Ecohistory Program

Program Director **SATO Yo-Ichiro**

The Ecohistory Program investigates circulation, diversity, and resources in terms of historical time. Behind every problem (or phenomenon) there lies, in some measure, the issue of historical causality; this fact underscores the need to comprehend the present through investigation of the past (in Japanese this idea is described by the phrase *onko chishin*). As its specific goal, this program contributes its long-term historical and civilizational perspective contemporary and future societies. Like all RIHN research programs, it should elucidate global environmental issues, propose solutions and deepen understanding of human-environmental potential.

Focusing on different regions and a range of historical moments, current projects in the Ecohistory Program address the environmental histories of two distinct areas, what might be called the "Asian Green Belt" and the "Eurasian Yellow Belt". In the former, generally speaking, communities managed to maintain sustainable livelihoods for a period of approximately 10,000 years. In the latter area, many civilizations collapsed within this same period of time. But is this reading of history correct? What distinguishes the conditions of productivity and sustainability between these two regions? This latter question is, ultimately, at the core of this research program; its answer is surely indispensable to human futurability.

Full Research	Leader	Title
H-02	**SATO Yo-Ichiro**	Agriculture and Environment Interactions in Eurasia: Past, Present and Future
H-03	**OSADA Toshiki**	Environmental Change and the Indus Civilization
H-04	**UCHIYAMA Junzo**	Neolithisation and Modernisation: Landscape History on East Asian Inland Seas

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

This research project examines the history of interactions between agricultural activities and the environment in three Eurasian climate zones: the 'Monsoon Agriculture Zone', 'Mugi Agriculture Zone' and 'Vegeculture Zone'. It takes an interdisciplinary approach to the concept of 'genetic diversity' in agriculture and its role in agricultural development in the last 'ten-thousand years'.

Project Leader
SATO Yo-Ichiro
RIHN

Professor Yo-ichiro Sato is Deputy Director-General of Research at the Research Institute for Humanity and Nature. He was born in 1952 in Wakayama prefecture and received his Ph.D. from the Department of Agriculture, Graduate School of Kyoto University, specializing in plant genetics. Since arriving at RIHN in 2003 he has conducted DNA analysis of rice remains excavated from numerous archaeological sites in order to describe the origin and diffusion of rice agriculture across Asia. He has published extensively on this subject, including *Yomigaeru Midori no Silk Road*, (Reviving the Green Silk Road, Iwanami Junior Books, 2006).

Core Members

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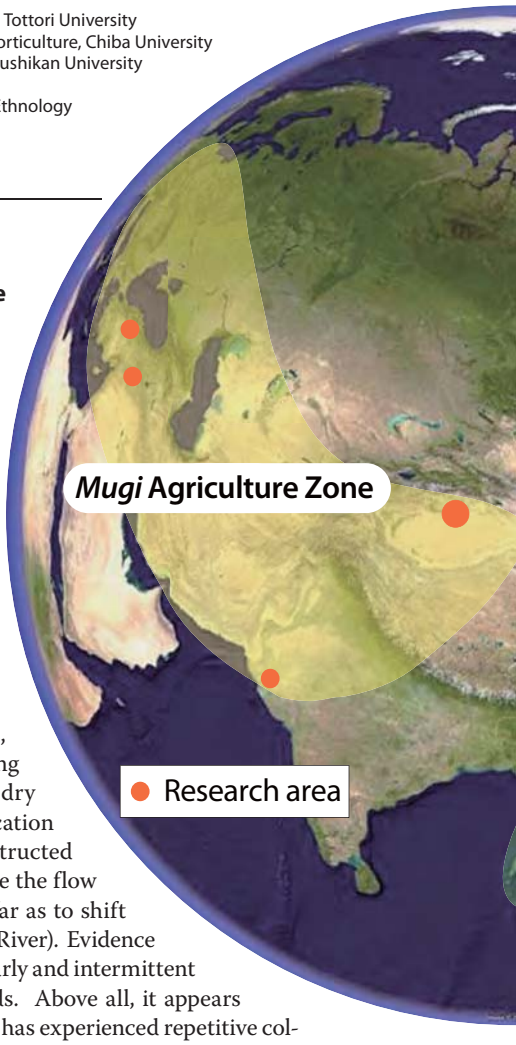
HOSOYA Leo Aoi	RIHN
MATTHEWS, Peter	National Museum of Ethnology

Objective of the project research

It is said that environmental destruction began with agriculture. Agriculture has indeed transformed environments wherever it has been practiced. In Eurasia between the Central Asian desert, where it is now almost impossible to conduct any agricultural activity, and the monsoon region, where vegetation and water are still abundant, there are large differences in the degree of environmental destruction or modification that can be associated with agriculture. The goal of our project is to grasp how agriculture emerged within, contributed to, and was affected by, wider patterns of environmental change in the last ten thousand years. In particular, we focus on the relationship between genetic diversity, agriculture, and environmental transformation, including degradation and collapse.

Project structure and findings

The project is comprised of three principal working groups, each of which investigates the history of human agricultural activities in one of three climate zones: the Monsoon Agriculture Group, the Mugi Agriculture Group (focusing on annual winter crops), and the Vegeculture Group. Their descriptions reveal that agricultural developpment has not been constant and that collapses were frequent. In addition, the Swidden Agriculture Group investigates modern farming techniques and those that may be sustainable in the future.



● Monsoon agriculture zone group

Excavation at Ikeshima Fukumanji prehistoric site in Osaka, Japan, has revealed that early peoples employed various adaptive techniques in the face of flood, drought and other environmental hazards. They adapted agricultural systems by introducing new cultivar species or cropping methods (as, for example, in developing *Shimabata*, or mounded dry fields), adjusted the location of cultivation, and constructed canals in order to manage the flow of water (even going so far as to shift the course of the Yamato River). Evidence suggests that there was early and intermittent cultivation of paddy fields. Above all, it appears that Japanese agriculture has experienced repetitive col-

Photo 1 **The scene of the Xiaohe Tomb site (2008)**
After traveling through the desert for eight hours, the Xiaohe graves came into sight.

Photo 2 **Excavated timber used as grave markers and coffins at the Xiaohe site (2007)**

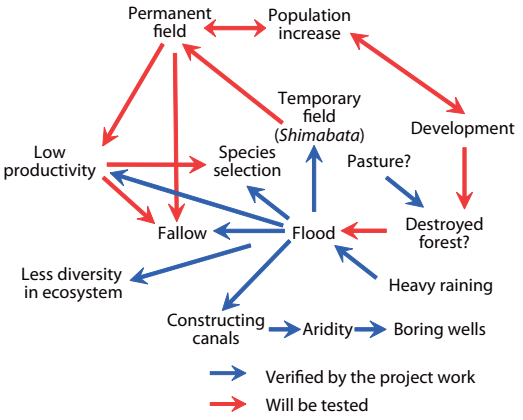


Figure 1
This conceptual outline of possible past human-environmental interactions is based on archaeological excavations undertaken at the Ikeshima Fukumanji site, Osaka

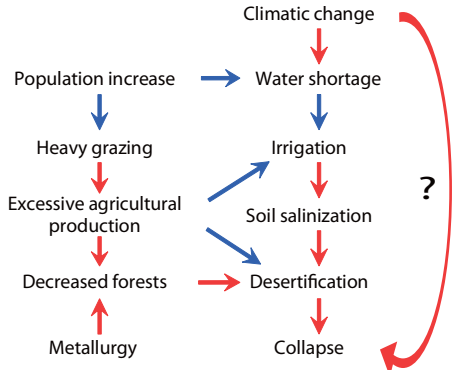
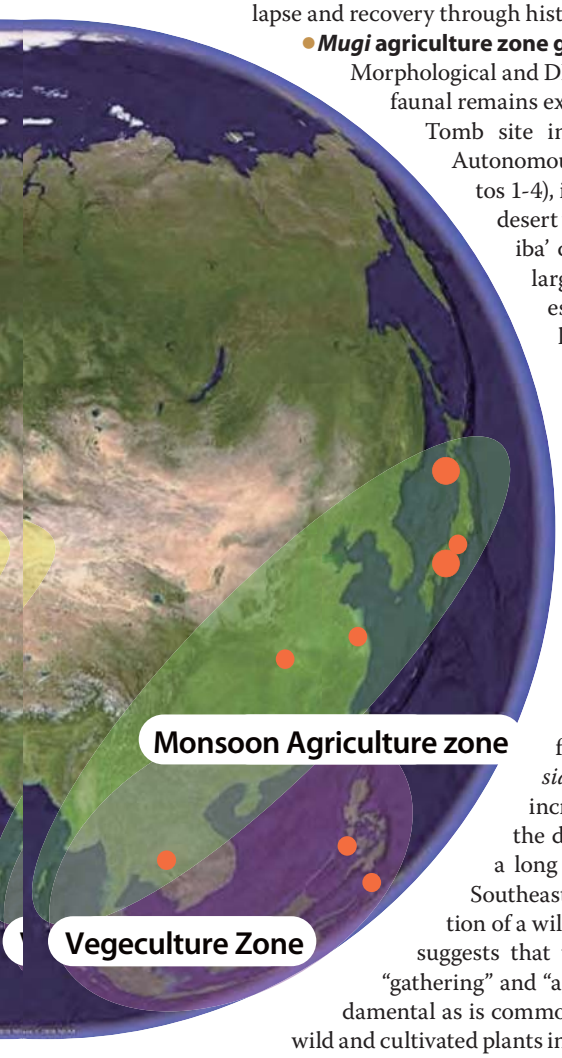


Figure 2
This conceptual outline of past human-environmental interactions is based on excavations at the Xiaohe Tomb site in the Xinjiang Uyghur Autonomous Area. Arrows have the same signifiance as in Figure 1.



lapse and recovery through history (Fig. 1).

● *Mugi* agriculture zone group

Morphological and DNA analyses of plant and faunal remains excavated from the Xiaohe Tomb site in the Xinjiang Uyghur Autonomous Region of China (Photos 1-4), indicate that what is now desert was formerly of the 'makiba' climate zone, containing large-scale wheat fields, forests and meadows. Pollen analysis reveals that there were also wetlands in the area. The theoretical model of such environmental transformation describes a sequence of cultivation activities → soil salinization → desertification (Fig. 2).

● Vegeculture zone group

Discovery of previously unreported wild forms of taro (*Colocasia spp.*) in the Philippines increases the likelihood that the domestication of taro has a long and complex history in Southeast Asia. Intensive utilization of a wild form with edible leaves suggests that the distinction between "gathering" and "agriculture" is not as fundamental as is commonly thought. The use of wild and cultivated plants in humanly-modified habitats invites reconsideration of the formal definition of agriculture.

● Swidden agriculture group

In addition to ethnographic research of modern swidden agriculture in Japan, project members carried out archival research on Edo period land-use at the site of old Shiramine Village, Ishikawa prefecture (presently Shiramine, Hakusan city). This research has clarified the state of swidden agriculture, which was often not recorded in official documents. Project members also organized "The 3rd Swidden Agriculture Summit", held in Oita, in order a forum for discussion of modern agricultural problems in Japan, particularly in relation to hilly and mountainous areas, and the significance of swidden agriculture in these areas.

Future research plan

In our final year of project research, we will use our historical description of agriculture-environment interactions in the three climate zones in order to suggest how agricultural production and food consumption can be better arranged in the future.

The Monsoon Agriculture, Mugi Agriculture and Vegeculture groups will analyze each factor in our theoretical model of agriculture-environment interactions, identifying key production characteristics and describing how ecosystems and the genetic diversity of cultivars were transformed in each climate zone. The Swidden Agriculture group will develop its discussion of the significance of swidden agriculture for future agriculture and lifestyle, especially in relation to its distant history in Japan and decline in the modern period.

A public exhibition of all project results is planned at the National Museum of Nature and Science (Tokyo) in autumn 2010, as is the publication of several monographs and edited volumes.

Photo 3
The coffins contained grains of wheat—probably funerary gifts—still in very good states of preservation (2005)

Photo 4 **Landscape of the Xiaohe site area (2006)**
An area of ancient fields, forests and meadows is now white with accumulated salt.

Environmental Change and the Indus Civilization

The Indus Civilization (2600 BC – 1900 BC) is one of the four great ancient civilizations. It is known for its cultural and technological achievements — its characteristic seals and scripts, fortified settlements and sewerage systems — and also for its brief tenure. The Indus civilization spread over an area of 680,000 km^2 along the Indus and Ghaggar rivers and into Gujarat in Western India, but its urban phase lasted only 700 years, much shorter than any of its contemporaries. Drawing on archaeology, Indology, and paleo-environmental investigation, this project reconstructs the social and environmental histories of several Indus cities, and attempts to determine whether and how environmental factors contributed to their short life and rapid decline.

Project Leader
OSADA Toshiki
RIHN

I am a linguist and have worked among the Munda people of Jharkhand, India. I spent more than six years in India in the 1980s. The Munda appear to be one of the longest resident peoples of India (their linguistic roots may be traced back to the Indus civilization, the earliest civilization on the subcontinent). I joined RIHN in 2003 and proposed this project shortly thereafter in order to apply the combined insights of linguistics and archaeology to the mystery of Indus civilization decline.

Core Members

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MALLAH, Qasid	Shah Abdul Latif University, Pakistan
MASIH, Farzand	Punjab University, Pakistan
MAEMOKU Hideaki	Hiroshima University
ONISHI Masayuki	RIHN
OHTA Shoji	Fukui Prefectural University
SHINDE, Vasant	Deccan College, Deemed University, India
UNO Takao	International Research Center for Japanese Studies

Project structure and objectives

This research project examines the social character and environmental context of the Indus civilization, and attempts to determine how they are related to the civilization's short life and rapid decline. In particular, we aim to evaluate the impact of environmental change on the subsistence economy and trade network that sustained the Indus civilization's urban system. Our research will also provide data on the long-term processes of climate change in South Asia. Such data will help us develop historical perspective on, and practical understanding of, contemporary environmental problems in the region.

Our project is divided into four research groups: (1) the Palaeo-Environmental Research Group (PERG); (2) the Material Culture Research Group (MCRG); (3) the Subsistence System Research Group (SSRG); and (4) the Inherited Culture Research Group (ICRG) (Fig. 1). They integrate cultural and biological data obtained from archaeological excavations and other field activities, palaeo-environmental data obtained from satellite imagery and field study, and original accounts obtained from ancient texts. Important subjects of study investigated so far include: ancient climate change; avulsion of the Ghaggar River; the palaeo-coastline of Gujarat; and palaeo-seismic activity.

Major achievements

In 2009 our project achieved great advance in the study of the natural environment surrounding the Indus civilization. Most substantially, PERG successfully obtained sediment core samples from the Rara Lake in Nepal (Photo 1), which will allow us to reconstruct climate change in South Asia in the last 7500 years (Fig. 2).

PERG conducted field research and analysis of satel-

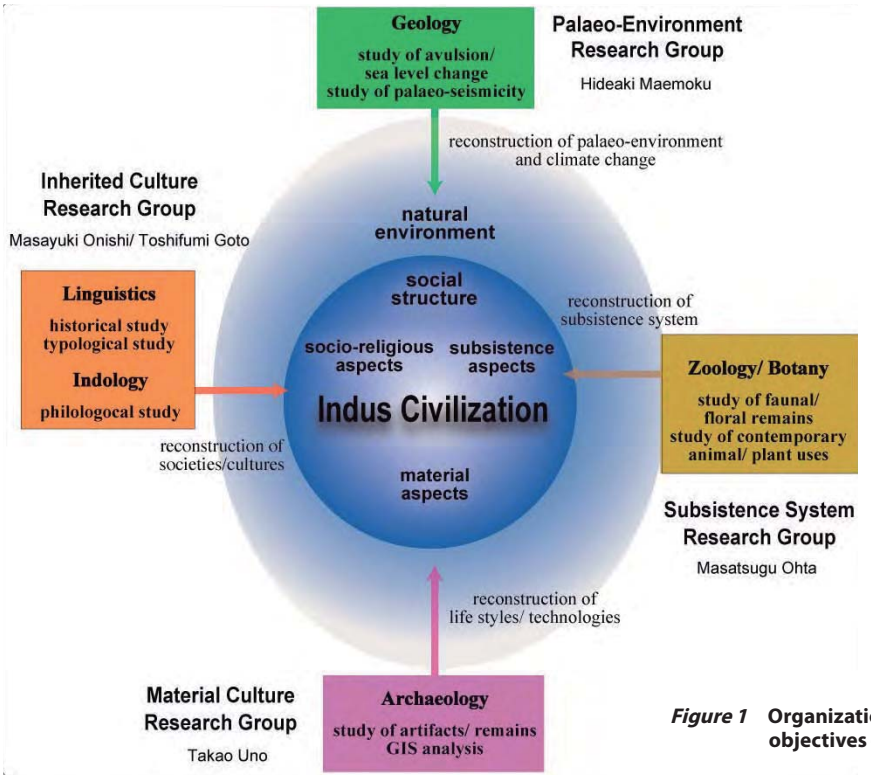

Figure 1 **Organization and objectives of research**

Photo 1 **Coring survey at Rara Lake, Nepal**

Photo 2 **Graves at the Farmana site**
We have discovered many well-preserved human bones.

Photo 3 **Pendants excavated from the Kanmer site**
One side of each pendant is stamped with an identical seal; different lettered script is found on the reverse sides.

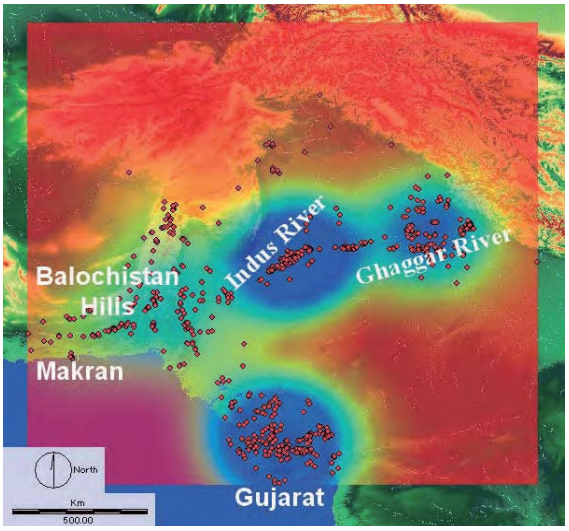

Figure 2 **Distribution and concentration of the Indus sites**
(adapted from Teramura and Uno 2006)

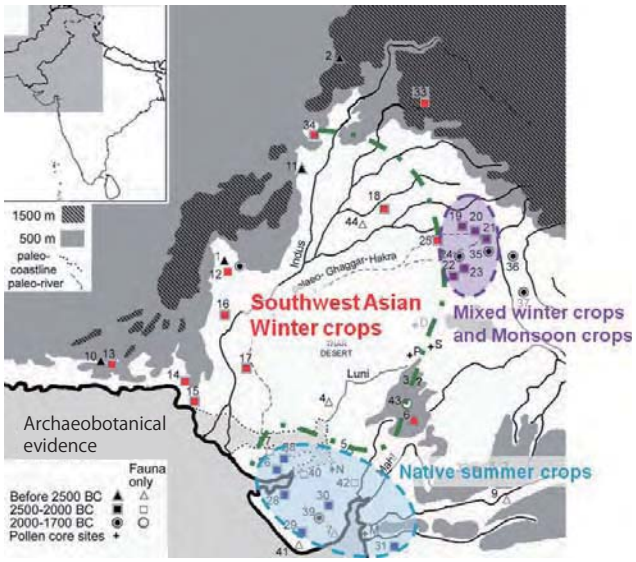

Figure 3 **Geographical distribution of annual crap**
(adapted from Fuller 2006)

lite imagery to identify the former course of the Ghaggar River (the old Saraswati River) and determine the causes and the dates of its avulsion. Contrary to its description in the Rig-Veda text (transliterated by ICRG), field evidence demonstrates that the Ghaggar was not a large river, but a small one capable of providing water for agriculture only during the monsoon season. This finding indicates that the Indus civilization was not as dependent as the three other great ancient civilizations on large rivers. MCRG analysis of archaeological artefacts from the Farmana site continues to improve our description of the Indus civilization resource base, society and economy.

Archaeological data obtained at the Kanmer site and geological and topographical data obtained through field research and satellite imagery are being combined to describe ancient sea level change along the coast of Gujarat. Simulation based on bathymetric data suggests that the Indus period sea level was about two meters higher than in present-day Gujarat. If correct, the ancient cities currently found inland would have earlier been located along the coast. We believe that these cities would have been an important base for trade with Mesopotamia. ICRG has been studying cuneiform texts for evidence relevant to our hypothesis.

Excavation at Farmana and Kanmer has concluded. The MCRG uncovered a number of important structures, artefacts, and plant and animal remains (Photos 2, 3), and analysis of these materials continues. Palaeo- and ethno-botanical research conducted by SCRG and philological research conducted by ICRG has allowed us to gradually reconstruct the ancient environment, subsistence systems and trade network of the Indus civilization. The geographical distribution of cultivated plants and archaeological sites during the Indus period (Fig. 3) suggests that climate change may have affected the monsoon pattern and triggered major agricultural change in the region.

The study of ancient sea temperatures through coral sampling in the Maldives and former monsoon rain temperature through the analysis of fossilized otoliths is also underway. In addition, a new study group was formed to conduct DNA analysis on the human bones discovered at the Farmana site.

Future activities

MCRG will continue analysing and preparing for publication the data obtained from excavations at Kanmer and Farmana. PERG will analyse the core samples obtained from the Rara Lake and Gujarat sites to reconstruct the palaeo-environment of Ghaggar and Gujarat regions. They plan to present their findings at the 2010 conference of the American Geophysical Union, and subsequently publish academic papers on climate change of ancient South Asia. SSRG will carry out pollen and phytolith analysis on data obtained from the excavations, while ICRG will continue its philological and linguistic research.

In sum, our efforts are now directed towards spatial and temporal synthesis of the findings of the individual research groups in order to develop a robust description of environmental change and cultural systems during the Indus period.

Neolithisation and Modernisation: Landscape History on East Asian Inland Seas

This project aims at reconstructing historical landscape change in the Japan Sea and East China Sea areas. Our research concentrates on two periods of revolutionary landscape change, Neolithisation and Modernisation. The present project uses a holistic human sciences perspective to explicate the formative history of the present-day landscape and to offer new insight into the concept of the "cultural landscape".

Project Leader
UCHIYAMA Junzo
RIHN

Junzo Uchiyama is an environmental archaeologist. He received his MA from Durham University, UK in 1996 and his Ph.D. from the Graduate University for Advanced Studies (Japan) in 2002. He is particularly keen on investigation of landscape changes in the Jomon period and assessing land use patterns based on the analysis of zooarchaeological assemblages.

Core Members

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HOSOYA Aoi	RIHN
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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
KOYAMA Shuzo	Suita City Museum
LINDSTRÖM, Kati	Institute of Philosophy and Semiotics, University of Tartu
MAKIBAYASHI Keisuke	RIHN
NAKAI Seiichi	Faculty of Humanities, Toyama University
NAKAJIMA Tsuneo	Lake Biwa Museum
NAKAMURA Oki	RIHN
POPOV, Alexander	Museum of Archaeology and Ethnography, Far East National University
SEGUCHI Shinji	Shiga Prefecture Cultural Properties Protection Association
YASUMURO Satoru	Graduate School of History and Folklore Studies, Kanagawa University
ZEBALLOS VELARDE, Carlos Renzo	RIHN

Research background and objectives

Project focuses on the landscape change in the East Asian Inland Seas (Fig. 1a), a region of rich cultural and landscape diversity, from the end of Ice Age up to the present day, with particular emphasis on the processes of Neolithisation and Modernisation. We hope to develop a more subtle and profound understanding of landscape and environmental issues in this region, and so to inform a solid landscape protection and development agenda.

Earlier described as a static composition, landscape is now considered as an evolving, recursive process of interaction between the physical environment found in a certain place and the culture and the value system of the people who inhabit it (Fig. 2). In the course of their everyday activities, people apply their environmental perceptions and skills to change their environment according to their values and beliefs. The resulting landscape will become the nexus of identity for the next generation, which will in turn alter its environment according to its abilities and imagination. Since landscapes are the stages of everyday life, landscape study can reveal how and why environmental issues arise and can best be addressed. Understanding the historical and cultural processes involved in landscape formation will help contemporary societies to address the disappearance of landscape diversity and design well-grounded landscape protection policies for the future.

Results to date

The project has eight regional work groups, each carrying out research in a key area of the East Asian Inland Seas (Fig.1b). Research focuses on four umbrella topics: (1) The birth and expansion of agriculture; (2) Water-

Figure 1a East Asian Inland Seas and Eight NEOMAP Research Areas

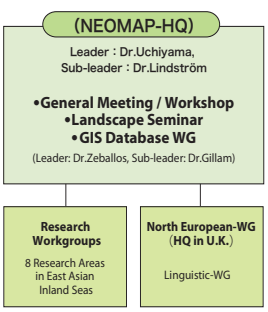

Figure 1b NEOMAP Organization

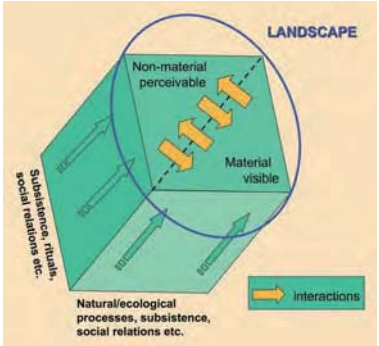

Figure 2 Concept of Landscape

Photo 1 **Shirakawa Village, Japan**

Photo 2 **Research at Boisman Shell Mound in Primorye, Russia**

fronts, including water bodies, waterways and rice paddies; (3) Migration and colonisation as forces of landscape change; (4) Travel and creation of mental landscape images. Special attention has been paid to three following major aspects of landscape formation in the region.

(1) Modernisation as seen from Neolithisation

What do the landscape changes associated with Modernisation have to do with Neolithisation? It was previously thought that the "Neolithic revolution," when agricultural societies and large-scale settlements emerged and the basic elements of modern landscapes were established, was an event that occurred in a relatively short period of time. If, however, we refer to humankind's increasing capacity to exploit their environments compared to earlier hunter-gatherer societies, "Neolithisation" should be defined as a process of human adaptation to the natural environment since the end of the last Ice Age. As aggressive resource use and increasing regional interdependency are characteristic of the present day as well, the period of Modernisation can be seen as a climax—or intensification of—Neolithisation.

(2) The cultural functions of inland seas

Seas have an immeasurable impact on their surrounding landscapes. Our Hokkaido workgroup describes how inland seas enable migrations and new colonisations, transforming indigenous spiritual and sustenance landscapes and imposing new settler landscapes. Okinawa, in contrast, was positioned as an outpost of trade between Japan and China. Its extensive coastlines and marine environments have shaped the regional landscapes from within, bringing about specific regional sustenance patterns and religious world views. At times, the maritime and continental influences interact, as in the Primorye Region, where the continental influence of Korean settlers blended with that of the new European settlers who arrived across the sea.

(3) The creation of mental landscape images

What is the impact of culture's mental structures on landscapes? What do great cultural systems like religion have to do with landscape and environmental issues? We explore one instance in Japan. With the rise of Buddhism in the Nara period (AD 710-794), the killing of living beings, including animals and fish, was prohibited. Since the Middle Ages, hunting and fishing were strictly prohibited within 2 li (roughly 1.3 km) of the temples, but this area was gradually redefined according to the area directly visible from the temple. Both the ban and its gradual redefinition, have had a large impact on resource use and the natural environment of the Japanese archipelago.

Topics for the future

NEOMAP researchers participate in many public events designed to increase public awareness about landscape and environmental issues. As visualization is a useful tool for making specific historical data accessible to non-academic audiences, in the next years our publications will emphasize the creation of landscape database and atlas. Superimposing the landscapes of Neolithisation and Modernisation on one single map can lead us to new discoveries about historical human-nature interrelationships and enhance consciousness about environmental issues.

We also hold regular seminars in and outside RIHN and present our results at international worskhops and symposia. NEOMAP is active in international collaboration, and has organised joint activities with scholars from Estonia, Belgium, Holland, UK and Germany.

Taking ice cores at Fedchenko Glacier,
Pamir Mountains, Tajikistan
Photo by TAKEUCHI Nozomu (Chiba University)

Monitoring the impact of climate warming
on the Sea of Okhotsk
Photo by KIMURA Noriaki (Ehime University)

Rising sea levels in Tuvalu, Polynesia
Photo by NAKADA Satoshi