

Inter-University Research Institute Corporation
National Institutes for the Humanities, Japan

Research Institute for Humanity and Nature

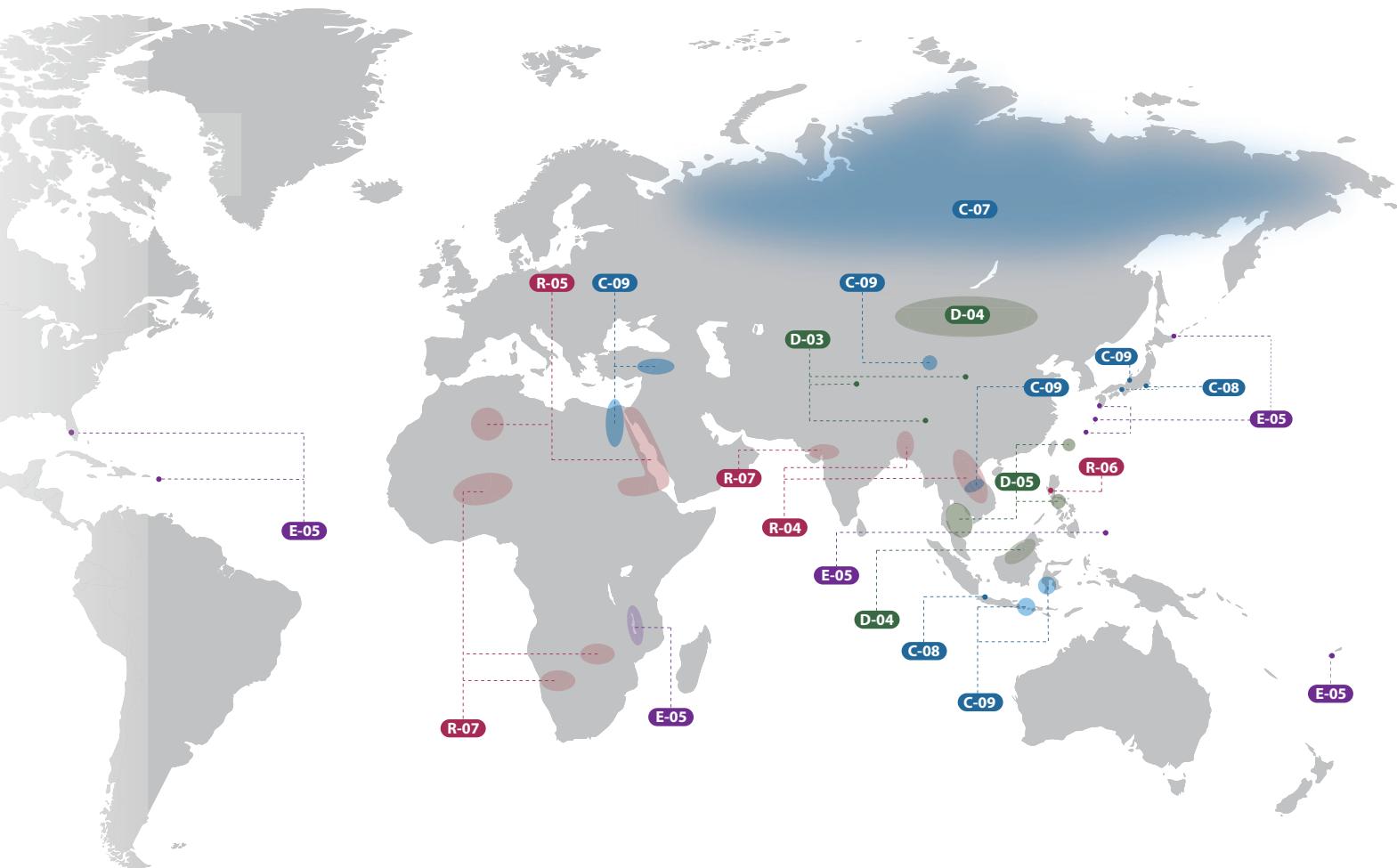
Prospectus 2012–2013



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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 as an inter-university research institute to promote integrated research in the field of global environmental studies. RIHN's objective is to define, conduct and debate integrative research capable of describing the true dynamism of Earth phenomena and humanity's place in it. To this end, RIHN solicits, funds and hosts fixed-term research projects on key areas of interaction between humanity and nature.

In 2011 RIHN celebrated its first decade of activity. Publication of *the RIHN Encyclopedia of Global Environmental Studies* demonstrates RIHN's impressive accomplishments in the realm of cognitive science to date. But we must look to the future. In our next decade, we have set our sights on several key tasks that are critical to the progress of contemporary environmental studies.

We reaffirm our commitment to conduct coordinated, problem-centered, context-specific, and multi-dimensional science. In 2011 we established the Core Research Hub in order to promote synthesis of the established domain-based projects, and to stimulate academy-society links that lead us from descriptive to design science. This endeavor has brought us into close communication and early steps

of collaboration with several important international organizations and networks with consonant goals. Such partnerships affirm our sense of urgency of the need for a new kind of environmental intelligence.

RIHN is taking substantial steps to amplify its capacity as a center of environmental study. Now that an interactive joint academic base, or hyperbase, has gotten up to full speed, we will further expand the functions and roles of inter-university research. In 2012 we also launch a project to create a network-based repository of project data. Such endeavors allow us to pursue more substantial and effective collaborations with our partners in Japan and around the world.

As we advance in our second decade, we renew our determination to make innovative society-science research projects supported by the most colorful and diverse spectrum of collaborations. In reviewing this prospectus, I believe you will see that RIHN is a unique research institute working in a field of urgent, global concern. Your continued support and guidance are greatly appreciated.

立本成文
TACHIMOTO Narifumi

Director-General
Research Institute for Humanity and Nature

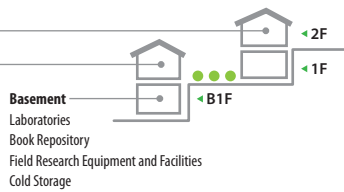


1. Breezeway between buildings 2. Main entrance hall 3. The *hanare*, or floating room, lies over a small pond 4. Basement laboratories

1	2
3	4



- 2F
 - Main Entrance Hall
 - Administration
 - Lecture Hall
 - Seminar Rooms
 - Dining Hall
- 1F
 - Employee Entrance
 - Research Project Rooms
 - CCPC
 - Library
 - Media Center
 - National Institutes for the Humanities Kansai Office



The small cluster of buildings above, and inset, is the RIHN House with one-, two-, and three-bedroom apartments for guest researchers and their families.



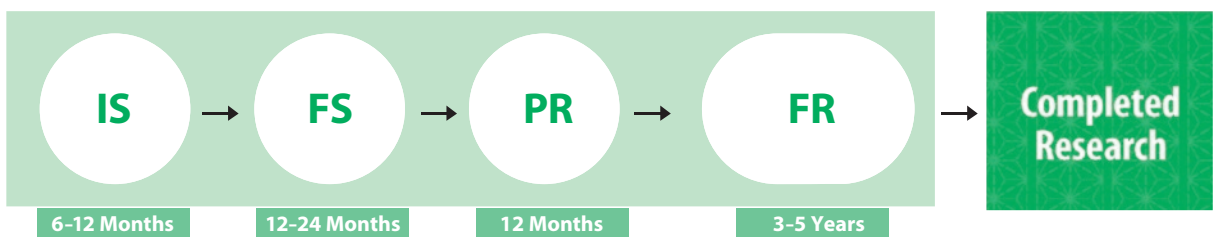
Philosophy and Structure

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.

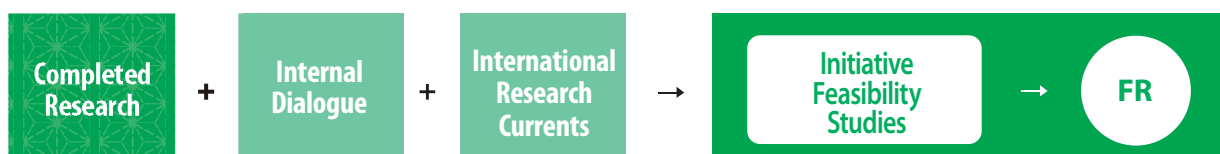


How should human societies act to enhance ecological integrity and improve human well-being in tandem, now and in the future? This is not simply a matter of defining the appropriate science and policy. Indeed, science and policy are liable to remain ineffectual unless they draw on deeper waters.*

After 10 years of domain-based research, the **Core Research Hub** was developed to achieve two related goals. First, the Hub is to enhance RIHN's capacity to benefit from its current and completed research projects. The Hub 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 Hub 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.

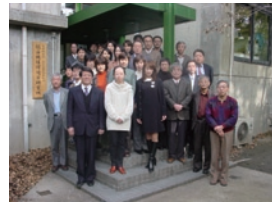
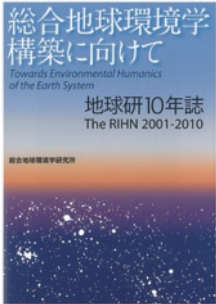
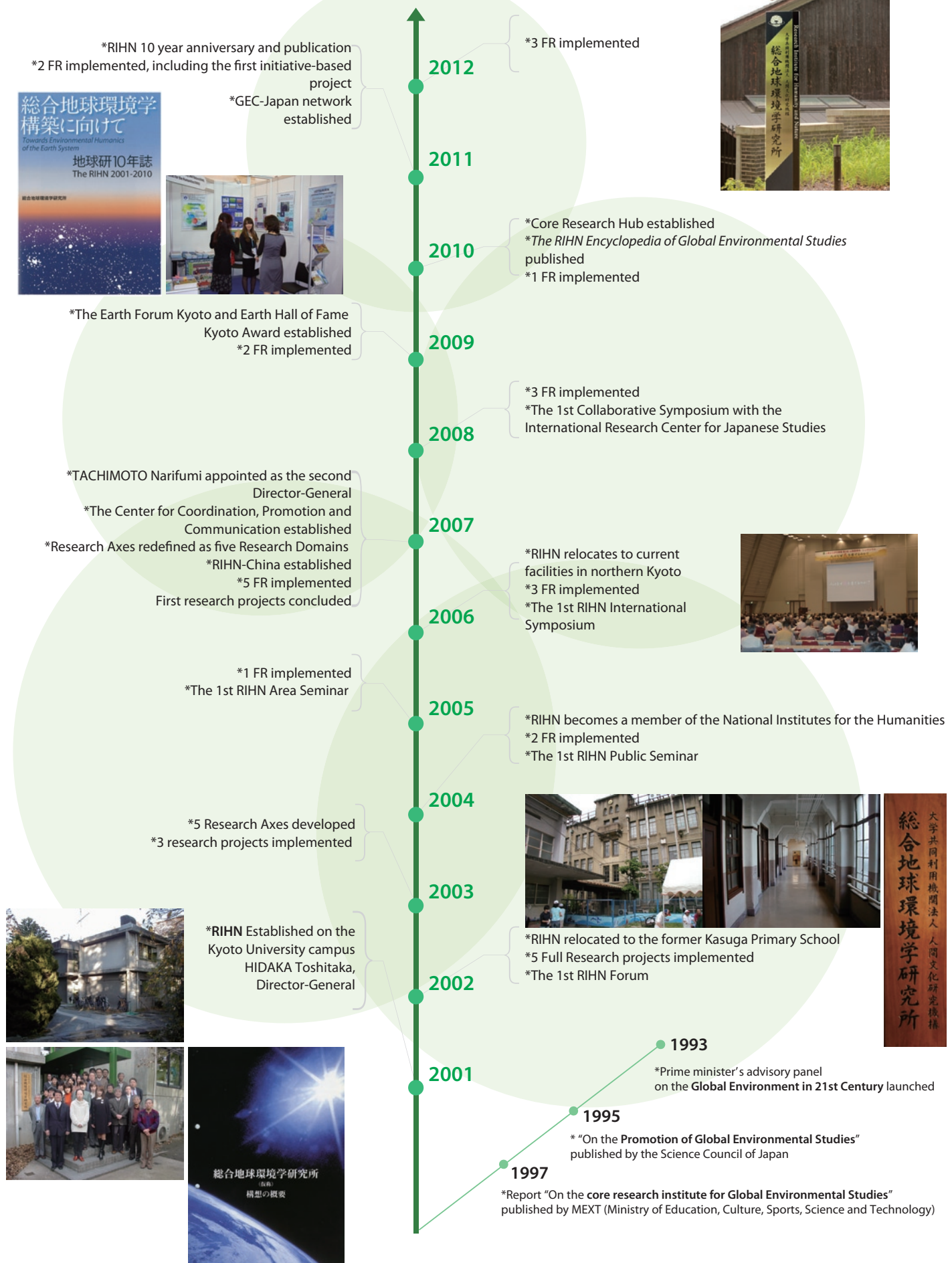
Initiative projects therefore emphasize the co-design and co-production of knowledge. In their scope and methodologies, initiative-based projects stimulate dialogue between different realms of observation, action and aspiration, generating new understanding of the causes of, and possible solutions to,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



Circulation Program

NAKANO Takanori | 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-05	TANIGUCHI Makoto	Human Impacts on Urban Subsurface Environments
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

Human Impacts on Urban Subsurface Environments

Project Leader **TANIGUCHI Makoto** RIHN

The great coastal cities of Asia place substantial burdens on subsurface environments, but little is known of the impact or its environmental or potential social significance. Subsurface conditions merit particular attention in Asian coastal cities where population numbers, urban density and use of subsurface environments have expanded rapidly. The goals of this project were to evaluate the subsurface environments of seven Asian coastal cities for such problems as subsidence, groundwater contamination and subsurface warming, and to suggest how they can be addressed or avoided. This project was therefore designed to reveal the groundwater recharge rate, storage, redox and other natural subsurface capacities in Tokyo, Osaka, Seoul, Taipei, Bangkok, Jakarta and Manila, and to measure the pace and scale of human disturbance of subsurface environments in these cities in the past century.

Summary of research findings

Cumulative human impacts on subsurface environments were documented at depths of up to 200–300 meters. Groundwater circulation was accelerated by more than 10 times in the past century. Subsurface thermal storage due to surface warming, such as by the urban ‘heat island effect’, is two to six times that attributable to global warming. Numerical modelling of the subsurface environment in Tokyo, Osaka, Bangkok, and Jakarta allowed evaluation of groundwater recharge rate and area, residence time, and exchange of fresh/salt water between land and ocean. GRACE satellite data was scaled down to the Chaopraya basin, Thailand, allowing comparison with basin models. Creation of a 0.5km grid GIS database based on nine categories of land cover/use in three different historical periods (1930s, 1970s, and 2000s) allowed evaluation of water, materials, and heat exchange between surface and subsurface environments in each city.



Establishment of consortium on water management in Asian megacities

The consortium is a network of national working groups and a platform for sharing international knowledge on monitoring, modeling, and policy making.

Research significance

Natural resource capacity and social and environmental development indices allowed integration of findings. In total, the indices in our five-stage urban development and DPSIR (Driving force, Pressure, State, Impact, and Response) models described patterns of land subsidence, groundwater contamination, and subsurface warming, and allowed us to suggest a range of suitable policy approaches, taking account of latecomer’s benefits, patterns of development, and natural resource capacities.

In total, project findings highlight the importance of careful public cross-boundary surface-subsurface environmental management. We conclude that subsurface environmental processes can be successfully managed, especially in their critical capacity in providing water, if policies correspond to actual material flows across surface-subsurface and land-marine boundaries. In regard to water quality, human societies should pay closer attention to the subsurface accumulation of contaminants and heat, especially as these loads can often be controlled or managed from the surface. Designing such policies, however, depends on accurate assessment of the stage of urban growth in relation to natural capacities and social capabilities.

Research communication

Project research findings have been disseminated widely in a variety of fora. The project has convened five international symposia, a side event of COP13 and collaboration with UNESCO-International Hydrological Programme. Project researchers have published more than 120 peer-reviewed scientific papers, five books (three in Japanese and two in English), a special issue of the journal STOTEN, and a CD-Book with multilayer contents for beginners to experts. Feedback seminars were organized to discuss project findings with local administrators and policy makers in Manila, Jakarta, and Bangkok. The utility of such seminars, and perceived value of comparative discussion of subsurface urban issues, now inspires the creation of a consortium concerned with urban water management in Asia.

Effects of Environmental Change on the Interactions between Pathogens and Humans

Project Leader **KAWABATA Zen'ichiro** RIHN

There is an important environmental component to infectious disease. The rapid spread of emerging infectious diseases is not only threatening humans, wildlife, and livestock worldwide, but also inducing economical loss and collapse of ecosystems. While pathological studies inform effective disease treatment, study of *disease ecology*—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. This project developed a model of environment–pathogen–human interactions, based on intensive examination of the ecological and social causes and effects of Koi Herpes Virus disease (Photo 1) in Lake Biwa, Japan. This model will allow us to suggest ways to prevent or minimize the emergence and communication of infectious diseases.

Project achievements

Project researchers invented a new method to quantitatively detect the pathogen KHV and its host carp in natural environments. This method can also be used to establish presence of other pathogens and can therefore be of great utility to studies of environment–pathogen–human linkages.

Analysis of the links between lakeshore degradation, KHV, and human activity, allowed partial verification of the hypothesis that anthropogenic alterations of the environment facilitate outbreaks and spread of infectious diseases.

We established that the conceptual model of the environment–pathogen–human linkage derived from KHV disease in Lake Biwa was applicable to other cases of infectious disease, such as schistosomiasis in Kenya (Photo 2), fish diseases in the Pin River at Chaing Mai, Thailand, and Legionella disease, MRSA, Norovirus disease, and nontuberculous mycobacteria disease in Japan.



Photo 1 Carp killed by KHV disease, Lake Biwa, 2004
by Masatomi Matsuoka [2010] In: *The RIHN Encyclopedia of Global Environmental Studies*, Koubundou, p. 284.

New concepts of infectious disease

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

We shared our research results with international and national academic communities and society. The concept of 'environmental disease' was introduced to academic communities in a general paper and more than 30 papers on specific environment–pathogen–human linkages, as well as through 10 edited special articles, and five project-organized international conferences. These activities formed the base of an international alliance of researchers to study environmental disease and promoted activities that can help alleviate infectious disease worldwide.



Photo 2 Field survey in Kenya (Photo: Zen'ichiro Kawabata)

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. This project uses multiple satellite and surface systems to track changes in water and carbon cycles and the cryosphere, and assesses their likely interactions and significance for human inhabitants of the region. The project is jointly conducted by Japanese and Russian universities and research institutes.

Regional climate predictions in Siberia are based on description of energy and water cycles and changes in surface reflectance due to snow, ice and vegetation coverage. The Lena River Basin in Eastern Siberia is covered in larch forest but receives little precipitation. 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. Local inhabitants depend on agriculture, stockbreeding and on fragile transport, building and water infrastructure. Human survival skills and adaptive capacity to environmental changes depend on unique social structures, history and culture, which have undergone Russian socialistic modernization.

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.

Three research groups are organized in order to realize these goals (Fig. 1). They are the Siberia bird's-eye group (Group 1), the Water cycle and ecosystem interaction group (Group 2), and the Human ecology group (Group 3).

Project research has emphasized five main research areas

1) Permafrost-ecosystem modeling

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 permafrost layer, in which we now see increased thawing depth and surface soil moisture, and an increase of net primary production. Additionally, it was detected that annual maximum thawing depth gradually increased (deepened) on a decadal scale. Based on climatological analyses of atmospheric water circulation over the region (Fig. 2), recent increases in precipitation seem to be related to increases in soil moisture and annual maximum thawing depth.

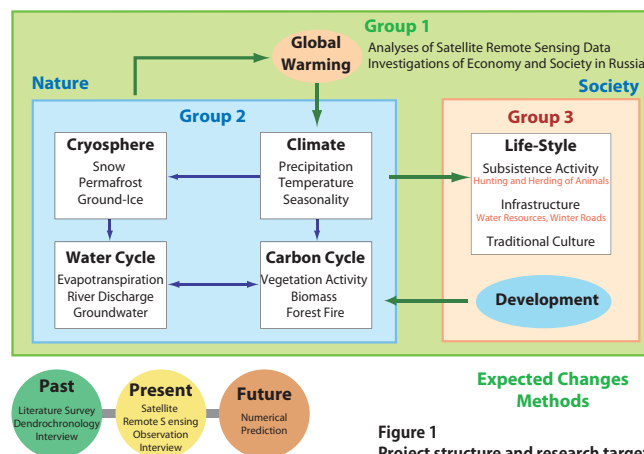


Figure 1
Project structure and research targets

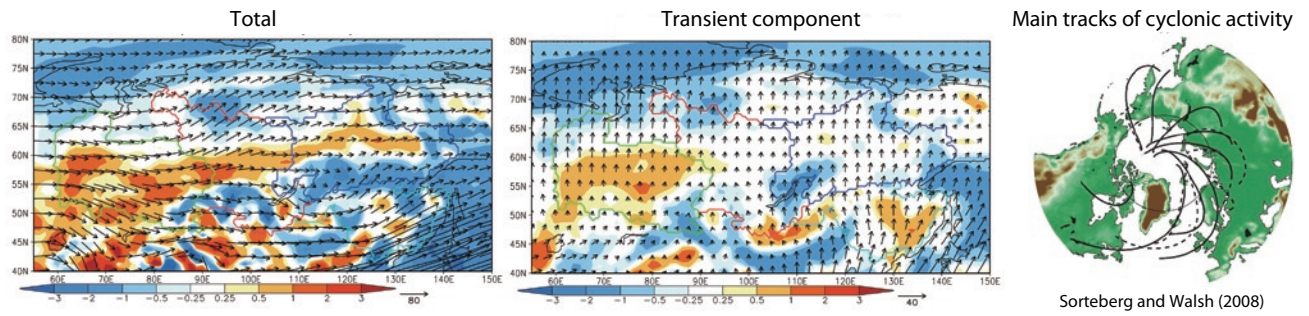


Figure 2 Atmospheric water circulation in summer (from June to August) over the Siberia. Main tracks of cyclonic activities (Sorteberg and Walsh, 2008) are also shown.

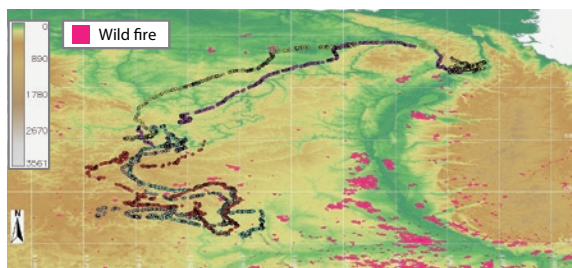
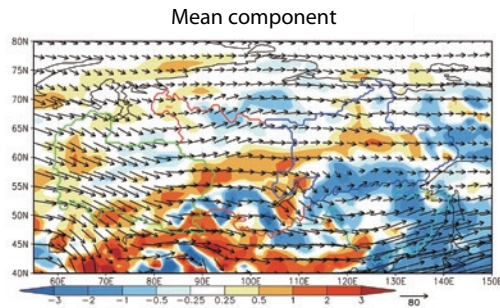


Figure 3 Tracking routes of eight wild reindeer detected using ARGOS satellite system from August 2010 to February 2011. The routes are drawn on a topographical map. Areas of wild fire are also shown in the figure.

2) Tracking reindeer migration

We are interested in documenting the migration routes of wild reindeer and whether these are 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. 3). Migration distance was similar to those documented in North America and North Europe. 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, while, on the contrary, they were severely impacted by social changes following the collapse of the Soviet Union (Fig. 4).

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. We 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.

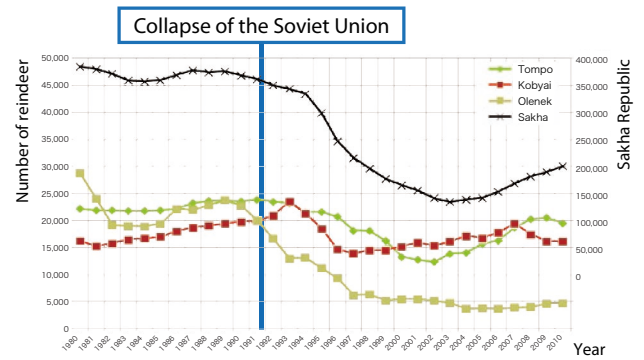


Figure 4 Interannual change in numbers of domestic reindeer in the Sakha Republic (right axis) and the three sub-regions (left axis) from 1980 to 2010

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.

5) Folklore

We have begun to analyze the local folklore recorded between the 19th and early 20th century. Examination of local myths, legends and fairy tales allows us to elucidate folk beliefs and traditions related to environmental change. We detect that indigenous people might often consider a disaster to be the revenge of nature for human transgressions.

Future research issues

We will continue to investigate the five collaborative research topics described above, with particular emphasis on describing local peoples' vulnerability and adaptations to the documented changes in climate and environment. It is also necessary to work with local peoples and governments to develop new adaptation strategies and propose appropriate policies.

Sub-Leader

FUJIWARA Junko RIHN

Core Members

YAMAGUCHI Yasushi Nagoya University

SASAI Takahiro Nagoya University

OHTA Takeshi Nagoya University
SUGIMOTO Atsuko Hokkaido University
YAMAZAKI Takeshi Tohoku University
TAKAKURA Hiroki Tohoku University
OKUMURA Makoto Tohoku University
TATSUZAWA Shiro Hokkaido University

Megacities and the Global Environment

Project Leader **MURAMATSU Shin** RIHN

Shin Muramatsu has studied Asian architectural and urban history and is now interested in developing new methods that can shed light on urban futures. His previous publications include *Shanghai: The City and Its Architecture*, *Addicted to China*, *Keeping an Elephant*, and *Asian Architectural Studies*. He is the founder of mAAN (<http://www.maan.org>), an NPO involved in the evaluation, conservation and revitalization of modern architecture in Asia.



As places that support half of the Earth's population, cities are becoming the most important spaces inhabited by human beings. To explore ways in which megacities with populations of 10 million or over can coexist in harmony with the global environment, this project adopted the following goals:

- 1) to determine methods for developing an integrated understanding of megacities from the perspective of different academic areas, history and culture
- 2) to propose integrated solutions for the mitigation of problems associated with megacities
- 3) to indicate images of how future cities that integrate the richness of their environments, economy and society should be

To achieve the above objectives, we decided to focus our research on the urban area surrounding the capital of Indonesia, known as Jabodetabek, which is located in a tropical monsoon area, and to study this urban area by comparing it with about 40 other megacities and megacapitals with populations of five million or over. For our project goals, we set four, two in the area of cognitive science and two in the area of design science respectively.

A. Cognitive Science

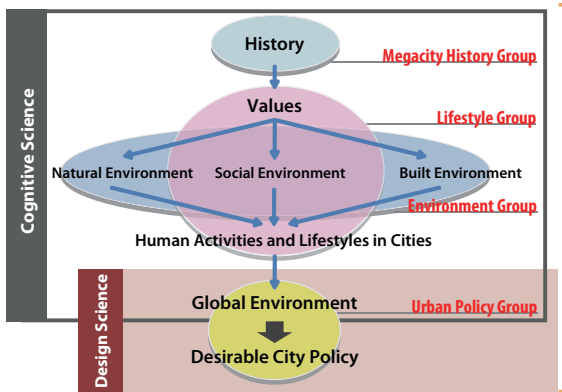
Goal 1 Identify historically restricting factors governing the manifestation of megacity mechanisms and environmental problems

Goal 2 Elucidate environmental problems and mechanisms associated with megacities and establish analytical methods for these

B. Design Science

Goal 3 Establish indices for evaluating the impact of cities on the global environment; integrate and make visible geographical data on urban spaces

Goal 4 Share project results from micro to macro aspects with the various stakeholders of local and international society



Supervisory Group

Figure 1 Project flow and research organization
The project is comprised of 5 groups.

	Urban village area	Planned residential area	High-rise residential area	Rural village area
Block planning	Unplanned	Planned	Planned	Unplanned
Land use	Buildings	Buildings	Buildings	Interspersed rice fields
Dwelling density	High density	Low density	Low density	Low density
Building height	Low height	Low height	High height	Low height

Figure 2 Four characteristics of the urban environment



Photo 1 With 40 Indonesian and Japanese university students participating, the Indonesian-Japanese Student Workshop took place from September 10–18, 2011



Photo 2 Urban village area (Cikini)

Photo 3 Presentation of project outcomes and sharing feedback with local residents

We also included the following five items in our final results:

- 1) to present megacity scenarios until the year 2050 for people who will live in the next generation
- 2) to construct a Megacity GIS network to facilitate grasping megacities
- 3) to develop educational and training programs for intervention in macro, meso and micro situations in megacities
- 4) to publish a series of Megacity Studies (English and Japanese) to introduce the results of our megacity research and the latest information
- 5) to assume an international role in cooperation with international organizations

Fiscal 2011 outcomes

1. Development of an ‘index of land attributes’ for analyzing cities at a micro level from the perspective of the built environment

In megacities of developing countries where changes are occurring rapidly, a variety of land uses and the built environment exist alongside each other. In this project, to get a deeper understanding of megacities, we categorized these mixed conditions of the built environment on 250m mesh scale graphic images from objective data on the four aspects of land use, district shape (either planned or unplanned), building height, and population density. As a result, we were able to grasp the distribution of the built environment of Jabodetabek by dividing it according to the four characteristics of the urban environment on individual 250m mesh scale graphic images: 1) urban village area, 2) rural village area, 3) high-rise residential area, and 4) planned residential area (Fig. 2).

2. Integrated survey of the environment and lifestyles in the urban village area (kampung type) and rural village area (rural type)

The groups of the project have up until now engaged in joint research on their respective topics in two areas of Jabodetabek: Cikini, an urban village area, and Tangerang, a rural village area. The groups undertook measurements and observations of environmental burden indices, indices relating to the local environment, and indices relating to people’s awareness of the environment, and they compared the characteristics of the two urban environments. This resulted in some interesting indications. For example, although in the urban village area figures for indices on the natural environment such as heat environment and biodiversity were low in comparison with those for the rural village, values for the four awareness indicators were high. This implies that possibilities for alternative technologies and lifestyles may exist there.

3. Joint Indonesian-Japanese Student Workshop in Indonesia on an urban village area

Forty Indonesian and Japanese students came together for a joint student workshop in September 2011 to consider methods of analysis and intervention in the local environment (Photos 1 and 3). Held in the urban village area of Cikini where students engaged in fieldwork and discussions on the built environment, the natural environment, and lifestyle over a 10-day period, the workshop culminated in a presentation of the workshop results before the residents of Cikini (Photo 2). Initiatives like this are an effective means of improving cities through education and awareness raising of disparate urban stakeholders regarding their urban environment.

Sub-Leader

HAYASHI Kengo RIHN

Core Members

OKABE Akiko Chiba University

KAGOTANI Naoto Kyoto University

KATO Hironori University of Tokyo

FUKAMI Naoko Waseda University

MURAKAMI Akinobu Tsukuba University

MORI Koichiro Shiga University

YAMASHITA Yuko Hitotsubashi University

MCGEE Terry British Columbia University

ELLISA Evawani University of Indonesia



Diversity Program

KADA Ryohei | 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-02	YUMOTO Takakazu	A New Cultural and Historical Exploration into Human-Nature Relationships in the Japanese Archipelago

Full 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
D-05	ISHIKAWA Satoshi	Coastal Area Capability Enhancement in Southeast Asia

A New Cultural and Historical Exploration into Human-Nature Relationships in the Japanese Archipelago

Project Leader **YUMOTO Takakazu** Kyoto University

The Japanese Archipelago has been densely populated since the Neolithic Age, and its natural environment has been greatly influenced by human activities. In spite of intensive human intervention in the natural environment, the area is still rich in biota. More recent patterns of interaction between humanity and nature, however, have placed many plants and animals in danger of extinction.

The main objective of the project was to describe the history of human-nature relationships in the Japanese Archipelago. Project researchers examined how the area's physical environment and biota have changed since the late Paleolithic Age, when human presence was first established. Archaeological, historical and folkloric materials were used to indicate past human perception, knowledge and skills regarding nature in general, and the human effect on key plant and animal species. This combination of biophysical and human cultural history will enrich appreciation of human-environmental history in the archipelago.

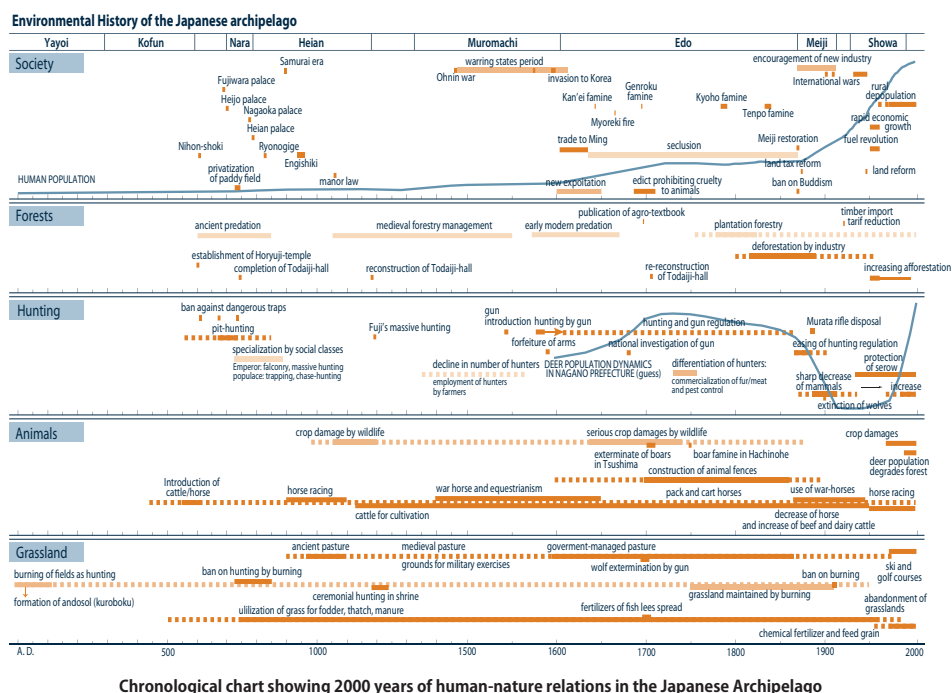
Results

In the history of the Japanese Archipelago, there are examples of both long-term sustainability and collapse. The common view that pre-modern or indigenous humans lived in harmony with nature, a harmony disturbed by modern science and technology, is partially true. Human ability to modify nature increased dramatically through time, and the earlier incentives to utilize local

bio-resources in a sustainable way were displaced by growing access to global economies and trade. Traditional knowledge does not guarantee sustainable resource utilization, however; traditional systems sometimes have led to over-exploitation of resources. Project research found that the level of community governance plays a critical role in sustainable use of ecosystem services: non-local systems of governance frequently led to collapse. Such findings strengthen the case for enhanced support of community or local governance, especially by the people suffering most from current and future ecosystem service degradation. In some cases, long-term sustainability or recovery from collapse was achieved through collaboration of actors sharing both traditional and scientific knowledge, including, for example, that allowing alignment between local and non-local layers of governance.

Research communication

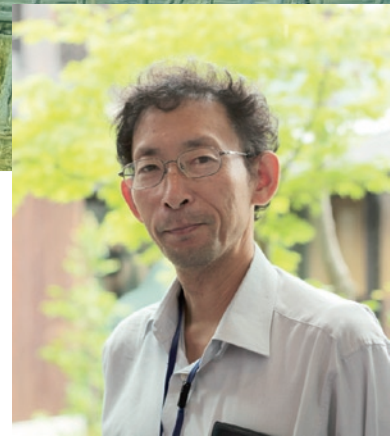
Project results have been published as Japanese books *35,000 Year History of the Japanese Archipelago* (in Japanese, six volumes). Important conclusions and messages were contributed to the report "Satoyama-Satoumi Ecosystem and Human Well-Being: Socio-ecological Production Landscapes of Japan (Summary for Decision Makers)" for the Convention of Biodiversity (COP10), held in Nagoya, October 2010.



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

Project Leader **OKUMIYA Kiyohito** RIHN

Dr. Okumiya is a medical doctor with a degree from Kochi Medical College. He has adopted a novel approach to field medicine, including cultural and environmental factors in the study of community-dwelling. He has published on field medicine, geriatrics, and neurology.



This project examines how humans have adapted to high-altitude environments physiologically, ecologically and culturally. Project researchers document the health status of elderly highlanders, and explore possible factors associated with lifestyle-related diseases in this population. Finally, we investigate the impact of modern development over the past 50 years on high altitude lifestyles and environments, and assess how these changes affect the quality of life of elderly highlanders. Study sites have been 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, and each of which has distinct ecological and socioeconomic conditions.

Ecological and cultural adaptation to the high-altitude environment and recent lifestyle change

In Arunachal Pradesh, project research described subsistence livelihood strategies of ethnic groups, patterns of alien plant invasion (Fig. 1), and wisdom of the aged and community support for its conservation (Photo 1). Locally perceived mountain sickness, or ‘laduk,’ which often occurs in association with aging, influenced highlanders’ daily

activities. In Ladakh, detailed household interviews and analysis of satellite images revealed a recent decrease in the number of livestock, increasing use of chemical fertilizers, and increasing land abandonment in the village. Decline in agriculture and village hollowing will probably weaken social cohesion. Risk assessment of glacial lake collapse, risk of flood to newly inhabited areas, and flood damage restoration have been reported.

The Highland model of lifestyle-related diseases

The relationship between long-term physiological hypoxic adaptation and lifestyle-related diseases was clarified. An association between diabetes mellitus and hemoglobin levels was documented in Tibet and the Andes, suggesting that poor hypoxic adaptation increases vulnerability to diabetes

Lifestyle changes may accelerate the development of such diseases in hypoxia-adapted people who are also culturally adapted to resource scarcities and have lifestyles that have traditionally been preventive of diabetes (the ‘diabetes acceleration hypothesis’). In Tibet, genetic adaptation to hypoxia often leads to excessive hemoglobin levels and appears to increase the risk of diabetes (Fig. 2). Studies clarified the role of the chemoreceptor reflex

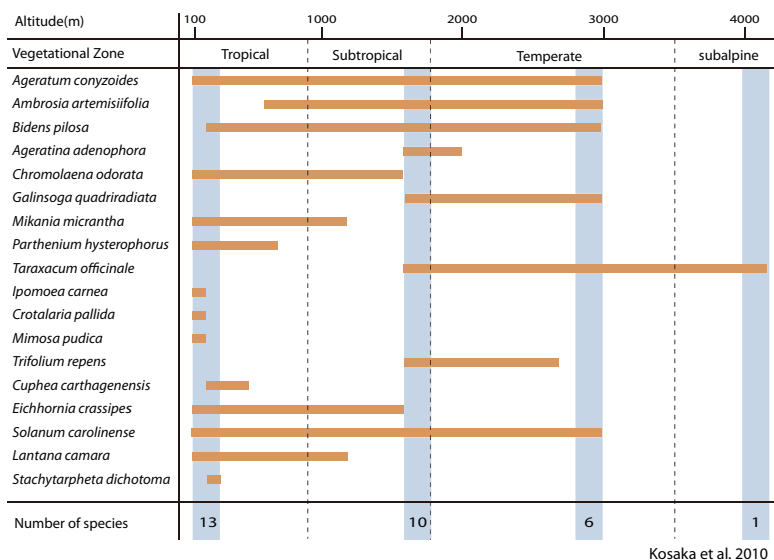


Figure 1 Altitudinal range of invasive alien plants in Arunachal Pradesh
The number of invasive alien plants decreased along with the altitudinal range. Low temperature and snowfall in the highland filtered nonadapted species from tropical region.



Photo 1 Chanting contest among Apatani shamans in Arunachal Pradesh

The shamans of Apatani community, who live in the mountain valley at the altitude of 1600m, have their special language and knowledge for rituals. Since 2000, a chanting contest has been held during the annual festival to conserve their cultural heritage.

Photo 2 The First Biennial Health Conference in Bhutan

The forum evaluated the impact of the pilot project in Khaling on elderly care and recommended integrating elderly care into the primary health care system during the 11th Five-Year Plan.

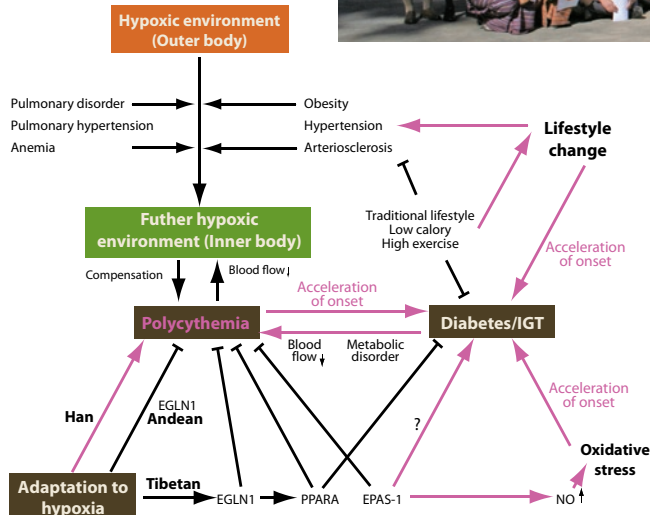


Figure 2 Trade-off of hypoxic adaptation with high oxidative stress and diabetes
With a background condition of high oxidative stress by hypoxic adaptation in Tibetan people, lifestyle change may accelerate diabetes.

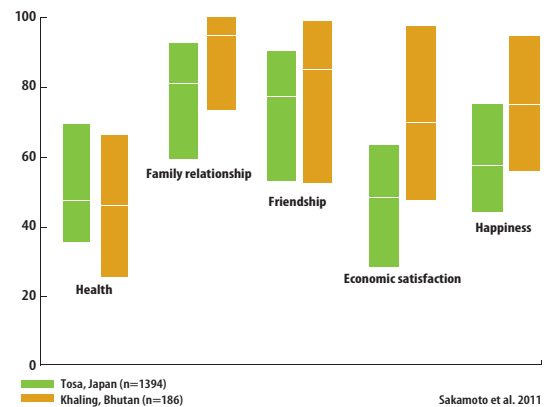


Figure 3 Subjective quality of life (QOL) in the elderly in Bhutan
High subjective QOL was shown despite low subjective health. Deep devotion to religion and tight interpersonal network may be related.

(linking the heart and the brain's cardioregulatory center) in adaptation to hypoxia, as well as the beneficial effects of highland peoples' preserved circadian rhythm.

We examined urban-rural differences on food diversity in relation to health status. Initial analysis indicates that diversity of diet is closely related to daily activities, and subjective QOL and depression. The association between high altitudes and depression was clarified in the Himalaya and the Andes. Despite the high altitude, the prevalence of depression was low in elderly highlander. Deep devotion to religion and tight interpersonal network may be related to this fact.

Health care design for elderly people in highlands: optimal aging with high QOL

Health care designed to provide high QOL among elderly highland peoples is conducted in collaboration with local health and community workers. Blood pressure, body weight, and amount of exercise were monitored by local health staffs in Ladakh for 2 years, and improvements in hypertension and diabetes were shown. We also conducted an international workshop in Arunachal Pradesh, including local residents, researchers and medical officers, in order to generate grassroots discussion of a region-specific kind of development for high QOL to the elderly.

Medical checkups were conducted for 186 community-dwelling elderly (96% of eligible people) in Khaling, Bhutan, in cooperation with the Ministry of Health (Photo 2). QOL was assessed on a visual analogue scale. Notably, the medians of all subjective QOL, including self-rated happiness, but excluding subjective health, were significantly higher in the elderly in Khaling than in a rural town in Japan (Fig. 3) to study environmental disease and promoted activities that can help alleviate infectious disease worldwide.

Schedule in 2012/2013

Global environmental changes associated with socioeconomic globalization and climate warming are manifest in the human bodies of highland peoples. In the coming period of research, we will examine the difference between adaptation and maladaptation in relation to our hypotheses of Highland lifestyle-related diseases and diabetes acceleration. In this task, we will continue to integrate the research and findings of the medical and cultural/ecological teams. In describing a model of health care that is culturally and ecologically suited to the challenges of highland civilizations, and that is based in the wisdom of the elderly concerning quality of life, aging, and death, we will reflect on present lifestyles and the future not only of highlands but also of modern civilization.

Sub-Leader

KOSAKA Yasuyuki RIHN

Core Members

ANDO Kazuo Kyoto University

INAMURA Tetsuya Aichi Prefectural University

KAWAI Akinobu

MATSUBAYASHI Kozo Kyoto University

SAKAMOTO Ryota Kyoto University

SHIGETA Masayoshi Kyoto University

TAKEDA Shinya Kyoto University

TSUKIHARA Toshihiro University of Fukui

The Open University of Japan

Kyoto University

Kyoto University

Kyoto University

Kyoto University

University of Fukui

Collapse and Restoration of Ecosystem Networks with Human Activity

Project Leader **SAKAI Shoko** RIHN

I started my academic career in botany and ecology. I have conducted several research projects on plant reproduction and plant-animal interactions the tropical forests of Borneo and Panama. In recent years, my interests have broadened to include interactions between ecosystems and human societies. I was an associate professor at Center for Ecological Research, Kyoto University from 2004 to 2008, and have been at RIHN since 2008.



Many ecosystems on the planet have been seriously degraded by human activity and are in critical condition. There are no simple solutions to this problem, as countermeasures must address both the internal complexity of, and interactions between, ecosystems and human societies. This project utilizes the concept of ecosystem network—a nested pattern of interactions among and within ecological subsystems, including human subsystems—to address tropical rainforest decrease in Sarawak, Malaysia and grassland degradation in Mongolia.

Research is conducted in three core phases:

- (1) Identification of the network structure in which the problem occurs: Here we use field surveys, remote sensing, literature surveys, and modeling to propose and evaluate hypothetical ecosystem network structures.
- (2) Scenario analysis: In this phase we estimate land cover and network structures based on the results obtained in (1) and evaluate ecosystem and social status predictions according to several key indices.
- (3) Theorization of ecosystem network conservation: We evaluate the relationships between ecosystem or resource characteristics, network structure, and key environmental problems in both Sarawak and Mongolia. Our explanations can build theories indicating why certain network structures are likely to lead to environmental problems, or how they can be resolved or avoided.

Identification of ecosystem network structures and problems

Mongolia

Although an increase in the number of goats raised to produce cashmere for export has been considered the primary cause of pasture degradation, the distribution of livestock on the landscape and decrease of mobility in nomadic herding are also important causes. The high price of meat has enticed many herders to move their flocks into areas surrounding the capital, overburdening grasslands there. Meanwhile, land privatization and settlement policies are promoted by the government for development. Nevertheless, our simulation model demonstrated that in unpredictable environments, nomadic pastoralism is more sustainable and profitable than settled pastoralism (Fig. 2). Illegal logging and forest fires also negatively affect grassland productivity as forests maintain soil moisture on which grasslands depend (Fig. 3).

Sarawak

Drastic changes in land cover are affecting biodiversity and indigenous peoples. We conducted interview surveys at more than 90 villages in the Baram and Rajang river basins (Fig. 4) where large-scale timber extraction is occurring. Our data indicate that while decreasing forest area is not a direct cause of population decline, it does reduce opportunities for group activities such as hunting and swidden agriculture, and the overall social capital of the

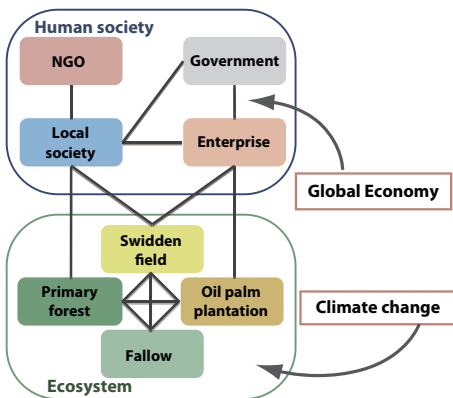
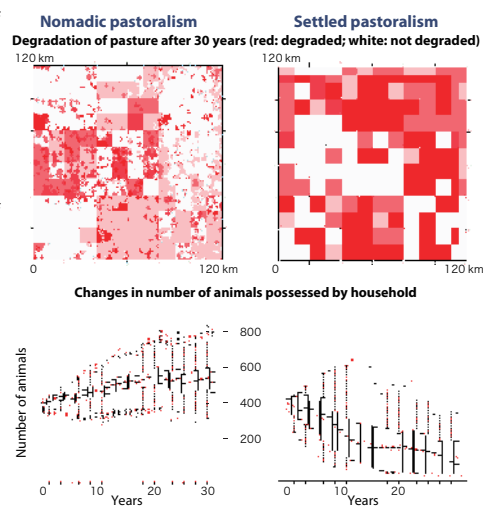


Figure 1 An example of ecosystem network
Within the ecosystem, there are subsystems, such as a primary forest and an oil palm plantation, modified or managed by different human activities. Within the human society, some actors interact with some subsystems, while others indirectly affect ecosystem through other actors.

Figure 2 An example of output of the simulation model
In the model, each household keeps and breeds animals. In the settled pastoralism option, each household is assigned a land of 100km² for each task, while in the nomadic option, each household can move to a better site within a certain range. The latter causes considerable degradation of grassland compared with the former.



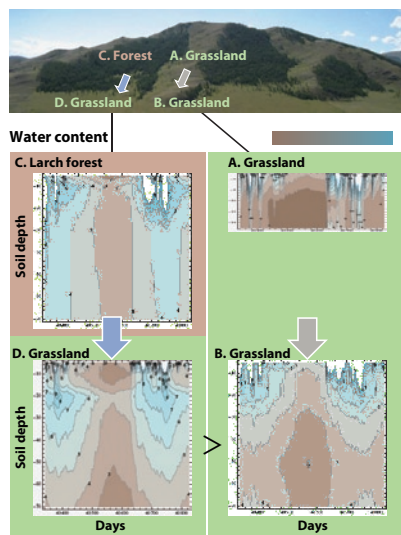


Figure 3 Changes in the water content of soil in a Mongolian steppe
The four graphs show water content in the soil along its depth at different sites on a slope; white and bluish shades indicate higher water content, and dark brown, lower. Water content is directly related to rainfall in both contexts, while water penetrates deeper into the soil and is retained for a longer time in the forest (upper left) than in the steppe (upper right). On the lower part of the slope, the water content is affected by the vegetation. The water content is generally higher in the slope with a forest in the upper part (lower left) than that in the slope without forests (lower right).



Photos Environmental problems in Mongolia and Sarawak
The number of livestock, especially goats, is increasing rapidly, leading to degradation of pastures (left). Oil-palm plantations are rapidly replacing natural forests in Sarawak (above).

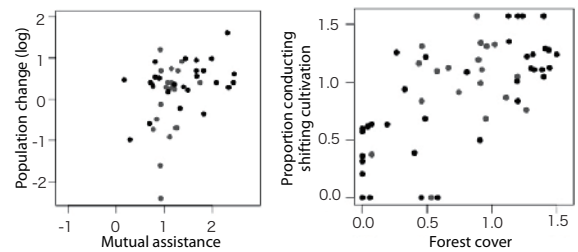


Figure 4 Questionnaire survey conducted in Baram and Rajan River Basins
In this survey, surveyors visited village leaders and representatives of 20 households in numerous villages. Data obtained show positive correlation between population changes and mutual assistance (left) and between proportion of households conducting shifting cultivation and forest areas surrounding the village (right).

village. Our data on biodiversity show that primary forests are irreplaceable in terms of species diversity conservation, however. In addition, we found that land cover conversion affects biodiversity not just at the site of deforestation but also in surrounding areas.

Comparison of ecosystem networks of Mongolia and Sarawak

Enterprises and local people have different mobility and dependence on local ecosystems in Mongolia and Sarawak. Ecosystem deterioration in Sarawak affects local people more significantly than does enterprise activity, since enterprises can move on to new territory in a way that people usually cannot. In Mongolia key ecological resources are generally used by local people and then sold to enterprises as product: local people and enterprises are mutually dependent. In Sarawak, enterprises directly exploit ecological resources; they therefore compete directly with local people for resources.

Scenario analyses

In order to communicate our analysis in an understandable way, we constructed three parallel scenarios for Mongolia and Sarawak, each of which focused on either economic, environmental or local community outcomes. A set of policies and institutions was used to base estimates of land cover and a range of environmental, social, and economic conditions over 30 years. Analysis shows that local communities are not sustainable in either environmental or economic scenarios. Furthermore, land use in the economically-focused scenario is not expected to produce significantly higher economic returns in 30 years. In economic terms, development is therefore sub-optimal: it

is delivering short-term returns at the expense of greater income in the longer-term.

Theory of ecosystem network conservation

Ecosystem network structures are so different in Mongolia and Sarawak that they require distinct policies and institutions. In Mongolia, where local people are the primary land managers, there is potential that negative feedback (decreasing pastures decreasing income) may reduce grazing livestock and lead to grassland recovery. Sustainable management will entail design of policies that observe and support such feedbacks, while also balancing local economic needs. In Sarawak, where enterprises are not immediately damaged by forest overexploitation, policies that introduce feedbacks or restrict intensity of resource use are necessary for sustainable management.

What is the cause of the differences in ecosystem structure in Mongolia and Sarawak? We consider that ecosystem productivity and biomass (or resource) distribution is a main factor. Historical differences, such as status of land ownership, also affect the networks differently.

Activities in the final year

In the final year project researchers turn to develop the theory of ecosystem network conservation. Comparison of the Mongolia and Sarawak ecosystem networks suggests that enterprises' direct or indirect use of ecological resources depends on history and the ecological characteristics of these resources and ecosystems. During the final year, we will evaluate this idea by examining network structures of various ecological resources, including wild animals, non-timber forest products, and fisheries.

Sub-Leader

ISHII Reiichiro

Research Institute for Global Change
Japan Agency for Marine-Earth Science and Technology

Core Members

FUJITA Noboru

RIHN

ICHIKAWA Masahiro

Kochi University

KAMIMURA Akira

Tokyo University of Foreign Studies

ITIOKA Takao

Kyoto University

MATSUOKA Masayuki

Kochi University

HYODO Fujio

Okayama University

YAMAMURA Norio

Doshisha University

Coastal Area Capability Enhancement in Southeast Asia

Project Leader **ISHIKAWA Satoshi** RIHN

Satoshi Ishikawa has researched population genetics of aquatic animals and conservation, and rural development through fisheries improvements and human capacity building in Asia and Pacific areas. He conducted surveys 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.



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.

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.

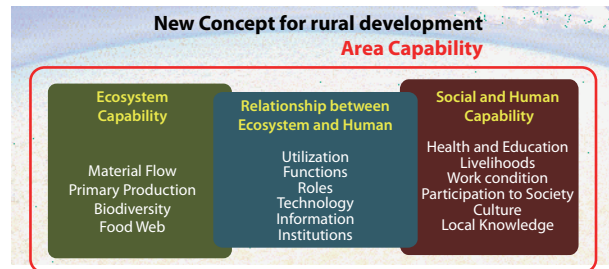


Figure 1 Conceptual Diagram

The period of Feasibility Study allowed us to develop our thinking in Japan and to contact many local researchers and people in order to discuss the concept and design a plan for Full Research. 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 a seminar in the Philippines of researchers from Kagoshima University, Research Institute for Humanity and Nature, UPV and SEAFDEC. Both 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.

Joint research is now planned in Thailand with the Secretariat and Training Departments of South East Asian Fisheries Development Center (SEAFDEC), as well as the Faculty of Fisheries of Kasetsart University. In the Philippines, the Aquaculture Department of SEAFDEC in Panay and the University of the Philippines Visayas (UPV) will collaborate with the project team. Collaborations have also begun with local set-net fishery and marketing groups



Photo 1 Community market managed by set-net fishery group
 Photo 2 Community based oyster aquaculture
 Photo 3 Intensive fishery in Batan Bay in Philippines
 Photo 4 Set-net in Rayong

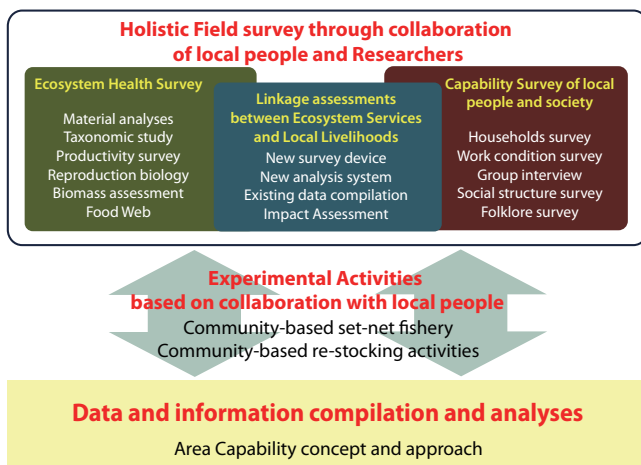


Figure 2 Flow of project activities

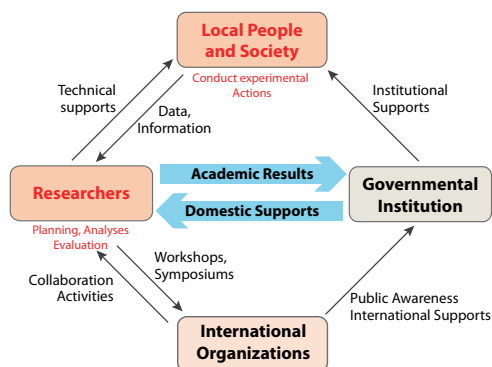


Figure 3 Framework of collaboration activities



Photo 5 Group photo at Joint Seminar held in Philippines 2011

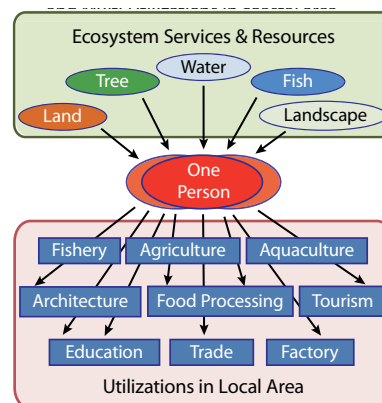


Figure 4 Utilization situation of coastal resources in developing areas

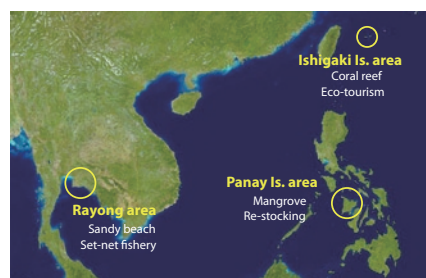


Figure 5 Main target areas

in the Rayong area of Thailand, and aquaculture groups in Batan Bay, Philippines.

Future tasks

Full research will examine coastal area resources, ecosystem services and 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.

Sub Leader

TAKAGI Akira RIHN

Core Member

- KUROKURA Hisashi** University of Tokyo
- KONO Yasuyuki** Kyoto University
- IKEMOTO Yukio** University of Tokyo
- NISHIDA Mutsumi** University of Tokyo
- ARIMOTO Takafumi** Tokyo University of Marine Science and Technology
- BABA Osamu** Tokyo University of Marine Science and Technology
- YAMADA Yoshihiko** Tokai University
- KAWADA Makito** Chukyo University

- KANZAKI Mamoru** Kyoto University
- TAKAHASHI Hiroshi** National Fisheries University
- MATSUOKA Tatsuro** Kagoshima University
- MOTOMURA Hiroyuki** Kagoshima University Museum
- MUNPRASIT, Aussanee** Southeast Asian Fisheries Development Center
- TOLEDO, Joebert D.** Aquaculture Department, Southeast Asian Fisheries Development Center
- MUNPRASIT, Ratana** Department of Fisheries, Kingdom of Thailand
- TUNKIJANUKIJ, Suriyan** Faculty of Fisheries, Kasetsart University
- BABARAN, Ricardo** University of Philippines Visayas
- FERRER, Alice J. G.** University of Philippines Visayas

Resources Program

MOJI Kazuhiko | 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

Full Research	Leader	Title
R-04	MOJI Kazuhiko	Environmental Change and Infectious Disease in Tropical Asia
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

Nomads were once the principal inhabitants of semi-arid Central Eurasia. Following the rise and fall of various ethnic groups and empires, the Yuan Dynasty took nominal control of much of Eurasia in the 13th and 14th centuries. In the 18th century, however, a national border was drawn across the region, definitely distinguishing Russia from Qing China. The inhabitants of the area subsequently experienced a great change of lifestyle, as the border and national settlement policies forced nomadic peoples out of their traditional patterns of livelihood.

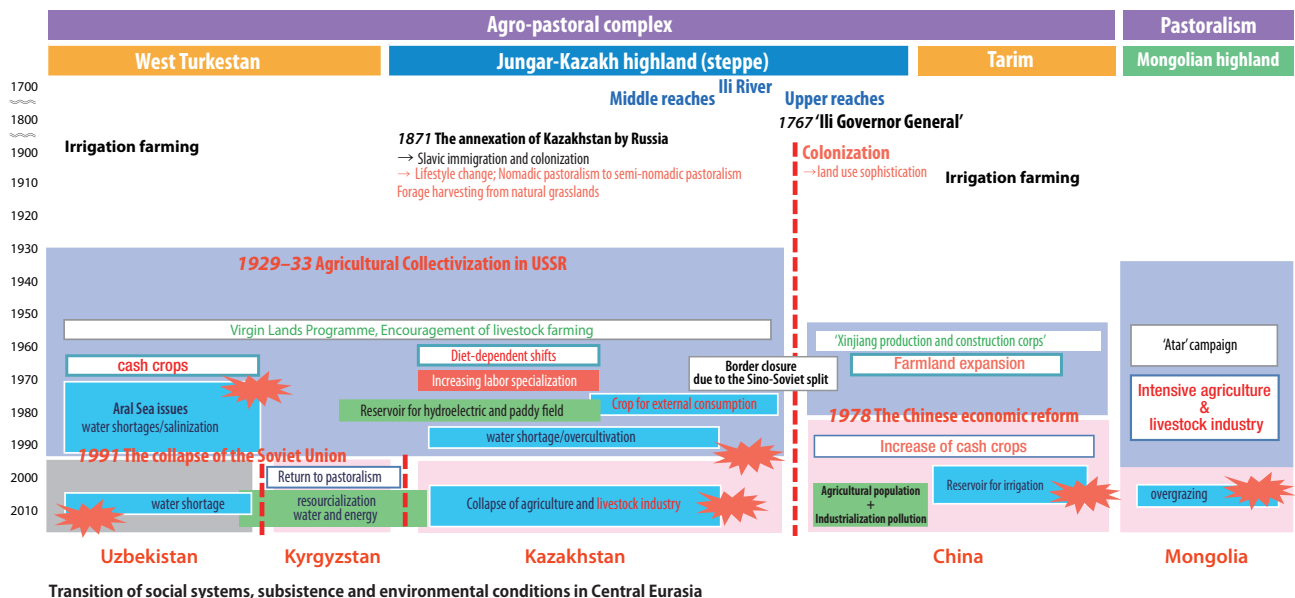
This project combined analysis of historical documents, archaeological remains and natural proxies such as ice cores, lake sediment samples, tree rings and wind-blown deposits in order to describe how nomadic peoples and nation-states affected the natural resources and climatic conditions in the Ili River watershed. Project researchers also investigated human activities on both sides of the Russia/China border in order to describe the likely impact of these activities on contemporary environmental conditions.

We used a number of proxies to reconstruct climate and environmental change in the past one thousand years. Reconstructing temperature and precipitation allowed us to estimate river flow and extent of grasslands. We developed a chronological database of archaeological monuments, showing the appearance and duration of settlements. Nomadic populations and their key sites were identified with historical documents. This analysis showed that in medieval times, agricultural and nomadic peoples

lived in separate, yet complementary, communities making full use of environmental variation.

We found that climate change had both negative and positive effects on agricultural and nomadic production. Relocation and change in subsistence pattern were major adaptations. After a clear political border was drawn between Russia and Qing China, patterns of human-environmental interaction in the region shifted dramatically. In Kazakhstan, natural grasslands for nomadic pastoralism were transformed into agricultural farms. The socialist planned economy, including the division of labor, not only prevented the accumulation of agricultural knowledge, but also caused the loss of traditional knowledge of nomadic pastoralism. As a result, the area suffered a severe economic crisis, and recovery after the collapse of the USSR was very difficult. In China, on the contrary, modern development in the area was delayed and the traditional nomadic pastoral system has been well preserved in the mountains.

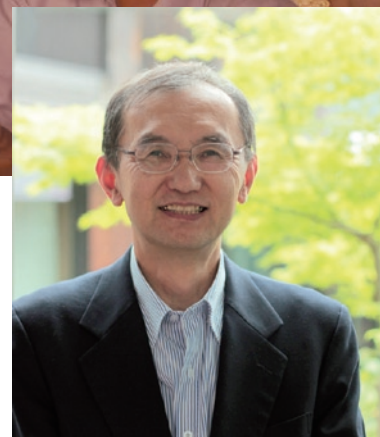
Outcomes of the project were compiled and published as a series of books (four volumes, in Japanese). An international scientific workshop and a public seminar in Almaty, Kazakhstan were organized. In the scientific workshop, we invited local planners and discussed present problems in the area. In the public seminar, we presented our outcomes to public, especially university students. We look forward to continued dialogue with local researchers, NGO activists, and researchers in international organizations.



Environmental Change and Infectious Disease in Tropical Asia

Project Leader **MOJI Kazuhiko** RIHN

Kazuhiko Moji has been at RIHN since 2007. He received his MA (1978) and Ph.D. (1987) in Health Sciences at the University of Tokyo. He was Research Associate at the Department of Human Ecology at the University of Tokyo (1983–1987). In 1987 he moved to Nagasaki University, where he served as Associate Professor in the Department of Public Health (1987–1999) and Professor in the School of Allied Medical Sciences (1999–2001), Faculty of Health Sciences (2001–2002), and Research Centre for Tropical Infectious Diseases of Institute of Tropical Medicine (2002–2007). He was a visiting Takemi Fellow of International Health at Harvard School of Public Health (1991–1992) and a visiting researcher in the Department of Bio-anthropology, Cambridge University (1998–2000).



The health profile of a human population can be seen as a product of both biophysical and human elements. The field of ecohealth examines this relationship between human health, livelihood and environmental conditions. From this perspective, construction and conservation of sound human ecosystems is essential to the survival of human populations.

The RIHN Ecohealth Project examines the effect of climate/environmental and social change on the ecology of human infectious disease in tropical monsoon Asia. Key drivers of ecological change in this area include climate change, population increase, deforestation, resettlement, urbanization, expansion of wet rice cultivation, changes in water management, economic development and changes in livelihood or lifestyle. Diseases associated with such change include malaria, liver fluke infection, and diarrhea. The study will offer new ecologically based insights for the evaluation and control of infectious disease in relation to both local and global environmental change.

Progress to date

Liver fluke in Laos

In Savannakhet Province, Laos, we examined the patterns of liver fluke infection of *Opisthorchis viverrini* (Ov), a parasitic infection associated with the consumption of raw freshwater fish. We identified habitats of snails and fish that serve as intermediate hosts in disturbed environments. In particular, we studied the relationship between Ov infection and increased conversion of forest to rice paddies, finding that paddy fields increased habitat of

first intermediate host snails and fish. Using the Lahanam Health and Demographic Surveillance System (HDSS), 7000 residents were surveyed to determine use of toilets and open defecation. Over 3000 feces were collected and examined; DNA was analyzed and GPS coordinates and distribution of outdoor defecation sites were recorded to generate a predictive map of Ov egg accumulation (Fig. 1). A combined, educational, behavioural, and environmental Ov control program successfully reduced the infection rate.

Malaria in Laos

The team assessed malaria prevalence in Sepone district. Using a mobile phone-based health information network, a survey among village health volunteers reported 1217 cases of malaria. Higher malaria infection rates were found only in small sized communities, irrespective of forest coverage, and in proximity to watering holes created from bomb craters, suspected as ideal breeding habitats for the mosquito vector (Fig. 2). Anthropological study in the area revealed high rates of birth and infant mortality.

Malaria at the Vietnam–Lao border

Surveys conducted at the Vietnam–Lao border in collaboration with the Khanh Phu Malaria Research Center, Quang Tri Provincial Health Office, Nagasaki University, and Savannakhet Provincial Health Office revealed higher malaria incidence and presence of malaria mosquito vectors inside homes on the Lao side of the border. We documented the first case of *Plasmodium knowlesi* in Laos, only the fifth *Plasmodium* species known to infect humans, as this malarial parasite is normally transmitted between non-human primates.

Diarrhoeal diseases in Bangladesh

The Bangladesh Study Group worked in collaboration with the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR, B) to study the relationship between the Indian Ocean Dipole and the incidence of cholera in Dhaka. This group studied the long-term effects of flood on morbidity and mortality. Results were contrary to expectations, as its work showed the 2004 flooding had relatively little impact on mortality rates related to diarrhoeal diseases. Nevertheless, as Bangladesh is highly vulnerable to diverse climate effects, we suggest that a sensitive health survey system devised by the government is vital to a comprehensive plan for vector control.

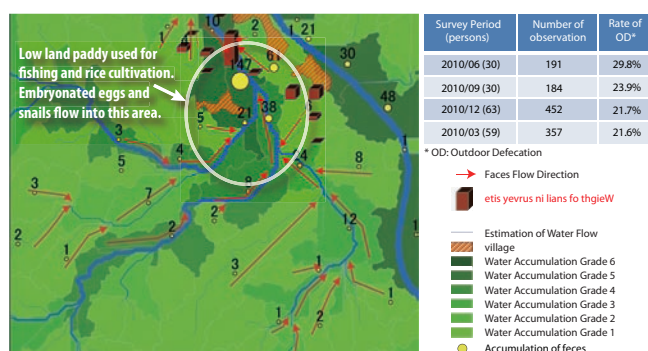
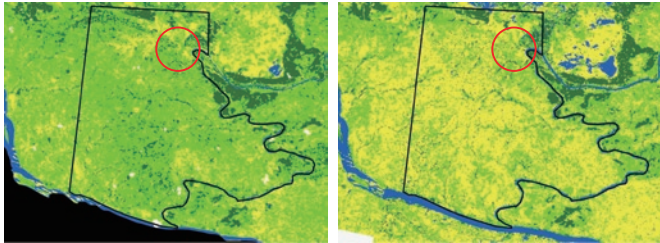
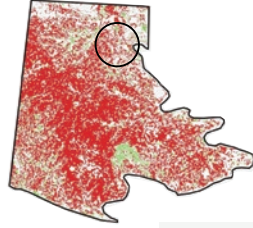


Figure 1 Flow distribution and accumulation sites of human feces potentially releasing embryonated eggs and snails serving as intermediate host

In 1968: Almost all area was covered by forest In 2006: Forest was replaced by paddy field in large area



Land-cover changes between 1968 and 2006



Red: Deforestation area
Green: Reforestation area

Figure 2 Land-cover changes in Songkhone District, Lao PDR

Circled area represents study site. Over a period of nearly 40 years, population growth and environmental changes of converting forests to paddy fields have resulted in increased risk of Liver fluke infections in the area (Tojo, Komano 2011).

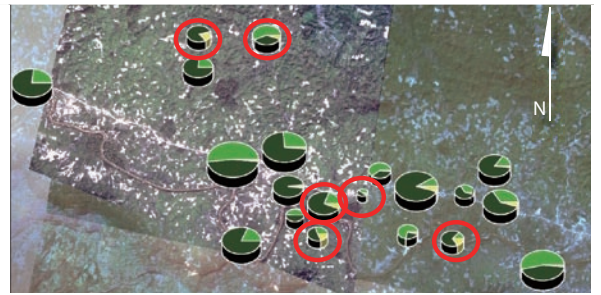


Figure 3 Malaria positive rate of school-age children in Xepon village, Lao PDR (June, 2011)

Red circles show villages of small population size with high malaria positive rates.

Infectious disease in Southwest China

Applying a traditional historical approach, the China Study Group investigated how social and environmental changes led to the reduction of malaria and schistosomiasis.

Current problems addressed in the study focus on the health impacts of social changes since the late 1980s and prevalence of HIV/AIDS, tuberculosis, and sexually transmitted disease. In collaboration with Yunnan Health and Development Research Association, ecohealth focused monitoring continues in 10 villages (Fig. 3).

Future tasks

In its final year, the RIHN Ecohealth project will synthesize its findings in order to develop approaches to governance and management of disease that are appropriate to each study area. In Laos, an ecohealth text book will be published to engage communities and advance practice and knowledge of the links between environment and health. We will organize an international symposium as an initial platform for experts in ecohealth and in order to build a lasting network of individuals and groups for ecohealth research and practice.

JINGJIANG RIVER & DONGTING LAKE IN

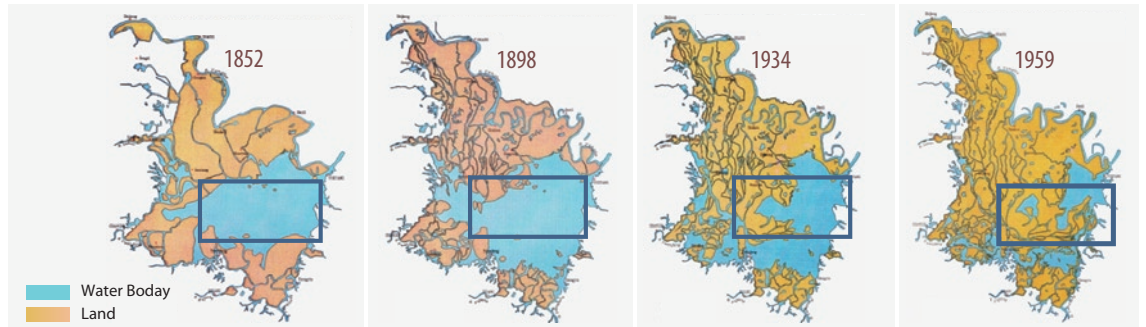


Figure 4 Changes in the Yang-zi River Basin affecting schistosomiasis endemicity

Since the 17th century, introduction of cattle, increased human migration, cultivation practices, and changes in river ecology due to flooding, segmentation and collapse of embankments have impacted the level of endemic schistosomiasis in the Yang-zi River Basin.

Yuan Jiang 沅江 (West shore of Dongting Lake, Hunan Province) 1850s–1950s



Figure 5 Schistosomiasis control and changes in agricultural activities (Yunnan)

Beginning in the 1950s, the Chinese Government implemented a project to increase food production. Along with changing agricultural activities, several schistosomiasis control measures were implemented, including a program to control feces by producing fertilizers, mechanization of some farming practices, and land-use change.

Sub-Leader

NISHIMOTO Futoshi RIHN

Core Members

KOBAYASHI Jun Nagasaki University
KOBAYASHI Shigeo Kyoto University
IJIMA Wataru Aoyama Gakuin University
ITOH Makoto Aichi Medical University
TOMITA Shinsuke Kyoto University
ASAKURA Takashi Tokyo Gakugei University
YAMAMOTO Taro Nagasaki University
KANEKO Satoshi Nagasaki University
NAKAZAWA Shusuke Nagasaki University
CAI Guoxi Nagasaki University

HASHIZUME Masahiro

Nagasaki University

SUNAHARA Toshihiko

Nagasaki University

AHMED, Kamruddin

Oita University

BOUPHA, Boungnong

National Institute of Public Health, Lao PDR

KOUNNAVONG, Sengchanh

National Institute of Public Health, Lao PDR

PHONGMANY, Panom

Savannakhet Province Health Department, Lao PDR

PONGVONGSA, Tiengkham

Savannakhet Malaria Station, Lao PDR

MASCIE-TAYLOR, Nick

Cambridge University, UK

HOSSAIN, Moazzem

Institute of Allergy and Clinical Immunology, Bangladesh

RAHMAN, Mahmudur

IEDCR, Bangladesh

ZHANG, Kong-Lai

Peking Union Medical College, China

ZHANG, Kaining

YHDRA, China

TOJO Bunpei

RIHN

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.



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 examines life support mechanisms and self-sufficient modes of production among Arab peoples who have survived in dryland environments for more than a millennium. It examines low energy-intensity life-support mechanisms and modes of production, such as hunting, gathering, fishing, herding, farming, and forestry. In doing so the study 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 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 (Fig. 1).

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 their dependence on 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
- 4) Local ecosystems comparative studies group (Fig. 2).

Assessing the environmental effects of development in coastal arid tropical zones

Local peoples in coastal arid tropical ecosystems have historically depended on sea products (fish, shellfish, dugong, dolphin, and sea turtles), and harvesting from mangrove forests (dominant species: *Avicennia marina*) and coral reefs, two complex and interrelated ecosystems. Such coastal zones present a large—but fragile—frontier for development. Development can lead to environmental degradation through destruction of mangrove forests, coral reefs, and seagrass beds and the release of highly concentrated saline water into the sea (Fig. 3). Meanwhile,

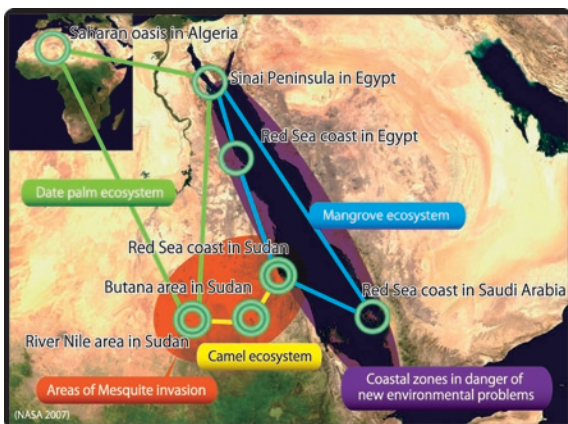


Figure 1 Field survey areas

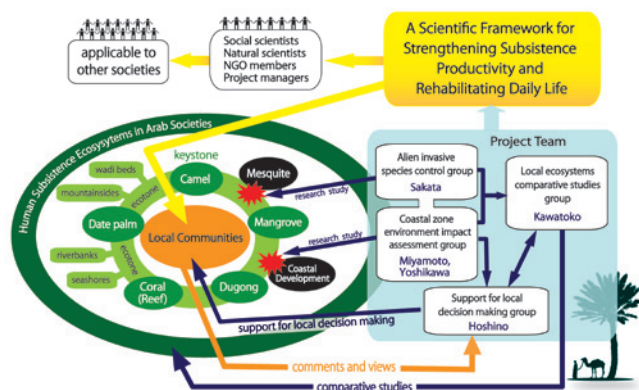


Figure 2 Research methods, approaches, and organization



Figure 3 Coastal zones in danger of new environmental problems



Figure 4 Mangrove leaf sampling area

mangrove afforestation projects can provide fodder for domesticated animals such as camels while also serving as nurseries for nearby reef fish. In order to suggest frameworks for a new environmental assessment with community participation for prevention of environmental problems, we have conducted multi-principal studies focusing on coastal mangroves in Sudan, Egypt, and Saudi Arabia.

Based on studies on forest structure, morphological adaptation to environmental stresses, and isotope analysis of *Avicennia marina* water-use characteristics, we found significant impacts of soil salinity on tree height, leaf dry weight, internode length, and shoot length. We also found in some forests that appropriate camel feeding might promote the growth of *A. marina* leaves and shoots. Having begun DNA analysis of 3100 leaf samples collected along the Red Sea Coast (13 forests in Egypt; 25 forests in Sudan; 24 forests in Saudi Arabia) (Fig. 4) which will allow a regional-scale analysis of genetic diversity, mangrove forest dynamics and processes of change.

Since concluding a MOU with the Red Sea University, a principal institution of marine science in Sudan, several full-scale field surveys are now underway. These include a behavioral study using biologging of dugongs in seagrass beds, a GPS-based monitoring of camel grazing area and browsing pressure in *A. marina* forests, and continuing anthropological study on fishing villages.

Future activities

In the next year, we will synthesize our findings in order to propose a scientific framework to strengthen subsistence productivity and combat livelihood degradation in local Arab communities in preparation for the post-oil era. Several books are also in preparation, including *How Do We Live Without Oil?* (RIHN book series, in Japanese) and *Human Subsistence Ecosystems in Arab Societies* (9 volumes, in Japanese).



Photo 1 Mangrove leaf sampling (Saudi Arabia)



Photo 2 Camels eat mangrove leaves and branches (Sudan)



Photo 3 Japanese and Sudanese researchers discuss a mangrove plantation (Sudan)



Photo 4 Morphological study on *A. marina* (Sudan)

Sub Leader

ISHIYAMA Shun RIHN

Core Member

KAWATOKO Mutsuo Research Institute for Islamic Archaeology and Culture
MIYAMOTO Chiharu Action for Mangrove Reforestation
SAKATA Takashi Ishinomaki Senshu University

YOSHIKAWA Ken

HOSHINO Buhe

SHINODA Kenichi

BABIKER, Abdel Gabar E. T.

ABU SIN, Abdalla M. A.

LAUREANO, Pietro

BENKHALIFA, Abdrahmane

Okayama University

Rakuno Gakuen University

National Museum of Nature and Science

Sudan University of Science and Technology

Gezira University, Sudan

Traditional Knowledge World Bank, Italy

Ecole Normal Supérieure, Algeria

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 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.



This research project investigates the links between environmental change, ecological degradation, food availability and quality, and human health. Research is conducted at Sta. Rosa Watershed and other sites in the Laguna Lake region, a highly populated and variegated region in which rich ecological resources are threatened by rapid land use change, urbanization and industrialization. Study sites are representative of the challenges facing many other Asian watersheds.

This project combines social, medical and physical sciences in order to develop strategies of ecological risk management for sustainable food, health and environmental security planning in the Laguna Lake Watershed, Philippines. In addition to the dense population and urbanization, continuing deforestation, upsurge in inland fisheries, and unabated abuse of the land uses surrounding the lake have increased deposition of sediments and damaged water quality. With initial data indicating that such pollution is harming human health, Japanese and Filipino researchers have begun to build partnerships with locally organized leaders to put a Community-based risk communication and early warning system in place to ensure a sustainable resource base and food-health security.

The project has four principal objectives:

- 1) to document the current levels and pathways of heavy metals 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 analyse the ecological effects of agrochemical inputs, and their cumulative impact on food production and relation to subsequent ecosystem deterioration; and
- 4) to describe land use change in the Laguna Lake area and its impact on water and material cycles, including impacts on sedimentation and groundwater level and quality.

Research organization

Five research teams are comprised mainly of researchers at 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. The Environmental Risk Assessment Team identifies the exact sources of, and factors responsible for, particular pollutants in the food chain, utilizing stable isotope and other analytical techniques. The Socio-Economic Evaluation Team explores how market- and non-market-based

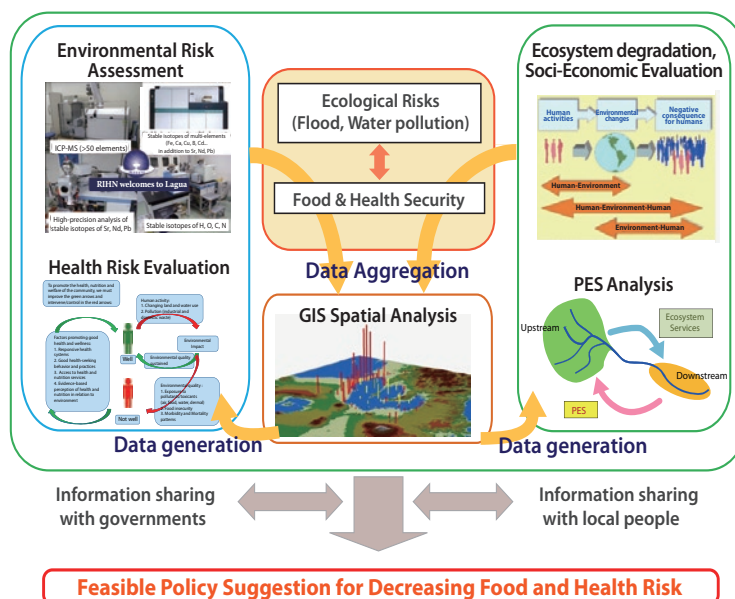


Figure 1 Overall research flow and organization

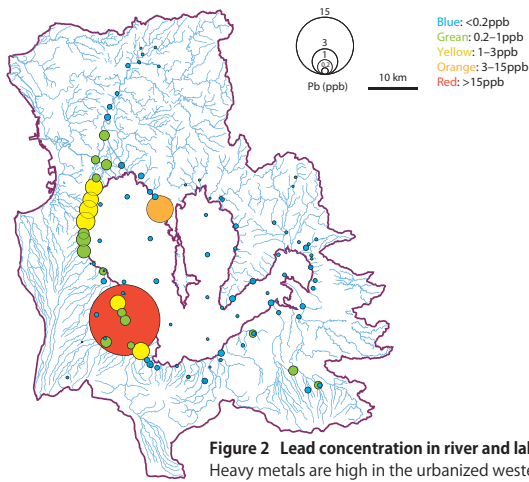


Figure 2 Lead concentration in river and lake waters
Heavy metals are high in the urbanized western region

instruments can be used to improve water quality, food security and public health. The Health Risk Evaluation Team describes human nutrition, history of disease, and life expectancy in the region, especially in relation to socio-economic dynamics. The Payment for Ecosystem Services Team (PES) investigates the design of ecosystem service payment programs. The 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 (Fig. 1).

Recent achievements and research issues ahead

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

The Environmental Risk Assessment Team has created water quality maps for the Laguna Lake and its watersheds. The maps show high presence of heavy metals in the western region, likely reflecting urbanization there (Fig. 2 and 3). The pathways of heavy metals from source to food will be traced by analyzing lead isotope compositions of water, sediment and samples from edible fish and water plants.

The Socio-Economic Evaluation Team will use statistical and econometric methods to address: (i) consumer behavior and perception of food & health risk; (ii) economic and environmental values by agricultural/ agro-forest land use; (iii) waste management and community development; (iv) long-term comparison of food & health security. Several household and farm surveys have been conducted in the Sta. Rosa sub-watershed and control area since fall 2011.

The Health Risk Evaluation Team has completed the baseline evaluation to clarify the type and severity of environmental exposures affecting human health. Description of the health status of households and dietary diversity in the Santa Rosa sub-watershed area has also been completed. A pilot study assessing exposure to environmental pollutants among community residents near Laguna Lake area was completed. Further analysis of community exposure to environmental pollutants and risk communication strategies will be formulated.

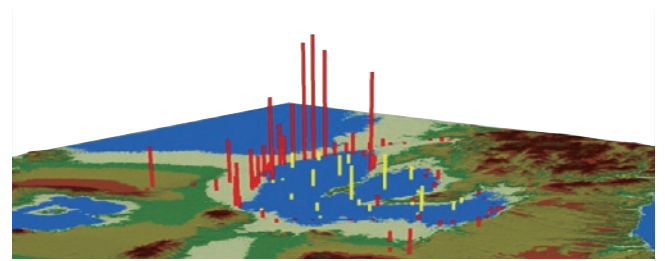


Figure 3 Spatial distribution of Zinc Red: river sample Yellow: lake sample



Upstream: Soil erosion easily occurs due to plantation (Silang, Cavite: Sta Rosa City)

Midstream: Less water than before; more flooding

Downstream (7km from lakeshore): Urban sprawl and housing development; the river turned to be a drainage



Photos Water quality is degraded by human activity as it flows downstream

The Payment for Ecosystem Services (PES) Analysis Team estimates farmers' decisionmaking in agroforestry and describes how agriculture contributes ecosystem services to the region. It also evaluates individual willingness-to-pay for enhanced ecosystem services. Combining these results, the team will eventually conduct policy simulations and derive a PES scheme that adequately reflects regional livelihoods and ecology.

The GIS Risk Analysis Team constructed a spatial analysis data map which aggregates spatial data (paper maps, satellite images), data contributed by other teams, and new variables such as land use and land change (Fig. 3). It will construct an efficient information-sharing structure in a local community in the current fiscal year.

The project is now in its third year of research. Through the field work, laboratory experiments, interviews and discussions with stakeholders, and household, farm, and biomedical surveys, each team is submitting rigorous preliminary research results. A community forum will be held in September 2012 in Laguna in order to communicate our research activities and findings to date. Feedback from the local stakeholders will be utilized for the interdisciplinary study next year.

Sub-Leader

MASUDA Tadayoshi RIHN

Core Members

NAKANO Takanori RIHN

ARIMA Makoto Yokohama National University

MASUNAGA Shigeki Yokohama National University

TANAKA Katsuya Shiga University

YUMOTO Takakazu

Kyoto University

RAZAFINDRABE, Bam H. N

University of the Ryukyus

GALVEZ-TAN, J.

University of the Philippines–Manila

MOLINA, Victorio B.

University of the Philippines–Manila

RANOLA, Roberto

University of the Philippines–Los Baños

CONCEPCION, Rogelio N.

University of the Philippines–Los Baños

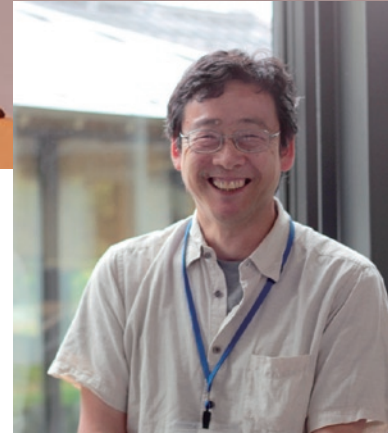
SANTOS-BORJA, A. C

Laguna Lake Development Authority

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), and associate professor in the Graduate School of Global Environmental Studies, Kyoto University (2002–2011). His major fields of interests are soil science, agronomy, indigenous knowledge and techniques in terrestrial ecosystems management, and desertification and rural development assistance in West Africa, Southern Africa, India and Southeast Asia.



Research backgrounds, objectives and study areas

Semi-arid Afro-Eurasia suffers from a vicious cycle of poverty and land degradation. It is one of the front-lines 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 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 Sahel or in China and Mongolia, will be considered.

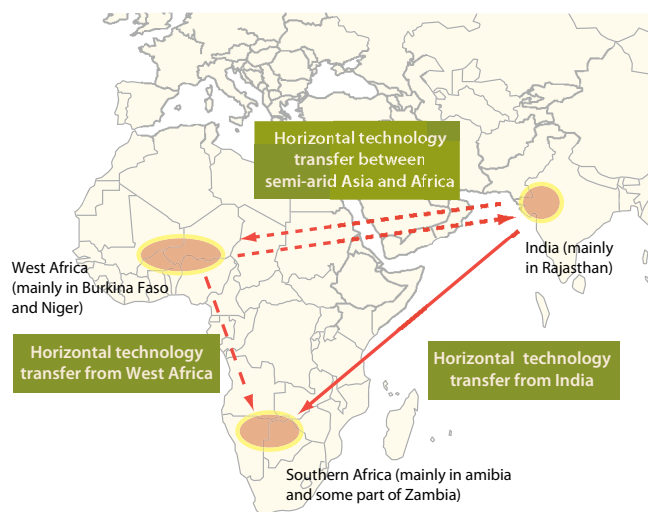


Figure 1 Targeted study areas in the project
circle: study area; rectangle: direction of technology transfer

Progress to date

Crisis years: Coping activities as socio-ecological adaptations

The Fakara area in Western Niger receives approximately 400mm of annual rainfall, and frequently suffers drought, irregular rainfall, and locust outbreaks. We asked cultivators and pastoralists to remember years of crisis since the 1970s, and the coping strategies they employed. Cultivators indentified 1973, 1984, and 1991 as years of crisis, while pastoralists named 1984, 1992, 1998 and 2005 (Fig. 2). Household vulnerability differed by ethnicity, as different ethnic groups typically rely on distinct livelihood strategies. Major coping activities were sale of livestock, food aid, seasonal migrant works, borrowing food and money, consumption of stored food, gathering of useful plants and insects, sale of fuel woods, and donation and remittance of money from family members working abroad. Pastoralists tended to manage within the range of their livelihood systems i.e. they would sell livestock, while, by contrast, cultivators tended to combine plural activities and depend on external support.

The fallow-band system

Project researchers developed the ‘fallow-band system’, a unique practical technique to reduce wind erosion and improve crop yield. 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 2011, the technique has been practiced by 381 households in 44 villages, 9 districts and 3 regions in Niger (Fig. 3), and continues

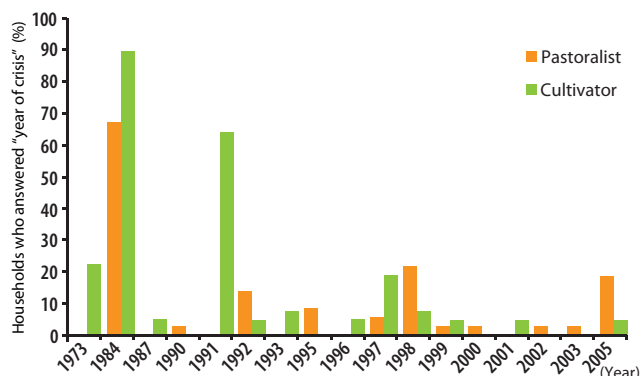


Figure 2 ‘Years of crisis’ experienced since 1970s in Fakara area, Western Niger

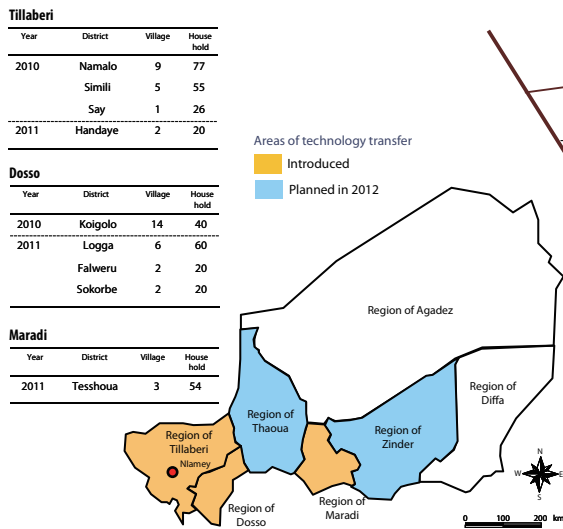


Figure 3 Areas in Niger in which the fallow band system will be introduced

to spread. We consider this system as the good fruit of collaboration between local households, academics, and development agencies.

Social network in a Sahelian community

We examined the dissemination of the fallow band system within the commune of Finare, in Say District, Niger, as an expression of social networking. Figure 4 shows the location of households that practiced and did not practice the technique. Households using the technique, indicated in closed circle and triangle, are located in and near Finare sub-village, where the chief of the commune lives. A village chief is commonly designated as an access point in participatory approach by many rural development projects. Why was the introduced technique not disseminated throughout the entire commune despite its proven benefits? The reasons may be given by Figure 5, which shows the networks of information and confidence in the commune. The sub-villages of Finare and Gardje have relatively dense network of information. Some households in Winde Gaoude and Koma are, however, isolated from the network. In addition, the chief, though he is a point of access to the community, is not a converging point in the network of confidence. These facts mean that the common participatory approach has some shortcomings and room for improvement. Figure 5 further suggests that some persons or households who are points of convergence and confidence in the community may enable future adoption of introduced techniques. This project will investigate the further practical advantages of interweaving such analysis of social networks into agricultural extension and rural development services.

Future tasks

Preliminary research was principally conducted in West Africa. In the year 2012–13, we expand our research in Southern Africa and India in relation to local livelihood, re-appraisal of indigenous knowledge, socio-ecological adaptation, desertification, and improvement of practical techniques and rural development approaches.

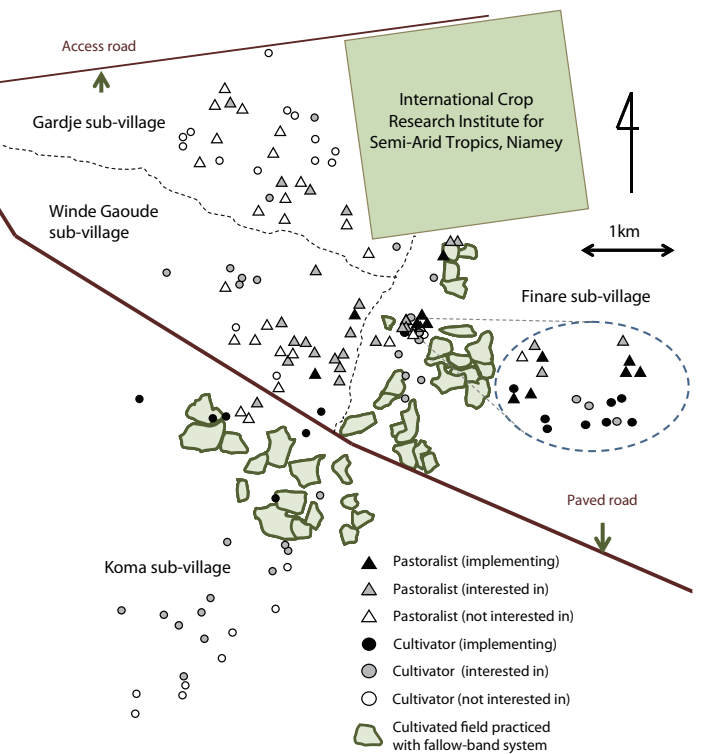


Figure 4 Cultivated fields using the fallow-band system and attitude of local people to the introduced technique in Finare commune, Western Niger

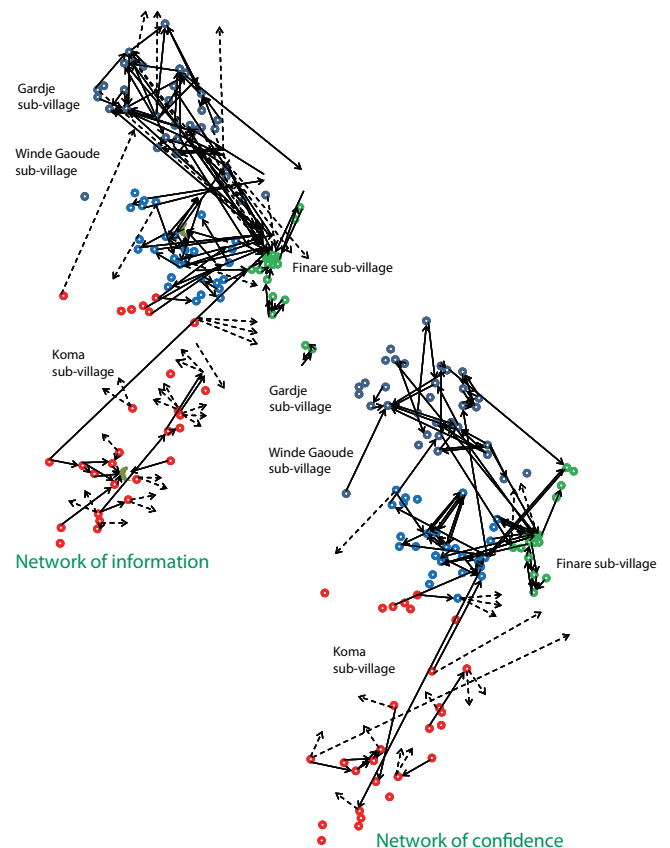


Figure 5 Network of information (left) and network of confidence (right) in Finare commune, Western Niger

Sub-leader

ISHIMOTO Yudai RIHN

Core members

SHINJO Hitoshi Kyoto University

IKAZAKI Kenta Cosmopolitan University of Tokyo

KOBAYASHI Hirohide Kyoto University

NAKAMURA Hiroshi Global Environmental Forum

MIURA Rei-ichi Kyoto University

UCHIDA Satoshi Japan International Research Center for Agricultural Science

MIYAZAKI Hidetoshi RIHN

Ecohistory Program

TANIGUCHI Makoto | 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-02	SATO Yo-Ichiro	Agriculture and Environment Interactions in Eurasia
H-03	OSADA Toshiki	Environmental Change and the Indus Civilization
H-04	UCHIYAMA Junzo	Neolithisation and Modernisation

Agriculture and Environment Interactions in Eurasia: Past, Present and Future —A ten-thousand-year history

Project Leader **SATO Yo-ichiro** RIHN

Agriculture represents a fundamental change in relations between humanity and nature. This research project examined historical interplay of agriculture and environment, focusing on the relation between climate, crops and food consumption in three major agricultural zones of Eurasia: the Rice, Mugi, and Vegeticulture Zones. Project research was designed to reconstruct the human-environmental histories of these zones in the last ten-thousand years. We suggest that such histories can provide important insight into the contemporary and future challenges to agricultural production and food consumption. ‘Genetic diversity’ was a key concept in the study.

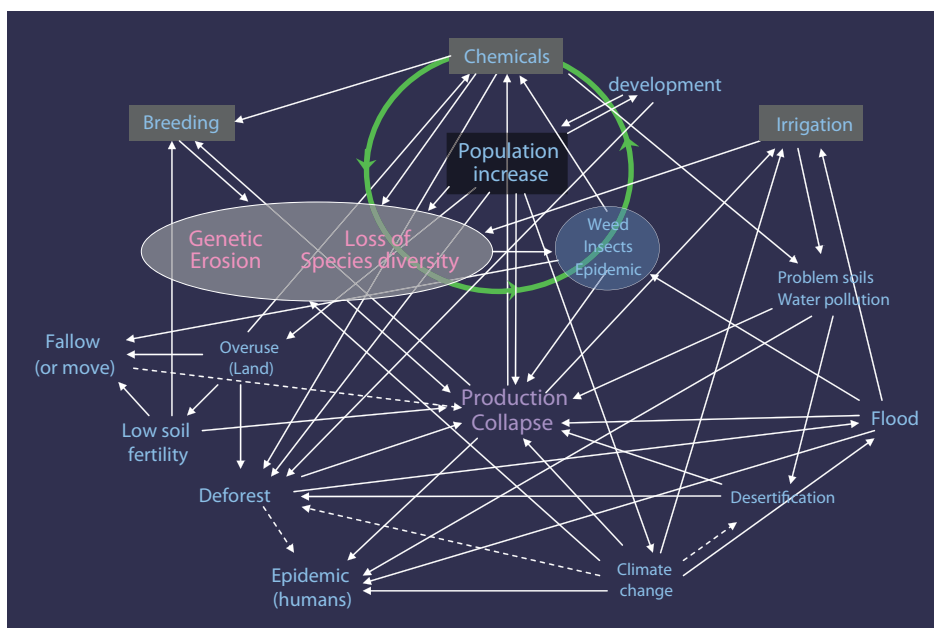
Project achievements

Project research successfully modeled agriculture-environment interactions involving multiple inter-woven factors, or what was termed the ‘Human Food Web’. Based on extensive field work and genetic analyses conducted on materials collected from all three agricultural zones, it was clearly shown that genetic diversity has decreased significantly in the course of agricultural development. Past collapses of food production indicate that epidemics were a substantial threat. The past suggests that current losses of genetic diversity increase the risk of collapse in agricultural production.

In the Rice Zone, natural and human disasters frequently disturbed food production. Following disaster,

however, human societies were able to recover production through the use of various techniques (called *shinogi* in Japanese) adapted through history. Such techniques can teach much to contemporary observers of food production. In the Mugi Zone, fieldwork revealed that the desert found throughout the region today is the result of past human over-use of lands in agriculture. This finding was based on substantial new data obtained by our research team. Such histories should lead to greater awareness of potential agricultural crisis and encourage critical reconsideration of our present agricultures. Research conducted in the Vegeticulture Zone shed light on the origins of vegeticulture, demonstrating that the process of plant domestication was a means of long-term environmental adaptation.

In total, our research indicates that in order to maintain food production and to address the difficult contemporary global environmental problems that humanity confronts today, we should not seek to ‘control’ nature, but to coexist with nature. Specialists in agriculture should therefore promote the production of genetically diverse cultivars suited to local environments, and rooted in local traditional cultures. Project researchers have presented this message to the public through a number of publications (e.g. *Agricultural History in Eurasia* Vols. 1–5, 2008–2010) and a special exhibition at the National Museum of Nature and Sciences entitled “Food for Tomorrow: Biodiversity and Sustainability” (September 2010–January 2011), which was viewed by more than 143,000 visitors.



Human food web
The model indicates that the agricultural collapse is a key element in the Web. Collapse is both a cause and an effect of other events.

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. Drawing on archaeology, Indology, and palaeo-environmental investigation, this project reconstructed the social and environmental histories of several key Indus areas, and attempted to determine whether and how environmental factors contributed to their short life and rapid decline. Especially through palaeo-environmental investigation, the project 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

In 2009 project researchers extracted cores from Rara Lake in the Lesser-Himalayan region in order to reconstruct long-term climate changes in South Asia. Preliminary core analysis shows that there were six intervals of weak summer monsoon events during the Mid-Late Holocene, and that the summer monsoon intensified as the Indus civilization declined.

Our research on regional environmental changes centers around two 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.

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.

We conclude that Indus Civilization underwent a process of transformation due to population migration from the Indus river basin to monsoon affected areas. 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.

Research communication

Project findings have been presented in numerous international conferences and reported twice in *Science*. English publications include nine volumes of *Current Studies on the Indus Civilization* and two books—*Cultural relations between the Indus and the Iranian Plateau during the third millennium BCE* and *Language Atlas of South Asia* (2012)—from Harvard University Press. We were also active in conducting seminars and workshops in Japan and India for academics and general audiences. Currently we are preparing a book on the Indus Civilization for general readers in Japan.



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 Rann 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, civilization.

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? Karamer's odd-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.



Figure 1 East Asian Inland Seas and NEOMAP workgroups

- (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 historical-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.

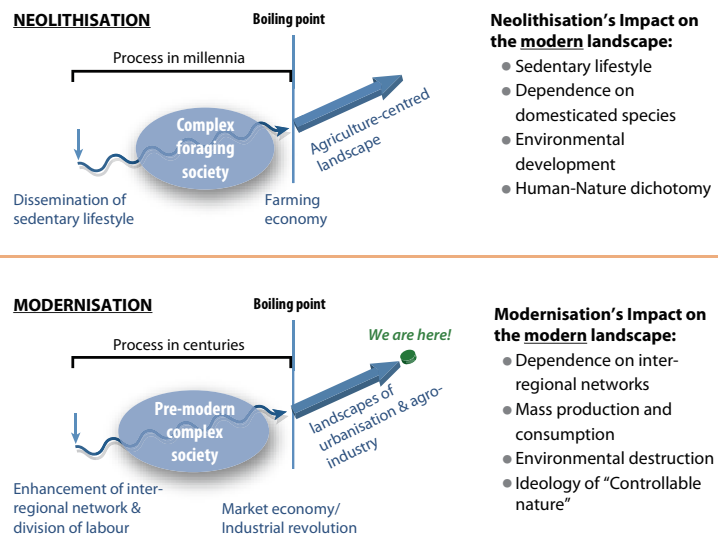


Figure 2 Neolithisation and Modernisation as historical processes of major landscape shifts

Ecosophy Program

KUBOTA Jumpei | 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** RIHN

A cycle of poverty and environmental degradation is a principal cause of severe global environmental problems. Forest degradation and desertification are prevalent throughout the semi-arid tropics, including in Sub-Saharan Africa and South Asia, where the majority of the world's impoverished people live. People in the semi-arid tropics depend on rain-fed agricultural production systems that are vulnerable to climate variability. Environmental resources such as vegetation and soil are also vulnerable to human activities. A key factor in preventing environmental problems lies in social-ecological resilience, or the ability of human societies and ecosystems to recover from social or environmental shocks.

This project examined the factors affecting social-ecological resilience in rural Zambia and the ways in which it can be enhanced. Project research focused on heavy rain in 2007 as an environmental shock. Crop damage differed by geographical location and condition, and we observed that farmers diversify field locations as an ex-ante coping mechanism. Weekly household surveys revealed that declines in food consumption levels depended not only on crop damage but also on associated increases in food prices. Heavy rain caused a decline of calorie intake as well as body weight, thus affecting not only agricultural production but also health and labor supply.

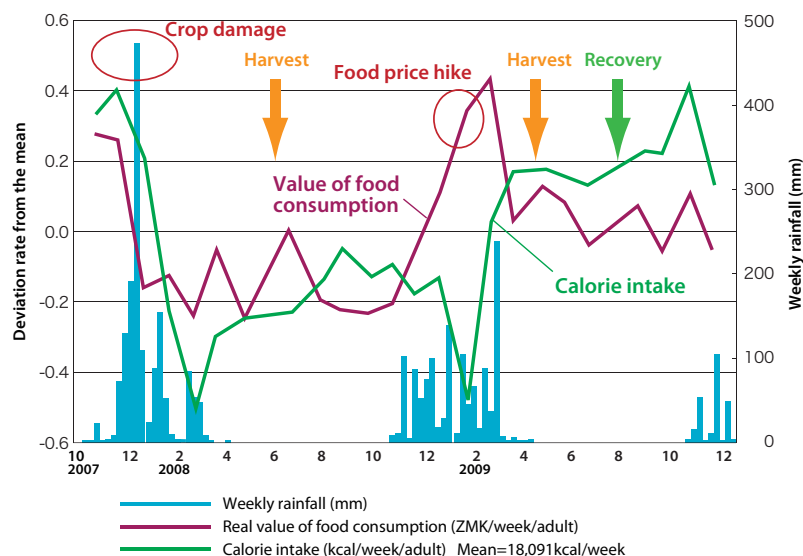
Farm households employ various coping activities, including replanting maize and cotton, changing crops, and earning cash income from non-agricultural activities by utilizing available natural resources, economic

opportunities and social networks. Most households did not recover food consumption after extreme rainfall for more than one year, and poor households suffered the most severe and long lasting impacts.

In the short run, household resilience in the rural communities can be considered as livelihood recovery through food consumption and production. Our results indicated long term strategies, such as improvements in basic services such as education, health care and market access, are necessary to improve adaptive capacity, as is resource management suited to local ecological conditions. Long-term observation also shows that change in rural institutions, social organization and development forces complicate changes in household resource use and affects their vulnerability and resilience.

Dissemination of research outcomes

In 2011, we organized two international symposia and discussed our research outcomes with various researchers and stakeholders. In Lusaka, Zambia, we organized Lusaka Workshop in 2007, 2009 and 2011 and discussed applicability of resilience concept to development projects. In August 2011, we held a village workshop for disseminating research outcomes to villagers in the study site and discussed together strategies to enhance resilience of the community. Additionally, we plan to publish research outcomes as three books in 2012.



Change of food consumption after 2007 heavy rain

Impact of heavy rain in Dec. 2007 appeared as food price hike in Feb. 2009 just before the next harvest season and affected poor households. It took more than one year for most households to recover from the rainfall shock and they fully recovered only after the next harvest in 2009.

TOWARDS ENVIRONMENTAL HUMANICS OF THE EARTH SYSTEM



The triple catastrophe Japan experienced in March 2011 underscored the complete dependence of all societies, no matter how technologically advanced, on the Earth's elemental forces and properties. It also exposed how this dependence is managed and mediated by both formal and informal social institutions, which are often embedded and expressed in the practices of everyday life. In this sense, we see that science, governance, institutions and social practices comprise a single field of activity, yet one which cannot be identified as such in conventional forms of study. In order to open our research at RIHN to such dimensions, we now focus our efforts on conjoining the existing Domain Programs through a set of cross-cutting Initiatives intended to enhance design-oriented, problem-solving approaches for the contemporary human-environmental condition.

A plant sprouts fresh leaves in a mudflat created by the 2011 tsunami

RIHN Initiative Projects

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.



Designing Local Frameworks for Integrated Water Resources Management

Project Leader **WATANABE Tsugihiko** RIHN

Tsugihiko WATANABE received his doctor's degree in agricultural engineering from Kyoto University in 1986. He was the leader of RIHN's Research Project "Impacts of climate change on agricultural production system in arid areas", which had been implemented from 2002 until 2007, mainly in the Mediterranean region of Turkey. He is interested in irrigation as an expression of local wisdom of land and water, and its functions to sustain local environment and to adapt to global changes.



World water and food resources are under pressure. Population growth and development will increase aggregate demand for freshwater just as climate change is predicted to affect the historical spatial and temporal patterns of water availability. Since hydrologic cycles and agricultural systems are so closely linked, human societies must plan for change in both in relation to increasing demand and predicted increases in water-related disasters such as flood and drought.

This project conducts extensive historical and contemporary evaluation of several local-scale agricultural water management regimes, seeking principles that promote, or blockages that hinder, efficient water-use. Combining best quantitative measures of water flow, use, and quality, and insights from irrigation engineering, historical description and institutional analysis, it evaluates and describes scenarios for culturally relevant and institutionally and economically feasible re-design of local water management regimes in several case-study sites. It seeks to improve the adaptability of the integrated water resources management (IWRM) framework to local cultural and economic contexts. The project then turns to fundamental re-design of local land- and water-management systems in relation to the combined social, economic and environmental challenges of the future.

Main results to date

Case studies are designed to illuminate water- and food-related challenges in specific environmental and social contexts. To date, project objectives and research activities have been appreciated by national and international researchers and institutes, governments, and local user associations as highly significant and worthy of their participation. The project has exchanged Memoranda of Understanding with six universities and research institutes in Turkey, Indonesia and Egypt, conducted collaborative works with FAO and IWMI, and anticipates collaboration with the Water-Culture Institute (USA) and Turkish Water Institute (see Figure.).

In Southeastern Turkey, a large scale irrigation development project is underway. Farmers in newly irrigated areas often practice inappropriate water management that results in land degradation. Project research examines the sources and processes of the problems, including structure and function of the institutions and organizations related to irrigation development. In Bali, there is a famous local water management system 'subak', which has been elaborated historically, but is now challenged by contemporary issues related to expansion of cash crop production and agrotourism. On the other hand, in South Sulawesi, Indonesia,



Photo 1 Diversion work in a traditional water management system 'subak' in Bali of Indonesia

Elaborated and precise management practices contribute to equitable and sustainable water distribution.



Photo 2

People picking up cotton flowers in the GAP Region (the South-Eastern Anatolia Development Project Region) of Turkey

Cotton production with higher income has been expanded widely and very rapidly with irrigation development, while it causes problems of soil salinity and water shortage in the region due to inappropriate water management practices.



Photo 3 Interview with farmers on water management practices in the Biri-Biri Irrigation scheme of South-Sulawesi, Indonesia

They share space for regular meetings of water use farmers.

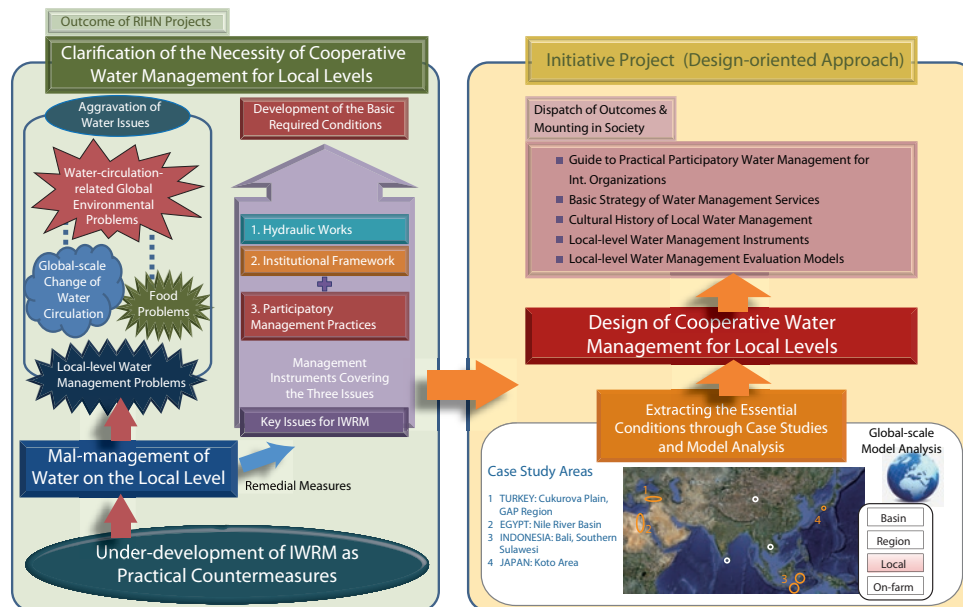


Figure Background and flow of the project research
 Many of global environmental problems are water-related and caused by inappropriate water management of local level. The integrated water resources management (IWRM) is proposed world widely to improve the situation. To date, however, IWRM has not achieved its potential. Local water management, or district level management, is a key component of IWRM, and its basic policy and framework are to be re-designed in the context of contemporary global environmental changes. This project research, based on several completed and ongoing projects of RIHN, entails interdisciplinary investigation of the merits and demerits in conventional regimes of local/distinct water management, especially related to irrigation, in several environmental contexts. Main research foci are agricultural productivity, water balance and environment, management institutions and organizations, and human behavior and consciousness. Field and modeling studies are integrated to develop an advanced description of the knowledge systems affecting water management; it will allow comprehensive analysis of the key elements in improved management of basin water resources and in human–water–land relationships more generally.

modern irrigation has been developed in order to provide irrigation in the dry season. Based on observation of actual water and crop conditions in this area, project research establishes the necessity of modifying this management system in order to provide supplementary irrigation in the wet season. Project research also examines the processes of farmer participation organized by newly established NGOs,

In Egypt, the long history of irrigation and cooperation in water use is to be reproduced with paleo-climate data, hydrological modeling, and historical proxies and references. Based on this historical review, current projects for participatory irrigation management are reviewed. In the Echi River Basin of Shiga, Japan, reformation and empowerment of local water management is an urgent issue caused by changes of farming system and the complicated system of water-use developed in the last decades. Here, research describes the impacts of management on water quality of Lake Biwa downstream and on the hydrological cycle of the region.

Research plan

The system of local water management in each location is to be examined according to the following three main themes: 1) environment, including soil and water-use, and hydrology; 2) socio-economy, including institutions, land holding system, agriculture and local industry, and development organizations; and 3) culture, including environmental consciousness, tradition and customs,

and behavior. A dedicated sub-team will investigate each theme at each study site. Sub-teams are to share, integrate, communicate their findings, and propose improved scheme of local water management from community and district level up to region or basin. Cross-site integration is overseen by a central coordination group composed of researchers from each of the study sites as well as representatives of relevant international agencies. Such proposed modifications in local water management and basin hydrological models will establish the significance of, and necessity of improving, local water management within the global hydrological regime.

This research project will therefore contribute to the design of place-specific water policies and practices and to the concepts, models and theories that describe the multi-scale and linked nature of human-ecological systems. The models or method to be developed in the project can simulate and evaluate the impacts and implication of water management practices on agricultural production and hydrological conditions both qualitatively and quantitatively. They also can provide stakeholders with basic requirements of better management and guide selection of options available to improve their systems.

Expected outcomes, including the fundamental frame of cooperative water management, are to be disseminated to local communities, decision makers, and international aid organizations, so that they can be widely examined, debated, and applied to the significant water-agriculture problems and pressures faced in different areas in the world.

Sub-Leader

HAMASAKI Hironori RIHN

Core Members

AKÇA, Erhan Adiyaman University, Turkey
AKIYAMA Michio University of Shiga Prefecture
BERBEROĞLU, Suha Çukurova University, Turkey
ÇULLU, Mehmet. A. Haran 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
TAKARA Kaoru Kyoto University
TAMURA Ulara Japan Society for Promotion of Science (National Museum of Ethnology)

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 and behavior of cichlid fishes of Lakes Tanganyika and Malawi for 20 years, and has since expanded his research areas to community-based conservation and natural resource management. Throughout his career, including as associate professor in the University of Malawi and as Conservation Director of WWF Japan, he focused on creating scientific knowledge bases for sustainable development and community-based management of ecosystem services. He also served as Professor of Ecology and Environmental Sciences at Nagano University from 2006 to 2012, leading a project to create a network of local scientists producing Integrated Local Environmental Knowledge all over Japan.



This project examines three important frontiers of contemporary environmental studies. First, it examines the processes of local knowledge production related to environmental problems and solutions. Second, it recasts the fields of environmental perception and action so that their dimensions and complexity in real social settings are more accurately indicated: it addresses the ‘new commons’, a term used to indicate the overlapping of biophysical and human forces and materials that constitute social-ecological systems and the range of actors beyond single communities that are implicated in management of these commons. Finally, the project advances the theory and practice of transdisciplinarity, as the project itself progresses through a process of co-design and co-production among a wide range of scientists, theoreticians, and local and nonlocal stakeholders and intermediaries.

This project studies and develops processes of local knowledge production and circulation that can lead to bottom-up solutions to global environmental problems. It examines and facilitates dialogue between scientific explanation and everyday ways of understanding, and it monitors how this knowledge changes as it is utilized at different points and levels of social networks. The knowledge produced is called Integrated Local Environmental Knowledge (ILEK).

This project is based on the conviction that bottom-up approaches are essential to provide solutions to global environment problems. Its goal is to facilitate adaptive governance of diverse local ecosystems as an expression of new commons. Project research focuses on the formation and circulation of local knowledge, or ILEK. ILEK is formed through transdisciplinary dialogue of scientific research and the knowledge produced in the daily practices of local stakeholders. If recognized and mobilized, ILEK can deepen the knowledge bases used to make decisions and design community-based adaptive governance of diverse ecosystem services. The project therefore also aims to facilitate production and circulation of ILEK in order to understand how community-based adaptive governance systems emerge and function.

We examine the local stakeholder networks and societal impacts of ongoing and completed RIHN research projects, as well as those of a range of cases of stakeholder-scientist interactions around the world. Meta-analysis and modeling allows us to elucidate the key actors and mechanisms facilitating ILEK production and adaptive governance. Integration of case observations, meta-analysis, and theoretical modeling will allow us to design a series of social experiments for the case study sites in order to examine in real time the adaptive governance systems facilitating collaboration among diverse stakeholders. With this approach to co-design and co-production of knowledge, we aim to shape a new approach of design-oriented science supporting bottom-up solutions of global environment problems.

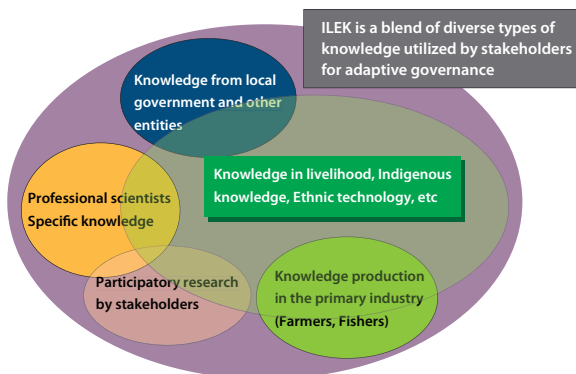


Figure 1 Structure of local knowledge for environment and sustainability
Production and circulation of ILEK is not exclusively performed by professional scientists. Rather, it is often produced and circulated by diverse actors in local communities, including skilled workers in primary industries, local 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.

Main activities to date

During the Feasibility Study in 2011, we established preliminary analytical frameworks for meta-analysis of case studies, based on guidelines of collaboration between scientists and stakeholders published by the Local Science Network for Environment and Sustainability (LSNES). The LSNES and guidelines are the product of a research and development project entitled Construction of a Pragmatic Scientist Community Contributing to Stakeholder-driven Management of Local Environment (2008 to 2012), funded by JST Research Institute of Science and Technology for Society (RISTEX).

The Case Study Group consists of three research teams (East Asia, Europe and North America, and Developing Countries); it conducted preliminary analyses of eleven

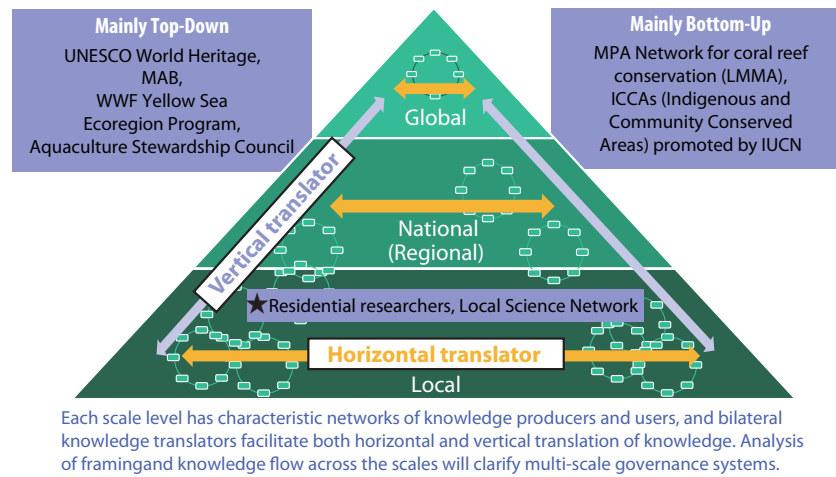


Figure 2 Hypothetical framework of multi-scale analyses
 This framework will be used to analyze the role of bilateral knowledge translators in supporting knowledge flow and adaptive governance across different scales from local to global.

RIHN projects, multiple LSNEs sites, as well as others around the world, and selected 38 case study sites and 11 candidate sites so far. We are currently designing common criteria of meta-analysis from the viewpoints of knowledge users as well as from responsive potentials of local stakeholder networks to the production and circulation of ILEK.

Early analysis has demonstrated the significance of key individuals in knowledge production and communication networks. Residential researchers and bilateral translators in various local communities were found to play important roles linking local knowledge users to global perspectives, and at the same time, in translating locally accumulated knowledge among stakeholders into scientific languages. We also identified ‘vertical’ translators, individuals and organizations that facilitate flow of knowledge between local and global scales and so offer insight into the challenging problem of designing multi-scale governance systems. We established a Multi-scale Analysis Group, with two research teams corresponding to top-down and bottom-up processes respectively, in order to examine these scalar dimensions of knowledge production and circulation.

The Theory and Modeling Group includes mathematical and conceptual theoreticians with experience in network analyses, complex systems theories, and dynamic system games. Their task is to develop the transdisciplinary methodologies capable of integrating case studies and illuminating the processes of knowledge production that facilitate adaptive and bottom-up governance. Their results will be regularly communicated to ongoing case studies and social experiments, stimulating interactions between theory-development and empirical study. The Theory and Modeling Group will work in close collaboration with a Managing Group consisting of team leaders and other members with strong backgrounds in integrative methodologies, who in-turn act as intra-project knowledge



Photo A stone tidal weir restored by local stakeholders of Shiraho coral reefs, Ishigaki Island, Okinawa, Japan

This example of restoration of a traditional fishing gear to create and improve coral reef ecosystem services is underpinned by transdisciplinary ILEK including integrated knowledge on ecosystem functions of the stone weir, history and traditional knowledge on the local practice, and social mechanisms to utilize it. (photo by Masahito Kamimura)

translators, facilitating knowledge flow among diverse project members.

These integrative analyses will be used to develop methods used in social experiments that can clarify mechanisms for adaptive governance of new commons. Social experiments will be co-designed with residential researchers and local translators. They will entail monitoring the deliberate production and circulation of ILEK to measure its impact within stakeholder networks.

As described, the design and approach of this initiative-based project is an extraordinary experiment in design-oriented science that explores how innovative knowledge production practices and social systems can offer solutions to global environment problems.

Core Members

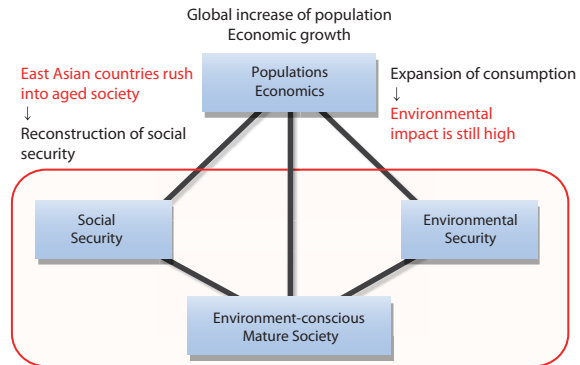
MIYAUCHI Taisuke	Hokkaido University
NIITSUMA Hiroaki	Tohoku University
TOMITA Sho	Tohoku University
SUGA Yutaka	University of Tokyo
MATSUDA Hiroyuki	Yokohama National University
SAKAI Akiko	Yokohama National University
YUMOTO Takakazu	Kyoto University
YAMAKOSHI Gen	Kyoto University
SHIMIZU Mayuko	RIHN

TOKITA Kei	Osaka University
KIKUCHI Naoki	University of Hyogo/ Hyogo Prefectural Homeland for the Oriental White Stork
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
CASTILLA, Juan Carlos	Pontificia Universidad Católica de Chile

Current Feasibility Studies

Shrinking Societies: Integrating Ecosystem Health and Social Welfare in East Asia

KUBOTA Jumpei, RIHN Region: China, Japan and Korea



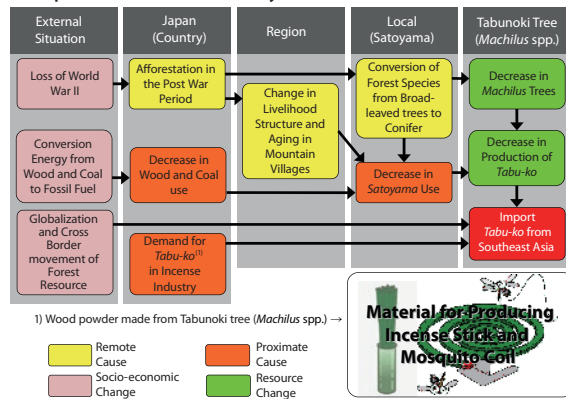
While global population continues to increase, East Asian countries are aging. How can quality of life in such societies be maintained—and improved—without population or even economic growth? In China, Japan, and Korea, where per capita consumption continues to increase, long term trends of population decline will not necessarily reduce demand for resources or pressure on ecosystems. This project therefore will develop new indices for evaluating ecosystem health and social welfare and propose a vision for environmentally-conscious, high-welfare societies in East Asia.

Land Use Diversity and Autonomy in Southeast Asia

TANIGUCHI Makoto, RIHN Region: Southeast Asia

In Tropical Asia, monoculture plantations of para-rubber, eucalyptus and acacia have expanded far beyond ecologically suitable habitats. Decreasing quantity and quality of natural forest have significantly impacted socio-cultural practices and ecological conditions in the region. How have residents and communities coped with these changes and their international dimensions? This feasibility study clarifies the proximate and remote causes and driving forces of land- and resource-use change in the region, with special attention to policy and practical options available to local communities.

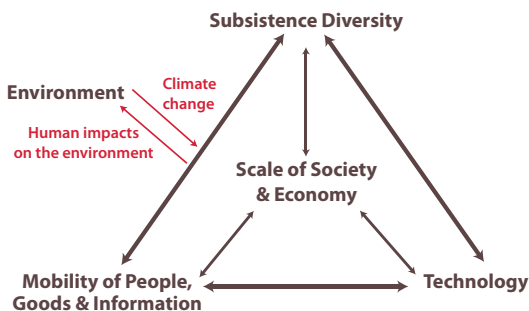
Example of Resource Chain Study



Reevaluating Advantages of Small-Scale Economies: Finding Alternative Strategies to Overcome Vulnerability in Large-Scale Economies

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 small-scale and diversified economies, especially of food production, for the 'long-term' sustainability of human societies. Archaeological, historical, ethnohistorical and paleoenvironmental studies from several locations will test our hypothesis that diversity in food production was inseparably related to the scale of communities and their long-term sustainability. Ethnographic and sociological studies of small-scale communities and food systems will be conducted to understand the complex interrelationships between cultural and natural factors in contemporary urban and rural settings. Insights obtained from past and present case studies will be used to develop proposals for future plans and public outreach programs that will convey the significance of subsistence/food diversity and guide the actions of the next generations.

Improving Environmental Literacy and Stakeholder Communication

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. It emphasizes how 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 two communities 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.



The History of Human-Water Interactions in East Asian Livelihood Complexes

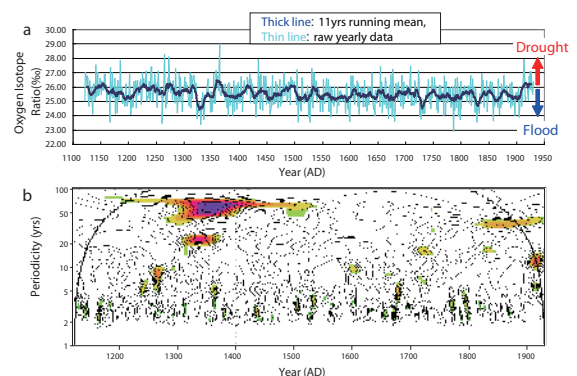
MURAMATSU Koichi, Gakushuin University
Region: four areas of the Loess Plateau (Yanan, Wuding Hu, Fen He, and Datong)

This project will describe the history of human-water relationships in livelihood complexes found in four areas of the Loess Plateau in China. The Plateau has a long history of human inhabitation and several distinct livelihood complexes can be identified, as can a long sequence of both natural- and anthropogenically-caused environmental transformations. The availability and use of water has been a determining factor throughout. In integrating environmental history, arid-land forest science, and environmental law and governance, the project will contribute to a design-oriented, problem-solving approach to human-water interactions in the Plateau.



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

NAKATSUKA Takeshi, Nagoya University
Region: Japan

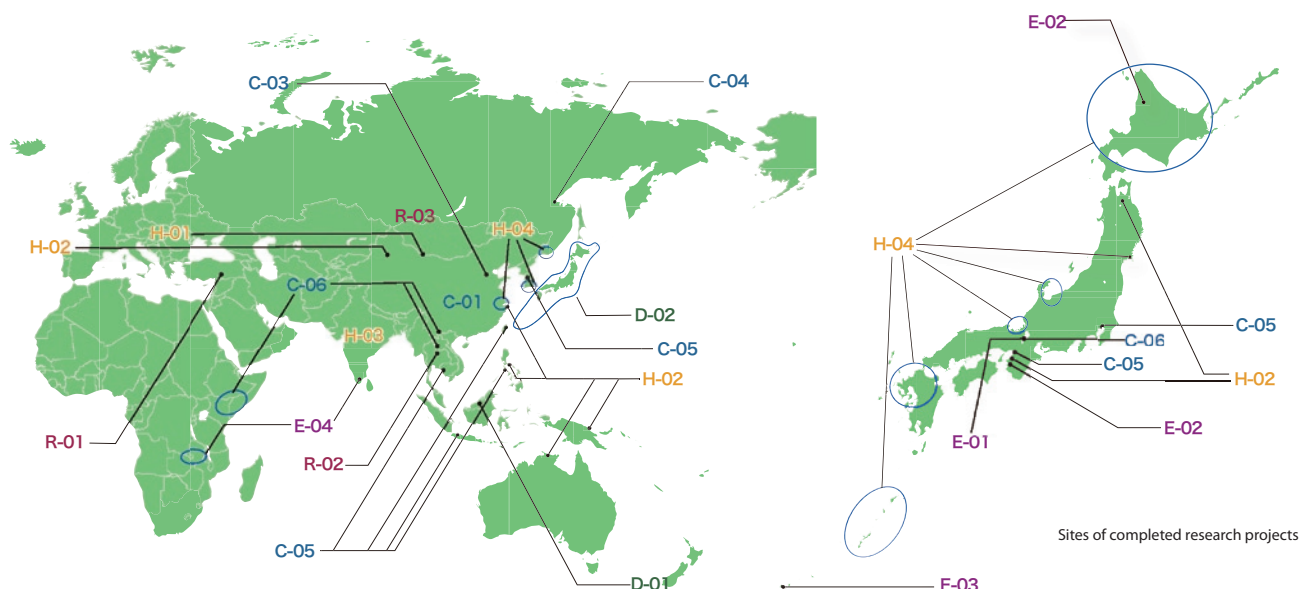


This project investigates the ways in which human societies in Japan have reacted to environmental change since the Jomon era. Past climate variability can now be reconstructed with great precision due to recent developments in the analysis of paleoclimatological data, chiefly tree-ring oxygen isotopic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

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; they are assessed in the final post-evaluation, two years after formal project conclusion. At RIHN, however, each project forms part of the institute's heritage; project results and data are entered into the RIHN archives upon which future RIHN projects may be formulated.

Fiscal Year Completed	Leader	No	Research Project
2006	HAYASAKA Tadahiro	C-01	Emissions of Greenhouse Gases and Aerosols, and Human Activities in East Asia
	KANAE Shinjiro	C-02	Global Water Cycle Variation and the Current World Water Resources Issues and Their Perspectives
	WATANABE Tsugihiro	R-01	Impact of Climate Changes on Agricultural Production System in the Arid Areas
	NAKAWO Masayoshi	H-01	Historical Evolution of the Adaptability in an Oasis Region to Water Resource Changes
	YACHI Shigeo	E-01	Multi-Disciplinary Research for Understanding Interactions between Humans and Nature in the Lake Biwa-Yodo River Watershed
2007	FUKUSHIMA Yoshihiro	C-03	Recent Rapid Change of Water Circulation in the Yellow River and Its Effects on Environment
	ICHIKAWA Masahiro	D-01	Sustainability and Biodiversity Assessment on Forest Utilization Options
	AKIMICHI Tomoya	R-02	A Trans-Disciplinary Study on Regional Eco-History in Tropical Monsoon Asia: 1945-2005
2008	SEKINO Tatsuki	E-02	Interaction between Environmental Quality of the Watershed and Environmental Consciousness
	TAKASO Tokushiro	E-03	Interactions between Natural Environment and Human Social Systems in Subtropical Islands
2009	SHIRAIWA Takayuki	C-04	Human Activities in Northeastern Asia and their Impact on Biological Productivity in the North Pacific Ocean
2010	TANIGUCHI Makoto	C-05	Human Impacts on Urban Subsurface Environments
	YUMOTO Takakazu	D-02	A New Cultural and Historical Exploration into Human-Nature Relationships in the Japanese Archipelago
	SATO Yo-ichiro	H-02	Agriculture and Environment Interactions in Eurasia: Past, Present and Future
2011	KAWABATA Zen'ichiro	C-06	Effects of Environmental Change on the Interactions between Pathogens and Humans
	KUBOTA Jumpei	R-03	Historical Interactions between Multi-Cultural Societies and the Natural Environment in a Semi-Arid Region in Central Eurasia
	OSADA Toshiki	H-03	Environmental Change and the Indus Civilization
	UCHIYAMA Junzo	H-04	Neolithisation and Modernisation: Landscape History on East Asian Inland Seas
	UMETSU Chieko	E-04	Vulnerability and Resilience of Social-Ecological Systems



The Center for Coordination, Promotion and Communication (CCPC)

The Center for Coordination, Promotion and Communication (CCPC) is responsible for research, infrastructure, coordination, and management that concern the institute as a whole. It is divided into three divisions.

The **Division of Research Development** is chiefly responsible for establishing RIHN's long term research trajectory and facilitating the internal and external projects and collaborations necessary for its realization.

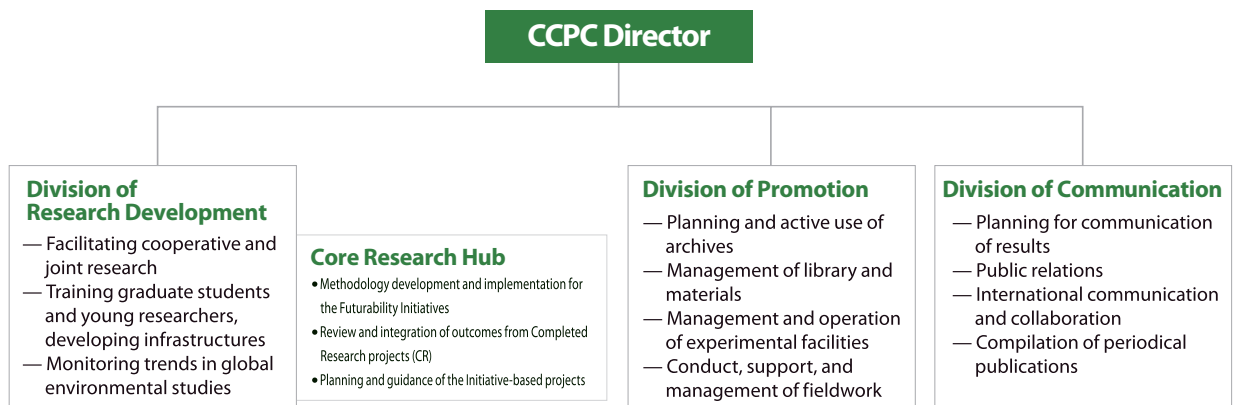
Since 2011 the Division also houses the **Core Research Hub** (see pages 4-5), which serves as a cross-cutting mechanism to capture and synthesize key contributions of domain-based research projects and develop new research projects. Its efforts are most recently manifest in the formation of the Global Environmental Change-Japan network described on page 50.

The **Division of Promotion** develops and maintains the laboratory facilities necessary for research and fieldwork, and builds the databases and archives supporting ongoing research (see pages 52-53).

The **Division of Communication** determines how communication regarding RIHN research, processes and outcomes should be established with academic, public and user-specific communities (see pages 48-49).



Professor SATO Yo-Ichiro,
Director of the CCPC.



The CCPC also regularly organizes events for students and the general public. Past events have included talks and activities on animals, insects and story-telling, enriching normal science curricula and expanding students' ideas of who is a scientist and what scientists do. RIHN also regularly provides tours of the research rooms and laboratories to groups of primary-, middle-, high-school and university students, and conducts an annual open house for the surrounding community.



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.



The 2011 recipients of the Earth Hall of Fame Kyoto Award were Professor Lester R. Brown (left), founder of the World Watch Institute and founder and President of the Earth Policy Institute, and Professor Klaus Töpfer (right), former Minister of the Environment, Nature Conservation and Nuclear Safety in Germany, former Under-Secretary-General of the United Nations, former Executive Director of the United Nations Environment Programme, and founding director of the Institute for Advanced Sustainability Studies in Potsdam.

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.

Reflections on the water around us, 3 July 2011

RIHN International Symposium

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



Professor Sander van der Leeuw, Dean of the School of Sustainability at Arizona State University, giving the 2011 keynote address

Beyond Collapse: Transformation of human-environmental relationships, past, present and future, 26-28 October, 2011

RIHN Public Seminars

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

Recovery from the Great East Japan Earthquake: The importance of including survivors' perspectives
19 May, 2011

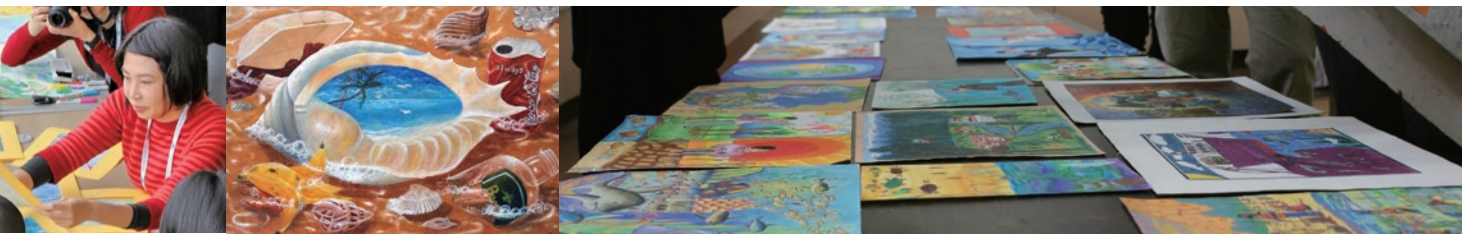
Invitation to global environmental studies: Behind the scenes
5 August, 2011

How will you live after oil resources are gone?
9 September, 2011

RIHN Area Seminars

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

People and nature in Eastern Eurasia: Twenty years after the Soviet Union
12 June 2011, Hokkaido University



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:

Health impacts by disasters in the world and East Japan Earthquake—Challenges and perspectives of emergency and long-term response

KUNII Osamu, Chief, Child Survival and Development, UNICEF Somalia Support Center, Nairobi, Kenya
13 July, 2011

Understanding climate change and cultural innovation in long-term perspective

Peter Jordan, Reader, University of Aberdeen/RIHN Visiting Research Fellow
2 August, 2011

Malaria situation and related factors in a Central Border Areas of Laos and Vietnam

Tiengkham Pongvongsa, Director, Center of Malariology, Parasitology and Entomology, Savannakhet Province, Lao P. D. R./RIHN Visiting Research Fellow
4 August, 2011

In search of the first farmers of Gujarat

Pottentavida Ajithprasad, Professor, the Maharaja Sayajirao University of Baroda/RIHN Visiting Research Fellow
4 August, 2011

Transdisciplinarity discussions on the future of global environmental change and sustainability research

Patrick Monfray, Deputy Head of the National Research Agency, France (ANR)
Heidi Hackmann, Executive Director, International Social Science Council (ISSC)
19 January 2012

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

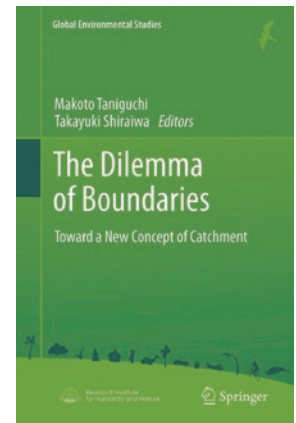
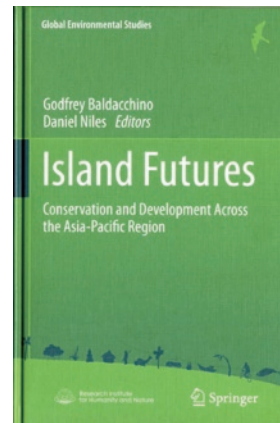
RIHN is collaborating with the Onshirin Regional Public Association, a group of Japanese commoners, and the International Association for the Study of the Commons (IASC) to organize the principal international conference of the broad community of scholars examining the use and governance of common property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

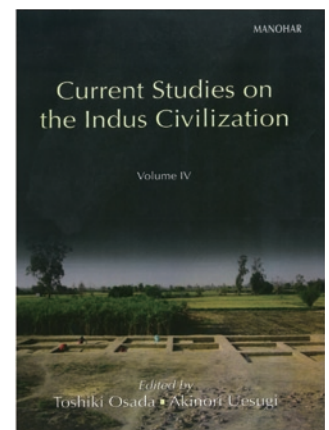


RIHN Book Series: Global Environmental Studies

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 and Seminars

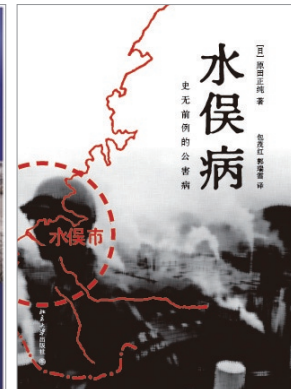
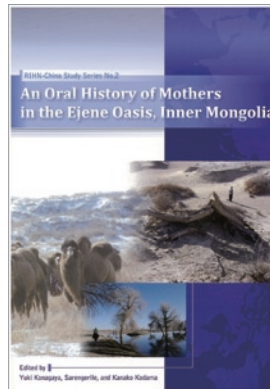


The RIHN Encyclopedia of Global Environmental Studies was published in 2010 to commemorate RIHN's 10th anniversary.

The encyclopedia was designed and written in order to present a single systematic and comprehensive reference work describing RIHN's research in the field of global environmental studies.

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 in the network of East Asian scholars concerned with environmental change in China. 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.



Photos (clockwise from top):

The RIHN-China lecture in Peking University in February 2012.

RIHN supported publication of a Chinese translation of Professor Harada's acclaimed book on Minamata disease.

RIHN-China Study Series publication No. 2, *An Oral History of Mothers in the Ejene Oasis, Inner Mongolia*.

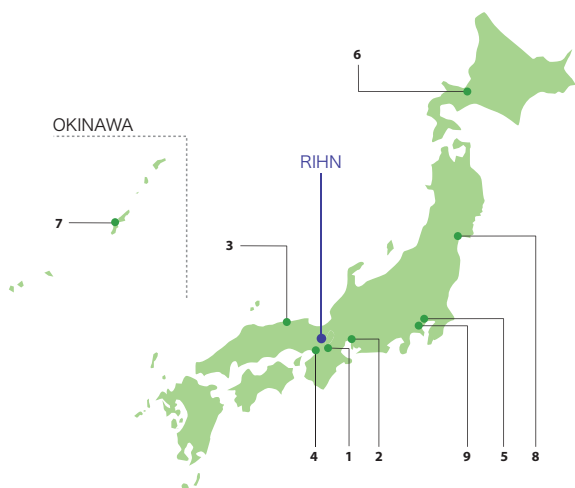
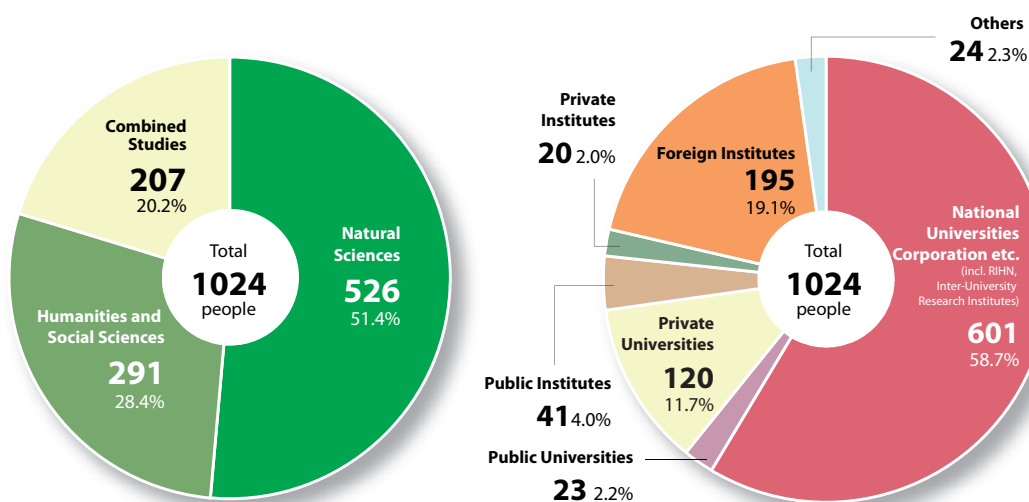
GEC Japan

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



Collaboration in Japan

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

International Collaboration

Memoranda of Understanding and Research Cooperation Agreements (As of April 1st, 2012)

*MOU signed in 2011

ALGERIA Centre National de Développement des Ressources Biologiques (R-05)
BANGLADESH International Centre for Diarrhoeal Disease Research (R-04)
BHUTAN Department of Medical Service, Ministry of Health, the Kingdom of Bhutan (D-03)
CHINA Fudan University (RIHN-CHINA) Qinghai University Hospital (D-03) Research Center for Environmental Technology of River and Lake, Shanghai Jiao Tong University (C-06) Yunnan Health and Development Research Association* (R-04)
FRANCE La Fondation Maison des Sciences de l'Homme (R-02)
INDIA Maharaja Sayajirao University of Baroda (H-03) Rajiv Gandhi University (D-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)
MONGOLIA Hustai National Park Trust (D-04) Institute of Biology, Mongolian Academy of Sciences (D-04) Institute of Botany, Mongolian Academy of Sciences (D-04) Institute of Geoecology, Mongolian Academy of Sciences (D-04) Institute of Meteorology and Hydrology, Ministry of Nature and Environment (D-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) Cukurova 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)
ZAMBIA Zambia Agricultural Research Institute, Ministry of Agriculture and Cooperatives (E-04)

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.



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

While individual projects make extensive use of specialized instruments, RIHN provides common access to the advanced instruments essential to contemporary environmental studies. In order to assure the proper use and care for this equipment, and to support its accessibility to the joint research of an inter-university research institute, the Division of Promotion maintains a manual of standard equipment and laboratory procedures. Stable isotope analysis has stimulated environmental science in recent years, and RIHN houses one of the most advanced laboratories for stable isotope analysis in Japan, as well as a range of support instrumentation. In order to facilitate access to the instruments, common consumable supplies are purchased collectively.

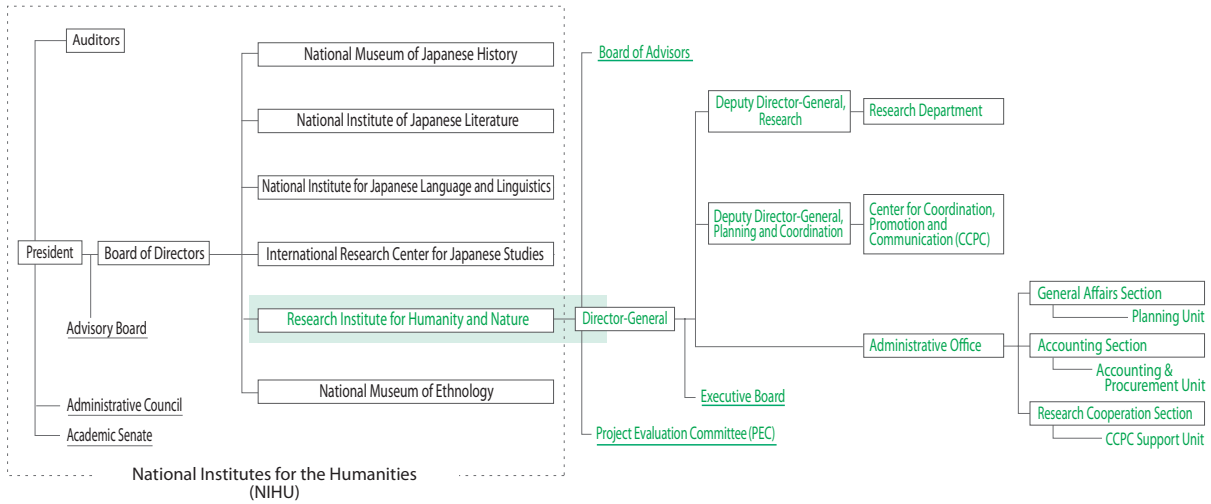
Management

Within the Center for Coordination, Promotion and Communication, the Division of Promotion manages and maintains the research facilities in cooperation with the research projects making use of them. About 200 people from 35 institutes used the RIHN laboratory facilities in fiscal 2009. As new research projects are established at RIHN each year, the Division of Promotion runs workshops several times a year in order to develop general understanding of the facilities and their procedures and enhance communication among lab workers. Laboratory procedures, instrument manuals and information relating to samples in storage are also available on the RIHN laboratory website. Beginning in 2010, the Division of Promotion will also conduct research into new technical methods in environmental studies.



Stable isotope analysis describes how things are linked to one another, where they come from and how they change in contact with other elements and through time. It is a powerful tool in the study of contemporary biogeochemical processes as well as of deep historical change. In analyzing the stable isotopes of the varying elements present in ground-, river-, and lake-water of a particular landscape, for example, researchers can describe its original sources as well as the route and time it took to get to its present location. Such description can illuminate how mountain forests and soils contribute to the quality of rice grown on the plains below.

Administrative Structure



Financial Information

Segmental Financial Information (Fiscal Year 2010)

Operating Expenses

Category	Amount (Yen in thousands)
Operating Expenses	1,998,248
Inter-University/Joint Research	997,894
Outsourced Studies	63,720
Outsourced Operations	75,692
Personnel	860,941
General Management	180,817
Financial Expenses	57,199
Total Expenses	2,236,265

Operating Income

Category	Amount (Yen in thousands)
Subsidy for Operation	2,000,251
Contract Operations, etc.	85,338
Donations	3,842
Others	159,780
Total Earnings	2,249,213

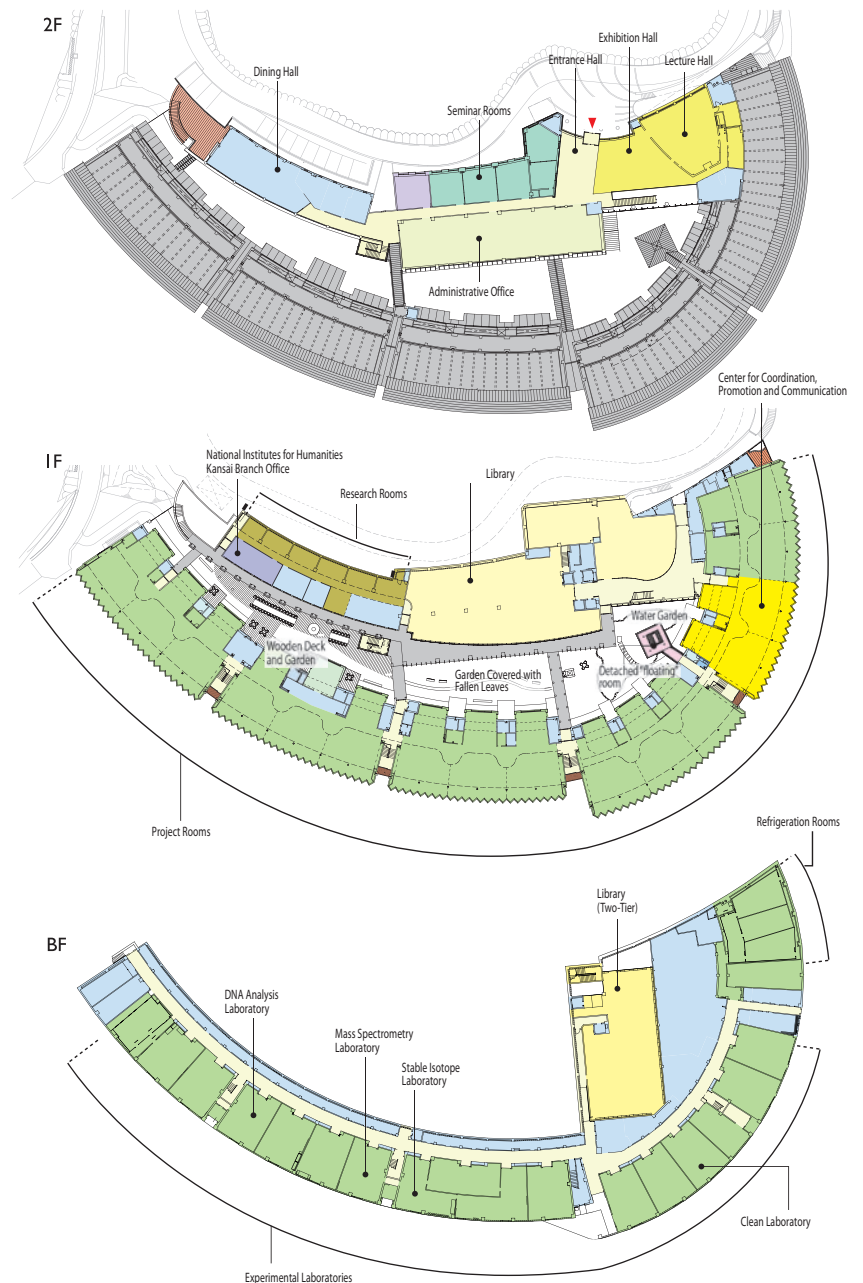
Operational Balance 12,947

External Sources of Funding

(Fiscal Year 2010)

Category	Amount (Yen in thousands)
Fund for Promotion of Academic and Industrial Collaboration	83,045
Grants-in-Aids for Scientific Research	70,870
Donations for Research	20,925

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



Board and Committees

*As of July, 2012

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
Professor, Research Institute for Sustainable Humanosphere, Kyoto University
KONAGAYA Yuki
Professor, Department of Social Research, National Museum of Ethnology
OTSUKI Kyoichi
Professor, Faculty of Agriculture, Kyushu University
WASHIDA Kiyokazu
Professor, Department of Philosophy, Faculty of Letters, Otani University

WASHITANI Izumi
Professor, Graduate School of Agricultural and Life Sciences, the University of Tokyo
YASUNARI Tetsuzo
Professor, Hydrospheric Atmospheric Reseach Center, Nagoya University

KADA Ryohei
Program Director, RIHN
KUBOTA Jumpei
Program Director, RIHN
MOJI Kazuhiko
Program Director, RIHN
NAKANO Takanori
Program Director, RIHN
SATO Yo-Ichiro
Deputy Director-General, RIHN
Director, CCPC, RIHN
TANIGUCHI Makoto
Program Director, RIHN
WATANABE Tsugihiko
Deputy Director-General, 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
Dean, Graduate School of Economics and Faculty of Economics, Kyoto University
WASHIDA Kiyokazu
Professor, Department of Philosophy, Faculty of Letters, Otani University
YAMAGATA Toshio
Dean, School of Science, 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, Natural and Social Science Interface, Institute for Environmental Decisions, Swiss Federal Institute of Technology Zurich, Switzerland

Executive Board

Oversees administrative operation of the institute

TACHIMOTO Narifumi
Director-General
SATO Yo-Ichiro
Deputy Director-General
Director, CCPC
WATANABE Tsugihiko
Deputy Director-General

KADA Ryohei
Program Director
KUBOTA Jumpei
Program Director
MOJI Kazuhiko
Program Director

NAKANO Takanori
Program Director
TANIGUCHI Makoto
Program Director
IBUKA Junji
Director, Administrative Office

Emeritus Professor

NAKANISHI Masami
WADA Eitaro
NAKAWO Masayoshi
FUKUSHIMA Yoshihiro
AKIMICHI Tomoya
KAWABATA Zen'ichiro

Guest Professor

KINOSHITA Tetsuya

In Memoriam

Professor HIDAKA Toshitaka
First Director-General of RIHN

RIHN Staff

DIRECTOR-GENERAL

DEPUTY DIRECTOR-GENERAL, Planning and Coordination

DEPUTY DIRECTOR-GENERAL, Research

TACHIMOTO Narifumi

SATO Yo-Ichiro

WATANABE Tsugihiko

ADMINISTRATIVE OFFICE

GENERAL AFFAIRS SECTION

Head IWASAKA Yutaka
Deputy Head MATSUO Takashi
General Affairs Subsection
Head UEMURA Hiroki
Chief HARA Akiko
Personnel Subsection
Head SUMITA Emi
Clerk KIDA Yoshimi
Clerk HIRAMATSU Naoko
Planning Unit
Head MATSUO Takashi
Planning & Assessment Subsection
Head MATSUO Takashi
Clerk NAKAOHJI Yu

ADMINISTRATIVE DIRECTOR

IBUKA Junji

Information Subsection

Head MATSUO Takashi
Clerk NAKAOHJI Yu

ACCOUNTING SECTION

Head MINAMI Kenichi
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
Accounting & Procurement Subunit
Head FUKAO Hidemasa
Chief MURASE Mamiko

RESEARCH COOPERATION SECTION

Head BANJOE Yoichi
Deputy Head MAENO Yoshiaki
Research Cooperation Subsection
Head SHINNO Masato
Clerk TAKATORI Yoko
International Affairs Subsection
Head TOKUDA Miki
CCPC Support Unit
Head MAENO Yoshiaki
CCPC Support Subunit
Head MIHARA Kazuaki
Clerk TSUJI Hanako

RESEARCH DEPARTMENT

Program Directors

KADA Ryohei
KUBOTA Jumpei
MOJI Kazuhiko
NAKANO Takanori
TANIGUCHI Makoto

(Program Assistant Directors)

HIYAMA Tetsuya
NAWATA Hiroshi
SAKAI Shoko

Professors

KADA Ryohei	Agricultural Policy, Environmental Economics
MOJI Kazuhiko	Human Ecology
MURAMATSU Shin	Architectural History, Urban History
OSADA Toshiki	Linguistics
SATO Tetsu	Local Environmental Studies, Conservation Ecology
WATANABE Tsugihiko	Irrigation Engineering

Associate Professors

HIYAMA Tetsuya	Ecohydrology
ISHIKAWA Satoshi	Conservation Ecology, Global Fisheries Science
NAWATA Hiroshi	Cultural Anthropology
OKUMIYA Kiyohito	Field Medicine
SAKAI Shoko	Plant Ecology
TANAKA Ueru	Terrestrial Ecosystem Management
UCHIYAMA Junzo	Prehistoric Anthropology

Visiting Professors

HABU Junko	Environmental Anthropology, Historical Ecology, East Asian Archaeology
HIMIYAMA Yukio	Geography
KATO Tsuyoshi	Comparative Sociology
KAWASAKI Masahiro	Atmospheric Chemistry
KOYAMA Shuzo	Archaeology
NAKAGAMI Ken'ichi	Environmental Economics and Policy
NAKAJIMA Tsunao	Ichthyology
NAKATSUKA Takeshi	Environmental Dynamic Analysis, Earth and Space Science
YAMAMURA Norio	Mathematical Ecology
UCHIBORI Motomitsu	Cultural Anthropology

Visiting Associate Professors

FUJITA Noboru	Grassland Ecology
ISHIKAWA Mamoru	Geography
MURAMATSU Koichi	Asian history
SHIRAIWA Takayuki	Glaciology
UMETSU Chieko	Resource and Environmental Economics

Visiting Research Fellows

CONCEPCION, Rogelio Navea	Resources Management
GAIBALLA ADIER, Abdelaziz Karamalla	Remote Sensing
KIMHI, Ayal	Agricultural and Development Economics, Labor and Family Economics
ZAMBA, Batjargal	Meteorology, 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-04 MINAMOTO Toshifumi	Molecular Ecology
R-06 MASUDA Tadayoshi	Agricultural & Resource Economics

Project Researchers

C-07 OSHIMA Kazuhiro	Climatology, Atmospheric Physics
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-09 HAMASAKI Hironori	Water Governance, IWRM
C-09 IMAGAWA Chie	Hydrology
C-09 WATANABE Satoko	Soil Science
D-03 KOSAKA Yasuyuki	Ethnobotany
D-03 NOSE Mitsuhiro	Forest Resource Management Ecology
D-04 KATO Satoshi	Forest Ecology
D-04 KODA Ryosuke	Insect Ecology
D-04 TAKANO Takenaka Kohei	Cultural Anthropology, Southeast Asian Studies
D-05 OGAWA Hisashi	Agricultural Systems
D-05 OKAMOTO Yuki	Coral Reef Ecology
D-05 YAP, Minlee	Human Ecology
R-04 JIANG, Hongwei	Social Anthropology
R-04 NISHIMOTO Futoshi	Area Studies
R-04 TOJO Bunpei	Bioacoustics
R-05 ICHIKAWA Kotaro	Cultural Anthropology
R-05 ISHIYAMA Shun	Cultural Anthropology
R-05 NAKAMURA Ryo	Isotope Geochemistry
R-06 SAITO Satoshi	Spatial Econometrics, GIS
R-06 YAOTA Kiyoyuki	Ecological Anthropology
R-07 ISHIMOTO Yudai	Soil Science
R-07 MIYAZAKI Hidetoshi	Rural Development
R-07 SASAKI Yuko	Cultural Anthropology
R-07 SHIMIZU Takao	Geography
R-07 TESHIROGI Koki	

Project Research Associates

C-07 SHIMIZU Hiromi	
C-09 KATO Hisaaki	
C-09 KOYAMA Masami	
D-04 KITAMURA Naoko	
R-05 HAFIZ KOURA, Hafiz Mohamed Fathy	
R-05 MIZUMA Sakiko	
R-05 OKAMOTO Yoko	
R-05 WANG, Na	
R-06 OKAMOTO Takako	
R-07 KIHIRA Tomoe	
E-05 FUKUSHIMA Atsuko	

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

FUKUSHI Yuki	Modern Chinese History
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Center for Coordination Promotion and Communication (CCPC)

DIRECTOR SATO Yo-Ichiro

Heads of Divisions

Division of Research Development	TANIGUCHI Makoto
Division of Promotion	SEKINO Tatsuki
Division of Communication	ABE Ken-ichi

Associate Professors

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

Head, Core Research Hub

KUBOTA Jumpei

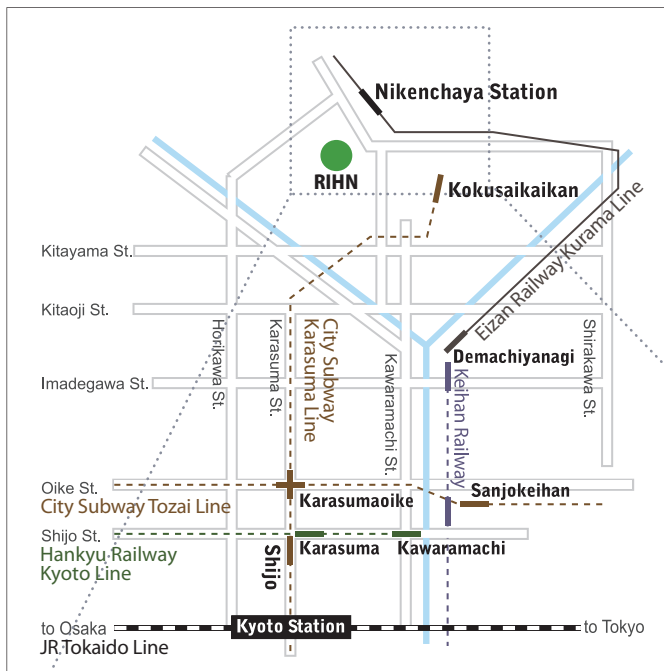
Professors

ABE Ken-ichi	Ecological Anthropology
KUBOTA Jumpei	Hydrology
NAKANO Takanori	Isotope Environmental Studies
SATO Tetsu	Local Environmental Studies, Conservation Ecology
SATO Yo-Ichiro	Plant Genetics
TANIGUCHI Makoto	Hydrology

Assistant Professors

KUMAZAWA Terukazu	Environmental Planning, Regional Informatics
NAITO Daisuke	Southeast Asian Area Study, Political Ecology
NILES, Daniel	Geography
SHIMIZU Mayuko	Community-based Sustainable Development
UYAR, Aysun	International Relations, International Political Economy
YASUTOMI Natsuko	Meteorology, Climatology

Access



By City Subway

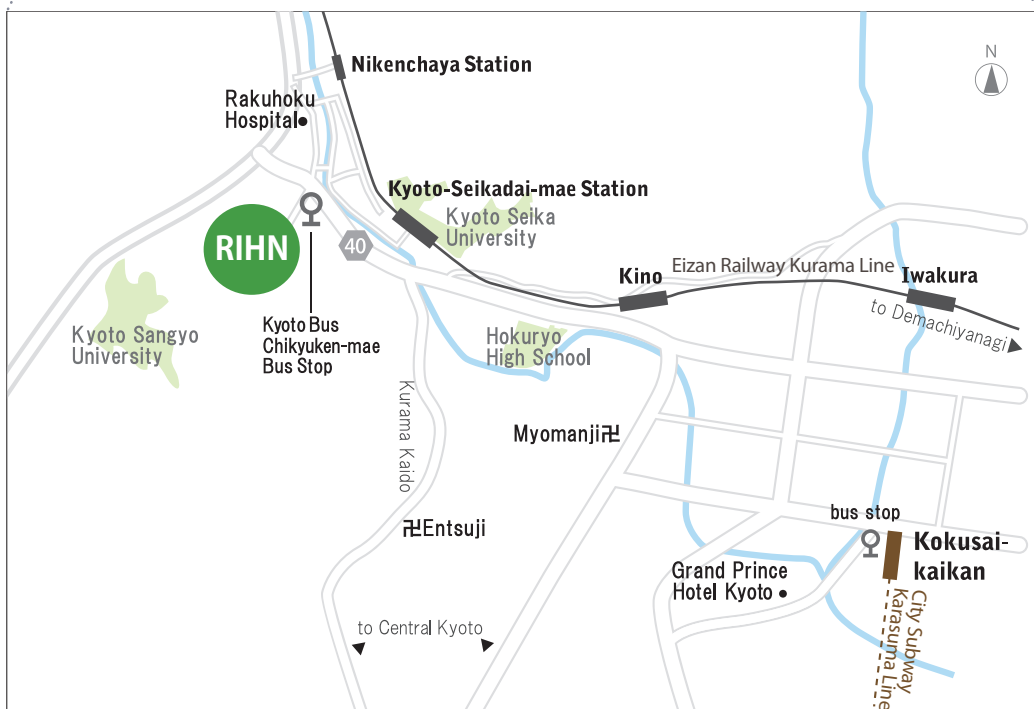
From Kyoto Station, take the Karasuma Line to Kokusaikaikan Station (the last station), and transfer to Kyoto Bus.

By Kyoto Bus

From Kokusaikaikan Station, take bus No. 40 or 50 to Chikyuken-mae. RIHN is at the base of the hill to your left.

By Eizan Railway

From Demachiyangi Station in Kyoto City, take the Kurama Line. Exit at Nikenchaya Station. RIHN is a 10 minute walk to the South.



Cover photo:

Wearing her father's sandals, a young girl in the Sudanese savannah glances quickly at the sky as she watches over her family's cattle.
Photo by ISHIYAMA Shun

Back cover photo:

People cross a hanging bridge as the head to market.
Photo by ABE Ken-ichi

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Overseen by: ABE Ken-ichi

Written and edited by: NILES, Daniel and KURATA Takashi

Designed by: OKAZAWA Rina



Research Institute for Humanity and Nature

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

Tel. +81-75-707-2100
Fax. +81-75-707-2106

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

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