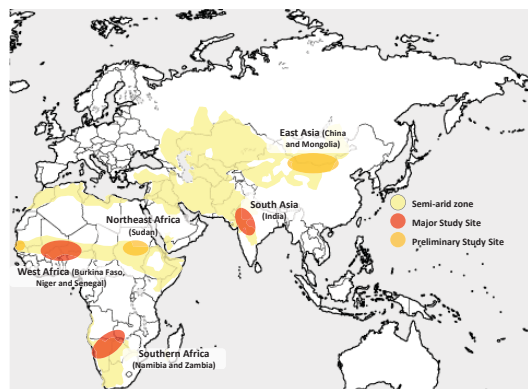


Figure 1 Targeted study areas in the project

Progress to date

Modification of extension method

Project researchers developed the ‘fallow-band system’, a unique practical technique to reduce wind erosion and improve crop yield (Fig. 2). This technique was endorsed by the JICA Grassroots Project “Formation and dissemination of practical techniques for mitigation of desertification and improvement of household income in Niger” (April 2010–March 2013). As of December 2012, the technique has been practiced by 439 households in 75 villages, 23 districts and 4 regions in Niger. It appears to be effective. Our survey in a selected village, however, revealed that the distribution of households practicing this technique were limited to the area closer to the village chief. This was explained by the intensity of social relations among villagers as showed in Fig. 3. If a new idea or technique is introduced to a village through a local chief as a contact point, as is commonly advocated in “participatory” approaches for rural development, the range of diffusion may be limited by the networking with and distance to this contact person. A social network survey may clear this black-box in conventional rural development approaches. We also identified some opinion leaders located in key nodes of the network, as indicated by the arrows in Figure 3. These individuals may be additional access points for introduced ideas and techniques.

Design of practical technique affordable for local people

Many techniques have been introduced to control desertification to date, but most are, unfortunately, not adopted by local people. New techniques, however scientifically sound and rational, may not match the needs and situation of local people, e.g. in relation to cost or time and labor requirement. Some techniques are highly dependent on materials and machinery from outside that may not be affordable locally or normally available. Together with volunteer villagers in Niger, we designed one technique using local materials and indigenous technique to control soil erosion by water. Figure 4 shows an on-farm experiment. We set a line of local wild perennial grass (*Andropogon gayanus* Kunth) with indigenous planting technique and allocated a stone band along the contour line in a cultivated field. Participating villagers said that the grass line and stone band may be effective for erosion control but the latter is not attractive as it is hard work to

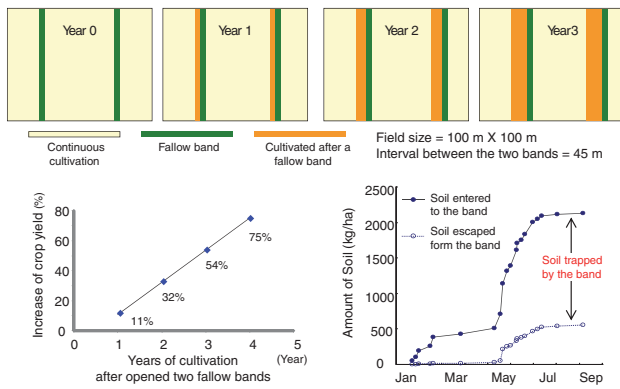


Figure 2 Fallow-band system for soil erosion control and yield increase

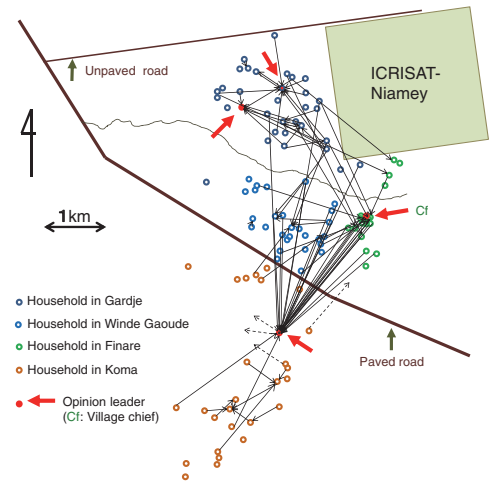


Figure 3 Network of consultation and opinion leaders in a selected village

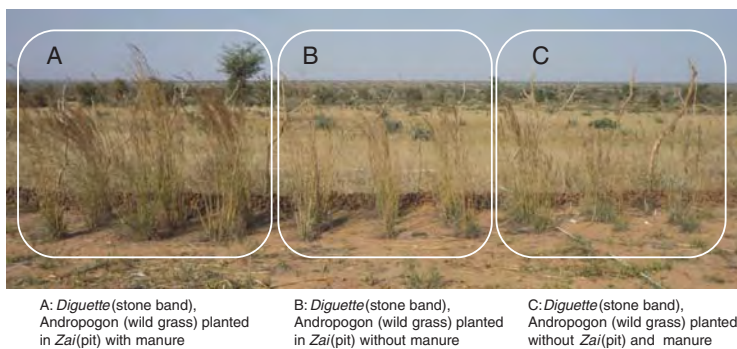


Figure 4 On-farm experiment to control soil erosion using local materials and indigenous technique

carry such a number of stones. The harvested wild grass is used for a granary material and sold in local market, which becomes an alternative source of income. The result shows the possibility of establishing a practical technique with locally available material that contributes both to household income and erosion control.

Future tasks

Through several field studies we have recognized particularly vulnerable people in a community. The survey of social network visibly indicates the location of households of widow, divorced, disabled and elder persons (Fig.5). Some of these peoples' lives and livelihoods are particularly vulnerable to desertification. Our study focuses on these vulnerabilities in both rural and urban communities, since we believe such multi-dimensional problems are one of the challenging issues for humanistic environmental studies.

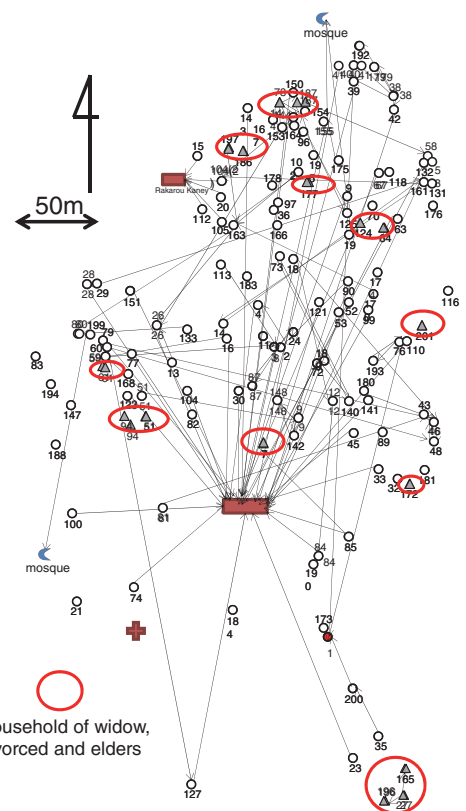


Figure 5 Information network and vulnerable households identified in a selected village

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 SASAKI Yuko RINH
 TESHIROGI Koki RIHN
 ENDO Hitoshi RIHN

Ecohistory Program

SATO Yo-Ichiro | Program Director

The Ecohistory program investigates circulation, diversity, and resources from a historical point of view. We can find that there is historical causality embedded in every problem or phenomenon. This fact emphasizes the need to investigate the past to understand the present. The goal of this program is to contribute to contemporary and future societies. Like other RIHN research programs, it must also articulate global environmental issues, propose solutions, and deepen understanding of potential interactions between humanity and nature.

Current projects of the Ecohistory Program examine the environmental histories of two distinct areas, known as the 'Asian Green Belt' and 'Eurasian Yellow Belt'. In the former, communities managed to maintain sustainable livelihoods for approximately ten thousand years. In the latter region, many civilizations collapsed during the same time period. Is this understanding historically correct? What caused such difference in the productivity and sustainability of the two regions? This question is at the core of this research program; its answer is vital to the human future.

Completed Research	Leader	Title
H-03	OSADA Toshiki	Environmental Change and the Indus Civilization
H-04	UCHIYAMA Junzo	Neolithisation and Modernisation

Environmental Change and the Indus Civilization

Project Leader **OSADA Toshiki** RIHN

The Indus Civilization (2600 BC–1900 BC) is one of the four great ancient civilizations. It is known for its cultural and technological achievements—its characteristic seals and scripts, fortified settlements and drain systems—and also for its brief tenure. Its sites spread over 680,000 sq. km., not only along the Indus River but also along the Ghaggar River and in the Gujarat state of India. Drawing on archaeology, Indology, and palaeo-environmental investigation, this project attempted to determine whether and how environmental factors contributed to their short life and rapid decline. Especially through palaeo-environmental investigation, it also attempted to enhance understanding of the relationship between long- and short-term environmental changes and human civilizations, and thus contribute to contemporary debates of environmental change.

Principal findings

Our research on environmental changes centered around three issues. The first concerns the long-standing debate about the Ghaggar-Hakra River. It was identified as the 'mighty' Sarasvati River in the Rig-Veda text, and therefore considered critical to Indus agricultural systems. Our team, however, established that in the Indus period the Ghaggar was much as it is today, a rather small river highly affected by monsoon.

The second issue is the sea level change during the Indus period. Sea trade between Indus regions and the west was somewhat reconstructed through study of Mesopotamian cuneiform texts. Additionally, artifacts discovered at sites in Gujarat clearly indicate that they were centers of trade with Mesopotamia and Africa. Our examinations of sea level change indicate that the important seaport Lothal fell out of use in the first millennium BC, suggesting that regional environmental change was related to the decline of trade along the coast of Gujarat.

Thirdly, our palaeo-environmental team extracted cores from Rara Lake in the Lesser-Himalayan region in 2009 in order to reconstruct long-term climate changes in South Asia. The analysis of these cores established that the summer monsoon intensified as the Indus civilization declined.

Due to the outcome of these studies we conclude that Indus Civilization underwent a process of transformation due to population migration from the Indus river basin to monsoon affected areas, causing gradual disintegration of trade network which connected different regions of the Indus society. This migration was caused by both long- and short-term environmental changes. The Indus declined; it did not collapse suddenly due to drastic natural or social events.

Our contributions to Global Environmental Issues

As Jared Diamond showed in his celebrated book "Collapse", past civilizations teach us many things. The regional diversity of natural and social environment and the trade network connecting different regions found in the Indus Civilization remind us of modern Indian societies rather than the other ancient civilizations. This diversity of South Asian societies which apparently continued from the Indus period is something we need to value when we think about the future of this Earth.

In addition, the proxy data obtained from Rara Lake cover not only the Indus period but the period of over several thousand years. We consider that they will be useful to the future study of climate change on a global scale.

Research communication

When we presented the outcome of our research at the conference of South Asian Archaeology in Paris in July 2012, Professor Mark Kenoyer, authority of the Indus archaeology, congratulated the completion of our project, saying that the project had made a great contribution to the South Asian archaeology. Currently we are trying to start a new project which will inherit the outcome of the Indus project. As regards academic publications, our presentation at the Chapman meeting of AGU in March 2011 proving that the Ghaggar was not a mighty river was finally published in the monograph of the meeting. Other publications are listed on the RIHN project website.



The Coastal Indus Looks West

Fortified coastal settlements suggest that the Indus Civilization, once considered an insular society, shipped goods to the west

DHOLAVIRA, INDIA—Most of the year, this small island near the Pakistan border is surrounded by thick salt flats in the estuary called the Rans of Kutch. In late January, the midday heat is already intense, and the land is brown and barren. Yet more than 4000 years ago, architects and engineers designed a vast city here with high stone battlements,

is during the height of the Indus River, or Harappan, civilizations.

And yet Dholavira is hundreds of kilometers from the cities long considered the heart of the Indus River Valley civilization, Harappa and Mohenjo Daro, which lie far upstream on the Indus River in modern-day Pakistan. But recent digs and surveys in India's western-



Indus passports? Kanner's oval-shaped pendants may have been related to trade and travel.

Photo From *SCIENCE* 328: 1100 (2010) Reprinted with permission from AAAS

Neolithisation and Modernisation: Landscape History on East Asian Inland Seas

Project Leader **UCHIYAMA Junzo** RIHN

Project research focused on landscape change in the East Asian Inland Seas (the Japan Sea and East China Sea), a region of rich cultural and landscape diversity, from the end of Ice Age up to the present day. It emphasized two revolutionary processes of landscape shift in particular, Neolithisation and Modernisation, in order to develop a subtle and profound understanding of landscape and environmental issues in the region, and so inform a solid landscape protection and development agenda.

Earlier described as a static composition, landscape change is now considered as a process of interaction between physical environment and the culture and value systems of the inhabiting people. In the course of their everyday activities, people apply their environmental perceptions and skills to change their environment in accordance with their values and beliefs. The resulting landscape will become the nexus of identity for the next generation, which will in turn alter its environment according to its abilities and imagination. Since landscapes are the stages of everyday life, landscape study can reveal how and why environmental issues arise and can best be addressed.

Project achievements

Comparative studies of periods of significant landscape change in key areas of the East Asian Inland Seas (Fig. 1) revealed several significant insights (Fig. 2):

- (1) Neolithisation was not a short-term revolutionary event, but can be defined as a process lasting for millennia in which a sedentary lifestyle and

agricultural landscapes gradually and permanently replaced previous foraging ones.

- (2) Modernisation is also a long-term process lasting for centuries, in which inter-regional networks associated with an expanding division of labour and homogenized forms of landscape were created through industrialization and extensive market systems.
- (3) Neolithisation brought about the mental separation of the human domain from nature, while modernisation created the concept that humans can subordinate natural surroundings to their control large-scale resource exploitation and land development.
- (4) Given the considerable impact of Neolithisation and Modernisation on contemporary landscapes, which themselves serve as a material and cultural base of present human-nature interactions, long-term historical perspectives should be brought to bear on future environmental policies.
- (5) The East Asian Inland Seas have allowed intense human interactions and so supported cultural unity within diverse local landscapes since prehistory. It is therefore indispensable to recognize such areas sharing historico-cultural backgrounds as areal units relevant to future environmental protection and landscape management.

Research communication

Project outcomes were published in academic journals and books, including a three-volume series on landscape history, and presented at various national and international congresses and symposia. The project has also been editing a special volume of the Journal of World Prehistory and creating an atlas of historical landscapes for the general public.



Figure 1 East Asian Inland Seas and NEOMAP workgroups

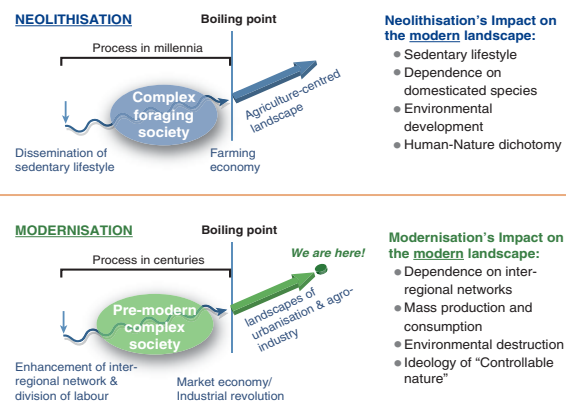


Figure 2 Neolithisation and Modernisation as historical processes of major landscape shifts

Ecosophy Program

SATO Yo-Ichiro | Program Director

Climate warming is one of the truly global environmental problems. It affects almost all systems of the world, including sea-level, hydrological regime, vegetation, agricultural production, marine life, and so on. On the other hand, most environmental problems are described as specific phenomena — as declining water quality or loss of forest or biodiversity in a particular place — yet these can also be viewed in global perspective. In arid regions, for example, the construction of large reservoirs and irrigation systems has greatly enhanced agricultural productivity. Such transformations of hydrology and landscape have clear local effects, yet as humankind comes to view the biophysical phenomena found in a place as iterations of larger processes, we recognize that the world is characterized by linkage and connection. Water shortage or soil degradation in one area may lead to food shortage or air pollution in another.

Humans have created new global cycles and scales of interaction with nature. The exchange of people, ideas and materials can stimulate human creativity, yet at present there is little agreement of how to establish patterns of exchange that will simultaneously enhance human wellbeing and ecological integrity. This is the fundamental problem of our time.

Projects in this domain examine the manner in which contemporary environmental problems both contribute to and result from global phenomena and processes. These research projects focus on specific social and environmental contexts in which environmental problems are found, the linkages of these problems to social and material phenomena in other places, and on the conceptual models used to describe such interconnection.

Completed Research	Leader	Title
E-04	UMETSU Chieko	Vulnerability and Resilience of Social-Ecological Systems



Vulnerability and Resilience of Social-Ecological Systems

Project Leader **UMETSU Chieko** Nagasaki University

What we found after the project

In Zambia, we focused on 2007 heavy rain as environmental shock and compared with other years. Crop damage by heavy rain differs by geographical condition of farm fields and farmers diversify field locations in various places as ex-ante coping mechanism. Weekly household survey revealed that the change of food consumption levels depends not only on crop damage but also succeeding food price hikes. Heavy rain caused a decline of calorie intake level as well as body weight thus affecting not only agricultural production but also health and labor supply.

In face of crop damage, farm households tried various coping activities including replanting maize and cotton, changing crops, earning cash income from non-agricultural activities by fully utilizing available resources such as natural resources, economic opportunities and social networks. Most households did not recover food consumption after extreme rainfall for one year, with poor households receiving the most severe and long lasting impacts due to price hikes and poor access to markets.

From the long-term observation of rural livelihoods, various factors such as changes of rural institution, social organization and development forces complicate and co-evolve the change of resource use by households and affecting vulnerability and resilience of rural society.

Resilience in the context of food security in Semi-Arid Tropics can be considered as livelihood recovery through food consumption and production in the short run. In the long run, resilience for food security is the bundle of various adaptive capacities of households and community. To improve adaptive capacity, long term strategies are required for improving basic services including education and health care. Furthermore, not only enhancing specific resilience to a certain risk, but building general resilience

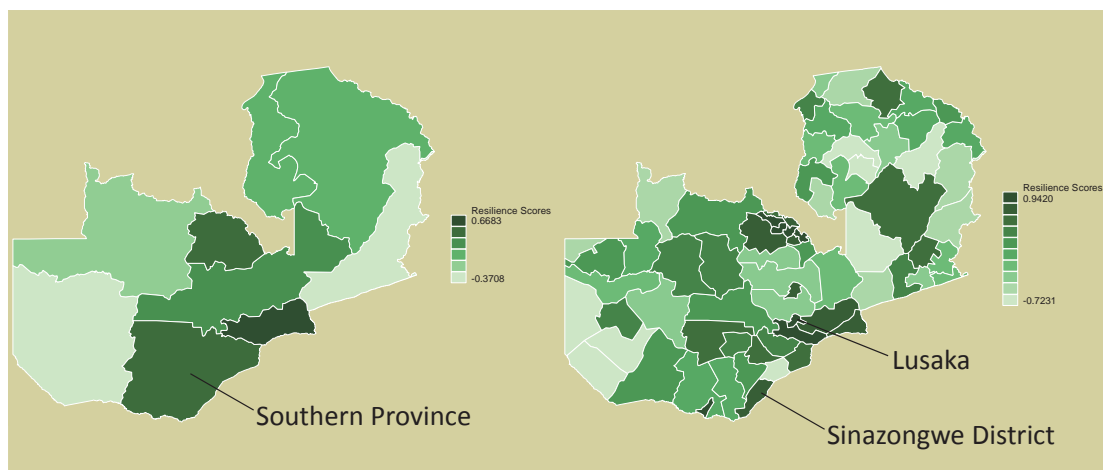
of the society to respond to all types of risks is necessary. Thus more comprehensive approach to food security is required.

Contribution to Global Environmental Research

Vulnerability of social-ecological system is the main cause of global environmental problem. In our project, we identify what causes vulnerability of households and communities and the factors affecting resilience. Our results indicated long term strategies for improving adaptive capacity such as education and market access are necessary as well as resource use that match with local ecological conditions. This strategy that suit to local condition while increasing overall adaptive capacity is the key for enhancing households and community resilience.

Dissemination of research outcomes

In 2012, we presented our research in many international conferences to share final project outcomes with various stakeholders. Those included Planet Under Pressure 2012 Meeting, Japan Geoscience Union IHDP session, and JIRCAS International Symposium. At the World Water Week 2012, we received Best Poster Award. Our research results received recognition from the international community for advancing interdisciplinary research on resilience. The Resilience Project has been contacted by many researchers and policy makers for information and collaboration. Additionally, we plan to publish research outcomes as three books in 2013.



Data: Zambia Living Condition Monitoring Survey 2004, N=19,340 HH

Resilience Mapping

Resilience scores to food insecurity were estimated and mapped in Provinces (left) and Districts (right). These maps allow policy makers to identify where are the hot spots that need policy focus in the region in terms of building resilience to food insecurity.

RIHN Initiative Projects

KUBOTA Jumpei | Initiative Framework Unit Head

RIHN Initiative Projects are developed through intensive discussion at RIHN of past, present and future research objectives (see page 5). They operate within a major field of thought roughly analogous to the ancient Greek realms described by Gaia, Oikos and Ethos.

GAIA Initiative

As human societies design their futures they require best understandings of the Earth's natural dynamism, and the significance of human action within it. The Gaia Initiative therefore performs investigations of the biophysical bases of humanity at multiple spatial and temporal scales. The Initiative emphasizes description of physical standards related to boundaries and thresholds so as to allow analysis of, and best eco-technological adaptations to, dynamic Earth environments.

OIKOS Initiative

Research in the Oikos Initiative investigates the practices and knowledge systems through which cultures and communities humanize environments. It emphasizes the human ecologies and economies—from modern techno-centric to traditional—associated with environmental commons. The Oikos Initiative therefore emphasizes examination of the values associated with resource use, and the importance of linking a range of eco-technologies and social equity.

ETHOS Initiative

The Ethos Initiative examines the values and dynamics affecting human ecological knowledge, especially in relation to the key areas of food production and human health. The Initiative describes the relationship between environmental knowledge, including that embedded as cultural value and sense of self, on quality of individual and community life.

Full Research	Leader	Title
C-09	KUBOTA Jumpei	Designing Local Frameworks for Integrated Water Resources Management
E-05	SATO Tetsu	Creation and Sustainable Governance of New Commons through Formation of Integrated Local Environmental Knowledge
R-08	TANIGUCHI Makoto	Human-Environmental Security in Asia-Pacific Ring of Fire: Water-Energy-Food Nexus



Designing Local Frameworks for Integrated Water Resources Management

Interim Project Leader **KUBOTA Jumpei** RIHN

Professor Kubota earned a doctorate in forest hydrology from Kyoto University (1987). He was previously Assistant Professor at Kyoto University (1987-1989), 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 CRD and RIHN-China initiative. His major research fields are hydrology, water issues in arid regions, and human adaptation to societal and environmental changes.



Backgrounds and objectives

Humanity's rapidly-increasing water demands has a dramatic impact on the global water cycle. Water availability is limited, and thus Integrated Water Resources Management (IWRM) has been developed as an effective measure to coordinate its sustainable use. Whereas IWRM was initially advocated as a philosophy and practice to comprehensively manage water resources involving various sectors and stakeholders, more recently it is challenged to develop regular techniques by which its significance and societal implementation can be evaluated. At the local level, new policy guidelines are required, because social structures often vary, as exemplified by decentralisation of water management in several of our study zones. It is also important to note that IWRM discourse has shifted dramatically, perhaps in relation to the Millennium Development Goals, from its previous emphasis on water quantity to its present concern for safe water quality. As a consequence, water resources managements now must address both water quality and quantity in relation to basin hydrology and ecosystem integrity. For this project, local level agricultural, industrial, and domestic use of water is of fundamental importance to understanding desired interactions between humanity and nature in the context of global freshwater use and supply.

The objective of the project is to propose knowledge structures and functions of water resources management for various local-level stakeholders who play an essential role in adapting IWRM into society. To this end, our project aims at developing *water consilience* for a desirable local water resources management and embodying co-creation of knowledge between science and society, in order to describe real-world functions and prerequisites of management structures composed by infrastructures, institutions, and organisations, throughout agricultural, industrial, and domestic sectors. We will derive evaluation indices of water management on a variety of spatio-temporal scales, and develop tools contributing to concrete goal-setting and evaluation measures. We will also address potential impacts of IWRM on global water resource dynamics that involve local water resources management in watersheds as well as virtual water trades, thereby providing scientific evidence of futurability to various stakeholders, such as policymakers and local end water users, towards solutions of global water environmental problems.

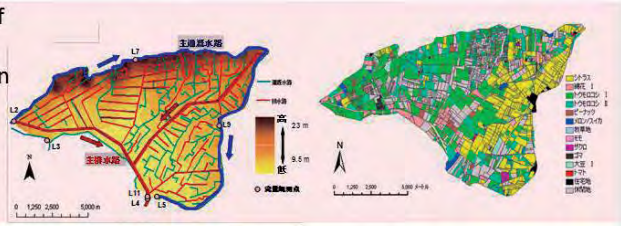
Main results to date

We have re-designed our research methodology to integrate the selected local case studies and global water resources assessment into a single transdisciplinary synthesis, *water consilience*. Validity of the selected case study sites was re-examined through an analysis of FAOSTAT that summarises national statistics on the socioeconomic activities and natural environment.

In each case study area, an interdisciplinary survey proceeded with rigorous scientific elucidation, upon which an attempt has been made to perform co-creation of knowledge between science and society, a key element of transdisciplinarity. In Turkey, we have figured out problems in water management operation such as divided information and unclear responsibilities in spite of privatisation. At the 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. In Indonesia, field survey on Subak in Bali has pointed to a mechanism of organisational transition that public policies changed managing organisations from autonomous to cooperative unions. Furthermore, in South Sulawesi, the scheme to implement co-creation between science and society was established, in cooperation with individual farmers, municipalities, and local NGOs. For the Egypt site, we have developed methodologies to reconstruct the formation process of local water resources management over the past 5,000 years, as well as a palaeoenvironmental model of river flow and basin irrigation system of the Nile. At the Echi River site, hydrological surveys in beneficiary areas of the Eigen-ji Dam have revealed that water demands have depended on the transition of water resources management and form of agricultural management after dam construction. To complement these field-based studies, we ran a global water resources model and performed uncertainty and sensitivity analysis, in order to evaluate hydrological characteristics of each case study site. Our Bayesian uncertainty analysis helped to delineate several regions where uncertainties in the model predictions are significant, for which the model merits further improvement.

Integrated understanding of the impacts of institutions, technologies and outlook on natural resources of water users related to water resources management.

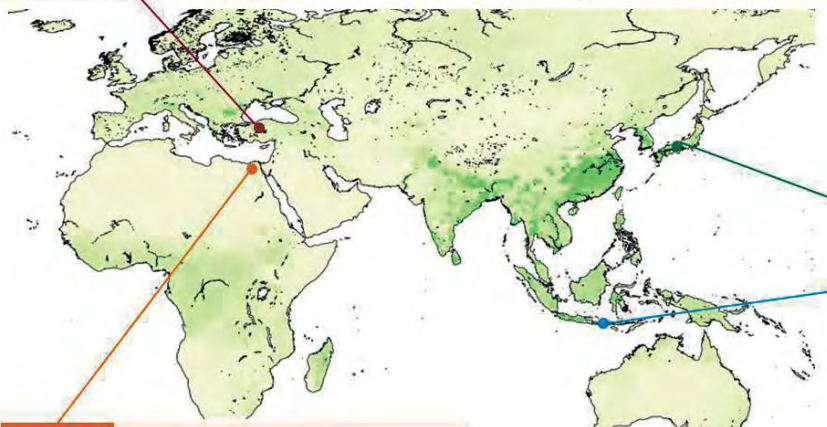
TURKEY



Examination of water resources management by clarifying water users' recognition of allocation and understanding water quality characteristics.

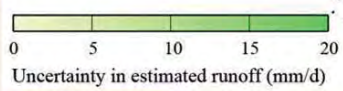
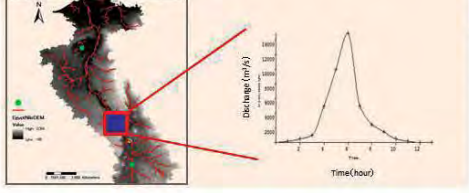


ECHI RIVER



EGYPT

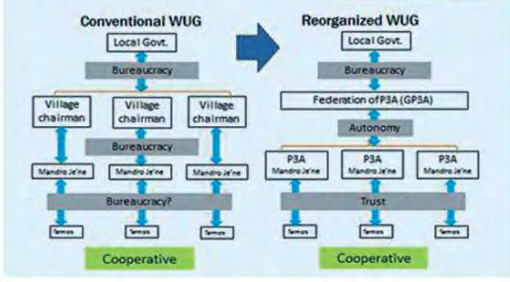
Historical elucidation of local water resources management based on reconstructions of stream flow and evaluation of irrigation improvement projects.



GLOBE
Bayesian uncertainty analysis and numerical simulation linking local cases and global water resources dynamics: towards pro-humanistic assessment.

INDONESIA

Clarification of conventional water resources management systems in humid areas and attempts to co-creation of knowledge between science and society.



Progress of the Project C-09-Init at a glance. The map in the centre indicates the geography of uncertainties in a state-of-the-art water resources model for runoff predictions, on which the key elements of research problems and findings in the four case study sites on water resources management are featured. The map in the centre indicates that the deeper green is, the higher uncertainties are. This means that it is difficult to estimate the amount of 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 realised so as to develop *water consilience* as a single transdisciplinary integration.

Research plan

Major challenges in the next step will be development of Bayesian ANthro-Socioeconomic-Hydrological systems Evaluation Emulator (BANSHEE) for pro-humanistic water resources assessment, as well as further field surveys in each case study areas. In detail, we aim at integrating patterns of decision making with scientific findings through hydrological observations. The former might be clarified through socio-economic surveys such as interview and questionnaires. The latter might be indicated by water quantity, water quality, and stream regime. Thus, it is necessary to describe “wisdom of land and water

management” from each case study area, both quantitatively and qualitatively, and to formulate local knowledge through collaboration with stakeholders in a proactive way.

Based on BANSHEE, our project aims at outreaching concrete outcomes for both science and society. We will propose pro-humanistic water resources assessment toward science as scientific innovation, and local water resources governance toward society as societal implementation, on the other hand. The former will further reveal how decision making among stakeholders should impact water resources dynamics in the future. On the basis of that, our project will concretely propose road maps for sustainable water resources management desirable in local areas.

Sub Leader

HAMASAKI Hironori RIHN

Core Member

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

- NAITO Masanori** Doshisha University
- RAMPISELA, Agnes** Hasanuddin University, Indonesia
- 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)

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

Project Leader **SATO Tetsu** RHIN

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** RHIN

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

Diverse 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 with different values and interests, 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 all over the world to achieve sustainable development of local communities. We aim to clarify mechanisms to facilitate production and circulation of ILEK and dynamic changes of social systems supported by ILEK to propose ILEK-based adaptive governance mechanisms of local communities. We also make a quest of mechanisms for integrating multi-scale governance for global environment problems, by analysing formation of multi-scale knowledge bases through knowledge flow mediated by bilateral knowledge translators promoting circulation of knowledge between knowledge producers and users, both within local community and across global, regional and local scales. By integrating a wide range of research results on these knowledge production and utilization systems, the project aims to understand formation mechanisms of ILEK and adaptive governance systems of local communities using ILEK as a knowledge base.

Main results to date

We have selected 61 case study sites (32 sites from East Asia including Japan, 12 from developed countries in Europe and North America and 17 from developing countries) from RIHN projects and other examples of diverse local knowledge productions in the world in order to accumulate and analyse ILEK production mechanisms. The case study group consisted of researchers deeply involved in each local community who have conducted participatory research and meta-analysis to elucidate ILEK production and sustainable adaptive governance mechanisms leveraged by ILEK. Twelve candidate sites for social experiments to verify focused hypothesis have been identified among these case studies, including Shiraho community in Ishigaki Island, Yakushima Inland (Japan), Sarasota Bay in Florida (USA) and Karapinar area (Turkey) to design experimental procedures.

Case studies so far have revealed importance of residential researchers living in local communities and conducting transdisciplinary research as a member of local stakeholders in production of ILEK essential for community-based adaptive governance. Bilateral translators of knowledge 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 knowledge among stakeholders into scientific language. The project has been analysing transdisciplinary knowledge productions of these important actors from RIHN projects and diverse examples of solution oriented researches from the world, based on the cases of ILEK production and utilization

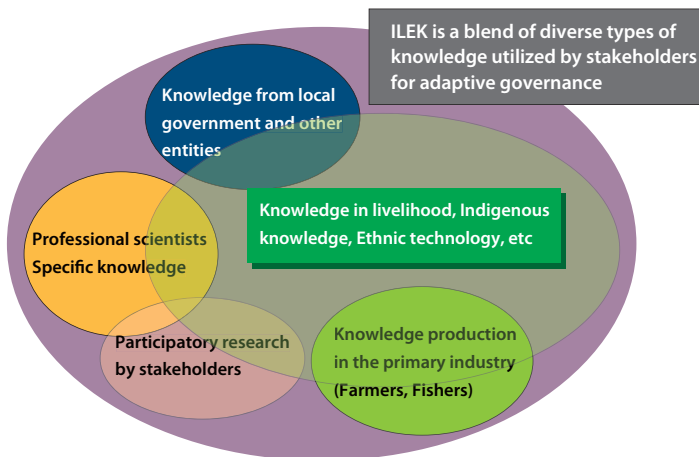


Figure 1 Structure of local knowledge for environment and sustainability

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 knowledge and local knowledge produced in daily livelihood and culture among local stakeholders.

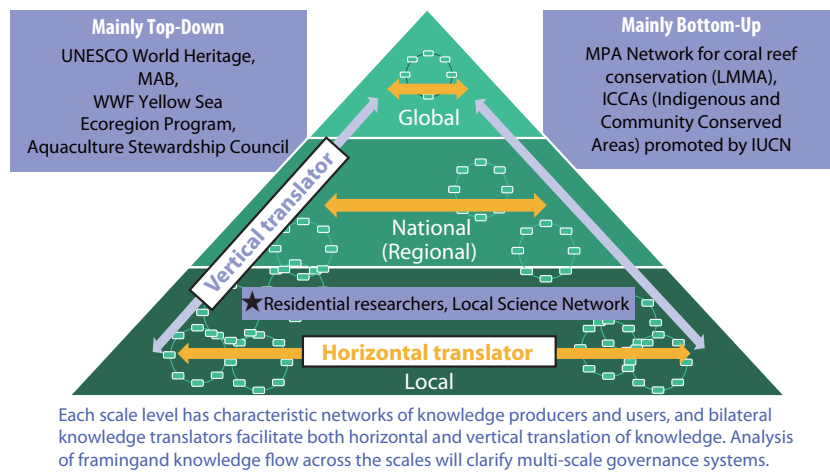


Figure 2 Hypothetical framework of multi-scale analyses
This framework will be used to analyze the role of bilateral knowledge translators in supporting knowledge flow and adaptive governance across different scales from local to global.

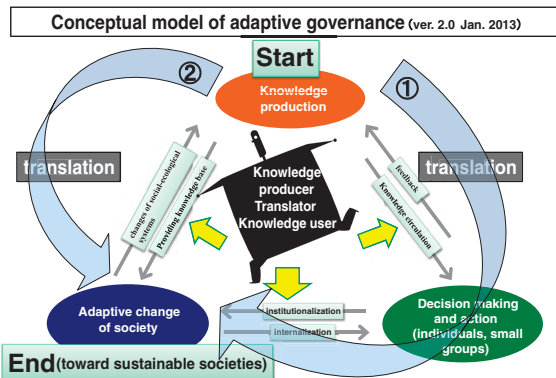


Figure 3 Conceptual model of adaptive governance based on ILEK
The pathways to achieve adaptive governance using ILEK are postulated in this model with two different processes starting from knowledge production resulting in adaptive societal changes via changes in individual decisions and actions, or directly influencing formal and informal institutions.

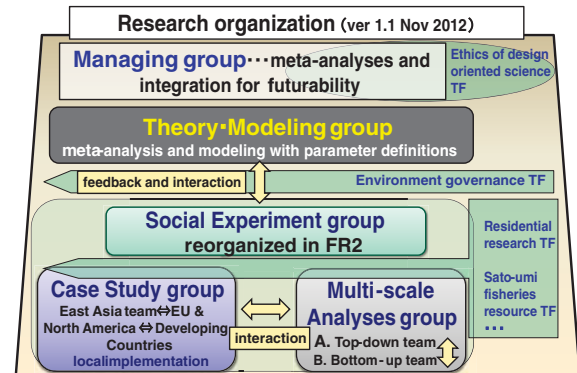


Figure 4 Research organization
The ILEK project research groups are composed of case studies and multi-scale analysis groups at the empirical side and the theory and modeling group at the abstract side, interacting with each other to conduct meta-analysis and integration by brainstorming and participatory field research. Diverse taskforces focus on meta-analysis from specific perspectives. The managing group integrates all these results to postulate adaptive governance mechanisms toward sustainable societies.

accumulated among diverse residential researchers, local translators, visiting researchers and stakeholders in the Local Science Network for Environment and Sustainability. We also established the multi-scale analysis group to analyse knowledge circulation mechanisms across multiple scales from local to global levels facilitated by the bilateral knowledge translators, and thereby aim to understand multi-scale adaptive governance mechanisms through knowledge circulations across multiple scale levels (Fig. 2).

Future research plan

We have established the preliminary conceptual model of ILEK-based adaptive governance for meta-analysis and modeling in collaboration with the mathematical scientists and conceptual theoreticians in the theory and modeling group to integrate diverse local case studies and multi-scale analysis. In this conceptual model, ILEK productions are hypothesized to lead to dynamic changes of social systems

toward sustainability through two different pathways: first, through changes of individual decision makings and actions resulting in adaptive changes of social systems; and second, through direct effects upon formal and informal institutions and collective knowledge systems in the community (Fig. 3). We also established several task forces (TFs) in the project to integrate diverse case studies from specific perspectives, including TF on the ethics of design-oriented science in order to examine ethical aspects of transdisciplinary sciences, environmental governance TF analysing governance theories of local environment from wider perspectives, and a residential research TF focusing on roles and functions of residential researchers (Fig. 4). We will explore accurate understanding of adaptive governance systems based on ILEK production and circulation by theoretical analysis and integration using this conceptual model in combination with analyses in TFs and focused social experiments.

Core Member

MIYAUCHI Taisuke	Hokkaido University
NIITSUMA Hiroaki	Tohoku University
TOMITA Sho	Tohoku University
SUGA Yutaka	The University of Tokyo
MATSUDA Hiroyuki	Yokohama National University
SAKAI Akiko	Yokohama National University
TOKITA Kei	Nagoya University
YUMOTO Takakazu	Kyoto University
YAMAKOSHI Gen	Kyoto University

SHIMIZU Mayuko	Ryukoku University
YANAKA Shigeru	Tottori University
KUME Takashi	Ehime University
YANAGI Tetsuo	Kyushu University
KAKUMA Shinichiro	Okinawa Prefecture Fisheries Development and Extension Center
KAMIMURA Masahito	WWF Japan Coral Reef Conservation and Research Centre
CROSBY, Michael P.	Mote Marine Laboratory, Sarasota, Florida, USA
CASTILLA, Juan Carlos	Pontificia Universidad Católica de Chile, Chile



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

Project Leader **TANIGUCHI Makoto** RHIN

Prof. Dr. Makoto Taniguchi is a hydrologist. He has been working on global studies of groundwater as a leader of UNESCO GRAPHIC Project “Groundwater Resources Assessment under the Pressures of Humanity and Climate Change”, Vice President (2007-2011) of the International Committee of Groundwater of IAHS under IUGG, and 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”.



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 vulnerability) by choosing management structures and policies that optimize both the water-food and water-energy connections in Asia-Pacific coastal regions. 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 organization

Five different interdisciplinary approaches, scales and clusters will be used in this investigation: (1) Environmental governance, science in/for society, and co-design/

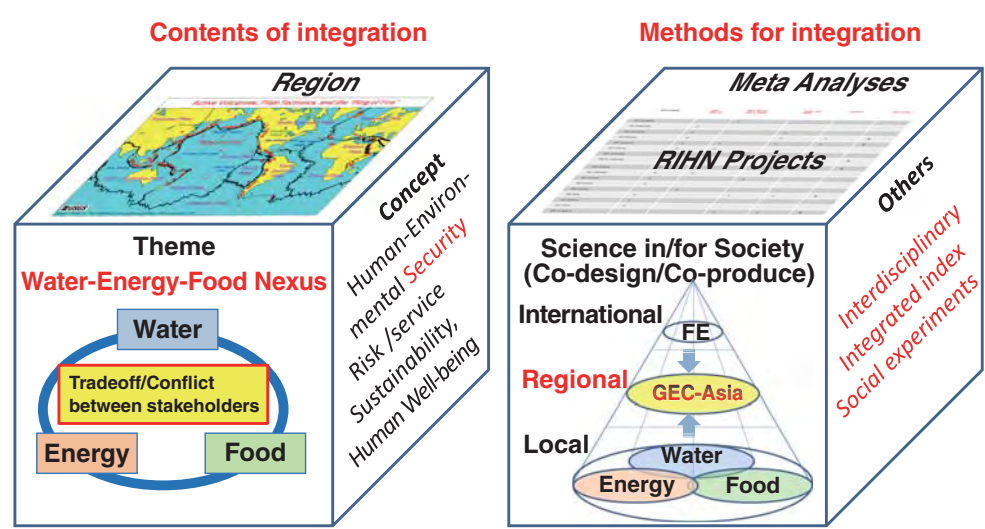


Figure 1 Integration of theme, concept, region, and methods.

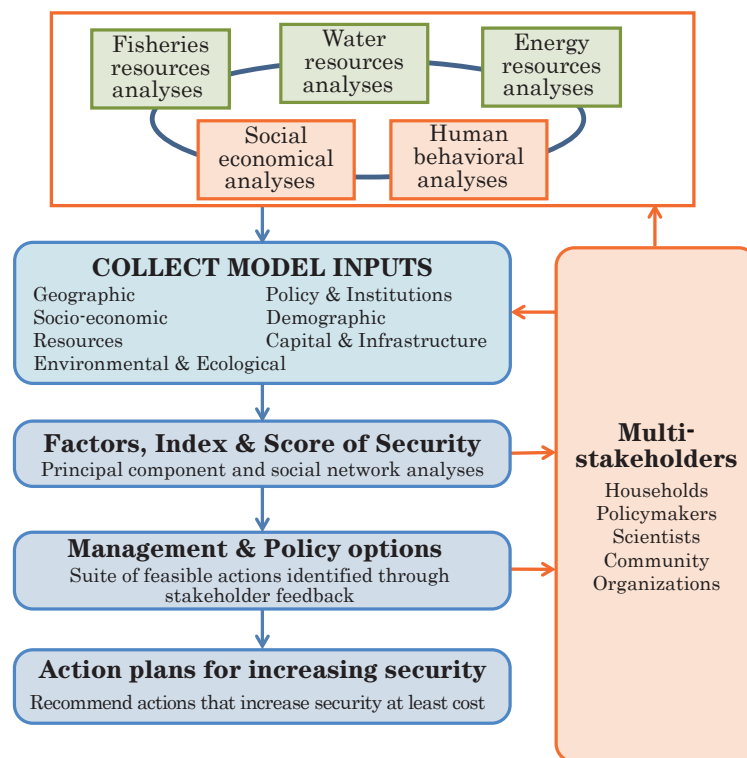


Figure 2 Analyses of human-environmental security in water-energy-food nexus

co-production approaches, in particular emphasizing regional scale stakeholders such as the GEC (Global Environmental Change) Asia Platform; (2) Biophysical measurements and analyses of the water-food (e.g., fisheries resources) nexus by using state-of-the-art geochemical, coastal oceanographic, geophysical, hydrologic, and ecological techniques including isotopic tracers to evaluate the linkages between land and ocean; (3) Biophysical measurements and analyses of the water-energy nexus by state-of-art space satellite, geothermic, and hydrogeological techniques to evaluate linkages between water and energy; (4) Social measurements and analyses of the water-energy-food relationships through community surveys, cost-benefit/efficiency analysis, and environmental valuation, based on sociology, economics, anthropology, psychology, and behavior-science methodologies; and (5) Development of integrated

indicators/indices and network analyses based on principal component analyses, social network analyses, and factors weights determined by feedback from stakeholder meetings and workshops.

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 Member

OHSAWA Shinji Kyoto University
FUJII Masahiko Hokkaido University
MORI Seiichi Gifu Keizai University
SHOJI Jun Hiroshima University
BABA Kenshi Socio-economic Research Center, Central Research Institute of Electric Power Industry
ITADERA Kazuhiro Hot Springs Research Institute of Kanagawa Prefecture

PARAGAS, Vicente Santos National Water Resources Board, Philippines
ALLEN, Diana M. Simon Fraser University, Canada
GURDAK, Jason San Francisco State University, USA
BURNETT, Kimbaly University of Hawaii, USA
SAPTADJI, Nenny Bandung Institute of Technology, Indonesia
CIPTOMULYONO, Udibowo PT. PLN, Geothermal, Indonesia

Current Feasibility Studies

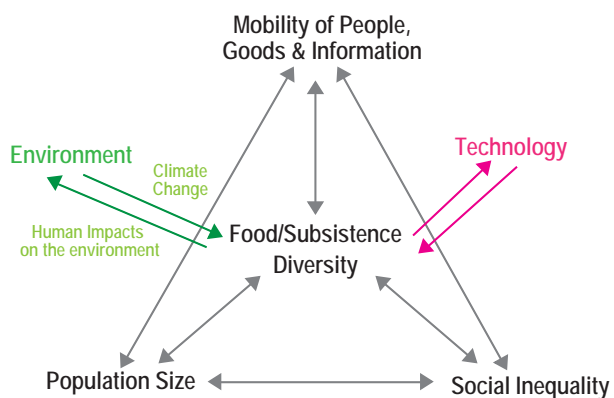
Long-term Sustainability through Place-based, Small-scale Economies: Approaches from Historical Ecology *

*PR in 2013 TBD

HABU Junko, University of California, Berkeley

Region: the North Pacific Rim, including Japan, the Kuril Islands, the Russian Far East, Alaska, the Pacific Northwest Coast, California and Nevada

This project examines the importance of place-based, small-scale and diversified economies for the long-term sustainability of human societies. Archaeological, historical, ethnohistorical and paleoenvironmental studies will test our hypothesis that long-term community sustainability has been directly linked to community scale and food system diversity. Ethnographic studies of small-scale communities and food systems will allow comparative analysis of corresponding cultural and natural factors in contemporary urban and rural food systems. In combination, historical and contemporary studies will point to the future, as the research process also involves discussion and collaborative design of ecologically sound and equitable food systems.



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

*PR in Oct. 2013

NAKATSUKA Takeshi, Nagoya University

Region: Japan

How have people adapted to abrupt climate change in the past? This project investigates the ways in which human societies in Japan have reacted to large abrupt climate changes since the Jomon era. Past climate variability can now be reconstructed with great precision in annual or monthly time resolutions due to recent developments in the analysis of paleoclimatological proxies, chiefly tree-ring cellulose oxygen isotopic ratios. In correlating records of past climate changes with historical and archeological evidence, we may identify general characteristics of social systems that are tolerant of or vulnerable to abrupt climate and environmental changes.

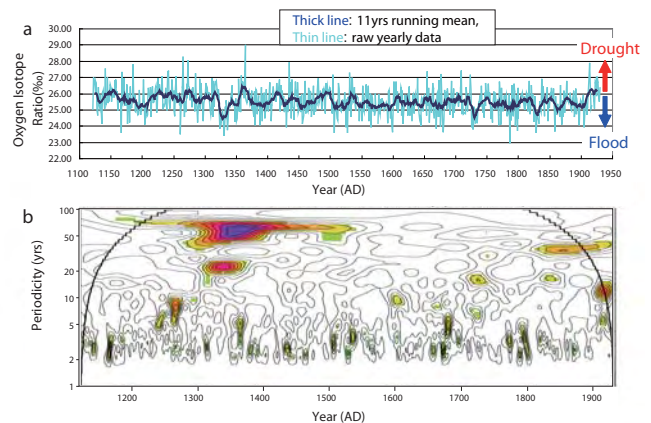


Figure Variations in tree-ring oxygen isotope ratio of a Japanese cypress tree in Gifu prefecture during 12-20th centuries, indicating change of summer precipitation in central Japan (a) and its wavelet diagram, illustrating of larger variability using warmer colors (b). You can see that there are large multi-decadal climate variabilities during medieval period characterized by frequent famines and warfares.



Photo Sampling of a tree ring core

Improving Environmental Literacy to Promote Self-Sustaining Communities

ISHIKAWA Mamoru, Hokkaido University

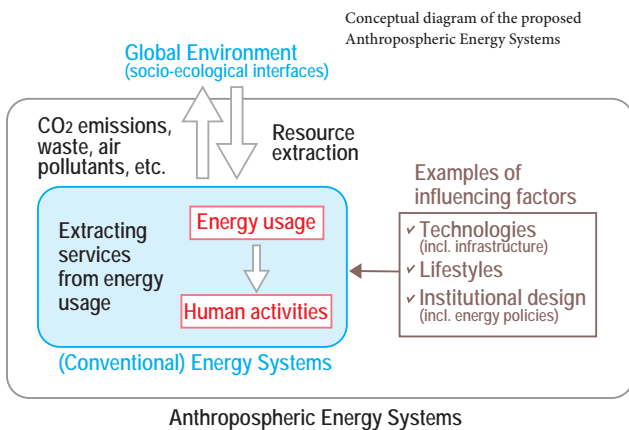
Region: Mongolia and rural Hokkaido, Japan

This project examines how local stakeholder and scientific communities perceive and respond to environmental problems. Project research examines the extent to which differences in environmental literacy—the ability to effectively seek, read, and use environmental information—inhibit or facilitate awareness of and dialogue about environmental problems. It examines communities in two places undergoing rapid socio-ecological change: Mongolia, where traditional use of ecosystem services is being displaced by new products and values; and Hokkaido, where, following depopulation and loss of industry, stakeholders have begun to collaborate with scientists to seek new resource-based livelihood strategies.

Design and Integrated Assessment of Regional Anthropospheric Energy Systems

KISHITA Yusuke, Osaka University
Region: Japan

We aim to design future visions of and pathways to *anthropospheric energy systems*, focused on the local community and region. The systems of interest involve complex interactions among energy technologies and infrastructure, political institutions, and the surrounding biospheric environment. We employ a scenario approach to describe desirable transitions of anthropospheric energy systems, in collaboration with a wide spectrum of stakeholders, and then develop a method to evaluate the systems in light of their environmental impact, economic dimensions, and over-all resilience. Our scenario workshops involving citizens, policy-makers, and researchers will result in the co-creation of knowledge on anthropospheric energy systems, thereby profiling the future state of, and regional governance for, the systems.

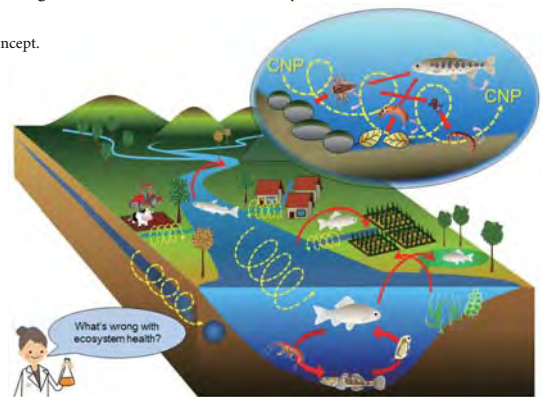


Biodiversity-driven Nutrient Cycling in Social-ecological Systems: New Measures of Ecosystem Health

OKUDA Noboru, Kyoto University
Region: Lake Biwa Watershed and watersheds in Asian developing countries

This research project will develop quantitative methods to evaluate nutrient cycling in watershed ecosystems. In disentangling the intricate interactions among human activities, biodiversity and nutrient cycling, our research will contribute to the construction of sustainable social-ecological systems in which biodiversity-driven nutrient cycling and human-wellbeing of local societies are interdependently enhanced, reaching to good ecohealth. We propose a methodology of “hierarchical watershed management”, in which citizens and other stakeholders are involved in the co-design and co-production of the research and management process, and thus empowered to practice conservation of local biodiversity and its nutrient cycling functions in watershed ecosystems.

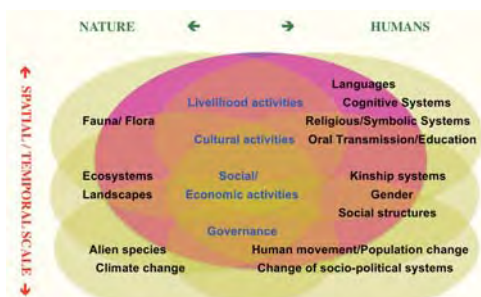
River vein concept.



Biocultural Diversity in the Asia-Pacific : Linking Community-based Participatory Research and the Transmission of Ecological Knowledge to Future Generations

ONISHI Masayuki, RIHN
Region: The Asia-Pacific region, including, Sikkim/North Bengal/Jharkhand (India), Okinawa, and Bougainville (Papua New Guinea)

This project investigates biocultural diversity in several diversity hotspots in the Asia-Pacific region. Drawing on existing materials and fresh field studies, project research will develop a framework to evaluate major elements and mechanisms linking biological and cultural diversity. Field research will involve the active participation of community members and local researchers, particularly those from younger generations. Together we will investigate natural and cultural resources of field regions and analyse the social and natural factors that have contributed to the maintenance and/or degradation of the local environments. The research process will also investigate and engage local activities and social practices that facilitate transmission of ecological knowledge to future generations.



Biocultural Diversity in the Chains of Human-Nature Interaction

A Transdisciplinary Study of the Environmental Impact of Military Activities

TANAKA Masakazu, Kyoto University
Region: Japan and Korea



Photo A barbed-wire fence that divides a military base and local society

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.

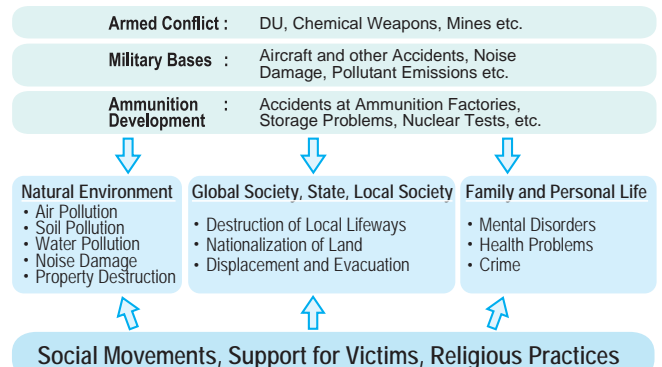
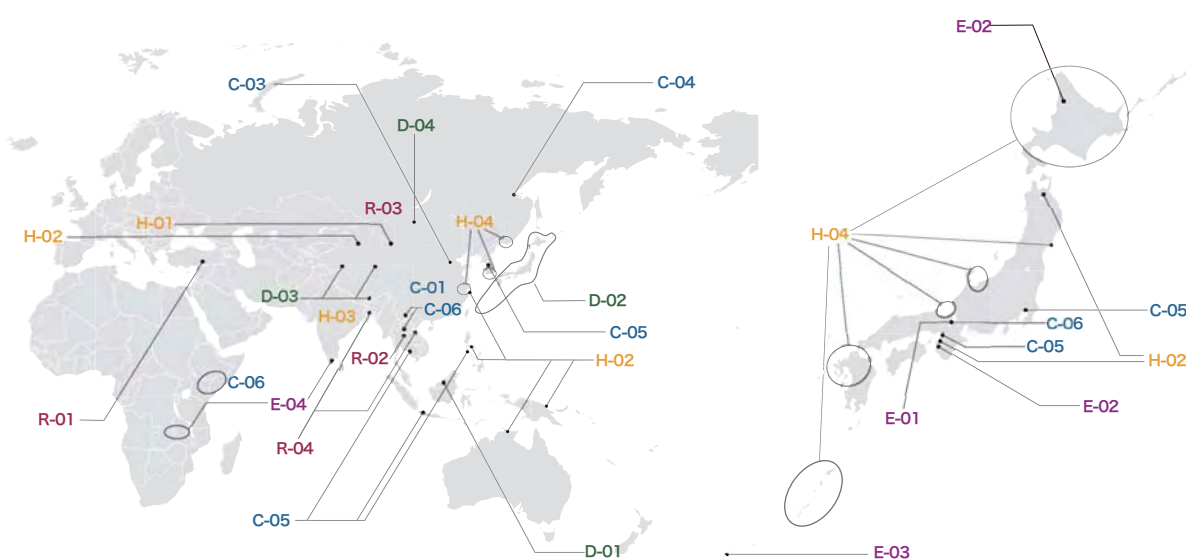


Figure Environmental issues related to the military

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 Tsugihiko	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



Sites of completed research projects

Research Coordination

The Center for Coordination, Promotion and Communication (CCPC) has thus far been responsible for the research, infrastructure, coordination, and management that concern the institute as a whole. As of April 2013, the CCPC is divided into two centers, namely the Center for Research Development (CRD) and the Center for Research Promotion (CRP).

The Center for Research Development (CRD) consists of three units. The Planning Unit is chiefly responsible for establishing RIHN's long term vision and organizing fundamental committees, including project evaluation and personnel affairs. The Initiative Framework Unit serves as a cross-cutting mechanism to capture and synthesize key contributions of domain-based research projects and develop new research projects for RIHN's Futurability Initiatives. The Collaboration Nexus Unit facilitates the internal and external research networks. Its efforts are most recently manifest in the formation of the Global Environmental Change-Japan network described on page 54.

The Center for Research Promotion (CRP) is also divided into three units. The Survey and Analysis Unit develops and maintains the laboratory facilities necessary for research and fieldwork (see page 52). 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 50–51).





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 Centre, and RIHN.



Dr. Vandana Shiva



Dr. Amory B. Lovins

The 2012 recipients of the Earth Hall of Fame Kyoto Award were Dr. Vandana Shiva, scientist, author, environmentalist and founder of Navdanya, and Dr. Amory B. Lovins, physicist, environmental scientist, Chairman and Chief Scientist of the Rocky Mountain Institute.

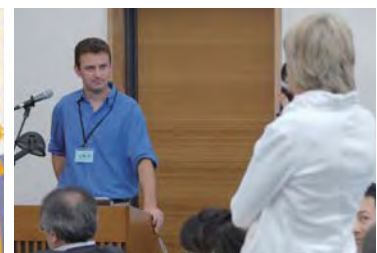
RIHN Forum

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.

Creating Connections, 8 July 2012

RIHN International Symposium

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



Professor Graeme S. Cumming, one of the leaders in the study of resilience of social-ecological systems, taking questions after his keynote address at the 2012 International Symposium.

Complexification and Simplification: Ecosystems, human health and lifestyle in Asia
24-26 October, 2012

RIHN Public Seminars

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

Search for a new image of the Indus Civilization
11 May, 2012

Environmental Destruction in Southeast Asia and the Future of Our Food
22 June, 2012

We Stay With Africa: Technical innovations to control desertification
18 January, 2013

RIHN Area Seminars

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

East Asian Environmental Security: Calling for a Transboundary Solution
10 June, 2012



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:

“Yaman ng Lawa” Community-based lake ecology learning centre

Rogelio N. Concepcion, University of the Philippines Los Baños / RIHN Visiting Research Fellow
6 September, 2012

Climate change, agricultural adaptation, and food prices : Evidence from Israel

Ayal Kimhi, Associate Professor, The Hebrew University of Jerusalem / RIHN Visiting Research Fellow
25 September, 2012

Pastoralism and camel herding in Sudan

Abdelaziz Karamalla Gaiballa, Professor, College of Forestry and Range Science, Sudan University of Science and Technology / RIHN Visiting Research Fellow
28 November, 2012

Carcinogenic health risk of arsenic biomagnification in five commercially important fish from Laguna de Bay, Philippines

Victorio Moina, Associate Professor, University of Philippines Manila / RIHN Visiting Research Fellow
29 January, 2013

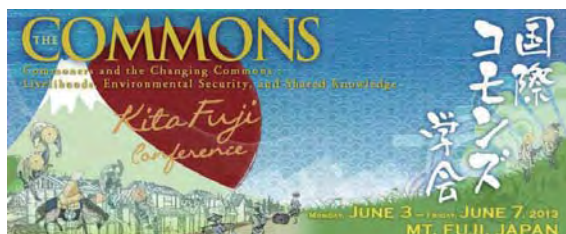
Changes in permafrost dynamics and the influence on landscapes and social adaptation in Eastern Siberia

Alexander Fedorov, Head of Laboratory, Melnikov Permafrost Institute, Siberian Branch of Russian Academy of Sciences / RIHN Visiting Research Fellow
29 January, 2013

2013 Conference of the International Association for the Study of the Commons (IASC)

RIHN is collaborating with the Onshirin Regional Public Association, a group of Japanese commoners, and the International Association for the Study of the Commons (IASC) to organize the principal international conference of the broad community of scholars examining the use and governance of common property and shared resources.

The 2013 conference is to take place on common lands located on the north slope of Mt. Fuji, and is Co-Chaired by Professor Margaret McKean (Duke University), and RIHN Professor Tomoya AKIMICHI.



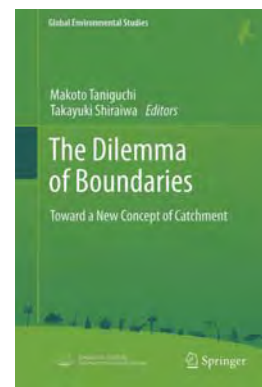
2013 GIAHS International Forum

RIHN is a co-organizer, with the Government of Ishikawa Prefecture and Japan’s Ministry of Agriculture, Forestry and Fisheries, of the 2013 International Forum on Globally Important Agricultural Heritage Systems (GIAHS). GIAHS, a program run by the Food and Agriculture Organization of the U.N., signals the importance of small-scale agriculture for local food security, biodiversity conservation, and landscape integrity. The Forum, which occurs every two years, gathers experts in the field together with representatives of GIAHS sites from around the world in order to celebrate agricultural heritage, invite new communities into the network, and think strategically about the individual and collective experience of such systems in the 21st century.

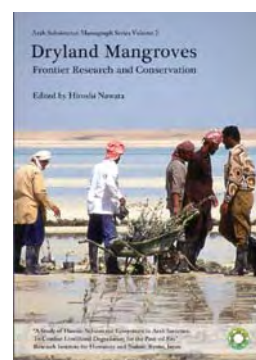


RIHN Book Series: Global Environmental Studies

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



Project research may be published in several languages as was this bilingual English-Arabic monograph from the Arab Subsistence Project (R-05), which also publishes in French and Swahili.

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 Measurement and Analysis Division 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



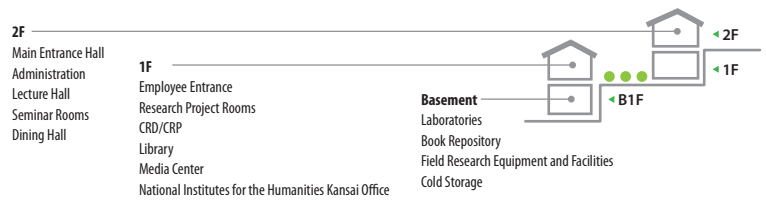
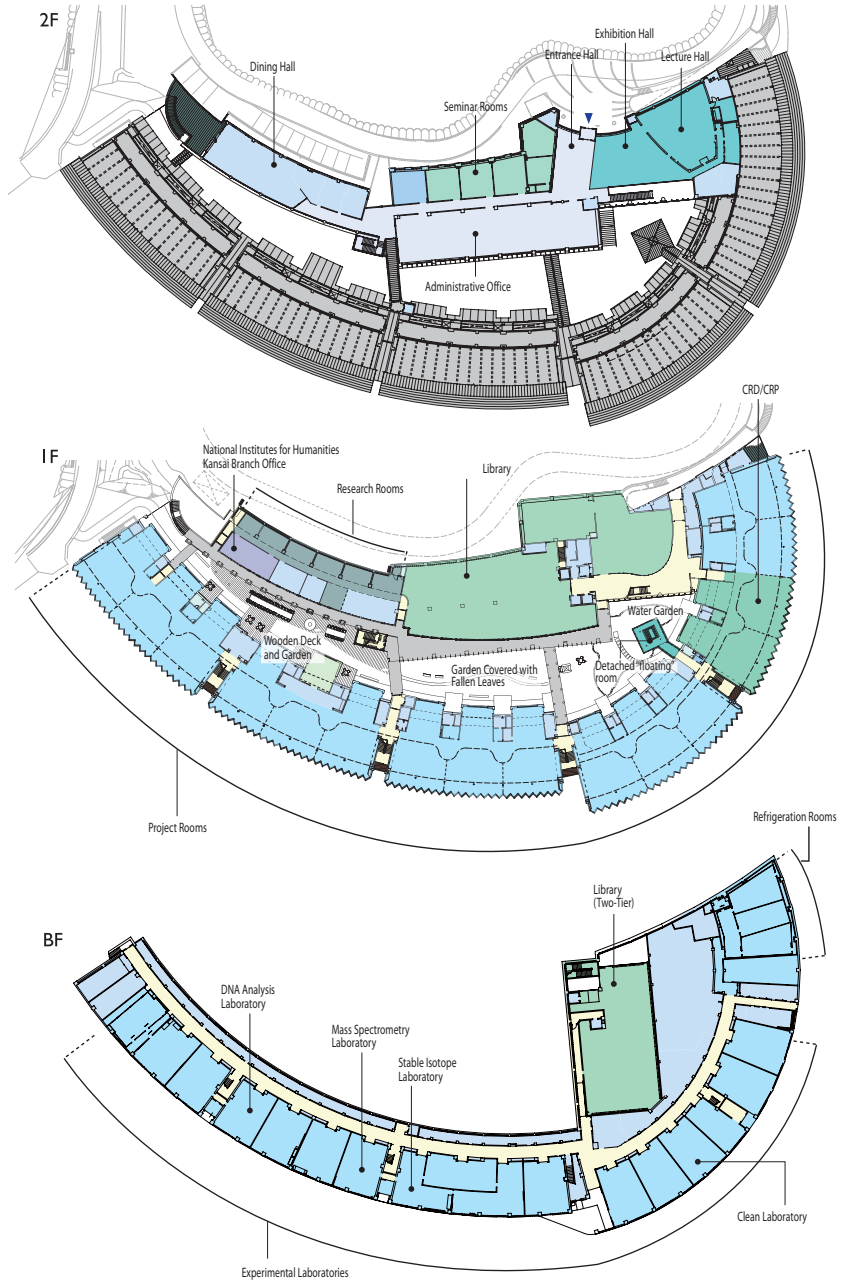
Main entrance hall



Basement laboratories



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



RIHN-China

With support from the National Institute for the Humanities' Center for the Promotion of Area Studies, RIHN maintains 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 2012-13, among other activities, RIHN-China scholars participated in a workshop at East China Normal University and attended the 3rd Lecture on Global Environmental Studies at Peking University. We are pleased to announce the signing of Memoranda of Understanding with both institutions.



Photos (counterclockwise from top):
The International Symposium on "The Past, Present and Future of Lakes" in Shanghai Jiao Tong University in January 2013.
The signing ceremony for the RIHN MOU with East China Normal University in January 2013.
RIHN-China News Letter No.19.

GEC Japan

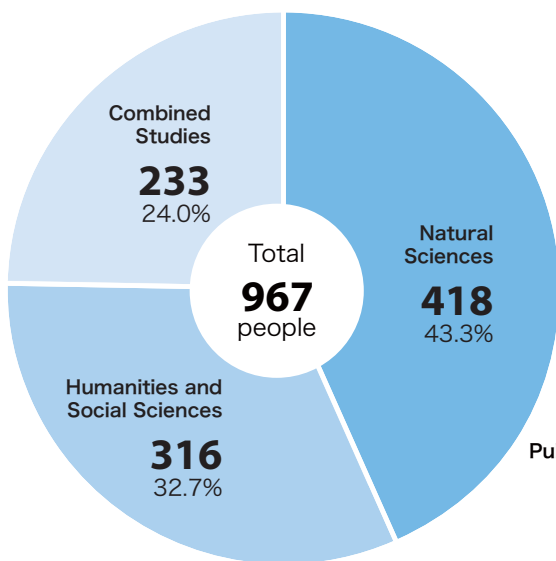
GEC-Japan is a networking platform created in 2011 to facilitate and promote institutional and research collaboration among Japanese and international representatives of the four Global Environmental Change Programs: the International Human Dimensions Programme (IHDP), DIVERSITAS, the International Geosphere-Biosphere Program (IGBP), and the World Climate Research Program (WCRP).

As the landscape of international environmental research is changing rapidly, RIHN actively consults with key actors and institutions in order to ensure that, while retaining its specific qualities, RIHN's research and institutional trajectory are broadly consistent with international currents and priorities. To this end RIHN hosted the 5th meeting of the Belmont Forum in January 2012, and many RIHN researchers attended the Planet Under Pressure conference in March 2012. The GEC-Japan platform is to support and promote dialogue among scholars interested in global change issues and transdisciplinary actions in Asia.

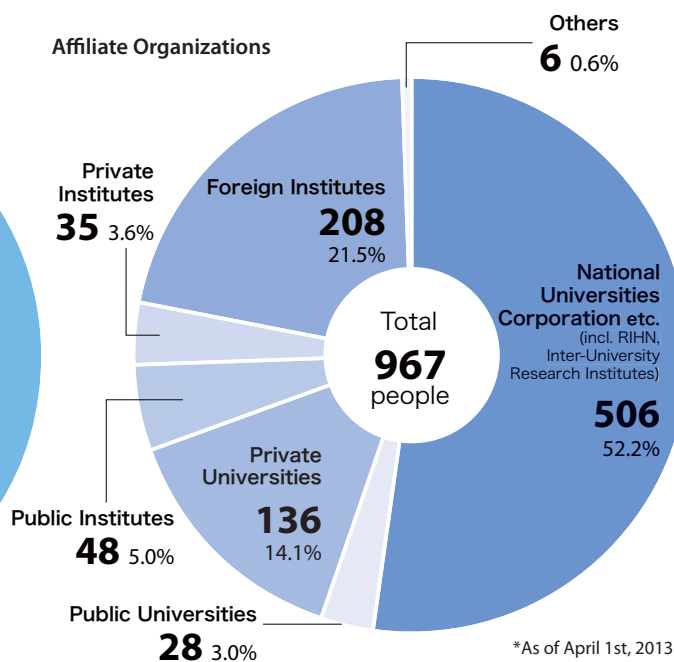


Research Collaboration

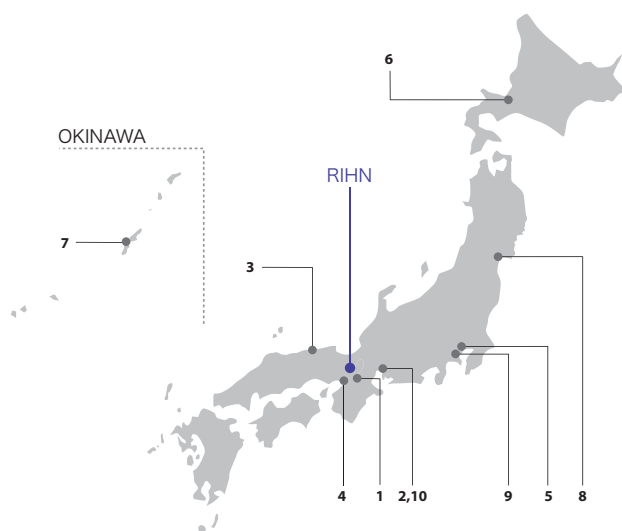
Research Areas



Affiliate Organizations



*As of April 1st, 2013



Collaboration in Japan

- Center for Ecological Research, Kyoto University
- Hydrospheric-Atmospheric Research Center, Nagoya University
- Arid Land Research Center, Tottori University
- National Museum of Ethnology
- Institute of Industrial Sciences, the University of Tokyo
- Institute of Low Temperature Science, Hokkaido University
- Tropical Biosphere Research Center, University of the Ryukyus
- Graduate School of Science, Tohoku University
- Graduate School and Research Institute of Environment and Information Sciences, Yokohama National University
- Graduate School of Environmental Studies, Nagoya University

International Collaboration

Memoranda of Understanding and Research Cooperation Agreements (As of April 1st, 2013, including CR projects)

*MOU signed in 2012

ALGERIA

Centre National de Développement des Ressources Biologiques (R-05)

BANGLADESH

International Centre for Diarrhoeal Disease Research (R-04)

CHINA

East China Normal University* (RIHN-CHINA)
Peking University* (RIHN-CHINA)
Yunnan Health and Development Research Association (R-04)

EGYPT

National Water Research Center (NWRC)* (C-09-Init)

FRANCE

La Fondation Maison des Sciences de l'Homme (R-02)

INDIA

Institute of Rajasthan Studies, JRN Rajasthan Vidyapeeth (R-07)
Maharaja Sayajirao University of Baroda (H-03)

INDONESIA

Bogor Agricultural University (C-08)
Hasanuddin University (C-09-Init)
Indonesian Institute of Sciences (C-08)
Universitas Indonesia (C-08)

KENYA

National Museums of Kenya (C-06)

LAOS

National Agriculture and Forestry Research Institute (H-02)
National Institute of Public Health, Ministry of Health (R-04)

NIGER

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), West and Central Africa (R-07)

PHILIPPINES

University of the Philippines Visayas (D-05)

RUSSIA

Far Eastern National University (H-04)
Institute for Biological Problems of Cryolithozone (C-07)
Institute of Humanitarian Research and the Problems of the Northern Minority Peoples (C-07)
The Melnikov Permafrost Institute of Siberian Branch of the Russian Academy of Sciences (C-07)

SOUTH KOREA

Institute of Islands Culture (D-02)

SUDAN

Red Sea University (R-05)
Sudan University of Science and Technology (R-05)

SWEDEN

The Sven Hedin Foundation (H-02)

THAILAND

Faculty of Fisheries, Kasetsart University (D-05)
Rice Department, Ministry of Agriculture and Cooperatives (H-02)
The Southeast Asian Fisheries Development Center (D-05)

TURKEY

Adiyaman University (C-09-Init)
Çukurova University (C-09-Init)
Harran University (C-09-Init)

UNITED KINGDOM

Sainsbury Institute for the Study of Japanese Arts and Cultures (H-04)
London School of Hygiene and Tropical Medicine (R-04)

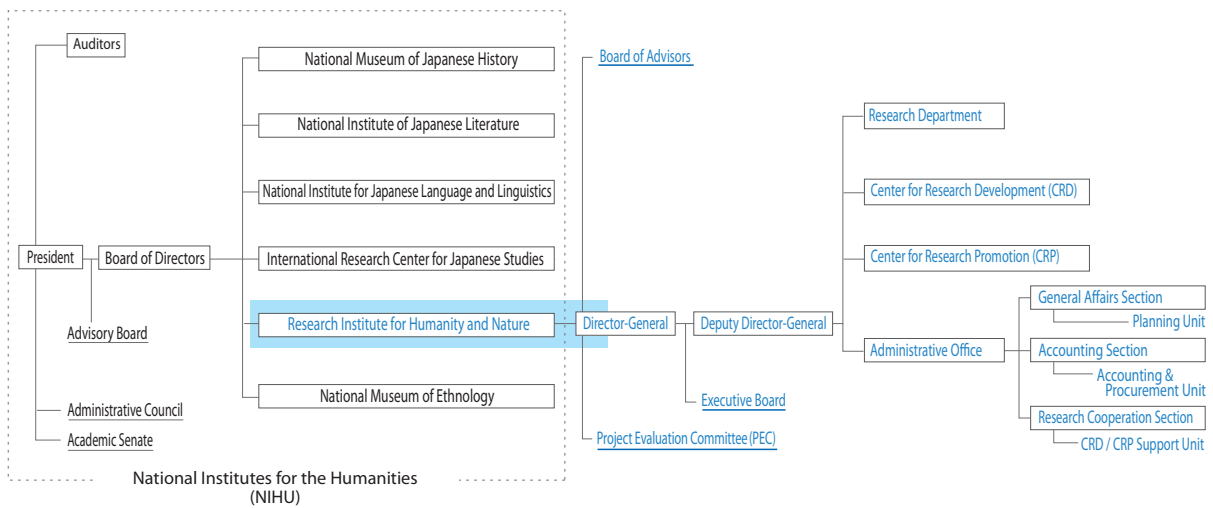
UNITED STATES OF AMERICA

Mote Marine Laboratory* (E-05-Init)
University of the Virgin Islands* (E-05-Init)

ZAMBIA

Zambia Agricultural Research Institute, Ministry of Agriculture and Livestock (R-07)

Administrative Structure



Financial Information

Segmental Financial Information (Fiscal Year 2011)

Operating Expenses

Category	Amount (Yen in thousands)
Operating Expenses	2,052,338
Inter-University/Joint Research	963,206
Outsourced Studies	93,927
Outsourced Operations	53,712
Personnel	941,491
General Management	139,805
Financial Expenses	53,309
Total Expenses	2,245,452

Operating Income

Category	Amount (Yen in thousands)
Subsidy for Operation	2,020,492
Contract Operations, etc.	64,396
Donations	16,345
Others	169,234
Total Earnings	2,270,469

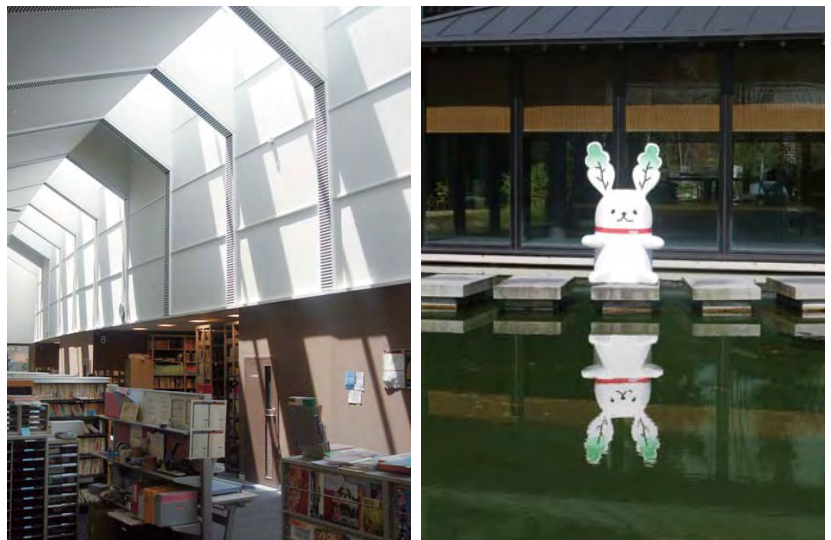
Operational Balance 25,016

External Sources of Funding

(Fiscal Year 2011)

Category	Amount (Yen in thousands)
Fund for Promotion of Academic and Industrial Collaboration	65,413
Grants-in-Aids for Scientific Research	70,700
Donations for Research	7,430

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



Board and Committees

*As of April, 2013

Board of Advisors

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

FUJIOKA Ichiro
President, Kyoto Sangyo University
FURUSAWA Iwao
President, Tottori University of Environmental Studies
KAWAI Shuichi
Dean, Graduate School of Advanced Integrated Studies in Human Survivability, Kyoto University
KONAGAYA Yuki
Professor, Department of Social Research, National Museum of Ethnology

OTSUKI Kyoichi
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WASHIDA Kiyokazu
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WASHITANI Izumi
Professor, Graduate School of Agricultural and Life Sciences, the University of Tokyo

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KUBOTA Jumpei
Director, CRD, RIHN
Program Director, RIHN
NAKANO Takanori
Director, CRP, RIHN
SATO Tetsu
Program Director, RIHN
SATO Yo-Ichiro
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
NAKAMURA Masami
Professor, Edogawa University / Former Senior Staff Writer, Editorial Bureau, Nihonkeizai Shimbun Inc.
NAKANISHI Hisae
Professor, Graduate School of Global Studies, Doshisha University
UETA Kazuhiro
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Professor, Department of Philosophy, Faculty of Letters, Otani University
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Director, Application Laboratory, Japan Agency for Marine-Earth Science and Technology / Professor Emeritus, the University of Tokyo
YASUOKA Yoshifumi
External Auditor, Research Organization of Information and Systems
YOKOYAMA Toshio
Vice-President, Shiga University

Overseas

BELLWOOD, Peter
Professor, School of Archaeology and Anthropology, the Australian National University, Australia
CHUN Kyung-soo
Professor, Department of Anthropology, Seoul National University, Korea
FU Congbin
Director, Institute for Climate and Global Change Research, School of Atmospheric Science, Nanjing University, China
LOVEJOY, Thomas E.
President, the H. John Heinz III Center for Science, Economics and the Environment, USA
McDONALD, Anne
Professor, Graduate School of Global Environmental Studies, Sophia University, Japan
RANDALL, Roland
Life Fellow, Girton College, University of Cambridge, UK
SCHOLZ, Roland
Professor Emeritus, Natural and Social Science Interface, Institute for Environmental Decisions, Swiss Federal Institute of Technology Zurich, Switzerland

Executive Board

■ Oversees administrative operation of the institute

YASUNARI Tetsuzo
Director-General
SATO Yo-Ichiro
Deputy Director-General
Program Director

KUBOTA Jumpei
Director, CRD
Program Director
NAKANO Takanori
Director, CRP

SATO Tetsu
Program Director
TANIGUCHI Makoto
Program Director
IBUKA Junji
Director, Administrative Office

Advisor

TACHIMOTO Narifumi

Emeritus Professor

NAKANISHI Masami
WADA Eitaro
HIDAKA Toshitaka
NAKAWO Masayoshi
FUKUSHIMA Yoshihiro
AKIMICHI Tomoya
KAWABATA Zen'ichiro
OSADA Toshiki

RIHN Staff

■ DIRECTOR-GENERAL
■ DEPUTY DIRECTOR-GENERAL

YASUNARI Tetsuzo
SATO Yo-Ichiro

ADMINISTRATIVE OFFICE

GENERAL AFFAIRS SECTION

Head IWASAKA Yutaka
Deputy Head IZUMORI Yoshihiro
General Affairs Subsection
Head UEMURA Hiroki
Chief HARA Akiko
Personnel Subsection
Head SUMITA Emi
Clerk KIDA Yoshimi
Clerk TANAKA Mika
Planning Unit
Head IZUMORI Yoshihiro
Public Relations Subunit
Clerk HONDA Tomoko
Clerk NAKAOHJI Yu

ADMINISTRATIVE DIRECTOR

IBUKA Junji

ACCOUNTING SECTION

Head YOSHIDA Takashi
Deputy Head FUJIWARA Koichi
Financial Planning Subsection
Head YAMAGATA Satoshi
Clerk HONDA Takayuki
Facility Management Subsection
Head UMEGAMI Tatsushi
Accounting & Procurement Unit
Head FUJIWARA Koichi
Procurement Subunit
Head SAKODA Fumiyo
Accounting Subunit
Head FUKAO Hidemasa

RESEARCH COOPERATION SECTION

Head BANJOE Yoichi
Research Cooperation Subsection
Head SHINNO Masato
Clerk KOGISO Ayana
International Affairs Subsection
Head BIVONE Junko
CRD/CRP Support Unit
Head BANJOE Yoichi
CRD Support Subunit
Chief ZENIZUKA Rie
Clerk TSUJI Hanako
CRP Support Subunit
Head YAMAMOTO Hiroshi

RESEARCH DEPARTMENT

Program Directors

KUBOTA Jumpei
SATO Tetsu
SATO Yo-ichiro
TANIGUCHI Makoto

Professors

KADA Ryohei Agricultural Policy,
Environmental Economics
KUBOTA Jumpei Hydrology
MOJI Kazuhiko Human Ecology
MURAMATSU Shin Architectural History, Urban
History
SATO Tetsu Local Environmental Studies,
Conservation Ecology
TANIGUCHI Makoto Hydrology

Associate Professors

HIYAMA Tetsuya Ecohydrology
ISHIKAWA Satoshi Conservation Ecology,
Global Fisheries Science
KIKUCHI Naoki Environmental Sociology
NAWATA Hiroshi Cultural Anthropology
OKUMIYA Kiyohito Field Medicine
TANAKA Ueru Agricultural Studies

Visiting Professors

ARIMA Makoto Petrology
HABU Junko Environmental
Anthropology, Historical
Ecology, East Asian
Archaeology
HIYAYAMA Yukio Geography
KATO Tsuyoshi Comparative Sociology
KITAGAWA Hideki Environmental Policy
MORI Soichi Science and Technology
Policy, Global Sustainability
NAKAGAMI Ken'ichi Environmental Economics
and Policy
NAKATSUKA Takeshi Biogeochemistry,
Paleoclimatology
ONISHI Masayuki Linguistics, Language
Education
OSADA Toshiki Linguistics
TANAKA Masakazu Cultural Anthropology
UCHIBORI Motomitsu Cultural Anthropology
YONEMOTO Shohei History and Philosophy of
Science

Visiting Associate Professors

ISHIKAWA Mamoru Geography
KISHITA Yusuke Scenario Design
OKUDA Noboru Ecology
SHIRAIWA Takayuki Glaciology
UCHIYAMA Junzo Environmental
Archaeology, Landscape
History

Visiting Research Fellows

GALVEZ TAN, Jaime Public Health
HENNY, Cynthia Environmental
RANOLA, Roberto Jr. Dela Fuente Science, Engineering
SETIAWAN, Budi Indra Resource Economics
Soil Physics, Hydrology

Senior Project Researchers

C-07 FUJIWARA Junko Cultural Anthropology
C-07 SAKAI Toru Satellite Ecology
D-05 TAKAGI Akira Fisheries Science,
Molecular Ecology
R-06 MASUDA Tadayoshi Agricultural & Resource
Economics

Project Researchers

C-08 HAYASHI Kengo Southeast Aian
Architectural History,
Urban History
C-08 MATSUDA Hiroko Southeast Aian
Architectural History,
Urban History
C-08 MEUTIA, Ami Aminah Hydrology
C-08 MIMURA Yutaka Architectural History,
Urban History, GIS
C-08 UCHIYAMA Yuta Architectural History,
Urban History
C-09 HAMASAKI Hironori Water Governance, IWRM
C-09 HASHIMOTO (WATANABE) Satoko Soil Science
C-09 IMAGAWA Chie Hydrology
D-05 OKAMOTO Yuki Agricultural Systems
D-05 WATANABE Kazuo Area Studies
D-05 YAP, Minlee Coral Reef Ecology
R-04 JIANG, Hongwei Human Ecology
R-05 ICHIKAWA Kotaro Bioacoustics
R-05 ISHIYAMA Shun Cultural Anthropology
R-05 NAKAMURA Ryo Cultural Anthropology
R-06 YAOTA Kiyoyuki Spatial Econometrics, GIS
R-07 ENDO Hitoshi Archaeology
R-07 ISHIMOTO Yudai Ecological Anthropology
R-07 MIYAZAKI Hidetoshi Soil Science
R-07 SASAKI Yuko Rural Development
R-07 SHIMIZU Takao Cultural Anthropology

R-07 TESHIROGI Koki Geography
E-05 ISHIHARA Hiroe Environmental Sociology,
Ecological Economics
E-05 NAKAGAWA Chigusa Environmental Sociology
E-05 TAKEMURA Shion Landscape Ecology

Project Research Associates

C-07 SHIMIZU Hiromi
C-09 KATO Hisaaki
C-09 KOYAMA Masami
R-05 HAFIZ KOURA, Hafiz Mohamed Fathy
R-05 MIZUMA Sakiko
R-05 OKAMOTO Yoko
R-05 WANG Na
R-06 MIYAKAWA Chie
R-06 OKAMOTO Takako
R-06 TSUJWA Saeka
R-07 KIHIRA Tomoe
E-05 FUKUSHIMA Atsuko

Center for Research Development (CRD)

DIRECTOR KUBOTA Jumpei

Heads of Units

Initiative Framework Unit KUBOTA Jumpei
Collaboration Nexus Unit TANIGUCHI Makoto
Planning Unit SATO Yo-ichiro

Professors

KUBOTA Jumpei Hydrology
MALLEE, Hein Social Science
SATO Tetsu Local Environmental Studies, Conservation Ecology
SATO Yo-ichiro Plant Genetics
TANIGUCHI Makoto Hydrology

Associate Professors

HANDOH Itsuki C. Earth Systems Science, Mathematical Modeling
KURATA Takashi Philosophy

Assistant Professors

MCGREEVY, Steven Robert Rural Sustainable Development

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)

DIRECTOR NAKANO Takanori

Heads of Units

Survey and Analysis Unit NAKANO Takanori
Informatics Unit SEKINO Tatsuki
Communication and Production Unit ABE Ken-ichi

Professors

ABE Ken-ichi Ecological Anthropology
NAKANO Takanori Isotope Environmental Studies

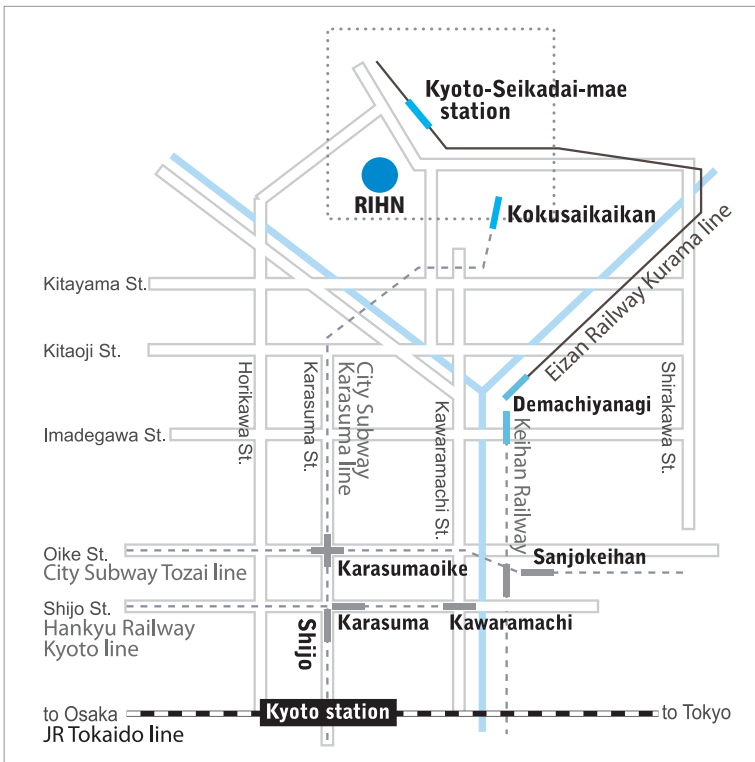
Associate Professors

SEKINO Tatsuki Information Science
TERADA Masahiro History, Museum Anthropology

Assistant Professors

KUMAZAWA Terukazu Environmental Planning, Regional Informatics
MINAMI Yoshitaka Informatics
NAITO Daisuke Southeast Asian Area Study, Political Ecology
NILES, Daniel Geography
SHIN Kicheol Petrology, Geochemistry, Isotope Geology
YASUTOMI Natsuko Meteorology, Climatology

Access



By City Subway

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

By Kyoto Bus

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

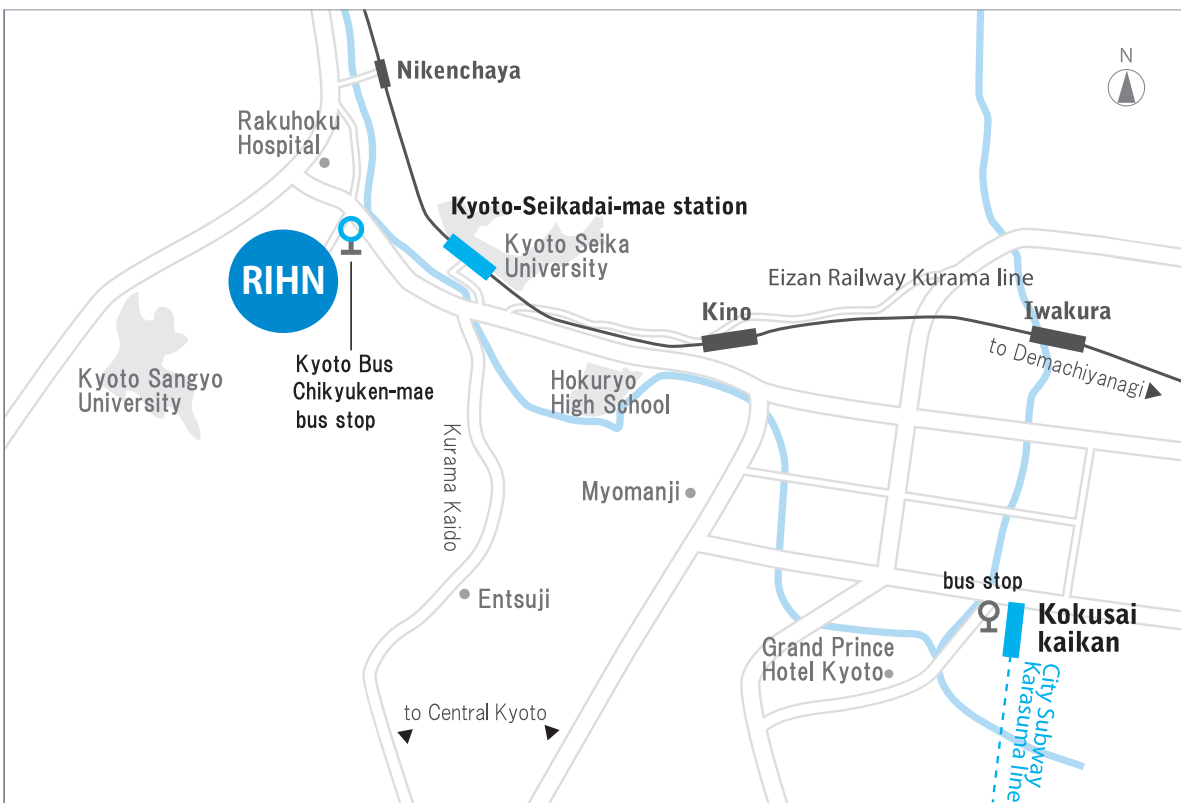
RIHN is at the base of the hill on your left.

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.



Cover photo:

Horse and boy, plain and mountain, Mongolia
Photo by TAKANO Takenaka Kohei

RIHN Prospectus 2013-2014

Overseen by ABE Ken-ichi

Written and edited by Daniel NILES, KURATA Takashi and TERADA Masahiro

Designed by OKAZAWA Rina



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