# ENVIRONMENT RESEARCH AND TECHNOLOGY DEVELOPMENT FUND FY2011

Ministry of the Environment

# What is the Environment Research and Technology Development Fund?

## Objective

**To preserve the environment in order to establish a sustainable society while promoting survey-style research and technical development**

The Environment Research and Technology Development Fund (ERTDF) is a competitive research fund oriented toward policy contribution. It is based on a recognition of the serious and severe impacts of environmental problems on the foundations of human existence, and was established for the purpose of promoting survey-style research and technical development in a comprehensive manner from an interdisciplinary, international viewpoint, bringing together the total capabilities of researchers in various fields in order to contribute to preservation of the environment and establish a sustainable society.

## Features

**A clearly defined orientation toward support for environmental policy**

The ERTDF has a clear orientation toward contribution to environmental policy, promoting the discovery of solutions to various environmental problems and working toward establishing a sustainable society, through support for accumulation of scientific knowledge by survey research and technical development in the field of environmental science.

The calls for proposals and evaluation of research projects are oriented toward strong promotion of strategic research development built on administrative needs, based on the concept of "Promotional strategy of environmental research and environmental technology development" which highlights crucial issues and goals from a middle- to-long-term perspective. The selection system for the "Strategic Research and Development Area" consists of competition among research teams after the Ministry of the Environment establishes its outline for selecting research themes and project leaders.

**A competitive research fund ensuring transparency and fairness**

The ERTDF has a committee and some subcommittees comprised of outside specialists. A separate subcommittee is established for each research field. Proposals are competitively examined and selected by the committee and appropriate subcommittees in terms of effectiveness of the research and efficiency of the use of funds. Approved research projects are evaluated on the degree of progress in research and the cost performance at the mid-point of the research period. The results of the evaluation are used in the allocation of the research budget in order to maintain appropriate progress in the research projects.

**International cooperation and domestic collaboration**

Research projects are promoted so as to contribute to the efforts of international organizations like IPCC (Intergovernmental Panel on Climate Change), or to facilitate collaboration with international research programs such as IGBP (International Geosphere-Biosphere Programme), WCRP (World Climate Research Program) and IHDP (International Human Dimension Programme).

Additionally, research projects are promoted to facilitate collaboration with regions that have issues in common.

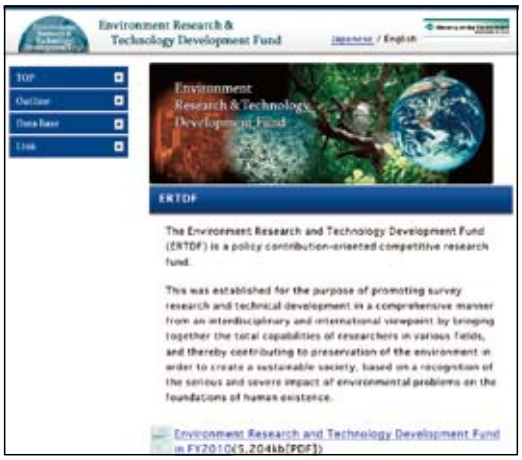
## Research Fields

- **Global System Change**
  Global-scale problems, including destruction of the ozone layer, global warming and the impacts of water circulation and oceanic currents on global environmental changes
- **Environmental Pollution**
  Pollution of domestic/overseas atmospheric environments, urban environments, water environments and soil environments, and transboundary pollution of those environments
- **Health and Ecological Risks**
  Environmental risks and health risks associated with chemical substances, global environmental changes, etc.
- **Protection/Restoration of Nature and Ecosystems**
  Protection and restoration of ecosystems in view of problems of ecosystem disruption, reduced biodiversity, diminished

tropical forests and desertification with an aim toward harmonious coexistence with nature

- **Research on Sustainable Society/Policy**
  Integrated research from environmental, economic and societal perspectives related to protection of the environment and establishment of a sustainable society
- **Cross-field Studies**
  Cross-sectional research projects in comprehensive initiatives such as Low-carbon Society, Recycling-based Society, Harmonious Coexistence Society, and Safe and Secure Society
- **Establishment of a Sound Material-cycle Society and the Next-generation Waste Treatment Technology**
  Technical development regarding appropriate disposal of waste materials and establishment of a recycling-oriented society

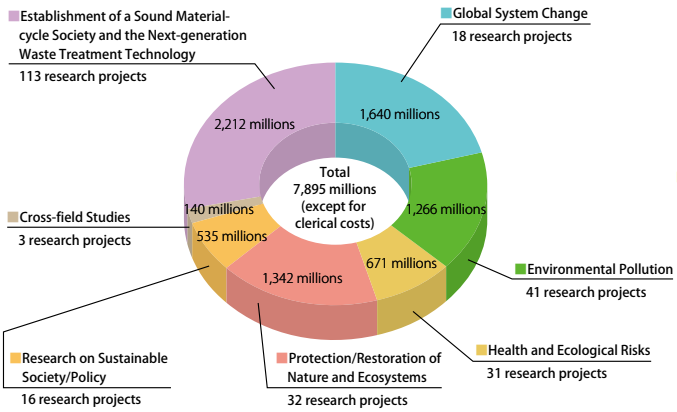
A website has been created which explains the ERTDF system and provides information on calls for proposals.
http://www.env.go.jp/policy/kenkyu/suishin/english/index.html



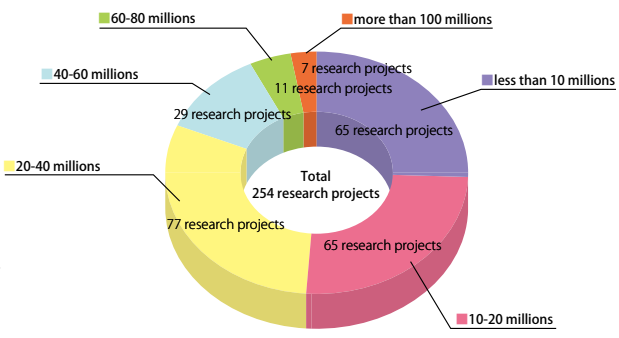

## History of the ERTDF

The ERTDF originated through the integration of three competitive research funds, the Global Environmental Research Fund (GERF), the Environment Technology Development Fund (ETDF) and the Grant-in-Aid for Scientific Research about Establishing a Sound Material-cycle Society.
In April of 2010, the GERF and the ETDF were integrated into the ERTDF, and in April of 2011, the Grant-in-Aid for Scientific Research about Establishing a Sound Material-cycle Society was further added. Thereby, the contact point of the ERTDF has been centralized and the convenience for applicants has been improved. At the same time, it is expected to better facilitate the development of cross-field research in environmental sciences.

## Research Projects Conducted in FY2011




Budget allocated for research fields (unit: yen)




Numbers of research projects per budget size (unit: yen)

# Strategic Research and Development Area

**Large-scale research projects that should be given emphasis and promoted on a priority basis, or large-scale research projects for which individual studies should be integrated and scenarios should be developed**

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

(Period I : FY2007-2009)
(Period II : FY2010-2011)
Budget in FY2011 : JPY 432,938,000

**Akimasa SUMI,** The University of Tokyo (Cooperated by 15 institutions)

<S−5>

Despite increasing efforts to project future climate change, the best available future climate change projections do not seem to be communicated sufficiently to decision makers or to the public. To improve this situation, coordinated research has been conducted under four themes.

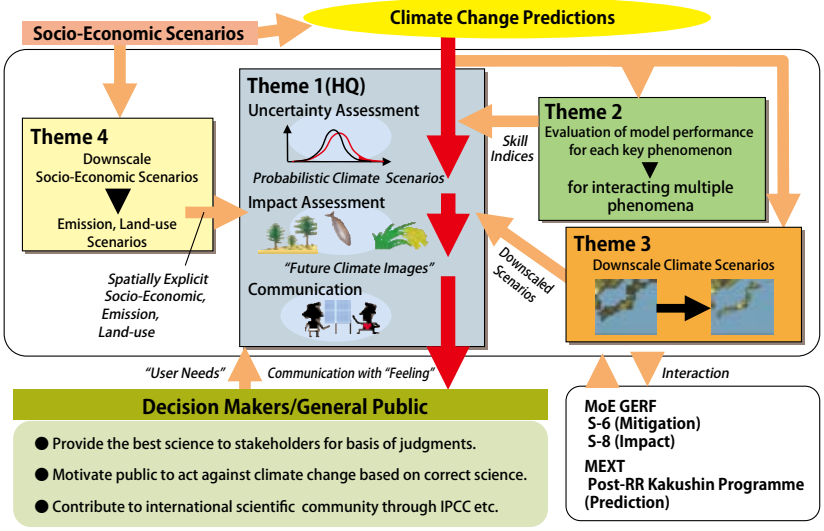
Theme 1 consists of uncertainty assessment, impact assessment and communications research. Statistical methods have been developed to analyze the uncertainty of climate projections, and impact assessments with quantified uncertainty have been conducted based on multi-climate model scenarios for various sectors, including water resources, marine and terrestrial ecosystems, the cryosphere and agriculture. The communications studies have improved our understanding of people's perception of climate change risks, and helped in the development of platforms for communication.

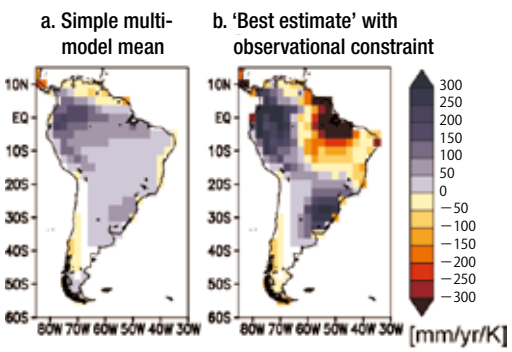
Theme 2 deals with the evaluation of climate model simulations in terms of various atmospheric and oceanic phenomena for reducing the uncertainty that resides in information on future climate variability projections. The reproducibility of phenomena in 20th Century historical runs from the Coupled Model Intercomparison Project, Phase 3 (CMIP3) multi-model data sets, has been evaluated in comparison with actual observations, and future projection runs for the 21st Century have also been analyzed. Based on these analyses, metrics to evaluate climate modelling skills have been developed. A synthetic metric for the Asian climate is also being designed.

Using a combination of multiple regional climate models and statistical techniques, climate change projections produced by global climate models are downscaled under Theme 3 to a scale that is relevant to impact assessment. With an aim to develop a system for evaluating uncertainty in these downscaled projections, dynamical downscaling of the future projections has been performed using multi-regional climate models. A further downscaling to urban scales has also been performed using an urban canopy model and urban land-use scenarios developed under Theme 4.

Finally, Theme 4 deals with the development of spatially explicit emissions and land-use scenarios to be used as boundary conditions of climate models, as well as downscaled population and GDP scenarios to be analyzed in conjunction with climate scenarios in impact assessments. Having contributed to the development of Representative Concentration Pathways (RCPs) in the new scenario development process catalyzed by the IPCC, land-use changes and associated $CO_2$ emissions in the RCPs have been analyzed. Land-use scenarios have been further downscaled to urban scales for metropolitan areas.

Overall, the results of climate and impact analyses and downscaling are highly relevant to the issues which will be included in the coming 5th Assessment Report of IPCC. The findings in communications research are expected to help us communicate comprehensive climate change scenarios to the general public.






An Example of Impact Assessment Considering Uncertainty (water resources in South America)

# Research Project to Establish a Methodology to Evaluate Middle to Long Term Environmental Policy Options toward Asian Low-Carbon Societies (Low-Carbon Asia Research Project)

(Period I : FY2009-2011)
(Period II : FY2012-2013)
Budget in FY2011 : JPY 257,216,000

**Mikiko KAINUMA,** National Institute for Environmental Studies (Cooperated by 13 institutions) <S−6>

The objectives of this research project are twofold: to establish a vision for low-carbon societies (LCS) in Asia which would help keep global mean temperature changes within two degrees centigrade of the norms in preindustrial times, and to develop and evaluate comprehensive policy roadmaps through five sub-project studies that would enable this vision to be achieved.

The first sub-project study provides integrated LCS scenarios premised on achieving both economic growth and environmental protection in Asia. The scenarios have been developed using global, national, subnational, and city scale models, in order to enhance their accuracy and to clarify the relationships between different levels of societal organization. The roadmaps identified provide robust pathways to achieving LCS, and are subject to rigorous quantitative and qualitative analysis using a backcasting approach.

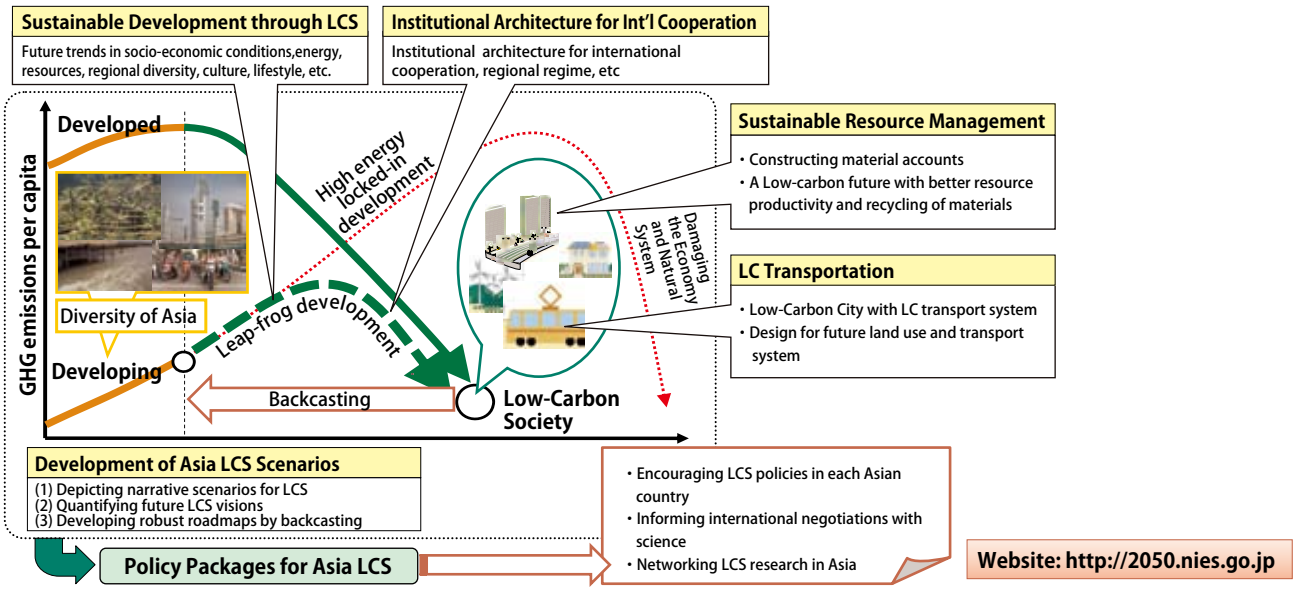
The second study, focusing on the potential for low carbon growth in Asia, aims to demonstrate the possibility of low-carbon development pathways based on scenario analysis, taking into account the values and philosophies of Asian countries. It analyzes domestic and international motivators for, and barriers to leapfrogging development in Asia. Specifically, it examines climate change policies in China, India and Indonesia, and consider how urbanization patterns in Asian countries influence their energy consumption and GHG emissions.

The third study, focusing on institutional architecture for the LCS in Asia, explores allocation criteria for differentiation of $CO_2$ emissions reduction among countries and other actors. It also examines funding mechanisms for the development and distribution of low-carbon technologies.

The fourth study, focusing on resource consumption in Asia, estimates GHG emissions from Asian countries based on future resource demand and the production of goods associated with economic development. It also examines the potential for countries to move toward low-carbon societies and avoid resource depletion through efficient cyclic utilization of resources. This includes an analysis of the metal resources required for low carbon technologies, and a specific scenario analysis of China's economic development and its demands for paper and cardboard, construction materials, etc.

The fifth study, focusing on low-carbon transport systems, analyzes three strategic options: avoiding unnecessary travel demand, promoting low-carbon transport modes, and improving technologies for lower emissions intensity. It identifies the best combination of low carbon transport leapfrog strategies to enable the achievement of $CO_2$ mitigation targets.

This research project will integrate the outcomes of the above studies, presenting policy roadmaps necessary to facilitate a shift to Asian societies characterized by low-carbon emissions, low-resource consumption, and solid economic growth.



# Scientific Analysis of Regional Air Pollution and Promotion of Air Pollution Management in East Asia Considering Co-benefits

(Period I : FY2009-2011)
(Period II : FY2012-2013)
Budget in FY2011 : JPY 156,384,000

**Hajime AKIMOTO,** Asia Center for Air Pollution Research (Cooperated by 9 institutions)

<S−7>

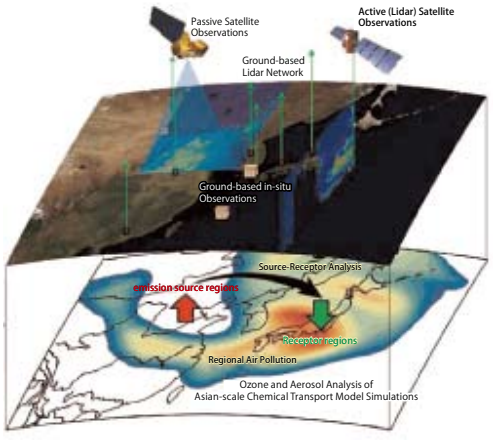
In recent years, emissions of ozone and aerosol precursors (NOx, VOC, etc.) as well as of greenhouse gases ($CO_2$ , etc.) have been increasing rapidly in East Asia, accompanying an increase in energy consumption due to rapid economic development. These are thought to have resulted in increased transboundary transport of air pollutants to our country, greater background air pollution at a hemispherical scale, and also a higher degree of East Asian contribution to global warming.

In order to deal with these problems in East Asia, not only are individual control measures for air pollutants and greenhouse gases needed, but also a strategic approach will be necessary for evaluating the atmospheric environmental load comprehensively and quantitatively, and promoting reduction measures for air pollutants and greenhouse gases simultaneously in an effective and efficient manner.

Particularly in developing countries, social incentives for direct reduction of $CO_2$ emissions are likely to be weak while incentives for controlling air pollution would work better from the standpoint of mitigation of public health impact. At the G8 Environment Ministerial Meeting, the desirability of promoting a co-benefit approach in developing countries was confirmed. For example, improvement of combustion efficiency from the standpoint of air pollution measures leads to reduction of $CO_2$ emissions, and is important from the point of view of co-benefits. Also, evaluation of the impacts of air pollution reduction on climate change is important in providing a scientific basis for promoting co-benefit policies.

From the standpoint of atmospheric environmental impacts in Japan, the contribution of transboundary air pollution to increased concentrations of ozone and aerosols (particularly PM2.5) is a significant issue. Relevant scientific knowledge is strongly needed on source-receptor relationships of these air pollutants, as is establishment of measures to promote strategic atmospheric environmental management in East Asia through international collaboration.

In order to promote measures to cope with Asian regional air pollution and subsidiary global warming through the betterment of atmospheric environmental management, the objectives of this project are to quantify contributions of regional air pollution in East Asia and hemispherical long-range transport of ozone and aerosol pollution affecting Japan, and to conduct policy science studies on an international framework for resolving transboundary air pollution. It also aims to develop a scenario of reduced regional air pollutants in East Asia considering a co-benefit approach that is effective for mitigation of both transboundary air pollution and global warming, and to study a route for reaching an international agreement on the basis of scientific knowledge.




**The first step to solve the problem is international sharing of scientific knowledge on regional air pollution**

**Synthesis of observations and chemical transport models to analyze trans-boundary air pollution and effects of reducing short-lived climate forcers (SLCFs)**

**Theme 1** Elucidation of ozone and aerosol pollution synthesizing numerical model and observation

**Theme 2** Improvement of emission inventories of air pollutants and presentation of air pollutant reduction scienario

**A grasp of the actual conditions of emissions is necessary for the air pollutant reduction scenario**

**Theme 3** Research on international framework toward promotion of air pollution measures and a co-benefit approach

**International framework of trans-boundary air pollution measures is studied considering simultaneous control of global warming**

# Comprehensive Study on Impact Assessment and Adaptation for Climate Change

(Period I : FY2010-2012)
(Period II : FY2013-2014)
Budget in FY2011 : JPY 431,971,000

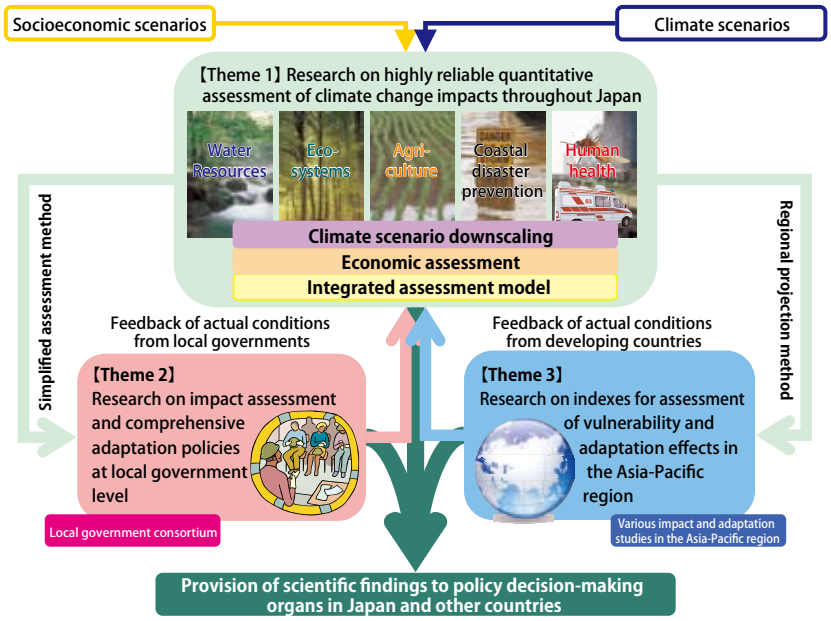
**Nobuo MIMURA,** Ibaraki University (Cooperated by 30 institutions)

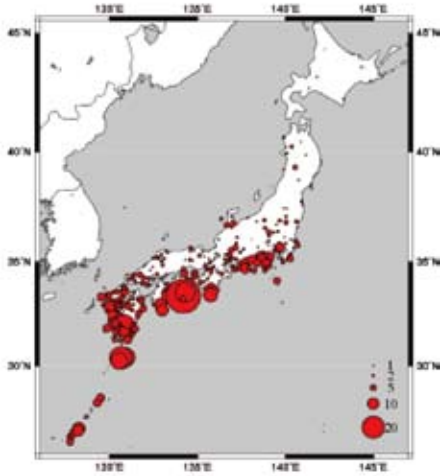
<S−8>

Effects of global warming have been appearing around the world, making relevant mitigation and adaptation countermeasures more urgent. Previous studies have revealed that Japan could experience various impacts on water resources, forests, agriculture, coasts and human health, which also have significant regional distributions. The degree and extent of the impacts will depend on global efforts to reduce $CO_2$ and other greenhouse gas emissions, however, even if future temperature increases could be stabilized below a relatively low target such as two degrees C, some impacts would still remain. Therefore, a long-term policy to prevent and prepare for the possible impacts in the form of adaptation is needed in parallel with mitigation efforts. As the impacts of climate change differ with regions and localities, a new challenge is to form a scientific basis for more detailed projections of climate change and resultant impacts so as to enable development of adaptation policies.

This project aims to promote research to meet the challenge with three concrete objectives. The first is to present a more detailed estimate of physical and socioeconomic impacts induced by climate change and to evaluate the effects of adaptation measures, focusing on Japan. To this end, detailed bottom-up and top-down predictive models will be developed to present national risk maps of future impacts. The second objective of the project will be to create information on particularly effective impact assessment methods and introduce adaptation policies at the prefectural and municipality levels. This will be achieved through collaboration with the national assessment team for developing methodologies to predict local impacts and visualize the results. The third objective will be to help developing countries in Asia adapt. As these countries are expected to have severe impacts, this project will contribute to the introduction of adaptation strategies through development of indexes for impacts, vulnerability and effectiveness of adaptation. Case studies will be carried out on the Mekong River Delta for flooding and the Indo-Ganges Plain for agriculture.

This project is expected to contribute to the establishment of a safe, sustainable society which can adapt to climate change. The form of such societies should differ among places, because each locality has its own peculiar geographical, environmental and socioeconomic conditions. Therefore, local governmental policies should also reflect these differences. Quantitative methods for assessing the impacts and effects of adaptation must be a useful tool for implementing adaptation strategies and options developed by local governments. Furthermore, this project will contribute to promotion of international adaptation policies through assessment of the impacts, vulnerability and adaptation effects in developing countries. To achieve these goals, we will pursue a systematic approach featuring active interaction among different fields.



The frequency of a torrential rain (more than 50mm/hour) has been increasing in the southern part of Japan (from 1996 to 2005)

# Integrative Observations and Assessments of Asian Biodiversity

(Period Ⅰ : FY2011-2013)
(Period Ⅱ : FY2014-2015)
Budget in FY2011 : JPY 374,057,000

**Tetsukazu YAHARA,** Kyushu University (Cooperated by 18 institutions)

<S−9>

"The 2010 biodiversity target," a trial effort based on an international agreement to significantly decrease the rate of the current global diversity loss by 2010, ended up termed unsuccessful based on the latest data on the status and trends in biodiversity, as summarized in the third edition of Global Biodiversity Outlook (GBO-3). In response to these results, new strategic plans under the Convention on Biodiversity (CBD) including "the 2020 Biodiversity Target (Aichi Target)" were agreed upon at the COP10 meeting in Nagoya last year. Also, international observation efforts have been started based on the GEO BON (Group on Earth Observations Biodiversity Observation Network) Implementation Plan, and an International Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) has been organized. Now, as chair of the CBD, our country is expected to lead the international collaboration on observing the current state and trend of global biodiversity and assessing the impacts and costs resulting from biodiversity loss. We must also carry out national-scale observations and assessments to revise the Japanese Biodiversity Outlook and the National Strategies on Biodiversity.

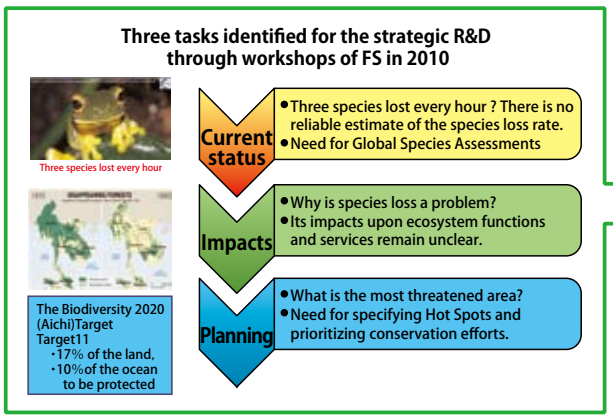
The goal of this project is to contribute to the resolution of these issues by conducting "Integrative Observations and Assessments of Asian Biodiversity."

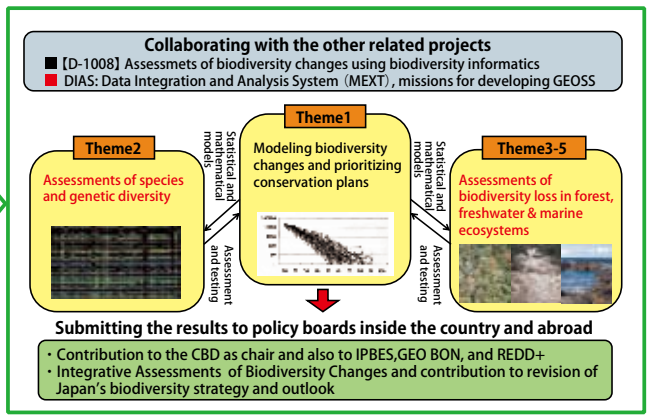
Specific tasks of this project are as follows.

- Establishing methods and models to quantify the rate of biodiversity loss in Asia.
- Exploring methodology to assess biodiversity loss from time-series data.
- Developing a database of ground-based observation results of the entire Asia-Pacific area so as to enable us to assess biodiversity loss at the Asian scale.
- Modeling the relationship between species richness and ecosystem functions/services.
- Designing conservation plans by prioritizing terrestrial and marine candidate areas for protection.

By combining the methods, models and databases that we will develop with available methods of distribution modeling and extinction risk analyses plus available data obtained from remote sensing, we aim to assess "Where/How/How much Biodiversity loss is happening in Asia."

We expect that the results of this project will contribute to global efforts in biodiversity observation, assessment and conservation and national efforts to revise Japan's biodiversity strategy and outlook by providing a scientific basis for the observations and assessments of Asian biodiversity.



# Global System Change

**Global-scale problems, including destruction of the ozone layer, global warming and the impacts of water circulation and oceanic currents on global environmental changes**

## Integrated Impact of Vegetation and Aerosol Changes on Asian Monsoon Climate

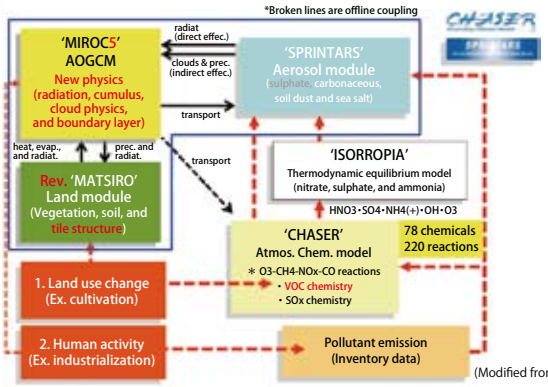
(FY2009-2011)
Budget in FY2011 : JPY 49,754,000

**Tetsuzo YASUNARI,** Nagoya University (Cooperated by 3 institutions)

<A—0902>

The impacts of agriculture-induced nitrate aerosols and secondary organic aerosols (SOA) on the Asian monsoon climate are significant. In addition, volatile organic compounds (VOCs) from vegetation are probably having a large impact on aerosol production and related cloud/precipitation processes over the Asian monsoon region (as shown in the diagram). This study focuses on unraveling these integrated vegetation-aerosol processes using a full-aerosol process model coupled with CHASER, an atmospheric chemistry climate model, and confirming these effects using high-resolution climate data analyses of the past several decades or longer.

To assess the roles of aerosols in past/present changes in the Asian monsoon climate, we have examined changes in individual aerosol components and their radiative forcings using a climate model (MIROC) coupled with an aerosol model (SPRINTARS) and a chemistry model (CHASER). We have particularly focused on changes in nitrate and secondary organic aerosol (SOA), which are tightly linked to land use change. Our preliminary simulation indicates that changes in SOA formation are influenced both by changes in biogenic VOCs through land use change and by changes in POA (primary organic aerosol) and atmospheric constituents (e.g., $O_3$, OH, $NO_3$) that oxidize VOCs.




(Modified from Sudo, 2010)

Coupled Climate Model (MIROC) and Chemical Model

## Development of a Next Generation System for Monitoring the Atmospheric Environment and Estimating the Emission Inventory of Related Species

(FY2009-2011)
Budget in FY2011 : JPY 28,533,000

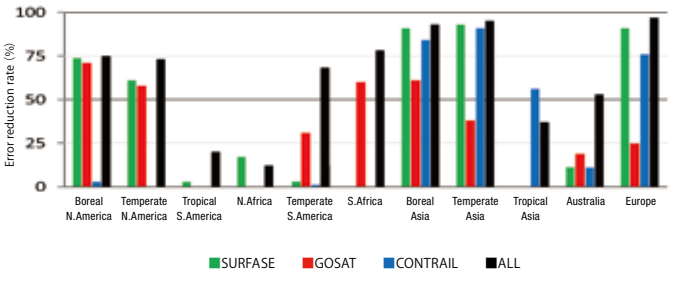
**Toshiki IWASAKI,** Tohoku University (Cooperated by 4 institutions)

<A—0903>

Monitoring the atmospheric environment and estimating the emission inventory are indispensable to preserving atmospheric quality. We are developing a four- dimensional data assimilation system, which assimilates observations of carbon dioxide, aerosols and ozone into a chemical transport model. With regard to carbon dioxide, the products of this data assimilation system are beneficial to global initiatives to cap carbon dioxide emissions.

We are examining the performance of our four-dimensional data assimilation system for carbon dioxide through an observational system simulation experiment (OSSE), assuming that surface observations, aircraft observations (CONTRAIL) and satellite observations (GOSAT) are available. The figure illustrates error reduction rates for regional mean surface fluxes through the use of these three observations in the OSSE. Every observation reduces the flux errors in the four-dimensional data assimilation, though the contribution is different from region to region. The combined use of these data maximizes the error reduction rate. In the future, those errors will be greatly reduced by further advancements in satellite observation quality and quantity.

Error reduction rates for regional mean surface $CO_2$ fluxes



# Environmental Pollution

**Pollution of domestic/overseas atmospheric environments, urban environments, water environments and soil environments, and transboundary pollution of those environments**

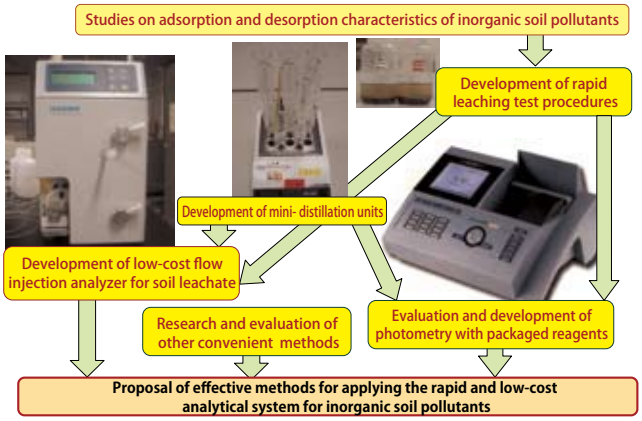
## Development of Rapid and Low-cost Analytical System of Inorganic Soil Pollutants

(FY2009-2011)
Budget in FY2011 : JPY 27,405,000

**Kohei URANO,** Yokohama National University (Cooperated by 2 institutions)

<S2−07>

Testing and analytical methods for soil pollution are currently complicated and expensive. We therefore studied the adsorption and the desorption characteristics of inorganic pollutants in soils and found that an acceleration test method using heating at first was effective for many polluted soil samples. Very small scale and economical distillation units have been developed for cyanide and fluoride and analytical methods are developing for cyanide, fluoride, chromate, borate, lead and cadmium salts with the new low-cost and simplified all-in-one FIA apparatus. We clarified the applicability of 40 commercial packaged reagents to the determination of inorganic pollutants by photometry, examining actual detection limits and interferences with the coexistence of chemicals in the soil leachate. In the future, investigations on and countermeasures to soil pollution should be promoted.




Development of Rapid, Low-cost Analytical System for Investigations on and Countermeasures to Soil Contamination at Many Sites

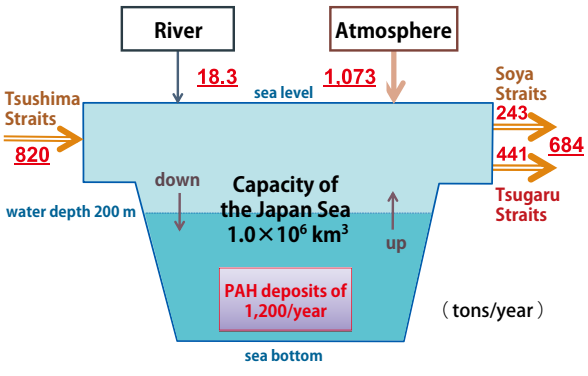
## Study on Potential Threat Caused by Organic Pollutants in the Japan Sea Region

(FY2009-2011)
Budget in FY2011 : JPY 47,224,000

**Kazuichi HAYAKAWA,** Kanazawa University (Cooperated by 3 institutions)

<B−0905>

China, South Korea, Russia and Japan release large amounts of hazardous chemicals, and because they are developing most remarkably among the world's economies, these releases threaten the atmospheric and marine environments. Although the Japan Sea is rich in natural resources, such as fishing products, it is enclosed by land masses with narrow straits, suggesting that its environmental preservation is important. The present study is an international joint research effort organized by researchers of the above-mentioned countries to investigate the current state of hazardous artificial contaminants, such as polycyclic aromatic hydrocarbons and persistent organic pollutants, and to clarify their origins and behaviors in this region. Moreover, the project aims to develop techniques for estimating future pollution in East Asia in order to contribute to the prevention of that pollution and the protection of the resources. By concurrently advancing both field surveillance studies to determine the pollutants and simulation software development to estimate their behaviors, we are clarifying to what degree those contaminants flow into the Japan Sea through the atmosphere, rivers and ocean currents.




A Trial Calculation of the PAH Balance in the Japan Sea

# Health and Ecological Risks

**Environmental risks and health risks associated with chemical substances, global environmental changes, etc.**

## Research on the Evaluation of Human Impact of Low Frequency Noise from Wind Turbine Generators

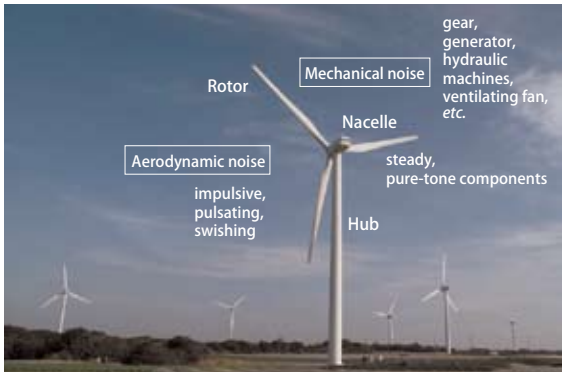
(FY2010-2012)
Budget in FY2011 : JPY 42,623,000

**Hideki TACHIBANA,** Chiba Institute of Technology (Cooperated by 3 institutions)

<S2−11>

In Japan, the construction of wind turbine generator plants has accelerated since about 2000. While they are anticipated to provide a promising means of utilizating renewable energy, noise problems, including low frequency sound, have often occurred in areas near the plants. To deal with this new type of environmental noise problem, it has become necessary to establish administrative measures such as environmental impact assessments. As a basic study for this purpose, this research project was planned over three years and launched in FY2010. The project includes various research topics such as (1) field measurements of wind turbine noise, (2) questionnaire surveys on the response of nearby inhabitants and (3) laboratory experiments on human auditory perception of low frequency noise.

In FY2010, field measurements and social surveys were carried out in six areas surrounding wind turbine plants, and basic experiments on auditory thresholds for low frequency sounds were performed. By completing these investigations in the next two years, we expect to elucidate the relationship between physical properties of wind turbine noise and its physiological and psychological effects on man and to prepare administrative measures and guidelines.




Investigation of Noise/Low-frequency Sound around Wind Turbine Plants

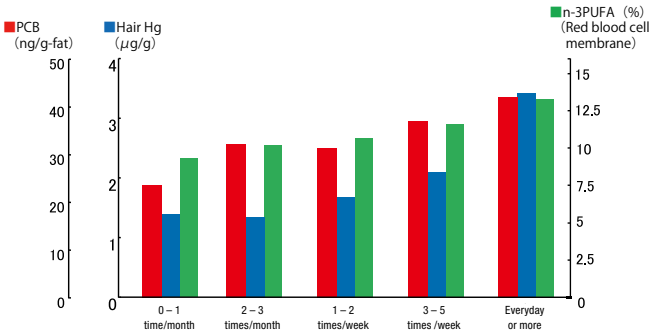
## Interventional Study to Reduce Body Burden of POPs in Young Females

(FY2009-2011)
Budget in FY2011 : JPY 20,790,000

**Kunihiko NAKAI,** Tohoku University (Cooperated by 5 institutions)

<C−0902>

Perinatal exposures to persistent organic pollutants (POPs) and methyl mercury have been shown to cause delays and defects in child growth and development. The aim of this study is to elucidate whether the reduction of POP-contaminated fish and shellfish intake would contribute to the reduction of the body burden of POPs and methyl mercury in young females. A randomized controlled intervention trial with 133 young females was designed to examine potential effects of providing information regarding chemical contamination of fish and shellfish. Baseline data showed that there were strong correlations among plasma PCBs, hair total mercury and n-3 PUFA (polyunsaturated fatty acid) in red blood cell membranes, and fish intake frequency, suggesting that intake of fish and shellfish was the major factor in POP and methyl mercury exposure. To provide the relevant information to the interventional group, interviews, lectures, and cooking classes were held. We will continue further interventions by providing information on chemical contamination of foods, especially fish and shellfish, and by conducting a nutritional educational program for the subjects on food safety and risk control through selection of foods.




Fish intake frequency

# Protection/Restoration of Nature and Ecosystems

**Protection and restoration of ecosystems in view of problems of ecosystem disruption, reduced biodiversity, diminished tropical forests and desertification with an aim toward harmonious coexistence with nature**

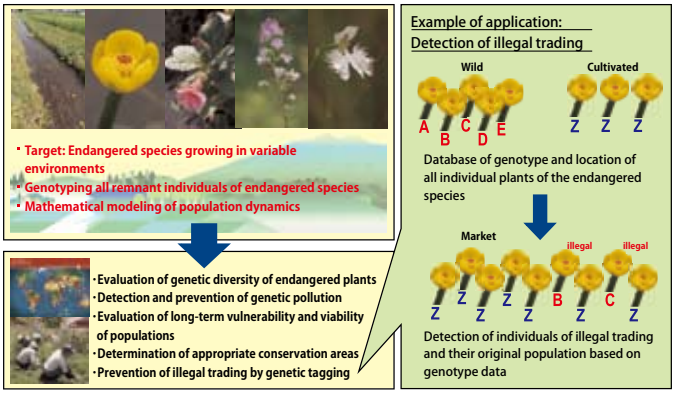
## Investigation of Biodiversity Conservation on the Basis of Ubiquitous Genotyping of Critically Endangered Plant Species

(FY2009-2011)
Budget in FY2011 : JPY 32,976,000

**Yuji ISAGI,** Kyoto University (Cooperated by 4 institutions)

<D−0903>

In this study, we aim to obtain a general understanding of biodiversity conservation based on genetic analysis and mathematical modeling analysis of all remnant individuals of critically endangered plant species of which less than several hundreds of individuals remain (15 angiosperm species and five fern species). By taking advantage of information from genetic analysis and mathematical modeling, we are able to monitor genetic diversity and allele frequency of remnant individuals, reveal regeneration status and genetic traits of regenerated plants, detect genetic pollution, and evaluate long term vulnerability and viability of populations. The findings of this study will make it possible to detect illegal collection and trading by genetic tagging, determine appropriate locations for transplantation based on the genetic structure of remnant populations, and select appropriate plant individuals for artificial crossing. Conservation measures based on information on locations and genotypes of all individuals will directly contribute to conservation measures for critically endangered species by NPOs and local/national conservation agencies.




## Current Situation of Biodiversity Crisis in the Forest-Alpine Ecotone and its Mechanism under Global Change

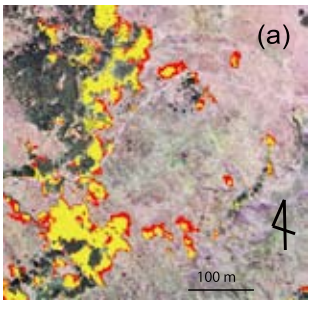
(FY2009-2011)
Budget in FY2011 : JPY 20,885,000

**Gaku KUDO,** Hokkaido University (Cooperated by 4 institutions)

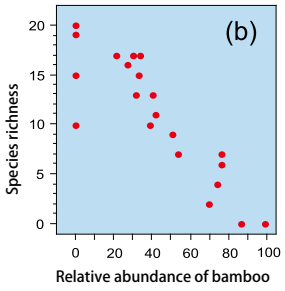
<D−0904>

Middle-latitudinal alpine ecosystems are a hot spot of biodiversity and an important tourism resource, but are most sensitive to global change due to their isolated locations and specific biota. Timberline movement and vegetation dynamics influence the biodiversity of mountain regions. In particular, expansion of dwarf bamboo has decreased the species diversity of alpine vegetation in Japan due to its intensive shading effect. For the adaptive management of pristine ecosystems, clarification of biodiversity responses to climate change is crucial.

We aim to quantify the vegetation dynamics, clarify its mechanism, and predict changes in biodiversity in the forest-alpine ecotone using multi-scale techniques ranging from the landscape to the molecular ecology scale. We are developing systems to monitor vegetation dynamics and environmental change using GIS and establishing long-term monitoring plots. We have detected rapid expansion of dwarf bamboo and declining snow-meadow vegetation during the last 20-30 years due to earlier snowmelt. Patterns of timberline dynamics are strongly site-specific, and landscape complexity significantly influences the speed of vegetation change. The genetic diversity of alpine plants is fragmented among regions, indicating genetic fragility. Finally, we will project specific methods of mountain ecosystem management at a regional scale.




(a) Rapid expansion of dwarf bamboo clumps in an alpine snow-meadow in the Taisetsu Mts., Hokkaido. The yellow area indicates the distribution in 1977, and the red area indicates the additionally expanded parts as of 2009.




(b) With the increase in bamboo abundance, the species diversity of alpine vegetation abruptly decreases due to the severe shading effect.

# Research on Sustainable Society/Policy

**Integrated research from environmental, economic and societal perspectives related to protection of the environment and establishment of a sustainable society**

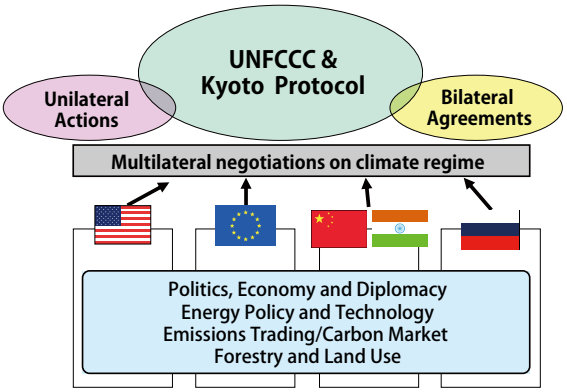
## Study on Major Countries' Decision Making Concerning International Negotiation on Future Institution on Climate Change beyond 2012

(FY2009-2011)
Budget in FY2011 : JPY 36,180,000

**Yasuko KAMEYAMA,** National Institute for Environmental Studies (Cooperated by 10 institutions) <E−0901>

A series of international negotiations on the post-2012 international framework to tackle climate change at the multilateral level have been conducted since 2007, but the negotiations have made little progress so far. It is indispensable to analyze all major countries' national circumstances and to propose an institutional structure which is acceptable to these countries. This study makes a comparative analysis of national climate change policies and policy making processes of major countries and economies, namely the United States, the European Union, Russia, China and India. The comparison is made so as to focus on various dimensions that may affect climate change policies; i.e., domestic politics, energy policy, technology, diplomacy, the carbon market and forestry.

The study revealed differences among countries as to what factors affect national decision making on climate change. There are various factors that could contribute to facilitating international cooperation for tackling climate change in the near future. On the other hand, limitation and/or reduction of emissions may occur even without international cooperation if "races for low-carbon" such as technology competition become influential.



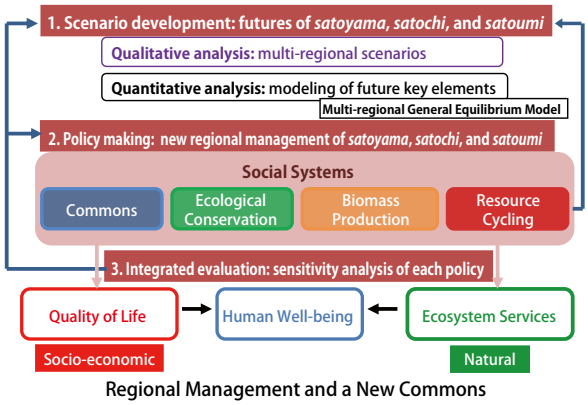

## Ecosystem Services Assessment of *Satoyama*, *Satochi*, and *Satoumi* to Identify New Commons for Nature-harmonious Society

(FY2009-2011)
Budget in FY2011 : JPY 52,315,000

**Masataka WATANABE,** United Nations University (Cooperated by 5 institutions) <E−0902>

Applying the ecosystem services assessment framework, proposed by the United Nations global ecosystem assessment, to assess *satoyama*, *satochi*, and *satoumi* ecosystems, this research project aims to propose modalities in managing biodiversity and ecosystem services as a new commons, so as to provide policy options for realizing a nature-harmonious society. In particular, we have conducted a *satoyama* biodiversity hotspot analysis, an economic assessment of ecosystem services, a nationwide survey of cultural services, an investigation of traditional commons management in *satoyama* and *satoumi* landscapes, and a land-use scenario development based on demographic projection and reevaluation of *satoyama* resources.

We will finally construct an economic model that incorporates ecosystems services to evaluate how utilization of ecosystem services from *satoyama*, *satochi*, and *satoumi* landscapes can increase the competitiveness of agriculture, forestry and fisheries. This will lead to the development of new national land planning schemes and environmental policies for the realization of a nature-harmonious society. The findings are also expected to contribute to reconstruction plans for the regions affected by the Great East Japan Earthquake by revealing the socio-economic impacts of the decline/degradation of biodiversity and ecosystem services.



Regional Management and a New Commons

# Cross-field Studies

**Cross-sectional research projects in comprehensive initiatives such as Low-carbon Society, Recycling-based Society, Harmonious Coexistence Society, and Safe and Secure Society**

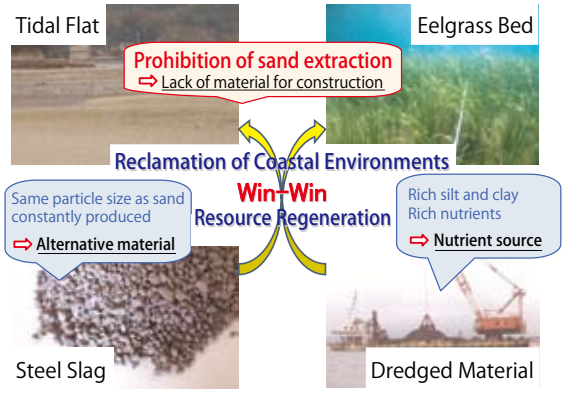
## Ecological Evaluation and Material Flow Analysis of Tidal Flat and Eelgrass Bed Ecosystems Constructed with Steel Slag and Dredged Material

<FY2011-2013>
Budget in FY2011 : JPY 69,399,000

**Wataru NISHIJIMA,** Hiroshima University (Cooperated by 2 institutions)

<F−1102>

A number of tidal flats and eelgrass beds have been lost. Their creation/regeneration is desired to mitigate that loss. However, a large amount of sand is required for their construction and extraction of sand from sea or river bottoms may disturb aquatic ecosystems. In this study, we have focused on the advantages of the combined use of the steel slag with almost the same particle size as sand and dredged material rich with nutrients, silt and clay as materials for construction of tidal flats and eelgrass beds. The slag releases free lime that increases the pH of interstitial water and induces various chemical reactions. The dredged material is expected to reduce such effects produced by the slag. Therefore, we will trace the material flow in the sediments and evaluate ecosystem development in tidal flats and eelgrass beds made from slag and dredged material. Our goal is to propose an optimal proportion for the combination of slag and dredged material for the construction of tidal flats and eelgrass beds and to create a win-win relationship between environmental regeneration and resource regeneration.




## Column What is a "Cross-field" study?

The June 2010 report of the Central Environment Council, "Promotional strategy of environmental research and environmental technology development," emphasizes four areas of study (Low-carbon Society, Recycling-based Society, Harmonius Coexistence Society, and Safe and Secure Society), along with the major themes of "common-field" and "cross-field" studies (see list in table), and promotes comprehensive research development.

"Common-field," studies involve comprehensive research with social, economic and political perspectives in order to pursue continually a vision of what a mid-to-long-term society should be as a guideline for research development.

In the field of environmental science, one often sees "win-win" situations, in which effective measures in one area have a positive impact on other areas, and "trade-off" situations, in which effective measures in one area have a negative impact on other areas. "Cross-field" studies emphasize research development for attaining win-win approaches and resolving trade-offs.

Based on these directional objectives, the Environment Research and Technology Development Fund (ERTDF) has established a new research field (6th research subcommittee) in FY2011, and supporting research and development corresponding to major themes referred to under "common-field" and the "cross-field" studies.

Furthermore, through future calls for proposals the ERTDF is planning on further promotion of cooperative research and development with specialists from different areas.

Major Themes Referred to under "Common-field" and "Cross-field" Studies

| Area | Major themes |
|---|---|
| Common-field | 1. Research on society desirable from a long-term national perspective (sustainable society) |
| | 2. Research on transformation toward a sustainable society |
| | 3. Response to international agendas in Asia and other regions |
| Cross-field | 4. Research and development of win-win approaches contributing simultaneously to two or more areas |
| | 5. Research and development for resolving trade-offs occurring between two or more areas |
| | 6. Impact on society of environmental factors and society's adaptation |

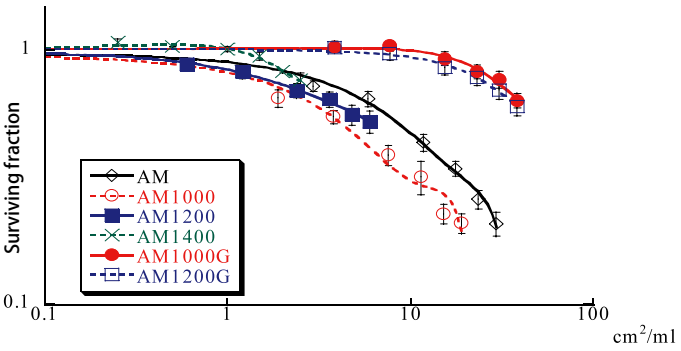
## Evaluation of Biological Effects of Thermally Transformed Amosite

(FY2009-2011)
Budget in FY2011: JPY 45,213,000

**Hiroshi YAMAUCHI,** Kitasato University (Cooperated by 4 institutions) <K2303>

Exposure to asbestos (chrysotile [CH], amosite [AM]) is associated with development of malignant mesothelioma. Therefore, it is important to ensure safety in promoting future practical use of processed asbestos. Destruction of the asbestos structure by thermal transformation is thought to be effective for detoxification of waste including asbestos. The effectiveness of this process in decreasing toxicity has been shown in changing CH into forsterite, but similar studies have not been carried out for AM.

This study was performed with the aim of accumulating basic data for use in evaluating the safety and environmental risks of thermal detoxification of AM. We examined practical recycling of thermally transformed AM based on a high-level evaluation of safety. This was achieved by establishing technologies and techniques focused on the thermal temperature (1,000-1,400°C), fiber form, crushed form, crushing time, and crystal structure for evaluation and practical use of detoxified materials. We used a comprehensive approach through a combination of cytotoxicity tests (for rapid evaluation) with safety tests in animals (for ascertaining carcinogenicity and acute/chronic effects).




**Cytotoxicity Test for Amosite (AM), Thermally Transformed AM Materials (1,000-1,400°C), and Crushed Materials (AM1000G and AM1200G)**
The cytotoxicity of AM1000G was lowest.

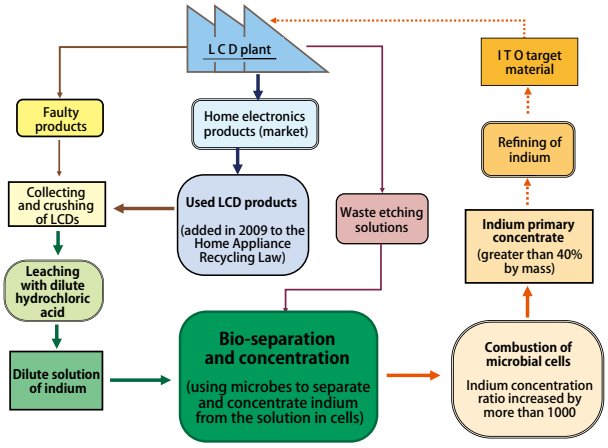
## Environmentally Friendly Wet-Recovery of Indium from Electronic Scraps Using Microorganisms

(FY2009-2011)
Budget in FY2011 : JPY 13,548,000

**Yasuhiro KONISHI,** Osaka Prefecture University (Cooperated by 2 institutions) <K2308>

Indium is a rare metal essential for the manufacture of liquid crystal displays (LCDs), and 100% of the indium used in Japan is imported. This situation, combined with an upsurge in demand for indium due to the increasing size of LCDs and the rapidly growing market, mandates the development of technology for the recycling of indium from used LCD televisions (a target appliance under the Home Appliance Recycling Law) in order to secure a stable supply of rare metal resources as well as strive for waste detoxification.

We will develop an indium recycling process based on an eco-friendly biotechnology for target appliances, such as used LCDs that have not been recycled. We have found a microorganism which has the ability to separate indium from a diluted hydrochloric acid leachate of crushed LCDs and concentrate it within its cells. Using operating conditions that allow efficient and economical bio-recovery of indium, combustion of the indium-containing cells has produced a primary concentrate of more than 40% indium content. This research contributes to the construction of recycling systems for indium from the urban mine.



# List of Research Projects Conducted in FY2011

Project Code / Research Title

## Strategic Research and Development Area
**total 5 research projects**

S-9/Integrative Observations and Assessments of Asian Biodiversity
S-8/Comprehensive Study on Impact Assessment and Adaptation for Climate Change
S-7/Scientific Analysis of Regional Air Pollution and Promotion of Air Pollution Management in East Asia Considering Co-benefits
S-6/Research Project to Establish a Methodology to Evaluate Middle to Long Term Environmental Policy Options toward Asian Low-Carbon Societies (Low-Carbon Asia Research Project)
S-5/Integrated Research on Climate Change Scenarios to Increase Public Awareness and Contribute to the Policy Process

## Global System Change
**total 15 researches**

A-1101/Assessment of the Effects of Reductions of Black Carbon Aerosols as a Measure of Slowing down Global Warming
A-1102/Study on Precision Improvement of Greenhouse Gas Concentrations Obtained by Analysis of the "IBUKI"Observational Data
A-1103/Assessment of Impacts of Climate Policy in Japan in the Backdrop of Global Climate Policy Using Integrated Assessment Model
A-1001/Study on Comparative Evaluation of Mitigation Technology on Greenhouse Gas Emission from Waste Landfills
A-1002/Mechanism Elucidation and Future Forecast on the Decreasing Trend of Dissolved Oxygen Concentrations in the Deep Water of the Japan Sea
A-1003/Observational Arctic Terrestrial Soil Carbon Dynamics Research and Development of their Modeling for Predicting Arctic Climate Change Under Global Warming
A-0901/Above-ground and Below-ground Forest Carbon Budgeting by Multi-temporal Airborne Laser Altimetry
A-0902/Integrated Impact of Vegetation and Aerosol Changes on Asian Monsoon Climate
A-0903/Development of a Next Generation System for Monitoring the Atmospheric Environment and Estimating the Emission Inventory of Related Species
A-0904/Quantitative Studies on the Cycles of Some Global Warming Gases and Related Materials through their Isotopomers
RFa-1101/Archiving of GPS Water Vapor Data for Global Warming Assessment
RFa-1102/Measuring DMS and VOC Flux at the Ocean-atmosphere Interface and Evaluation of Gas Transfer Co-efficient
RF-1006/Quantifying the Change in Aboveground Carbon Stocks by Forest Management Using Airborne LiDAR and PALSAR
RF-1007/Refinement of Terrestrial Biosphere Models and its Downscaling Using GOSAT Satellite Data
RF-1008/Studies of Optical Properties of Secondary Organic Aerosols: Impact on Earth's Radiation Balance

## Environmental Pollution
**total 40 researches**

S2-05/Development of Novel Real-time Detector of Nitro-compounds Using High-sensitivity Spectroscopy
S2-06/Real-time Monitor of Nitro Organic Compounds from Diesel Vehicle Exhaust Using PTR-TOFMS
S2-07/Development of Rapid and Low-cost Analytical System of Inorganic Soil Pollutants
S2-08/Development of Quick and Low-cost Chemical Analytical Method for Toxic Metals in Contaminated Soil
B-1101/Current Status Elucidation and Source Contribution Assessment of PM2.5 Pollution in Collaboration with Environmental Research Institutes across Japan
B-1102/Evaluation of Function of Littoral Zone and its Dominant Factors in Formation of Lake Water Quality
B-1103/Development of Low Environmental Impact-systems to Attain Co-benefits Piggery Wastewater Treatment and Forage Rice Production
B-1104/Collection of Supporting Data to Amend Agricultural Chemicals Regulation Law in Registration of Agricultural Chemicals Causing Water Pollution
B-1105/Evaluation of Effects of Ozone on Japanese Forest Trees Based on Leaf Ozone Uptake
B-1106/Chemical Oceanography to Elucidate Global Kinetics of Persistent Perfluorinated Chemicals (PFCs)
B-1107/Elucidation of Form Change of Heavy Metals in Environment Causing Naturally Occurring Soil Contamination
B-1001/Development of DSi Inflow Load Model in Northeastern Ariake Bay
B-1002/Investigation of Environmental Impact of Perfluorinated Compounds (PFCs) and Development of Emission Reduction Method of PFCs
B-1003/Development of Monitoring Technique to Assess Impact to Benthic Life by Hypoxia and of Achievement Evaluation Method for Bottom DO Criteria
B-1004/Analysis of Formation Mechanism of Bottom Environment and Development of Sedimentation Control Technology in Shallow Closed Water Area
B-1005/Development of Highly Sensitive Dye Nanoparticle-coated Test Strips (DNTS) for On-site Detection of Harmful Inorganic Contaminants
B-1006/High Precision Origin/History Analysis of Trans-boundary Particulate Matters Using Innovative Single Particle Structure Analyzer
B-1007/Study on Chemical-pollutant Transport by Beach Litter and Establishment of Public Education Regimes to Reduce its Environmental Risk
B-1008/Research for Measurement, Dynamics, and Control of Long-distance Transboundary Migration of Atmospheric Mercury Using Mountain as Observation Tower
B-0901/Improving Kosa Forecasting Model with Assimilated LIDAR Monitoring Network Data and Assessing Human Health/ Environmental Effects of Kosa due to Adsorbed Bioaerosols
B-0902/Research on Impacts of Asian Dust on our Health and Environment
B-0903/Studies on Origin, Long-range Atmospheric Transport and Photochemical Transformation of Organic Aerosols in East Asia and North Pacific
B-0904/Source-identification of Polycyclic Aromatic Hydrocarbons (PAHs) in Asian Environments and Evaluation of Long-range Migration of PAHs
B-0905/Study on Potential Threat Caused by Organic Pollutants in the Japan Sea Region
B-0906/Development of Integrated Environmental Management for Changjiang River Basin to Conserve Sound Environmental Conditions in East China Sea
B-0907/Novel Environmental Catalysts for Complete Oxidation of Volatile Organic Compounds at Moderate Temperatures
B-0908/Research of Effects in Inner Bay Ecosystem by Increased Nutrient Inputs during Rain Events
B-0909/Development of High-frequency Monitoring Method for Distributions of Transparency in Waters Using Remote Sensing
B-0910/Establishment of Monitoring System of Seagrass Beds by GIS Database Integrating Field Census Data
B-0911/Development of Brook Renovation Technology Using Molded Zeolite and Aquatic Plants
B-0912/Development of Low-cost and Simple All-Inkjet-Printed Water Quality Monitoring Chip Using Nanoparticle-based Chemical Sensing Inks
B-0806/Development of Selective Removal Technique of Environmental Pollutants Using Template Molecule Mimics
B-0807/Research on Super Flexible Organic Solar Cells Using New Nano-materials
B-0702/Development of High Capacity Capacitor Using High-energy Density Surface Boundary
RFb-1101/Development of Anaerobic Bioremediation Technology for Benzene-contaminated Soil and Groundwater
RFb-1102/Study on Recent Decrease of Nutrients in Harima-Nada Sea and Factor Causing Variation of Nutrient Flux from Rivers
RFb-1103/Elucidation of Secondary-formation Ability and Emission Sources of Halogenated Aromatic Compounds Associated with Airborne Fine Particles
RFb-11T1/Study on Load Estimation of Non-point Source Pollution

RF-1001/Development of Ink-jet Based Aerosol-generation Device to Calibrate Particle Counter at Sampling Site
RF-1002/Identification and Quantification of Bacterial Groups and their Contribution to Nitrogen Removal at Rice Paddy Field

## Health and Ecological Risks
**total 31 researches**

S2-11/Research on the Evaluation of Human Impact of Low Frequency Noise from Wind Turbine Generators
S2-12/Studies on Mechanisms by which Environmental Chemicals Affect Developing Nervous System and Immunological System
S2-09/Development of Systematic Assessment of Ecosystem Risk Impact Using Microcosm
C-1101/Development and Application of Specific Bioprobes for Rapid Asbestos Detection to Reduce Asbestos Risk at Demolition Sites
C-1102/Development of Quantitative Risk Assessment Method of Pesticide to Enable Selection of Appropriate Risk-management Practice of Usage
C-1151/Exposure Assessment to Plastisizer and Flame Retardants and their Risk on Children's Allergies
C-1152/Quantitative Evaluation of Desert Dust (Asian Dust) on Respiratory/Allergy Risk, Taking into Consideration Times Spent Outside
C-1153/A Risk and Benefit Assessment of Chemical Exposures and Fish Intake in Females and Infants
C-1154/Research to Reveal Association of Human Health and Asian Dust by the Clinical and Basic Study
C-1155/Studies on Biological Effects and Clarification of the Mechanisms of Asian Dust Aerosol, Attached Microorganisms and Chemical Substances
C-1001/Evaluation of Validity and Predictability of Air Quality Modeling for Urban PM2.5 in Japan
C-1002/New Analysis Method for Internal Mixture State of Diesel-origin Nanoparticles (Contribution to Health-risk Research)
C-1003/Environmental Risk Minimization Method Based on Lifecycle Risk Assessment and Alternative Assessment for Persistent Organic Pollutant, such as HBCD, in Products
C-1004/Risk Management Strategy for Industry-environmental Systems
C-1005/Epidemiological Study on Effects of Chemical Composition of Airborne Particulate Matter and Ozone on Asthma Attacks
C-1006/Investigation into Effect of Environmental Chemicals to Placental Nutrient Transport Activity in Pregnant Women
C-1007/Molecular Toxicology Study for Risk Assessment of Combined Exposure to Environmental Chemicals
C-1008/Case-control Study on Epigenetic Alteration of Human Sperm of Environmental Chemical Disrupters
C-0901/Study on Biomarkers in the Effect of Diesel Exhaust Nanoparticles on Brain, Liver, Kidney and Reproductive Organs, and Risk Assessment
C-0902/Interventional Study to Reduce Body Burden of POPs in Young Females
C-0903/Investigation on Risk Assessment for Maternal Dioxin Exposure during Pregnancy on Fetal, Neonatal and Infantile Health and Development
C-0904/Study on Relationship between Infant Atopic Dermatitis and Exposure to Environmental Pollutants Including Brominated Flame Retardants (BFRs) during Fetal and Infant Period in Japan
C-0905/Assessment of Environmental Risk for Development of Congenital Anomalies
C-0906/Elucidation of Novel Toxicity Mechanisms of Dioxins that are not Accompanied with AhR Activation
C-0803/Development of Artificial Tissue-Nanodevice Sensor Complex for Versatile Application to Risk Assessment of Health
RFc-1101/Exposure Assessment of Market Products Including Nanomaterial in General Use and Disposal Process
RFc-1151/Development and Validation of the Epigenomic Analysis System for Chemical Exposure during *in vitro* Culture
RF-1003/Development of Monitoring System for Effects of Environmental Stress on Animals
RF-1004/Development of Assessment and Management Technique to Evaluate Environmental Pollution of PPCPs and Surfactants by Whole Effluent Toxicity (WET) Test and Toxicity Identification Using Aquatic/Benthic Organisms
RF-1005/Development of High-throughput Screening of Genotoxins Using Genetic Approach
RF-0909/Development of Toxicogenomics Analysis System to Evaluate Actual Combined Toxicities and its On-site Application

## Protection/Restoration of Nature and Ecosystems
**total 31 researches**

S2-10/Research on Estimating Population Size of Bears in Japan
D-1101/Development of Integrated Control Methods and Systems for Invasive Alien Animals
D-1102/Stable Isotope Indicators for Evaluating Ecosystem Functions of Biodiversity
D-1103/Developing and Evaluating Capture Methods of Sika Deer for Ecosystem Management in the Shikotsu-Toya National Park
D-1104/Study on Tidal-flat Benthic Communities and Ecosystem Functions for the Conservation of Amakusa and Shimabara Shores, Western Kyushu, Japan
D-1105/Studies on Grassland Biodiversity and Sustainability of Nomadic Production in Semiarid Regions of North-East Asia
D-1106/Study on Ecosystem and its Appropriate Management on the Miyakejima Island Damaged by the Eruption in 2000
D-1001/Evaluation of Adaptive Properties of Grassland Plants on Soil Environments and Development of Conservation Methods of Semi-natural Grassland Plants in Japan
D-1002/Development of Retrospective Monitoring Techniques for Lake Ecosystems
D-1003/Development of a Prediction and Decision Support System for Wildlife Management
D-1004/Development of a Conservation System for Lake Ecosystems by Top-down Effects of Fishes
D-1005/Research on Experimental Studies for Upgrading the REDD Mechanism in Ways that Incorporate Ecosystem Services and Values
D-1006/Maximizing the Co-benefits of REDD in the Biodiversity Conservation of Tropical Rain Forests
D-1007/Sustainable Conservation Management of Isolated Primate Populations in Areas of Human Habitation
D-1008/Research on Evaluation and Prediction Methods for Biodiversity Dynamics and Development of Environmental Indicators Using Biodiversity Informatics
D-0901/Establishment of Methods for Assessing Forest Degradation Caused by Deforestation and Maintenance of Biodiversity
D-0902/Studies on the Conservation Measures of Swamp Forests through Sustainable Use of Ecological Resources by Local Communities
D-0903/Investigation of Biodiversity Conservation on the Basis of Ubiquitous Genotyping of Critically Endangered Plant Species
D-0904/Current Situation of Biodiversity Crisis in the Forest-Alpine Ecotone and its Mechanism under Global Change
D-0905/Ecophysiology, Phylogeography and Environmental Sociology on Water Blooms of the Globally Distributed Cyanobacterium *Microcystis Aeruginosa*
D-0906/Assessment and Reinforcement of Natural and Social Capital for Biodiversity Restoration in Rice Paddy Ecosystems
D-0907/Risk Analysis Study on Infectious Disease Transmission from Migratory Birds to Endangered Japanese Birds
D-0908/Development of a Monitoring System for a Mire/Pond Ecosystem Using Sarobetsu Mire and the Wakasakanai Coastal Dune Mire as a Model
D-0909/Large-scale Estimations of Ecosystem Functions Using Biological Indexes and Development of Eco-informatics
D-0910/Integrated Study of the Lake Mikata Ecosystem toward the Restoration Using Japanese Eel and Cyprinid Fish as Icon Species
RFd-1101/Plant Response to Environmental Change: Exploring the Mechanism of General Flowering by Integrating Molecular and Modeling Approaches
RFd-1102/Biodiversity Informatics and Development of Ex-situ Conservation Techniques of Endangered Species: a Case Study on Charalean Algae
RF-1009/Evaluation of Impact from Human Activities on Coral Reef Environments Based on Coral Skeleton
RF-1010/Evaluation of Hybridization Risk and Carbon Fixation Ability in Fragmented Tropical Forests
RF-1011/Development of Teak Provenancing System in Southeast Asia in Support of Legal Logging
RF-0910/Study on Genetic Disturbance of Freshwater Fish Species: Genetic Invasions to Native Population by Non-native Population and Predicting the Invasions

## Research on Sustainable Society/Policy
**total 16 researches**

E-1101/Strategy to Enhance Resilience to Climate and Ecosystem Changes Utilizing Traditional Bio-production Systems in Rural Asia
E-1102/A Proposal of Coastal Zone Management Based on Quantification, Economic Evaluation and Analysis of Spatio-temporal Variability of the Provisioning Service of Seagrass Beds
E-1103/Environmental Friendly Agriculture Based on Community Resources: A Strategy for Sustainable Development and Biodiversity
E-1104/Development and Practice of Advanced Basin Model in Asia - toward Adaptation of Climate Changes-
E-1105/Design and Implementation Process of Building Blocks for Realizing Low Carbon Society
E-1106/Study on Supply Chain for Low Carbon in the Area Including Asia
E-1001/Co-benefit Study on Development of GHG Mitigation Technologies toward Asian Low-Carbon Society
E-1002/Incentive of Local Community for REDD and Semi-domestication of Non-timber Forest Products
E-1003/A Study on Urban Infrastructure and Institution for Low Carbon Transport Systems Focusing on Electric Vehicle Utilization
E-0901/Study on Major Countries' Decision Making Concerning International Negotiation on Future Institution on Climate Change beyond 2012
E-0902/Ecosystem Services Assessment of *Satoyama*, *Satochi* and *Satoumi* to Identify New Commons for Nature-harmonious Society
E-0905/Construction of Sustainable and Regional Community Model Based on Agricultural Bio-fuel Production
E-0906/Study on Low-carbon Development in Asian Developing Countries through International Intercity Collaboration
RFe-1101/Enetourism: Methane Fermentation System Using Hot Spring with the Tourist Participatory Approach
RFe-11T1/Futures Energy Systems Built by Feasible Technologies for Japan
RF-1012/An Investigation of Transport Policies to Induce the Behavioral Modification toward the Reduction of Carbon Dioxide Emission Considering Economic and Social Sustainability

## Cross-field Studies
**total 3 researches**

F-1101/Development of Evaluation Method of Ecosystem Services to Find Good Balance between Climate Change Prevention and Biodiversity Conservation
F-1102/Ecological Evaluation and Material Flow Analysis of Tidal Flat and Eelgrass Bed Ecosystems Constructed with Steel Slag and Dredged Material
RFf-1101/Development of Recycling and Production Method of Solar-grade Si by Molten Salt Electro-refining

## Establishment of a Sound Material-cycle Society and the Next-generation Waste Treatment Technology
**total 113 researches**

J112001/Demonstration Project of Generating Energy-value from Wastewater by Hydrothermal Gasification Process
J112002/Development of Low Carbon Type Shaft Furnace for Worldwide Waste Treatment
J113003/Development of a Sorting System for Asbestos Containing Construction Material
J112004/Development of Ethanol Conversion Process Using Biomass Recovered from MSW
J113005/Cooperative Research and Development of Hollow Carbon Microparticles from Lignin by Utilization of Black Liquor
J112006/Developing Recycle Technique of Calcium Hydroxide, By-product in Acetylene Gas Process from Calcium Carbide
J113007/Development of Composites with Cellulose Nanofiber (CNF) Derived from Untapped Biomass and Wasted Fiber-reinforced Plastic (FRP), and its Small Batch Production System
J112008/Development of Advanced Phosphorus Recovery Technology from Sludge of Night Soil/Johkasoh by HAP Method
J111009/Development of Volume Reduction Technology for Firm and Small Bulk Specific Gravity Heat Insulator with Asbestos Content in Corresponding to Removal Construction Scale.
K113001/Environmental Sound Management of Hazardous Metals such as Mercury in Cyclical Use
K113002/Planning System to Apply Japanese Circular Technologies and Policy System in Asian Cities
K112003/Research on Recycling Certification in Asia (ReCA)
K113004/Establishment of a Methodology for Environmentally Sound Quality Control of Wastes and By-products toward Standardization in East Asian Countries
K112005/Development and Analysis of Reaction Mechanisms of Efficient Organic Acid Fermentation Technology from Organic Waste
K113006 /Development of System for Saccharification of Lignocellulosic Biomass Waste Using Solid Acidic Catalysts
K112007/Development and Evaluation of High-efficient Saccharification Processing of Lignocellulosic Biomass by Irradiation with Quantum Beams
K113008/Research on the Proper Treatment of Waste Glass Materials
K113009/Research on Inspection Methods and Recovery Techniques for Healthy Landfill Functions
K113010/Development of Strategy on Transfer of Japanese Venous Industry to Asia
K113011/Establishment of Safe and Effective Recycling System for Hazardous Products and Components
K113012/Environmental Impact Analysis and Policy Comparison Study for Sound Management and Recycling of Battery
K111013/Establishment of Recycling Method of Rare Earth Magnets by Using a Non-imported Reductant
K111014/Investigation of Separation System of Indium and Gallium in Urban Mine
K113015/Development of Technologies Achieving Early Stabilization of Waste in Landfills Mainly Accepting Intermediate Treatment Residues
K113016/Development of Solar Fuel and Chemical Production System from Biomass and Carbon Dioxide
K113017/Study on Ensuring Reliability and Effective Utilization of Described Information in Manifests for Industrial Waste Management
K113018/Bioethanol Production by Magnetic Nanoparticles Immobilized Biocatalyst and Development of Biodegradable Composites Compatibilizing Processing
K113019/The Study of Bioethanol Manufacturing System from Agricultural Wastes by Cascade Type Recycling Process
K112020/Recycling Phosphorus in Organic Wastes Using Bacterial Enzymes
K113021/Policy Effect Analyses of Municipality Policy and Behavior Modification Program on 3R
K113022/Study on Appropriate Treatment of Bulky and Non-combustible Municipal Solid Waste
K113023/Study on Household Hazardous Waste (HHW) Management with a Main Emphasis on Household Chemicals
K113024/Establishment of Screening Methods of Asbestos-containing Construction Materials, and Safety Assessment of Recycled Crushed Stone
K113025/Visualization and Optimization of Thermochemical Destruction of Organohalogen Compounds
K113026/Quantitative and Structure Analysis of Psychological Factors which Cause Improper Manual Separation of Recyclable Wastes
K113027/Appropriate Countermeasure and Technology Transfer on Waste Landfill Leachate as Development of Urban Waste Management in Asia
K111028/Research on Design and Evaluation of Resource Collection System such as Used-small Consumer Electronics that Use Existing Infrastructure
K113029/Development of High Selective Separation Technology Using Sulfurized Waste Biomass Adsorbent
K113030/3R Promotion through Waste Biomass Utilization in Japan and Asian Regions
K112031/Recovery of Rare Metals by Using Inorganic Layered Oxides
K113032/Formation Pathways and Health Risk Assessment of Halogenated Polycyclic Aromatic Hydrocarbons in Waste Incinerator
K112033/Reforming of Herbaceous and Woody Biomass by Normal Temperature Deoiling and Dewatering Technology
K2301/Development of Economic Recycle Process for the Waste of Magnets Aimed at Highly Efficient Recovering Rare Earths
K2302/Development of Continuous Production Technology of High-quality Biodiesel Fuel Using Acid Oil By-produced in Edible Oil Processing
K2303/Evaluation of Biological Effects of Thermally Transformed Amosite
K2304/Assessment of Slope Stability of Deposited Solid Waste at Sites of Illegal Dump and Other Inappropriate Disposal
K2305/Development and Evaluation of a Vein/Artery Linkage Production Technology for the Next Generation Biodiesel Fuel from Waste Oils and Fats

K2306/Development of Advanced Technology and Management System of Highly Energy-saving and Low-carbon Society Johkaso

K2307/Development of Analytical Model on Phosphorus Recovery and Utilization

K2308/Environmentally Friendly Wet-recovery of Indium from Electronic Scraps Using Microorganisms

K2309/Studies on Chemical Decomposition of Asbestos at Room Temperature and Safety Reuse of the Decomposed Asbestos as New Materials

K2310/Development of Technology for Reducing Difficult-to-dewatering Organic Sludge at High Rate by Step-up Ultrahigh-pressure Expression Combined with Reversible Flocculation

K2311/Risk Control of Brominated Flame Retardants during Article/Product Life Cycle Including Waste Treatment and Recycling Processes

K2312/Development of Advanced Separation Technology of Rare Metals Using Extraction Separation and Crystallization Stripping

K2313/Selective Indium Recovery Process from Waste by Means of Pyrometallugical Method

K2314/International Comparative Study on Policy Developments of 3R and Waste Management, and Integration with Chemical Control Systems

K2315/Synthesis of Calcium Phosphate Hydrogel from Waste Incineration Fly Ash, Bone Powder and its Application to Fuel Cell

K2316/Development of Optimum Treatment Technique and Recovery of Rare Metals from Scraps Containing their Elements Using Biomass Wastes

K2317/Model Research of Maintenance, Repair and Replacement of Sub-categorized Equipment in Waste Incineration Plants, Appropriating to both of Energy Recover Initiatives and Tendency of Reducing Waste Volume

K2318/Development of Waste Gasification and Catalytic Reforming Technologies with Molecular Separation Process Using Nano-porous Membrane

K2319/Development of Chemical Zero Emission Technology for Recovery and Recycling of Valuable Metals from Incineration and Melting Fly Ash

K2320/Optimization of Separation Process for Rare Metals Recycling in E-waste

K2321/Scheme for the Development of Rare Metal Recycling and its System Evaluation Method

K2322/Development of Decision Support System for Supporting Consumer's Environmentally Conscious Action

K2323/Assessment of Municipal Solid Waste Management by Using Benchmarking Methods

K2324/Complete Decomposing of Perfluoro Compounds and F-Recovery Using In-line Type Plasma Reactor in Liquid

K2325/Selective Recovery of Gallium by Foam Chromatography from Industrial Wastes

K2326/Recycling of Rare Metals and Organic Substances from City Mine: toward Organic-solvent-free and Complete Recycling

K2327/Research for Pretreatment for Enzyme Saccharification of Biomass Using a New Hot Water Explosion Method

K2328/Lead Recovery Processing from CRT Glass Cullet Utilizing Lead Smelting Process

K2329/Process Development for Rare-metal Recovery from Printed Circuit Board Wastes by Using Chlorination-volatilization and Hydrometallurgical Treatment

K2330/Establishment of Microbiological Assessment for Safe and Available Compost Application

K2331/Recycling Process of Wasted Ink for Fabrication of High Strength Titanium Reinforced with Carbon Black Particles

K2332/Development of Environmental Assessment Technique of Johkaso System as an Infrastructure for Supporting Sustainable Society

K2333/Systems Analysis for Biomass Utilization Based on Local Sound Material-cycle Society Blocks

K2334/Development of Arsenic Detoxification Method and Rare-metal Recycling Technique

K2335/Study on Proper Management of Asbestos in Recycling and Treatment Processes of Asbestos Wastes

K2336/Recycling System of Rare Metals Using Food-waste Biomass with High Selectivity

K2337/High Grade Liquid Fuel Production from Biomass/Wastes by Steam-hydrogenation Hybrid Gasification

K2338/Development of Municipal Solid Waste Database and Evaluation of Municipal Solid Waste Management Systems in Southeast Asia

K2339/Development of Advanced Ethanol Fermentation Technology Using Mutated-fused Yeast

K2340/Development of Sophisticated Extraction and Selective Recovery System of Rare Metals from Valuable Wastes

K2341/Mechanism of FRP Decomposition in Water Vapor at Atmospheric Pressure High Temperature and the Reuse of Recycled Materials

K2342/Development of an Efficient Extraction Separation System for the Recovery of Rare-metals by Using Environmentally-friendly Ionic Liquids as Solvents

K2343/Investigation of Discharge Behavior in Final Landfill Site and Countermeasure Technology of Perfluorinated Compounds (PFCs)

K2344/Separation and Recovery Process of Rare Earth Metals from Wastes by Using Molten Salt and Alloy Diaphragm

K2345/Rare Metal and Carbon Recovery by Carbonization of Used Scraps

K2346/Recycling of Precious Metals

K2347/Classification of E-waste Recycling Technology in Asian Developing Countries

K2348/Recovery of Rare Metal from End-of-life Electronic Equipment by Using Steam Gasification in the Present of Molten Carbonate Mixtures

K2349/A Study on Load Reduction on Melting Furnace and Metal Recovery

K2350/Research on Application and Risk Assessment for the Innovative Technology of Ecological Restoration Using Steel Slag and Humic Substances

K2351/Development of Assessment Methodology for Preferable Sound Material-cycle Blocks and Scenario Analysis

K2352/Psychological Modeling of Waste Prevention Behavior and Program Fostering Citizens' Behavior

K2353/Study on Development of Environmental Remediation Technologies of Polluted Site with Volatile Organic Compounds Contained in Unlawfully Renounced Wastes and their Evaluation Methods

K2354/Development of Adsorption Technology for the Recovery of Rare Metals from Spent Small Size Household Electric and Electronic Appliances Using Biomass Wastes

K2355/Development of New Treatment Method for Sulfur Oxide and Nitrogen Oxide from Exhausted Gas Using Magnesium-Aluminum Oxide

K2356/Development of Low-cost Decomposition Process for Dioxin-contaminated Soil and Sediment Using Carbonized Material-based Adsorbent

K2357/A Simulator for Long-term Behaviors of Toxic Pollutants to Assess Environmental Stability and Safety of a Wastes Landfill Site in the Post-service Phase

K2358/Sanitation Constraints Classification and Alternatives Evaluation for Asian Cities

K2359/Effective Use of Bassanite as Soil Improvement Materials Produced from Waste Plaster Board

K2360/Research of Strategic Phosphorus Resource Recycling System by Local Production for Local Consumption from Iwate

K2361/Extraction of Rare Metals with High Selectivity and Efficiency by Using of High-ordered Mesoporous Monolith (HOM)

K2362/Reduction of Generated Waste and Promotion of Recovery & Disposal of Solid Waste on the Sea of Japan Coast

K2363/Research on Recycling of Salt the By-product according to Waste Management

K2364/Scenario Analysis on Economic Feasibility and Evaluation of Biomass Utilization

K2365/Sustainable Management for Sewage Treatment System under the Condition of Population Decreasing and Facility Aging

K2366/Control Technology of Air and Water Pollutants Using Recovered Phosphorus Resources

K2367/Simultaneous Recovery of Rare Metal and Lithium from Waste Li-ion Battery Using a Carbon Reduction Method

K2368/Study on the Transportation and Storage of Wasted Heat from Refuse Incineration Plants at Ambient Temperature

K2369/Application of Steel Slag to Construction of Artificial Tidal Flats Sustainably Providing Ecosystem Services

K2370/Investigation of Biomass Utilization Strategy Aimed at Regional Activation

K2371/Development of Novel Recycling Process of Phosphorus from Iron- and Steel-making Slags

## Information on calls for proposals

**Schedule**

The schedule and arrangements are announced on the ERTDF website, as well as on environmental and scientific websites. A call for applications is announced every October. Applications are accepted with a deadline in the middle of November.

**Application Procedures**

All necessary application forms for proposals can be downloaded from the ERTDF website. The proposals are accepted through the Cross-ministerial R&D Management System (e-Rad).

**Selection of Research Projects**

After the application forms have been checked, the Planning Committee for Environment Research and its subcommittees, comprised of outside specialists, will evaluate the proposed research projects. First, the proposals will be narrowed down in an initial screening of the written description. The remaining proposals will then be evaluated for final selection on the basis of interviews.
Notification of approved proposals will be made every March. The results of the evaluation will include comments on the proposals and will be sent to the applicants after the selections have been made.

## Inquiries


### Ministry of the Environment, Government of Japan

- General inquiries, Environmental pollution, Ecological risks, Cross-field studies
  **Environmental Policy Bureau**
  **Office of Environmental Research and Technology**

- Health risks
  **Environmental Health Department**
  **Environmental Risk Assessment Office**

- Global system change, Protection/Restoration of nature and ecosystems, Research on sustainable society/policy
  **Global Environment Bureau**
  **Research and Information Office**

- Establishment of a sound material-cycle society and the next-generation waste treatment technology
  **Waste Management and Recycling Department**
  **Waste Management Division**

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