



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

# RESEARCH INSTITUTE FOR HUMANITY AND NATURE

2008-2009

RESEARCH INSTITUTE FOR HUMANITY AND NATURE

2008 - 2009



Message from the Director-General	1
Founding Mission and Goals	2
Features of RIHN	3
Towards Consilience and Futurable Societies	4
Research Projects	6
Introduction of the Research Projects	8
<b>● Circulation</b>	<b>8</b>
C-01 (CR2) Emissions of Greenhouse Gases and Aerosols, and Human Activities in East Asia	9
C-02 (CR2) Global Water Cycle Variation and the Current World Water Resources Issues and Their Perspectives	10
C-03 (CR1) Recent Rapid Change of Water Circulation in the Yellow River and Its Effects on Environment	11
C-04 (FR4) Human Activities in Northeastern Asia and Their Impact on the Biological Productivity in North Pacific Ocean	12
C-05 (FR3) Human Impacts on Urban Subsurface Environments	14
C-06 (FR2) Effects of environmental change on the interactions between pathogens and humans	16
C-07 (PR) Global Warming and the Human-Nature dimension in Siberia —The social adaptation to the changes of the terrestrial ecosystem with an emphasis on the water environment	18
C-FS1 Urban Circularity and Diversity: Future Possibilities for a Great Complex System to Bridge the Human Race and Global Environment	19
C-FS2 Study of regional diversity of water quality: toward water management based on circulation	20
<b>● Diversity</b>	<b>22</b>
D-01 (CR1) Sustainability and Biodiversity Assessment on Forest Utilization Options	23
D-02 (FR3) A New Cultural and Historical Exploration into Human-Nature Relationships in the Japanese Archipelago	24
D-03 (FR1) Human Life, Aging, and Disease in High-Altitude Environments: Physio-medical, Ecological and Cultural Adaptation in the Three Great "Highland Civilizations"	26
D-04 (FR1) Collapse and Restoration of Ecosystem Networks with Human Activity	28
<b>● Resources</b>	<b>31</b>
R-01 (CR2) Impact of Climate Changes on Agricultural Production System in the Arid Areas	32
R-02 (CR1) A Trans-disciplinary Study on Regional Eco-history in Tropical Monsoon Asia: 1945-2005.	33
R-03 (FR2) Historical Interactions between the Multi-cultural Societies and the Natural Environment in a Semi-arid Region in Central Eurasia	34
R-04 (FR1) Environmental Changes and Infectious Diseases in Tropical Asia	36
R-05 (PR) A Study of Human Subsistence Ecosystems among Arab Societies: To Combat Livelihood Degradation for the Post-Oil Era	38
<b>● Ecohistory</b>	<b>40</b>
H-01 (CR2) Historical Evolution of the Adaptability in an Oasis Region to Water Resource Changes	41
H-02 (FR3) Agriculture and Environment Interactions in Eurasia: Past, Present and Future —A ten-thousand-year history	42
H-03 (FR2) Environmental Change and the Indus Civilization	44
H-04 (FR2) Neolithisation and Modernisation: Landscape History on East Asian Inland Seas	46
H-FS Interactions between man and the environment in Mesopotamia	48
<b>● Ecosophy</b>	<b>50</b>
E-01 (CR2) Multi-Disciplinary Research for Understanding Interactions between Humans and Nature in the Lake Biwa-Yodo River Watershed	51
E-02 (FR5) Interaction between Environmental Quality of the Watershed and Environmental Consciousness: With Reference to Environmental Changes Caused by the Use of Land and Water Resource	52
E-03 (FR5) Interactions between Natural Environment and Human Social Systems in Subtropical Islands	54
E-04 (FR2) Vulnerability and Resilience of Social-Ecological Systems	56
Activities of the Center for Coordination, Promotion and Communication (CCPC)	58
RIHN as a Member of the National Institutes for the Humanities	59
Research Collaboration	60
Communication of Research Results	62
A Guide to the Facilities	66
Organization	68
Access	72
<b>●column Encounters in the Field</b> .....	People 21
.....	Lifestyles 30
.....	Food 39
<b>Scenes from Field Surveys</b>	49

## Message from the Director-General

**TACHIMOTO Narifumi**



The Research Institute for Humanity and Nature (RIHN) was established to conduct comprehensive, integrated research (global environmental studies) in order to create an academic discipline directed to solution of the earth's environmental problems. As one of the National Institutes for the Humanities of the Inter-University Research Institute Corporation, RIHN is unique in promoting the fusion of sciences and the humanities.

Environmental problems are said to have reached global proportions as modern civilization challenged and sought to control nature. Such global environmental problems are rooted in human culture in the broadest sense of the term. With this basic understanding, we at RIHN consider that the solution of global environmental problems lies in unraveling the chains of interaction between man and nature and seeking new paradigms of dynamic equilibrium.

Research into the essence of global environmental problems is organized at RIHN through a system of research projects and fixed-term appointments. Supported by cooperative research with universities and research institutes at home and abroad, this system of fixed-term projects gives rise to the features of integration, international networking, leadership and fluidity that characterize our inter-university research institute. In particular, the selection of projects involves rigorous evaluation by a committee comprised entirely of external members including overseas researchers.

In March 2007 the initial projects were completed, and more projects will reach completion in the near future. In response to this, a system of programs that bring together several projects has been introduced into the Research Department, and the former Research Promotion Center has been restructured as the Center for Cooperation, Promotion and Communication (CCPC). This CCPC will function not only to support research but also to establish the core identity of RIHN and organize the dissemination of results. From this year, the projects are grouped in this prospectus according to the domain of the program to which they belong.

In this way, based on an organizational system of research that is unique not only in Japan but also worldwide, RIHN is poised to take flight as a research institute of which Japan can be proud, where researchers, educators and staff from a diversity of fields gather to face new challenges. I invite your warm understanding and support, together with your criticisms, of not only this prospectus but all of RIHN's activities.

## Founding Mission and Goals

The Research Institute for Humanity and Nature (RIHN) was established in April 2001 as an inter-university research institute of the Ministry of Education, Culture, Sports, Science, and Technology. It was to conduct comprehensive research in order to create an academic discipline directed to the solution of the earth's environmental problems.

Environmental research has hitherto been tackled in various separate fields of the natural sciences. RIHN's mission is to clarify the essence of environmental problems and identify ways that man should interact with nature. It is necessary to understand that environmental problems have three dimensions or aspects.

The first dimension is that of environmental problems in daily life, including various problems related to the human body and people's lifestyles. The second is that of socially constituted problems. These include global warming, loss of biodiversity, depletion of water resources, pollution by waste, and salt-water damage. An important task here is to clarify the social (political and economic) systems that cause these problems. The third dimension is that of "true" environmental problems. These are problems related to the mechanisms of and changes in global systems, such as the atmosphere, water, land, and climate, which are primarily the concern of the natural sciences and earth sciences.

Global environmental studies is not a finished, systematized discipline but something to be built for man's future survival through continuing trial and error. In this regard, the aim should be to build a constantly changing dynamic system.

At RIHN, we firmly believe that environmental problems concern humanity and all living organisms that presently inhabit the earth or will do so in the future. The "comprehensive" research that is RIHN's mission means not only the integration of academic domains but also the pursuit of understanding a phenomenon in its entirety.

If global environmental problems are rooted in human culture, then the global environmental studies to which RIHN aspires can be regarded as humanics, the inquiry into how humans live. For this reason, global environmental studies should stand at the starting point of environmental studies, dealing with the problems of humans and humanity in the midst of nature.



# Features of RIHN

## Integration

Research aimed at solving global environmental problems has progressed in many fields worldwide in recent years. At RIHN, we focus on problems such as warming, rising sea levels and loss of diversity at a regional level and, because regional problems have a complex bearing on the earth as a whole, we consider it necessary to conduct the basic research of field survey and data accumulation within an integrated framework that includes correlations with human existence. Research into questions of human lifestyles and culture is naturally based on the methods and viewpoints of the humanities and social sciences; but in carrying out such research, we consider it important to combine this approach with the methods and viewpoints of the natural sciences. An interactive approach between the natural sciences and the humanities and social sciences leads to the integration of global environmental studies as humanics.

## International Networking

Research projects at RIHN involve not only researchers from domestic universities and research institutes but also overseas researchers participating through agreements with research institutes overseas. RIHN also actively participates in the planning and operation of research projects at overseas institutes and invites overseas researchers to RIHN as visiting faculty or researchers. In 2006, 58 scholars from overseas took part in our first international symposium and four satellite symposia. In 2007, our second international symposium attracted 28 researchers from overseas. In 2008, overseas researchers will again be invited to our third international symposium.

## Leadership

Research projects at RIHN are grouped under one of five programs according to the research domain, and each program has an overall leader. Through the program leaders and project leaders, research projects are implemented in an integrated fashion. The Director-General, Deputy Director-General, program leaders and head of the Center for Cooperation, Promotion and Communication play central roles at home and abroad in coordinating the building of global environmental studies, disseminating research results, organizing international symposia, and responding to internal and external evaluations.

## Fluidity

At RIHN, all professors, associate professors and assistant professors participate in research projects on the basis of fixed-term appointments, and project researchers and others similarly finish their terms of appointment with the completion of the project. This project system ensures the fluidity of personnel. Projects, moreover, progress from incubation study (IS) through feasibility study (FS) and pre-research (PR) to full research (FR), and the project system allows a flexible response to the organizational and personnel requirements at each stage. Fluidity is also realized through the constant exchange of personnel with domestic partner institutes.

Winnowing after the harvest of teff. Teff, which can grow in the cold climate of the high plateau, is a basic ingredient of injera (the staple Ethiopian food). Teff contains a great abundance of iron, calcium, potassium, and protein for a poaceous cereal. Teff was cultivated only within Ethiopia in the past, but these days, is cultivated in other countries, including Australia, the Netherlands, and the United States.

# Towards Consilience and Futurable Societies

Research at RIHN seeks to elucidate the chains of interaction between man and nature. Research programs are established in five domains, circulation, diversity, resources, environmental history, and global area studies (ecosophy); and each program comprises a number of projects with a variety of topics, concerned with a diversity of areas and time-scales. In this situation, it is necessary to establish a clear direction in which unify these projects as constituents of global environmental studies.

Research projects at RIHN have hitherto been grouped under a diversity of topics, including water circulation, atmosphere, climate, oceans, underground environments, islands, ecosystems, food production systems, disease, landscapes, and civilizations. These individual studies have been classified along particular axes of research.

We consider it a major mission of RIHN to build consilience among these research axes within a more readily comprehensible framework of global environmental studies. Building consilience will elucidate the essence of global environmental problems and allow us to grasp them through new paradigms. This in turn will allow us to plan for the formation of futurable societies.

The new framework for research comprises five so-called domains (Figure 1). The domains of circulation, diversity, and resources provide frameworks for the analysis of problems related to the dynamics of man's interactions with nature. These three together encompass environmental studies of the humanosphere. Studies along the axes of time and space are respectively classified in the domains of environmental history and global area studies (ecosophy). Environmental history looks at the change and continuity in civilizations from past to present and explores possibilities for the future. Ecosophy can be called the study of governance in the widest sense, seeking to understand regional environmental problems in conjunction with global environmental problems. In this way, we consider global environmental studies to rest on three pillars: the domains related to man's interaction with nature (circulation, diversity, and resources), environmental history, and ecosophy.

The five programs, RIHN's mission and direction are shown on the following page in Figure 2.



Figure 1 Concept of Global Environmental Studies

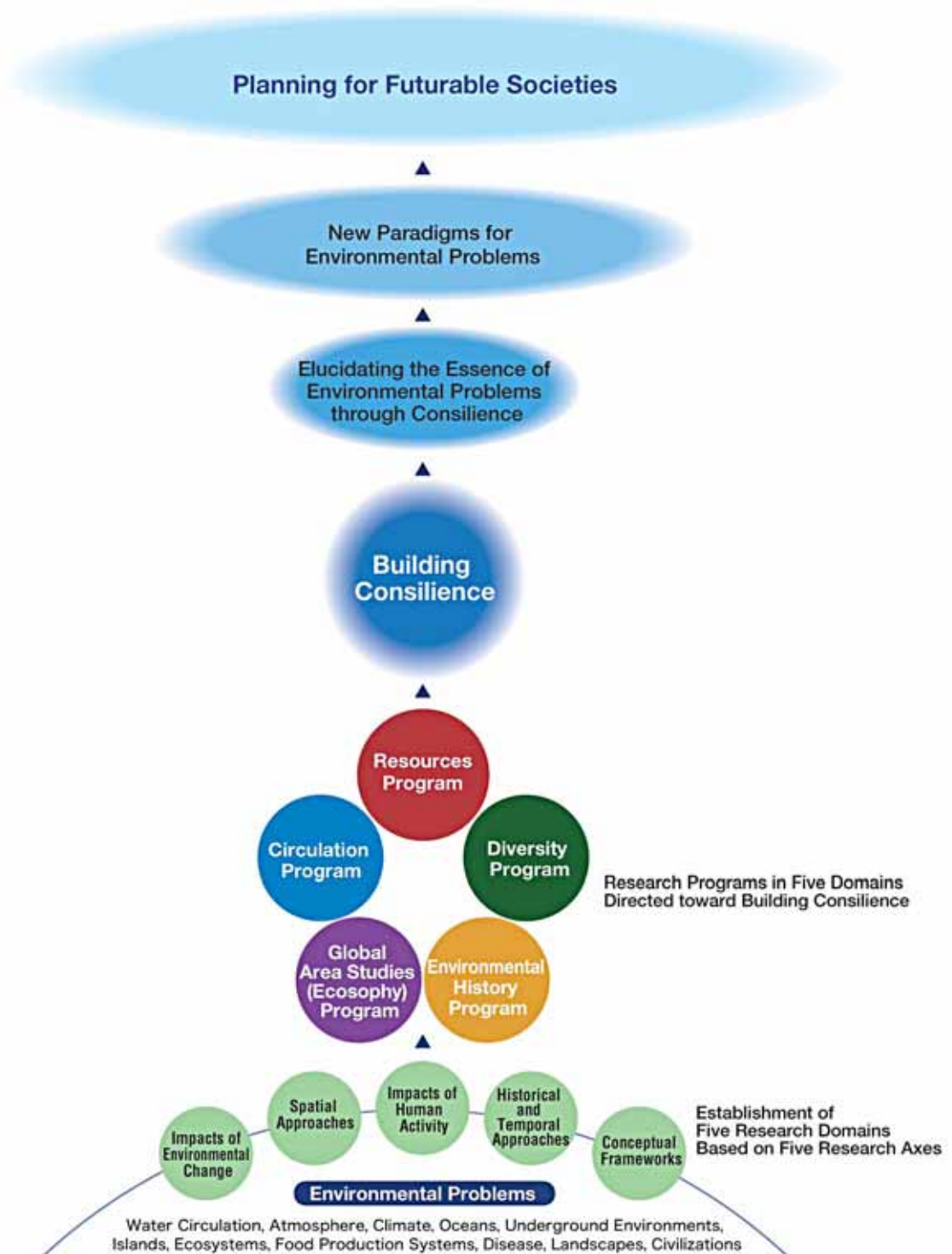


Figure 2 Building Consilience

- **Circulation Domain Program** Centered on the sphere of human survival, this program deals mainly with problems arising from excess and deficiency, imbalanced distribution and overuse in the circulations of water, atmosphere, carbon, nitrogen and other materials.
- **Diversity Domain Program** This program addresses global environmental problems of recent concern arising mainly from the loss of diversity, whether biological, including genetic diversity and diversity of niches, or cultural, including diversity of languages, social structures, religions and world-views.
- **Resources Domain Program** This program covers problems related to the food and energy that support human survival and their means of production through agriculture, forestry and fisheries; and problems related to the human body, including health and nutrition.
- **Environmental History Domain Program** This program takes an interdisciplinary approach to the history of global environmental problems as the “chains of interaction between man and nature.”
- **Global Area Studies (Ecosophy) Domain Program** This new domain of scholarship is expected to constitute a completely new framework for global area studies that lies beyond the bounds of existing academic fields.

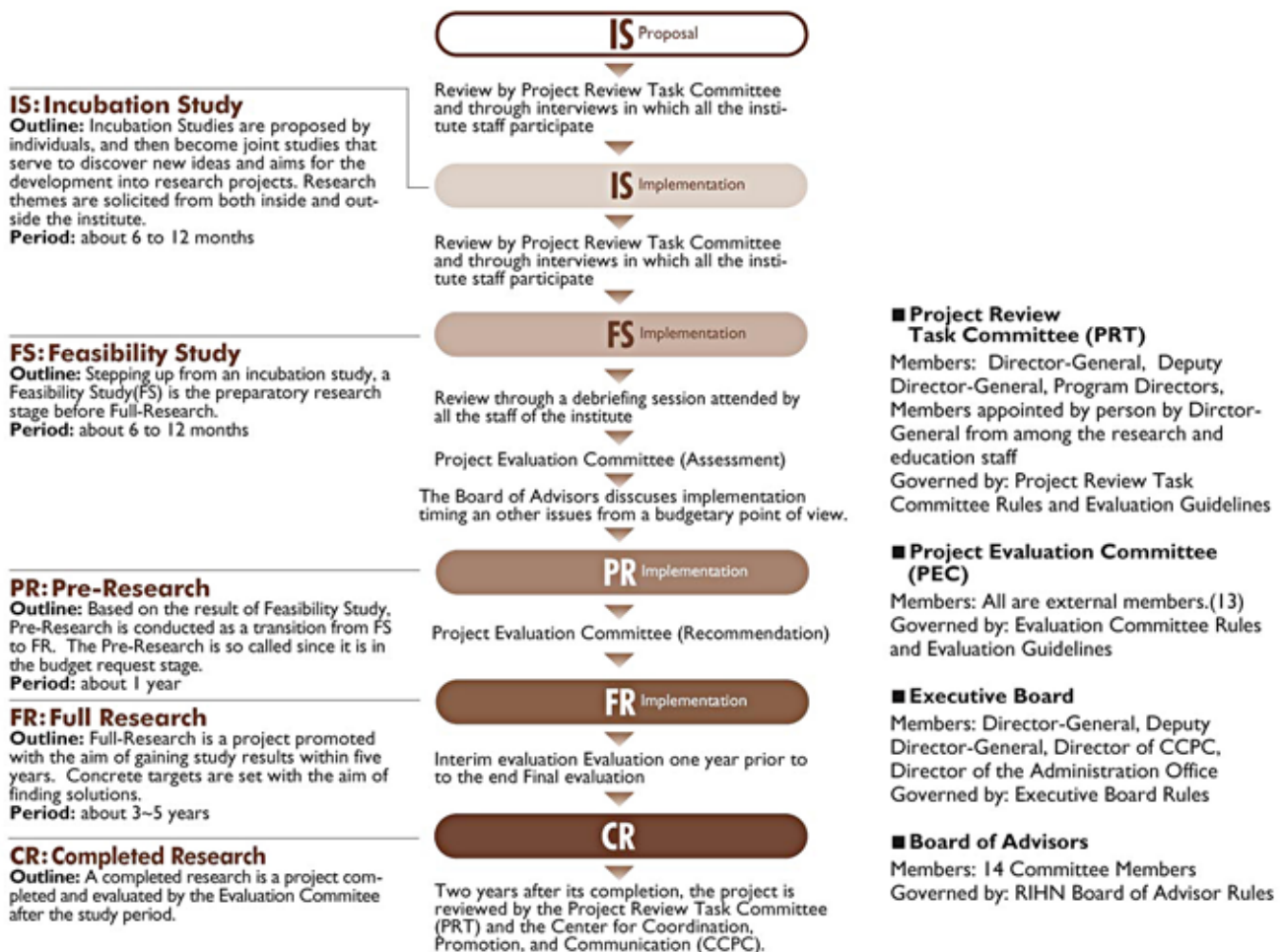
# Research Projects

## Research Project System

RIHN operates a system of five-year fixed-term research projects like those of the 21<sup>st</sup> Century Center of Excellence (COE) and Global COE programs, but which differs in that projects are evaluated at several stages in their progress. The first preliminary stage, taking from six months to one year, is the incubation study (IS), in which a research proposal is drawn up. If the proposal is approved, the research moves to the stage of feasibility study (FS), in which preparatory research is conducted for about one year. The FS then passes through the Project Evaluation Committee and, if approved, the Board of Advisors. With the board's approval, the project proceeds through a transitional period of about one year of pre-research (PR) to three to five years of full research (FR). After the second year of full research, a mid-term evaluation is carried out; and further evaluations follow one year before completion and at the time of completion. The validity and feasibility of research plans and the significance of results are thus subjected several times to evaluation and review, in a system designed to assure the quality as well as the independence of research.

### ■ The Process Leading to Full Research

The "Policy for Implementation of Research Projects" states: The research project system at RIHN is to produce results through the cooperative research of specialists in diverse fields for a fixed period on a designated topic that accords with the founding mission of RIHN. The launching of research projects as designated joint research is to be based on the collaboration and concerted action of the wider community of researchers and should undergo the following process.





## Evaluation of Completed Research

### ■ System for evaluation of completed research

The three research projects completed in 2007, together with the five completed in 2006, bring to eight the number of research project results that RIHN has published. In 2008, full research is progressing in fourteen projects. This number is unlikely to change greatly in the future, meaning that the proportion of completed projects will continue to grow. The content of these completed projects and the value accorded them will be important in shaping the future of RIHN, being reflected in the further development of research and the launching of new projects.

With this idea in mind, the system for evaluation of completed research was revised during the 2007 academic year, as follows.

- 1) While previously the Project Evaluation Committee evaluated projects retrospectively at the time of completion (FR5), since 2007 progress has also been evaluated in the year before completion (FR4). The results of the evaluation are reflected in the research activities and collation of results in the final year, which are reported to the committee for the final evaluation upon completion of the project (FR5).
- 2) Two years after completion (CR2), a report is submitted to the Project Review Task Committee on the publication and ramifications of the research results and their contribution to society; and the committee makes a retrospective summary evaluation from the standpoint of RIHN.

With these changes, the February 2008 meeting of the Project Evaluation Committee examined the three projects completed in the 2007 academic year (retrospective evaluation under the old rules) and the two projects due to be completed in the 2008 academic year (evaluation one year prior to completion, under the new rules).

### ■ Projects Completed in 2007

The three projects completed in academic year 2007 differed in the global environmental problems they addressed, their fields and methods of research, but all were carried out as "integrated research" involving specialists from a range of disciplines. At the end of each project, the results are disseminated in various forms, not only academic papers but also books, films, and educational materials. Detailed evaluations of each project are also published on RIHN's home page.

All three projects concerned the utilization and management of forests and green spaces in Asia; and based on their results, in October 2007 RIHN held its second international symposium, entitled Asian Green Belt: Its Past, Present and the Future, where opinions were exchanged with scholars from around the world. The results are due to be published in a collection of papers, and summaries can be viewed on RIHN's home page.



2<sup>nd</sup> International Symposium "Asian Green Belt: Its Past, Present and the Future"

### ■ Projects due to be completed in 2008

**E-03(FR5)** Interactions between Natural Environment and Human Social Systems in Subtropical Islands. (Project leader: TAKASO Tokushiro)

**E-02(FR5)** Interactions between Environmental Quality of a Watershed and Environmental Consciousness: With Reference to Environmental Changes Caused by the Use of Land and Water Resources. (Project leader: SEKINO Tatsuki)

# Introduction of the Research Projects



## Circulation

Program Director ■ **HAYASAKA Tadahiro** RIHN

What is circulation in relation to global environmental problems? Two concepts of circulation are considered in this program. One is circulation of energy and matter at the Earth's surface. The word matter includes atmosphere and ocean themselves, and chemical components and living organisms therein. In the broader view, it is applied to human being and goods in socio-economic activities. Solar radiative energy absorbed by the Earth's surface systems as well as fossil fuel causes the circulation of energy and matter in various forms. The circulation in a large spatial and temporal scale may look like a flow in a small scale. The critical issue in the global environmental problems is sudden and irreversible change in the circulation, which is hard to predict in the future. It is closely related to culture, thought, and action in the human society.

Another way to grasp circulation here is a more conceptual view. In the framework of humanity and nature, the interaction between them can be considered a kind of circulation in a different dimension from the circulation of energy and matter at the Earth's surface. The development of economy, industry and technology gives rise to huge energy consumption and changes in landuse. The circulation in the sense of interaction is the process in which human society influences nature, altered nature in turn influences human society and human society then again influences nature. The fact that human society changes in this process means that the interaction of human being and nature is not simple one.

The individual research project in the circulation program is carried out with the above concepts, and the outcomes from the research project will be sent out together from RIHN.

Completed Research	Leader	Theme
<b>C-01 (CR2)</b>	HAYASAKA Tadahiro	Emissions of Greenhouse Gases and Aerosols, and Human Activities in East Asia
<b>C-02 (CR2)</b>	KANAE Shinjiro	Global Water Cycle Variation and the Current World Water Resources Issues and Their Perspectives
<b>C-03 (CR1)</b>	FUKUSHIMA Yoshihiro	Recent Rapid Change of Water Circulation in the Yellow River and Its Effects on Environment
Full Research	Leader	Theme
<b>C-04 (FR4)</b>	SHIRAIWA Takayuki	Human Activities in Northeastern Asia and Their Impact on the Biological Productivity in North Pacific Ocean
<b>C-05 (FR3)</b>	TANIGUCHI Makoto	Human Impacts on Urban Subsurface Environments
<b>C-06 (FR2)</b>	KAWABATA Zen'ichiro	Effects of environmental change on the interactions between pathogens and humans
Pre-Research	Leader	Theme
<b>C-07 (PR)</b>	INOUE Gen	Global Warming and the Human-Nature dimension in Siberia — The social adaptation to the changes of the terrestrial ecosystem with an emphasis on the water environment
Feasibility Study	Principal Investigator	Theme
<b>C-FS1</b>	MURAMATSU Shin	Urban Circularity and Diversity: Future Possibilities for a Great Complex System to Bridge the Human Race and Global Environment
<b>C-FS2</b>	NAKANO Takanori	Study of regional diversity of water quality: toward water management based on circulation

## Emissions of Greenhouse Gases and Aerosols, and Human Activities in East Asia

The recent growth of economy in East Asian region is being watched with keen interest. The relationship between human activities and emissions of greenhouse gases and aerosols in this region are studied with collaboration of socioeconomic analysts and atmospheric scientists. This research project consists of macro-analysis of economy, development of emission inventory, analysis of atmospheric transport by using model and satellite data, and ground-based observation around Japan and China.

Project Leader ■ HAYASAKA Tadahiro RIHN

The present study focused on the East Asia, especially China for the past few decades to investigate (1) relationship between the change in human activities such as economy and industry and the change in emissions of anthropogenic gasses and aerosols, and (2) the influence of the emitted gases and aerosols on the climate change and air pollution.

The macroanalysis of economy was performed as planned. The economic development in the East Asian countries led by the industrialization brought increases in energy consumption and emissions of CO<sub>2</sub>, SO<sub>2</sub> and others. However, SO<sub>2</sub> emission has not increased so much as expected. The emission density of CO<sub>2</sub> has not increased or has decreased due to an improvement of energy efficiency.

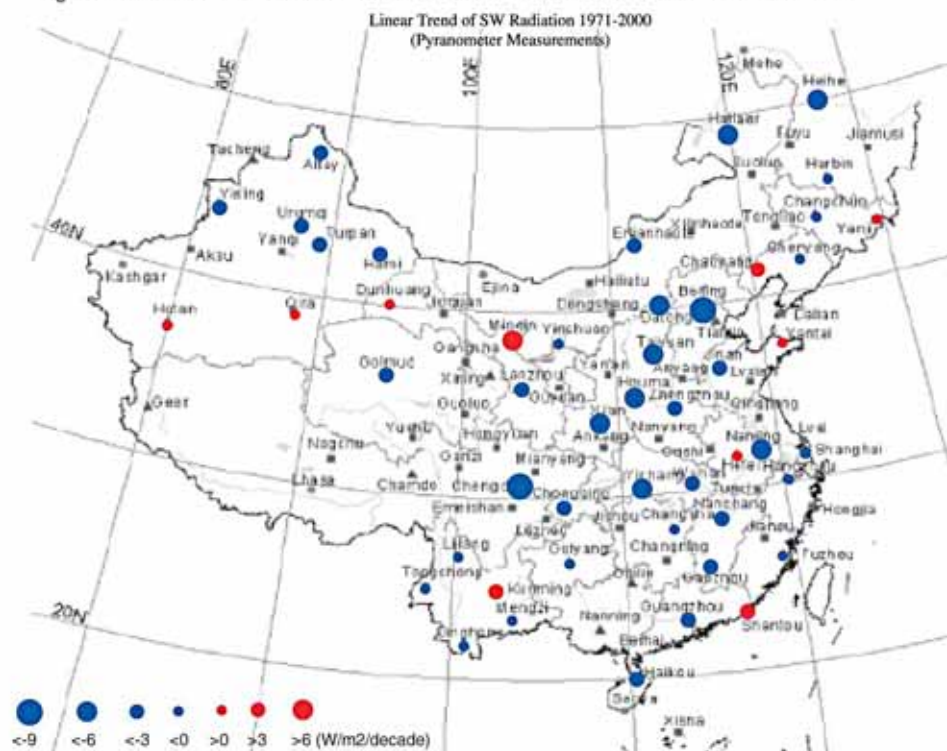
The emission inventory was developed according to the initial plan, which includes anthropogenic greenhouse gases, aerosols, and precursors of aerosols for the period, 1980-2003.

Figure 1, for example, shows the changes in the amount of the emission of SO<sub>2</sub>, NO<sub>x</sub>, and Black carbon (BC) in Asia.

The analysis of emitted anthropogenic gases and aerosols was performed with observations and atmospheric transport models. The observations of greenhouse gases were carried out in China and around Japan. The observations of aerosols were carried out mainly in Japan. The results of those observations were consistent with the emission inventory.

As a result, aerosol loading increased with an increase in fossil fuel consumption in China and other Asian countries and air pollution increased, and thus surface shortwave irradiance decreased. However, the surface air temperature increased in almost all regions of China for the past 40 years, because of increasing greenhouse gases and complicated climate system.

Figure 1 Linear trend of surface shortwave irradiance observed in China for 1971-2000.



# Global Water Cycle Variation and the Current World Water Resources Issues and Their Perspectives

It is alleged that the 21<sup>st</sup> century is the "century of water." Wars over water may occur, like those fought over oil in the last century. The rapid increase in population and the coming global climate change could cause water scarcity. This project attempts to develop global perspectives of such water resource issues by integrating field observations, predicting natural water cycles and human water usage in the future, and by establishing guidelines for sustainable development from the viewpoint of water resource issues.

Project Leader ■ **KANAE Shinjiro** Institute of Industrial Science, the University of Tokyo (RIHN until March 2007)

## Specific Research Findings

Regarding the primary goal, which is, "showing perspectives and making projections", we have succeeded in positioning our research on the cutting-edge, with the finest estimation and projection of global water cycles and resources in the world. For example, we successfully reproduced the daily fluctuation of land hydrological cycles through the past 100 years for the first time in the world. At the same time, we made a projection of land hydrological cycles for the next 100 years. Moreover, by estimating current and future water demands through an integration of all the estimations above, we have calculated current and future water stress on a global scale.

## Contribution to "Earth-Environment Study"

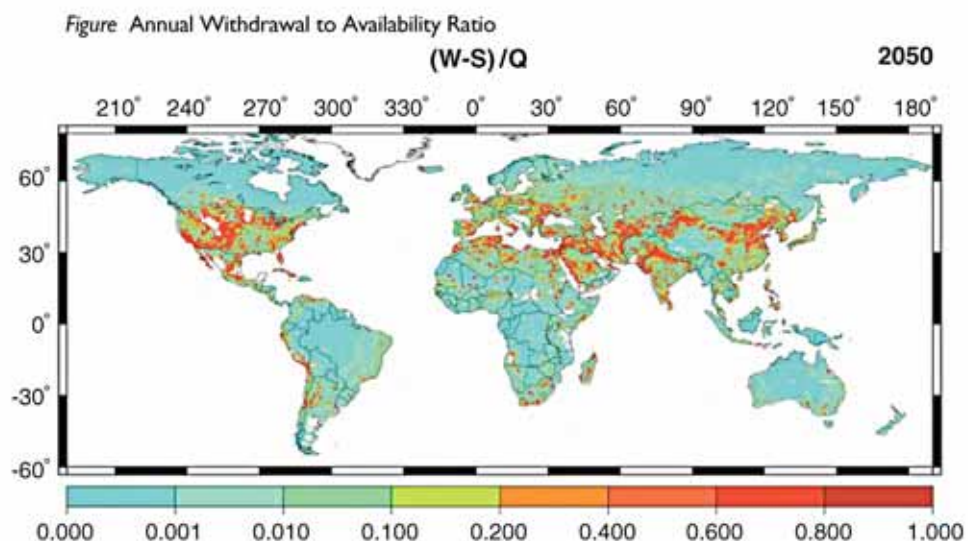
We have succeeded in making an estimation and projection of global water cycles and resources paying attention to the interaction between humans and nature. It is, however, on a local scale that such an interaction is considered in the study

of water circulation and water budgets. This interaction, especially on a global scale, has been overlooked. In this sense, our results can be a model of "Earth-Environment Study." Besides, we also carried out research that dealt with specific areas with water problems, such as Thailand and California.

Studies that analyzed policy tools for preventing water conflict and water shortage are additional examples of an interdisciplinary analysis.

## Communication of Research Findings

Dr. Taikan OKI, the former leader and currently a core project member, was chosen as the lead author of the IPCC AR4 and the Millennium Assessment. Also our paper in Science has effectively promoted the achievement of this project. Moreover, our achievement on virtual water has been widely disseminated in domestic society through multiple media and a "White Book" on water resources made by the Japanese government. We hope our research results (Figure 1) become a seed for ideas for coming water-related projects.



The map shows the quotient obtained by dividing (expected water consumption for 2050) by (water availability forecast for 2050) of each geographic area. The quotient is high in areas painted red or yellow, in which available water is expected to be almost used up. In other words, red and yellow areas are candidate water crisis "hot spots."

# Recent Rapid Change of Water Circulation in the Yellow River and Its Effects on Environment

The recent crisis that occurred in the Yellow River basin is complicated because factors like natural climate fluctuation, global warming and changes of land utilization may be affecting one another. We will evaluate how land use changes affect the water cycle throughout the Yellow River drainage basin and what kind of effect the decrease in groundwater storage downstream could have on marine conditions, through five years of research. This study may prove to be at the forefront of ecological studies of densely-populated coastal zones, and through studying the Bohai Sea and Yellow Sea.

Project Leader ■ **FUKUSHIMA Yoshihiro** (RIHN until March 2008)

## Outcome

By implementing our Yellow River Study Project (hereafter referred to as YRIS), we were able to invite young and excellent researchers from Chinese universities and institutes. We were also able to obtain good results from the exchange of information between Japanese and Chinese scientists, and from our analysis based on observations, investigations and inspections over a period of five years from 2003 to 2007.

We found that reforestation works by the institute for soil and water conservation on Loess Plateau occupying almost 40% of the Yellow River Basin area have resulted in a remarkable decrease in the volume of river water by 15 billion m<sup>3</sup> due to an increase in evapo-transpiration in keeping with successful reforestation since the 1980s. The Chinese Yellow River Conservancy Commission (YRCC) had not been aware that this tremendous decrease in river water was due to the effects of reforestation. However, this amount can be explained by the results of our experimental research which found that the increase in evaporation is less than 50 mm annually. We also found that rules for the supply of water from the Yellow River to each province had already been decided in the 1980s. These rules gave each province independent authority. After the severe drying-up of the Yellow River that occurred in 1997, an improved "water law" was established and it became effective in 2002. Most importantly the Chinese government was given complete authority over river water use and the ability to punish cases where disobedience occurred. Fortunately, there has been a rather large amount of precipitation on the North China Plain since 2000, so there were no instances of the unfair use of river water.

Though the yield of eroded material from the

Loess Plateau has gradually decreased, the downstream riverbed is still continuing to increase or to maintain the same level despite the completion of the Xiaolandi Dam in 1997 and its important function of flushing out sediment on the riverbed by instigating small flood events. This means that there is increased danger of a flood disaster in an area in which nearly 100 million people live.

The environment of the Bohai Sea has been changed by the shortage of inflow water from the Yellow River. Firstly, the critical condition for primary bio-production has changed from Nitrogen to Phosphorus. Secondly, the exchange of fresh and sea water has decreased remarkably. Thirdly, chlorophyll-*a* has decreased with the decrease of river water. These findings suggest that primary bio-productivity in the Bohai Sea is decreasing.

How changes in land use have affected the atmosphere above the Loess Plateau is still being analyzed because topographic conditions and the strength of the Asia Monsoon seem to have a larger affect on the atmosphere than conditions on the surface of the land such as whether it is planted in crops or is bare.

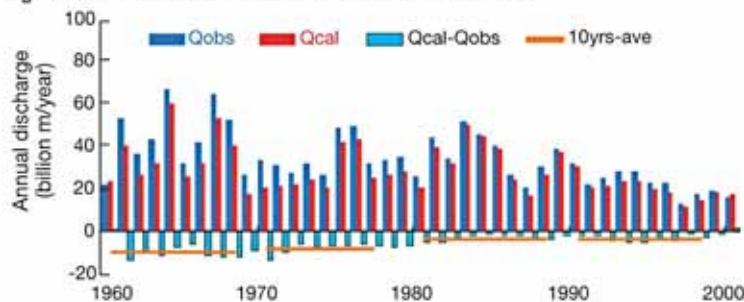
Large irrigated districts such as Qintongxia and Hetao, located upstream, are estimated to have consumed the same amount of river water for irrigated agriculture from 1960 to 2000. Their consumption is estimated at almost 10 billion m<sup>3</sup>.

You can find accounts of our study in YRIS Newsletters 1-8, published from Sept.1, 2003 to January 31, 2008. (<http://www.chikyu.ac.jp/yris/newsletters.html>)

## Future Issues

With growth in the human population, irrigated agricultural fields may have to expand into areas where climate conditions are rather dry, in order to obtain more food crops. Nevertheless, efforts to increase the efficiency of water use would appear to be too late to improve agricultural fields given the rather small amounts of precipitation, and salt accumulation is apt to affect even the Yellow River Basin. The supply of water from the Chang Jiang River to Beijing, Tianjin and the North China Plain is to be realized soon. But many problems can be anticipated because the pollution of the Yellow River water remains unresolved. Therefore, the diversion of water may cause increased water pollution in the Bohai Sea.

Fig. Result of model simulation for the Loess Plateau area



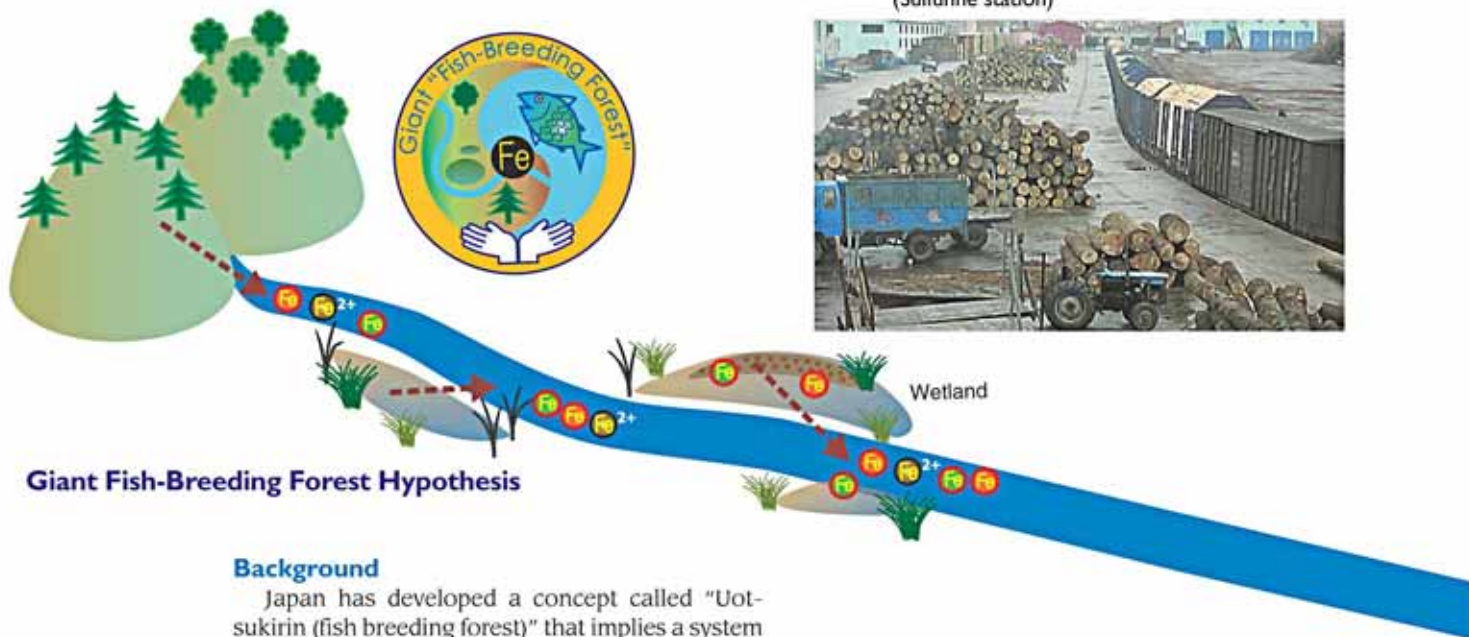
# Human Activities in Northeastern Asia and Their Impact on the Biological Productivity in North Pacific Ocean

Recently, we have recognized a possible function of continental forests breeding fish in ocean. In this study, we will investigate how the Amur River transports dissolved iron from forests to the Sea of Okhotsk and the Oyashio area and supports primary production, and clarify to what extent the human activities on the Amur basin may disturb this material linkage, in order to create an ideal relationship between land and ocean ecosystems including humankind.

Project Leader ■ SHIRAIWA Takayuki RIHN

Core Members ■ HARUYAMA Shigeko Graduate School / Faculty of Bioresources, Mie University  
 KAKIZAWA Hiroaki Graduate School of Agriculture, Hokkaido University  
 KISHI Michio Graduate School of Fisheries Sciences, Hokkaido University  
 KUMA Kenshi Graduate School of Fisheries Sciences, Hokkaido University  
 KONDOH Akihiko Center for Environmental Remote Sensing, Chiba University  
 MATOBA Sumito Institute of Low Temperature Science, Hokkaido University  
 MATSUDA Hiroyuki Graduate School of Environment and Information Sciences, Yokohama National University  
 NAGAO Seiya Graduate School of Environmental Earth Sciences, Hokkaido University  
 NAKATSUKA Takeshi Institute of Low Temperature Science, Hokkaido University  
 OHSHIMA Keiichiro Institute of Low Temperature Science, Hokkaido University  
 ONISHI Takeo RIHN  
 SHIBATA Hideaki Field Science Center for Northern Biosphere, Hokkaido University  
 UEMATSU Mitsuo Ocean Research Institute, University of Tokyo  
 YOH Muneoki Environmental Conservation, Tokyo University of Agriculture and Technology

Photo / Transportation of Russian timbers (Suifunhe station)



## Giant Fish-Breeding Forest Hypothesis

### Background

Japan has developed a concept called "Uotsukirin (fish breeding forest)" that implies a system connecting the land surface with the ocean in terms of ecological linkage. We are proposing a similar but much larger-scale concept we have called "Kyodai Uotsukirin ("Giant" Fish-breeding forest)" to show the ecological linkage between the Amur river basin and the Sea of Okhotsk/Oyashio area. The system has various functions, but it is uniquely characterized by the flow of dissolved iron, which is an essential element for the primary production of the Oyashio area. The Amur River basin is underlain by extensive wetland and forest; both are important sources of dissolved iron. The dissolved iron is transported to the Oyashio area through the Sea of Okhotsk by thermohaline circulation driven by

sea-ice production in the Sea of Okhotsk. This natural mechanism distributes the dissolved iron further into the Oyashio area with a help of the east Sakhalin current. This well established system tells us that the ecological conditions in the Sea of Okhotsk and the Oyashio area are determined by the land surface condition in the Amur River basin.

The Amur River basin includes territories in Russia, China and Mongolia. More than 100 million people live in the basin and depend on agriculture, forestry and industry for their livelihoods. The human activities impact on the land surface conditions so that the changes in land uses influ-

Figure 1 Land use pattern of the Amur River basin (left:1930s'-1940s', right:2000)

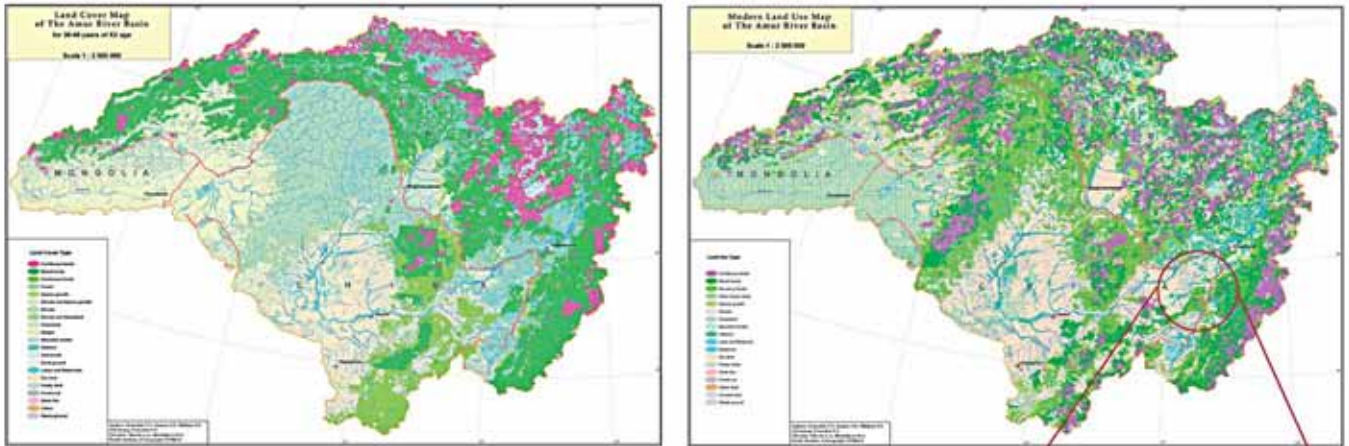
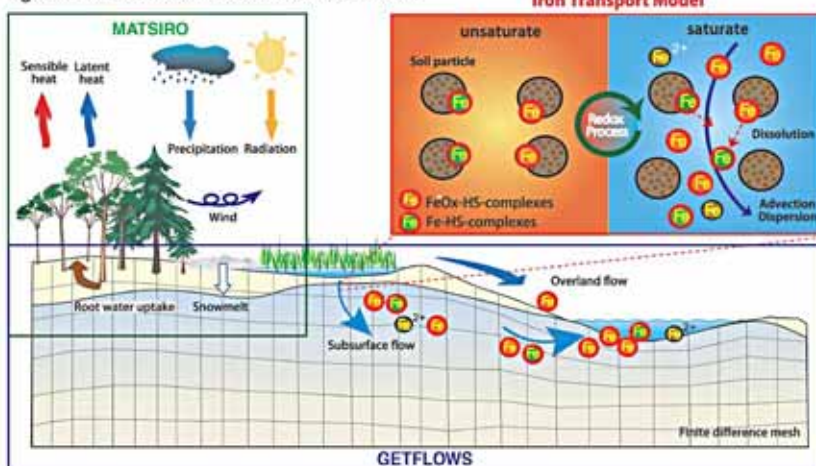
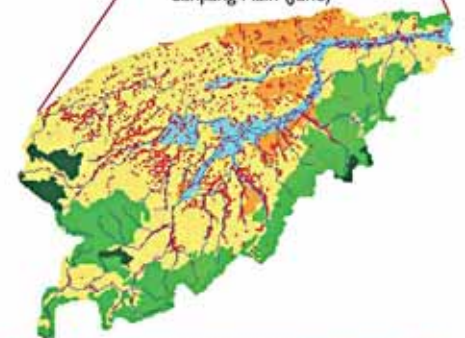


Figure 2 Structure of the land surface model



Noali watershed in the Sanjiang Plain (June)



■ : The location where dissolved iron is produced  
Dissolved iron concentration is calculated according to the degree of soil saturation

Figure 3 Example of simulated dissolved iron distribution

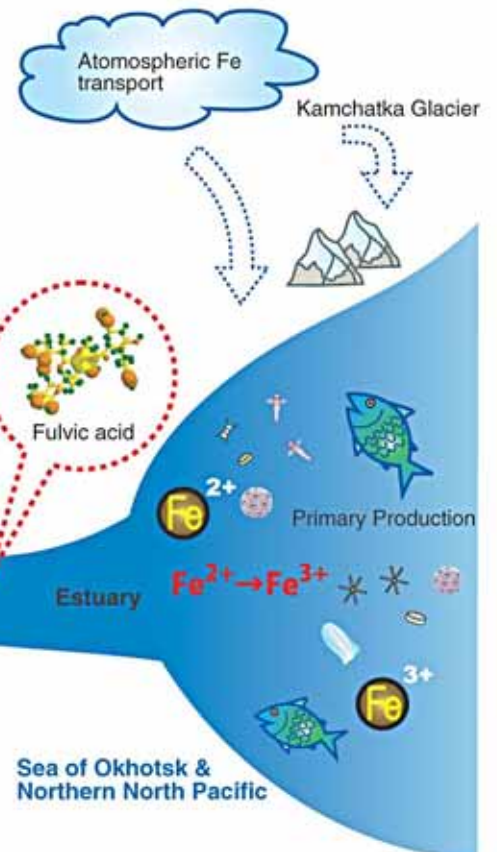
ence the wetlands and forests, which then affect the flux of dissolved iron and finally have an affect on primary production in the ocean.

### Major results and tasks

Up to now, this project successfully clarified the above mentioned natural mechanism with collaborative efforts from Russian and Chinese research institutions. We clarified that the 20<sup>th</sup> century changes in the land-uses in the Amur River basin had most probably resulted in the changes seen in the flux of dissolved iron moving to the ocean. We are now considering how we can best conserve

Amur River

Fulvic Fe transport



this vast system that expands across the international borders of Japan, Russia, China and Mongolia. Now is the time to collaborate to maintain the system and ensure that it is as sustainable as possible. In the final two years of this project, our trans-disciplinary team will be dedicated to this theme.

# Human Impacts on Urban Subsurface Environments

This project will assess the effects of human activities on the urban subsurface environment, an important aspect of human life in the present and future but not yet evaluated. This is especially true in Asian coastal cities where population numbers and density have expanded rapidly and uses of subsurface environment have increased. The primary goal of this project is to evaluate the relationships between the development stage of cities and various subsurface environmental problems, including extreme subsidence, groundwater contamination, and subsurface thermal anomalies. We will address the sustainable use of groundwater and subsurface environments to provide for better future development and human well-being.

Project Leader ■ **TANIGUCHI Makoto** RIHN

Core Members ■ **EHARA Sachio** Kyushu University  
**YOSHIKOSHI Akihisa** Ritsumeikan University  
**YAMANO Makoto** University of Tokyo  
**FUKUDA Yoichi** Kyoto University  
**KANEKO Shinji** Hiroshima University  
**ADACHI Itsu** JICA  
**TOKUNAGA Tomochika** University of Tokyo  
**SHIMADA Jun** Kumamoto University  
**ONODERA Shin-ichi** Hiroshima University  
**NAKANO Takanori** RIHN

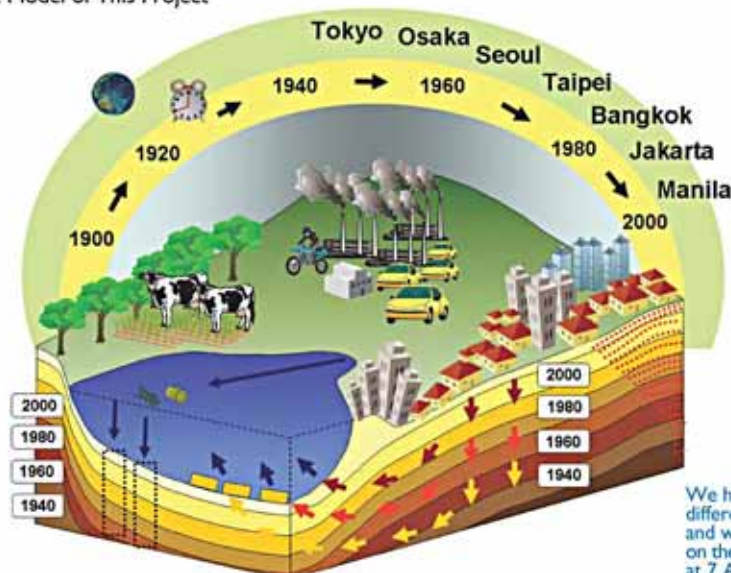
## (1) Objectives of this project

Most global environmental studies have long been focused on the environmental issues above ground surface such as air pollution, global warming, seawater pollution, and decrease in biodiversity. Subsurface environmental issues are also important for human life in the present and future, but have been largely ignored because of the invisibility of the phenomena and difficulty of the evaluations. Subsurface environmental problems such as subsidence due to excessive pumping, groundwater contamination, have occurred repeatedly in Asian major cities with a time lag depending on the development stage of urbanization. Therefore, we may be able to assess future scenarios if we can evaluate the relationships between subsurface environmental problems and

the development stage of the city.

This project will deal with; (1) Relationships between the development stages of the cities and subsurface environmental problems will be assessed by socio-economical analyses and reconstructions of urban areas by uses of historical records; (2) Serious problems in subsurface environments and changes in reliable water resources will be studied after evaluations of groundwater flow systems and changes in groundwater storage by uses of hydrogeochemical data and in-situ/satellite-GRACE gravity data; (3) We will also evaluate accumulations of the materials (contaminants) in subsurface and their transports from land to ocean including groundwater pathways by uses of chemical analyses of subsurface waters, sediments and tracers; and (4) Subsurface

Figure 1 Schematic Model of This Project



We have investigated how the different developing processes and water usage have affected on the subsurface environments at 7 Asian-Mega cities.

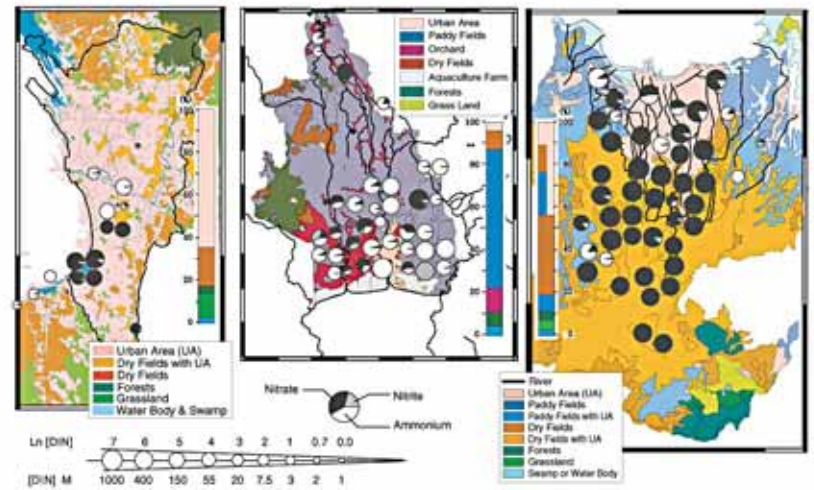


Photo 1 A children drawing well water at Jakarta



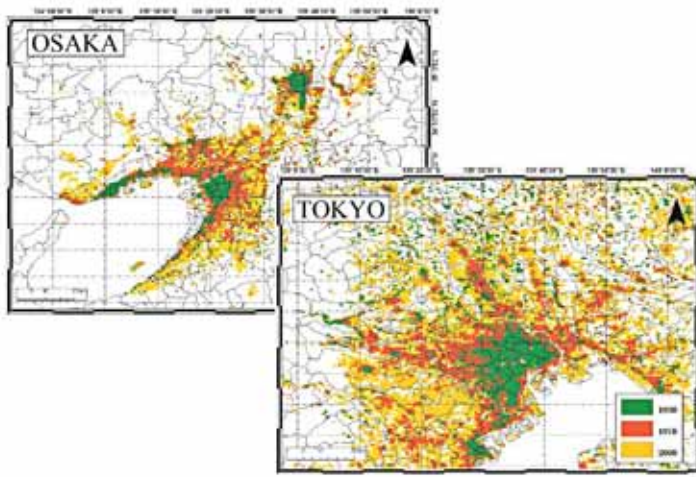
What can we do for conservation and sustainable use of groundwater?

Figure 3 Groundwater pollutions in Asian cities



Magnitudes and composition ratios of Nitrate, Nitrite, and Ammonium pollutions of groundwater at Manila (left), Bangkok (middle), and Jakarta (right).

Figure 2 Expansions of urban area at Tokyo and Osaka from 1930 to 2000



Changes in land cover/use due to urbanization are used for analyses of subsurface environment in Asian cities based on GIS.

thermal contamination due to the “heat island” effect in urban areas will be evaluated by reconstruction of surface temperature history and urban meteorological analyses.

## (2) Progress of the project

- Field surveys on subsurface environment in targeted cities have been made (12 times in 2007), and monitoring of subsurface environments have been going on.
- Assessments of natural and social data in each city, and the structure of project database based on GIS have been made.
- Land cover/use maps based on GIS with 0.5 km mesh have been made at three development stages of Tokyo and Osaka, and current stage of other five cities.
- 2<sup>nd</sup> International Symposium of this project was held at Bali on Dec. 2007 (which was authorized as side event of COP13), and the proceeding of the symposium was published.
- Results on the impacts of climate change and heat island was published as a special issue of International Journal (VZJ), and was cited by Open Science News “Scitizen”.

- Cross cutting theme such as relationship between religion and groundwater has been started in Bangkok and Jakarta.
- Preliminary models such as GRACE, groundwater flow, and DPSIR+C have been established in each sub theme.
- In order to evaluate the origin and process of material loads to subsurface, isotopes and chemical analyses of water samples have been made, and new tracers (CFC, Kr etc.) techniques have been introduced.

## (3) Future works and challenges

- In order to present the interim results of the project, special issue of STOTEN (Science of Total Environment, Elsevier) will be prepared.
- New approaches on the relationship between law/institution and groundwater (private water) /surface water (public water) will be launched.
- New working group will be launched to evaluate an integrated model and indicators.
- New observation system by uses of CFC, KR and absolute gravity measurement will be tested, and inter comparison with different observation methods will be operated.

# Effects of environmental change on the interactions between pathogens and humans

The rapid spread of emerging infectious diseases is threatening human lives. Our project team aims to reveal the interactions between environmental alterations by human activities, outbreaks of infectious diseases, and changes in human lifestyle. We will suggest ways to prevent the outbreak and spread of infectious diseases and explain how to facilitate the safe coexistence of humans and pathogens.

Project Leader ■ **KAWABATA Zen'ichiro** RIHN

Core Members ■ **ASANO Kota** Graduate School of Human and Environmental Sciences, Kyoto University  
**ITAYAMA Tomoaki** National Institute for Environmental Studies  
**KAKEHASHI Masayuki** Graduate School of Health Sciences, Hiroshima University  
**KONG Hainan** School of Environmental Science and Engineering, Shanghai Jiao Tong University, China  
**MATSUI Kazuaki** Department of Civil and Environmental Engineering, Kinki University  
**MATSUOKA Masatomi** Asahi Fishery Cooperative, Shiga  
**MINAMOTO Toshifumi** RIHN  
**NASU Masao** Environmental Science and Microbiology, Graduate School of Pharmaceutical Sciences, Osaka University  
**OKUDA Noboru** Center for Ecological Research, Kyoto University  
**OMORI Koji** Center for Marine Environmental Studies, Ehime University  
**WU, Deyi** School of Environmental Science and Engineering, Shanghai Jiao Tong University, China

## Research Aims

The spread of emerging infectious diseases is becoming a serious global environmental problem. To predict outbreaks of infectious diseases and to prevent epidemics, it is essential not only to conduct pathological studies but also to understand the interactions between humans and environments that cause and spread infectious diseases.

The objectives of this study are to clarify the anthropogenic environmental changes, pathogens, and human linkages to help deal with emerging infectious diseases proactively, before they become a major health threat, through an understanding of the nature of disease, and contribute to the safe coexistence of humans with pathogens to realize long-term societal security

## Research Methods and Organization

Outbreaks of mass mortality in carp, which have long been part of human food resource and culture, caused by the koi herpesvirus (KHV) disease have occurred worldwide since 1998. Specif-

ically, we will focus on the relationships between environmental changes in a freshwater ecosystem, KHV, common carp (*Cyprinus carpio carpio*), KHV disease and humans. We regard this system as a model of interactions between pathogens and humans (Fig. 1), because parameters common to other diseases are involved in the system and also this system allows us to conduct experiments to verify the interactions. We will then establish a general model for the emergence and spread of diseases (Fig. 2).

Fields surveys are mainly conducted at Lake Biwa, Japan, and Lake Erhai, China. Our project is organized into five research groups, an executive group, and an advisory group. The role of each group is as follows:

Environmental alteration by humans (Group 1): revealing the effects of anthropogenic environmental alteration on the emergence and spread of a pathogen (KHV) and on the behavior of its host common carp.

Ecology of pathogens and their hosts (Group 2): clarifying the dynamics of a pathogen (KHV) and its host (common carp) in relation to environmental factors, thereby defining the environmental factors involved in KHV infection.

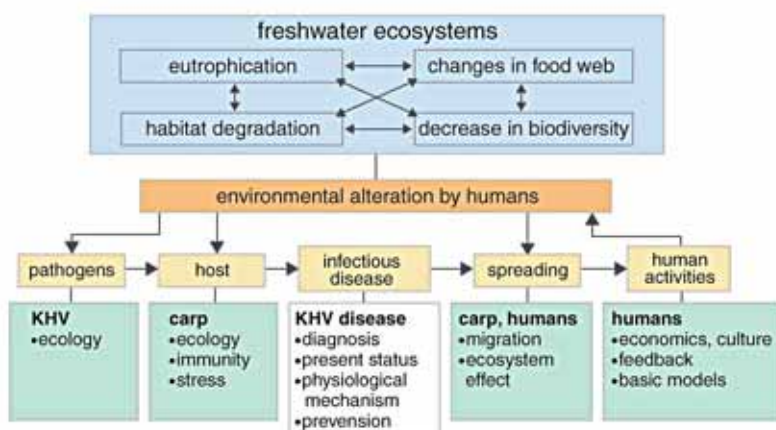
Infection and spread process and ecosystem effects (Group 3): revealing the infection and spread process and the effects of KHV disease on ecosystem functions such as material cycling.

Economics and culture (Group 4): clarifying losses in terms of ecosystem services, economics and culture as a result of KHV diseases, and the compensation process for those losses.

Feedback (Group 5): clarifying the effects of those losses on subsequent environmental alteration by humans.

Executive: coordinating the activities of each group to connect the research subjects to attain our objective. Applying our model to other infectious diseases.

Figure 1 Interactions between KHV disease and humans



■: research fields with many unrevealed subjects

Figure 2 Relationship of our model to a general human pathogen model

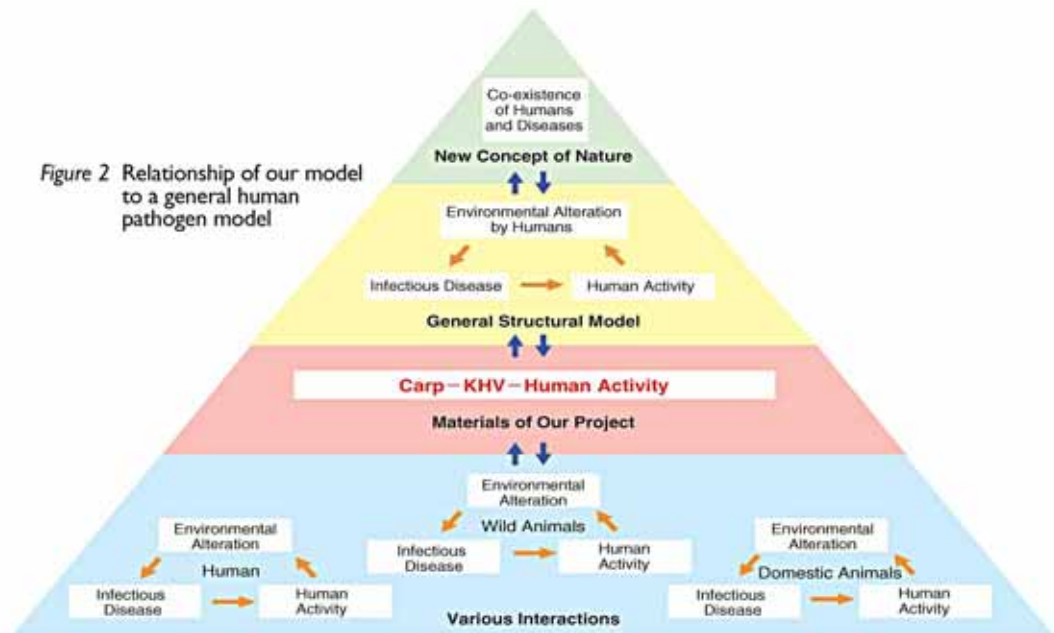
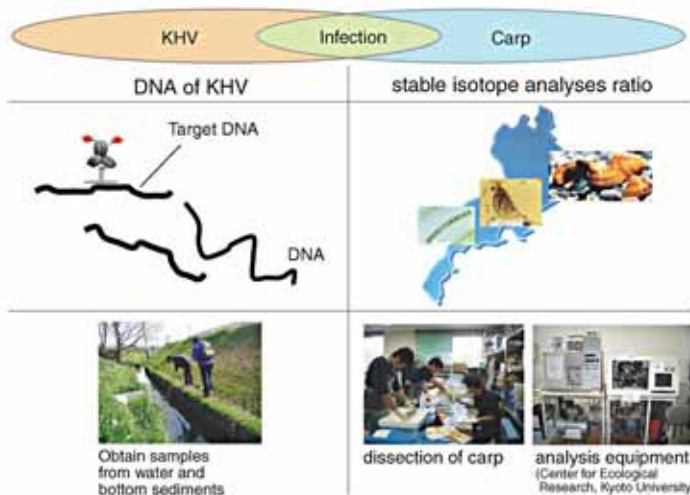


Figure 3 Survey of distribution of KHV and behavioral range of carp to predict the outbreak of infectious diseases



Advisory: giving us suggestions to improve our project from the viewpoint of international experts.

### Results in 2007

- 1) We surveyed the topology, bottom quality, and water quality of four satellite lakes of Lake Biwa that seemed to be important habitat for common carp. We found heterogeneous environments in these lakes. It was suggested that these environments may affect the behavior of common carp. A mathematical model, based on the hypothesis that common carp migrate between the satellite lakes seeking better habitats, predicted that lower connectivity among satellite lakes increases the stress carp experience and enhances the spread of KHV.
- 2) A pre-survey was conducted in Lake Erhai, China, with Chinese collaborators.
- 3) We established a method to detect KHV in lake water.
- 4) We collected carp from seven sites in Lake Biwa to obtain materials for stable isotope analyses and identified their behavioral range (Fig.3).
- 5) We developed a method to measure cortisol in

water as a stress-induced hormone. We conducted a preliminary stress experiment using breeding tanks for common carp with a controlled water temperature.

- 6) We measured antibodies against KHV in blood and detected KHV in tissues of common carp.
- 7) We began our study of the effect of common carp extinction on humans.
- 8) We exchanged information about some infectious diseases with other research groups to find common parameters involved in infectious disease outbreaks.
- 9) We have integrated results from each group into the basic structure of the interactions between pathogens and humans.

### Scheduled Research Activities in 2008

- 1) Clarify the behavior of the common carp in a lake using radio telemetry system.
- 2) Clarify the behavior of the common carp with a KHV antibody that reveals the history of KHV infection, and shows the places where the infection is likely to occur.
- 3) Reveal the distribution of KHV in Lake Biwa.
- 4) Clarify the environmental characteristics of the places where KHV and the carp are both present.
- 5) Reveal the relationship between environmental factors and stress through experiments.
- 6) Try to assess the economic impact of the disappearance of the carp.
- 7) Create a preliminary model of the effect of environmental change on the interactions between KHV and humans.
- 8) Analyze cases of other infectious diseases from the viewpoint of their interaction with humans.
- 9) Conduct a survey on spatial distribution in water temperature in Lake Erhai, China.
- 10) Provide multidimensional assessment of environmental change on the interactions between pathogens and humans from the perspective of the local residents.
- 11) Collaborate with an international program of biodiversity science (DIVERSITAS).
- 12) Hold an international symposium on Environmental Change, Pathogens and Human Linkages at RIHN, Kyoto.

# Global Warming and the Human-Nature dimension in Siberia

## —The social adaptation to the changes of the terrestrial ecosystem with an emphasis on the water environment

Siberia is one of the areas where global warming will be most evident, and perceivable changes in the climate, ecosystem and permafrost have already been reported in recent years. The change of natural processes, the capability of multi-ethnic population to adapt to the changes, and the interaction between the nature and the human activities are studied with the international flame work.

Project Leader ■ **INOUE Gen** Professor, Nagoya University

Core Members ■ **YAMAGUCHI Yasushi** Nagoya University  
**OHTA Takeshi** Nagoya University  
**HIYAMA Tetsuya** Nagoya University  
**TAKAKURA Hiroki** Tohoku University  
**OKUMURA Makoto** Tohoku University  
**SASAI Takahiro** National Institute of Advanced Industrial Science and Technology

### Research purpose

The climate change accompanied by the enhanced variability of climate is expected to impact on the mechanism of social and cultural activities through the ecosystem and water environment change. The objectives of this project are (1) to understand the change of water and carbon cycle caused by the global warming and (2) to predict the impact on the socio-cultural aspects of the society.

### Research method and area

The target research area is assigned to East Siberia, Lena River Basin. Field study results on the water and carbon cycles are scaled up by satellite data, and the validated model predicts their future change. In a similar manner, based on the field study of urban and rural inhabitant activities,

we predict their future focusing on the indigenous-local environmental perception, the food production activities of indigenous hunters and pastoralists, and the social infrastructure constructed by Soviet style modernization.

### Expected result

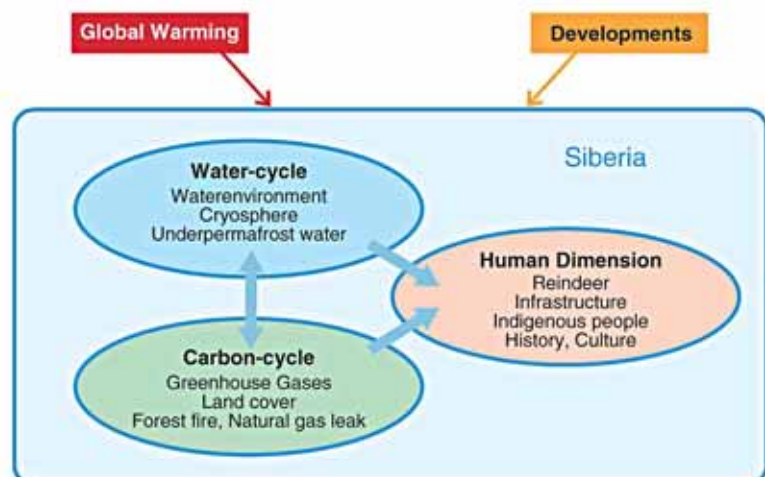
The results of the research in Siberia have the social value in the form of Early Warning addressing the issue of global warming. The carbon budget over Siberia is comparable with that over the tropical forest, and the reduction of global warming feedback uncertainty of carbon cycle is important. The importance of social and cultural factors in the impact assessment will be indicated which have been ignored because they are difficult for the global climate impact prediction model to take into account.

Photo Melting permafrost in the area facing to Arctic Ocean



The global warming and rapid development will cause the drastic change of the water environment (including snow and permafrost) and ecosystem (including the greenhouse gas budget) in Siberia. Their impacts on the human society both in urban and rural area are assessed based on the field study and socio-cultural and historical points of view.

Figure Flow chart of the project



# Urban Circularity and Diversity: Future Possibilities for a Great Complex System to Bridge the Human Race and Global Environment

Cities are a result of highly dense human agglomeration, which has heavily burdened the global environment. On the other hand, cities are also an assemblage of human wisdom that allows us to coexist with our environment. In order to investigate this complex system, we will adopt "circularity" and "diversity" as our viewpoints from which we can observe human value system, institutions, population, urban environmental resources, and other factors vis-à-vis multidimensional time-space coordination. The purpose of this study is to comprehensively evaluate both positive and negative urban impact upon the global environment based on the result of our investigation, and make proposals regarding the future of our cities.

Principal Investigator ■ **MURAMATSU Shin** Institute of Industrial Science, the University of Tokyo

Core Members ■ **ANDERSEN, Hans Thor** Copenhagen University  
**FUKAMI Naoko** Kokushikan University  
**HAYASHI Kengo** The University of Tokyo  
**HAYASHI Reiko** JICA Senegal  
**KAGOTANI Naoto** Kyoto University  
**KATO Hironori** The University of Tokyo  
**KIMURA Takeshi** University of Tsukuba  
**KINOSHITA Tetsuya** RIHN  
**KITAGAKI Ryoma** The University of Tokyo  
**KURIHARA Shinji** Nihon University  
**MORI Koichiro** The University of Tokyo  
**MURAKAMI Akinobu** University of Tsukuba  
**SHIMA Noritoshi** The University of Tokyo  
**TAKEUCHI Ayumu** The University of Tokyo  
**TANIGAWA Ryuichi** The University of Tokyo  
**TANIGUCHI Masato** RIHN  
**WIDODO, Johanness** National University of Singapore  
**YAMASAKI Seiko** Dentsu Communication Institute  
**YAMASHITA Yuko** Hitotsubashi University

Photo Urban landscape, Jakarta, 2006



Here, people, commodities, capital, and information flow in from all over the world and transform the city. We will conduct a historical investigation of these factors and consider future possibilities for our cities by focusing on their diversity.

## The Background and the Purpose of the Research

Currently, more than half the human activities on earth occur in cities. The urban concentration of people, commodities, capital, and information has been accelerating. This phenomenon is not only a result of global-scale mobility but also of migration from rural and suburban areas to the urban centers. People, commodities, capital, and information, once concentrated in a city, are amplified, consuming and wasting global resources — water, wood, farmland, and air — and as a result, rubbish, discarded lumber, carbon dioxide, and waste water are discharged.

Many of our environmental problems on the earth are caused by such urban consumption and discharge, which in turn should adversely affect the environment of the city itself. However, urban activities consist of so many different elements, and these various phenomena, while being bound by historical and civilization related factors, travel across urban and national borders, making it difficult for us to grasp them, let alone control them. This study is an attempt to grasp and analyze such phenomena of urban migration and sojourn, namely phenomena of urban circulation, which have been too complicated for any investigation so far, by means of various academic approaches. Furthermore, it attempts to investigate future possibilities for our cities by focusing on their diversity as a barometer.

## The Research Methods and the Expected Tasks

We have chosen Southeast Asia as the focus of our study — particularly Jakarta and its urban circulatory sphere — as this is the area where the struggling forces of globalization converge and

whose urban environments are being heavily degraded. We are also going to study Scandinavia — particularly Copenhagen and its circulatory sphere — in order to make a comparison with Southeast Asia. We will deal with the urban circulatory mechanism vis-à-vis people, commodities, capital, and information during the period from the end of the eighteenth century, when a great change was caused by the British Empire's making inroads into the region, to the present. We will study our subjects over the long-term (across a span of about 100 years), mid-term (across a span of about 30 years), short-term (across a span of about 10 years), and very short-term (within a span of one year). Out studies will be conducted cross-disciplinarily, involving various academic fields such as economic history, urban history, transportation engineering, religious studies, and the history of ideas. Thus, we will observe and compare the two target cities and clarify their dynamic structures.

We will also examine which elements are responsible for the degradation of the earth's environment. Based on our results, and by introducing the concept of urban diversity, we would like to construct a model for sustainable urban regeneration that will improve urban as well as global environmental problems and lead to future-oriented and practical urban policies. Finally, we will choose approximately 150 cities that humankind created on the earth and study their histories of rise and fall. This investigation, together with the study of our two target urban circulatory spheres, will allow us to build an inventory of urban wisdom and failures, which in turn will nurture future possibilities for our cities.

## Study of regional diversity of water quality: toward water management based on circulation

Global viewpoint becomes indispensable for the management of aquatic environment even in a local area because of the enlargement of human impacts on the atmosphere and the globalization in the society. This project aims to develop a method to diagnose the natural and artificial effects on the water quality, propose an environmental index to show the globalization signature in water, and arrange methods for the local water management which is adaptable for the global environmental change.

Project Leader ■ **NAKANO Takanori** RIHN

Core Members ■ **TAYASU Ichiro** Center for Ecological Research, Kyoto University

**SAITO Yuh** RIHN

**TSUJIMURA Maki** School of Life and Environmental Sciences, University of Tsukuba

**ENDO Takahiro** RIHN

**YAMADA Yoshihiro** Faculty of Agriculture, Kagawa University

**ITO Makoto** Faculty of Science, Chiba University

### Research purpose

The major subject of watershed management has been changed from the water mass problems to the water quality ones. As water contains materials derived from the watershed and foreign countries, elucidating the global circulation structure of materials in nature and society becomes indispensable for the better management of local water.

### Research method and area

Utilizing the advanced traceability technique by integrating various geochemical and isotopic analysis methods, we will identify the source of components in water and classify them into a local source and a global one. Based on this traceability diagnosis, we will develop an effective moni-

toring method to sustain the water quality and support the water management by local governance dependent on its social and natural characteristics.

### Expected result

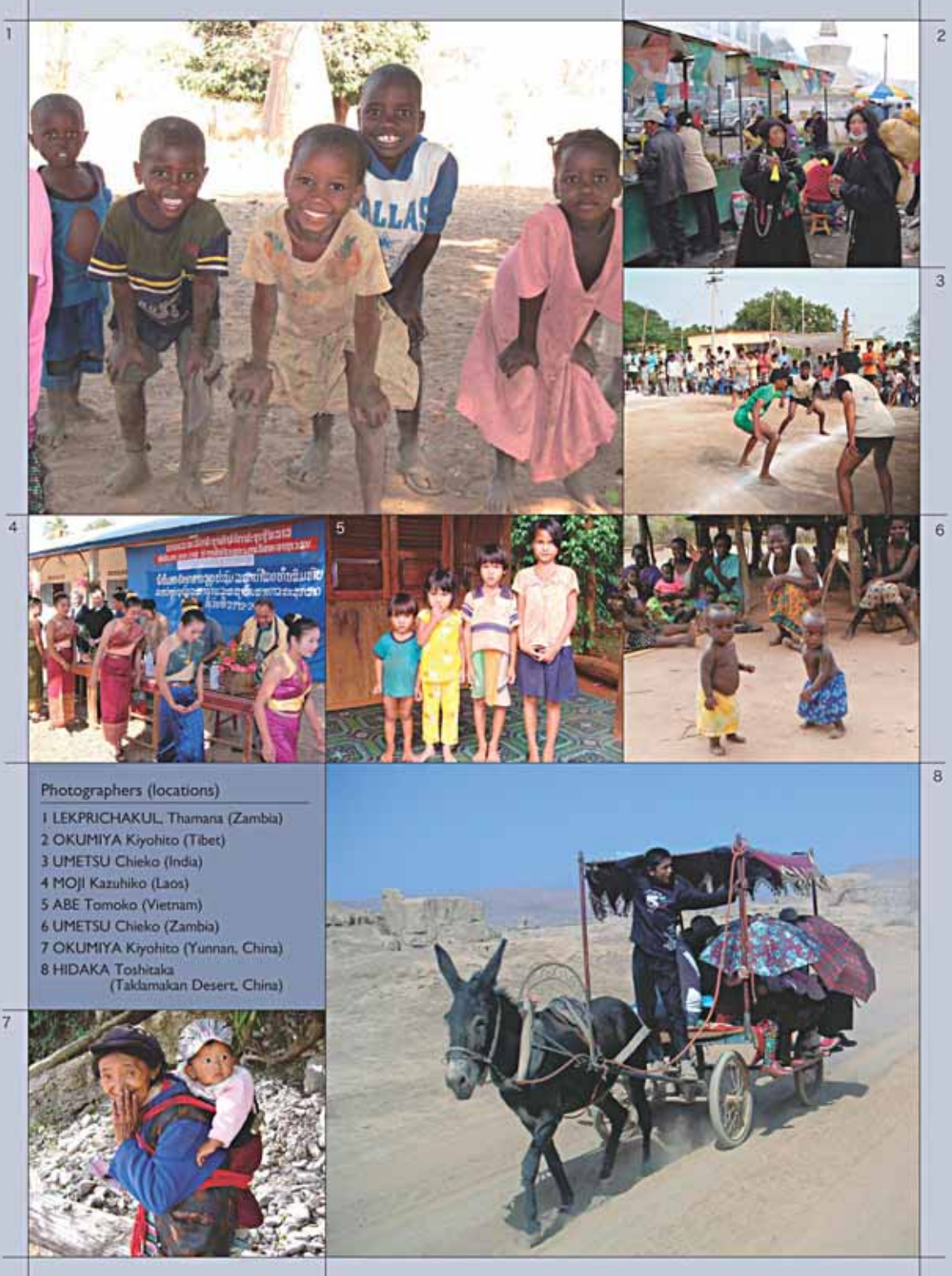
The traceability diagnosis will increase in the analytical precision for the material flow in nature and human society, and can identify the source area and its size of materials in a local environment. It will lead to evaluating the water safety based on the precaution rule, establishing a new water index to evaluate the contribution of foreign materials, and improving the environmental consciousness of people, which is the basis of the water management based on circulation.

Photo Popular Koubou-water welling from the seafloor in the Saijo city of Ehime prefecture.



The photos in the lower right and left are the enlargement of the Koubou-water. Groundwater of good quality in Saijo is the basis of municipal lives. However, the mountainous area of recharging groundwater has been in a state of forest devastation and receiving atmospheric pollutants from the Asian continent, whereas the plain area is concerned with various human impacts and saltzation due to the rise of sea-level. Thereby, the future management plan of the total watershed is prerequisite.

In the field we encounter people of different ethnic groups, with different languages, cultures, histories and customs. The environmental problems they face also vary from region to region, but all share one common planet Earth. Their problems are our problems, and together we must seek solutions.



**Photographers (locations)**

- 1 LEKPRICHAKUL, Thamana (Zambia)
- 2 OKUMIYA Kiyohito (Tibet)
- 3 UMETSU Chieko (India)
- 4 MOJI Kazuhiko (Laos)
- 5 ABE Tomoko (Vietnam)
- 6 UMETSU Chieko (Zambia)
- 7 OKUMIYA Kiyohito (Yunnan, China)
- 8 HIDAKA Toshitaka (Taklamakan Desert, China)

# D

## Diversity

Program Director ■ **YUMOTO Takakazu** RIHN

Diversity program deals with global environmental issues derived from the loss and degradation of biological diversity from genetic-specific to ecosystem, as well as cultural diversity including language, social structure, religion and cosmology. Diversity is significant as an indicator of a harmonious society where people lead safe, healthy lives with peace of mind, where human rights are not violated, and where the individual can live with hope and pride.

In the context of the history of civilization, the loss of cultural diversity should be seen as part of a large-scale process that threatens biological diversity on Earth, in particular, as part of the global breakdown of man's relationship with nature that has become prominent since the last century. We face a situation in which the cultures and languages that embrace the thinking that have caused today's global environmental problems are expelling from the world the cultures and languages that have embraced "wise use" in harmony with nature.

Diversity program aims to clarify the formation, maintenance and functions of biological and cultural diversity within human-nature interactions in various environments. And it seeks the ways to inherit "wise use" of nature that prevents renewable natural resources from exhausting, and extracts ecosystem services sustainably, for realizing environmentally low-impact but wealthy-in-mind daily life by applying biological and cultural diversity.

Completed Research	Leader	Theme
<b>D-01 (CR1)</b>	ICHIKAWA Masahiro	Sustainability and Biodiversity Assessment on Forest Utilization Options
Full Research		
<b>D-02 (FR3)</b>	YUMOTO Takakazu	A New Cultural and Historical Exploration into Human-Nature Relationships in the Japanese Archipelago
<b>D-03 (FR1)</b>	OKUMIYA Kiyohito	Human Life, Aging, and Disease in High-Altitude Environments: Physio-medical, Ecological and Cultural Adaptation in the Three Great "Highland Civilizations"
<b>D-04 (FR1)</b>	YAMAMURA Norio	Collapse and Restoration of Ecosystem Networks with Human Activity



## Sustainability and Biodiversity Assessment on Forest Utilization Options

Terrestrial biodiversity has decreased mainly because of the loss and/or deterioration of forest ecosystems. A system to utilize forest resources while conserving biodiversity should be developed. This project aims to elucidate the socio-economic background causing forest decrease, its effects on biodiversity, and ecological services that might be lost as a consequence of biodiversity loss. We also evaluate the forest-use options both from ecological and socio-economical aspects to develop a sustainable utilization system.

Project Leader ■ ICHIKAWA Masahiro RIHN

### Findings from the project

The following subjects were studied at four sites, Sarawak state and Sabah state in Malaysia, and Yaku Island and Abukuma Mountains in Japan.

1. Changes of forests and their driving forces
  - The results were shown as land-use maps and matrices.
  - Driving forces of change
2. Effects of forest changes on biodiversity
  - Biodiversity losses in each utilization option. The results were shown as biodiversity maps.
  - Mechanisms of maintenance and loss of biodiversity in natural and disturbed systems
3. Ecosystem functions and services provided by biodiversity and their changes
  - The results were shown as ecosystem function and service maps.
4. Social institutions on sustainable use of forest biodiversity
  - Environmental economy of each utilization option. Ecological and socio-economic value of each utilization option.

Finally from the results of 1 to 4 above, we built an integrated method for assessment of sustainable uses of forest and biodiversity.

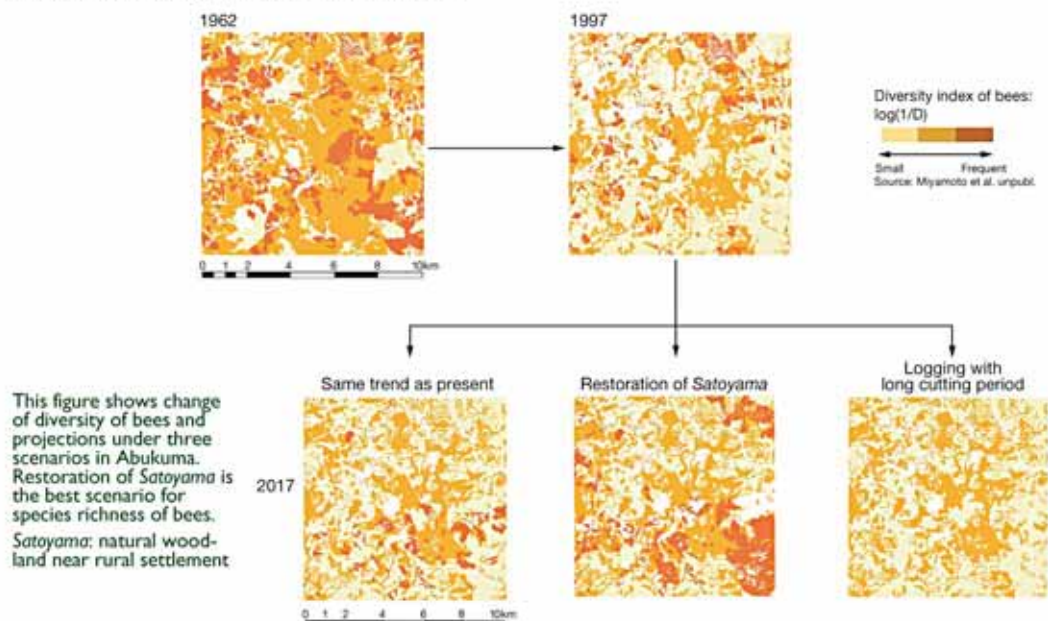
### Contribution of Project Results to Tackling Global Environment Problems

The results of this project showed how forest changes affected the biodiversity, from which an integrated method to assess sustainable uses of forest and biodiversity was proposed. The assessment will be useful to seek ways for resolution of problems on uses of forests and biodiversity in each area. The assessment method could be standardized for use by public and private sectors.

### Published products

Academic papers with peer review: 203 (English 165, Japanese 38). Papers in books: 67 (English 21, Japanese 46). *For the Future of Biodiversity* (11 chapters), a presentation material for undergraduate students (RIHN and Showa-do, in Japanese). *Forest Degradation in the Tropics of Southeast Asia* (Jinbun Shoin, in Japanese), Special issue in *Ecological Research* (2007), *Sustainability and Diversity of Forest Ecosystems* (2007 Springer), and others.

Figure An example of ecosystem function maps



This figure shows change of diversity of bees and projections under three scenarios in Abukuma. Restoration of *Satoyama* is the best scenario for species richness of bees. *Satoyama*: natural woodland near rural settlement

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

The Japanese Archipelago has been extremely densely populated since the Neolithic Age, and most of the natural environment has been strongly influenced by human activities. However, in spite of the intensive intervention by humans in the natural environment, there is still a rich biota in the Japanese Archipelago, which includes, for example, an abundance of indigenous species of angiosperm and freshwater fish. But recently, many plants and animals are close to extinction because human-nature relations in this Archipelago have changes. This project aims to reconstruct human-nature relationships as historical processes to suggest concrete measures for preventing further extinction of species in the near future.

Project Leader ■ **YUMOTO Takakazu** RHIN

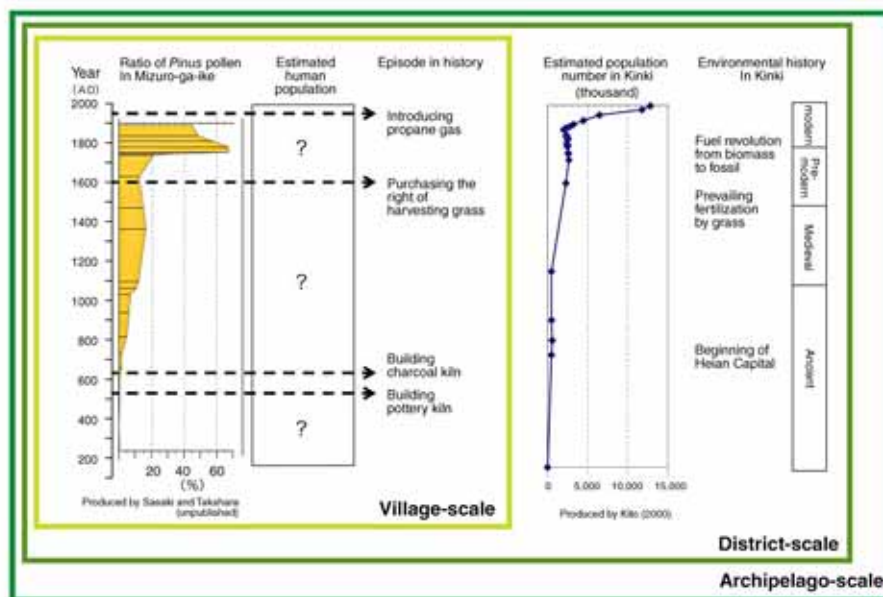
Core Members ■ **ABE Hiroshi** Graduate School of Human and Environmental Studies, Kyoto University  
**ANKEI Yuji** Faculty of International Studies, Yamaguchi Prefectural University  
**IINUMA Kenji** Faculty of Humanities, Beppu University  
**IKEYA Kazunobu** National Museum of Ethnology  
**IMAMURA Akiyo** Faculty of Bioenvironmental Science, Kyoto Gakuen University  
**KATAYAMA Kazumichi** Graduate School of Science, Kyoto University  
**MATSUDA Hiroyuki** Graduate School of Environment and Information Sciences, Yokohama National University  
**MURAKAMI Noriaki** Faculty of Urban Liberal Arts, Tokyo Metropolitan University  
**NAKAI Sei'ichi** Faculty of Humanities, Toyama University  
**NAKANO Takanori** RHIN  
**OSUMI Katsuhiko** Forestry and Forest Products Research Institute  
**SATO Hiroyuki** Graduate School of Humanity and Sociology, The University of Tokyo  
**SHIROUZU Satoshi** The Law Faculty, Chuo-Gakuin University  
**TAJIMA Yoshiya** Faculty of Economics, Kanagawa University  
**TAKAHARA Hikaru** Faculty of Agriculture, Kyoto Prefectural University  
**TAYASU Ichiro** Center for Ecological Research, Kyoto University  
**YAHARA Tetsukazu** Graduate School of Sciences, Kyushu University  
**YAMAGUCHI Hirofumi** Graduate School of Agriculture and Biological Sciences, Osaka Prefecture University  
**YONEDA Minoru** Graduate School of Frontier Sciences, The University of Tokyo

## Objectives

The objective of the present project is to reconstruct human-nature relationships as historical processes. It will examine, first, how the natural environment has been changed since the late Paleolithic Age, when human beings are first

known to have existed in the Japanese Archipelago; second, how the biota has changed during that process; and third, what kind of perceptions, knowledge and skills the humans possessed, concerning both nature in general, and specific life forms. Our aim is to present a foundation for con-

Figure 1 A prototype of the chronological chart of environmental history (Kyoto Basin as an example)



The chronological chart of the environment consists of three layers: village-scale, district-scale and archipelago-scale, according to multi-layered environment governance. A series of chronological charts of environmental history for each district is being compiled from epoch-making events on environmental issues and policy changes on resource managements. It will be completed by adding data of estimated vegetation changes (pollen analysis) and population change (historical demography).

Figure 2 Scheme of historical dynamics in human-nature relation

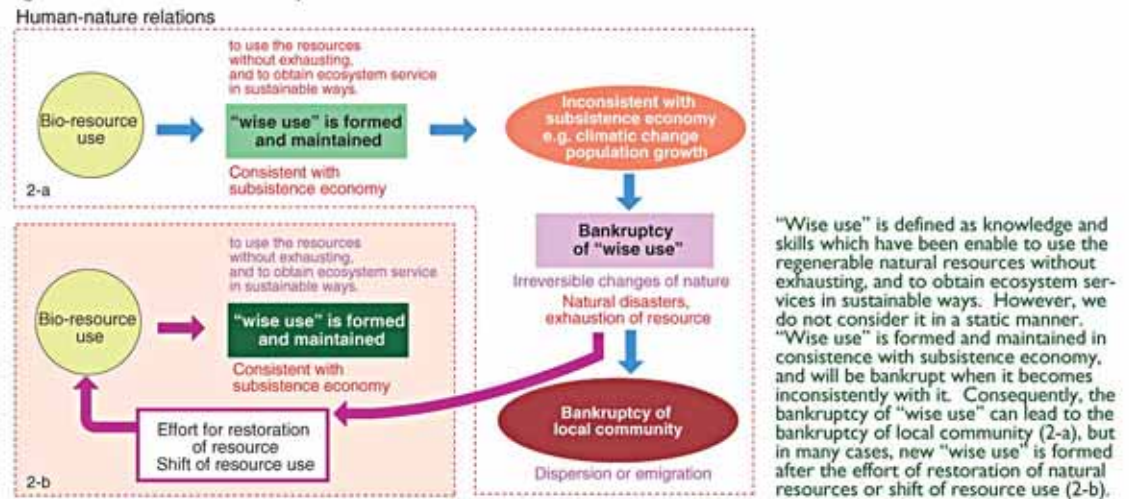
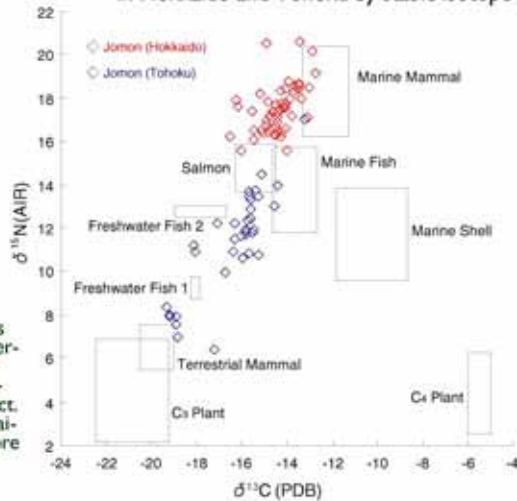


Figure 3 Diet analysis of Jomon people in Hokkaido and Tohoku by stable isotope



A big difference in diets in Jomon people (hunter-gatherer) was found between Hokkaido district and Tohoku district. Jomon people in Hokkaido depended much more on marine mammals.

templating how human-nature relations should be developed, and to suggest concrete measures for preventing further extinction of species in the near future.

### Study Area and Methodology

The project will elucidate the historical process of change in human-nature relationships under the global and/or local climate changes in these six regions: Hokkaido, Tohoku, Chubu, Kinki, Kyushu and Amani-Okinawa, in addition of Sakhalin, using biological remains that contain pollen samples, archaeological remains, old documents and folkloric materials. In addition, we intend to examine the change of the historico-economic background and the knowledge and skills concerning nature and living organisms, with special emphasis on their relation to the disappearance, or thriving, of organisms. Main approaches are: 1) the analysis of ancient vegetation and changes in the distribution of plants and animals; 2) reconstruction of human ecology based on population estimates and the diets; 3) reconstruction of human-nature relations in the past, and the analysis of the social systems behind them; and 4) theoretical modeling of human-nature relations. In the process of compil-

ing the chronological chart of environmental history (vegetation change, human population, episode in history) in each site by comparative methods including proxy and tracer analyses (pollen, DNA, stable isotope), we will analyze the change of human-nature relations and its drivers under the multi-layered environmental governance ("wise use" of whom, by whom, for whom).

### Progresses, Organizing working groups and targeting core sites in seven districts

We have re-organized seven district-based working groups targeting core sites (shown in parentheses), Hokkaido (Shiribeshi), Tohoku (Kitakami), Chubu (Akiyama), Kinki (Kyoto-Tanba), Kyushu (Kuju-Aso), Ryukyu (Okinawa Island and Amami-oshima Island), in addition of Sakhalin, each of which possesses characteristic climate, vegetation, flora and fauna, and traditional life style of people, and includes ca. 100 km X 100 km area of agricultural and forestry villages, and mountains. Also, we organized three method-based working groups targeting paleo-ecosystem, plant-geography, and old human bones.

- 1) A series of chronological charts of environmental history for each district is being compiled from epoch-making events on environmental issues and policy changes on resource managements. It will be completed by adding data of estimated vegetation changes (based on pollen analysis) and population change (based on historical demography).
- 2) The word "wise use" has been examined from various aspects. Consequently, it is defined as knowledge and skills which have been able to use the regenerable natural resources without exhausting, and to obtain ecosystem services (provisioning, regulating, cultural, and supporting, in sensu Millennium Assessment (2005)) in sustainable ways. Examples of "wise use" and "unwise use" from each district are being sorted out and categorized by identifying which governance (e.g. household, community, local government, national government, international organization) took an initiative role, and according to what kind of incentive it concerned.

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

Highlands are the places where people have been building specific means of livelihood and unique cultures to survive in challenging environment with thin air and limited ecological resources over the years. The Himalaya/Tibet, the Andes and the Ethiopian Highland are three great examples of such highlands. Life, aging, disease and death are closely-linked to lifestyle and environmental condition. Communities in the highlands have kept the interaction with those in lowlands in balance. However, in recent years, the wave of globalization has rushed over highlands, as symbolized by the infiltration of money economy, the acceleration of migration, the change of lifestyle and the extended life spans. The aim of this research is to evaluate the impact of changing natural conditions and lifestyles on life, aging, disease and death. The change of natural ecosystems and cultures has accumulated in the human bodies through lifetimes. Aging and disease can be regarded as the environmental issues that affect the human bodies.

- Project Leader ■ **OKUMIYA Kiyohito** RIHN
- Core Members ■ **ANDO Kazuo** Center for Southeast Asian Studies, Kyoto University  
**KAWAI Akinobu** Faculty of Liberal Arts, The Open University of Japan  
**KOSAKA Yasuyuki** RIHN  
**SAKAMOTO Ryota** RIHN  
**SHIGETA Masayoshi** Graduate School of Asian and African Area Studies, Kyoto University  
**TAKEDA Shinya** Graduate School of Asian and African Area Studies, Kyoto University  
**TSUKIHARA Toshihiro** Faculty of Education and Regional Studies, University of Fukui  
**MATSUBAYASHI Kozo** Center for Southeast Asian Studies, Kyoto University

### Background

Nowadays, urbanization and environment destruction are expanding on a global scale. The effects have also reached living environments of highlanders, such as migration in village communities, decrease in physical activity due to spread of motorbikes and drastic decline in forest and grass cover. As a result of extended life spans and change in lifestyle, the number of so-called civilization diseases such as hypertension and diabetes has increased. There is a possibility that highlanders are vulnerable to aging and lifestyle related diseases because of hypoxic stress, high levels of ultraviolet radiation or other factors. On the other hand, there remains the local knowledge like spirit of cooperation within communities and healing of mind through the network of religious activities in highlands.

### Objectives

The objective of this research is to evaluate the impact of peculiar natural conditions and changing traditional lifestyle on human life, aging, disease and death in the Himalaya/Tibet, the Andes and the Ethiopian Highland. We will learn wisdom of the aged in highlands and also disclose futurity in which highlanders can live in relief in highlands and find ways to adapt to our society.

### Research Content

The effects of globalization on highlander's lifestyle will be examined with special reference to lifestyle-related diseases, chronic mountain sickness, and human aging phenomena through comprehensive geriatric assessment as a health check-up for the elderly, interviews of residents' life histories, and observation of the lives and the envi-

Figure The change of natural ecosystems and cultures has accumulated in the human bodies through lifetimes. Aging and disease can be regarded as the environmental issues that affect the human bodies.

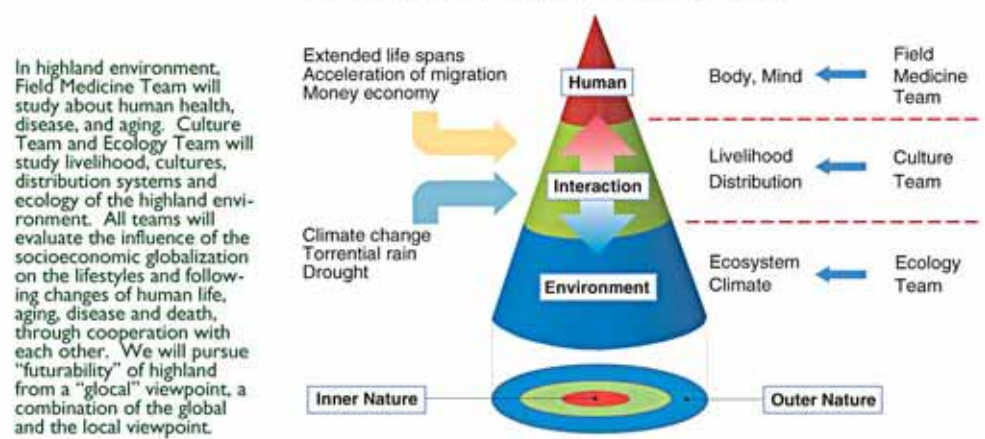


Photo 1 Vicugna, wild race of camelid (wild relative of alpaca). (the Andes , Peru)



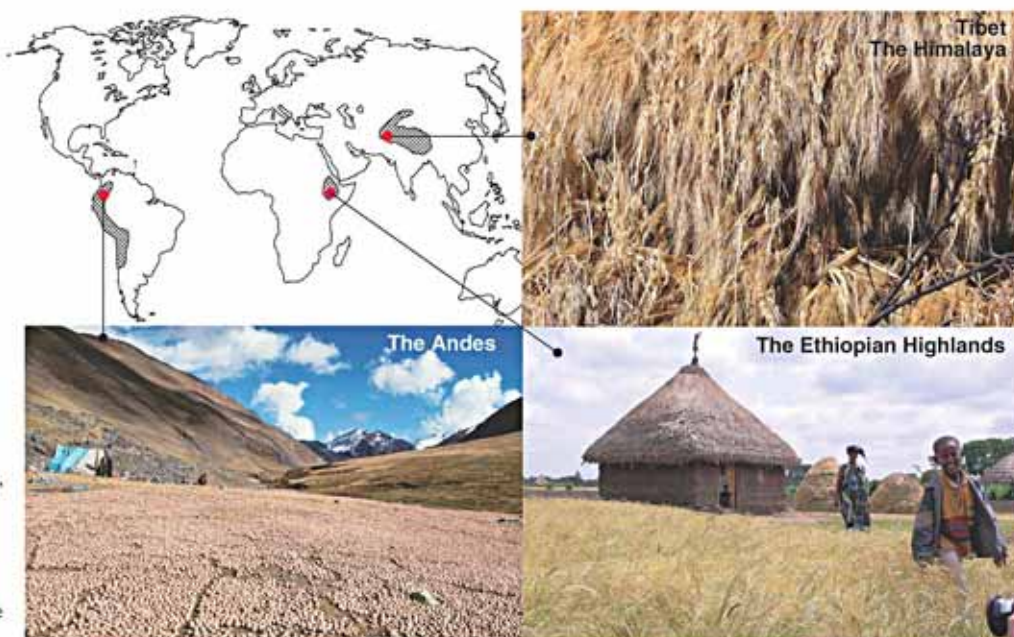
A custom in the time of the Inca Empire of "Chacu" was revived recently. The custom was to release vicugna without killing them after drive-in hunting and shearing. The price of vicugna wool has risen with the globalization of economic activities and the economic profit was brought about in the community. Co-management of vicugna in the community has reduced poaching and has contributed to natural conservation and recovery of confidence in its own cultures.

Photo 2 Highland people in health check-up (Shangri-La, Yunnan, China)



One of the problems among highlanders is an increase in lifestyle-related diseases, including hypertension and obesity, especially in urban area.

Photo 3 Indigenous crops having supported the three major highland's culture



Suitable crops for highland have supported cultures in highland. For example, there are potatoes in Andes, barley in Tibet, teff and enset in Ethiopia. Also, there are suitable domesticated animals for highland like llama and alpaca in Andes, yak in Tibet, and cattle in Ethiopia. There are the issues of zoonotic infections on the other side of the coin.

ronments (Field Medicine Team).

There are common features of environmental exploitation, such as agriculture and animal husbandry, in the livelihoods of the three major highlands. Livelihoods, cultures and ecosystem in the highlands will be clarified that affect human life, aging, disease and death in highlanders. The relationship between people and the high-altitude environments will be investigated through the surveys on local knowledge and techniques. Interaction between highland and lowland in order to maintain highland communities and lifestyles is also examined. The ecosystem in highlands that affect the livelihood and diseases will be studied with special reference to weather, climate change, land use, forest use and vegetation. (Highland's Culture and Ecology Teams).

The actual features of the diseases and human aging phenomena among highlanders will be clarified with special reference to high-altitude ecology and its socio-economic backgrounds. The young researchers from the field medicine team and the highland's culture and environment teams will stay in the fields on a long-term in principle

and conduct the interdisciplinary works in the common study field areas.

#### Annual progress 2007

- 1) The surveys on the relationship between health of highland people and their economic condition in Yunnan Province, China revealed an increase in high-blood pressure and obesity, and also susceptibility to lifestyle-based diseases.
- 2) Preliminary surveys on lifestyle-related diseases, chronic mountain sickness, and zoonotic infection were conducted in Qinghai Province, China, and the Andes Highland, Peru.
- 3) Preliminary surveys on agricultural systems, forest vegetation, trading and lifestyle were conducted in Arunachal Pradesh and Ladakh, India, and Yunnan Province, China.

#### Schedule in 2008

The study will be carried out mainly in Qinghai Province, China in the Himalaya/Tibet, and in the Andes and the Ethiopian Highland.

# Collapse and Restoration of Ecosystem Networks with Human Activity

Most ecosystems on the planet have been seriously degraded by human activities and are now in a critical situation. Nevertheless, most researches on the problem have focused only on the direct consequences. The project aims to clarify the mechanisms resulting in the collapse and deterioration of ecosystems, and then pave the way to restore and maintain healthier ecosystems with high biodiversity and ecological functions while minimizing instability and uncertainty in the long term over a wide area.

Project Leader ■ **YAMAMURA Norio** RIHN  
 Core Members ■ **SAKAI Shoko** RHIN  
**ISHII Reiichiro** Frontier Research Center for Global Change  
**FUJITA Noboru** Center for Ecological Research, Kyoto University  
**ICHIKAWA Masahiro** RIHN  
**MAEKAWA Ai** RIHN  
**NAKASHIZUKA Tohru** Faculty of Bioscience, Tohoku University  
**OHGUSHI Takayuki** Center for Ecological Research, Kyoto University

## Objectives

Degradation of ecosystems, which has led to the loss of biodiversity and ecosystem function, is widely accepted as one of the most serious global environmental problems. Nevertheless, most researches on the problem have focused only on

the direct consequences. The collapse and deterioration of ecosystems by human activities via interactions within the ecosystem network, including indirect and cascade effects, have rarely been considered. In addition, few studies take a social science perspective, although environmental problems are one of the consequences of the interactions between nature and human society.

The recent boom in theoretical studies on complex networks (complex system sciences, complex adaptive systems) and the remarkable progress in computer performance have dramatically increased our capacity to deal with complex systems such as ecosystems and social interactions. Complex system sciences are now a practical, important tool in various fields of sociology, economics, and ecology.

This project takes advantage of the interdisciplinary nature of network sciences to consider environ-

mental problems, especially the problem of ecosystem deterioration, by linking sociology, economics, and ecology. The project aims to clarify the mechanisms resulting in the collapse and deterioration of ecosystems, and then pave the way to restore and maintain healthier ecosystems with high biodiversity and ecological functions while minimizing instability and uncertainty in the long term over a wide area.

## Research Sites

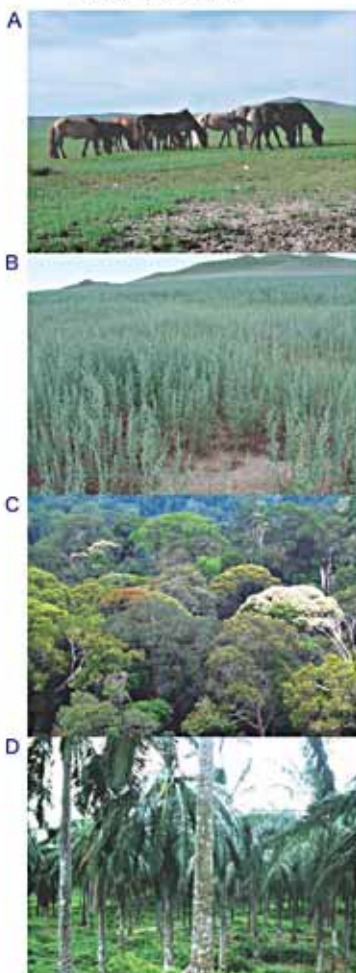
The research areas for this project are tropical rainforests in Southeast Asia and grassland in Central Asia. For a comparative investigation, it is essential to establish more than one research area to obtain general results and discussion. At both sites, the terrestrial ecosystems are being devastated with the surge in the Asian economy associated with the recent dramatic economic growth of China. Nevertheless, the lives of many people depend on natural ecosystems, and the destruction of these ecosystems directly results in dramatic changes in their lives. The economies of both regions have similar frameworks, whereas their ecological characteristics differ, such as the regeneration time of vegetation and position of humans in the food web. Both sites are good research areas because many studies in the social sciences and ecology have been conducted there. In general, it is impossible to go from a description of the ecosystem networks to constructing models for projections at multiple study sites if we start from scratch, considering the time span and research budget of projects at the RIHN. By using such information, we expect to make significant achievements in a period as short as six years.

## Research Methods

The most important concept of this project is the "ecosystem network," which has a nested structure involving interactions among and within subsystems, including human societies, as shown in Figure 1.

We will conduct fieldwork in two regions: trop-

Photo Mongol, Healthy grassland (A) and degraded pasture (B).  
 Sarawak, Rainforest (C) and plantation (D).



In Mongolia, livestock have grazed the grassland intensively for the long time. In recent years, overgrazing by livestock, especially by the increased number of goats for the production of cashmere for export, has caused a serious problem in the region. In Sarawak, the ecosystem has changed dramatically over the last 100 years; land use has shifted from extensive agriculture in forests by aboriginal people to logging in natural forests as a source of timber for export, and then to oil-palm plantations.

ical rainforests in Southeast Asia and grassland in Central Asia. First, we will describe the existing ecosystem network structure in both regions using information obtained from fieldwork and the literature. Because relatively large amounts of information on biological interactions within subsystems have already accumulated, the ecological surveys will focus mainly on material flow and the movements of organisms between subsystems, especially the movements of pollinators, predators, and parasitoids related to ecosystem function. For the networks of human societies, we will investigate which actors are responsible for the changes in the ecosystems, the intention of the change, how other actors control these activities, and the historical transition of actors driving the ecosystem changes. Based on our results, we will construct models for making projections and evaluating the ecosystem networks in the two regions. Further, we will generalize the results to determine the critical network characteristics likely to result in environmental problems.

In the ecosystem network, the subsystems (e.g., primary forests, secondary forests, lands for shifting cultivation) form an interacting network. In addition, each subsystem consists of networks of biological interactions. Moreover, we place human society as a subsystem within the ecosystem network and regard human activities as part of the interactions within the ecosystem network.

### Progress up to now

We determined the structure of the network model that we will construct during the full research period. We listed available and measurable variables relevant to our subject matter in the two field research sites (Sarawak and Mongolia) and classified them according to their inter-relationships and the potential mechanisms linking them. The model is hierarchically structured, with three spatial scales: i) 200-600 km (large scale), ii) 10-50 km (medium scale), and iii) 50 m to 1 km (small scale). The spatial resolution at each scale is the distance range of the one-step lower scale. The spatial scale of human migration and settlement processes has increased at the nationwide (large) scale owing to the expansion of the transportation and economic networks, whereas these processes for other organisms in nature are mostly limited to a more narrow (medium) scale by climatic, geographical, and biological constraints. The ecological interactions within a landscape do not incorporate spatial structure, which would enable their inclusion in small-scale models.

We are starting to collect quantitative and qualitative data at different spatial scales in the field by combining large-scale surveys and intensive investigations at a small number of sites. The large-scale surveys will involve interviews and simple ecological assessments at several locations. The surveys may elucidate the large-scale correlations between changes in ecological networks and the structures of social and ecological networks. The intensive surveys aim to clarify the mechanisms of patterns revealed by the large-scale surveys.

Figure 1 Ecosystem network studied in this project (an example in Sarawak)

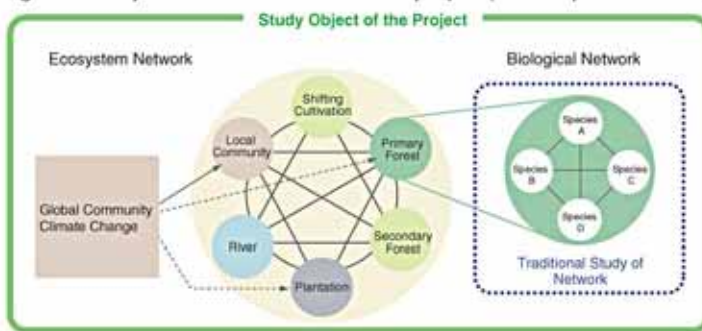
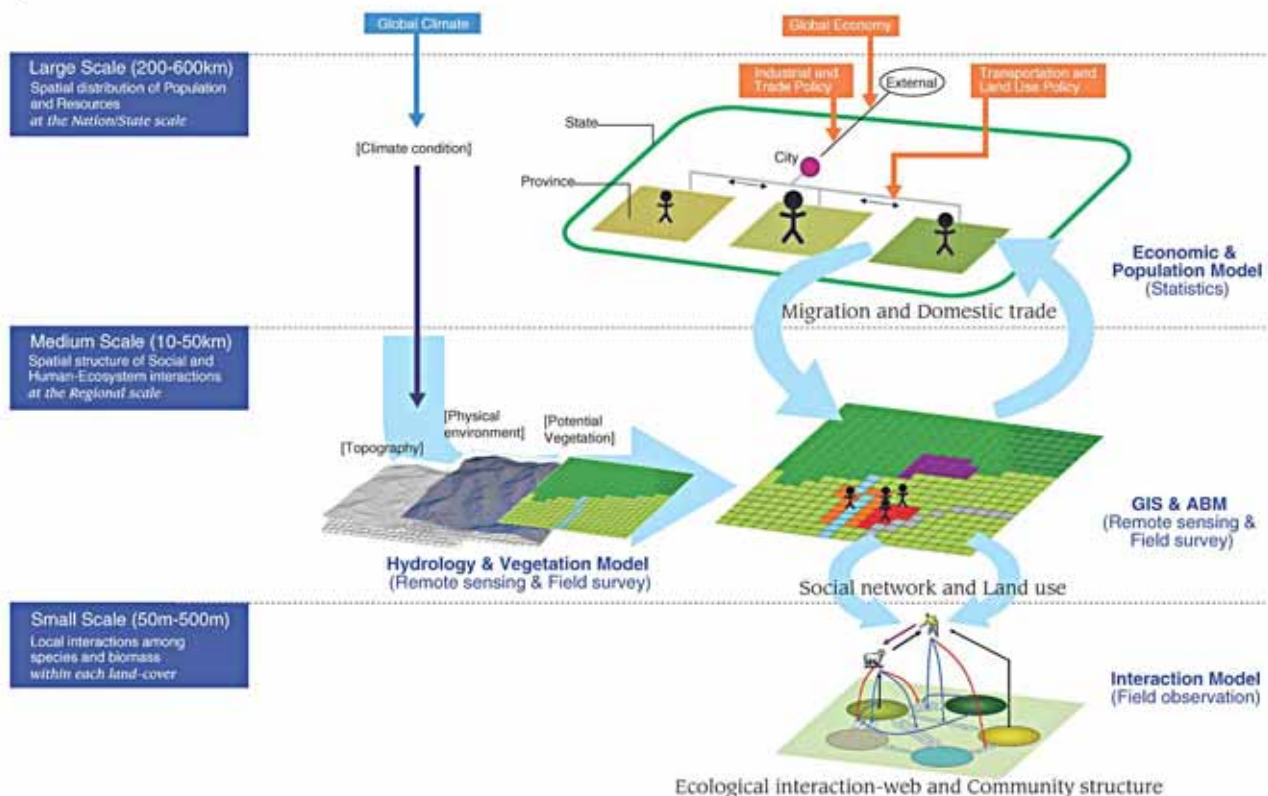
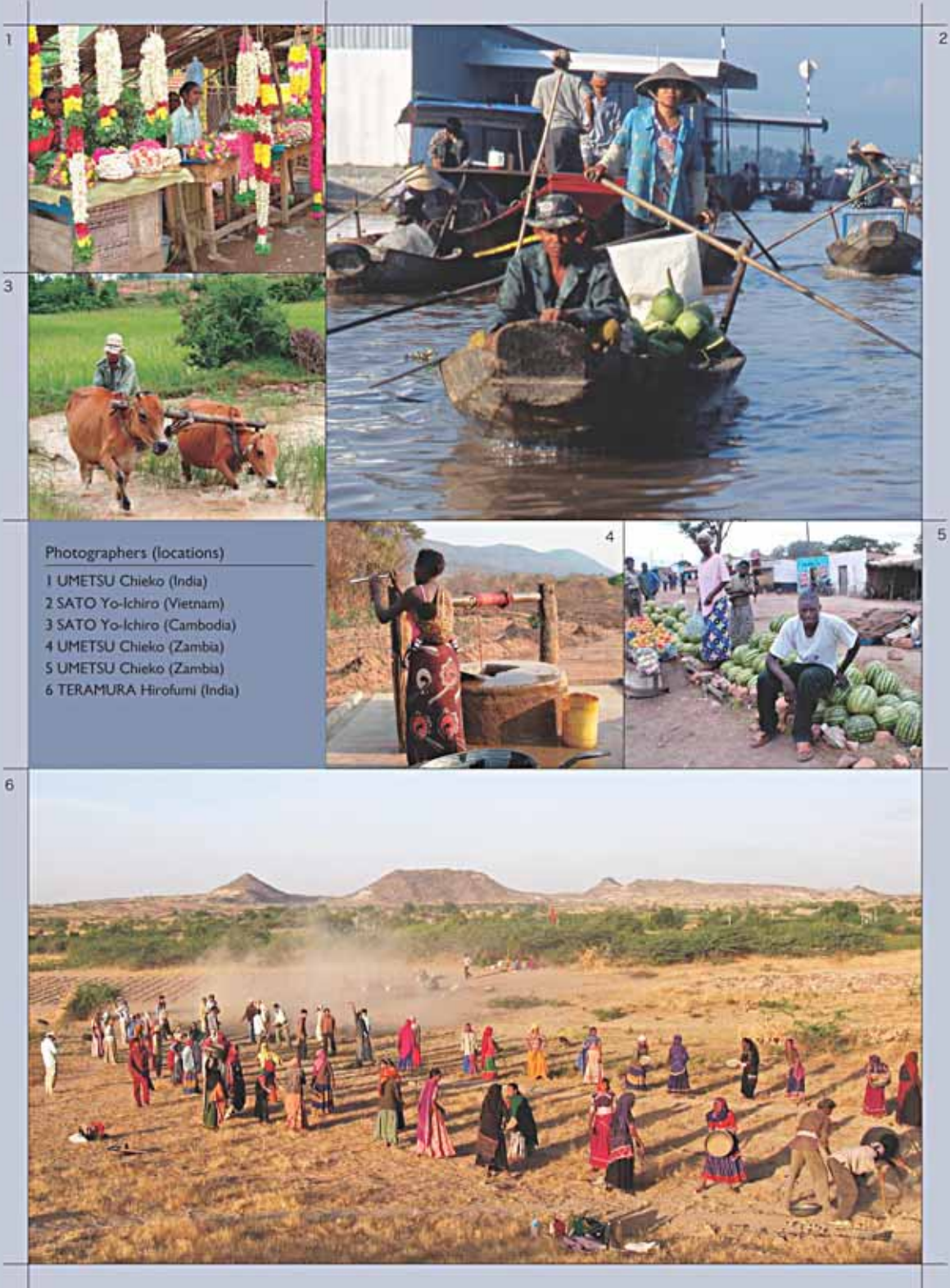


Figure 2 Hierarchical structure of the model



Degradation of the earth's environment is seriously affecting people's lifestyles. But by reconsidering excesses in daily life, it is possible to alleviate the burden on the environment. Research activities at RIHN also look at the lifestyles of people inhabiting areas with different natural features.



Photographers (locations)

- 1 UMETSU Chieko (India)
- 2 SATO Yo-ichiro (Vietnam)
- 3 SATO Yo-ichiro (Cambodia)
- 4 UMETSU Chieko (Zambia)
- 5 UMETSU Chieko (Zambia)
- 6 TERAMURA Hirofumi (India)



# Resources

# R

Program Director ■ **AKIMICHI Tomoya** RIHN

This program aims to demonstrate various facets of problems deriving from humans' use and conservation of renewable and non-renewable resources on earth. Since prehistoric time, humans have utilized plant and animal species for food procurement and then succeeded in domesticating some of these wild resources. Through this historical process, humans were able to gain more food products, and this resulted in population increase. At the same time, however, the exploitation of land for agricultural production and for pasture has inevitably decreased forest cover and reduced biodiversity. In general, food used to be produced and consumed locally; but this norm has been drastically changed by the development of transportation technology, which has made long-distance trade possible. At the same time, long-distance trade eventually increased energy consumption in accordance with the product of distance between production and consumption areas and weight of food, namely, food mileage. This has imposed serious environmental loads through the emission of CO<sub>2</sub>. Increasing refuse has also become a serious threat to the environment.

If the amount of water used for producing agricultural crops and meat can hypothetically be estimated as virtual water, we can understand how much water is consumed and how much water is transported through international trade. As is also clear from widespread disputes over water, the appropriate governance of water management is absolutely important. On the other hand, food and water are incorporated into the human body as a source of life maintenance, but it must be noted that they also cause disease and health problems. In other words, food-borne and water-borne diseases due to poverty and pollution, like sexually transmitted HIV, must be eradicated, as these are primarily linked with human security and rights. Also, the traceability of food resources should be examined in terms of food safety and security and for the betterment of human health.

Completed Research	Leader	Theme
<b>R-01 (CR2)</b>	WATANABE Tsugihiro	Impact of Climate Changes on Agricultural Production System in the Arid Areas
<b>R-02 (CR1)</b>	AKIMICHI Tomoya	A Trans-disciplinary Study on Regional Eco-history in Tropical Monsoon Asia: 1945-2005.
Full Research	Leader	Theme
<b>R-03 (FR2)</b>	KUBOTA Jumpei	Historical Interactions between Multi-cultural Societies and the Natural Environment in a Semi-arid Region in Central Eurasia
<b>R-04 (FR1)</b>	MOJI Kazuhiko	Environmental Changes and Infectious Diseases in Tropical Asia
<b>R-05 (PR)</b>	NAWATA Hiroshi	A Study of Human Subsistence Ecosystems among Arab Societies: To Combat Livelihood Degradation for the Post-Oil Era

# Impact of Climate Changes on Agricultural Production System in the Arid Areas

This research project aimed at identifying the direction and dimensions of the potential impacts of climate changes and ensuing adaptations in the agricultural production systems of arid regions, where water resources are limited, based on the projection of future regional climate changes on the eastern coast of the Mediterranean Sea, the case study region. While the relationship between climate and agriculture in the past and present was analyzed, the impacts of climate changes, including rise in air temperature, decrease in precipitation and sea-level rise, on agricultural production systems were assessed. The project was implemented as an international joint project in cooperation with the Scientific and Technological Research Council of Turkey.

Project Leader ■ **WATANABE Tsugihiko** RIHN

## Summary of Research Outcomes

Climate change in the 2070s in the Seyhan River Basin was projected by using the latest climate model, and impacts of climate change on the condition of the river basin and agricultural production were assessed through generated climate change scenarios. The state-of-the-art GCMs and pseudo global warming experiments for the 2070s project temperature increase by 2 to 3.5° in all seasons and precipitation decrease by about 20% except for the summer season.

Field experiments and crop models proved that in the future there could be the regions both of increased yield and decreased yield of wheat, since wheat yield may increase with raised air temperature and CO<sub>2</sub> concentration, while it may decrease with less precipitation. Natural vegetation also would be affected and the areas of steppe and evergreen broad-leaved forest might increase in the 2070s while sub-alpine plant area would decrease. Decreases in snow and rainfall will reduce available water resources. The expansion of vegetables and fruits of highly profitable crops

and the irrigated area might result in water shortage and less yield in the irrigated area.

The projections and predictions are the discussions, which could be recognized as a sort of inference experiment based on the probable conditions and available information. An adaptive management approach is to be essential in the future against the global warming.

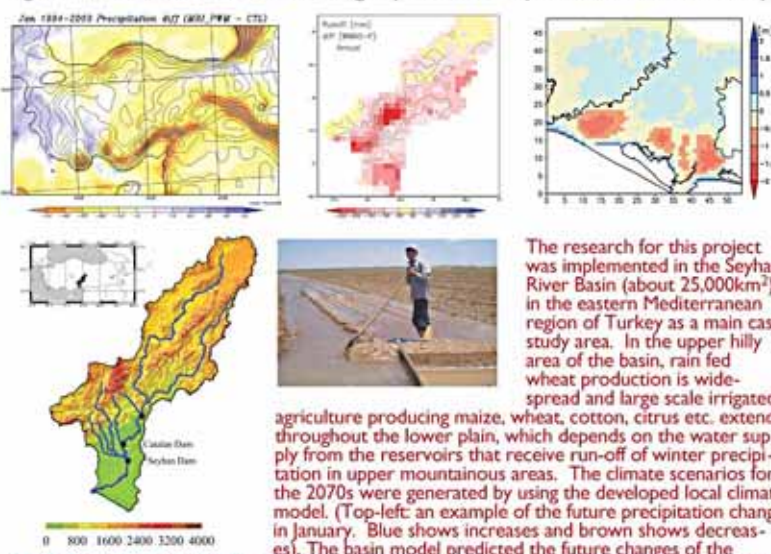
## Contribution to Better Solutions for Global Environment Problems

Climate change due to global warming will affect the natural conditions for agriculture like land and water resources and consequently impacts agricultural production. With these impacts, humans may act to adapt to the changes or to mitigate the damage caused by climate change. These human reactions may result in other changes in the environmental problems. Therefore, for better solutions to the problems, it is essential to understand and project the impacts of climate change on agricultural production, and to let local knowledge and systems react to the changes. In this project, a method to diagnose the problems of land and water use and identify the crucial points was developed. In Turkey, where the case study area was located, the project provided the opportunity to establish new research organizations and a cross-disciplinary approach to the problem, and promoted enhanced consciousness of the importance of impact assessment of global warming on basin hydrology and agriculture.

## Disseminations of the Project Outcomes

The project outcomes are distributed through books, lectures, and reports inside and outside of Japan. Many scientific papers are published in academic journals and presented in international conferences. The report in Turkish language was published. In Turkey, the international symposium was held toward sustainable agriculture, and the project outcomes were broadcasted on TV programs. The outcomes contribute to tackling with global warming disseminating the developed methodology and results to the international organizations such as ICID, International Committee on Irrigation and Drainage.

Figure Assessment of Global Warming Impacts in the Seyhan River Basin of Turkey



The research for this project was implemented in the Seyhan River Basin (about 25,000km<sup>2</sup>) in the eastern Mediterranean region of Turkey as a main case study area. In the upper hilly area of the basin, rain fed wheat production is widespread and large scale irrigated agriculture producing maize, wheat, cotton, citrus etc. extends throughout the lower plain, which depends on the water supply from the reservoirs that receive run-off of winter precipitation in upper mountainous areas. The climate scenarios for the 2070s were generated by using the developed local climate model. (Top-left: an example of the future precipitation change in January. Blue shows increases and brown shows decreases). The basin model predicted the future changes of the hydrological regime along with the climate scenarios. (Top-center: predicted changes in annual runoff yield. Blue shows increases and red shows decreases). The future crop growth and water balance in the farmland were predicted based on these conditions. (Top-right: change of average groundwater table in the lower basin. Blue shows future rise and red shows decline).

## A Trans-disciplinary Study on Regional Eco-history in Tropical Monsoon Asia: 1945-2005.

This research project completed a holistic analysis of eco-historical consequences in tropical monsoon Asian region during the past several decades since WW II. In line with the changing process of the political regimes, devastating wars, infiltration of modernization, economic globalization, and population growth that swept this region, both local environment and human populations have had serious impacts. The processes were illustrated as about 80 flow charts in which regional eco-historical consequences have emerged. This eco-historical model can be expected to extensively be applied for the analysis of local-and-global environmental problems.

Project Leader ■ **AKIMICHI Tomoya** RIHN

### Major Research Findings

In scrutinize eco-historical consequences that have occurred in tropical monsoon Asia during the past several decades, our project aimed to synthesize an eco-linkage model by choosing about 80 parameters for tracing them in historical interactions between local environment, human populations, and external forces. Interactions and events that have been genuinely illustrated as flow charts in which relevant factors, drivers and a chain reaction were identified in a complex whole. For implementing flow charts, eco-sensitive factors such as natural and domestic resources, human nutrition and health, and access rights and eco-policies were chosen, based on fieldworks in the relevant topics.

From our analytical inquiries, not only state policies but also local community's decision provides a key to understand historical consequences that have occurred in tropical monsoon region.

Rapid modernization and globalization has apparently given impacts on local environment,

mode of life and human health depicted as increase of cash crop land use, frequent migration, and intake of sugar and fat. Yet, despite these changes, food habits to consume glutinous rice, raw animal meat, particularly of freshwater fish remain the same as before, that are manifested as high incidence of paragonimiasis and liver fluke.

Besides these findings, our project compiled database on material culture and photographs collected by Japanese scholars during the past several decades in this region. Eco-chronicle database in Yunnan, China has also been completed for public use.

### Outcomes and Database

Besides articles and papers, we have published sixteen books on various themes and topics (10 Japanese, 4 English and 2 Chinese). Meta database on our findings and collected materials is now ready for public use through RIHN's archives (<http://db1.chikyu.ac.jp/archives/>).

Photo Rural Landscape in Southern Laos



Paddy field, fish trap and water buffalo in rice producing forest.

# Historical Interactions between Multi-cultural Societies and the Natural Environment in a Semi-arid Region in Central Eurasia

This project highlights man-made trans-boundary problems between countries or ethnic groups, religions, agriculture and nomadism, or between cities and the surrounding areas. People in the semi-arid region of Central Eurasia once lived a nomadic lifestyle in a symbiotic relationship with agriculture in oases. After a long transition which saw the rise and fall of various ethnic groups and countries, a tight and well-defined border divided the region between Russia and Qing. Both sides of the border, once the same, have developed differently. This project aims to study and clarify the historical interaction between human activities and natural systems in the semi-arid region of Central Eurasia, with particular emphasis on such trans-boundary issues. This project should provide important keys not only for evaluating the effects of projected human activities on ecosystems in semi-arid regions, but also for elucidating fundamental perspectives from which to examine a desirable mode of living in multi-cultural regions.

Project Leader ■ **KUBOTA Jumpei** RIHN

Core Members ■ **UYAMA Tomohiko** Slavic Research Center, Hokkaido University  
**MATSUYAMA Hiroshi** Faculty of Urban Environmental Sciences, Tokyo Metropolitan University  
**TAKEUCHI Nozomu** Graduate School of Science, Chiba University  
**FUJITA Koji** Graduate School of Environmental Studies, Nagoya University  
**SUGIYAMA Masaaki** Graduate School of Letters, Kyoto University  
**FUNAKAWA Shinya** Graduate school of Agriculture, Kyoto University  
**SOHMA Hidehiro** Faculty of Letters, Nara Women's University  
**KONAGAYA Yuki** National Museum of Ethnology  
**YOSHIKAWA Ken** Graduate School of Environmental Science, Okayama University  
**YOSHIDA Setsuko** Department of Applied Sociology, Shikoku Gakuin University  
**KATO Yuzo** RIHN  
**CHENGZHI** RIHN

## Background and objectives

With the exception of the inhabitants of oasis areas, people of the semi-arid region that extends across Central Eurasia once lived a predominately nomadic lifestyle. After a long transition marked by the rise and fall of various ethnic groups and countries, the Yuan Dynasty came to govern the whole of Eurasia as a loosely controlled unity during the 13<sup>th</sup> and 14<sup>th</sup> centuries. In the 18<sup>th</sup> century, however, a tight and well-defined border divided the region between Russia and Qing. At the same time, the people of this area experienced a great change in their lifestyle, caused by the migration of farmers, settlement of nomads and development of agriculture in association with the expansion of Russia and Qing. Settlement policies and

borders have prevented these people from following their former way of adaptation. Man-made trans-boundary issues, between countries or ethnic groups, religions, agriculture and nomadism, or between cities and the surrounding areas, commonly lie behind the various environmental problems in the world. This project aims to study and clarify the historical interaction of human activities and natural systems in the semi-arid region of Central Eurasia. This project should provide important keys not only for evaluating the effects of projected human activities on ecosystems in semi-arid regions, but also for elucidating fundamental perspectives from which to examine a desirable mode of living in multi-cultural regions.

Figure 1 The study area: The Tian Shan Mountains and Ili River

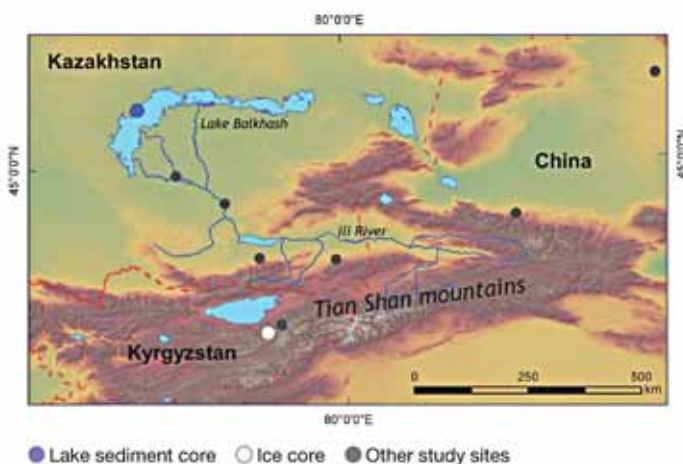


Figure 2 Outline of the project

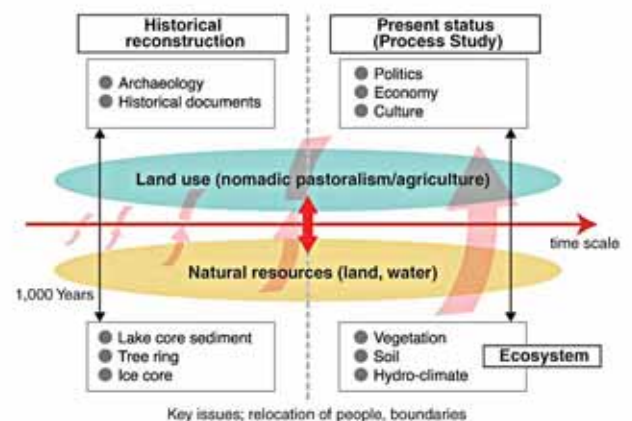


Figure 3 and 4 Comparison of glacier coverage in 1971 and 1999 in the Kungoy Ala-Too range and Zailiiskii Ala-Tau range in the Tian Shan Mountains.

Figure 3 Spatial distribution.

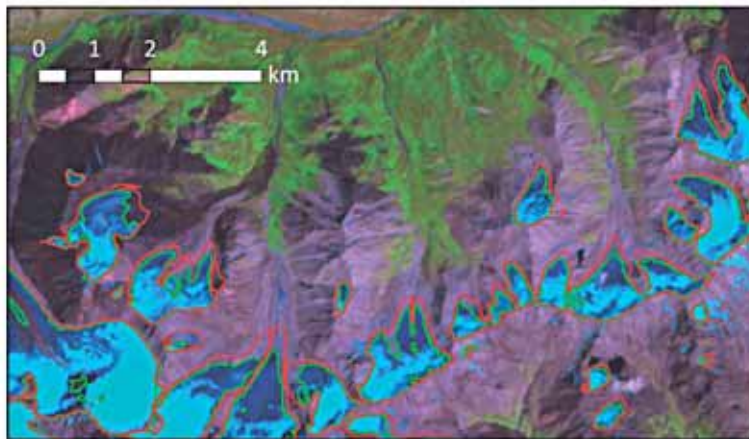


Photo A stripe pattern at a depth of 85m in the ice core drilled in the Gregoriev Glacier in the Tian Shan Mountains, Kyrgyzstan.



## Content and methods

### 1) Research area

The area of study is the watershed of the Ili River, which flows from China to Kazakhstan and terminates at Lake Balkhash, and its surrounding areas, including Kyrgyzstan and Uzbekistan. Historically, the Ili River watershed and its surrounding areas have been a key area of East-West interaction, and in which many ethnic groups and countries have risen and fallen. Today, parts of this area are experiencing environmental problems due to modern development under socialism.

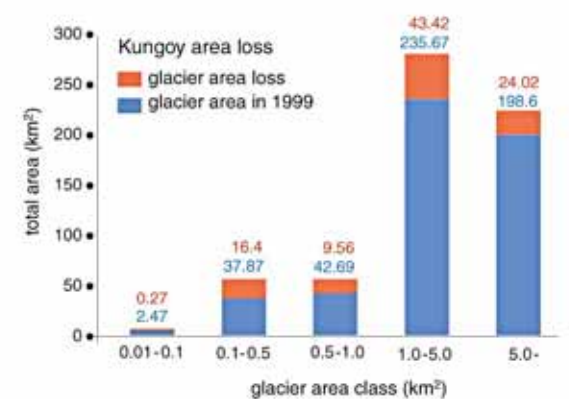
### 2) Research groups

The project consists of two research groups: one will set out to clarify historical changes in both human activities and natural systems through the analysis of historical documents and a variety of natural proxies; and the other group will investigate the current processes of human activities and natural systems for the purpose of interpreting the historical information.

### 3) Objectives

- To clarify historical changes, the rise and fall of nomadic groups and countries, their removal, changes in subsistence, the use of natural resources, and climate change through the analysis of historical documents and archaeological investigations as well as various natural proxies such as ice cores, lake sediment samples, tree rings and wind-blown deposits.
- To investigate the present status of the area and the effects of human activities on the natural environment, with particular emphasis on their

Figure 4 Relationship between glacier size and glacier area lost



Coverage decreased by 20% in the Kungoy Ala-Too range and 12% in the Zailiiskii Ala-Tau range.

social, religious and cultural background.

- To compare both sides of the border within the context of historical changes and their current status, examining areas that were previously similar but that have subsequently developed differently, to understand the meaning of boundaries in the context of environmental issues.

## Present status of the project

### (I) Progress to date

- The ice-core research group drilled two ice-core samples of 85.35m and 63.1m in depth at the Gregoriev Glacier in the Tian Shan Mountains of Kyrgyzstan. The deeper one reached the bottom of the glacier. Also, with the collaboration with the Kazakhstan Institute of Geology, a lake sediment core sample of 8m was taken at Lake Balkhash.
- A comparative analysis of Corona images of 1971 and a Landsat image of 1999 exhibits significant reduction of 12 to 20 % in the area of glaciers on the northern side of the Tian Shan Mountains.
- Several research groups, comprising researchers in various disciplines, including geography, hydrology, ecology, archaeology, sociology and anthropology, conducted fieldwork in Kazakhstan, focusing on the impact of human activities, especially the use of natural resources, on regional ecosystems, and its historical transition. A large amount of basic information on vegetation, soil, meteorological and hydrological conditions was gathered.
- Various historical documents and images were collected through cooperative studies with research institutions in Kazakhstan, China and Russia.

### Expected results

This project should provide important keys not only for evaluating the effects of projected human activities on fragile ecosystems in semi-arid regions, but also for proposing fundamental perspectives from which to examine a desirable mode of living in multicultural regions.

# Environmental Changes and Infectious Diseases in Tropical Asia

This project, The RIHN EcoHealth Project, is to clarify the relationship between various climate and environmental changes and changes in health profile of people living in tropical monsoon Asia through study of infectious diseases. The project studies the effects of human societal and environmental changes as well as climate changes on the ecology, epidemiology and epidemiology of various infectious diseases such as vector-borne diseases (malaria, dengue fever, and filariasis), and food- and water-borne diseases (liver fluke infection, cholera and other diarrheal diseases). The study aims at offering an ecohealth insight for evaluating the relation of health profile with local and global environmental changes. The project synthesis report shall be published in 2012.

Project Leader ■ **MOJI Kazuhiko** RIHN

Core Members ■ **MASCIE-TAYLOR, Nicholas C.G.** Cambridge University, UK  
**KOBAYASHI Shigeo** Graduate School of Asian and African Area Study, Kyoto University  
**IJIMA Wataru** Aoyama Gakuin University  
**KAMMURDIN, Ahmed** Oita University  
**HASHIZUME Masahiro** Nagasaki University Institute of Tropical Medicine  
**SUNAHARA Toshihiko** Nagasaki University Institute of Tropical Medicine  
**YAMAMOTO Taro** Nagasaki University Institute of Tropical Medicine  
**OHBA Tamotsu** Blue Ecology Research  
**BOUPHA, Boungnong** National Institute of Public Health, Lao PDR  
**KOUNNAVONG, Sengchanh** National Institute of Public Health, Lao PDR  
**PONGYONGSA, Tiengkham** Savannakhet Malaria Centre, Lao PDR  
**ISLAM, Sirajul** ICDDR, B, Bangladesh  
**HUNTER, Paul** University of East Anglia, UK  
**RAHMAN, Mahmudur** IEDCR, Bangladesh  
**HOSSAIN, Zakir** NIPSOM, Bangladesh  
**LE, Khanh Thuan** NIMPE, Vietnam  
**KOBAYASHI Jun** International Medical Center, Japan  
**CAI, Gou Xi** RIHN

## Background and Objectives

The project aims at delineating the relation of environmental changes and rise and fall of infectious diseases among people living in tropical monsoon Asia, in order to offer a long-term insight on life and health of the people. To be studied includes 1) changes of health profile of people living in area of the Lahanam Demographic Surveillance System (DSS) Lao PDR with changes of their environment and lifestyle, 2) relation of climate and occurrence of diarrheal diseases in Matlab

DSS, Bangladesh. In addition to these field studies, analysis of existing data on regional and national levels as well as analysis of historical data shall be conducted.

Tropical monsoon Asia can be characterized by clear rainy season and dry season. The area is vulnerable both to flood and drought. People were living in the tropical monsoon forest by doing slash and burn cultivation. Then, wet rice cultivation was introduced and towns and cities were constructed. Population increase, urbanization,

Figure 1 View of infectious diseases in the RIHN EcoHealth project



It is a component of the long-term human and his environmental security.

Photo 1 Malaria Survey in a village of ethnic minority in Sepone district, Savannakhet province, Lao PDR.



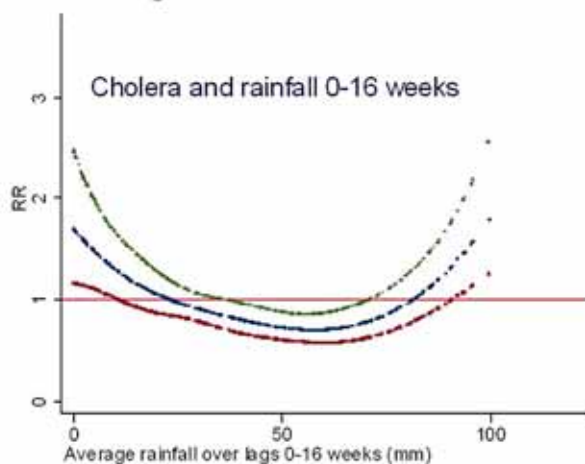
The slide positive rate was 62% (172 villagers out of 279 were parasitemia for malaria).

Photo 2 A village of ethnic minority, Sepone district, Savannakhet province, Lao PDR.



The village is surrounded by tropical monsoon forest.

**Figure 2** Relation of cholera and rainfall: Relative risk of number of cholera patients in a hospital of Dhaka city is related with average rainfall over lags 0-16 weeks.



The effect of rainfall on the incidence of cholera in Bangladesh. *Epidemiology*. 2008 Jan; 19(1): 103-10. From Hashizume M, Armstrong B, Hajat S, Wagatsuma Y, Faruque AS, Hayashi T, Sack DA.

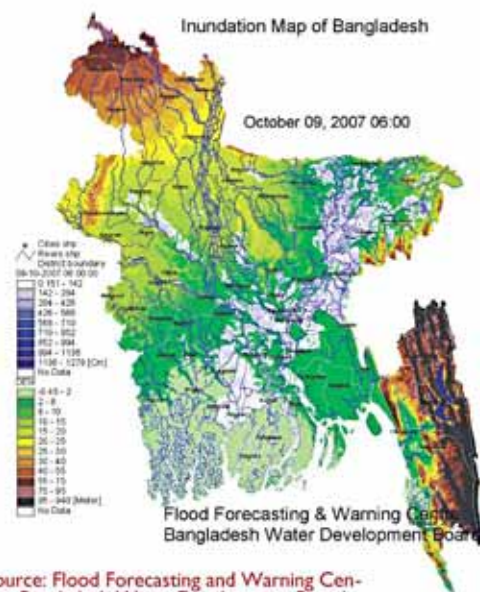
deforestation, spread of wet rice cultivation, economic development, changes in lifestyle or so-called modernization, and population migration are the factors changing the ecological relationships among human beings, pathogens, and vectors. The project also investigates the relation between climate changes (temperature, rainfall, flood, and cyclone etc.) and health in tropical monsoon Asia.

#### Research Methods and Target Areas

The project applies several kinds of study methods. 1) Long-term observation of a local population in Lahanam area, Songkhone district, Savannakhet province, Lao PDR by establishing DSS. Since 2005 we are following about 4500 residents. In Bangladesh, we use data from the Matlab DSS and others. 2) Collection of community-based information on environmental changes and health profile from many communities of tropical monsoon Asia through group interviews. 3) Collection of information on environmental changes and health change in the district/provincial/national level.

The project team is divided into two groups; the field study group and the integration group. Field group can be further divided into two major groups (Lao and Bangladesh) and small groups. The Lao team collaborates with National Institute of Public Health (NIOPH) and other institutions in Lao and study liver fluke infection, malaria, and maternal and child health. The Bangladesh team collaborates with ICDDR,B, IEDCR, NIPSOM and UK universities, and study the relation between climate and health. The team study cholera and other diarrheal diseases, leishmaniasis, filariasis, malaria, and so on. In addition to these two countries, information on environmental changes and occurrence of infectious diseases will be collected in Vietnam, Myanmar, Indonesia, Sri Lanka, China, and The Philippines. The historical team will col-

**Figure 3** Area of flood (under water) in Bangladesh at 6am of 9 of October, 2007.



Source: Flood Forecasting and Warning Centre, Bangladesh Water Development Board

lect information on epidemiology and infectious diseases control policy in Asia and establish a database. The forest-agriculture team will analyze changes in vegetation and land use by satellite images, field observation and interview to people.

#### Achievement and Future Activities

The Laos team jointly organized the first National Health Research Forum with National Institute of Public Health (NIOPH) in September 2007 in Vientiane, Lao PDR. The plan of our study for the next five years as well as results of our study of the RIHN eco-history project for the last five years were presented. The detailed plan for the next five years was drafted.

The Bangladesh team published three papers on climate and diarrhea. Collaboration with Kyoto University Institute of Disaster Prevention has been promoted, and detailed research plan was discussed with ICDDR,B.

In the academic year of 2008/9, the project is planning the following activities:

- 1) In Lahanam DSS: renewal census, training of staff, introduction of the paperless DSS, introduction of bio-metric identification, establishment of the vital record, studies on liver fluke infection, studies of MCH.
- 2) Malaria study in Sepone district: Collection of malaria data in remote areas, urine examination for malaria epidemiology.
- 3) Bangladesh: collaboration with ICDDR,B on study of relation between climate and health, collaboration with IEDCR, NIPSOM, and Cambridge University, establishment of national database for infectious diseases, analyses of the data on malaria, filaria and other diseases, study the relation among vegetation, climate and diseases.

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

This research project aims to promote basic studies to clarify human life support mechanisms and self-sufficient modes of production among Arab people who have survived more than a thousand years under a peculiar natural environment of drylands. Based on these research results, we intend to propose a scientific framework to strengthen their subsistence productivity and combat livelihood degradation in local communities of Arab people to prepare for the post-oil era.

Project Leader ■ **NAWATA Hiroshi** RIHN

Core Members ■ **KAWATOKO Mutsuo** Research Institute for Islamic Archaeology and Culture  
**KOBORI Iwao** United Nations University  
**MIYAMOTO Chiharu** Action for Mangrove Reforestation  
**SUGIMOTO Yukihiro** Graduate School of Agricultural Science, Kobe University  
**SAKATA Takashi** Faculty of Science and Engineering, Ishinomaki Senshu University  
**YOSHIKAWA Ken** Graduate School of Environmental Science, Okayama University  
**HOSHINO Buhe** Faculty of Environment Systems, Rakuno Gakuen University  
**ONUMA Hiroyasu** Appropriate Agriculture International Co.  
**ABDEL GABAR, E. T. Babiker** Sudan University of Science and Technology  
**ABDALLA, M. A. Abu Sin** Gezira University  
**ABDEL BAGI, M. Ali** Agricultural Research Cooperation, Sudan  
**ABDEL HADI, A. W.** Agricultural Research Cooperation, Sudan  
**LAUREANO, Pietro** Traditional Knowledge World Bank  
**BENKHALIFA, Abdrahmane** University of Science and Technology, Algeria

### Objectives

Japan and oil-rich countries of the Middle East have put excessive pressure on the Earth in terms of energy, water and food. As they have put first priority on economic prosperity for their own benefits, they have exploited irreplaceable resources such as fossil fuel and fossil water. Such attitudes have also pushed local ecosystems into an abnormal state by planting alien species, and furthered social differences among the people of the Middle East. As we are facing a turning point in oil-based modern civilization, our inter-dependency through trading fossil fuel must change drastically to a new inter-dependency to build a futurable society.

We focus on human subsistence ecosystems, which are human life support mechanisms and self-sufficient modes of production (hunting, gathering, fishing, herding, farming, and forestry) with low energy resource consumption. We also take another look at advanced technology and economic development, and reexamine the conceptual framework of comprehensive measures to combat desertification. Based on these research results, we intend to propose a scientific framework to strengthen subsistence productivity and to rehabilitate the daily life of general population among Arab societies for the post-oil era.

### Research Methods and Areas

A study of human subsistence ecosystems among Arab societies will be advanced and implemented as three separate issues, such as 1) comprehensive measures to control alien invasive species mesquites, 2) an assessment of environmental effects by development programs in coastal zones of the arid tropics, and 3) supporting peoples' decision making by sharing research results.

Our research methods consist of two main pillars: (1) analysis of subsistence ecosystems focusing on keystone species (camels, date-palm, man-

grove, and coral (reef)), (2) inspection of sustainability and fragility of Arab societies focusing on ecotones (wadi-beds, river-side, mountain-side, and sea shore).

Field surveys will be conducted in semi-arid lands between the River Nile and the Red Sea in Sudan; Red Sea coasts, Butana area and the River Nile area, as the main survey area, and in other areas of three countries; Sinai peninsula in Egypt, Red Sea coasts in Saudi Arabia, and Sahara oasis in Algeria, as sub-survey areas, so that we can compare a combination of keystone species, ecotones and traditional knowledge and examine a difference in sustainability of subsistence economy particularly under site-specific conditions.

### Expected Results

We are conscious of social reduction of research results making use of these for local peoples' decision making as well as nations' policy making, by information dispatch through printing and digital devices in Japanese (bridge between Japanese and Arab societies), English (scientific language for scientists communities) and Arabic (local common language for local communities).

In pre-research, we will hold an international symposium "Human subsistence ecosystems with mangrove and coral reef in drylands", compiling knowledge from various fields of science and backgrounds on this particular topic as the starting point of the project. Then, we will publish the results of this symposium in English and Arabic to distribute to local people in Arab societies. By obtaining their comments through interviews and questionnaires, we plan to feed their opinions back to our project targets and research activities, and hope to publish a revised version of the book, as a result of information sharing, when we have finished the project.

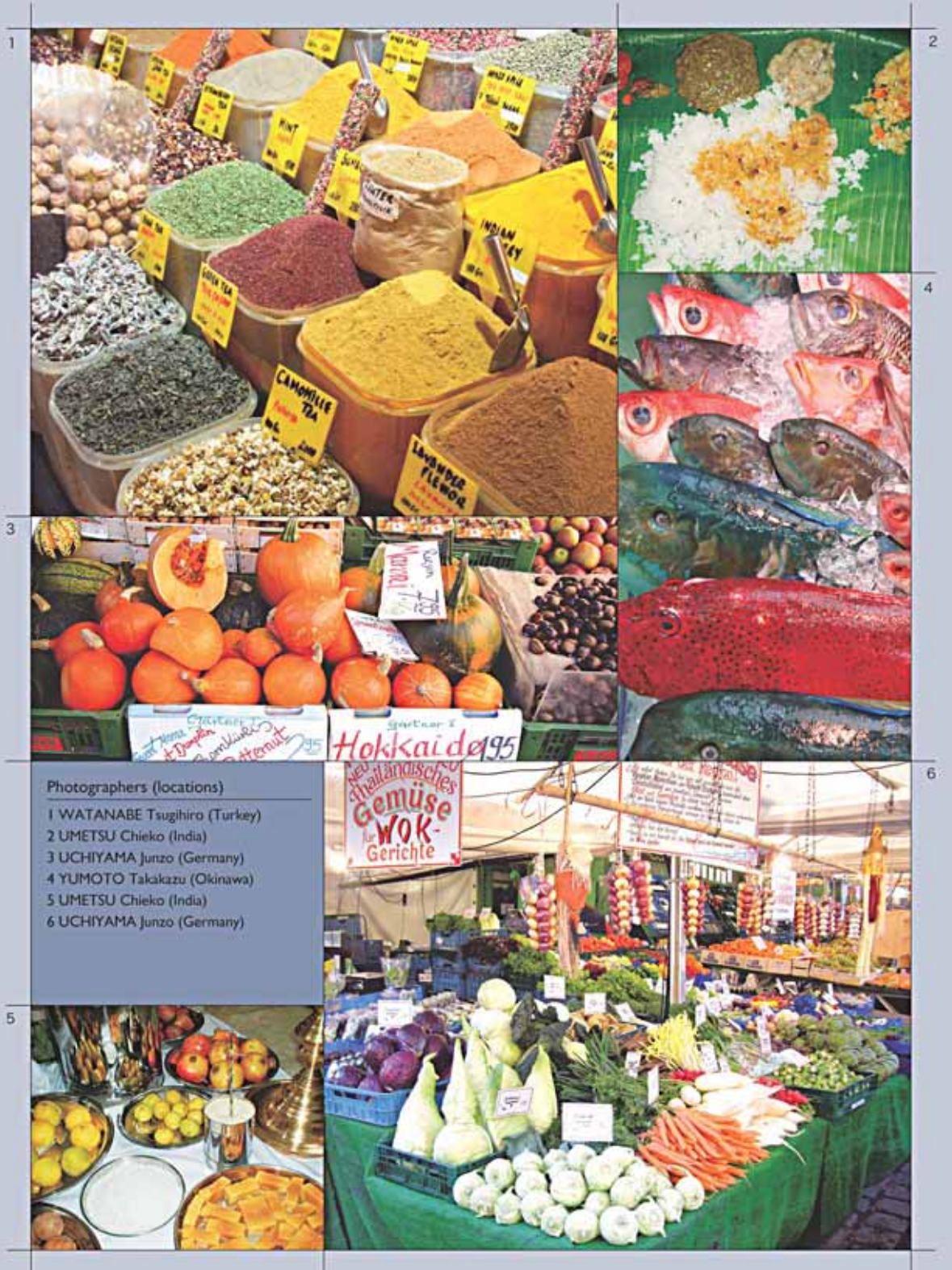
Photo Assessment of environmental affects by development programs in coastal zones of the arid tropics



The coastal zones, in which fresh water can be converted from seawater, became a big development frontier and may cause environmental degradation by releasing highly concentrated saline water into the sea. On the other hand, this area is rich in biodiversity, so it has high potential for seafood and pastoral food production through reforestation of mangroves as fish nurseries and forage safekeeping. We are compiling scientific knowledge to prevent a new outbreak of environmental problems in coastal area development.



During breaks in field surveys, a stroll through the market may reveal an astonishing variety of foods. Invitations to meals offer opportunities to experience unique regional food cultures. Biological and cultural diversity fosters a rich food culture.



Photographers (locations)

- 1 WATANABE Tsugihiko (Turkey)
- 2 UMETSU Chieko (India)
- 3 UCHIYAMA Junzo (Germany)
- 4 YUMOTO Takakazu (Okinawa)
- 5 UMETSU Chieko (India)
- 6 UCHIYAMA Junzo (Germany)

# H

## Ecohistory

Program Director ■ **SATO Yo-Ichiro** RIHN

“Ecohistory” investigates “Circulation,” “Diversity,” and “Resources,” which are among the principle concerns of global environmental study, in terms of historical time. Behind every problem (or phenomenon) there lies, in some measure, the issue of historical causality, and this underscores the need for the intellectual stance of comprehending the present through investigation of the past (*Onko chishin*). As its specific goal, this program seeks to design a framework of “futurability” in accordance with RIHN’s mission: elucidating global environmental issues and proposing solutions.

The program comprises four projects, one completed to date (CR), three in progress (FR), and one feasibility study (FS): “Historical Evolution of the Adaptability in an Oasis Region to Water Resource Changes (CR; Project leader, NAKAWO Masayoshi); “Agriculture and Environment Interactions in Eurasia: Past, Present and Future—A Ten-Thousand-Year History” (FR; Project leader, SATO Yo-Ichiro); “Environmental Change and the Indus Civilization” (FR; Project leader, OSADA Toshiki); and “Neolithisation and Modernization: Landscape History of East Asian Inland Seas” (FR; Project leader, UCHIYAMA Junzo); and, “Interactions between man and the environment in Mesopotamia” (FS; Project leader, WATANABE Chikako).

Focusing on different regions and a range of historical moments, these projects address the environmental histories of two main and contrastive areas, what might be called the “Asian Green Belt” and “Yellow Belt” in Eurasia. In the former, generally speaking, communities managed to maintain sustainable development for a period of approximately 10,000 years, while in the latter, many civilizations had collapsed within this time frame. But is this correct? What distinguishes the conditions of productivity and sustainability between these two regions? This question is, ultimately, at the core of this project and whose answer is surely indispensable to human futurability.

Completed Research	Leader	Theme
<b>H-01 (CR2)</b>	NAKAWO Masayoshi	Historical Evolution of the Adaptability in an Oasis Region to Water Resource Changes
Full Research	Leader	Theme
<b>H-02 (FR3)</b>	SATO Yo-Ichiro	Agriculture and Environment Interactions in Eurasia: Past, Present and Future —A ten-thousand-year history
<b>H-03 (FR2)</b>	OSADA Toshiki	Environmental Change and the Indus Civilization
<b>H-04 (FR2)</b>	UCHIYAMA Junzo	Neolithisation and Modernisation: Landscape History on East Asian Inland Seas
Feasibility Study	Principal Investigator	Theme
<b>H-FS</b>	WATANABE Chikako E.	Interactions between man and the environment in Mesopotamia

# Historical Evolution of the Adaptability in an Oasis Region to Water Resource Changes

The Oasis Project is a research project aiming at reconstructing the history of the interaction between people and nature for the last 2000 years in a Chinese arid region. The project adopts a trans-disciplinary approach, integrating the studies of history, archeology, ethnology, economics, hydrology, meteorology, climatology, glaciology, biology, and agriculture. The major research field has been in and around the Heihe region in central Eurasia, where outstanding human cultures have developed for the last 2000 years.

Project Leader ■ **NAKAWO Masayoshi** (RIHN until March 2008)

## Research Content

The history of the region has been reconstructed by examining historical documents, and a variety of proxies such as ice cores from glaciers, tree-ring samples, and lake sediment cores. The water circulation system in the basin, water resources and demands placed on them has been also studied.

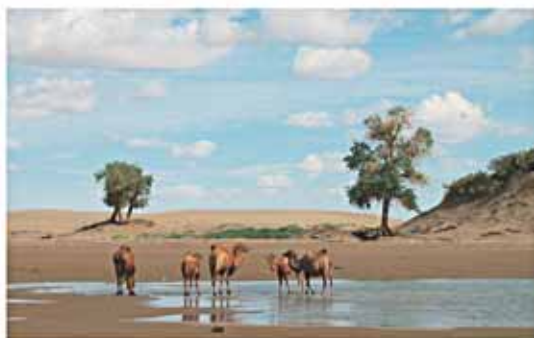
## The Outline of the Research Results

The Heihe Basin is a region where farming was developed by numerous colonial soldiers sent there to confront the Huns during the Han Dynasty 2000 years ago. At that time, the area of the Juyanze Lake was as large as 1600 km<sup>2</sup>. The lake area started decreasing thereafter, and this is considered to be due to the development of irrigated farmland. Thereafter, the region's population fell temporarily, but increased during each of the following dynasties: Tang, Xixia and Yuan.

Three-dimensional views helped identify the geographical extent of the agricultural lands around Kara Khoto during the Xixia and Yuan Dynasties in the period when Kara Khoto flourished. It was approximately twice the size of the modern Ejina Oasis.

Ice core analysis showed that the air temperature from the end of the Yuan through the early Ming dynasties gradually fell. In other words, the volume of river flow per annum became less than the total annual precipitation concomitant with the growth of the glaciers due to the cooling effect.

Also, it became clear that many large-scale water routes were constructed during the Yuan Dynasty, and were used to develop vast tracts of agricultural land. This development of farmland definitely increased the volume of water drawn from the river around the



The river bed on the Heihe in 2002, where no water is flowing at all.

oases, and consequently the downstream region of Kara Khoto was visited with water shortages.

At present, water shortages are again evident. Nearby vegetation is on the verge of crisis. Juyanze is also a shadow of its former self. The cause, basically, is the increase in the volume of water drawn from the river for irrigation farming at the oases, since water supply from the mountains has increased lately.

Two countermeasures to this problem have been established: forestation, and limits to the water drawn from the river in the mid-flow basins. Accordingly oasis farmers, for whom the volume of water they can take has been reduced, have come to dig wells to use the subterranean aquifers to augment their shortages in order to maintain their arable land. For forestation, a policy of "Ecological Relocation", in which herdsmen from the foothills of the mountains are moved to the area around the oasis, has been adopted. The displaced herdsmen, however, have to develop fresh arable land to graze their animals. Although only natural, their new farming regions need water. Hence, the oases need more water now than ever, and shallow wells in the downstream area and even around the midstream region of Zhangye have started to dry up. To supplement this, an abundance of deep wells are now being dug. The water, however, has started to be used in abundance. This is considered the major problem at the moment.

In the Heihe Basin, people have solved the problem of water shortages caused in the region (system) where they live, by expanding the area of the system. Drawing irrigation water from upstream of the Heihe River expands the area on which their livelihoods depend.

Recently, however, surface water has all been used up, and the system has been expanded to include the subterranean world as well. This fact also means that the range of the system on which people's livelihoods depends has expanded to a global scale. That is to say, our system has expanded as far as it can go, and it can only be said that we have now reached an era in which existing methods for solving problems by expanding the range of a system can no longer be used.

We have to find, therefore, completely different methods for solving problems that do not rely on solutions based on expanding the existing system. We are living in just such an age.

# Agriculture and Environment Interactions in Eurasia: Past, Present and Future

## —A ten-thousand-year history

Our project aims to comprehend the history of interaction between agriculture and environment in three major types of agricultural environment in Eurasia, namely the "mugi", "monsoon" and "vegeculture" zones, from an interdisciplinary perspective. Based on the research, we will attempt to suggest future directions for agriculture. As a means to reach this goal, we seek to reconstruct the history of the ten-thousand-year relationship between agriculture and environment, with "the loss of genetic diversity" as a guiding concept.

Project Leader ■ **SATO Yo-ichiro** RIHN

Core Members ■ **ISHIKAWA Ryuji** Faculty of Agriculture and Life Science, Hirosoaki University  
**WILLCOX, George** Maison de l'Orient et de la Mediterranee, France  
**KATO Kenji** Faculty of Agriculture, Okayama University  
**KIMURA Emi** RIHN  
**KURATA Takashi** RIHN  
**SHINODA Ken-ichi** Department of Anthropology, National Science Museum  
**JONES, Martin** University of Cambridge  
**TANAKA Katsunori** RIHN  
**TANNO Ken-ichi** RIHN  
**NAKAMURA Ikuo** Graduate School of Horticulture, Chiba University  
**HOSOYA Leo Aoi** RIHN  
**MATTHEWS, Peter** National Museum of Ethnology  
**MUGURUMA Yumi** School of Art, Tohoku University of Art & Design  
**YANG, Haiying** Faculty of Humanities and Social Sciences, Shizuoka University

### Goal of our Project

Agriculture has largely modified and destroyed the ecosystem, and it has been said that the beginning of agriculture corresponds to the beginning of environmental destruction. In present day Eurasia, between Central Asian desert, where it is almost impossible to conduct any agricultural activity, and Monsoon region, where greenery and water still abound, there is large differences in agricultural productivity and the degree of environmental destruction.

The goal of our project is to grasp different aspects of environmental destruction under several types of climate, during its ten thousand years of relationship with agriculture (reconstruction of 'a ten-thousand-year history of relationship between agriculture and environment'). We will try to gain comprehensive understanding of this

relationship, focusing on the impact that the loss of "genetic diversity" had over environmental destruction.

### Research Themes and Method

There are different types of agricultural products in Eurasia, such as rice and wheat. The backgrounds of these productions, *i.e.* ecosystem (human ecosystem = "sato") and their histories are also very different. We subdivided Eurasia into three zones (abbreviated as Monsoon zone, Mugi (winter annual crop) zone, and Vegeculture zone), and established research groups that correspond to each of them (Fig. 1). In addition, the Slash-and-burn agriculture group was newly established in the fiscal year 2007, to study issues on culture and ideology concerning traditional agricultural techniques.

In each group, we selected a few sites where we have conducted:

- i) DNA and morphological analyses of botanical remains (Photo 1) discovered in archaeological sites (= assessment of genetic diversities<sup>1)</sup>),
- ii) Absolute dating
- iii) Characterization of artifacts (by stable isotope analyses).
- iv) Identification of plant remains such as seeds, pollen, phytolith, diatom and wooden pieces discovered in soil core (= reconstruction of the ecosystem)
- v) Ecological survey on current *sato*, using historical documents and ethnographic data.
- vi) Research on agricultural technology (including the hydrological balance and the amount of applied fertilizer), ethnobotany and circulation of agricultural products.

Note 1:  
Genetic diversity  
The scale of genetic diversity is measured using methods of statistical genetics. The diversity of cultivars is estimated using the Shannon's formula.

Figure 1 Research fields of this project

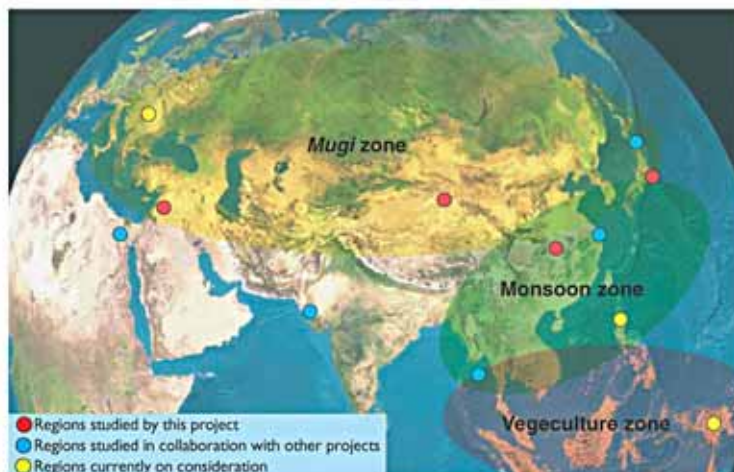


Photo 1 Sumac family pollen seen through electron microscope (from the Ikeshima Fukuman-ji site, Osaka, 2007)



Photo 2 Deposition of gravel, presumably traces of flood (from the Ikeshima Fukuman-ji site, Osaka, 2007)



Agricultural activity underwent occasional collapses every now and then.

Photo 3 Standing in the desert (Xinjiang Uygur Autonomous Region, China, 2007)



We need to go through such a desert area to go to the Xiaohu Tomb site.

Photo 4 Yam house (Milne Bay District, Papua New Guinea, 2008)



Yam is socially important foodstuff stored in Yam houses.

### Present Research Results

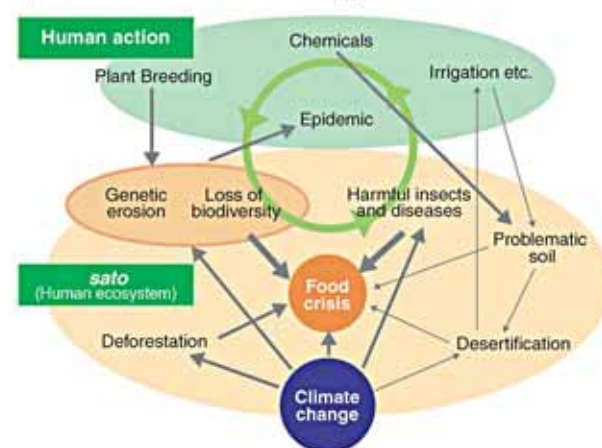
a) It has become clear that human agricultural activity did not grow incessantly, but there were numerous collapses in the history.

Monsoon Zone Group: As a cause of these collapses, we focused on environmental factors, represented by floods, and studied the process of collapse and recovery of agricultural activity following environmental changes (Ikeshima Fukuman-ji site, Osaka, Photo 2). We also began our research to clarify the relationship between agriculture and environment at the beginning of rice cultivation (Long-Que-Zhuang site, Jiangsu Province, China).

Mugi Zone Group: We examined past agricultural situation in West Asia and northwest China, and focused on examples of the collapse of agricultural activity in these regions (Xiaohu Tomb site in Xinjiang Uygur Autonomous Region, China, Photo 3) We studied mutual influence between the development of agricultural activity and environment, e.g. salt accumulation due to excessive irrigation.

- b) In August 2007, the Monsoon Zone Group and Mugi Zone Group successfully co-organized the First International Symposium "Recent Advancements of Archaeobotany in Eurasia" at RIHN and received fourteen speakers from eight countries. It was decided at the symposium to create a database of ancient plant remains on the collaborative basis.
- c) The Vegeculture Zone Group fixed its fields of research as the Philippines and Papua New Guinea, where there is high chance of learning about the beginning of vegeculture, and these

Figure 2 The correlation model of agriculture and environment



areas are mutually related. Little research has been carried out so far concerning environmental history in these regions, so we expect to achieve innovative results. In November and December 2007, preparatory meetings were held with research partners from each of these two regions, and in February 2008, preliminary research was carried out in a yam culture zone of Papua New Guinea (Photo 4).

- d) Based on the idea of the evolution of agricultural activity and its regional diversity due to the climate, we began our study for further understanding of the relationship between human and nature in contemporary society. We focused especially on slash-and-burn agriculture and in November 2007, we held the first Slash-and-burn Agriculture Summit in Kochi City, where we invited practitioners of this method from different regions (Slash-and-burn Agriculture Group). In addition, at RIHN we have regularly organized seminars on environmental ideology, where we developed discussion on the relationship between humanity and nature inviting specialists of different fields.

### Future Research Plans

We will refine the draft correlation model of agriculture and environment (Fig. 2) that we have created earlier. The Monsoon Zone Group and Mugi Zone Group will try to clarify how people managed to recover from frequent collapses, by examining the production method, changes in the surrounding environment and process of the loss of biodiversity of cultivars in the above mentioned sites.

The Vegeculture Zone Group plans to conduct field research in the Philippines in 2008, on the basis of research negotiation with the University of Philippines. Archaeological excavation in Papua New Guinea in collaboration with Otago University and Australia National University will also begin from the fiscal year 2008, aiming at reconstruction of the relationship between environmental change and early rootcrop cultivation.

The Slash-and-burn Agriculture Group will examine the actual situation of burnt field in different regions and create a database, as well as attempt to gain ideas how the relationship between human agricultural activity and environment ought to be.

## Environmental Change and the Indus Civilization

From birth, human beings have created dwelling spaces with sustainable food supply by modifying their surrounding natural environment. In this project, we research the impact of environmental change on the Indus Civilization. That is one of the four great ancient civilizations. Indus sites spread over 100,000 sq. km. of northwestern part of the Indian subcontinent. Indus people established cities and urban lifestyle from 2600 BC to 1900 BC. The urban phase of this civilization lasted only for a much shorter period than the other ancient civilizations. Our methodology is based on humanity sciences as well as scientific approaches. Our project aims to find out the reason for the decline of the Indus Civilization, shedding light on the relations between humanity and nature since ancient times.

- Project Leader ■ **OSADA Toshiki** RIHN
- Core Members ■ **GOTO Toshifumi** Tohoku University  
**KHARAKWAL, Jeewan Singh** Rajasthan Vidyapeeth, India  
**MALLAH, Qasid** Shah Abdul Latif University, Pakistan  
**MASIH, Farzand** Punjab University, Pakistan  
**MAEMOKU Hideaki** Hiroshima University  
**ONISHI Masayuki** RIHN  
**OTA Shoji** Fukui Prefectural University  
**SHINDE, Vasant** Deccan College, Deemed University, India  
**UNO Takao** International Research Center for Japanese Studies

### Objectives

Our project aims to understand the formation, development and decline of the Indus Civilization by means of an interdisciplinary approach. Especially, we attempt to evaluate the impact of environmental change on the subsistence economy and the trade network, which sustained the urban system.

Our project team is divided into four research groups, focusing respectively on the environmental changes, the material cultures, the inherited cultures, and the subsistence system.

The Palaeo-environment Research Group studies the environment surrounding the Indus Civilization. Two main researches are to be conducted: (i) the reconstruction of the lost course of the Saras-

vati river that seems to have played an important role in the Indus Civilization through geographical analyses using satellite images and remote sensing; (ii) core-boring from lakes with an aim of reconstructing a long-term environmental change.

The Material Culture Research Group studies excavated materials from archaeological sites to reconstruct the society and culture in the Harappan period. We have been excavating at Kanmer, in the Rann of Kachchh, Gujarat, India in collaboration with Indian archaeologists.

The Inherited Culture Research Group studies Indian cultures for the purpose of reconstructing the historical significance of the Indus Civilization through the Vedic studies by Indologists and field

Figure 1 Concept of the Project



By using the GIS, various data are being integrated into a spatial platform.

Figure 2 Distribution of Sites of the Indus Civilization

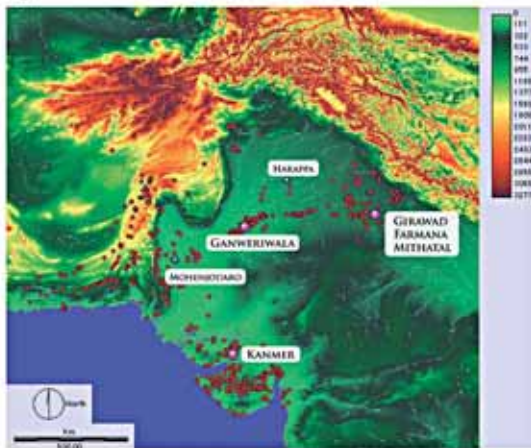


Photo 1 Stone-built Perimeter Wall at Kanmer



Excavation at Kanmer revealed that the site was enclosed by massive stone-built perimeter walls.

Photo 2 Mud-brick structure at Farmana

Mud-brick structures during the Indus Civilization were discovered at Farmana.



Photo 3 Indus Seal from Farmana



The Indus seals which depict various animals show a part of the relations between the human society and natural environment.

works by cultural anthropologists.

The Subsistence System Research Group deals with botanical and zoological evidence both from archaeological sites and from the present fauna and flora in order to reconstruct the subsistence system of the Indus Civilization.

### Results and Future Task

Our project has conducted archaeological excavations at Kanmer in Gujarat and, Girawad, Far-

mana and Mitthal in Haryana so far. Excavations is also planned to be made at Ganweriwala in Punjab, Pakistan.

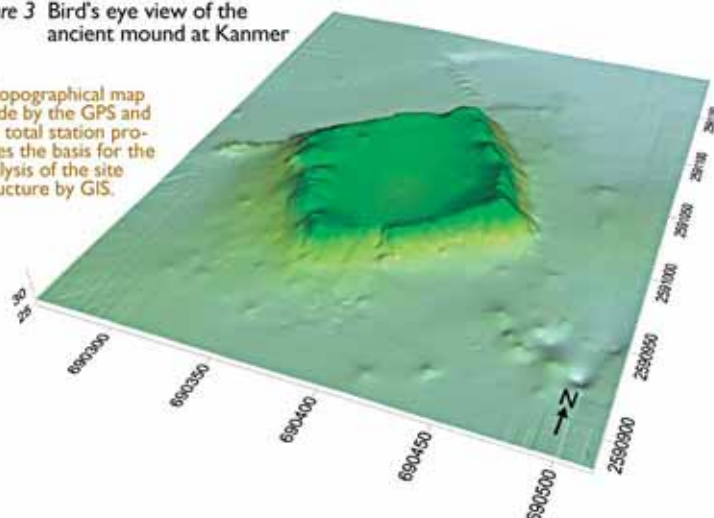
These excavations have revealed that the Indus Civilization was a society based on the utilization of diverse natural environment and diversity of societies/cultures. Further analysis on the excavated materials such as artefacts, and animal and plant remains from these sites, will contribute to our understanding on the social mechanism of the Indus Civilization and the relations between the diverse natural environment and human society.

The Palaeo-Environmental Research Group has started survey in the Saurashtra peninsula and on the dry-bed of the Ghaggar River in Haryana and Rajasthan. The Subsistence System Research Group conducted botanical and anthropological survey on the utilization of emmer wheat in south India, as well as the analysis of excavated plant remains from the sites. The Inherited Culture Research Group is preparing language maps of South Asia, as well as studying the Vedic texts.

By integrating the results from the four research groups, this project aims at investigating into the relations between the Indus Civilization and natural environment and at revealing its social structure and features.

Figure 3 Bird's eye view of the ancient mound at Kanmer

A topographical map made by the GPS and the total station provides the basis for the analysis of the site structure by GIS.



## Neolithisation and Modernisation: Landscape History on East Asian Inland Seas

This project aims at reconstructing and understanding historical landscape change to offer new insights into the concept of "cultural landscape". Focussing on the Japan Sea and East China Sea, our research concentrates on two periods of revolutionary landscape change, Neolithisation and Modernisation. The present project aspires to explicate the formative history of the present-day landscape through a holistic analysis from the human sciences' perspective.

- Project Leader ■ **UCHIYAMA Junzo** RIHN
- Core Members ■ **BAUSCH, Ilona** Faculty of Archaeology, Leiden University  
**FUKASAWA Yuriko** Tohoku University, Graduate School of International Cultural Studies  
**HARUTA Naoki** Faculty of Education, Kumamoto University  
**IIDA Taku** National Museum of Ethnology  
**IKEYA Kazunobu** National Museum of Ethnology  
**KANER, Simon** The Sainsbury Institute for the Study of Japanese Arts and Cultures  
**KIM, Jangsuk** Department of History, Kyung Hee University  
**LINDSTRÖM, Kati** Institute of Philosophy and Semiotics, University of Tartu  
**NAKAI Seiichi** Faculty of Humanities, Toyama University  
**NAKAJIMA Tsuneo** Lake Biwa Museum  
**NAKAMURA Oki** RIHN  
**POPOV, Alexander** Far-East National University

### Background and aims

Recent years have seen the concept of "cultural landscape" become increasingly important in landscape protection policies, not only in Japan but also on an international scale. Accordingly, it has become especially important to understand the cultural processes and mechanisms of landscape formation, change and evaluation.

Figure 1 East Asian Inland Seas and eight NEOMAP research areas.



### Landscape

Landscape is a holistic phenomenon, combining the elements of the natural environment as well as human actions, mental landscape images and traces of cultural processes. As such, the concept of landscape allows us to interpret not only the biological or physical processes behind the modern environmental problems, but also the mental and cultural processes behind the humans' destructive behaviour towards their natural environment.

### Inland seas

Throughout history, the inland sea regions have been densely populated and have acted as centres of extensive trading networks. Located on the borders of diverse cultural and natural environments, the inland seas can be considered a cultural system that has managed to maintain both intense cultural and economical contacts and remarkable cultural diversity. The research results of the NEOMAP project would be compared to

Figure 2 Concept of landscape

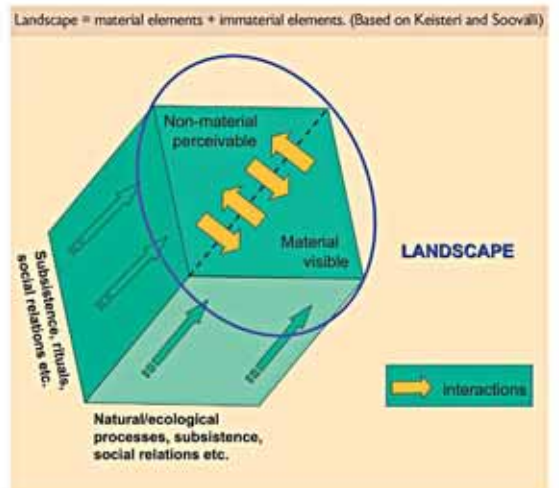




Photo 1 Shirakawa village, Japan



Landscape once created on the crossroads of mountain products' trade, has itself become an object of consumption.

Photo 2 Project members looking at ancient port remains at the early Neolithic Dienlanshan site in China.



those from North European Inland Seas (the Baltic Sea and the North Sea).

### Neolithisation and Modernisation

Present-day landscape elements can be traced back to different historical layers. The NEOMAP project defines *Neolithisation* and *Modernisation* as two key layers in historical landscape change. Neolithisation refers to a period of emerging permanent settlements and agriculture, the expansion of trading networks, and the birth of many novel technologies. Similarly, Modernisation is a time of urbanisation and industrialisation, the globalisation of trading activities and the invention of new revolutionary technologies.

### Results up to now

All eight project work groups have been carrying out their field work according to their research plans. The interregional and historical comparison is further facilitated by the creation of GIS database uniting basic historical, archaeological and environmental data from each research area. Up to 2008, the database format for both Neolithisation and Modernisation has been elaborated and

the data insertion for Biwako and Hokuriku is almost completed.

NEOMAP project has signed international collaboration agreements with Far-East National University in Russia and The Sainsbury Institute for the Study of Japanese Arts and Cultures in UK. Discussions have been held with scholars from Estonia, Belgium, Holland, England, Germany and elsewhere.

Inside the institute, the project has opened two seminar series, "Landscape Research" and "Wild Boar and Landscape". Project has participated in, organised and co-organised several workshops and seminars in Japan (at Society of Biosophia Studies, Lake Biwa Museum, Okinawa University) and abroad (SISJAC in UK, Far-East National University in Russia).

### Plans for 2008

2008 will see intensive field work in all the 8 regions. The topics that will be addressed by the individual researchers in all the research groups can be divided into four major common themes. (1) The birth and expansion of agriculture (rice paddy system, migratory waterfowl hunting, raised floor stock houses, gardening agriculture). (2) Waterfronts, i.e. the system of the inner/outer sea, rivers and lakes as a source of living and an object of worship, but also the function of waterways as a passage for trade of local produce. (3) Migration and colonisation as a major force of landscape change, including the change of settlement patterns inside one culture, as well as colonisation and immigration as a forced landscape shift from indigenous/traditional landscape systems to introduced ones. (4) Travelling and creation of mental landscape images.

In addition we will continue the database construction and start converting the inserted GIS data into visual maps. The research outcomes will be presented through symposia, workshops and publications.

# Interactions between man and the environment in Mesopotamia

This project focuses on the period around the time of the Third Dynasty of Ur in Mesopotamia. The people of this period suffered from the double stress of population increase and water shortage. It aims to examine the interaction between people and nature on a comprehensive scale involving both physical/material and spiritual/mental spheres.

Principal Investigator ■ **WATANABE Chikako E.** Osaka Gakuin University, Faculty of International Studies

Core Members ■ **BICHLER, Max** Vienna University of Technology, Atomic Institute of the Austrian Universities  
**KARAHASHI Fumi** Chuo University, Faculty of Letters  
**MAEKAWA Kazuya** Kokushikan University, School of Asia 21  
**MCKMAHON, Augusta** University of Cambridge, Faculty of Archaeology and Anthropology  
**SELZ, Gebhard** University of Vienna, Institute of Oriental Studies  
**WILKINSON, Tony J.** Durham University, Department of Archaeology

## Objectives of Research

Proxy data indicate that there was a trend towards increased aridity across the Middle East and Central-South Asia from the late 3<sup>rd</sup> through to the late 2<sup>nd</sup> millennium BC. At that time, Southern Mesopotamia was densely populated following an urban explosion.

The Third Dynasty of Ur (2113–2004 BC) was the last traditional Sumerian dynasty that established supremacy throughout Mesopotamia. Towards the end of this dynasty, there was widespread disorder, caused by a purported decline in agricultural productivity, soaring grain prices, the ongoing immigration and invasion of nomads, and the emigration of the native population. It is conjectured that this disorder was caused not just by political, social and economic failures, but that environmental factors also contributed to the situation resulting in the fall of the dynasty. The people of this period suffered from the tremendous double stress of population increase and water shortage. In the context of the global environmental problems we face today, a systematic exam-

ination of the ancients' attempt to cope with this complex situation should yield valuable insights.

## Methodology

There are four major areas of investigation:

- (1) palaeoenvironments
- (2) agriculture
- (3) cultural ideology
- (4) social situation

It is intended to establish how closely each of these four areas is related, and how such a delicate system is maintained on the basis of mutual balances.

## Expected Outcome

Our project aims to urge the public to revise a commonly-held misconception that progressive salinisation caused the collapse of Mesopotamian civilisation. The project also aims to provide useful data by reconstructing the ancient environment so as to trace the process of environmental changes to the present day.

Figure 1 The Royal Standard of Ur, Early Dynastic Period (2600–2400 BC), from Royal Tomb of Ur, The British Museum.



The scene shows Sumerian nobles attending a banquet being accompanied by musicians (upper register). The lower register shows a bull, sheep and goat being led in procession. An elaborately inlaid work of art made of lapis lazuli, shell and red limestone.

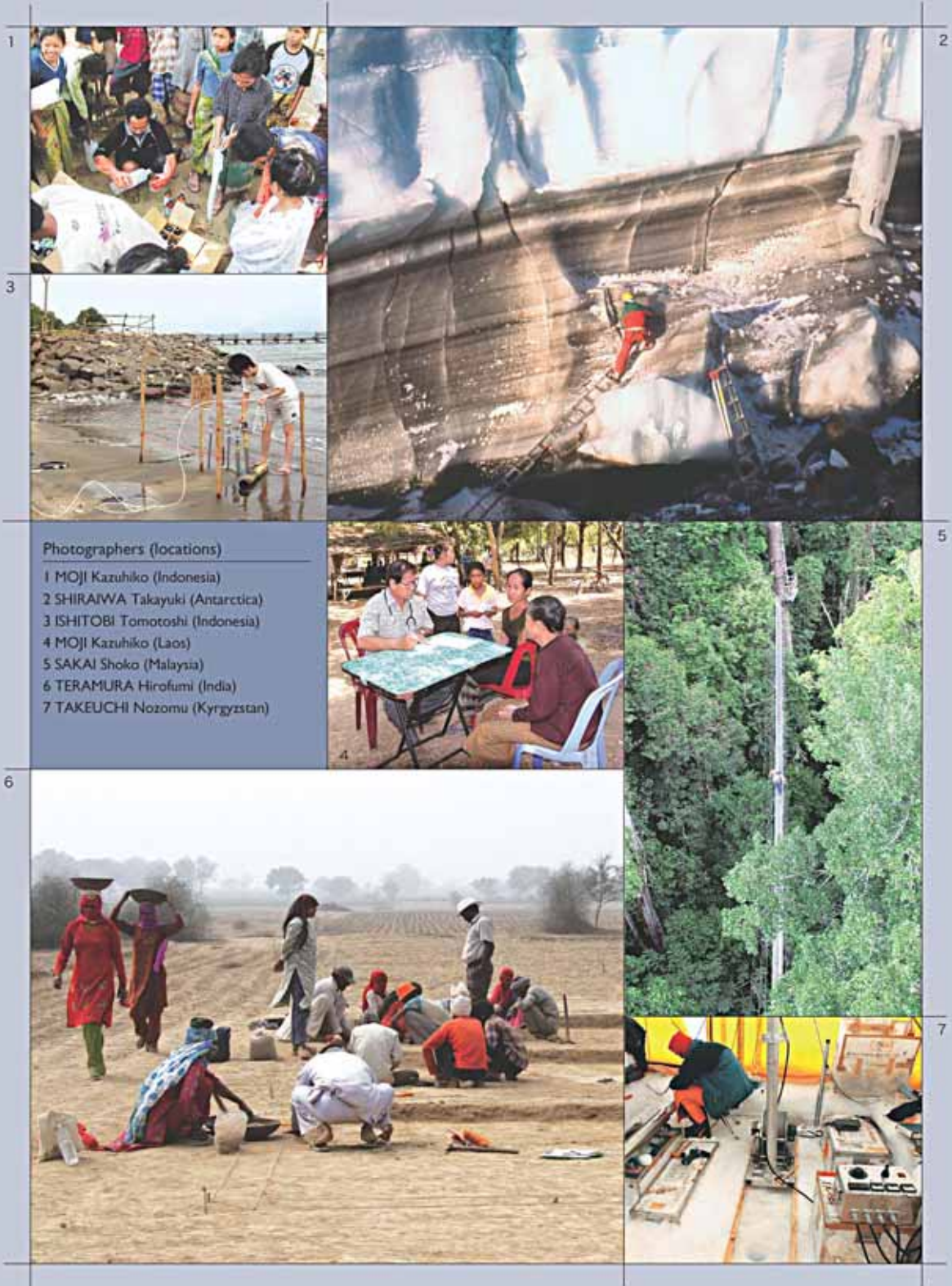
Figure 2 The royal lion hunt, Neo-Assyrian Period (645–640 BC), from North Palace, Nineveh, The British Museum.



The scene shows the Assyrian king, Ashurbanipal, killing a lion with a sword. Lions were dangerous to both humans and livestock, but it was taboo for ordinary people to kill lions, because the lion was a royal symbol. Only the king could kill lions. Lions became extinct in Iraq in the nineteenth century.

●column **Scenes from Field Surveys**

From the extreme cold of the world of ice to dry grasslands, hot and humid tropical forests, and further to modern cities bursting with people. Researchers drill into glaciers to take samples, make continued observations from the tops of tall trees, and go house-to-house conducting interviews. RIHN's field surveys take researchers to all areas of the world, where they employ the knowledge and methods of their specializations.



Photographers (locations)

- 1 MOJI Kazuhiko (Indonesia)
- 2 SHIRAIWA Takayuki (Antarctica)
- 3 ISHITOBI Tomotoshi (Indonesia)
- 4 MOJI Kazuhiko (Laos)
- 5 SAKAI Shoko (Malaysia)
- 6 TERAMURA Hirofumi (India)
- 7 TAKEUCHI Nozomu (Kyrgyzstan)

# E

## Ecosophy

Program Director ■ **WATANABE Tsugihiko** RIHN

Global warming is a “global” environmental problem that affects almost all systems of the world, as most people can easily recognize, including climate, sea-level, hydrological regimes, vegetation, agricultural production, marine resources, and so on. On the other hand, some environmental problems that might normally be recognized as “local” environmental problems, like desertification, deforestation, and loss of biodiversity, must be defined as “global” environmental problems. For example, in arid regions, water resources development and management by construction of large reservoirs and irrigation systems has been “successfully” implemented for enhancement of agricultural productivity with more stable water supply. As the result, however, issues have arisen concerning the distribution of developed water resources. In addition, changes in agricultural production systems due to globalization of economies and market bring much more serious water shortages. World food trade implies that water shortage in a food production area leads directly to food shortage in a food importing area. Therefore, the desertification that might be observed as a local issue should be identified as a global environmental problem.

Dust, pollutant particles and greenhouse gases in the atmosphere travel physically across regions of the earth; and trade activities are certainly typical of the artificial transfer of the materials across the boundaries of the world. As well as these trans-boundary movements of materials, the relationship between human activities and natural systems can cross boundaries with the evolving global information network. Consequently, we are losing the diversity of individual regions.

Internationalization of human lifestyles means loss of cultural diversity. Facing these global and local environmental problems, we must find accord between two different perceptions: “one globe” and “local value.”

Completed Research	Leader	Theme
<b>E-01 (CR2)</b>	YACHI Shigeo	Multi-Disciplinary Research for Understanding Interactions between Humans and Nature in the Lake Biwa-Yodo River Watershed
Full Research	Leader	Theme
<b>E-02 (FR5)</b>	SEKINO Tatsuki	Interaction between Environmental Quality of the Watershed and Environmental Consciousness: With Reference to Environmental Changes Caused by the Use of Land and Water Resource
<b>E-03 (FR5)</b>	TAKASO Tokushiro	Interactions between Natural Environment and Human Social Systems in Subtropical Islands
<b>E-04 (FR2)</b>	UMETSU Chieko	Vulnerability and Resilience of Social-Ecological Systems

# Multi-Disciplinary Research for Understanding Interactions between Humans and Nature in the Lake Biwa-Yodo River Watershed

The differences in problem consciousness among various stakeholders occurring from "hierarchy" of a watershed could be a major hindrance to governance, leading to conflicts between top-down and bottom-up Management. We proposed a system of "hierarchical watershed management" to overcome the restrictions derived from these hierarchical characteristics (Figure). Based on this idea, we conducted research on the agricultural turbidity problem in the Lake Biwa watershed to develop a methodology for environmental diagnosis and consensus building with an emphasis on communication. Our project is unique in 1) developing a new methodology to promote governance and participation of residents by 2) our transdisciplinary approach to natural science and social science 3) practiced in three scales in the Lake Biwa watershed (Shiga prefecture as macroscale, Inae district as mesoscale, local communities in Inae district as microscale, 4) moving towards practical watershed and global environmental studies.

Project Leader ■ **YACHI Shigeo** Center for Ecological Research, Kyoto University (RIHN until March 2008)

## Specific Research Findings

### (1) A new watershed diagnosis method revealing the relationship between Lake Biwa and its rivers

The results of newly developed watershed diagnosis methods including stable isotope ratios and rare elements indicate that agricultural activities related to smaller rivers flowing into the eastern part of the lake have a large potential impact on the water quality and eutrophication of Lake Biwa, and that fine-tuned water management and water channel cleaning by local residents through a bottom-up approach is both effective and necessary for the environmental preservation of Lake Biwa.

### (2) Clarification of an integrated picture of the agricultural turbid water problem and establishment of a communication methodology to support local residents' voluntary environmental preservation activities

In the background of the agricultural drainage issue, lies a drastic change of Japan's agricultural policy and agricultural community structure, which caused an increase in part-time farmers and decrease in young farmers. A workshop method was developed to support residents themselves

discussing the local water environment and its future prospects using maps. Practical workshops were held to confirm how the provision of information related to the current status of the water environment or measures for water environmental preservation would affect the farmers' awareness of environmental considerations or their actions. These results indicate the need to develop a communication method based on the assumption of the individuality of the community and the importance of conditions such as social capital that allow such a method to work effectively.

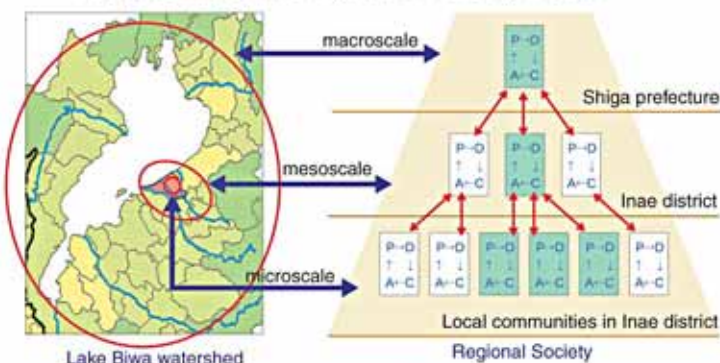
## Contributions to Global Environmental Studies

There are two important issues that must be dealt with if we are to solve global environmental problems: (1) a watershed area is important in terms of scale. Dealing with it not only solves regional environmental problems but also constitutes a test bed for specific solutions to global environmental problems; and (2) It is essential to appropriately coordinate various stakeholders with various patterns of involvement in the environment that are deeply rooted in the area. Although this project has the methodology for watershed management as its main theme, we believe the project provided a prototype methodology which can contribute to the way we consider and solve global environmental problems.

## Communication of Research Findings

The project final report (in Japanese, ISBN 978-4-902325-11-9) is now available at University libraries in Japan and at the libraries of cities and towns in the Shiga prefecture. In it, 5-year transdisciplinary research on watershed management is compiled as a first step to "watershed environmental studies" with close connection to global environmental problems. Readers will find not only the new research findings but also the message and dynamism of the project emphasizing the importance of practice in regional societies, the social meaning of transdisciplinary collaboration, and academic and social issues to be challenged.

Figure Hierarchical Watershed Management System Applied to Lake Biwa Watershed in the Case of Agricultural Turbidity Problem



Shiga prefecture, Inae district (region colored ■) and local communities in Inae district indicated by red circles (left) and green boxes (right) are regional stakeholders concerning the agricultural turbid water problem, however, their consciousness of the problem is not the same. The hierarchical watershed management system is a mechanism to promote watershed management by governance of the various stakeholders in the region by building 1) feedback mechanism (PDCA cycle) consisting of monitoring with diagnosis indicators at each scale, and 2) mechanisms to promote communication between hierarchies (indicated by red arrows).

# Interaction between Environmental Quality of the Watershed and Environmental Consciousness: With Reference to Environmental Changes Caused by the Use of Land and Water Resource

People's value judgment system on the environment, or the environmental consciousness, is explored through theoretical analyses and empirical surveys in order to identify the environmental elements and the human-sociological factors that are affecting the formation of this consciousness. Environmental changes caused by a virtual impact to a watershed environment are predicted and proposed to people. People's judgments on such environmental changes are analyzed to elucidate the relationship between people's environmental consciousness and the environmental quality. We will develop response-prediction models for a watershed environment and a methodology to clarify the changes in the people's value judgment on the environment.

Project Leader ■ **SEKINO Tatsuki** RIHN

Core Members ■ **FUJIHIRA Kazutoshi** Institute of Environmentology  
**HINO Shuji** Faculty of Science, Yamagata University  
**KOBA Keisuke** Institute of Symbiotic Science and Technology, Tokyo University of Agriculture and Technology  
**NAGATA Motohiko** Graduate School of Human and Environmental Studies, Kyoto University  
**NAKATA Kisaburo** School of Marine Science and Technology, Tokai University  
**ONISHI Fumihide** Project Development & Promotion Department, Takenaka Cooperation  
**OHTA Nobuhito** Graduate School of Agricultural and Life Sciences, University of Tokyo  
**SHIBATA Hideaki** Field Science Center for Northern Biosphere, Hokkaido University  
**TAKAHARA Hikaru** Graduate School of Life and Environmental Sciences, Kyoto Prefecture University  
**TOKUCHI Naoko** Field Science Education and Research Center, Kyoto University  
**YASUE Koh** Faculty of Agriculture, Shinshu University  
**YOSHIOKA Takahito** Field Science Education and Research Center, Kyoto University  
**ZHENG, Yuejun** RIHN

Adviser ■ **NAKAWO Masayoshi** National Institutes for the Humanities

## Purpose of the project

How do we perceive the environment? People's attitudes toward the environment are based on their various value judgments on it. We define this value judgment system as "environmental consciousness." What kinds of changes in the environmental qualities affect the formation of the people's environmental consciousness? We need quantitative evaluation of the changes in the environment to understand its present status and to predict its future. On the other hand, clarifying the relationships between the environmental quality and the environmental consciousness is important for wiser uses and conservation of the natural environment. In this project, we will develop a set of response-prediction models to simulate environmental changes as well as a methodology to analyze the people's value judgments when they are presented with the predicted environmental changes. Although the project is conducted mainly in the Lake Shumarinai watershed, Hokkaido, Japan, the method will be developed to be applicable to other environments.

## Methods and research area

In this project, several virtual scenarios of environmental changes are assumed. People's value judgments on those changes will be elucidated. The method developed in this project requires three functions: (1) quantitative prediction of changes in environmental elements caused by virtual environmental modifications, such as logging and dairy farming, (2) comprehensively informing the environmental changes to people and (3) analysis of the relationship between changes in the people's value judgments and those in the environmental elements. The method is composed of the response-prediction model for the environment and the tools to develop and analyze the attitude surveys. The main research area is the Lake Shumarinai watershed in northern Hokkaido, Japan. However, we are developing the method to be applicable not only to this particular watershed environment, but also to other environments. Attitude surveys are conducted through interest questionnaires and scenario questionnaires. From scenario questionnaire, the people's valuation to the environmental changes caused by human impacts can be estimated. Such people's environmental valuation would be a key factor for the Public Involvement in the strategic environmental assessment process.

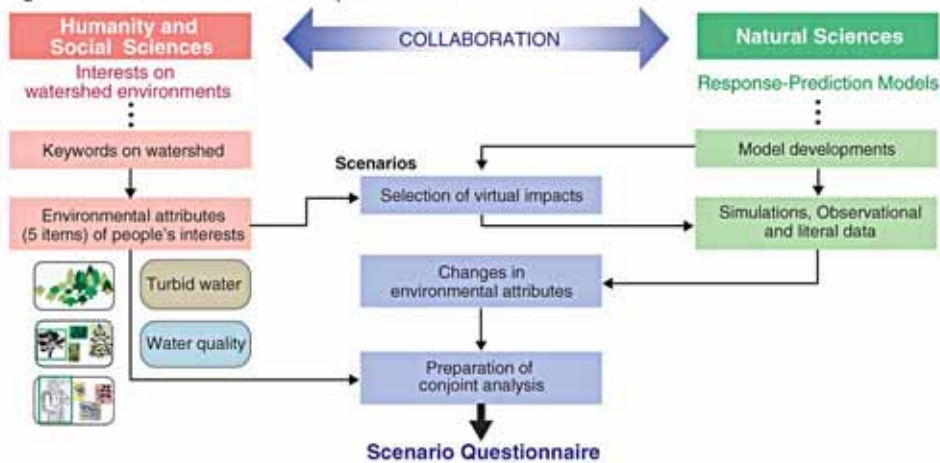
## Progress to date

### Planning the Scenario questionnaire

Scenario questionnaire, which is the most important survey in the project, has been con-

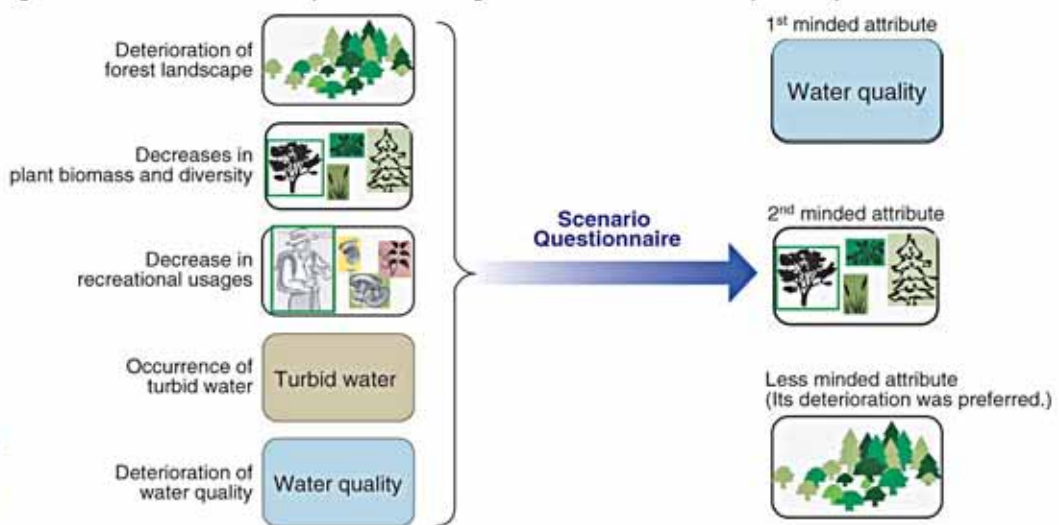


Figure 1 Procedure for a scenario questionnaire



In order to implement a scenario questionnaire, intensive collaboration between human and social sciences (left-hand part of the figure) and natural sciences (right-hand part) must be needed.

Figure 2 Results of the scenario questionnaire using realistic scenarios in the conjoint analysis.



Partial utility value estimated by the conjoint analysis of the scenario questionnaire was the largest for the water quality, while that for the forest landscape showed the opposite sign compared with other attributes.

ducted in the fiscal year 2007. People's preference on plans was surveyed for residents in 8 river drainage systems in Japan and in the Horokanai town, where the Lake Shumarinai is located. Five environmental attributes were selected, with respect to people's interests in watershed environments elucidated from keywords collected in the interest survey (the left-hand part of Figure 1). Several virtual plans including forest logging in the Lake Shumarinai watershed were selected. Environmental changes were estimated using the response-prediction model, field observations and literal information (the right-hand part of Figure 1). The people's preference on the plan-selection has been estimated using the conjoint analysis (the middle part of Figure 1). The conjoint analysis can elucidate attributes that are respected by residents. As shown in Figure 1, it is essential for implementing the scenario questionnaire to collaborate between the natural sciences, which predict environmental changes caused by the impact, and the humane-social sciences, which investigate people's preferences on the watershed environment.

#### People's valuations to environmental changes

Conjoint analysis suggested that people would firstly appreciate the plan in which the water quality was preserved (Figure 2). Secondary minded attribute was "Decreases in plant biomass and

diversity." Interestingly, the deterioration of the forest landscape (the decrease in forest area) showed the opposite sign of the partial utility value. It suggested that the deterioration of the landscape was less minded, or rather preferred by the people. In the case of the scenario questionnaire including unrealistic environmental changes, which were not based on the simulation results using the response-prediction model, the deterioration of the forest landscape was not preferred as in cases of other four attributes. Further analyses are needed to clarify the variations in the people's valuation to environmental changes.

#### Plan hereafter

In the last year (2008) of the project, an experiment to plan the environmental program will be conducted in Horokanai Town. Stakeholders (residents, local government, farmer's and fishermen's cooperatives and so on) will join the scenario workshop to make future visions of the town. In the workshop, results of the project will be assessed their effectiveness for making the public involvement substantial. Although the scenario questionnaire may be a complicated and laborious method, people's preference on environmental changes should be considered when we make a decision on measures for natural environments.

# Interactions between Natural Environment and Human Social Systems in Subtropical Islands

A variety of environmental problems have arisen on islands around the world, leading to the deterioration of precious natural environment and the disappearance of local cultures. In order to resolve environmental issues on islands, it is necessary to thoroughly understand the interaction between natural environment unique to islands and the human social systems that are found on islands. Using Iriomote Island in Okinawa Prefecture as a model, we hope to find information that will help resolve these issues. We aim to provide guidelines for building island human social systems that are sustainable in the future.

Project Leader ■ **TAKASO Tokushiro** RIHN

Core Members ■ **ARAMOTO Mitsunori** Tropical Biosphere Research Center, University of the Ryukyus

**HAGIWARA Natsuko** Faculty of Sociology, Rikkyo University

**INOKURA Youji** Faculty of Agriculture, Kagoshima University

**KAWAKUBO Nobumitsu** Faculty of Applied Biological Sciences, Gifu University

**KUBOTA Yasuhiro** Faculty of Science, University of the Ryukyus

**MAEKADO Akira** Faculty of Law and Letters, University of the Ryukyus

**OSHIRO Hajime** Faculty of Law and Letters, University of the Ryukyus

**SUZUKI Atsushi** Institute of Geology and Geoinformation, National Institute of Advanced Industrial Science and Technology

**YOSHIMURA Kazuhisa** Graduate School of Science, Kyushu University

## The Purpose of the Project

Islands throughout the world are faced with ongoing deterioration of their precious natural environment due to water shortages, industrial development and other factors. Along with this, local cultures are at risk of disappearing. To solve these problems, it is important to fully understand interaction between natural environment and human social systems on islands. As islands are geographically limited areas, their natural environment and human social systems tend to be different from others, as well as vulnerable. The main subjects of this project are environmental issues related to the unique features of islands. Iriomote Island, a typical subtropical island located in Okinawa Prefecture, is an ideal model for studying island environment, as it is rich in natural resources such as water and virgin forests, as well as traditional art and culture.

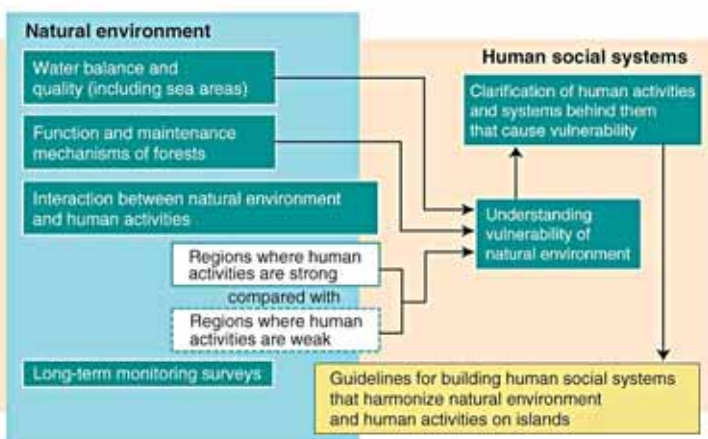
## Research Methods

1) We will build a water balance model of Iriomote

Island based on the estimated amount of precipitation, river flow, and evapotranspiration. The model will be used as a standard for future water usage. We also assess the human impact on rivers.

- 2) We clarify functions and maintenance mechanisms of broadleaved evergreen and mangrove forests, while studying biodiversity and interaction among organisms. We take a closer look at the dynamism of forests and assess the human impact on forests. As for the gathered research materials, we will use them as references for global warming issues.
- 3) We look into the background of human activities causing deterioration of natural environment, from the perspectives of industrial development, demographic structure and government policies. In particular, we explore how the main industry of the island has changed from traditional agriculture to tourism and how the social system has changed during the transfer period.
- 4) Regarding the decision-making process in communities, we study how local people should understand the impact of human activities on the natural environment and how local common rules should be modified according to changes in the use of natural resources.

Figure 1 Overview of the Project



## Progress Status, Achievements, and Future Challenges

- 1) To clarify the water balance on Iriomote Island, we have installed a monitoring device on the island. The database is being built up to help us make more accurate predictions about the quantity and quality of water that will be available in the future. Our observations have indicated that rain on the island is acidic throughout the year. We will identify the origins of the substances that cause the acid rain, estimate the total amount of such substances falling on the island, and monitor the impact. We will also



Photo 1 Seagod Festival (Shirahama Area)



Photo: Fumio Sakuma, Nature Image Inc.

Photo 2 Water Balance on Iriomote Island



Photo: Watanabe Suimon Kikaku

Photo 3 Industries as Bases of Life for the Islanders



Photo: Fumio Sakuma, Nature Image Inc.

identify substances that are carried down a river into the sea, especially to coral reef areas along coasts, and assess the impact.

- 2) Our studies have shown that typhoons affect turnover in broadleaved evergreen forests. In forests including those of mangroves, we have been keeping track of production/circulation of substances, while monitoring the impact of human activities. We will provide information on effective maintenance and management of forests in the future.

- 3) We have gathered a variety of reference materials including demographic statistics, administration policies and information on local industries, and categorized them for further analysis. We use these materials to develop measures to promote networking of small-scale industries from the viewpoint of island economics. In this process, we focus on tourism, agriculture, health and education.

- 4) We have been in close contact with the islanders by participating in various local events and educational programs designed for schools and communities. As a result, we learned that community centers on the island play a large role in the communities' decision-making processes.

To solve environmental problems on Iriomote Island, local people need a solid economic infrastructure to build self-esteem and become independent. To achieve this, it is important to share useful information with the islanders. We will proceed with this project so that the findings can contribute to promoting local industries and growing new ones. We take part in education at schools and in communities from the planning stage, and would like to help locals promote the island's traditional culture and smooth handover of its performing arts to younger generations.

※ <http://www1.gifu-u.ac.jp/~kawakubo/iriomote/index01.html>

Photo 4 Function and Maintenance Mechanism of Forests



Photo: Fumio Sakuma, Nature Image Inc.

Photo 1-4: Iriomote Island, located in the southwest of the Ryukyu Islands, is a perfect place to study natural environment. It is typical of subtropical islands that have precious natural environment. The islanders have developed an original lifestyle, even though the island itself has been under the influence of neighboring districts.

# Vulnerability and Resilience of Social-Ecological Systems

A vicious cycle of poverty and environmental degradation such as forest degradation and desertification is a major cause of global environmental problems. Especially in semi-arid tropics (SAT) including Sub-Saharan Africa and South Asia where the majority of the poor is concentrated, poverty and environmental degradation is widely prevalent. People in this area largely depend on rain-fed agricultural production systems and their livelihoods are vulnerable to environmental variability. Environmental resources such as vegetation and soil are also vulnerable to human activities. In order to solve these "global environmental issues", a key factor is a quick recovery from, or a resilience of human society and ecosystems to, the impacts of environmental variability. This project aims at identifying the factors affecting resilience and the ways to enhance the resilience of rural people in developing countries to environmental variability.

Project Leader ■ **UMETSU Chieko** RIHN

Core Members ■ **ISHIMOTO Yudai** RIHN

**KUME Takashi** RIHN

**LEKPRICHAKUL, Thamana** RIHN

**MIYAZAKI Hidetoshi** RIHN

**MWALE, Moses** Zambia Agricultural Research Institute (ZARI)

**PALANISAMI, K.** Centre for Agricultural and Rural Development Studies (CARDS), Tamil Nadu Agricultural University

**SAEKI Tazu** RIHN

**SAKURAI Takeshi** Faculty of Economics and Business Management, Wako University

**SHIMADA Shuhei** Graduate School of Asian and African Area Studies, Kyoto University

**SHINJO Hitoshi** Graduate School of Agriculture, Kyoto University

**TANAKA Ueru** Graduate School of Global Environmental Studies, Kyoto University

**YOSHIMURA Mitsunori** Remote Sensing Technology Center of Japan (RESTEC)

## Purpose of the Research Project

In developing countries, loss of resilience of social-ecological systems (Figure 1) due to an increase of population and the collapse of rural communities is of critical importance especially for farmers and nomads whose livelihoods rely heavily on environmental resources. This project tries to consider human activity against environmental change in view of social-ecological resilience and thus to clarify the effects of local environmental change on social-ecological systems as well as the mechanism through which the systems recover from such shocks. Also, from various case studies, our research tries to identify factors that determine the adaptive capacity of households and communities to environmental shocks, and the role of institutions on strengthening social-ecological resilience. By analyzing the factors influencing social-ecological resilience, it is possible to

introduce policy interventions for enhancing human security in developing countries.

## Research Methods and Target Areas

The method for comprehensive assessment of resilience is organized in four research themes as highlighted below in Figure 1.

- Theme I: We focus on soil and forest resources for analyzing ecological resilience.
- Theme II: We conduct intensive interviews of farm households/communities and identify the factors affecting social resilience.
- Theme III: We consider historical changes in land tenure systems made by government policies and their effects on natural environment as well as social-political factors of increasing vulnerability and the process of collapse and recovery of resilience in different communities.
- Theme IV: We cover larger areas utilizing statistical analysis, remote sensing data and aerial photographs to help trace long-term changes in land cover in addition to analysis of data on rainfall and temperature. By utilizing the information provided by themes I, II and III, we will develop comprehensive and integrative methods for assessing social-ecological resilience.

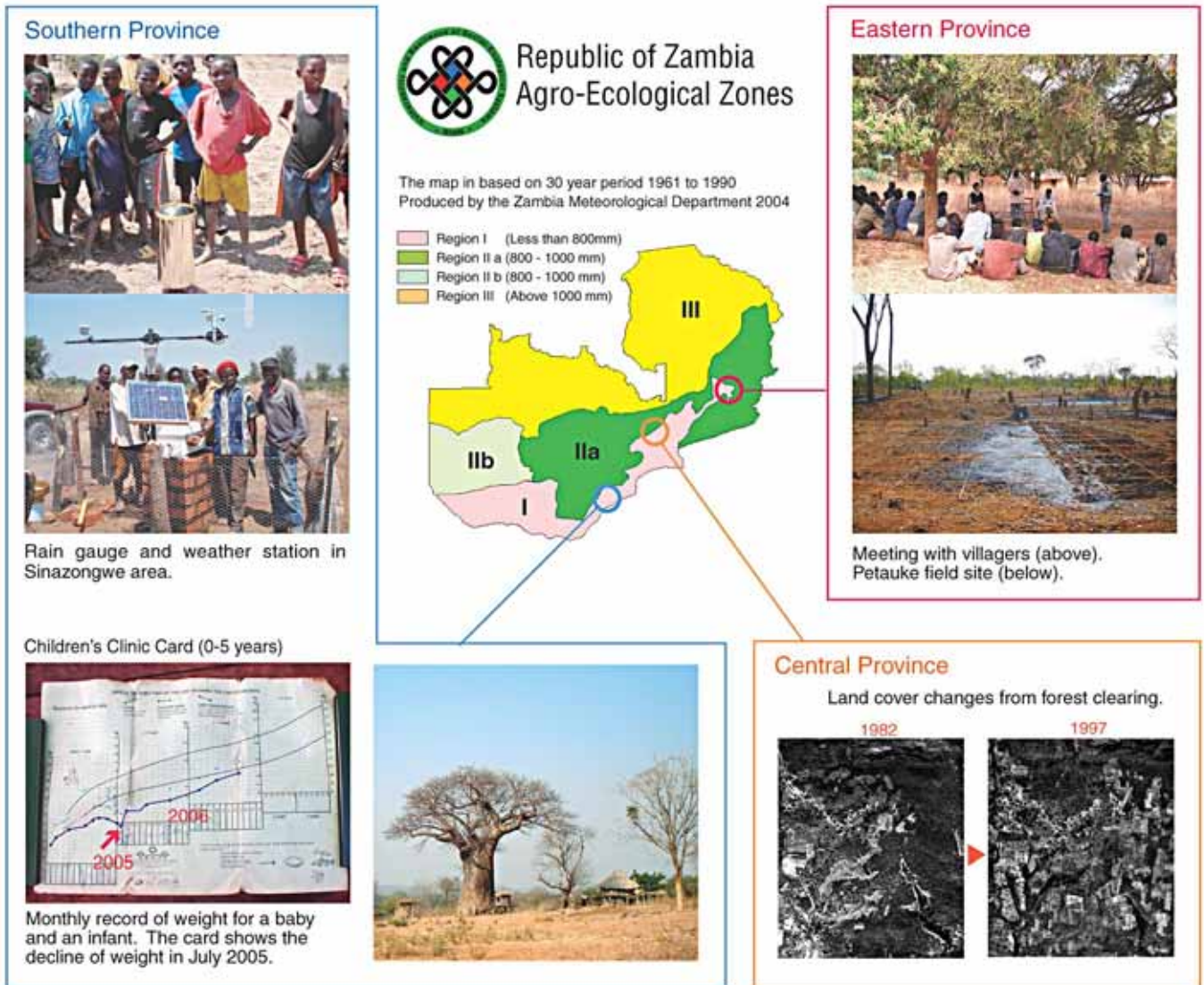
The main field sites are located in the semi-arid tropics (SAT) including Western Africa, Southern Africa and South Asia (India). Our main field site

When the ecological system receives a disturbance/shock from climate variability such as rainfall, the disturbance affects social resilience through agricultural production in agricultural society. If social resilience is low, a household or a community may fall into chronic poverty. If social resilience is high, a household or a community goes through transient poverty and recover to the original state. Institution, culture and technology for resource management link a bridge between ecological and social resilience and have an important role for building social-ecological resilience.

Figure 1 Close Relationship of Social and Ecological Resilience



Figure 2 Major Field Sites and Agro-Ecological Zones of Zambia (Classified by Precipitation)



is Zambia (Figure 2). The field sites were selected on the basis of agro-ecological zones and a history of recurrent extreme weather conditions, especially droughts.

### Research Outcomes to Date and Expected Results

During the FY2007 (FR1), we set up weather stations, rain gauges, prepared experimental fields, and conducted extensive household survey. After the start of the rainy season in November, we started field surveys and monitoring.

- At the experimental site in a village in Eastern Province, a survey of vegetation and topography was conducted. After land clearing, maize cultivation was commenced with the monitoring of meteorological and soil conditions.
- Based on the census survey, we identified three zones based on agro-ecological characteristics and selected study sites (total 48 households in 5 villages) in the Sinazongwe area, Southern Province. In November, weekly household survey, plot level rainfall measurement was launched. At the same time, weather stations were installed in two sites and started monitor-

ing. In the same villages, field trials were commenced to identify soil fertility parameters. Household surveys in villages revealed the farmers' strategy of diversification for production activities to mitigate crop failure and the role of migrant labor for their livelihood.

- In order to study country level environmental and social changes, we started analyzing meteorological data, satellite images, and an extensive household survey conducted in early 2007. We have collected documents about food security policies of Zambian government and donors, and conducted research about the food relief program in Southern Province.

The above study covers a wide range of fields such as agronomy, climatology, geography, social-economics, nutrition and health and we are expecting to obtain valuable information and data sets for considering resilience.

As we did in the last fiscal year 2007, we continue to organize workshops and seminars in and outside of Japan and make research results available to the public by uploading working papers and reports at our project website.

# Activities of the Center for Coordination, Promotion and Communication (CCPC)

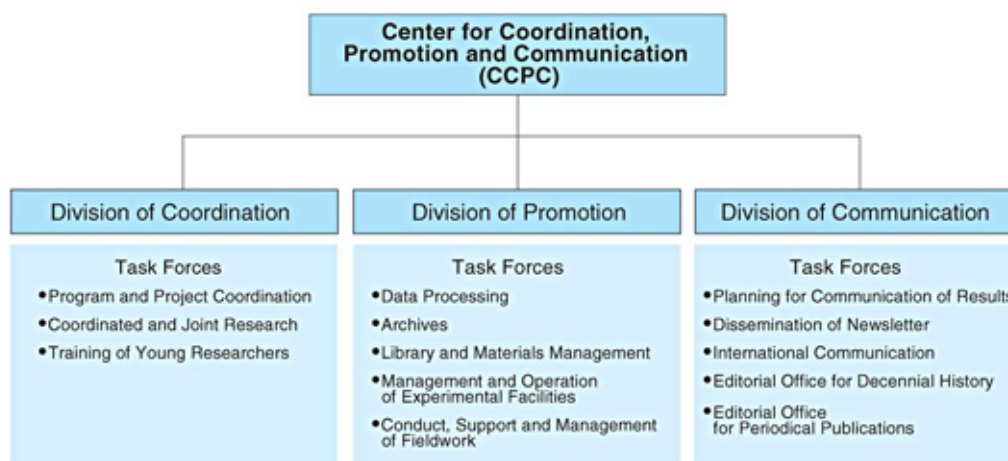
From 1 October 2007, the Research Promotion Center that had operated since the founding of RIHN was reorganized as the Center for Coordination, Promotion and Communication (CCPC).

CCPC functions to support RIHN's research projects, integrate and disseminate their results, and determine strategies for creating new research. To perform these important functions, CCPC has three divisions.

- (1) **The Division of Coordination:** Responsible for research design and future planning, promotion of coordinated research, training of young researchers, including establishment of a graduate school, and other tasks related to development of infrastructure for building global environmental studies.
- (2) **The Division of Promotion:** Responsible for data processing, upkeep and management of archives, books and materials, management of experimental facilities, and support and management of field research.
- (3) **The Division of Communication:** Responsible for policy, planning and implementing the communication of research results at home and abroad.

Each division has a full-time head and a number of task forces (TFs), while the Division of Communication also includes editorial offices. The work of the task forces is carried out by CCPC staff in coordination and cooperation with the Research Department and the Administration Office. This new system became fully operational from 1 April 2008.

CCPC aims to play a central role in promoting liaison with research institutes and organizations at home and abroad. At home, in particular, in order to further RIHN's function as an inter-university institute, CCPC will launch a project to make it the focus of an information network that will promote research through liaison among research institutes nationwide.



Organization and tasks of CCPC

# RIHN as a Member of the National Institutes for the Humanities

On 1 April 2004, the National Institutes for the Humanities (NIHU) was established under the National University Corporation Law as an Inter-University Research Institute Corporation, and together with the National Museum of Japanese History, the National Institute of Japanese Literature, the International Research Center for Japanese Studies, and the National Museum of Ethnology, RIHN became a member institute. In addition to conducting its own research projects, RIHN takes an active part in the activities promoted by NIHU, including joint research, resource-sharing, area studies and other initiatives, as well as public lectures, symposia and other inter-university events. In particular, RIHN is the core institution for An Integrated Study of Water and People in Humid Asia, which forms part of NIHU's collaborative research project Comprehensive Studies on Exchange between Eurasia and Japan. Also, as part of NIHU's Area Studies in Modern China undertaking to promote area studies, in August 2007 RIHN established the Research Initiative for Chinese Environmental Issues.

While NIHU comprises mainly institutes for research in the humanities and social sciences, RIHN incorporates the approaches of natural sciences in its integrated study of the global environment as a problem of human culture, and as such it harbors a great potential for collaboration with other member institutes as well as universities and research institutes nationwide.

## An Integrated Study of Water and People in Humid Asia



Research journal *Water and People* reporting on the National Institutes for the Humanities collaborative research project "Water and People". Volumes 0 to 4 have been published, each featuring a different topic.

This research, which forms part of NIHU's collaborative research project Comprehensive Studies on Exchange between Eurasia and Japan, takes as its theme the humid areas of Asia that have historically experienced the blessings and banes of water in a monsoon climate. Through integrated study of the diverse histories, peoples, customs, ecologies and ideas born of the involvement of human groups with water, this research has as the major aim of clarifying the significance in human history of man's involvement with water in Eurasia, of which Japan is part.

This collaborative research involves not only researchers, educators and staff from RIHN and other member institutes of NIHU, but also researchers from national, public and private universities nationwide. Beginning in April 2004, joint research meetings, public lecture series (comprising six lectures over a six-month period), and symposia have been held periodically.

## The Research Initiative for Chinese Environmental Issues



RIHN-China Newsletter published by RIHN Initiative for Chinese Environmental Issues. Volumes 0 and 1 have been published so far.

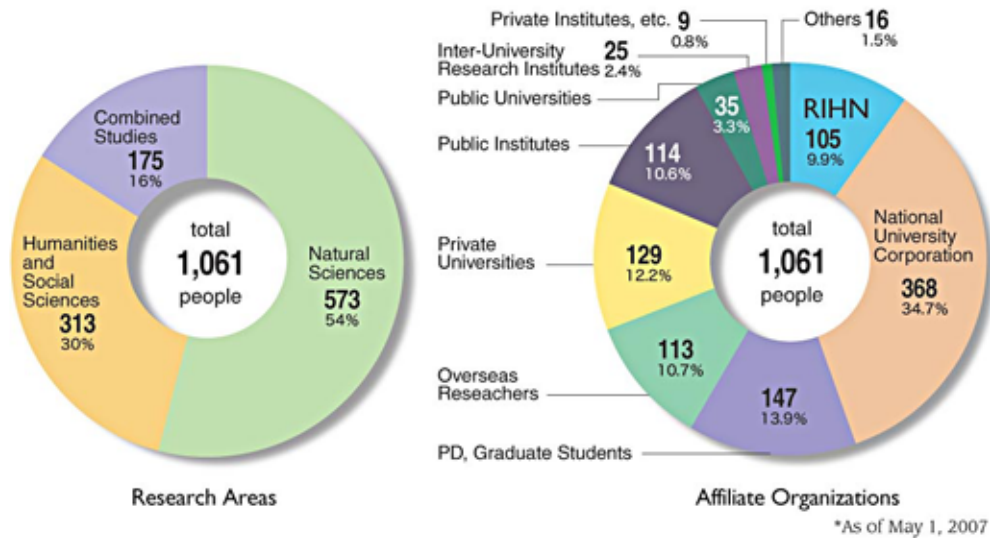
Based on the results of RIHN research projects, this initiative aims to gain a relative understanding of both scientific and human cultural aspects of China's environmental problems from the viewpoint of changes in culture, society and the environment due to development. By hosting various research meetings, forums, international symposia and publishing the RIHN-China Newsletter, RIHN publicizes the results of research into the realities of and countermeasures to environmental problems accompanying economic development in various parts of China. In October 2007, the First Symposium on Chinese Environmental Issues was held jointly by Kyoto University and NIHU's Integrated Study of Water and People in Humid Asia. Under the title of Environmental Thought and the Preservation of Lijiang Gucheng in Relation with its Water Environment, the symposium was directed towards building sustainable "social systems for the future." In November 2007, the second symposium on Social Development, Water Resources, and the Natural Environment was held in Nanjing with the cooperation of Nanjing University and Hehai University.

<<http://www.chikyuc.jp/rihn-china/>>

# Research Collaboration

## External Research Collaboration

As an Inter-University Research Institute, RIHN promotes integrative and cross-disciplinary joint research in the many fields related to global environmental studies. Collaboration extends not only to universities, national agencies, public organizations, and the private sector in Japan, but also overseas institutions.



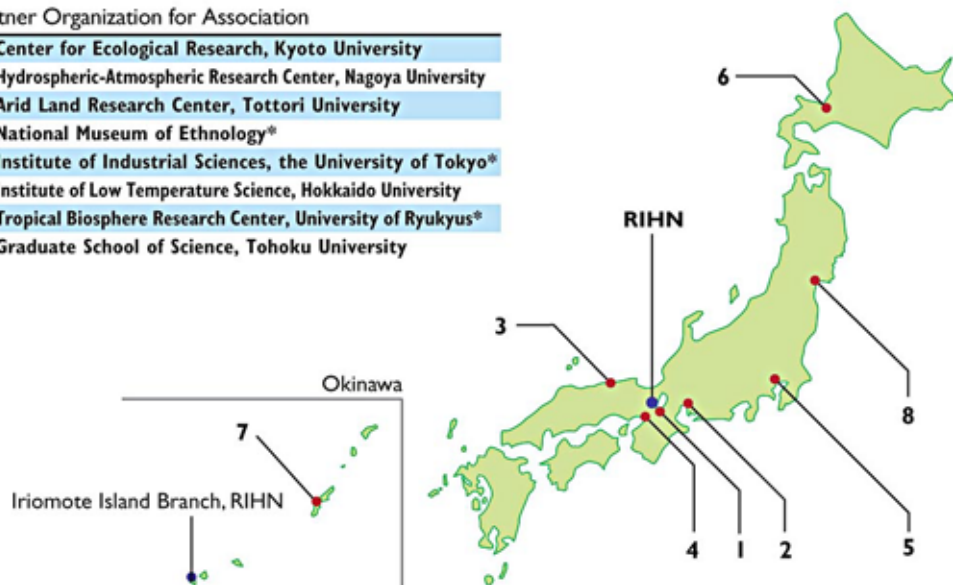
## Research Cooperation in Japan

RIHN has promoted research in collaboration with the following eight domestic institutions, including university research institutes. We receive more than one teaching staff member from each of these research institutes in accordance with our agreement. They work as teaching and research staff at RIHN for a fixed period.

\*Partner Organization for Association (It depends on fluid each members.)

### Partner Organization for Association

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 Ryukyus\*
8. Graduate School of Science, Tohoku University



MOU with Cambodian Agricultural Research and Development Institute (CARDI) <June, 2007>



## Cooperative Research Institutes Overseas

RIHN has signed memoranda and research cooperation agreements with overseas research institutes to encourage cooperative projects, share research information, and exchange researchers. Also, RIHN invites many distinguished researchers from overseas as Invited Research Fellows to establish closer ties with researchers abroad. In 2007, RIHN signed agreements with 11 Research Institutes overseas, including the Cambodian Agricultural Research and Development Institute.

Memoranda and Research Cooperation Agreements (As of April 1st, 2008)

\*MOU signed in 2007



### AUSTRALIA

- The Australian National University

### CAMBODIA

- Cambodian Agricultural Research and Development\*

### CHINA

- Cold and Arid Regions Environmental and Engineering Research Institute, CAS
- Geography and Planning School of Sun Yat-Sen University
- Henan University
- Institute of Archaeology Chinese Academy of Social Sciences
- Institute of Atmospheric Physics, CAS
- Institute of Geographic Sciences and Natural Resources Research, CAS
- National Chung Hsing University College of Agriculture and Natural Resources
- Nankai University
- Northeast Institute of Geography and Agroecology, CAS
- Northwest A&F University
- Research Center for Environmental Technology of River and Lake, Shanghai Jiao Tong University
- Research Institute of Cultural and Archaeological Relics of Xinjiang

### CZECH REPUBLIC

- Czech Technical University

### FINLAND

- Helsinki University of Technology

### FRANCE

- Centre national de la recherche scientifique
- La Fondation Maison des Science de l'Homme

### INDIA

- Deccan College Post-Graduate and Research Institute Deemed University\*
- Department of Archaeology, Deccan College, Post-Graduate & Research Institute\*
- Institute of Rajasthan Studies
- Tamil Nadu Agricultural University

### INDONESIA

- The Faculty of Agriculture Hasanuddin University\*

### KAZAKHSTAN

- The Institute of Archaeology\*
- The Institute of Geography\*

### LAOS

- National Agriculture and Forestry Research Institute

### NETHERLANDS

- Leiden University

### PAKISTAN

- University of the Punjab

### PANAMA

- Smithsonian Tropical Research Institute

### PHILIPPINES

- University of the Philippines

### RUSSIA

- Far Eastern Branch of the Russian Academy of Sciences
- Far Eastern National University\*
- Institute of Geography, Russian Academy of Sciences
- Institute of Water and Ecological Problems, Far Eastern Branch of Russian Academy of Sciences
- Maritime State University named after admiral G.I. Nevelskoy

### SOUTH KOREA

- The Korea Research Institute for Human Settlements\*

### TAIWAN

- National Cheng Kung University

### THAILAND

- Ministry of Natural Resources and Environment

### TURKEY

- Cukurova University\*
- Hacettepe University

### UNITED KINGDOM

- The Sainsbury Institute for the Study of Japanese Arts and Cultures\*
- University of Sussex

### UNITED STATES

- Florida State University
- University of Michigan
- Washington State University

### ZAMBIA

- Zambia Agricultural Research Institute, Ministry of Agriculture and Cooperatives
- University of Zambia

# Communication of Research Results

## International Symposia

Focusing on a research project that would be completed that year, RIHN has held international symposia for scholars from home and abroad.

The first international symposium, held in November 2006, was entitled Water and Better Human Life in the Future. The second, held in October 2007, addressed The Asian Green Belt: Past, Present and Future. Presentations and discussions covered the biological diversity of the forest zone stretching from North Asia to Southeast Asia, the cultural diversity that supports this green belt, and environmental policies toward the arid regions of China and Mongolia, which are thought to have a major influence on the green belt. The third international symposium is planned for October 2008, with the title Futurability of Islands: Beyond their Endemism and Vulnerability.

## Forums

Each year, the RIHN Forum has been held as a symposium for the general public. By raising concrete issues for the future based on RIHN's research results and philosophy, these forums seek to give participants a correct understanding of today's environmental problems that impinge on everyone's lives, and together to seek clues to solutions. Reports have been published for all six forums held from 2002 to 2007, and from 2004 the forum proceedings have been expanded and published in book form as the RIHN Series. Written for the general public, these books aim to increase public understanding of global environmental problems and have attracted an appreciable readership. (For the RIHN Series, see p. 64.)

In 2008, the RIHN Forum takes up Global Environmental Problems: Our Responsibilities toward Unseen People and Unborn Generations. Discussions will cover a variety of environmental problems, such as atmospheric and water pollution, whose effects reach across national borders and whose solution will require balancing the interests of several countries.



### No. Title / Date / Venue

1 <sup>st</sup>	The Global Environmental Problems – Toward an Integrated Approach	17 May, 2002	Kyoto International Conference Hall
2 <sup>nd</sup>	Global Warming – Nature and Culture	13 June, 2003	Kyoto International Conference Hall
3 <sup>rd</sup>	What Comes after Biodiversity Loss?	10 July, 2004	Kyoto International Conference Hall
4 <sup>th</sup>	Water Exhaustion	9 July, 2005	Kyoto International Conference Hall
5 <sup>th</sup>	Forests and People in Asia – Eco-historical Perspective	8 July, 2006	Kyoto International Conference Hall
6 <sup>th</sup>	Food as a Global Environmental Problem	7 July, 2007	Kyoto International Conference Hall
7 <sup>th</sup>	Global Environmental Problems: Our Responsibilities toward Unseen People and Unborn Generations	5 July, 2008	Kyoto International Conference Hall

## Seminars

Seminars hosted by RIHN for the general public include the almost monthly RIHN Public Seminar held in Kyoto, and the annual RIHN Area Seminar held in another area of the country.



At the venue of a Public Seminar





At the venue of the 3<sup>rd</sup> RIHN Area Seminar "Flora and Sea in the Izu Peninsula: Let consider global environmental issues in Ito City"

### Public Seminars

Since the first seminar in November 2004, twenty-four seminars had been offered by March 2008. Public seminars explain global environmental problems in plain terms using concrete examples. In every session, we receive enthusiastic questions from the audience.

No.	Title	Date	Speaker
1 <sup>st</sup>	The Fascination and the Reality of the Silk Road Region	5 November, 2004	NAKAWO Masayoshi (Professor, RIHN)
2 <sup>nd</sup>	A Multi-disciplinary challenge towards the Lake Biwa Watershed Management	3 December, 2004	YACHI Shigeo (Associate Professor, RIHN) NAKANO Takanori (Professor, RIHN)
3 <sup>rd</sup>	Iriomote Island with its Subtropical Nature and Life	4 February, 2005	TAKASO Tokushiro (Professor, RIHN) Mr. KOMIZ etc.
4 <sup>th</sup>	World water issues in the 21st century	4 March, 2005	KANAE Shinjiro (Associate Professor, RIHN)
5 <sup>th</sup>	Global Warming: Is It real?	1 April, 2005	HAYASAKA Tadahiro (Professor, RIHN)
6 <sup>th</sup>	Impacts of Climate Change on Life and Environment	3 June, 2005	WATANABE Tshugihiro (Professor, RIHN)
7 <sup>th</sup>	Kamo River and Hwang Ho — The Blessing and Misfortune	2 September, 2005	FUKUSHIMA Yoshihiro (Professor, RIHN)
8 <sup>th</sup>	Fish and Food Culture in Southeast Asia	7 October, 2005	AKIMICHI Tomoya (Professor, RIHN)
9 <sup>th</sup>	Species-rich Forests are necessary for sustainable human life	2 December, 2005	NAKASHIZUKA Tohru (Professor, RIHN)
10 <sup>th</sup>	Narrative Theory of Environment ? Environmental Quality and Environmental Consciousness	3 February, 2006	YOSHIOKA Takahito (Associate Professor, RIHN)
11 <sup>th</sup>	New Environmental Hypothesis entitled "Megascala Fish Feeding Forest" Applied to Amur River, the Sea of Okhotsk and the World Nature Heritage Shiretoko	3 March, 2006	SHIRAIWA Takayuki (Associate Professor, RIHN)
12 <sup>th</sup>	A Prologue to Environmental History in Eurasia — from Monsoon Asia to Silkroad	14 April, 2006	SATO Yo-ichiro (Professor, RIHN)
13 <sup>th</sup>	What will Become of Japanese Nature? How should we plan Japanese Land?	9 June, 2006	YUMOTO Takakazu (Professor, RIHN)
14 <sup>th</sup>	Why Did the Indus Civilization Decline?	22 September, 2006	OSADA Toshiki (Professor, RIHN)
15 <sup>th</sup>	Global Environmental Problems under the Ground	20 October, 2006	TANIGUCHI Makoto (Associate Professor, RIHN)
16 <sup>th</sup>	Landscape is Alive!	1 December, 2006	UCHIYAMA Junzo (Associate Professor, RIHN)
17 <sup>th</sup>	Different Types of Illness — Doctors for Humans and Doctors for the Environment	9 March, 2007	KAWABATA Zen'ichiro (Professor, RIHN) OKUMIYA Kiyohito (Associate Professor, RIHN)
18 <sup>th</sup>	The Silk Road — Historical Interactions between Human and Nature	20 April, 2007	KUBOTA Jumpei (Associate Professor, RIHN)
19 <sup>th</sup>	Farmers in Developing Countries who Live under Variable Environment	25 May, 2007	UMETSU Chieko (Associate Professor, RIHN)
20 <sup>th</sup>	Can Sacred Forests in the Japanese Shrines be Considered as Relics of Primeval Evergreen forests?	21 September, 2007	OGURA Jun'ich (Professor, Kyoto Seika University) YUMOTO Takakazu (Professor, RIHN)
21 <sup>st</sup>	A World Heritage Site in Kyoto — Message from Kamigamo Shrine Grove	12 October, 2007	MURAMATSU Akio (Priest, Kamigamo Shrine) AKIMICHI Tomoya (Deputy Director-General, RIHN)
22 <sup>nd</sup>	Satoyama — "Domestic Forest" in the Tropics and Temperate: Is Natural Forest alone Valuable for Living Things?	9 November, 2007	ABE Ken-ichi (Associate Professor, Kyoto University) ICHIKAWA Masahiro (Associate Professor, RIHN)
23 <sup>rd</sup>	Roles of the Citizens and Responsibility of the Researchers for Global and Regional Environment	15 February, 2008	ISHIDA Norio (Professor, Kyoto Gakuin University) WATANABE Tsugihiro (Professor, RIHN)
24 <sup>th</sup>	The History of the Yellow River and Northern China Plain	14 March, 2008	KINOSHITA Tetsuya (Professor, RIHN) FUKUSHIMA Yoshihiro (Professor, RIHN)

### RIHN Area Seminars

With RIHN research staff and regional intellectuals gathering together, consideration and lively discussion is held with the people of the region regarding various problems related to the environment and culture of each area of Japan. The first lecture was held in 2005. In fiscal 2008, the seminars are scheduled to be held in Naha City and Osaka City.

#### No. Title, Participants (Date, Venue)

1 <sup>st</sup>	Snow and People - Sustaining Life in the Japan Sea Area (17 September, 2005 Toyama City, Totama) NAKAI Seiichi (Associate Professor, University of Toyama), ZHANG Jin (Associate Professor, University of Toyama), SATO Takashi (Teacher, Ueichi High School in Toyama), AKIMICHI Tomoya (RIHN), UCHIYAMA Junzo (RIHN), SATO Yo-ichiro (RIHN), HAYASAKA Tadahiro (RIHN)
2 <sup>nd</sup>	Local Environments in Kagoshima -Volcano, Water and Food- (18 September, 2006 Kagoshima City, Kagoshima) HIRATA Tokio (Professor, Kagoshima National College of Technology), HAMAMOTO Nako (Executive Director, A non-profit organization Kusunoki Shizenkan), KAWANO Kazuaki (Chief Curator, Reimeikan), AKIMICHI Tomoya (RIHN), SATO Yo-ichiro (RIHN), NAKANO Takatoshi (RIHN)
3 <sup>rd</sup>	Flora and Sea in the Izu Peninsula: Let consider global environmental issues in Ito City (15 September, 2007 Ito City, Shizuoka) SANO To'emom (Vice President, Japan Cherry Blossom Association), KAWAKATSU Heita (President, Shizuoka University of Art and Culture), NISHIGAKI Masaru (President, University of Shizuoka), AKIMICHI Tomoya (RIHN), SATO Yo-ichiro (RIHN), YUMOTO Takakazu (RIHN)

At the venue of a  
Research Project  
Presentation



## Research Project Presentations

The leaders of each research project report on the state of progress before an audience comprising not only RIHN's researchers and educators but also administrative staff and external co-researchers. More than 500 people attend the three days of presentations. This institute-wide approach and the lively exchange of opinions that it occasions has an important bearing on RIHN's self-evaluation. In 2008, presentations are scheduled for December.

## Other Research Meetings

In addition to the research project presentations, RIHN holds various wide-ranging discussions directed toward RIHN's goal of building global environmental studies.

### RIHN Seminars

Leading researchers from institutes at home and abroad who are engaged in research related to the global environment are invited as speakers, in order to share information on the latest topics and directions of research and gain a wider perspective on global environmental studies.

Seminars were held five times in 2007, taking up a wide variety of topics: natural resources and occupations, vegetation and aquatic environments, humans and animals, sustainability, and interdisciplinary research.

Seminars are held almost every second month, at outside venues as well as at RIHN, and are attended not only by RIHN staff but by many other researchers in related fields.

### Colloquia

Colloquia are held over lunch. At RIHN, we pursue mutual understanding between diverse research fields and hold frequent discussions in line with the common theme of global environmental problems. Held almost every second week, colloquia are intended to present a topic that, while based on the speaker's research interests, includes common ground for many RIHN staff, thereby promoting mutual understanding and exchange between researchers.

## Publications and Newsletter



### The RIHN Series

These books introduce RIHN's research results to the general public. Those published in previous years (all in Japanese, published by Showado) are entitled: "Why Is Biodiversity Important?" "China's Environmental Policies: Ecological Migration," "Where Did the Water and Greenery of the Silk Road Disappear to?" and "Whose Are the Forests?" A further four volumes were published in the 2007 academic year (again in Japanese and published by Showado), entitled: "The Drying-up of the Yellow River: Water and Environmental Problems surrounding China's Gigantic River," "The Global Environment Can Be Seen from the Dining Table," "A Prescription for Earth: Closing in on the Source of Environmental Problems," and "Global Warming and Agriculture."

**Kōga Danryū ("The Drying-up of the Yellow River").** Edited by FUKUSHIMA Yoshihiro  
Based on the results of the Yellow River Project, including measured and estimated values of rainfall in the river basin, water drawn for irrigation of crops, and variations in flow volumes in different regions, this book also touches on the history of the Yellow River in revealing the problems it faces today.

**Shokutaku kara Chikyū Kankyō ga Mieru (The Global Environment Can Be Seen from the Dining Table).** Edited by YUMOTO Takakazu

A book based on the 6<sup>th</sup> RIHN forum "Foods in the Global Environmental Issues", considering global issues from daily dietary life.

**Chikyū no Shohōsen (A Prescription for Earth: Closing in on the Source of Environmental Problems).** Compiled by the RIHN

RIHN's researchers have been conducting field researches to obtain first-hand data from all over the world. Based on reliable data, each researcher describes the dynamic relations between human culture and global environment and expresses an opinion about futurability after careful consideration. As a result, this book contains a general introduction to the research activities of RIHN.

**Chikyū Ondanka to Nōgyō (Global Warming and Agriculture).** Edited by WATABNABE Tsugihiko  
Based mainly on the results of the Arid Land Agriculture Project, which focused on wheat production in Turkey, this book considers what will become of the region's water cycle and food production now that global warming is virtually inevitable.



Humanity & Nature Newsletter

### RIHN Library

RIHN has also published academic books dealing with the research activities of the RIHN staff, including: *Kusunoki to Nihonjin* (Camphor Trees and the Japanese), Yasaka Shobo; *Sekai Isan o Shika ga Kuu* (Deer Eat the World's Heritage), Bun-ichi Sogo Shuppan; *Himaraya to Chikyu Ondanka* (The Himalayas and Global Warming), Showado; *Indus Civilization-Texts and Contents*, Manohar; and *Hito wa Naze Hana o Mederu noka* (Why Do People Love Flowers?), Yasaka Shobo.

### Humanity & Nature Newsletter

This newsletter provides the research community and society with information such as a profile of the institute and its activities. The first issue was published in 2006. The A4-sized, full-color newsletter issued bimonthly offers readable articles.

### Other Publications

Based on the results the projects completed in fiscal year 2007, the following books were published.



**Kōga no Mizukankyō Mondai: Kogadanryū wo yomitoku (Hydrological Problems of the Yellow River: Understanding the Drying-Up of the Yellow River)**

Edited by FUKUSHIMA Yoshihiro and TANIGUCHI Makoto.

For specialists who are interested in environmental change in arid and semi-arid regions, in particular drying-up of the Yellow River and environmental change in Bohai sea.

**Hito to Sakana no Shizenshi (Natural History of People and Fish)**

Edited by AKIMICHI Tomoya and KUROKURA Hisashi.

A collection of articles on human and fish interactions in the Mekong River Basin, based on field works in China, Laos, Thailand, Cambodia and Vietnam. Joint studies by RIHN, The University of Tokyo and Tokai University.

**Seitai to Rekishi - Jinruigakuteki Shikaku (Ecology and History: From the Perspective of Anthropology)**

Edited by AKIMICHI Tomoya and YIN, Shaoting.

A collection of nineteen original articles on eco-historical case studies of ethnic minorities in Yunnan Province by Chinese scholars. The first book in China on eco-historical debates.

**Daigakukōgi no Tame no Purezen Kyōzai - Seibutsutayousei no Mirai ni Mukete (Presentation Materials for University Lectures: Toward the Future of Biodiversity)**

Edited by HATADA Aya, ICHIKAWA Masahiro, and NAKASHIZUKA Toru.

This provides materials for lectures to undergraduate students in order to introduce biodiversity from the viewpoint of ecology, ethnology, sociology and economy.

**Ronshu Monsūn Ajia no Seitaishi - Chiiki to Chikyu wo tsunagu: Seigyō no Seitaishi (Collected Papers on Ecohistory in Monsoon Asia: Linking Local Areas with the Earth. Vol. 1, An Ecohistory of Subsistence)**

Compiled by AKIMICHI Tomoya, edited by KONO Yasuyuki.

This collection clarifies the process of transformation in subsistence ecology in monsoon Asia from analyses of paddy and swidden cultivation, hunting and gathering, fishing, animal husbandry, and food and diet.

**Ronshu Monsūn Ajia no Seitaishi - Chiiki to Chikyu wo tsunagu: Chiiki no Seitaishi (Collected Papers on Ecohistory in Monsoon Asia: Linking Local Areas with the Earth. Vol. 2, An Ecohistory of Local Areas)**

Compiled by AKIMICHI Tomoya, edited by CHRISTIAN, Daniels.

This collection describes the ecohistory of local areas in monsoon Asia from analyses of migrations, the green revolution, trade, land use, opium cultivation, and stone inscriptions.

**Ronshu Monsūn Ajia no Seitaishi - Chiiki to Chikyu wo tsunagu: Kurashi to Karada no Seitaishi (Collected Papers on Ecohistory in Monsoon Asia: Linking Local Areas with the Earth. Vol. 3, An Ecohistory of Lifestyles and the Human Body)**

Compiled and edited by AKIMICHI Tomoya.

This collection demonstrates the changes that have taken place in lifestyles and the human body in monsoon Asia in terms of population, health and nutrition, food and clothing, migrations, trans-border trade, and natural resource management.



## A Guide to the Facilities

Our concept is that the root of global environmental problems lies in human 'culture' in the widest meaning of the word; and that solutions can be found through a culture of improved communications. RIHN aims to elucidate the complex and varied relationships linking humanity and nature. We are trying to synthesize new approaches beyond the formal disciplines of the natural sciences, social sciences and humanities. This requires communication and discussion among researchers. The RIHN campus is designed to provide an environment for that purpose.

Research rooms on the RIHN campus are designed to provide a sense of openness. The design concept is to allow projects implemented to be loosely interconnected as they occur in one large curved space 150 m in overall length. The facilities will 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. In other words, this particular layout enables joint research while maintaining the independence of individual projects. 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 that fits in with 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.



**1 RIHN Main Building**  
The exterior blends perfectly with the landscape.  
**2 Project Room**  
A row of five large spaces can each accommodate three projects. There are skylights in the ceiling, designed to make the most of natural light.



**2F: Administration Floor**

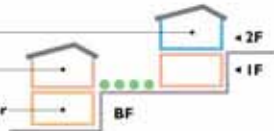
Entrance Hall  
Exhibition Hall  
Lecture Hall  
Administrative Office  
Seminar Rooms  
Dining Hall

**1F: Research Floor**

Project Rooms  
Research Rooms  
Center for Coordination,  
Promotion, and Communication  
Library

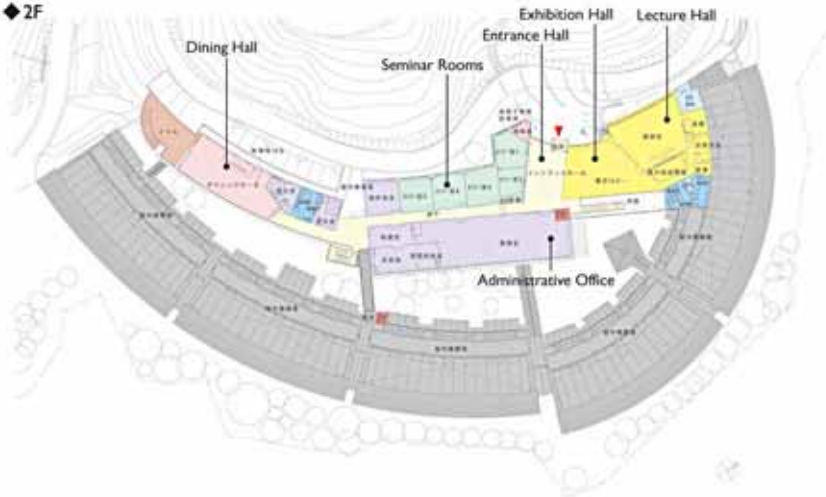
**BF: Laboratory Floor**

Experimental  
Laboratories  
Library Stacks  
Utilities



**Floor Plan of RIHN Main Building**

**◆ 2F**



**◆ 1F**



**◆ BF**



**3 Entrance Hall and Exhibition Hall**  
Exhibitions are held to provide information about RIHN activities and completed research

**4 Patio (Wooden Deck and Garden)**  
The patio comprises the Water Garden, the Garden Covered with Fallen Leaves, and the Wooden Deck and Garden to create a space in which humans, buildings, and nature are in harmony. Research rooms, project rooms, and the computer room are arranged on both sides of the patio.

**5 Detached Room "Hanare"**  
A Japanese-style common room that floats on the Water Garden.

**6 Experimental Laboratories**  
The laboratories are designed for the performance of various advanced experiments and are being furnished with equipment such as a state-of-the-art mass spectrometer (see photo) to support research projects.

**7 Assembly Hall, RIHN House**  
Visiting researchers can stay in the RIHN House from a few days to an extended period of time. The house has communal spaces to nurture friendship between guests and RIHN staff.

# Organization

## History

- 1995** April ● The Japan Science Council, Ministry of Education, Science, Sports and Culture, makes a proposal "On the Promotion of Global Environmental Studies."  
"It is necessary to examine the establishment of a core research institute to promote integrated collaborative research aimed at solving global environmental problems."  
July ● A committee is established to consider what form the proposed institute should take.
- 1997** March ● The committee's report is published.  
June ● The Ministerial Council for Global Environmental Conservation agrees "Provisional Measures for Global Environmental Conservation."  
"The Council will investigate the development of a research organization for global environmental studies, such that researchers from a wide range of specializations can conduct integrated research into global environmental problems."
- 1998** April ● Preparatory work begins for establishment of a Research Institute for Global Environmental Studies (provisional title)
- 2000** March ● The preparatory committee proposes the establishment of a Research Institute for Humanity and Nature (provisional title) to promote integrated research projects incorporating the humanities, social sciences and natural sciences through a network of universities and research institutions at home and abroad.  
April ● A Committee to Examine Establishment of the Research Institute for Humanity and Nature (provisional title) is established, together with an office and organization.
- 2001** February ● The committee publishes its final report, "On the Concept of the Research Institute for Humanity and Nature (provisional title)."  
April ● Foundation of the Research Institute for Humanity and Nature.  
RIHN begins its research activities on the campus of Kyoto University under the first director-general, HIDAKA Toshitaka.
- 2002** April ● RIHN relocates to the buildings of the former Kasuga Primary School.
- 2004** April ● With the corporatization of the inter-university research institutes, RIHN becomes a member of the National Institutes for the Humanities (NIHU).
- 2005** December ● Construction of the new facilities is completed.
- 2006** February ● RIHN relocates to the new facilities.  
May ● A ceremony is held to celebrate completion of the new facilities.
- 2007** April ● TACHIMOTO Narifumi is appointed as the second director-general.  
October ● The Research Promotion Center is reorganized as the Center for Coordination, Promotion and Communication (CCPC).



RIHN's first year <April 2001 to March 2002>

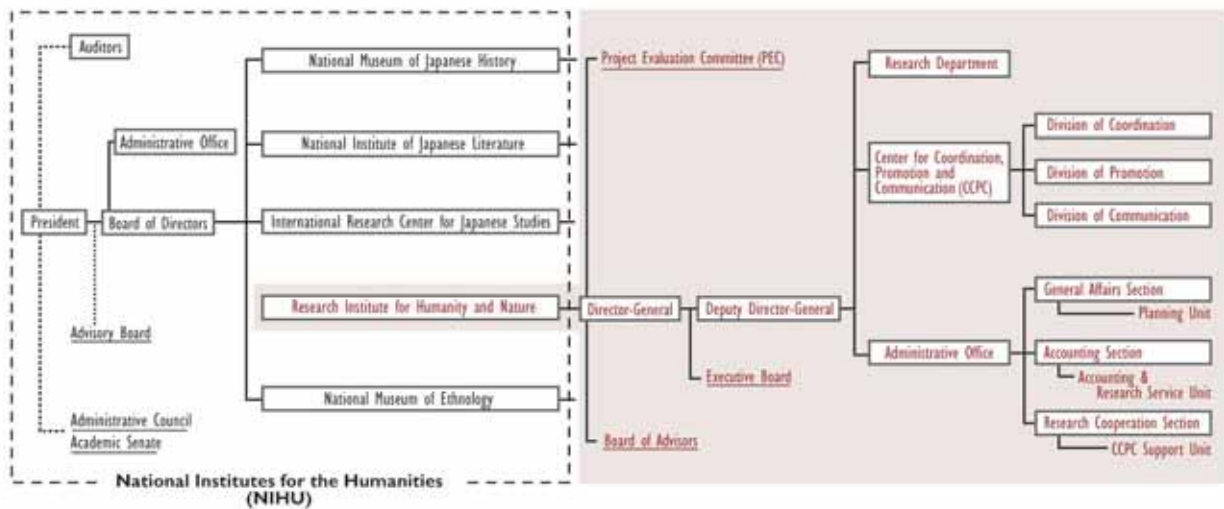


RIHN at the former Kasuga Primary School <April 2002 to January 2006>



The present RIHN <since February 2002>

## ● Organization



## ● Financial Information

### ■ Segmental Financial Information (Fiscal Year 2007)

#### Operating Expenses

Category	Amount (Yen in thousands)
Operating Expenses	2,236,859
Inter-University/Joint Research	1,120,735
Educational/Research Aids	51,905
Outsourced Studies	71,384
Outsourced Operations	7
Personnel	992,827
General Management	149,636
Financial Expenses	83,153
Miscellaneous	34
<b>Total Expenses</b>	<b>2,469,683</b>

Operational Balance

#### Operating Expenses

Category	Amount (Yen in thousands)
Subsidy for Operation	2,171,024
Contract Research, etc.	84,681
Contract Operations, etc.	7
Donations	22,800
Others	251,409
<b>Total Earnings</b>	<b>2,529,923</b>

60,240

### ■ External Sources of Funding (Fiscal Year 2007)

Category	Amount (Yen in thousands)
Fund for Promotion of Academic and Industrial Collaboration	84,682
Grants-in-Aids for Scientific Research	133,990
Donations for Research	33,200

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

## Board and Committees

### Board of Advisors

■ Deliberates on important matters relative to personnel, planning, administration and operation of the institute.

**FUJII Yoshiyuki**  
Director-General, National Institute of Polar Research,  
Research Organization of Information and Systems

**FURUSAWA Iwao**  
President, Tottori University of Environmental Studies

**IWASAKA Yasunobu**  
Professor, Kanazawa University Frontier Science Organization

**SHIRAHATA Yozaburo**  
Professor, Research Department,  
International Research Center for Japanese Studies, NIHU

**UEDA Hiroshi**  
Director, Hydrospheric Atmospheric Research Center,  
Nagoya University

**WASHIDA Kiyokazu**  
President, Osaka University

**YOKOYAMA Toshio**  
Vice President, Kyoto University  
Professor, Kyoto University  
Graduate School of Global Environmental Studies

**YONEMOTO Shohei**  
Professor, Research Center for Advanced Science and Technology,  
University of Tokyo

**AKIMICHI Tomoya**  
Deputy Director-General, RIHN

Program Director, RIHN  
Director, Center for Coordination, Promotion and Communication, RIHN

**ABE Ken-ichi**  
Professor, Center for Coordination, Promotion and Communication, RIHN

**HAYASAKA Tadahiro**  
Program Director, RIHN

**SATO Yo-ichiro**  
Program Director, RIHN

**WATANABE Tsugihiko**  
Program Director, RIHN

**YUMOTO Takakazu**  
Program Director, RIHN

### Project Evaluation Committee (PEC)

■ Deliberates professionally on necessary matters relative to specific collaborative project of the institute.

#### (Domestic)

**FURUSAWA Iwao**  
President, Tottori University of Environmental Studies

**IWASAKA Yasunobu**  
Professor, Kanazawa University Frontier Science Organization

**NIWA Masako**  
Professor Emeritus, Nara Women's University

**OHTSUKA Ryutaro**  
President, National Institute for Environmental Studies

**TANAKA Koji**  
Director, Center for Integrated Area Studies, Kyoto University

**UETA Kazuhiro**  
Professor, Graduate School of Economics,  
Kyoto University Graduate School of Global Environmental Studies

**YAMAGATA Toshio**  
Professor, School of Science, The University of Tokyo

**YOKOYAMA Toshio**  
Vice-President, Kyoto University;  
Professor, Kyoto University  
Graduate School of Global Environment Studies

#### (Overseas)

**BELLWOOD, Peter**  
Professor, Archaeology and Natural History,  
The Australian National University, Australia

**FU, Congbin**  
Director, START Regional Center for Temperate East Asia, Institute  
of Atmospheric Physics, Chinese Academy of Sciences, China

**IKAWA-SMITH Fumiko**  
Former Associate Vice Principal, McGill University, Canada

**LOVEJOY, Thomas E.**  
President, The H. John Heinz III Center for Science,  
Economics and the Environment, USA

**OHMURA Atsumu**  
Professor, Swiss Federal Institute of Technology, Switzerland

### Executive Board

■ Discuss important matters relative to administrative operation of the institute.

**TACHIMOTO Narifumi**  
Director-General, RIHN

**AKIMICHI Tomoya**  
Deputy Director-General, RIHN  
Program Director, RIHN  
Director, Center for Coordination,  
Promotion and Communication, RIHN

**HAYASAKA Tadahiro**  
Program Director, RIHN

**SATO Yo-ichiro**  
Program Director, RIHN

**WATANABE Tsugihiko**  
Program Director, RIHN

**YUMOTO Takakazu**  
Program Director, RIHN

**FURUYA Isamu**  
Director, Administrative Office, RIHN

RIHN organizes other committees, if  
necessary, for smooth operation.

### Senior Advisor

HIDAKA Toshitaka

### Emeritus Professors

NAKANISHI Masami    NAKAWO Masayoshi  
HIDAKA Toshitaka    FUKUSHIMA Yoshihiro  
WADA Eitaro

### Staff Members

■ DIRECTOR-GENERAL TACHIMOTO Narifumi

■ DEPUTY DIRECTOR-GENERAL AKIMICHI Tomoya

#### ADMINISTRATIVE OFFICE

##### GENERAL AFFAIRS SECTION

Head UEMURA Tsuyoshi

Deputy Head ISHII Koji

General Affairs Subsection

Head TSUNEMI Hiroyuki

Clerk ISHII Keisuke

Personnel Subsection

Head MIZUTANI Yukihiko

Chief INABA Shigeo

Clerk NAKANO Hiroyo

Planning Unit

Head ISHII Koji

Planning & Assessment Subsection

Head SHINDO Kenji

Chief SHIBUTANI Ichiro

Information Subsection

Head SHINDO Kenji

#### Administrative Director FURUYA Isamu

##### FINANCE SECTION

Head NANBU Shinichi

Deputy Head NAKAKUBO Takao

Budgeting Subsection

Head OKUMURA Azuma

Clerk YANO Tetsuya

Facility Management Subsection

Head NISHIKAWA Tomonobu

Accounting & Research Service Unit

Head NAKAKUBO Takao

Accounting & Research Service Subunit

Head SATO Fumiaki

Chief ISEMOTO Takashi

Chief YAMABAYASHI Nobuko

##### RESEARCH COOPERATION SECTION

Head KAWAMITSU Nobuo

Deputy Head ISHIDA Yataro

Research Cooperation Subsection

Head OHI Shunji

Clerk MICHİYAMA Satoko

International Affairs Subsection

Head OGATA Rika

CCPC Support Unit

Head ISHIDA Yataro

CCPC Support Subunit

Head ONO Futoshi



## RESEARCH DEPARTMENT

\*in alphabetical order

### ■Program Directors

AKIMICHI Tomoya  
HAYASAKA Tadahiro  
SATO Yo-ichiro  
WATANABE Tsugihiro  
YUMOTO Takakazu

### ■Professors

OSADA Toshiaki Linguistics  
KAWABATA Zen'ichiro Microbial Ecology  
KINOSHITA Tetsuya  
History of Chinese philosophy  
SATO Yo-ichiro Plant Genetics  
TAKASO Tokushiro Plant Morphology  
NAKANO Takanori Isotope Environmental Studies  
MOJI Kazuhiko  
Human ecology, population health in the tropics  
YAMAMURA Norio Mathematical Ecology  
YUMOTO Takakazu Plant Ecology

### ■Associate Professors

ICHIKAWA Masahiro Area Studies  
KUBOTA Jumpei Forest Hydrology  
NAWATA Hiroshi Cultural Anthropology  
OKUMIYA Kiyohito Field Medicine  
SAKAI Shoko Plant Ecology  
SEKINO Tatsuki Information Science  
SHIRAIWA Takayuki Glaciology  
TANIGUCHI Makoto Hydrology  
UCHIYAMA Junzo Prehistoric anthropology  
UMETSU Chieko  
Resource & Environmental Economics  
ZHENG, Yuejun Environmental Statistics

### ■Assistant Professors

ENDO Takahiro Political science  
KATO Yuzo Legal History  
SAEKI Tazu Atmospheric Physics  
YATAGAI Akiyo Meteorology, Climatology

### ■Visiting Professors

INOUE Gen Atmospheric Chemistry  
INOUE Takashi TV Documentary Production  
MITSUTANI Takumi Dendrochronology  
MURAMATSU Shin  
Architectural History, Urban History

### ■Visiting Associate Professor

WATANABE Chikako E. Assyriology

### ■Visiting Research Fellows

AJITHPRASAD, Pottentavida Archaeology  
BAUSCH, Ilona Renate Archaeology  
CHOY, Yee Keong  
Environmental and International Economics  
DELINOM Robert M. Hydrogeology  
EVANS, Tom Geography  
FLINT, Lawrence S.  
African Study, Development Study  
MULENGA, Chileshe Leonard  
Economic Geography  
SHAMOV, Vladimir V. Hydrology

### ■Senior Project Researchers

CHENGZHI Central Eurasian History  
HASEGAWA Shigeaki Theoretical Ecology  
KATSUYAMA Masanori Forest Hydrology  
KIMOTO Yukitoshi Plant Morphology  
KUME Takashi Soil Hydrology  
LEKPRICHAKUL, Thamana  
Environmental & Health Economics  
MINAMOTO Toshifumi Molecular Ecology  
MORI Wakaha Linguistics  
NODZU Masato Meteorology, Climatology  
ONISHI Masayuki Linguistic Typology  
ONISHI Takeo Hydrology  
TANNO Kenichi Archaeobotany, Crop Evolution

### ■Project Researchers

CAI, Guoxi International health & public health  
HAYASHI Naoki Rural Planning  
HONJO Mie Microbial Ecology  
HOSOYA Leo Aoi Archaeobotany, Ethnoarchaeology  
ICHIJO Tomoaki Environmental Microbiology  
ICHIKAWA Tomo History of medicine  
INOUE Mitsuyuki East Asian History  
ISHIMARU Eriko Zooarchaeology  
ISHIMOTO Yudai Ecological Anthropology  
ISHINE Masayuki Field medicine, Geriatrics  
ISHIYAMA Shun Cultural Anthropology  
IWATANI Hirofumi Cultural Anthropology  
KAWAMOTO Haruko Radar meteorology  
KAWASE Daiju Plant Ecology  
KIMURA Emi Culturehistory of Japanese  
KISHIMOTO Keiko Entomology  
KOIZUMI Miyako Ethnobotany  
KOSAKA Yasuyuki Ethnobotany  
KURATA Takashi Philosophy  
MAEKAWA Ai Cultural Anthropology  
MATSUKAWA Taichi Sociology

MIYAZAKI Hidetoshi Soil Science  
MURAKAMI Yumiko Archaeology  
NAKAGAWA Masato Plant Ecology  
NAKAMURA Oki Archaeology  
NAKAMURA Ryo Cultural Anthropology  
NARAMA Chiyuki Physical Geography  
NOMURA Naofumi Plant Ecology  
SAKAMOTO Ryota Public Health  
SASAKI Naoko Vegetation History  
SEO Akihiro Plant Taxonomy  
SHIRAKI Yohei Analysis of urban climate  
TAKAGI Mayumi Literary representation  
TANAKA Katsunori  
Plant Cell Genetics, Plant Breeding, Ethnobotany  
TERAMURA Hirofumi Archaeology  
TOJO Bunpei Area studies  
TSUJI Takashi Ecological anthropology  
TSUJINO Riyou Plant Ecology  
UCHII Kimiko Microbial Ecology  
UESUGI Akinori Archaeology  
WATANABE Mitsuko Physical Geography  
YAMAMOTO Keiko Gravity satellite analysis  
YAMANAKA Hiroki Aquatic Ecology  
YASUMOTO Jun Groundwater engineering  
YASUNARI Teppei Ice core & Meteorology  
ZEBALLOS VELARDE, Carlos Renzo  
Urban Environmental Planning

### ■Project Research Associates

FUJIMOTO Marika  
HOSOI Mayumi  
IBUKI Naomi  
IRIE Yuki  
KAMURA Nozomi  
KAWAGUCHI Tamaki  
MUKASA Akiko  
OKAMOTO Takako  
OKITA Hiroko  
OTANI Megumi  
SAITO Susumu  
SONODA Takeru  
TAKAHASHI Keiko  
YAMAZAKI Kahori  
YASUDA Keiko  
YODEN Makoto

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

KODAMA Kanako Anthropology

## Center for Coordination, Promotion, and Communication (CCPC)

■Director AKIMICHI Tomoya

### ■Professor

AKIMICHI Tomoya Ecological anthropology, Ethno-biology  
ABE Ken-ichi Integrated area study / Director, Division of Communication  
SAITO Kiyooki Journalism, Study of nature  
NAKANO Takanori Isotope Environmental Studies  
HAYASAKA Tadahiro  
Atmospheric physics / Director, Division of Promotion  
WATANABE Tsugihiro  
Irrigation engineering / Director, Division of Coordination

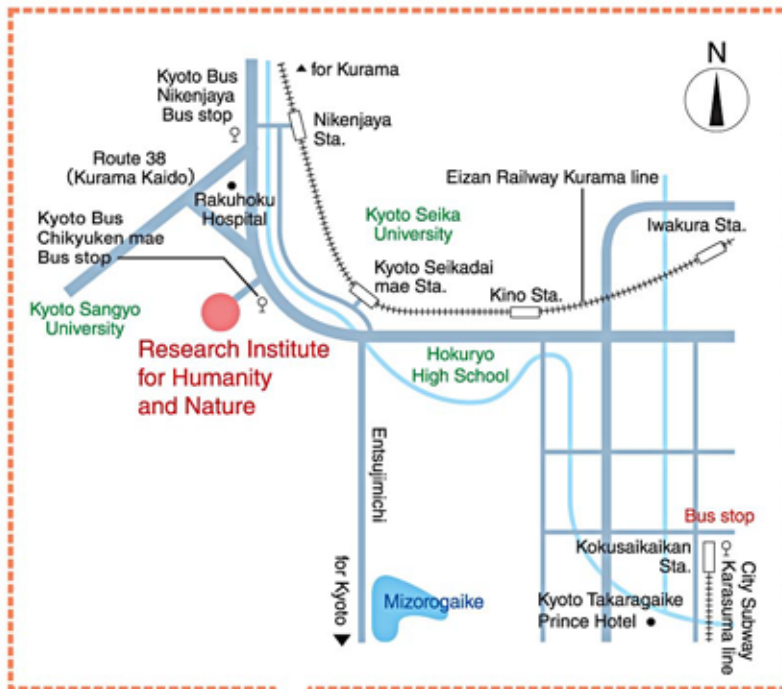
■Associate Professor

SEKINO Tatsuki Information Science

■Assistant Professor

KOHMATSU Yukihiko Ecology, Geography

# Access



## By City Subway

(<http://www.city.kyoto.jp/koho/eng/access/>)

From Kyoto Station, take the Karasuma line to Kokusaikaikan Station (Kyoto International Conference Hall), and transfer to Kyoto Bus.

## By Kyoto Bus

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

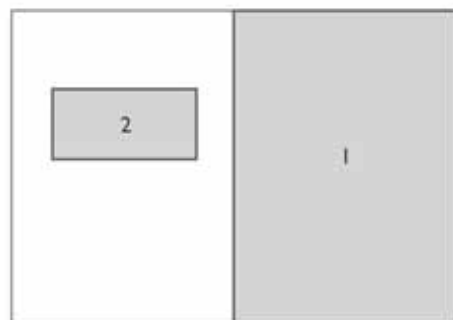
## By Eizan Railway

(<http://www.pref.kyoto.jp/visitkyoto/en/area/kyoto/course/09/index.html/>)

From Demachiyana Station, take the Kurama line to Nikenjaya Station and walk 15 minutes.

## By Car, Taxi

From Kyoto International Conference Hall, take Route 40 to Nikenjaya.



**Description of cover pictures**

1. Young people put on native dress in Shangri-La, Yunnan province. Transportation of massive goods and persons is getting easier and the wave of globalization of tourism has rushed over there, as symbolized by the recent opening of Qinghai-Tibet Railway. Although the lifestyles are in the process of change, there remains the functioning local knowledge like healing of mind through the traditional pilgrimage and the network of religious activities. (Photo by OKUMIYA Kiyohito)
2. Mongolian pastoralist carrying wool by mule in Uxin banner, Inner Mongolia, China. The wool is an important income in the region. (Photo by KODAMA Kanako)



**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

<http://www.chikyu.ac.jp>

e-mail: [kokusai@chikyu.ac.jp](mailto:kokusai@chikyu.ac.jp)

June 2008 © RESEARCH INSTITUTE FOR HUMANITY AND NATURE