

Completed Research



When a project moves to Completed Research (CR) status, the contract with RIHN is concluded. Research teams disperse to university research, teaching, and other duties. Project publications and other communications and contributions may follow for several years. At RIHN, each project forms part of the institute's heritage; project results and data are entered into the RIHN archives upon which future RIHN projects may be formulated.



Fiscal Year Completed	Leader	Research Project
2006	HAYASAKA Tadahiro	Emissions of Greenhouse Gases and Aerosols, and Human Activities in East Asia
	KANAE Shinjiro	Global Water Cycle Variation and the Current World Water Resources Issues and Their Perspectives
	WATANABE Tsugihiro	Impact of Climate Changes on Agricultural Production System in the Arid Areas
	NAKAWO Masayoshi	Historical Evolution of the Adaptability in an Oasis Region to Water Resource Changes
	YACHI Shigeo	Multi-Disciplinary Research for Understanding Interactions between Humans and Nature in the Lake Biwa-Yodo River Watershed
2007	FUKUSHIMA Yoshihiro	Recent Rapid Change of Water Circulation in the Yellow River and Its Effects on Environment
	ICHIKAWA Masahiro	Sustainability and Biodiversity Assessment on Forest Utilization Options
	AKIMICHI Tomoya	A Trans-Disciplinary Study on Regional Eco-History in Tropical Monsoon Asia: 1945-2005
2008	SEKINO Tatsuki	Interaction between Environmental Quality of the Watershed and Environmental Consciousness
	TAKASO Tokushiro	Interactions between Natural Environment and Human Social Systems in Subtropical Islands
2009	SHIRAIWA Takayuki	Human Activities in Northeastern Asia and their Impact on Biological Productivity in the North Pacific Ocean
2010	TANIGUCHI Makoto	Human Impacts on Urban Subsurface Environments
	YUMOTO Takakazu	A New Cultural and Historical Exploration into Human-Nature Relationships in the Japanese Archipelago
	SATO Yo-Ichiro	Agriculture and Environment Interactions in Eurasia: Past, Present and Future
2011	KAWABATA Zen'ichiro	Effects of Environmental Change on the Interactions between Pathogens and Humans
	KUBOTA Jumpei	Historical Interactions between Multi-Cultural Societies and the Natural Environment in a Semi-Arid Region in Central Eurasia
	OSADA Toshiki	Environmental Change and the Indus Civilization
	UCHIYAMA Junzo	Neolithisation and Modernisation: Landscape History on East Asian Inland Seas
	UMETSU Chieko	Vulnerability and Resilience of Social-Ecological Systems
2012	OKUMIYA Kiyohito	Human Life, Aging and Disease in High-Altitude Environments: Physio-Medical, Ecological and Cultural Adaptation in "Highland Civilizations"
	SAKAI Shoko	Collapse and Restoration of Ecosystem Networks with Human Activity
	MOJI Kazuhiko	Environmental Change and Infectious Disease in Tropical Asia
2013	HIYAMA Tetsuya	Global Warming and the Human-Nature Dimension in Siberia: Social Adaptation to the Changes of the Terrestrial Ecosystem, with an Emphasis on Water Environments
	NAWATA Hiroshi	A Study of Human Subsistence Ecosystems in Arab Societies: To Combat Livelihood Degradation for the Post-oil Era
	KADA Ryohei	Managing Environmental Risks to Food and Health Security in Asian Watersheds
2014	MURAMATSU Shin	Megacities and the Global Environment
2015	KUBOTA Jumpei	Designing Local Frameworks for Integrated Water Resources Management
2016	HABU Junko	Long-term Sustainability through Place-Based, Small-Scale Economies: Approaches from Historical Ecology
	SATO Tetsu KIKUCHI Naoki	Creation and Sustainable Governance of New Commons through Formation of Integrated Local Environmental Knowledge
	ISHIKAWA Satoshi	Coastal Area-capability Enhancement in Southeast Asia
	TANAKA Ueru	Desertification and Livelihood in Semi-Arid Afro-Eurasia
2017	ENDO Aiko	Human-Environmental Security in Asia-Pacific Ring of Fire: Water-Energy-Food Nexus

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

Project Leader **ENDO Aiko** RIHN

Climate change and social change, including accelerating development, urbanization, and globalization are increasing pressure on water, energy and food resources, increasing the number of tradeoffs and potential conflicts among these resources that have their complex interactions. In order to address these issues, the objectives of the project were to understand the complexity of the water-energy-food (WEF) nexus system and to create policy options to reduce trade-offs among resources and to alleviate conflicts of resource users using scientific evidence and under assumptions of uncertainty to maximize human-environmental security. The project also proposed solutions to local and global environmental problems by contributing to global research networks associated with the Future Earth platform and the U.N. Sustainable Development Goals.

The project involved 60 researchers from different disciplines and five countries, including Indonesia, the Philippines, Canada, Japan and the USA. Five research groups carried out the following tasks: 1) the Water-Energy Nexus Group conducted biophysical measurement and analysis using space satellites, geothermic, and hydrogeological techniques; 2) the Water-Food Nexus Group carried out biophysical measurements and analyses using geochemical, coastal oceanographic, geophysical, hydrologic, and ecological methods, including isotopic tracers; 3) the Stakeholder Analysis Group conducted stakeholder and social network analyses, community surveys, and scenario planning based on social and behavioral science approaches; 4) the Socio-culture of Resource Usage Group developed the science-policy interface based on its examination of the socio-cultural history of groundwater use; and 5) the Interdisciplinary Group completed the research with a mission to: i) identify research problems; and ii) determine the methods and/or

create new discipline-free methods based on synthesizing and harmonizing team-based production, collected from individual scientists in different disciplines from each team in order to assess human environmental security. In addition, the team further developed these approaches to incorporate non-scientific/non-disciplinary views on the analyses; and iii) design a nexus system.

Results

For the water-energy nexus component, we calculated the potential of using groundwater as a source of thermal energy in Obama. In Beppu, the subsurface environment, including flow of groundwater and hot springs, have been clarified by gravity measurement.

The Water-Food Nexus Group identified the location of submarine groundwater discharge at Obama and Beppu bays, and estimated the supply of nutrients conveyed from land to ocean by groundwater. Stakeholder analysis of hot spring resources also clarified key issues related to future scenarios and social change.

The Interdisciplinary Group developed several integrated methods, including model of Beppu and Otsuchi, Japan, Pajaro Valley, California, and British Columbia, Canada. This group also designed a nexus system at the local scale to understand the complexity of the nexus system and establish a clear definition of the nexus concept.

For collaborative scientific activities with society, we designed lectures open to local citizens and conducted a participatory survey on hot springs with local residences and stakeholders in Beppu. We developed a web page, the "Spring Map", in order to share the results of our groundwater survey. Such activities with local governments and private sector raised awareness of nexus issues.



Figure 1 Target research sites

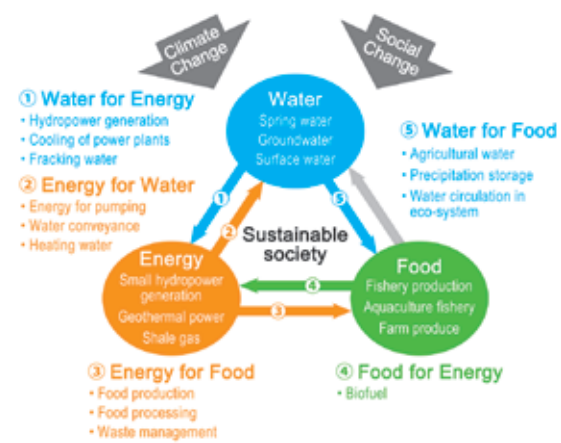


Figure 2 What is the Water, Energy and Food nexus?



Above: JIANG Hongwei, Departing for a field survey early in the morning, Savannakhet, Laos
Bottom: NAKAO Seiji, A blacksmith is making a toy bird, Burkina Faso

