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 historical perspective to the development of *futurability*. Like all RIHN research programs, it should elucidate global environmental issues, propose solutions and deepen understanding of human-environmental potential.

In 2009 the program is comprised of four projects, one already completed (CR) and three in progress (FR). These are: "Historical Evolution of the Adaptability of 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).

Focusing on different regions and a range of historical moments, these projects 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 Zone', 'Mugi Zone' and 'Vegeculture Zone'. It takes an interdisciplinary approach to the idea of 'genetic diversity' in agriculture in the hope that enriched appreciation of genetic diversity will contribute to improved future agriculture.

Project Leader
SATO Yo-Ichiro
RIHN

SATO Yo-Ichiro is Deputy Director-General and Professor at RIHN. He received his doctorate in agronomy from Kyoto University (1986). He served as Research Associate at Kochi University (1981-1983), Researcher at the National Institute of Genetics (1983-1994) and Associate Professor at Shizuoka University (1994-2003). His major research fields are plant genetics, especially evolution and genetics of rice plant and other crop species, and history of agriculture and human ecosystems. He is particularly interested in the domestication of crop species and using the tools of DNA archaeology to examine the origins of rice.

Core Members

ISHIKAWA Ryuji	Faculty of Agriculture and Life Science, Hirosaki 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	Department of Archaeology, University of Cambridge
TANAKA Katsunori	RIHN
TAN'NO Ken'ichi	Faculty of Agriculture, Yamaguchi University
TSUJIMOTO Hisashi	Faculty of Agriculture, Tottori University
NAKAMURA Ikuo	Graduate School of Horticulture, Chiba University
HARADA Nobuo	School of Asia 21, Kokushikan University
HOSOYA Leo Aoi	RIHN
MATTHEWS Peter	National Museum of Ethnology
YANG Haiying	Faculty of Humanities and Social Sciences, Shizuoka University

Project Description

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 greenery and water are still plentiful, 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 the character of agricultural and environmental change in three distinct climate zones in the last ten thousand years. We aim at comprehensive understanding of the history of agriculture-environment interactions, focusing on impact of "genetic diversity" on environmental transformation, destruction, collapse and recovery.

Research groups address the Monsoon zone, the *Mugi* (winter annual crop) zone, and the Vegeculture zone (Figure 1). The Swidden Agriculture Group conducts research on sustainable farming techniques based on the findings of the above groups.

Main Research Results

Using mixed methodologies (Figure 2), each research group has been drawing a picture of the history of human agricultural activities in its respective region. In each case, production developed unevenly and collapses were frequent.

● Monsoon Zone Group

Prehistoric sites offer evidence of early agriculture in Japan. Excavations have revealed the introduction of more vigorous cultivar species and evidence of river channels, probably constructed as buffers to flood, drought or other natural disaster. Nevertheless, it appears that cultivation was inconstant, interrupted by periods of fallow or natural disaster, in the middle Yayoi and ancient periods (Figure 3). Such results show that the history of Japanese agriculture has been one of collapse, adjustment and recovery, as described in Figure 4.

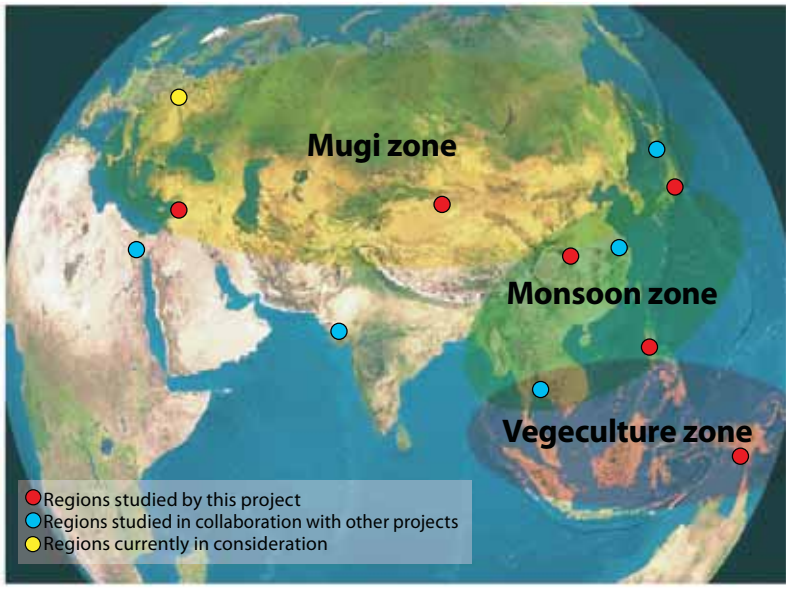

Figure 1 **Research zones and sites**

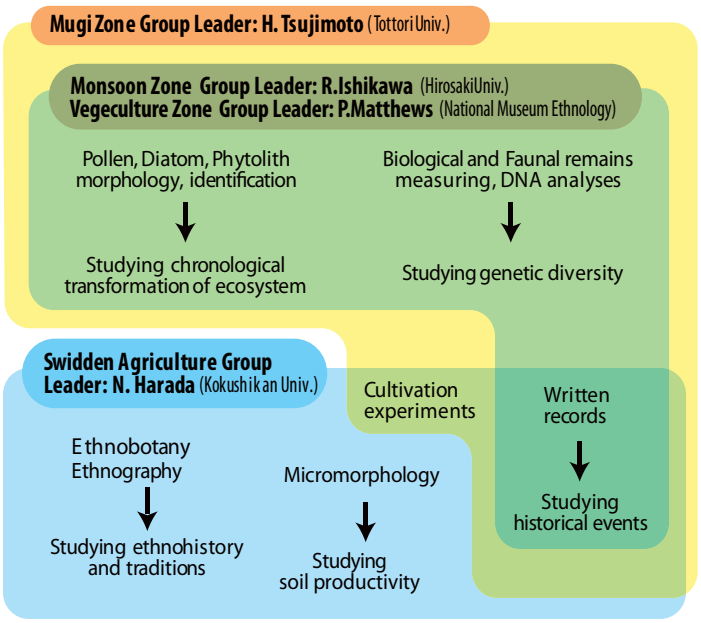

Figure 2

The four project groups and their study methods.

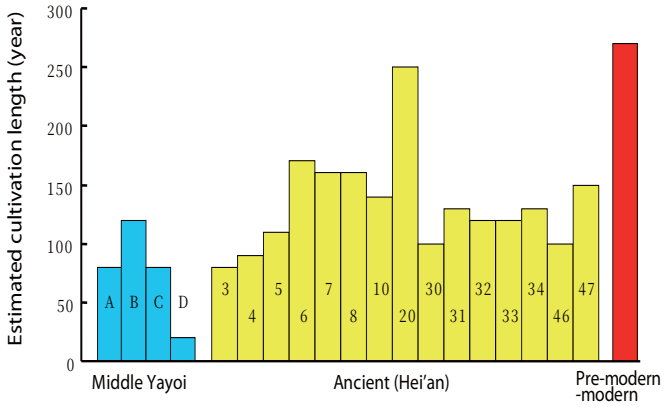

Figure 3

Each column represents the cumulative years of production in a single field unit. This figure indicates that there were frequent fallows or other interruption in earlier paddy rice production.

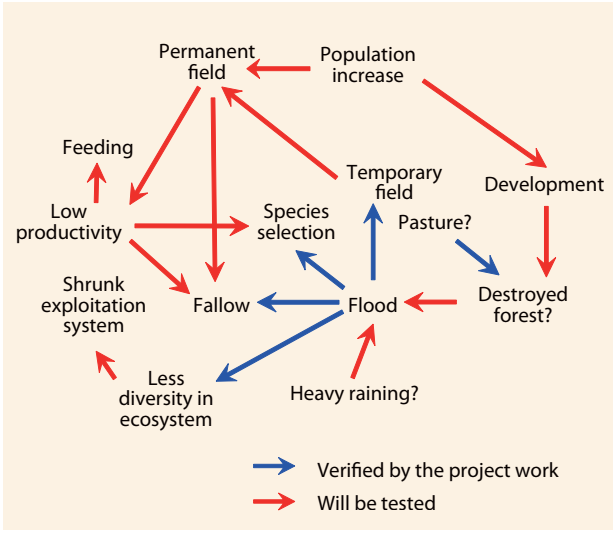

Figure 4

This conceptual outline of possible past human-environmental interactions is based on archaeological excavations undertaken in Osaka.

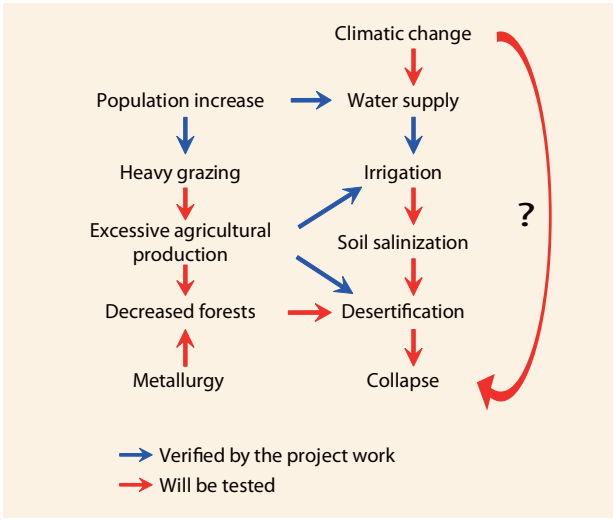

Figure 5

This conceptual outline of past human-environmental interactions is based on excavations at Shaohe in the Takaramakan desert.

- ***Mugi* Zone Group**

Excavation has been carried out in northwestern China. Morphological and DNA analyses of excavated faunal and botanical remains, suggest that the area was formerly of the *makiba*, or pasture climate zone, characterized by extensive wheat fields, meadow and forests; significantly different from its present desert-like, salinized state. One possible explanation for the change is the repeated cycle of 'cultivation > soil salinization > abandonment' shown in Figure 5.

- **Vegeculture Zone Group**

Core samples of pollen collected in the Kokoda Valley, Papua New Guinea, indicate that the origin of vegeculture there was much earlier than previously thought.

- **Swidden Agriculture Group**

Field tests of swidden agriculture in northeastern Japan verified that the use of fire was effective in eliminating harmful insects and weeds and in increasing inner-soil nitrogen, and thus that this agricultural technique has certain advantage to the modern agricultural technique.

Future research

Each research group will continue its efforts to develop the picture of Eurasian agricultural history in its respective climate zone. The *Mugi* and Monsoon Zone Groups will test each factor in their conceptual models of interactions between agriculture and the environment (Figure 4, 5), emphasizing the role of genetic diversity in relation to collapse and recovery of agricultural systems. The Vegeculture Zone Group will continue excavation in Papua New Guinea in order to describe the linkages between environmental change and early vegeculture there. The Swidden Agriculture Group will continue to build its database and analysis of present swidden fields and conduct studies to probe the conceptual models of the other research groups (Figure 4, 5). In particular, it will examine the relationship of fallows and genetic diversity in swidden agriculture, and the potential role of this relation to historical changes in genetic diversity and past cases of agricultural development and failure.

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 sewage systems—and also for its brief tenure. Indus cities and culture spread over 680,000 km² along the Indus and Ghaggar rivers and into Gujarat in Western India, yet its urban phase lasted for only 700 years, a much shorter period than any of its contemporaries. Drawing on archaeology, Indology, and paleo-environmental study, project members compose social and environmental histories of several Indus civilization cities in order to determine whether environmental factors were the cause of their short life and rapid decline.

Project Leader
OSADA Toshiki
RIHN

I am a linguist who has worked among the Munda people of Jharkhand, India, since the 1980s. I spent more than six years in India — from 1984 to 1990. The Munda appear to be one of the oldest peoples of India; (their linguistic roots may be traced back to the Indus civilization, the oldest of the Indian subcontinent). Formerly based at Kyoto University of Arts and Design, I joined RIHN in 2003 and proposed this project shortly thereafter in order to combine linguistic and archaeological inquiry into the mystery of Indus civilization decline.

Core Members

GOTO Toshifumi	Tohoku University
KHARAKWAL, Jeewan Singh	Rajasthan Vidyapeeth, India
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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

Our project is divided into four research groups: (1) the palaeo-environment 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) (Figure 1). The four groups combine sarchaeology and Indology with paleo-environmental study in order to evaluate the impact of environmental change on the subsistence economy and trade network that sustained the Indus civilization's urban system. Important subjects of investigation in 2008 included the avulsion of the Ghaggar River, the palaeo-coastline in Gujarat, ancient climate change, and palaeo-seismic activities (Figure 2). PERG uses field research and satellite imagery to identify the former course of the Ghaggar River (the old Sarasvati River) and to determine the causes and the dates of its avulsion. Indologists of ICRG compare these findings to description of the Sarasvati River found in the ancient Rig-Veda text. MCRG has excavated the Farmana site along the Ghaggar River in order to better describe the Indus society and economy and assess its possible susceptiblity to environmental flux.

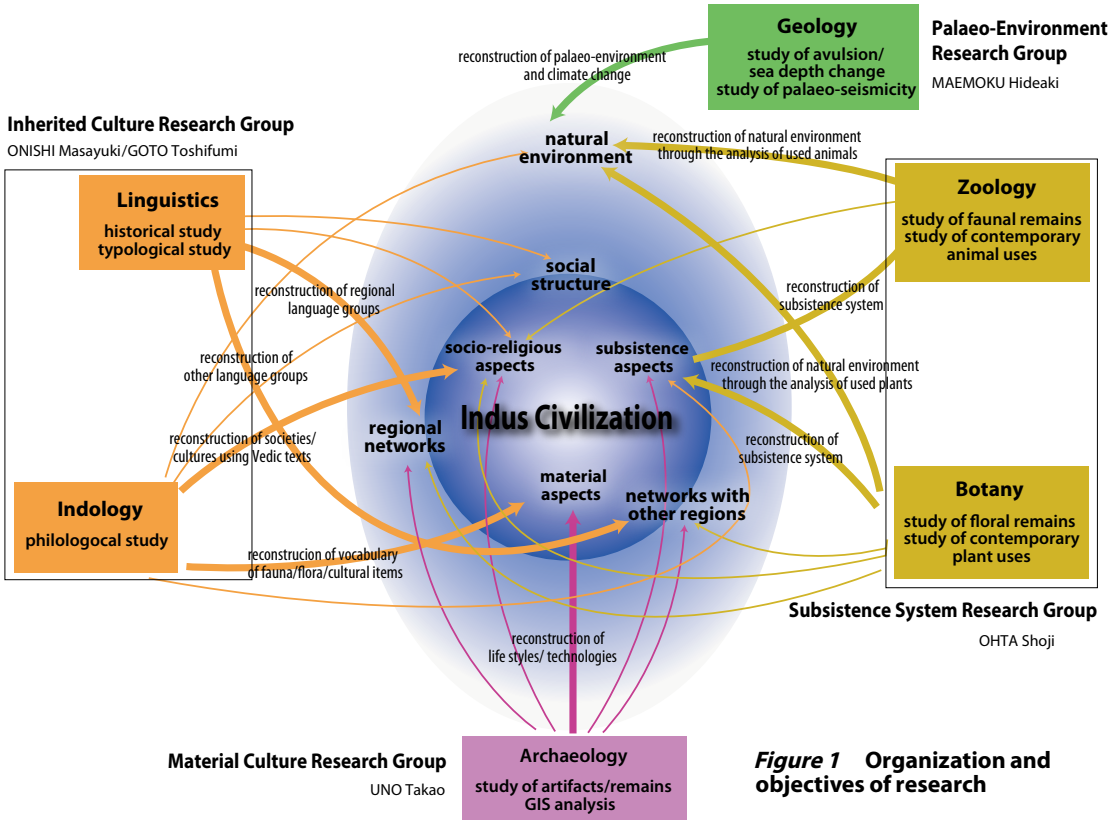

Figure 1 **Organization and objectives of research**

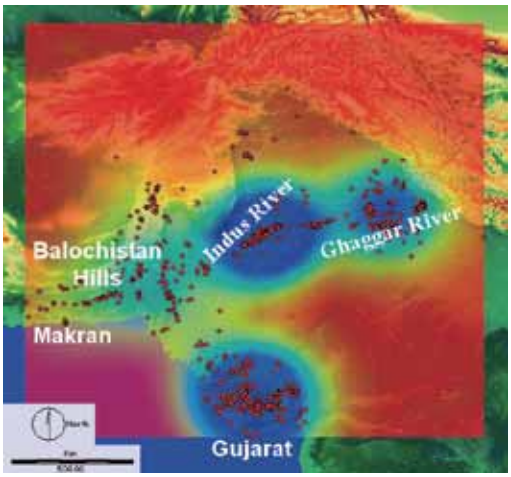

Figure 2 **Distribution and concentration of the Indus sites**

GIS allows integration of data obtained from each research group into a single database.

Photo 1 ***Graves at the Farmana site***

We have discovered many well-preserved human bones. We plan to begin DNA analysis of these bones in 2009.

Photo 2 **View of the Kanmer site**

Excavation revealed that the Kanmer site had been surrounded by large walls of stone.

Photo 3 **Pendants excavated from the Kanmer site**

The identical Indus seal is stamped on one side of each pendant and different lettered script is found on the reverse.

Geological and archaeological data obtained in excavation at Kanmer are combined to describe ancient sea level change along the coast of Gujarat. Palaeo- and ethno-botanical research are combined with philological and linguistic research to provide evidence of the past natural environment, subsistence system and trade network in this region.

We are particularly interested in the effect of the Indian Ocean Diapole (IOD) phenomenon on the decline of the Indus civilization. Coral samples taken in the Maldives allow description of Indus period sea temperatures and monsoon rains associated with the IOD. Integration of climate change evidence with pollen and pitholith analysis should allow us to describe the subsistence system of the Indus civilization and to examine whether environmental factors were involved in its decline.

Major Achievements

Excavations at Kanmer and Farmana have been immensely successful. In addition to uncovering a number of structures, including a citadel with rock walls (photo 2) and diverse artefacts, excavation teams found three pendants with Indus script (photo 3) and other Indus seals with and without Indus script. These artifacts provide important data for continued efforts to decipher the Indus writing system. In Farmana, where buildings made of sun-dried bricks were found in previous excavations, a large-scale burial ground was discovered (photo 1) as were grains of rice, which have rarely been found in Indus sites. Each of these findings makes a significant contribution to our understanding of the society, culture and subsistence system of the eastern Indus.

Paleo-environmental findings have also been substantial. It appears that the Ghaggar River, which was described as a large river in the Rig-Veda text, is likely to have been rather small and highly affected by the monsoon. If so, the Indus civilization would be unique among the four great ancient civilizations, all of which were established on large rivers. Simulation based on bathymetric data suggests that Indus period sea level was about two meters higher than in present day Gujarat. If correct, the cities which are currently found inland would have earlier been located along the coast.

Future Activities

Major excavations at the sites in Kanmer and Farmana were completed in 2008. The activities of MCRG members now shift to the analysis of obtained data. As of 2009, principal field activities will involve core sampling at Rara Lake and in the Maldives that may confirm our hypotheses of the Ghaggar and Gujarat sites. SSRG will carry out pollen and pitholith analysis on data already obtained from the excavations. Several human bones were discovered in the Farmana excavation, and a new research group specializing in DNA analysis will be formed for their analysis. In sum, our efforts are now directed towards synthesis of the findings of individual research groups in order to develop a robust description of the climate and subsistence systems of the Indus period.

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". Focusing 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

Junzo Uchiyama is an Associate Professor whose academic background is environmental archaeology. He received his MA from Durham University, UK in 1996 and his PhD from the Graduate University for Advanced Studies in 2002. He is particularly keen on landscape changes in the Jomon period and assessing land use patterns based on the analysis of hunting animals, such as wild boar and deer.

Core Members

BAUSCH, Ilona	Leiden University
FUKASAWA Yuriko	Graduate School of International Cultural Studies, Tohoku University
GILLAM, Christopher	South Carolina Institute of Archaeology and Anthropology, South Carolina University
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HOSOYA Aoi	RIHN
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
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

What is "landscape"? How should landscapes be maintained, protected or created? 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. 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 perception and identity for the next generation, which will in turn alter its environment according to its abilities and imagination. The term landscape thus refers to both the visible material landscape, the mental landscapes and their dynamic interrelations (Figure 2). As landscapes are the stages on which everyday life plays out, and contextualize the interactions between humanity and nature, landscape study can reveal how and why environmental issues arise and can best be addressed.

In recent years the terms "cultural landscape" and "cultural landscape protection" have gained importance in the international fight against the loss of cultural diversity. In the course of globalisation unique local landscapes that were rooted in peculiar traditional cultures are disappearing throughout the world. On the other hand, certain traditional landscapes are often idealized as examples of sustainability and virtuous interactions between humanity and nature. Large investments are made to maintain or even recreate such landscapes, even though the society and cultural processes that produced them are long lost. Understanding of the historical and cultural processes involved in landscape formation will help contemporary societies to address landscape extinction and design well-grounded landscape protection policies for the future.

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

Figure 1b **NEOMAP Organization**

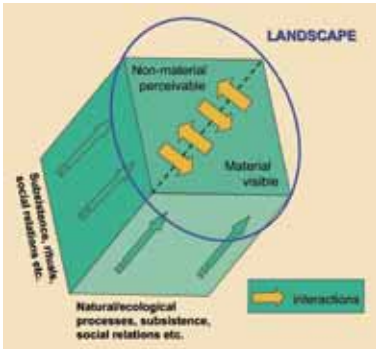

Figure 2 **Concept of Landscape**

Photo 1 **Shirakawa Village, Japan**

The present project focuses on the East Asian Inland Seas, a region of rich cultural and landscape diversity. This project examines landscape change in this area from the end of Ice Age up to the present day, with particular emphasis on Neolithisation and Modernisation, two epochs of profound landscape change. 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.

Photo 2 **The Research of Boisman Sell Mound in Primorye**

Results to date

The project has eight regional work groups that carry out research in eight key areas on the East Asian Inland Seas (Figure 1a). Research focuses on four umbrella topics: (1) The birth and expansion of agriculture; (2) Waterfronts including from the sea/lakes to the waterways/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

How 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 ever/increasing human exploitation of the environment, one that was manifest in domestication and gardening techniques already practiced in the primarily hunter-gatherer societies, "Neolithisation" should be defined as a process of human adaptation to the new natural environment following the end of the last Ice Age. As aggressive resource use and regional interdependency are characteristic of the present day as well, the Modernisation period can be seen as a climax—or continuation of—Neolithisation, and not as an utterly unique historical epoch.

(2) The cultural functions of inland seas

A sea has an immeasurable impact (both good and bad) on its surrounding landscapes. Inland seas enable migrations and new colonisations, transforming indigenous spiritual and sustenance landscapes and imposing new settler landscapes, as described by our Hokkaido workgroup. 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 view. At times, the maritime and continental influences cross-react, 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

A ban on killing living beings (animals, fish) was established in the Nara period (AD 710-794) under the influence of Buddhism. Its influence remained through premodern times in the form of taboo on eating meat, and has had a huge cultural impact over the natural environment of the Japanese archipelago. In the Middle Ages, hunting and fishing were 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. This had a profound impact on the landscape of the area: imagining the landscape from the Buddha statue's vantage point, the hunters and fishers went on altering some areas more than the others. The influence of this early landscape protection policy that was born from a religious and not environmental thought can be seen in the landscape until recent times.

Landscapes

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	Photographer	Location	
1	NAWATA Hiroshi	Sinai Peninsula, Egypt	Swarming egrets in the rich natural mangrove forest
2	NARAMA Chiyuki	Issy-Gol, Kyrgyzstan	Global warming is melting glaciers and leaving glacial lakes in the Tian Shan mountains
3	ENDO Takahiro	Triple frontier region of Thailand, Laos, and Myanmar	Boats coming and going along the Mekong River in the Golden Triangle
4	ENDO Takahiro	California, USA	Pacific Sea Lions with San Francisco in the background
5	ABE Ken-ichi	Indonesia	Taking a rest on a brace root during tough field research in a mangrove forest
6	ABE Ken-ichi	The upper Yangtze River, China	Milk coffee colored water flows, eroding the valley
7	NARAMA Chiyuki	Naryn Province, Kyrgyzstan	Pastoralism has been practiced since the time of the former Soviet Union and many pastoral farmers live in this area during summer
8	YUMOTO Takakazu	Uzuki-yama, Hiroshima	Each early spring, a controlled burn regenerates the grassland