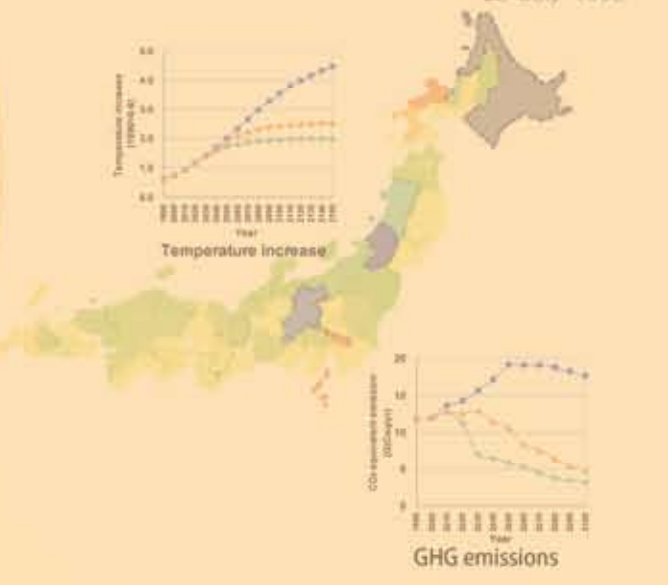
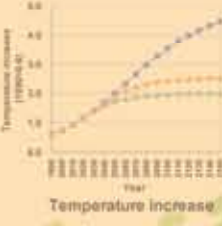
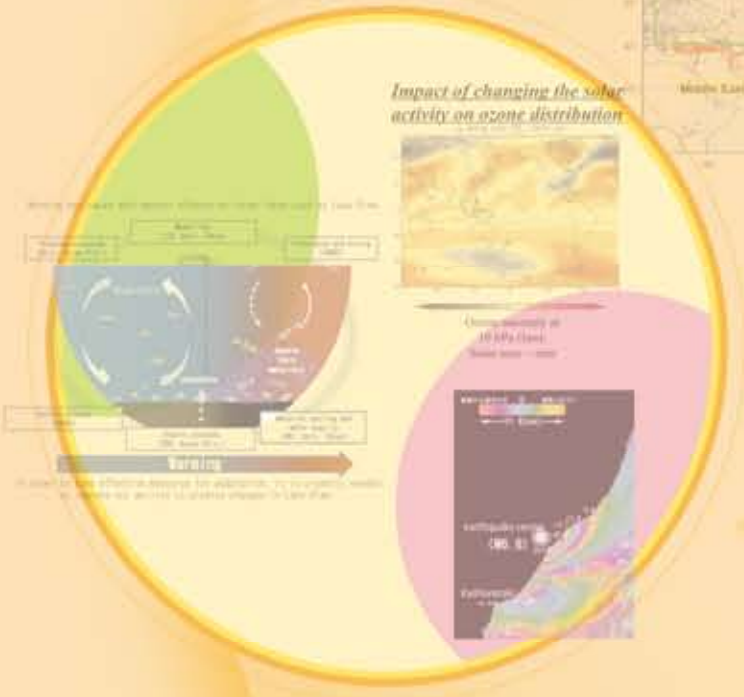


GLOBAL ENVIRONMENT RESEARCH FUND FY2008



APHRODITE precipitation data collection



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The Global Environment Research Fund in FY2008

Outline

Features:

- The GERF is a competitive grant scheme for global environmental research, initiated in 1990 with calls for proposals. Since then, the GERF has played a role as a core fund in Japan for promoting global environmental studies through interdisciplinary interaction among natural, social and political sciences.
- Each year, Ministry of the Environment formulates a “Global Environment Research Program” through consultation with external reviewers. Based on the program, research projects are conducted in a timely fashion in accordance with the international situation, reflecting domestic/international trends in global environmental research.
- Applicants are to be researchers belonging to Japanese research institutions.
- The research projects will be evaluated in collaboration with external reviewers, weighing in such factors as degree of contribution (in terms of either policy or science) and feasibility, taking into consideration domestic/international trends in the global environment.

Research Priorities :

- In order to obtain scientific evidence necessary for drafting and implementing policies to protect the global environment, the administration indicates desirable themes for research.
- In FY 2008, we created two special recruitment divisions : the “Wise Adaptation to Climate Change” division and “Low-Carbon Society” division.

System

Research Fields:

- **Global system changes**
Stratospheric ozone depletion, global warming, and hydrological circulation on a global scale
- **Transboundary pollution in the atmosphere, oceans and inland environments such as international rivers**
Transboundary pollution in the atmosphere, through oceanic and terrestrial areas, and along international rivers
- **Conservation and recovery of large-regional ecosystems**
Ecological disturbances, loss of biodiversity, tropical deforestation, desertification broadly occurring on a regional level (East Asia)
- **Sustainable societies and policies for their implementation**
Integrated research on global environmental conservation in relation to the environment, economy and society

Special Recruitment Divisions:

- **The “Wise Adaptation to Climate Change”**
For studying adaptation to the impacts of climate change so as to enable us to respond in an effective and efficient way to build a sustainable country and society
- **The “Low-Carbon Society”**
For studying policies on building a low-carbon society which would enable Japan to reduce its CO₂ emissions greatly, by even more than 50% compared to the 1990 level

Areas of Projects:

Areas of Research	Conditions	Research Period	Average of Annual Budget per Project (1US\$=120yen)
Strategic R & D Area	Large-scale projects for which Ministry of the Environment provides a research framework	5 years (three years for Period I and two for Period II)	About \$2 million
Global Environmental Research Area	Research contributing to solving individual or combinations of global environmental issues	3 years (could be extended to five years)	About \$0.4 million
Revolutionary Research in Feasibility Studies Area	Researchers required to be 40 year or younger in age	1 or 2 years	About \$80 thousand

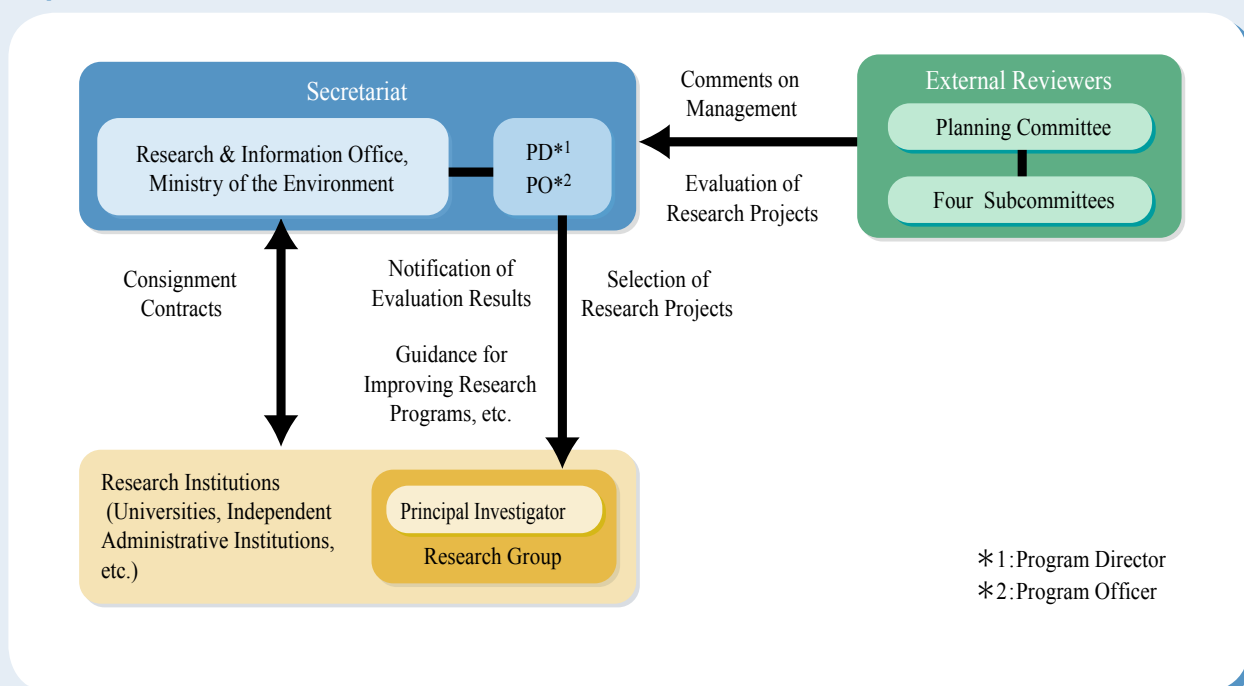
Projects of the Strategic R & D Area:

S-3 : Japan Law-Carbon Society Scenarios towards the Year 2050 (FY2004-2008)

S-4 : Comprehensive Assessment of Climate Change Impacts to Determine Dangerous Level of Global Warming and Appropriate Stabilization Target of Atmospheric GHG Concentration (FY2005-2009)

S-5 : Integrated Research on Climate Change Scenarios to Increase Public Awareness and Contribute to the Policy Process (FY2007-2011)

Implementation Structure:



Intermediate Evaluation:

- Research projects in the Global Environmental Research Area (for which the research period is three years) will undergo intermediate evaluation in their second year.
- Research projects in the Strategic R & D Area (for which the research period is five years) will undergo intermediate evaluation in their third year.
- Research projects in the Global Environmental Research Area rated highly in the evaluation will be considered for an extension. Research projects that achieve good results in the examination will be allowed a two-year extension (bringing the total to five years).

Recent Major Achievements

- **AIM (Asian-Pacific Integrated Model):**

The analytic results of the AIM are utilized for policy analysis including tax systems, subsidy policies, presumed effects on the Kyoto Mechanism, and presumed effects on global warming and impacts on economics through the introduction of new technologies, etc.

- **Desertification Early Warning System (EWS):**

The analytic results of an integrated model will be submitted to CRIC5 (Committee for the Review of the Implementation of the Convention) as a representative example of Japan's efforts.

- **Impact of Invasive Alien Species on Ecosystems:**

The research on alien species has been helping policymakers shape the Invasive Alien Species Act, and has been utilized in the establishment of protected forest ecosystem areas in the Ogasawara Islands.

- **Japan Low-Carbon Society 2050:**

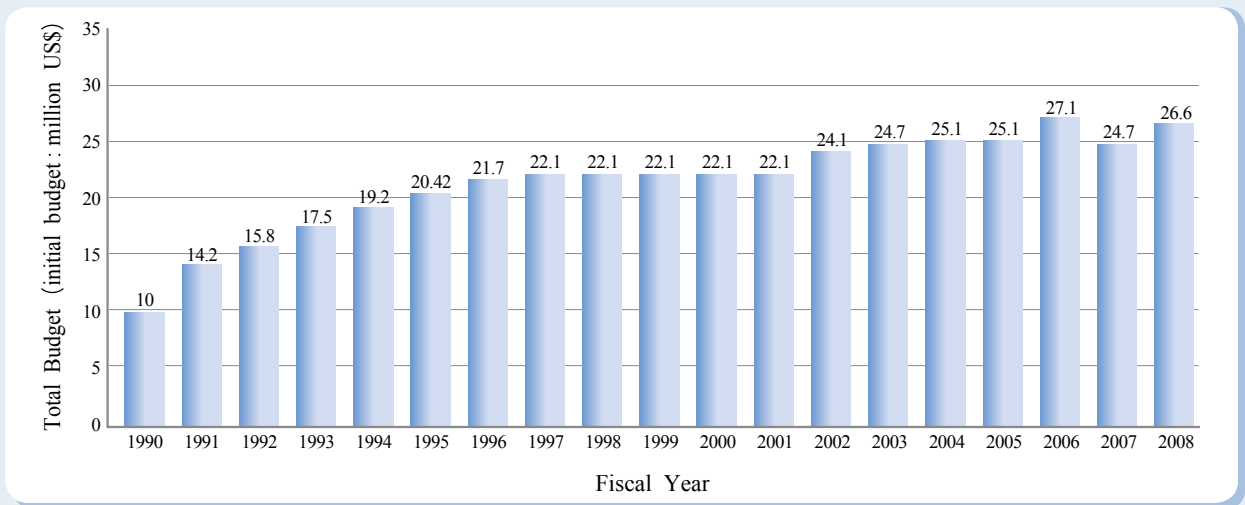
This is a cooperative scientific project between Japan and the UK started in February 2006. The research results are influencing formal/informal international negotiations for the Framework Convention on Climate Change.

- **Dust and Sandstorm (Kosa) Monitoring Network:**

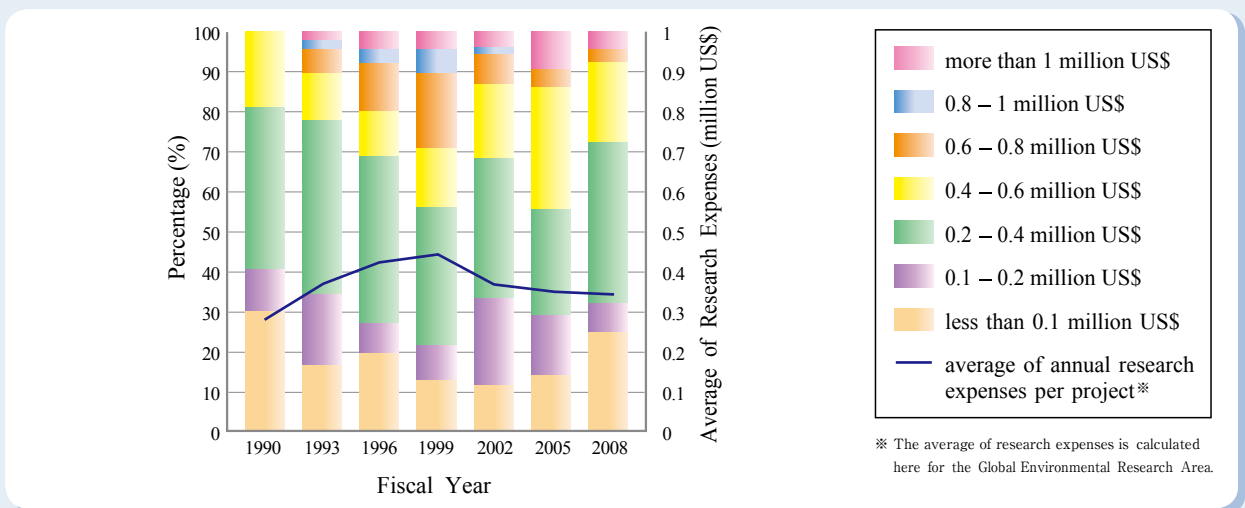
The research on Kosa has been contributing to the devising of policies aiming to solve the Kosa problem, which is a shared concern understood in common by all parties at the Tripartite Environment Ministers Meeting among China, Japan and Korea (TEMM).

Management Performance

Trends in the Total Budget (1 US\$ = 120yen) :

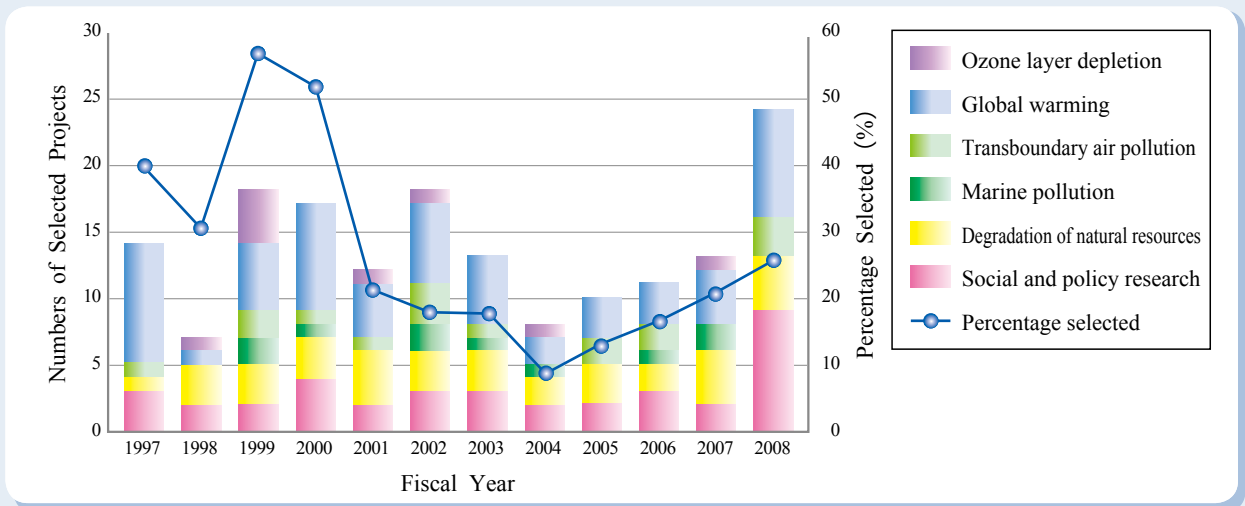


Trends in Annual Research Expenses per Project (1 US\$ = 120 yen):



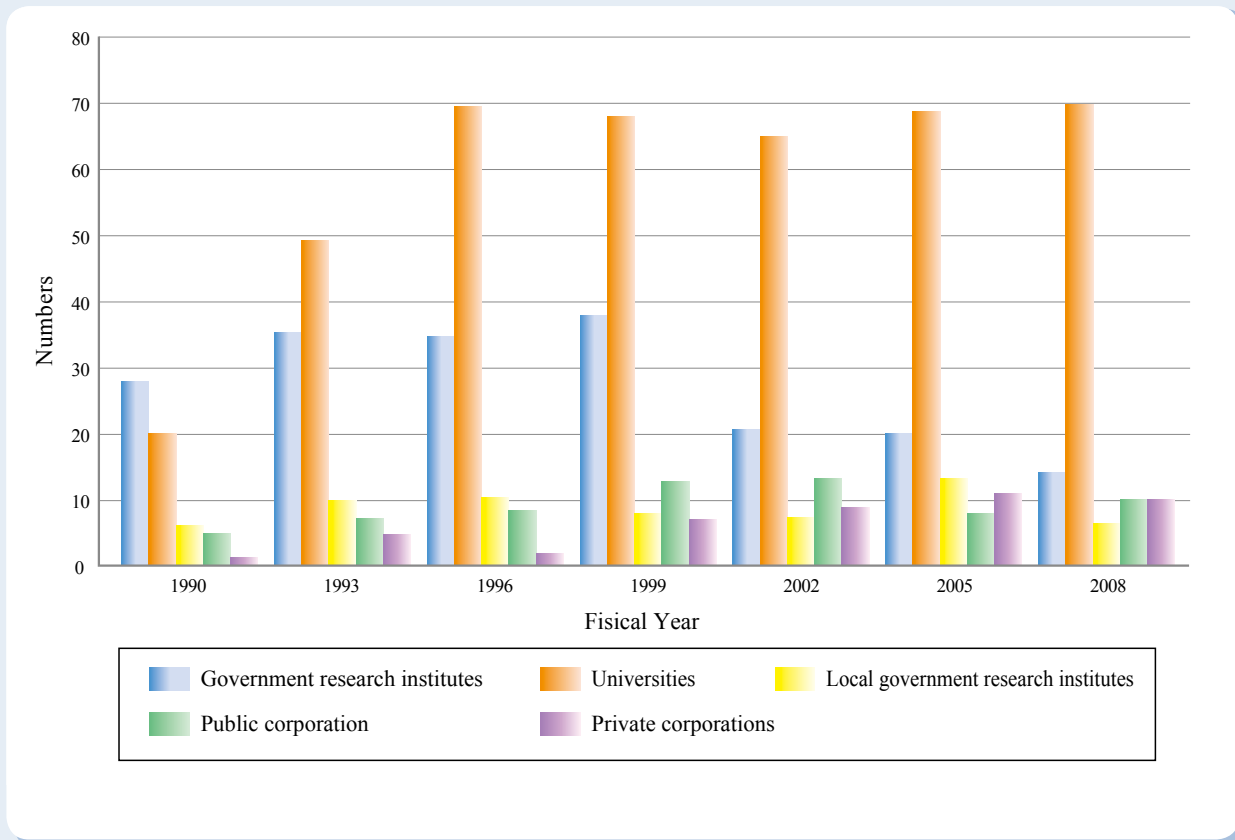
Percentages of Research Projects Selected:

Numbers of selected projects and trends in the selection ratio (Global Environmental Research Field)



Number of Participating Institutions:

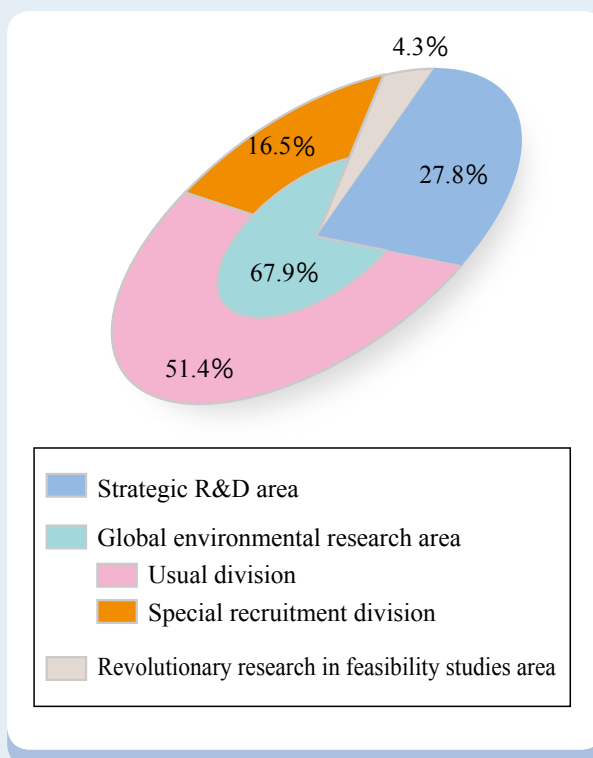
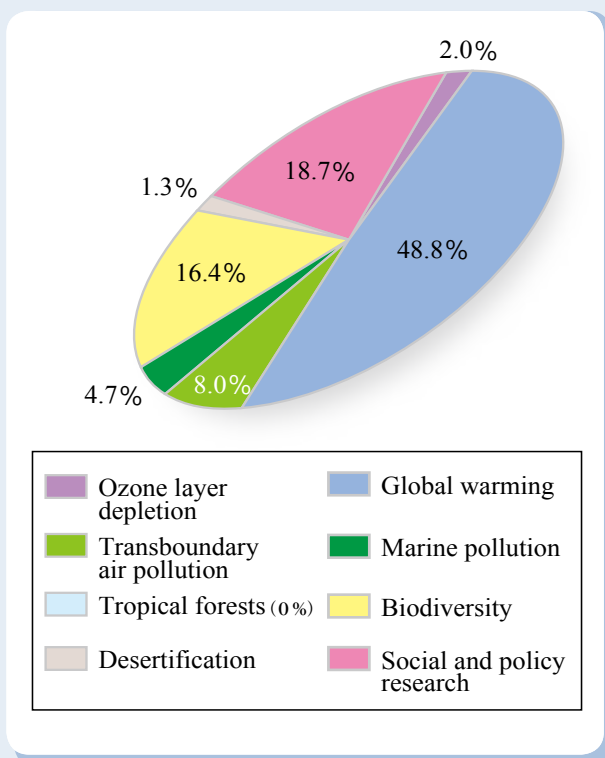
Trends in numbers of research institutions (in the case of universities, counted by university rather than faculty)



State of Implementation of Research Fields and Research Areas:

Ratios of fields of research conducted in FY2008 (based on budget distribution)

Ratios of areas of research conducted in FY2008 (based on budget distribution)



Strategic R&D Area

Global System Changes

Japan Low-Carbon Society Scenarios towards the Year 2050

(Period I : FY2004–2006)

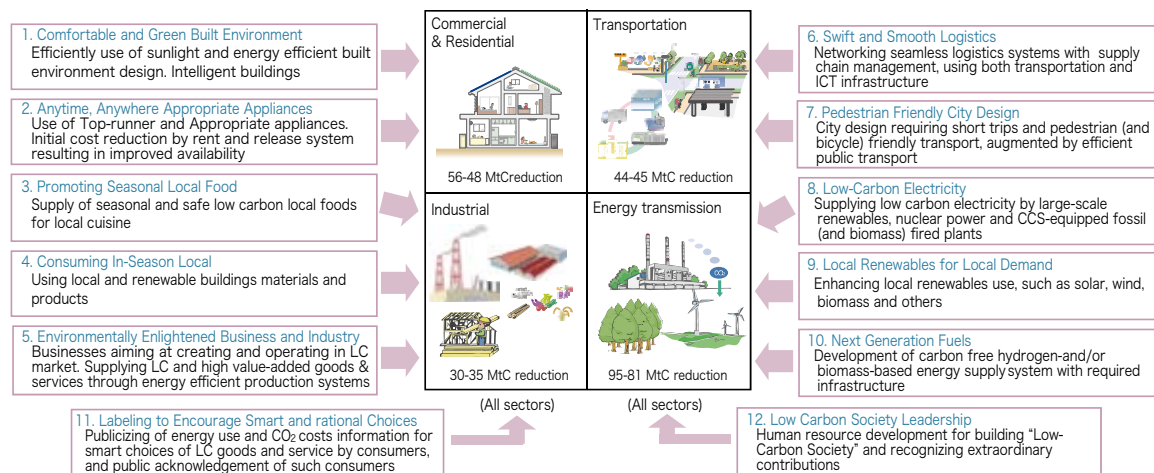
(Period II : FY2007–2008)

Project Leader : **Shuzo NISHIOKA**, National Institute for Environmental Studies (NIES) <S-3>

NIES, National Institute of Advanced Industrial Science and Technology, Forestry and Forest Products Research Institute, Institute for Global Environmental Strategies, The Japan Institute of Energy, Kyoto University, The University of Tokyo, Kobe University, Shinshu University, Nagoya University, Tokyo Institute of Technology, Tokyo University of Marine Science and Technology, Ritsumeikan University, Bunkyo University, Waseda University, International University of Japan, Keio University, Tokyo University of Science, Nippon Institute of Technology, Toyo University, Nippon Telegraph and Telephone Corporation, Mizuho Information & Research Institute, Inc., Mitsubishi Research Institute, Inc., JKL, Inc., Nikken Sekkei Research Institute

In order to achieve the ambitious goal (“Japan Low Carbon Society Scenarios: Feasibility study for 70% CO₂ emission reduction by 2050 below 1990 level” reported in 2007), innovations such as technologies and reform programs have been studied from the viewpoint of when and how such innovations should be implemented and what kind of measures and policies are effective to realize them. A dozen actions are proposed and

expected to cover the entire 70% reduction goal. Efforts in the energy demand sectors are particularly important: 30 to 35 MtC in industry, 48 to 56 MtC in residential and commercial, 44 to 45 MtC in transportation, and 81 to 95 MtC by energy conversion. Back-casting model has been developed to design roadmap towards Low-Carbon Societies from the viewpoint of when and how such innovations should be implemented.



*) Arrows indicate main contributable sector of the Actions.

**) Numbers are expected CO₂ reductions through implementation of the Actions (Scenario A and Scenario B)

Comprehensive Assessment of Climate Change Impacts to Determine the Dangerous Level of Global Warming and Appropriate Stabilization Target of Atmospheric GHG Concentration

(Period I : FY2005-2007)

(Period II : FY2008-2009)

Project Leader : **Nobuo MIMURA**, Ibaraki University

<S-4>

Ibaraki University, National Institute of Infectious Diseases, National Institute for Land and Infrastructure Management, National Institute for Environmental Studies, National Agriculture and Food Research Organization, National Institute for Agro-Environmental Sciences, Japan International Research Center for Agricultural Sciences, Forestry and Forest Products Research Institute, Tohoku University, University of Tsukuba, The University of Tokyo, Kyushu University, Meijo University, Mitsubishi Research Institute, Inc.

This project aims at assessing the physical and socioeconomic impacts of climate change in Japan and the Asia Pacific region, focusing on water resources, human health, agriculture, forest ecosystem, coastal zones, and disaster prevention. Studies of spatial and temporal distributions of the impacts and adaptation to them are coordinated to determine the dangerous level of global warming. Appropriate emission paths are also studied to build a scientific basis for the stabilization target of atmospheric GHG concentration.

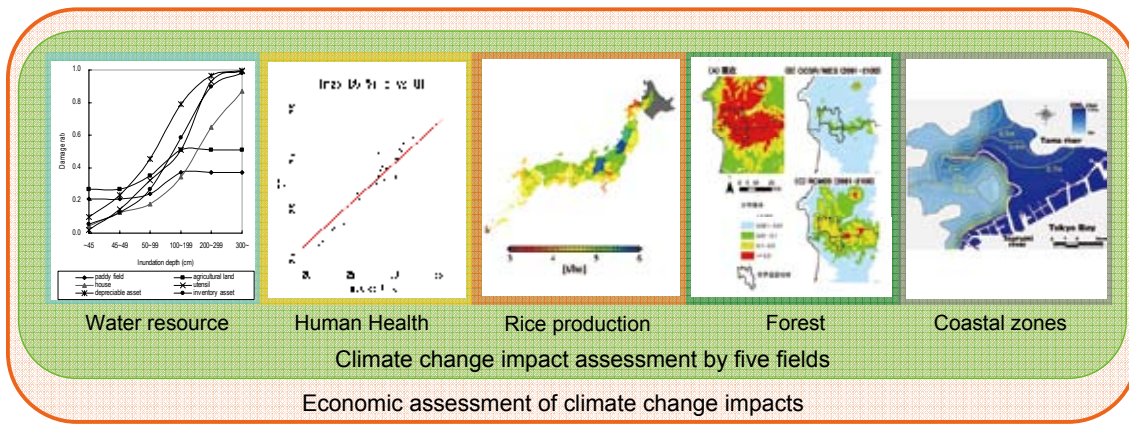
Research Objectives

(1) Integrated assessment of climate change impacts

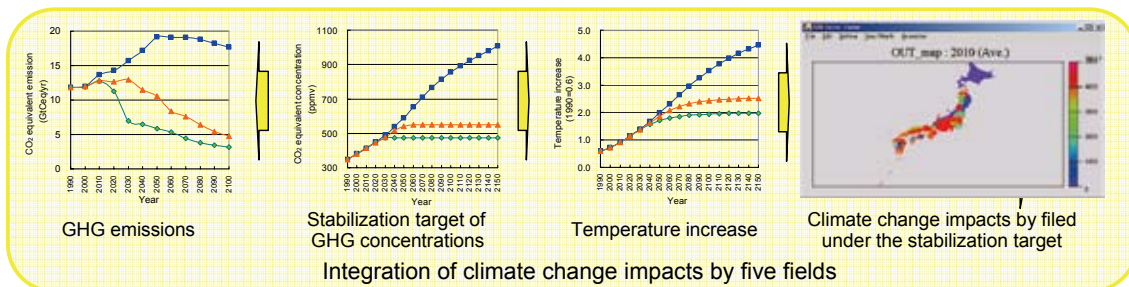
Quantitative assessment of climate change impacts on key sectors, Development of risk maps in Japan and the Asia Pacific region, Investigation of adaptation strategies to reduce climate change impacts

(2) Provision of scientific information to medium- and- long term climate policy

Assessment of dangerous levels of climate change, Investigation of GHG emission paths toward climate stabilization



Impact response function



Transmitted effect : Contribution to Strategic Research Project "Low carbon society scenarios toward 2050 (S-3)".
IPCC, UNFCCC and Kyoto Protocol

Integrated Research on Climate Change Scenarios to Increase Public Awareness and Contribute to the Policy Process

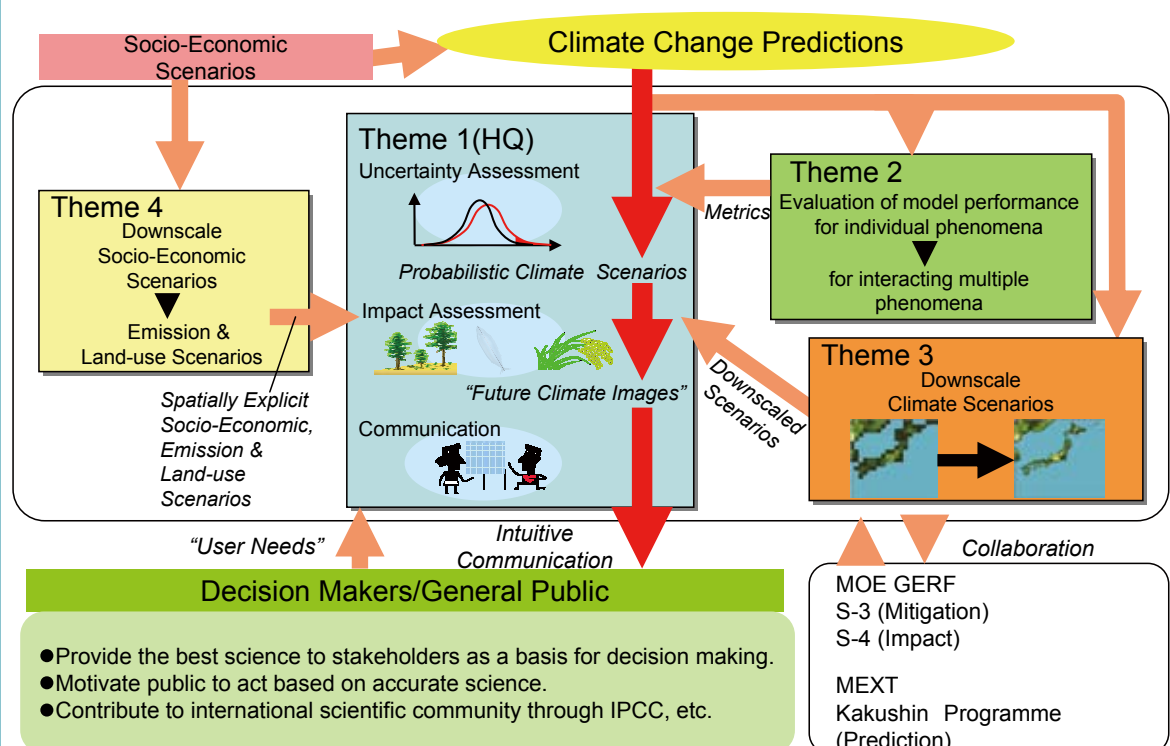
(Period I : FY2007-2009)
(Period II : FY2010-2011)

Project Leader : **Akimasa SUMI**, The University of Tokyo

<S-5>

The University of Tokyo, Meteorological Research Institute, National Institute for Environmental Studies, National Institute for Agro-Environmental Sciences, Japan Agency for Marine-Earth Science and Technology, National Research Institute for Earth Science and Disaster Prevention, Hokkaido University, University of Tsukuba, Nagoya University, Kyoto University, Kanagawa University, Toho University, Nomura Research Institute, Ltd.

In this research project, present-day simulations and future projections by domestic and international climate models are comprehensively analyzed to assign indices quantifying uncertainties embedded in future projections. In addition, we use regional climate models to generate spatially-specific projections for Japan and its environs. We are also working on downscaling socio-economic scenarios and the projections of land-use change. Through these efforts, we aim to construct comprehensive climate change scenarios that give detailed information about the impact of climate change on our society, and to find methodologies that will ensure that these scenarios can be presented in a manner that can be received intuitively by the public.



Global Environmental Research Area

Global System Changes

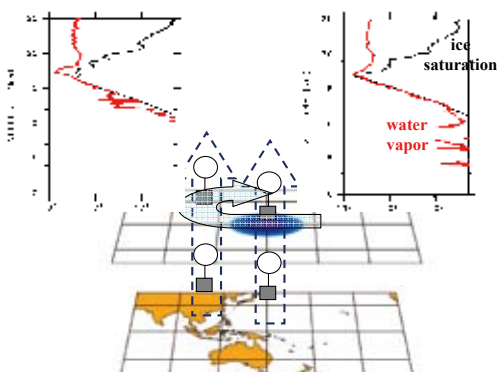
Studies on Variability of Stratospheric Processes and Uncertainties in the Prediction of Future Change of Stratospheric Ozone (FY2007-2009)

Principal Investigator : **Takashi IMAMURA**, National Institute for Environmental Studies (NIES) <A-071>

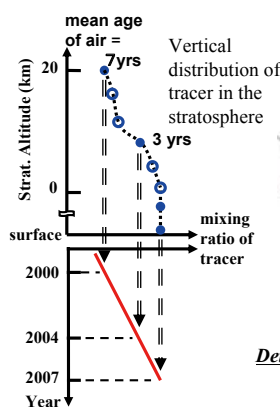
NIES, Hokkaido University, Miyagi University of Education, The University of Tokyo

In this research project, the following investigation is being conducted: (i) detection of the variation of water vapor in the tropical tropopause region, (ii) determination of the mean age of stratospheric air over Japan, (iii) understanding the ability of our stratospheric chemical-climate model to reproduce past trend and to predict

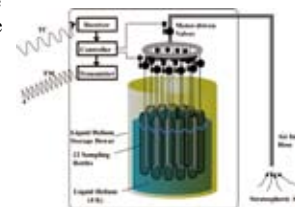
future change of the ozone layer, and (iv) understanding of the impact of solar activity change on ozone distribution. The results of these works are expected to provide scientific grounds when further countermeasures for ozone layer protection are considered.



Water vapor measurements over the tropical Pacific

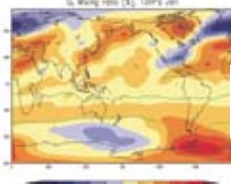


Determination of the age of air



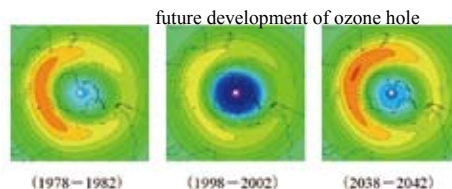
Detection of changing of water vapor and the age of air in the ozone layer
Evaluation of uncertainty of the predicted change of the ozone layer

Impact of changing the solar activity on ozone distribution



Ozone anomaly at 10 hPa (Jan):
Solar max - min

Validation of stratospheric chemistry model



future development of ozone hole

Qualitative Assessment and Prediction of Asian Monsoon Change Induced by Human Activities (FY2006-2008)

Principal Investigator : **Tetsuzo YASUNARI**, Nagoya University

<B-061>

Nagoya University, The University of Tokyo, Tokyo Metropolitan University, Japan Agency for Marine Earth Science and Technology

The global increase in greenhouse gases, the changes in aerosol qualities and quantity, and landcover/vegetation modification over Asia could cause large impact on Asian monsoon climate. Our research project has been assessing the influence of the human activities on a long-term variation in monsoonal precipitation qualitatively, through the investigation of the current

status by using long-range observational data and numerical experiments with a high-resolution climate models. These results are expected to contribute to assessment and prediction of economic/agricultural activities and measures for water resources and disaster alleviation in the Asian monsoon region associated with climate change in the 21st century.

Asian Precipitation-Highly-Resolved Observational Data Integration towards Evaluation of the Water Resources (APHRODITE's Water Resources) (FY2006-2008)

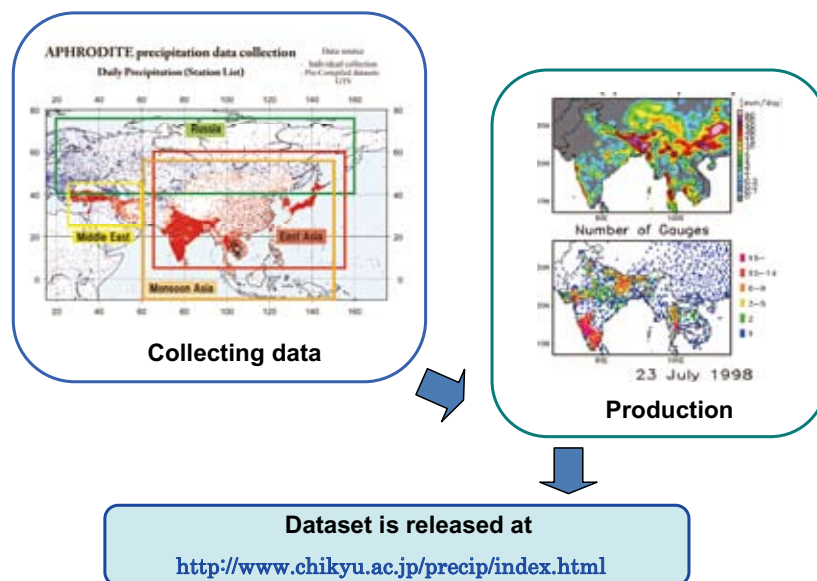
Principal Investigator : **Akiyo YATAGAI**, Research Institute for Humanity and Nature (RIHN)

<B-062>

RIHN, Meteorological Research Institute

The recent high-resolution General Circulation Models (GCMs) have allowed us to improve our understanding of the regional impacts of global warming on water resource. However observational datasets to validate such GCMs have not been developed. We propose to develop state-of-the-art daily grid precipitation datasets based on

long-term rain-gauge observations over Asia, and to assess the performance of GCMs. Our project will also highlight the importance of orographically-enhanced precipitation to the water resources. The gridded precipitation products developed by this project are released from the following web-page. (<http://www.chikyu.ac.jp/precip/index.html>)



Upgrading of GHG Inventory and Evaluation of Reduction Measures in Waste Sector

(FY2007-2009)

Principal Investigator : **Masato YAMADA**, National Institute for Environmental Studies (NIES) <B-071>

NIES, Ryukoku University, Osaka University

In order to achieve the reduction target on GHG emission in Japan, strategies for maximizing effects of several reduction measures should be considered. Moreover, it is important to promote the Clean Development Mechanism project in developing countries. Upgrading of the GHG inventory according to change in society and advancement in technology is basic for these activities. In this study, we are upgrading emission factors for waste disposal activities, revising emission factors from the waste water handling, evaluating methane reduction technologies for the Asian landfill and applying the life cycle assessment to integrated evaluation of reduction measures.

Research on the Feasibility to Estimate the GHG Emissions Reduction through Avoiding Deforestation

(FY2007-2009)

Principal Investigator : **Mitsuo MATSUMOTO**, Forestry and Forest Products Research Institute (FFPRI) <B-072>

FFPRI, Waseda University, The University of Tokyo

This study aims to examine the feasibility of REDD (Reducing Emissions from Deforestation in Developing Countries) from the technical viewpoints including methodology to estimate emission reduction and also from the socio-economic viewpoints including analysis of generation process and mechanisms. So far, a total monitoring scheme was designed to estimate emissions from deforestation and forest degradation for national level and regional level estimation, and incentive mechanisms were developed to distribute incentives from a government to local stakeholders. These results were provided for international discussion such as COP and SBSTA under the UNFCCC.

Evaluation of the Effect of Global Warming on Soil Respiration of Japanese Forest Ecosystems (FY2007–2009)

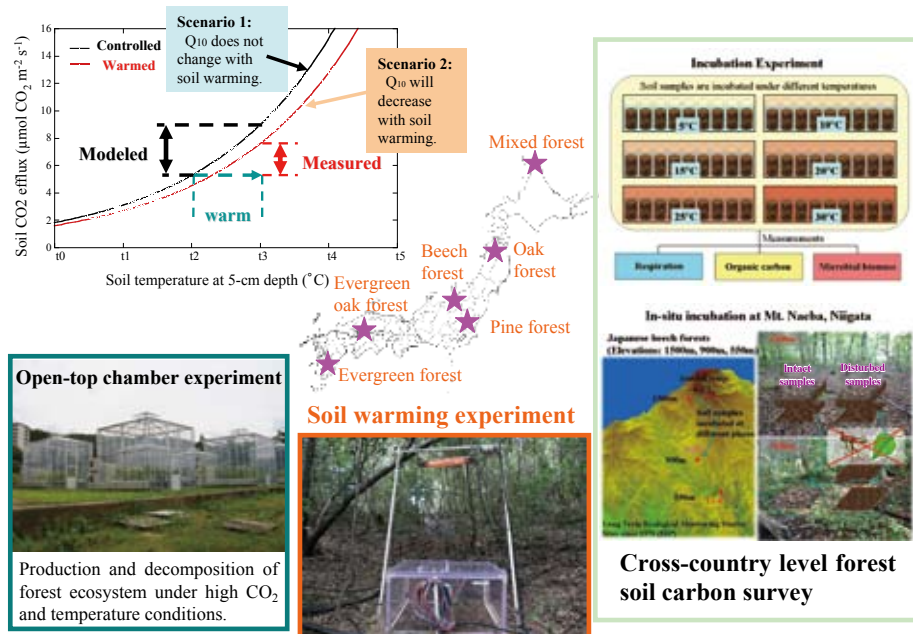
Principal Investigator : **Naishen LIANG**, National Institute for Environmental Studies (NIES)

<B-073>

NIES, Hokkaido University, Shizuoka University, Hiroshima University

Most of the carbon cycle models apply the exponential functions to predict the future global heterotrophic respiration with a Q_{10} of 2.0. In their models, global heterotrophic respiration increases exponentially with temperature increase at a rate of 6.2% per °C, and resulting that the current carbon sink of terrestrial ecosystem will convert to a carbon source after 2050. Our ultimate

objective is to estimate the carbon emission rate of whole Japanese forest soils under the climate change by using multi-approaches, including the soil warming experiment, open-top chamber facility, cross-country soil incubation and model simulation. Results are expected to improve the scientific basis of the post-Kyoto protocol as well as the IPCC 5th Assessment Report.



Development of a Method for Evaluating CDM Activities in Asian Countries (FY2007–2009)

Principal Investigator : **Eiichi ENDO**, National Institute of Advanced Industrial Science and Technology (AIST) <B-074>

AIST, University of Tsukuba

This study aims at developing a method to evaluate Clean Development Mechanism (CDM) activities in the next decades, focusing on investment in supply-side energy technologies in Asian countries, such as China. By combining energy system models of Japan and Asia and life

cycle assessment models, potential amount of CO₂ emission credit anticipated from those CDM activities will be discussed with their costs and benefits, in the light of the contribution of technology development to Japanese global environment policies.

Research on the Global Forest Carbon Monitoring System

(FY2008–2010)

Principal Investigator : **Yoshiki YAMAGATA**, National Institute for Environmental Studies (NIES) <B-081>

NIES, The University of Tokyo, Japan Aerospace Exploration Agency, Mitsubishi Research Institute, Inc.

The aim of this research project is to develop a system for mapping and monitoring of forest carbon stocks and of changes therein, through the synergetic use of in-situ networks and Earth Observation data. In particular, the project aims to assess the utility of using ALOS/PALSAR data to derive information about the status of the forest cover mapping and for identification and spatial quantification of changes in the forest cover as a result of deforestation, forest degradation and regeneration. The project also contributes to GEOSS (Global Earth Observation System of Systems) task.

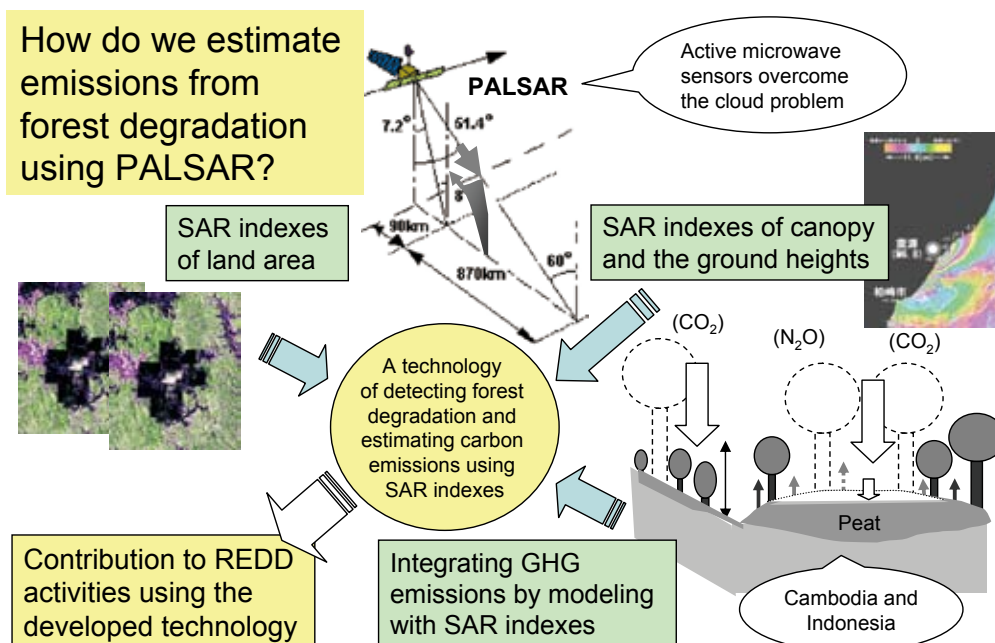
Development of the Forest Degradation Index and the Carbon Emission Estimation Method Using PALSAR Data

(FY2008–2010)

Principal Investigator : **Yoshiyuki KIYONO**, Forestry and Forest Products Research Institute (FFPRI) <B-082>

FFPRI, Japan Aerospace Exploration Agency, Hokkaido University

REDD (Reducing Emissions from Deforestation in Developing Countries) has been drawing international attention in Post-Kyoto climate negotiations as a new mechanism to foster reduction of deforestation in those countries. PALSAR is an active microwave sensor in the Japanese satellite "ALOS" and expected to monitor tropical forest with overcoming the cloud problem. Because feasibility of operational application of PALSAR data for detecting deforestation and degradation and estimating GHG emissions is still unclear, we will improve a technique using PALSAR and GHG modeling to give a new tool to monitor changes in GHG emissions in tropical forests including peat swamp forests.



Investigation of Physical and Chemical Properties of Aerosol by Advance Technologies for Improvement of Prediction of Climate Change (FY2008-2010)

Principal Investigator : **Yutaka KONDO**, The University of Tokyo

<B-083>

The University of Tokyo, National Institute for Environmental Studies, Chiba University

This study is aimed to investigate impacts of aerosol on climate by combining observations using advanced technologies and climate models. Microphysical processes of scattering and absorption of solar radiation by aerosol is to be fully understood by ground-based and aircraft observations. Greatly updated knowledge on aerosol optical properties is to be included in climate prediction models and estimation and prediction of aerosol radiative effects on global and Asian scales is to be greatly improved. Changes in radiation, cloud cover, and precipitation are predicted by performing numerical experiments using improved models. These results will be included in IPCC 5th report.

Experimental Study of Ocean Acidification Impact on Benthic Calcifiers (FY2008-2010)

Principal Investigator : **Yukihiro NOJIRI**, National Institute for Environmental Studies (NIES)

<B-084>

NIES, Kyoto University, Fisheries Research Agency, Advanced Industrial Science and Technology, University of the Ryukyus

According to the increase of atmospheric CO₂, ocean acidification has been started as the dissolution of CO₂ into surface seawater. Impact is expected to be serious for marine calcifiers, because they produce carbonate shell or skeleton. In this program, a precise CO₂ controlling system for culture of benthic calcifiers, such as sea urchin, shellfish and coral, will be operated to experiment the near future impact of CO₂ increase on the coastal marine animals.

Transboundary Pollution in the Atmosphere, Oceans and Inland Environments such as International Rivers

Network Observation of Dust and Sandstorm (DDS) in Northeast Asia and its Applications to Real-Time Forecast, Analysis of the Kosa Movement, and Evaluation of the Effects on the Movement (FY2006-2008)

Principal Investigator : **Masataka NISHIKAWA**, National Institute for Environmental Studies (NIES) <C-061>

NIES, Kyushu University, Saitama University

Mineral dust in the atmosphere has huge effects on the global environment. The mineral dust generated from arid areas in the interior of China and Mongolia is known as kosa aerosol (Asian mineral dust). The number of kosa events occurring in Northeast Asia has increased significantly, as have the associated environmental and social effects for Northeast Asian countries. We analyzed Asian dust events in the spring of 2007 using the NIES-lidar network data and CFORS. The dust season was unusually late in 2007, and the event in the end of May was a record late event. A four-dimensional variational

(4D-VAR) data assimilation system for a regional dust model was applied to a heavy dust event which occurred between 30 March to 4 April 2007 over eastern Asia. The heavy dust event was caused by the heavy dust uplift flux over the Gobi Desert during those days. We obtained the total optimized dust emissions of 57.9 Tg (57.8% larger than before assimilation). The results of lidar network monitoring have been also provided as part of the kosa information in a trial web service (<http://soramame.taiki.go.jp/dss/kosa/>) offered by Ministry of the Environment.

Predicting the Impacts of Increasing Surface Ozone Concentration in East Asia: Risks to Vegetation and Losses of Agricultural Crops

(FY2006-2008)

Principal Investigator : **Kazuhiko KOBAYASHI**, The University of Tokyo <C-062>

The University of Tokyo, National Institute for Agro-Environmental Sciences, Japan Agency for Marine-Earth Science and Technology, Tokyo University of Agriculture and Technology, Ehime University

Surface ozone concentration is rising rapidly in East Asia due to increasing emission of nitrogen oxides and other pollutants. This raises serious concerns about the risks in vegetation and losses of crop production in this region, which constitutes the world's largest crop production area. In this program, we will conduct field observations of ozone deposition to vegetation, computer simulation of surface ozone formation

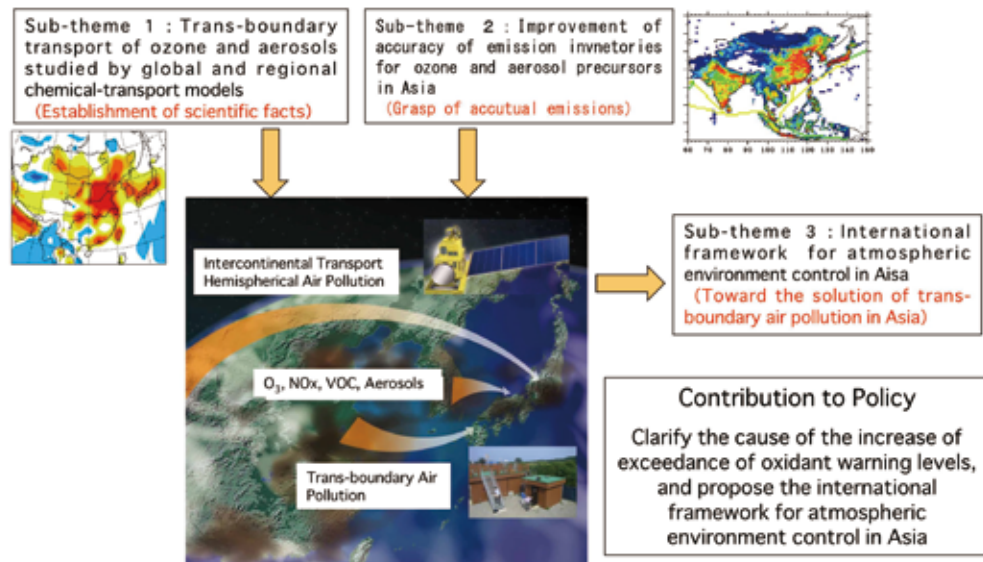
and transport, and field experiments of the crop losses. Combining the results of these studies, we have estimated that China has already experienced a large crop loss in wheat, whereas the crop loss in rice will increase greatly in the near future. These findings will underpin scientifically the policy-making efforts toward the air quality control across East Asia.

Studies on Long-Range Trans-Boundary Transport of Ozone and Aerosols in East Asia (FY2008-2010)

Principal Investigator : **Hajime AKIMOTO**, Japan Agency for Marine-Earth Science and Technology (JAMSTEC) <C-081>

JAMSTEC, National Institute for Environmental Studies, Kanazawa University

The aims of this project are to provide more accurate scientific knowledge on ozone and aerosol pollution by quantifying inter-continental transport in the northern hemisphere, trans-boundary transport in East Asia, and in situ formation in Japan, and to study a framework for international cooperation to solve the trans-boundary air pollution issue. In order to accomplish these goals, the following sub-themes are conducted; (1) analysis of ozone and aerosols pollution in East Asian and hemispherical scales by using chemical transport models, (2) sophistication of emission inventory in Asia based on observational data, (3) studies on a framework for atmospheric environment management by international cooperation in East Asia. Contribution to planning of policy for the transboundary pollution issue will be made based on the research output.



Study on the Prediction of Acidification and Nitrogen Leaching in East Asia Ecosystems with a Catchments Scale Model (FY2008-2010)

Principal Investigator : **Junko SHINDO**, National Institute for Agro-Environmental Sciences (NIAES) <C-082>

NIAES, Acid Deposition and Oxidant Research Center, The University of Tokyo

The emission rate of acidic substances is considered to increase over the next several decades in East Asia. In order to predict the acidification and nitrogen leaching of East Asian ecosystems, input, internal cycle and leaching of acidic substances are monitored in tropical region where such data are lacking, and a catchment scale model of elements cycle is developed. Land-use changes caused by biofuel production etc. and induced changes in acidic deposition are taken into account. This study will support EANET monitoring by providing basic data and an improved evaluation method, and will contribute to the air quality and ecosystem management in East Asia.

Study on Transboundary Pollution of POPs in Eastern Asia Region and its Countermeasures (FY2008-2010)

Principal Investigator : **Masatoshi MORITA**, Ehime University <C-083>

Ehime University, National Institute for Environmental Studies, United Nations University

The aim of the study is to prevent transboundary pollution by persistent organic pollutants (POPs) from rapidly industrializing east Asian countries. Research project includes development of monitoring method, retrospective analysis for trend analysis, simulation model for understanding transport and fate, and preparation of scenario for pollution reduction in co-operation with scientists from Asian countries and United Nations.

Study on the Ecological Deterioration of East Asian Marginal Seas due to the Anthropogenic Change in Effluent Nutrient Ratio (FY2006-2008)

Principal Investigator : **Akira HARASHIMA**, National Institute for Environmental Studies (NIES) <D-061>

NIES, Fisheries Research Agency, Hiroshima University

Combined effects of the increase in the discharge of nitrogen and phosphorus to the sea and the decrease of natural flow-down of silicon due to damming of rivers will be advantageous to the non-siliceous phytoplankton such as dinoflagellates (potentially harmful) but not to siliceous diatoms (mostly benign). Such a change will further fuel the food web including the jellyfish. Based on the ecosystem model, marine observation and vast review of existing papers, we are verifying this presumed scenario plus another anthropogenic factor that the damming also hampers the discharge of clay minerals and silts, which will alter the process of sedimentation and burial of particulate organic matters and therefore enhance the eutrophication.

East China Sea Marine-Litter Prediction Experiment Conducted by Citizens and Researchers (FY2007-2009)

Principal Investigator : **Atsuhiko ISOBE**, Ehime University <D-071>

Ehime University, The University of Tokyo, National Institute for Land and Infrastructure Management, National Institute of Advanced Industrial Science and Technology

The temporal variability of the marine-litter amount has been investigated at a Goto-Island beach by voluntary civic organizations together with oceanographers. Based on these data, the oceanographers try to specify major marine-litter sources using a numerical simulation model, and forecast the litter amount. In addition, the oceanographers using ocean radars and aerial photography attempt to establish marine-litter monitoring methods. Information of the marine-litter sources will be available for public awareness to reduce its occurrence. On-board marine-litter recovery procedures will be proposed using the forecast system developed in this project.

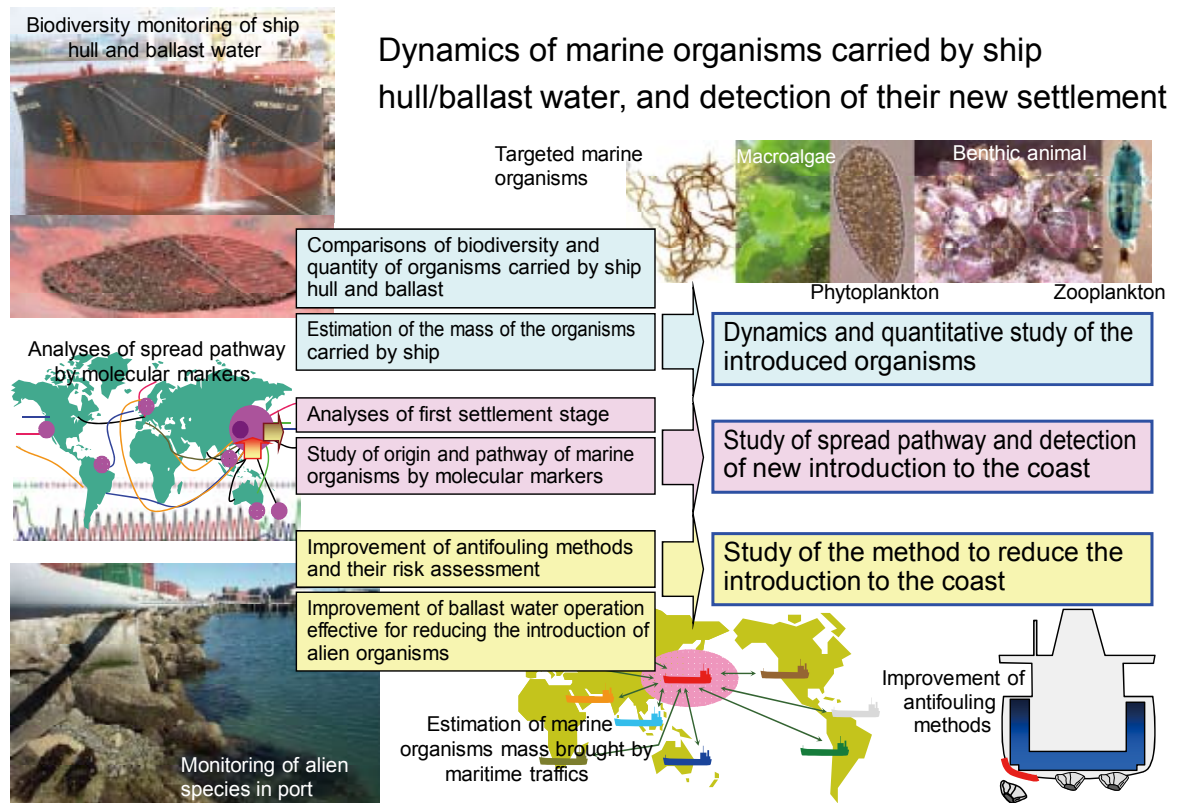
Dynamics of Marine Organisms Carried by Ship Hull/Ballast Water, and Detection of their New Settlement (FY2007-2009)

Principal Investigator: **Hiroshi KAWAI**, Kobe University

<D-072>

Kobe University, National Institute for Environmental Studies, Hiroshima University, Marine Ecological Institute, Inc., Chiba University, The University of Tokyo, Tokai University

In order to assess the contributions of large-scale cargo ships for intercontinental introductions of marine organisms, we have been monitoring the biodiversity and succession of the biota in the ballast tanks and ship hulls of bulk carriers, as well as investigating the biodiversity of introduced organisms in their ports of call for elucidating the early settlement processes. The resulting data will provide a valuable basis for drawing up guidelines to reduce or prevent species introductions, and to contribute to the conservation of the coastal ecosystems of Japan as well as the countries trading with Japan by ship transportation.



Conservation and Recovery of Large-Regional Ecosystems

Impacts of Invasive Alien Species on Biodiversity and Fragile Ecosystems in the Oceanic Ogasawara (Bonin) Islands (FY2005-2009)

Principal Investigator : **Isamu OKOCHI**, Forestry and Forest Products Research Institute (FFPRI) <F-051>

FFPRI, Tokyo Metropolitan University, Tohoku University, Kanagawa Prefectural Museum of Natural History, Japan Wildlife Research Center, Institute of Boninology

The objective of the project is to develop techniques for mitigating invasive alien species by studying their impacts on biodiversity in Ogasawara, where invasive species are thought to destroy native fauna and flora, as has happened in other oceanic islands including the Galapagos Islands. While an oceanic island may become a treasure trove of endemic organisms resulting from evolutionary processes without disturbance thanks to isolation from continents since the dawn of time, the island ecosystem is fragile for the same reason. Invasive alien species affect the entire ecosystem in Ogasawara through predation, interspecific competition, pollination and seed dispersal. By studying the mechanism of impact and techniques for eradicating invasive species and by proposing mitigation techniques focusing on gene conservation and rearing methods, we expect to contribute to policies for conserving ecosystems in Pacific oceanic islands. We also aim to contribute to restoration projects in the Ogasawaras for World Heritage nomination.

Search for Measures to Prevent the Extinction of the Great Apes Based on Natural and Social Sciences (FY2006-2008)

Principal Investigator : **Toshisada NISHIDA**, Japan Monkey Centre <F-061>

Japan Monkey Centre, Hayashibara Biochemical Labs., Inc., Meiji Gakuin University, Kyoto University

To save the great apes from extinction, this study aims to formulate realistic conservation action plans relevant to local conditions, and to propose a global policy for the great ape conservation. Research consists of survey of ape distribution and population density, monitoring of health conditions of apes and humans, and investigation of the forest use by human inhabitants. We also appraise the effect of some conservation measures after their practice, including study of regeneration of fragmented forests, ecotourism and community conservation. So far, we have estimated the population density of orangutans at Danam Valley, clarified the villagers' methods of acquisition and use of animal proteins from African forests, identified human metapneumovirus from chimpanzee feces, and compared the effect of hexatube with cutting methods for protection of seedlings in reforestation.

Investigation on the Route of Transmission and Infectious Risk of West Nile Virus and Blood Parasites by Migratory Birds (FY2006-2008)

Principal Investigator : **Takashi KUWANA**, National Institute for Environmental Studies (NIES) <F-062>

NIES, Nihon University, Rakuno Gakuen University

The epidemiological survey was performed on vector-borne diseases, West Nile Virus (WNV) and blood parasite in migratory shorebirds and resident birds including endangered birds to evaluate its outbreak possibility. There were no positive cases of WNV. However serum samples of ducks had N-antibodies against Eg-101 (WNV). In addition, more than 25 strains of avian malaria were detected from the migrating and resident birds. The same strain of avian malaria was found in migratory shorebirds and Japanese crane in Hokkaido. This result suggested that vector-borne diseases could spread from migratory shorebirds to resident birds in Japanese wetlands if migratory shorebirds carried some pathogenic agent transmitted by blood sucking insects.

Sustainable Management of Tropical Production Forests with the Economic Incentives of Carbon Sequestration and Biodiversity Conservation (FY2007-2009)

Principal Investigator : **Kanehiro KITAYAMA**, Kyoto University <F-071>

Kyoto University, Forestry and Forest Products Research Institute, Tokyo University of Agriculture, Research Institute for Humanity and Nature

A vast area of production forests, which are designated for permanent commercial timber production, exists in the Southeast Asian equatorial tropics. These production forests function also as the reservoir of endangered wildlife. A sustainable forest management that is harmonized with conservation is sought. We investigate the improved management effects of reduced-impact logging in conservation and carbon sequestration in Sabah, Malaysia. If improved effects are legitimately evaluated, these will become additional economic incentives so that the sustainable forest management is better adopted in a wider area.

Developing a Sustainable Program for the Recovery of Wild Japanese Crested Ibis and Public Consensus Strategy (FY2007-2009)

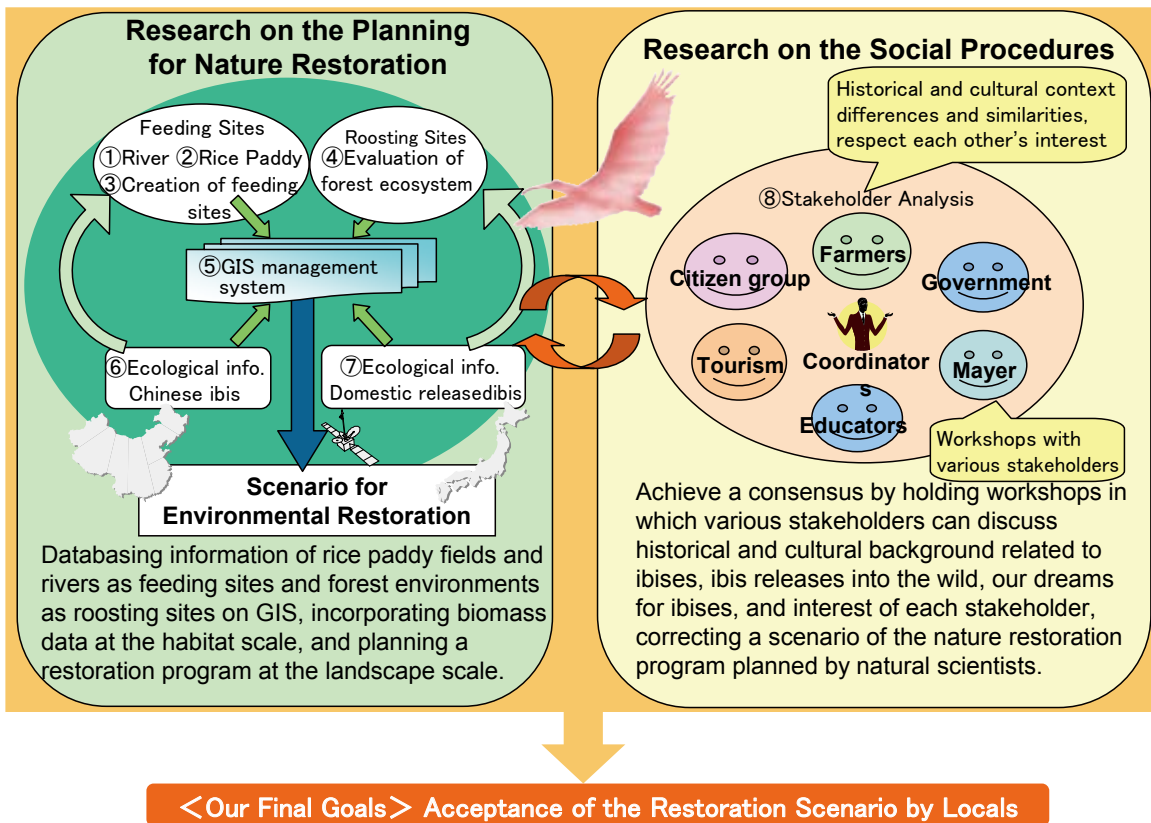
Principal Investigator : **Yukihiro SHIMATANI**, Kyushu University

<F-072>

Kyushu University, The University of Tokyo, Niigata University, Saitama University, Yamashina Institute for Ornithology, National Institute for Environmental Studies, Tokyo Institute of Technology

The captive propagation effort for the Japanese crested ibis (*Nipponia nippon*) on Sado will begin experimental release in 2008, aiming at colonization of 60 captive-bred birds in the wild by 2015. The goals of this study are to develop a naturally valid and socially feasible and sustainable program for restoring the wild Japanese crested

ibis and to allow the program to be accepted by the local society. This study will be conducted as collaboration between natural and social scientists addressing both restoration design and the social process to reach public consensus on the restoration program.



Soil Biodiversity and Ecosystem Functioning

(FY2007-2009)

Principal Investigator : **Nobuhiro KANEKO**, Yokohama National University

<F-073>

Yokohama National University, Hokkaido University, Ibaraki University, Shizuoka University, Kyoto University

Soils play a multi-functional role in providing essential ecosystem services such as mediating global nutrient and water cycles, water purification, primary production, carbon sequestration and buffering environmental disasters. Many of these ecosystem functions are probably sustained by a diverse soil biological community, however, there is a lack of evidence to support this argument. We will study the relationship between soil biodiversity and ecosystem functioning in soils

and propose that the conservation of soil biodiversity is essential to maintaining soil quality. We revealed that some earthworm species exploit aged soil carbon, and microbial community structure has been affected by gut passage. Casts become water stable aggregate and showed high methane decomposition, and carbon sequestration. Thus microbial and faunal diversity can be linked to nutrient cycling.

The Study for Assessment and Control of Ecological Risks Caused by Invasive Alien Parasites

(FY2008-2010)

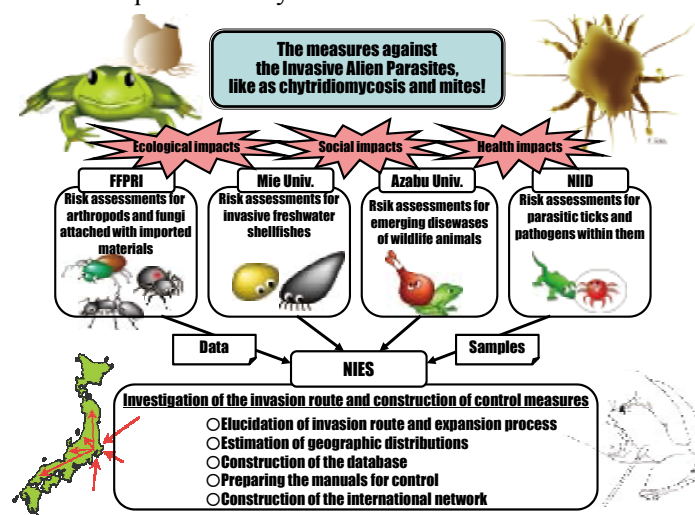
Principal Investigator : **Koichi GOKA**, National Institute for Environmental Studies (NIES)

<F-081>

NIES, Forestry and Forest Products Research Institute, National Institute of Infectious Diseases, Mie University, Azabu University

In this study we aim to reveal the actual conditions of the invasion caused by invasive alien parasites. And we will assess the ecological and health risks of the invasive alien parasites through accumulation of their biological information. We will investigate their invasion route and estimate the process of their distribution expansion based on not only ecological aspects but also socio-economical aspects. From these results we will devise actual control and quarantine systems.

Furthermore we will work in cooperation with the institutes of Asian countries for constructing international-network of control of invasive alien parasites. Finally this study will provide the scientific bases for reinforcement of law and quarantine systems against the invasive alien parasites those will increase more and more accompanied with the globalization of economy and global climatic changes.



Conservation Strategy Based on Regional Reef Connectivity and Environmental Load Assessment in SEA-WP Region (FY2008-2010)

Principal Investigator : **Kazuo NADAOKA**, Tokyo Institute of Technology

<F-082>

Tokyo Institute of Technology, National Research Institute of Fisheries and Environment of Inland Sea Fisheries Research Agency, Japan Agency for Marine-Earth Science and Technology

The South East Asia and West Pacific (SEA-WP) region is a significant reservoir of the world's richest marine biodiversity, but is deteriorating in its coastal ecosystems due to various environmental threats. For providing a proper conservation strategy, this study aims at clarifying regional reef connectivity in SEA-WP region and thereby identifying important candidate areas to be properly managed as Marine Protected Areas (MPAs), based on numerical simulations on larval dispersal, molecular biological analysis on meta-population dynamics and others.

Study on Progress of Ocean Acidification and its Effect on Structure and Function of Microbial Community (FY2008-2010)

Principal Investigator : **Takeo HAMA**, University of Tsukuba

<F-083>

University of Tsukuba, Meteorological Research Institute, Japan Hydrographic Association

Ocean has been absorbing about half of CO₂ emitted to atmosphere by combustion of fossil fuel. The concentration of CO₂ in the ocean is increasing year by year as well as atmospheric CO₂, suggesting that ocean acidification is proceeding steadily. In the present study, we will develop a new analytical instrument to measure the acidity of seawater with high accuracy and build up database on the ocean acidification by combining the numerous data that have been reported so far. The effect of ocean acidification on the structure and function of marine microbial community also will be evaluated. The results of our study will be likely reflected in the environmental policy to reduce the emission of anthropogenic CO₂.

Desertification Control and Restoration of Ecosystem Services in Grassland Regions of North-East Asia (FY2007-2009)

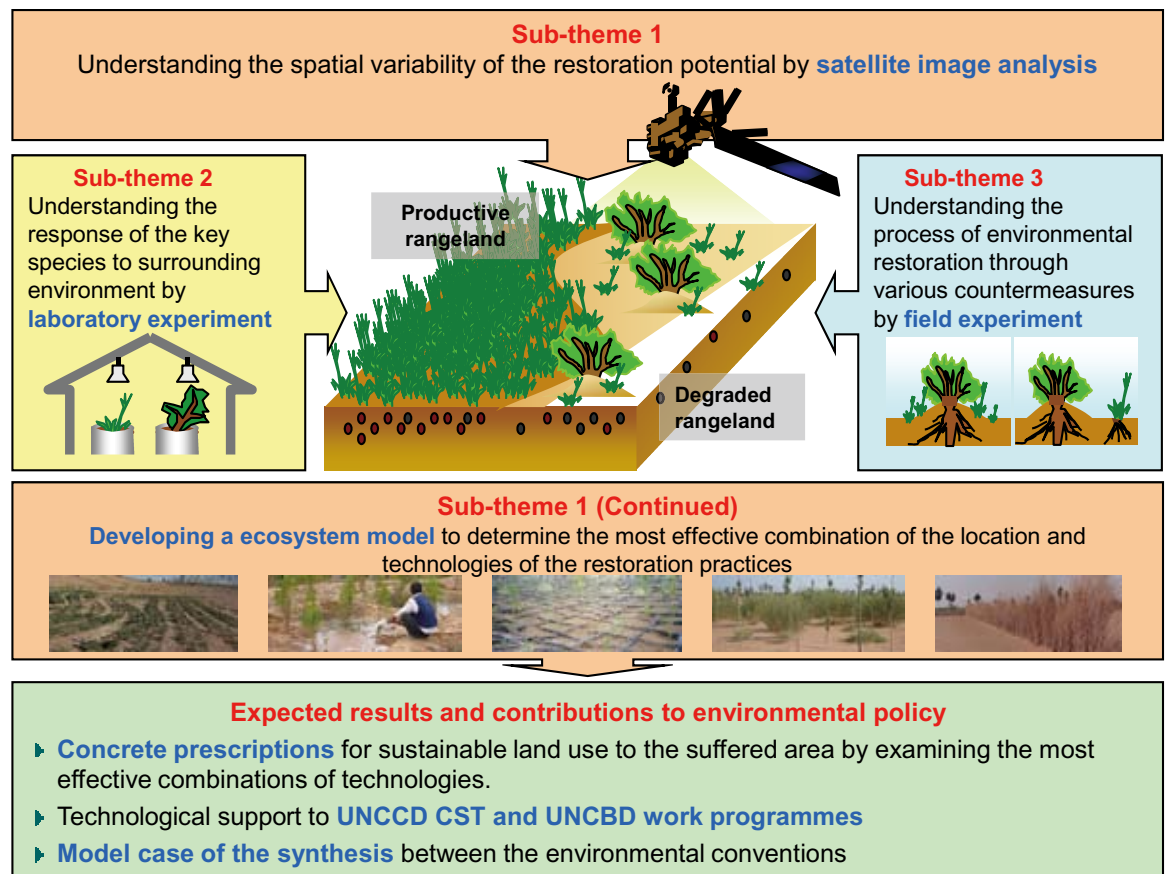
Principal Investigator : **Toshiya OKURO**, The University of Tokyo

<G-071>

The University of Tokyo, Okayama University, National Institute for Environmental Studies

This study aims to provide a guideline for the ecosystem restoration and the sustainable resource use in the rangelands of North-East Asia. We will provide the scientific evidences of that to where, and which combination of countermeasures can provide the most effective restoration and sustainable land management. This can contribute directly to the desertified land as

the concrete prescription for desertification, to United Nations Convention to Combat Desertification, and UN Convention on Biological Diversity. Last year we evaluated the facilitation effect on ecosystem restoration, and developed the methodologies of large-scale monitoring of vegetation types.



Sustainable Societies and Policies for their Implementation

Productivity, Clothing, Energy Conservation and Indoor Environment in 28°C Office (FY2006-2008)

Principal Investigator : **Shin-ichi TANABE**, Waseda University <H-061>

Waseda University, National Institute of Advanced Industrial Science and Technology, Shibaura Institute of Technology, Musashi Institute of Technology







To evaluate the effects of and to search for the best practices of offices with 28°C settings in summer, the economical effects and the energy conservation are discussed in this project. Experiments and field surveys are conducted to quantify the effect of indoor environmental quality on office workers' performance. Productivity Evaluation Tools were developed. A wide variety of clothing thermal resistance, including the effect of air movement, was collected. From a simulation, modifying the cooling preset temperature to be 2°C higher would result 1.64% reduction in the annual primary energy consumption. The installation of the environmental control technology such as personal ventilation systems and COOL BIZ are under evaluation.

Research on Evaluation for Design and Achievement of Sustainable Development Scenario with Cooperation between Institution and Technology (FY2006-2008)

Principal Investigator : **Tatsuyoshi SAIJO**, Osaka University <H-062>

Osaka University

This research aims to design a sustainable social institution by making mutual feedbacks from both social science and engineering insights upon covering the imperfectness of ignoring technological and regional characteristics in the traditional institution for solving the environmental problems. For this purpose, we apply experiential field survey in Shanghai to investigate preferences between solar panels and solar water heaters. Japanese prefer the solar panel, Chinese the solar water heater. To cope with the global warming, we believe that diffusing the solar water heater in the civilian sector in China has an important role.

Solar Panels vs. Solar Water Heater			
	Name	Solar Panels	Solar Water Heater
 Preferences with no information	Image		
	Cost	1,000,000 yen	200,000 yen
	Add information on the environment		
 Preferences with specific information on the environment	Image		
	Cost	1,000,000 yen	200,000 yen
	Abatement of CO ₂	1200kg/year	380kg/year
	Saving Cost	69,000 yen/year	28,000 yen/year

Evaluation and Alleviation of Environmental Burden due to Economic Development in Asia-Pacific Rural Areas (FY2006-2008)

Principal Investigator : **Chiho WATANABE**, The University of Tokyo

<H-063>

The University of Tokyo, Prefectural University of Kumamoto

Most of the rural regions in Asia-Pacific countries undergo a very rapid transition from traditional subsistence to cash-economy agriculture. Such transition entails introduction and release-accumulation of chemical substances, such as pesticides and food additives, into the local ecosystem, which in turn would affect not only the health and survival of the inhabitants, but also

the safety of local produce. Choosing seven areas from six Asia-Pacific countries, we will describe such transition and its environmental consequences in detail. The data collected so far suggested that intra-country differences might be greater than inter-country differences in terms of the effect variables.

Study on Architecture and Process for a Multilateral Agreement on International Climate Policies beyond 2012 (FY2006-2008)

Principal Investigator : **Yasuko KAMEYAMA**, National Institute for Environmental Studies (NIES) <H-064>

NIES, Tokyo Institute of Technology, University of Hyogo, Ryukoku University, Waseda University, Institute for Global Environmental Strategies

The Kyoto Protocol sets emission targets only for years between 2008 and 2012, and targets for years beyond it need to be determined in the near future. The objective of this study is to come up with a concrete proposal for future climate regime beyond 2012. Such a proposal includes not only a final comprehensive picture of an international

institution, but also a negotiation process to achieve an international agreement on such an institution, as well as linkages with other international/domestic activities related to climate mitigation/adaptation activities, such as that of G8 and Asia-Pacific Partnership (APP).

Strategic Policy Scenario Design for Sustainable Urban and Industrial System Based on the Integrated Environmental Flux Assessment for Water, Resource and Energy Circulation (FY2007-2009)

Principal Investigator : **Tsuyoshi FUJITA**, National Institute for Environmental Studies (NIES)

<H-071>

NIES, National Institute of Advanced Industrial Science and Technology, Keio University

This research project aims to develop an evaluation system to quantitatively assess environmental flux considering spatiotemporal distribution of water, resources, energy and GHG emission resulting from urban and industrial activities, which, then, could be utilized to evaluate present situation and the potential of ecosystem services under the constraints and

interactions with urban and industrial activities. The prototype of integrated environmental flux assessment system was developed in collaboration with municipal government and policy scenarios were tentatively evaluated to maximize the urban contribution for global environmental improvement.

Strategies for Sustainable National and Urban Spatial Configuration

(FY2007-2009)

Principal Investigator : **Yoshitsugu HAYASHI**, Nagoya University

<H-072>

Nagoya University, Kagawa University, Utsunomiya University, Toyohashi University of Technology

This project aims at exploring a new national and urban planning concept and relevant policy measures to realize financially and socially sustainable national and urban areas in Japan with consideration of mitigation of global warming and adaptation to climate change. A systematic framework for the evaluation of national and urban sustainability is developed by integrating the models for estimating environ-

mental load from human activities, quality of life in residential areas, cost for maintaining built-up areas within land use and transport planning scopes. Appropriate sustainable structure of national and urban areas and relevant policy implementations corresponding to post-Kyoto protocol are proposed to reduce GHG emissions and to deal with likely effects of climate change.

Developing Integrated Methods for the Evaluation of Forest Ecosystem Services in order to Contribute to "Satoyama Initiatives"

(FY2008-2010)

Principal Investigator : **Ken SUGIMURA**, Forestry and Forest Products Research Institute (FFPRI) <H-081>

FFPRI, University of Tsukuba, Kobe University

Various ecosystem services, such as provision of food and other resources, pest control, pollination, scenic beauty, have been rapidly degraded along with the decline of biodiversity. We study habitat conditions for the relevant group of species, how much forest landscapes are capable of providing these services, local people's utilization of these services, anthropogenic effects on

these services and so forth. Then, we develop integrated evaluation methods in terms of economic scale and attempt to find appropriate management options for the sustainable effective utilization of these services. This study is aimed at contributing to the meeting of the Convention on Biological Diversity in 2010.

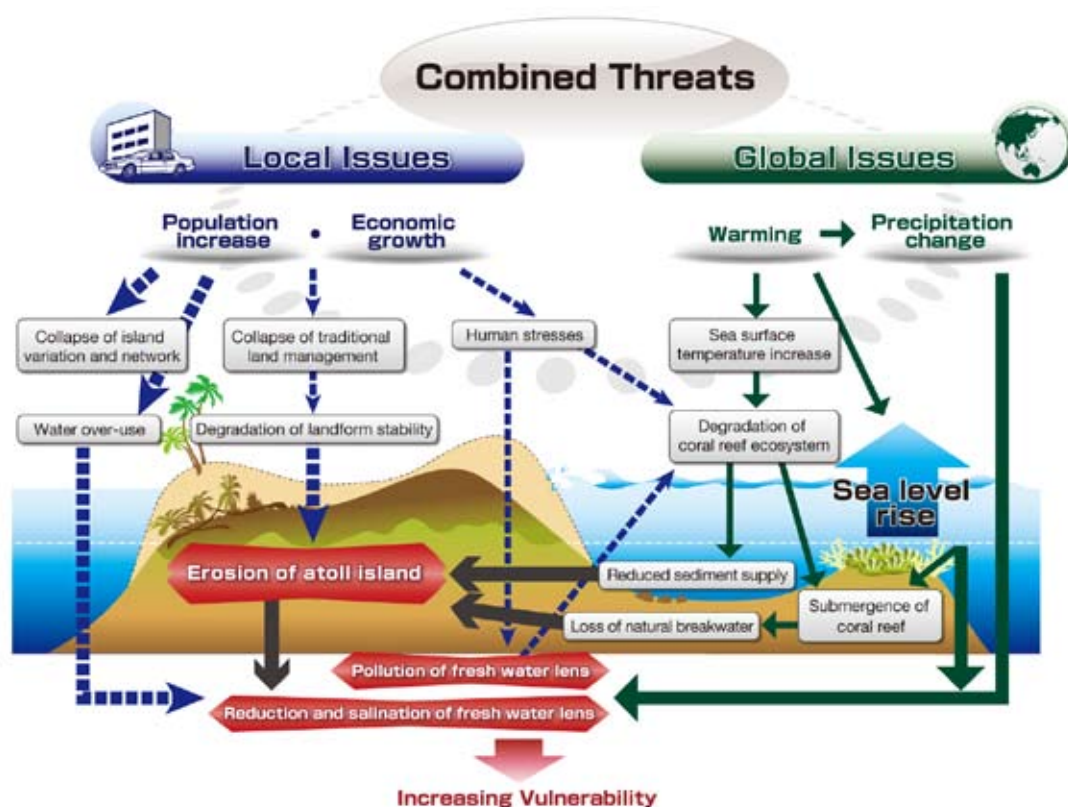
Wise Adaptation to Climate Change –Special Recruitment Division–

Adaptive Measures to Changes in Geomorphology and Water Resources on Atoll Island Countries (FY2008-2010)

Principal Investigator : **Hiroya YAMANO**, National Institute for Environmental Studies (NIES) <Ba-085>

NIES, The University of Tokyo, Keio University, Ochanomizu University, Ibaraki University, Research Institute for Humanity and Nature

Small island countries established on coral atoll are vulnerable to climate change and sea-level rise caused by global warming. In this project, carrying capacity of the countries will be estimated by analyzing the history of geomorphic development, precipitation variability and human settlement. The vulnerability to climate change, sea-level rise and changes in social structure will be assessed based on the changes in the carrying capacity. Based on these results, adaptive measures to both coastal erosion and degradation water resources in response to global warming will be proposed from the viewpoint of both scientific and social perspectives.



Assessment of Combined Effects of Increase in Temperature and Ozone Concentration on Rice Production and Quality, and its Application for Mitigation of Food Supply Risk in Asian Countries (FY2008-2010)

Principal Investigator : **Yoshihisa KOHNO**, Central Research Institute of Electric Power Industry (CRIEPI) <Ba-086>

CRIEPI, National Institute for Environmental Studies, Center for Environmental Science in Saitama

Increase in temperature accompanied by recent global warming may have potential to affect plant productivity through the increase in toxicity of tropospheric ozone. Rice plants are the most important crop for food supply in Asian countries. We will identify sensitivities of Asian rice varieties to combined effect of temperature and ozone. Proteome and transcriptome analysis will be performed to identify stress-induced proteins and/or genes for developing a novel diagnostic tool. These activities will support to propose a sustainable and feasible adaptation for reducing a risk of Asian food security.

Evaluating the Vulnerability of Agro-Environment in a Cold Region to Climate Change and Developing Adaptation Practices by Snow and Soil Frost Control (FY2008-2010)

Principal Investigator : **Tomoyoshi HIROTA**, National Agricultural Research Center for Hokkaido Region (NARCH) <Ba-087>

NARCH, Hokkaido University

Seasonally frozen soil has occurred widely in the Eastern Hokkaido, which is one of the largest agricultural regions in Japan. Agricultural productivity in cold regions is expected to increase due to climate warming. However, with the recent reduction of soil-frost depth, we have observed increasing weed problem and changing in the transport of soil water and dissolved solutes such as nitrogen in our study region. Extremely large amount of N₂O also may emit during snowmelt season. In this study we focus on nitrogen dynamics and evaluate the vulnerability of agro-environment in a cold region to climate warming. We will also develop sustainable adaptation measures for managing both increase in agricultural productivity and the protection of environmental by snow and soil frost control.

Impact Assessment of Global Warming on the Circulation and Ecosystem of Large Lakes (FY2008-2010)

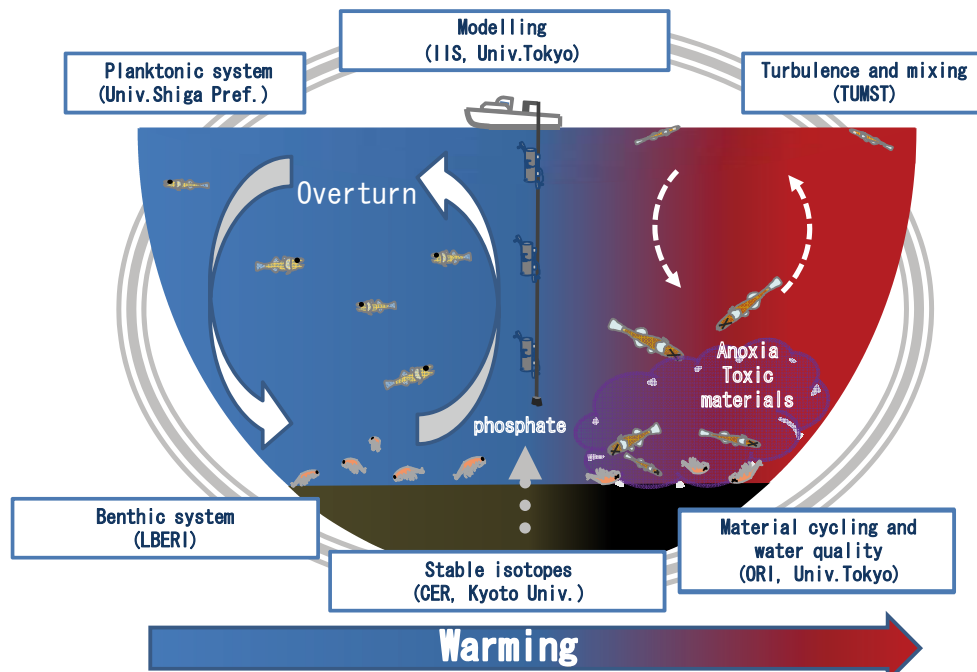
Principal Investigator : **Toshi NAGATA**, The University of Tokyo

<Fa-084>

The University of Tokyo, Tokyo University of Marine Science and Technology, Lake Biwa Environmental Research Institute, The University of Shiga Prefecture, Kyoto University

Lake Biwa, the largest lake in Japan, is known as a hot spot of freshwater biodiversity. Global warming now threatens the lake's ecosystem. Reduced vertical mixing due to warming may reduce the oxygen supply to deeper layers, which in turn may result in the extinction of benthic fauna and deterioration of water quality. The present study is aimed at constructing an ecosystem model of Lake Biwa to improve our ability to predict changes, in coming decades, of ecosystem processes. The obtained results are expected to aid in developing effective measures for adaptation and mitigation.

Warming may cause detrimental effects on large lakes such as Lake Biwa



In order to take effective measures for adaptation, it is urgently needed to improve our ability to predict changes in Lake Biwa.

Low-Carbon Society –Special Recruitment Division–

Research on Development of Integrated Scenarios on Climate Change and Assessment of Climate Policies Using Asia-Pacific Integrated Model (FY2008-2010)

Principal Investigator : **Toshihiko MASUI**, National Institute for Environmental Studies (NIES) <Bc-088>

NIES, Kyoto University, Mizuho Information & Research Institute, Inc.

This study develops the global and national scale integrated scenarios describing future socio-economic activities, greenhouse gas emissions, climate change, and climate change impacts by using the improved Asia-Pacific Integrated Model. The long term global scenarios reflect the Asian developing countries' perspectives. The outcomes are expected to contribute to enhancement of efforts to address the climate change in Japan and other Asian countries.

Biofuel Use Strategies for Sustainable Development (FY2008-2010)

Principal Investigator : **Kazuhiko TAKEUCHI**, The University of Tokyo <Hc-082>

The University of Tokyo, Osaka University, National Agricultural Research Center, United Nations University, Institute for Global Environmental Strategies

Although increased use of biofuels is expected to have advantageous effects such as CO₂ emissions reduction, it becomes the target of criticism because there is a possibility that it has some adverse impacts on environment as well as food supply. Therefore comprehensive analyses and assessments are required to achieve sustainable societies by means of appropriate use of biofuels. The principal goal of the research is to analyze problems related to biofuels and propose national, regional, and global strategies including policy options for biofuel use, with the focus on the Asia-Pacific region, through the approach of Sustainability Science. This interdisciplinary research is expected to contribute to international forums in considering sound use of biofuels.

Scenarios and Policies Proposal for Energy Saving in Residential/Non-Residential Buildings toward Creating a Low-Carbon Society (FY2008-2010)

Principal Investigator : **Shuzo MURAKAMI**, Building Research Institute <Hc-083>

Building Research Institute, Tokyo University of Science, Osaka University, Tohoku University, Keio University, Akita Prefectural University

There have been many studies for reducing energy consumption of residential and commercial buildings. However, the trend of energy consumption is still increasing. The objective of this work is to find the ways for drastic reduction of energy consumption in residential and non-residential buildings in terms of mid-/long-/ultra-long terms perspective. Various scenarios for reducing energy consumption will be investigated, based on the detailed database of energy consumption in buildings and various information such as future population, social system, building performance, popularization rate of facility equipment, ways of usages, introduction of energy efficiency regulations, etc. Furthermore, the projection trends in energy consumption based on the scenarios, with high accuracy, are estimated, and hence policies toward promoting the energy reduction into the practical application will be proposed.

EcoDesign of Low Carbon Society Based on Regional Partnership between Urban and Rural Areas (FY2008-2010)

Principal Investigator : **Yasushi UMEDA**, Osaka University

<Hc-084>

Osaka University, Hokkaido University, Ritsumeikan University

This study will indicate paths toward regional low carbonization by conceptualizing “systematic partnership between urban and rural areas” that creates regional circulation of energy and resources (e.g., biomass). By investigating and planning various pilot models in Japan and China, this study proposes three models; namely, technological innovation and development of low carbon industry in rural areas (industrial conjunction model), design of circulation of energy and resources through urban rural coalition (special

conjunction model), and political proposal for deploying technology and knowledge in Japan to low carbon pilot projects in China (international co-benefit model). These models and proposal of multi-beneficial scenarios, which realizes low carbonization, pollution prevention, and industrial development in China under the cooperation of Japan, will contribute to Japan’s environmental policies toward construction of the low carbon society.

Research on Socio-Technology System Planning for Biomass Utilization (FY2008-2010)

Principal Investigator : **Yuji NAKA**, Tokyo Institute of Technology

<Hc-085>

Tokyo Institute of Technology, Aomori Prefectural Agriculture and Forestry Research Center, Hirosaki University

In this research work, we are trying to build a Technological Information Infrastructure (TII) that can help in the development of a socio-technology system. This new socio-technology system will be used in building plans for various biomass resources utilization processes and provide different products based on the TII. A large number of conversion process and transportation UPs (Unit processes) are included in the

socio-technology system, there are many possible utilization configurations for a single or multiple biomass inputs. The TII enables us to investigate the different life cycles of different biomass utilization processes from resource collection to final disposal considering various stakeholders’ viewpoints such as, in more specific terms, the environmental and economical impacts of Aomori prefecture.

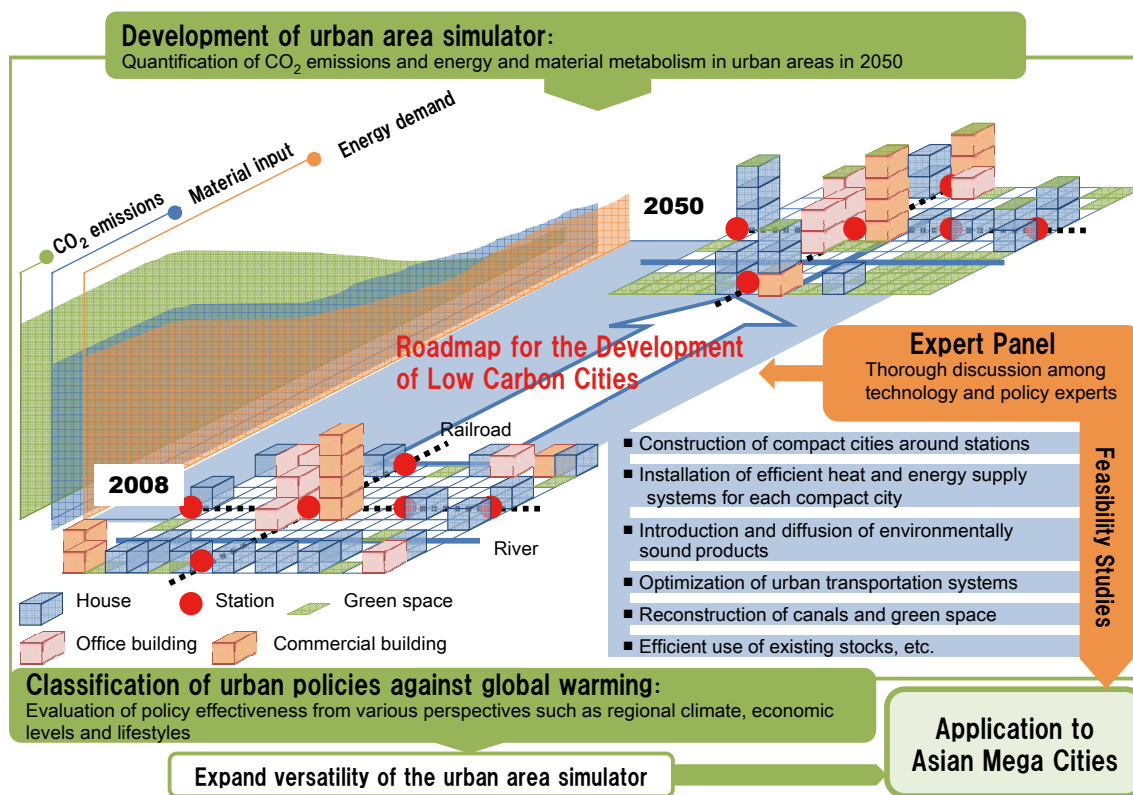
Study on the Strategic Urban Planning and Assessment of Low-Carbon Cities (FY2008-2010)

Principal Investigator : **Hidefumi IMURA**, Nagoya University

<He-086>

Nagoya University, National Institute for Environmental Studies

Urban commercial and transportation sectors bear great responsibilities to tackle global warming. Taking into account a substantial period of time and costs to restructure a once-built city of low efficiency and importance of assessing overall efficiency of the whole urban systems, this project develops methods to analyze impacts of policies and measures for a low carbon city and applies them to actual cities in Japan and Asia which has been recently experiencing rapid urbanization.



Assessment and Verification of CO₂ Reduction by Introducing Environmental Policies into Infrastructure Development (FY2008-2010)

Principal Investigator : **Takafumi NOGUCHI**, The University of Tokyo

<Hc-087>

The University of Tokyo, Kagawa University, Hiroshima University, The National Institute for Land and Infrastructure Management, Tokyo University of Science

The CO₂ emission from construction industry, which has regional characteristics, is estimated over 10% of the domestic total. Political strategies considering the characteristics are required to reduce CO₂ emission in construction industry. This research project is aiming at developing a system which can accurately simulate activities of construction industry and estimate environmental impact. The efficiency of political strategies is quantitatively evaluated using the simulation system, and the optimum strategies for each region are finally proposed.

Research on Simulation towards the Low Carbon Model City (FY2008-2010)

(FY2008-2010)

Principal Investigator : **Ben NAKAMURA**, Architectural Institute of Japan

<Hc-088>

Architectural Institute of Japan, The University of Tokyo, Nihon University, Tokyo Institute of Technology

This research project aims to design the adaptable urban space and life style to the issue of aging society, the shrinking population and the global warming of the year 2050, and to make the road map towards 2050. Five characteristic actual cities are selected as the Low Carbon Model City. Two of five cities are researched the detail, and estimated the amount of CO₂ in the cities and develop the reduction method over the discussion with the local residents. Result of the simulation to achieve the Low Carbon Model City is also expected to adapt to the other local governments and reveal a direction of development of green technology and goal of the society and urban development policies.

A Study on Climate Change Policy Options Scenarios in China and International Comparison (FY2008-2010)

(FY2008-2010)

Principal Investigator : **Yutaka TONOOKA**, Saitama University

<Hc-089>

Saitama University, The University of Kitakyushu, Tohoku University

In this study, we analyze climate change options and policies in China from a wide interdisciplinary viewpoint based on the detailed data analysis on energy matrix by province and emission models of greenhouse gases, precursors and several air pollutants. Under regional population, socioeconomic state, technologies, social capitals, transportation and logistics, international relations, human dimensions in urban and rural and so on, emission scenarios to 2030 would be compared. Regional structures in coastal-inland and urban-rural relations are also considered. Climate change policies would be evaluated with co-benefit elements, including air pollution control, productivity of resources and so on.

Revolutionary Research in Feasibility Studies Area

Assessment of Climate Change Using Self-Organizing Map

(FY2007-2008)

Principal Investigator : **Norihiko SUGIMOTO**, Keio University

<RF-070>

Keio University, Nagoya University

We propose a use of high speed spherical self-organizing map (HSS-SOM) to visualize climate variability as an alternative method to empirical orthogonal function analysis. We apply HSS-SOM to datasets of climate models to evaluate them for more reliable prediction of future climate change.

Study of the Influence of Anthropogenic Species in the Atmospheric Iodine Cycle on Global Warming

(FY2007-2008)

Principal Investigator : **Yukio NAKANO**, Hiroshima City University

<RF-071>

Hiroshima City University

In this study, we investigate the influence of anthropogenic species, such as nitrogen oxides and iodine compounds, on the atmospheric iodine cycle and the formation of atmospheric iodine aerosols. These chemical phenomena can be finally expected to affect global warming.

Study on Sampling and Identification of Kosa (Yellow Sand) Bioaerosols for the Investigation of Health Effects of Kosa Exposure in Japan

(FY2007-2008)

Principal Investigator : **Fumihisa KOBAYASHI**, Kanazawa University

<RF-072>

Kanazawa University, Prefectural University of Kumamoto, Kobe University

The goal of this study is the investigation of the behavior of Kosa bioaerosols, *i.e.* virus, bacteria, and fungus *et al.*, with the long-range transport of Kosa and the research on the potential of the health damage by pathogen in Kosa bioaerosols. We carried out the direct sampling of Kosa bioaerosols over the Kosa source region, Dunhuang, China, and obtained some bacteria and molds by separate culture and many DNA fragments of bacteria and fungi by the direct DNA analysis in Kosa bioaerosols. The direct sampling over Japan and the health damage by pathogen in Kosa bioaerosols will be investigated.

Development of Multivariate Analysis and a Neural Network Approach for Suspended Particulate Matter (SPM) and Air Pollutants (FY2007-2008)

Principal Investigator : **Junko KAMBE**, Edogawa University

<RF-073>

Edogawa University

For construction of good and safe human living space, we observe Suspended Particulate Matter (SPM) in mega cities of eastern Asia and Nagaryama city in Chiba. Applying multivariate analysis methods and neural network analysis, evaluation and integration of environmental parameters are being carried out using SPM observations and meteorological measurements in the human living space.

Development of Fine-Scale Substance Transport Measurement System for Assessing the Effect of Resuspension Event of Sea Bottom Sediment on Marine Environment (FY2007-2008)

Principal Investigator : **Yasuyuki NAKAGAWA**, Port and Airport Research Institute (PARI)

<RF-074>

PARI

Various substances are discharged into estuarine and coastal area through rivers. In order to estimate the effect of dispersion of contaminated sediments on marine environment a new system is under development to measure fine-scale substance transport.

Evaluation of the Ecological and Genetic Disturbances Caused by the Internal Invasions and Modeling of Risk Assessments on these Invasions (FY2007-2008)

Principal Investigator : **Norio ONIKURA**, Kyushu University

<RF-075>

Kyushu University, Gifu University

We aim to evaluate the ecological and genetic disturbances caused by internal invasions in this study. We have determined the present distributions of exotic fishes and detected the genetic disturbances caused by internal invasions in northern Kyushu Island before now.

Development of Rapid and High-Throughput Monitoring Methods for Detection of Microorganisms to Describe Complex Microbial Populations in Environment (FY2007-2008)

Principal Investigator : **Yuji SEKIGUCHI**, National Institute of Advanced Industrial Science and Technology (AIST)

<RF-076>

AIST

Quantitative detection of particular groups of microorganisms in environment is often required in environmental monitoring such as those for bioremediation. In this project, molecular techniques for quantitative detection of selected groups of microorganisms in environment are developed; special emphasis is put on RNA-based microbial monitoring.

Inter- and Intra-Generational Risk Trade-Offs and Sustainability

(FY2007-2008)

Principal Investigator : **Kenji TAKEUCHI**, Kobe University

<RF-077>

Kobe University, National Institute of Advanced Industrial Science and Technology, Konan University

This study aims to reveal people's evaluation on practical tool toward managing long-term global inter- and intra-generational risk reduction by environmental risks. stated preference techniques and suggest an

Study on Sustainable Supply and Demand Systems for Bio-Fuel in Asia

(FY2007-2008)

Principal Investigator : **Atsushi MARUYAMA**, Chiba University

<RF-078>

Chiba University, Research Institute of Innovative Technology for the Earth, INTAGE, INC.

The demand for biofuel is increasing in the world. demand system in terms of energy crop production. In the study, we examine critical factors necessary to establish a sustainable biofuel supply and tion, the local environment and fuel quality.

A Study on the Effects and Determinants of Corporate Environmental Activities

(FY2007-2008)

Principal Investigator : **Yuko KITORA**, Doshisha Women's College of Liberal Arts

<RF-079>

Doshisha Women's College of Liberal Arts, Osaka Gakuin University

The purpose of this study is to empirically and how actions related to such activities benefit the theoretically clarify what factors promote involved companies. corporate environmental and CSR activities and

Reconstruction of Past Water Isotopes Using Isotope Data from Corals and Atmospheric-Ocean General Circulation Model

(FY2008-2009)

Principal Investigator : **Yusuke YOKOYAMA**, The University of Tokyo

<RF-081>

The University of Tokyo, Japan Agency for Marine-Earth Science and Technology

Water oxygen isotopes will be reconstructed benchmark data to be used for inter models using coral samples to understand characteristics comparison which may will improve climate of Climate Models (Atmospheric-Ocean General Circulation Models). This will be an important projections.

Impacts of Global Warming and Ocean Acidification Reef Building Corals at Northern Latitude Limit in Japan (FY2008-2009)

Principal Investigator : **Tsuyoshi WATANABE**, Hokkaido University

<RF-082>

Hokkaido University, National Institute for Environmental Studies, Fukuoka University

Reef building corals growing at their latitudinal limit in Japan can provide an unique opportunity to reconstruct the recent histories of environmental changes. The goal of our project is to evaluate global warming and ocean acidification and it's impacts on coastal ecosystems.

Using Stable Water Isotope to Evaluate Hydrological Cycle of Climate Model (FY2008-2009)

Principal Investigator : **Naoyuki KURITA**, Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

JAMSTEC

Predictability of precipitation change using the climate model largely depends on how latest model can precisely reproduce present-day global precipitation field. In this project, the reproduc-

tivity of simulated present-day atmospheric circulation in Asia will be evaluated using novel dataset: stable water isotopes.

Investigation of Ultimate Source of Arsenic Found in Groundwater Contaminated with Arsenic in Bangladesh by Antimony Isotopic Ratio (FY2008-2009)

Principal Investigator : **Yoshio TAKAHASHI**, Hiroshima University

<RF-084>

Hiroshima University, Japan Agency for Marine-Earth Science and Technology

In this study, we develop a new method to identify ultimate source of arsenic in various contaminated area using antimony isotopic data, which will be applied to arsenic contaminated area in Bangladesh to verify whether the ultimate source of arsenic in Bangladesh is sulfide ores in Himalayas.

A Study on the Bioaccumulation of Mercury Using the Ecosystem of Yambaru Area as a Trial Model (FY2008)

Principal Investigator : **Izumi WATANABE**, Tokyo University of Agriculture and Technology

<RF-085>

Tokyo University of Agriculture and Technology, Kagoshima University, University of the Ryukyus

This study aim to elucidate the dynamics of mercury in the ecosystem using Yambaru area locating in Okinawa Island as a trial model and to investigate the bioconcentration process of mercury in the liver of Javan mongoose who is a specific accumulator of mercury.

Evaluation and Prediction of the Effects of Environmental Changes Based on the Diversity Profile of Phyllosphere Fungi (FY2008-2009)

Principal Investigator : **Hayato MASUYA**, Forestry and Forest Products Research Institute (FFPRI) <RF-086>

FFPRI, Kyoto University

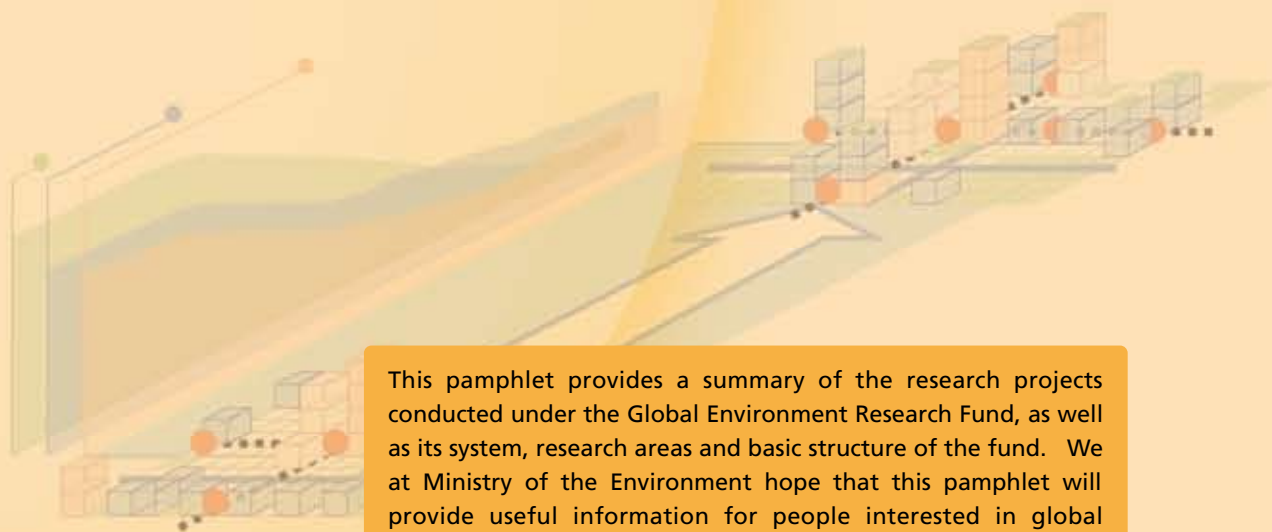
The objective of this study is to clarify the diversity of phyllosphere fungi on *Fagus crenata* and to show the effects of environmental changes to the fungal diversity. The knowledge obtained from this study will contribute to construct a system assessing and forecasting the response of Japanese beech forests to environmental changes.

Study on Consumers' Behavior that can Fulfill both Satisfactory Progress in Our Everyday Life and Mitigate CO₂ Emissions (FY2008-2009)

Principal Investigator : **Yuki KUDOH**, National Institute of Advanced Industrial Science and Technology (AIST) <RF-087>

AIST, Shibaura Institute of Technology

This study aims at investigating potential CO₂ reduction of daily activities that meet our needs of life by various life styles. Daily activities will be proposed that can be carried out voluntarily, mitigate CO₂ emissions and increase our utility in our everyday life.



This pamphlet provides a summary of the research projects conducted under the Global Environment Research Fund, as well as its system, research areas and basic structure of the fund. We at Ministry of the Environment hope that this pamphlet will provide useful information for people interested in global environmental issues, and that it will encourage further activities for global environmental protection and conservation.

GLOBAL ENVIRONMENT RESEARCH FUND

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