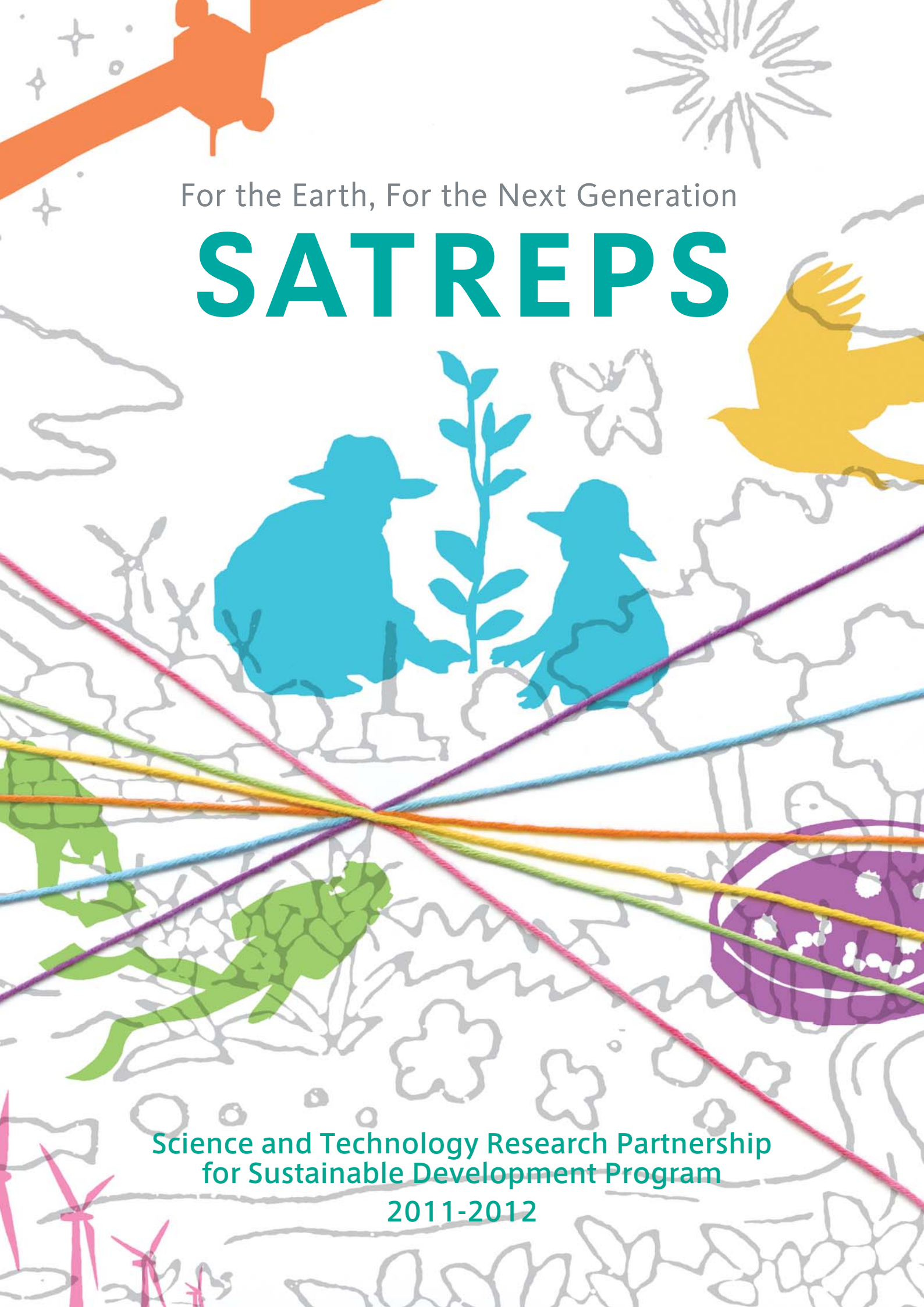
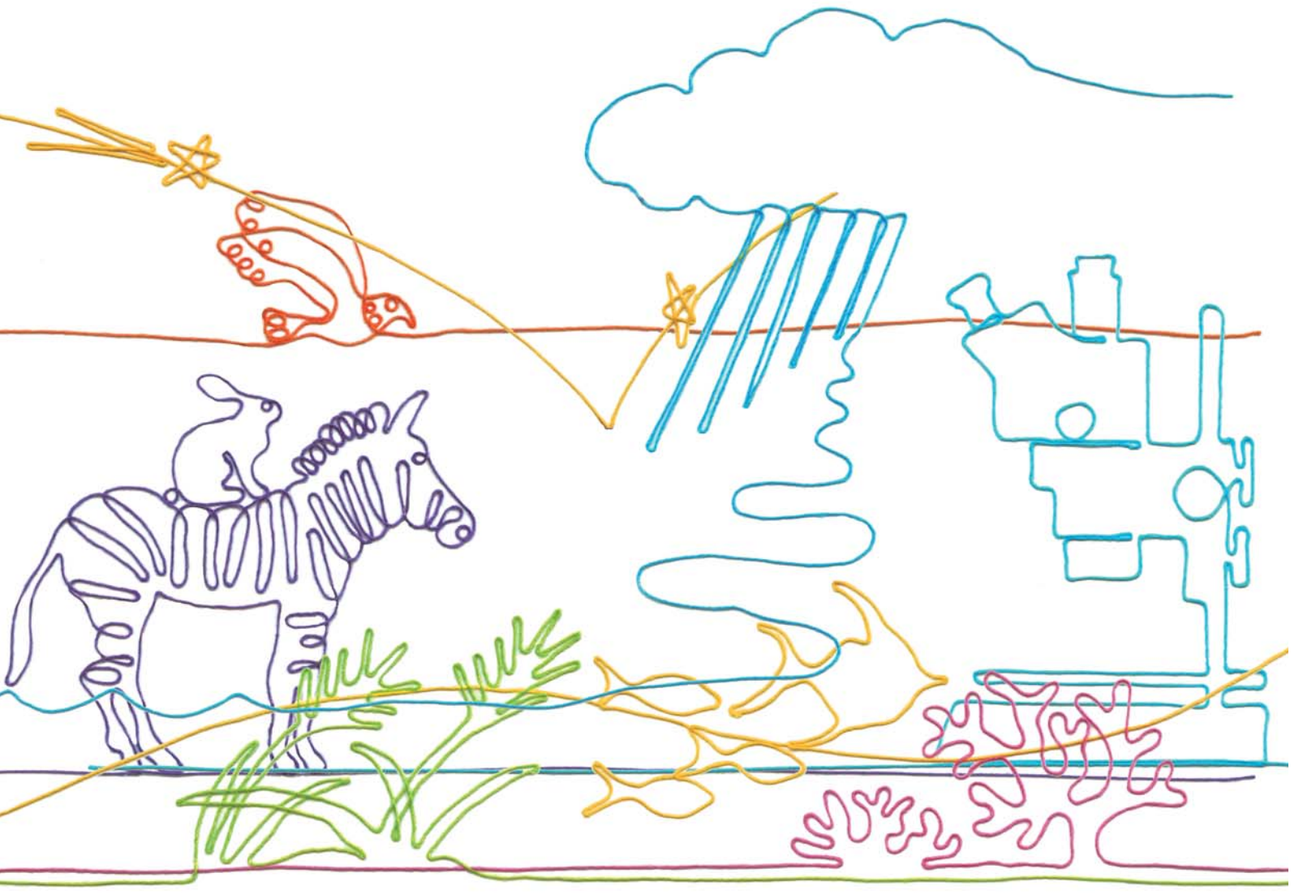
For the Earth, For the Next Generation

SATREPS



Science and Technology Research Partnership
for Sustainable Development Program

2011-2012



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SATREPS Program—
For the Earth, For the Next Generation

Science and Technology Research Partnership for Sustainable Development

Many of the greatest threats that we face today—including global warming, major natural disasters, and infectious diseases—are issues on a global scale.

In August 2011, the Japanese Cabinet approved the Fourth Science and Technology Basic Plan, under which Japan will work to resolve global issues by actively promoting international cooperation with developing countries. Japan sees it as its own responsibility within the international community to contribute to the advancement of science and technology in developing countries and to the cultivation of human resources.

In addition to the conventional approach of providing assistance by applying and transferring technology from Japan, joint research will be conducted under the SATREPS program through collaboration between universities and research institutes in Japan and in developing countries, with the objective of developing and utilizing new technologies and gaining new knowledge. The aim of this approach is to both resolve global issues and boost the capacity for science and technology, enhancing overall capabilities at research institutions in developing countries.

It is our expectation that SATREPS will assist the next generation of researchers in Japan and SATREPS partner countries to launch themselves, full of dreams and hopes for the future, into a world of scientific and technical innovation.

For the Earth, For the Next Generation—
SATREPS researchers working around the world, around the clock

SATREPS : Science and Technology Research Partnership for Sustainable Development

SATREPS is a Japanese government program that promotes international joint research. The program is structured as a collaboration between the Japan Science and Technology Agency (JST), which provides competitive research funds for science & technology projects, and the Japan International Cooperation Agency (JICA), which provides development assistance (ODA). Based on the needs of developing countries, the program aims to address global issues* and lead to research outcomes of practical benefit to both local and global society.

*Global issues: Issues that affect more than a single country or region, and cannot be resolved without international collaboration. Examples include energy/environment issues, disaster risk reduction, infectious disease control, and food security.

Addressing Global Issues, Advancing Science, Developing Capacity

The objectives of SATREPS are to acquire new knowledge and new technologies that lead to the resolution of global issues as well as the advancement of science and technology. SATREPS is also engaged in capacity development, working with developing countries to develop human resources for R&D and to develop sustainable research activities, leading to independent research capacity that can address global issues.

1. International Cooperation
Enhancing international cooperation in science and technology between Japan and developing countries

2. Addressing Global Issues and Advancing Science
Developing and applying new technology for the resolution of global issues and acquiring new knowledge that can lead to advancing the level of science and technology

3. Capacity Development
Boosting self-reliant research and development capacity in developing countries through international joint research, constructing sustainable research systems that can contribute to resolving issues, coordinating networking between researchers, and training future human resources in developing countries and in Japan

SATREPS joins and coordinates functions, activities, and capabilities that were once separate, using scientific research potential as a mediator for developmental diplomacy

Science and Technology
Promoting science and technology, encouraging innovation

Meeting Global Needs
Resolving global issues and contributing to the science and technology community

Japan's Capabilities
·World-leading technology, proven research capacity
·Soft power

×

International Cooperation
ODA, development assistance

Meeting Local Needs
Capacity development to address issues emerging as local needs in developing countries

Developing Countries' Capabilities
·Direct experience, knowledge, and data needed for research on global issues
·Potential to contribute to the global economy through new markets and industries

Research Fields

Environment/Energy

Population levels are growing, cities are becoming increasingly overcrowded, and production and consumption levels are increasing. There is a growing global need to pursue research into technology that can resolve environment and energy problems, and to deploy the outcomes of such research. In this context, SATREPS supports joint research for the purpose of reducing the negative impact of climate change on the natural environment.

Climate Change

※Research area:"Research contributing to adaptation to or mitigation of climate change" (closed for applications FY2010)

Mitigation strategies currently planned or being implemented are insufficient to address climate change, and further enhancement will be necessary. Current conditions are already prompting forecasts that the impact will be protracted, expanding across almost all areas, meaning that climate change cannot be addressed through measures for mitigation alone. We need to reduce the pace of climate change and diminish the risks associated with it through a combination of adaptation and mitigation approaches.

Low Carbon Society/Energy

※Research area: "Research contributing to energy systems for low carbon society" (from FY2010)

It is essential that both developed countries and developing counties take part in the efforts to achieve a low carbon society in order to reduce global emissions. Furthermore, research on low carbon energy systems contributes to the reduction of fossil fuel consumption. Development and deployment of such systems is extremely beneficial at both local and global levels.

Global-scale Environmental Issues

※Research area: "Research contributing to the resolution of global-scale environmental issues"

Climate change is occurring, population levels are growing, cities are becoming increasingly overcrowded, and production and consumption levels are increasing. There is a growing need, both locally and globally, to pursue research into technology that can resolve environment and energy problems, and to deploy the outcomes of such research.

Bioresources

※Research area: "Research contributing to sustainable utilization of bioresources" (from FY2009)

Sustainable production of food and other bioresources is threatened by problems such as desertification, salinization of agricultural land, and pests. In order to be able to continue enjoying the blessings of bioresources as the global population grows and climates change, there needs to be collaborative research that can point the way to sustainable means of production and utilization.

Natural Disaster Prevention

※Research area: "Research on natural disaster prevention attuned to the needs of developing countries"

Natural disasters are a constant danger in Japan, and have resulted in the accumulation of a great deal of knowledge and expertise. In addition to applying this knowledge to disasters and risk reduction in developing countries, collaboration is urgently needed to make further progress in research into earthquake/tsunami early-warning systems and high-precision weather forecasting.

Infectious Diseases Control

※Research area: "Research on measures to address infectious diseases control attuned to the needs of developing countries"

HIV/AIDS, malaria, dengue fever, tuberculosis, highly pathogenic influenza, and other emerging and re-emerging infectious diseases can be a major impediment to social and economic development. Efforts to address infectious diseases issues in developing countries can have a direct benefit in protecting the health of individuals worldwide. Collaboration between Japan and developing countries on research in this field contributes to the control of infectious diseases on a global scale.

JST and JICA Collaboration

Competitive Research Funds/Technical Cooperation Projects

SATREPS projects are conducted through collaboration between JST and JICA. JST uses research contracts to support research costs incurred in Japan (and in other locations outside the developing country involved in the project). In contrast, JICA provides support through its technical cooperation project framework to cover costs* in the developing country.

Overall R&D management of the international joint research is handled jointly by JST, which has expertise in funding research projects at research institutions in Japan, and JICA, which has expertise in technical cooperation in developing countries.

*Costs in the developing country: Since costs are covered by JICA through its technical cooperation projects framework, self-help efforts by the developing country are crucial. Consequently, personnel costs and office usage costs in the developing country, consumables used by the developing country research team, and local in-country travel costs for the developing country's researchers are normally covered by the developing country itself.

Point

■ Research Fields

Environment/Energy, Bioresources, Natural Disaster Prevention, Infectious Diseases Control

■ Research Period/Duration of Research

Three to five (3-5) years

■ Countries Covered by SATREPS (Country where research institution is located)

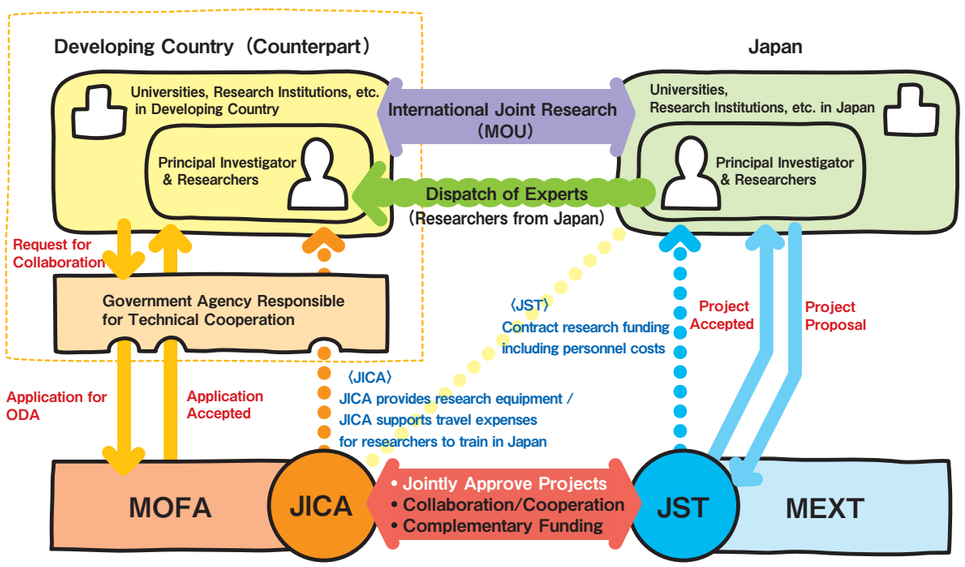
Developing countries targeted for ODA "Technical Cooperation Projects"
(with emphasis on Asian and African countries)

■ Project Size

Approx. 100 million yen per project per year

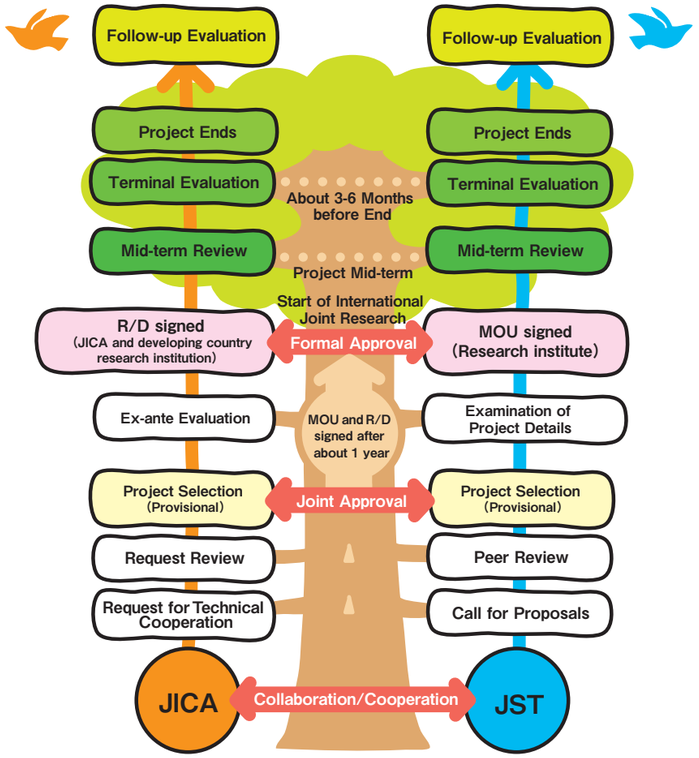
Funding split: JST: Approx. 38 million yen
JICA: Approx. 60 million yen

SATREPS Project Scheme



SATREPS Projects: Beginning to End

Project Progress



Selection of SATREPS Projects

SATREPS projects are selected by a process involving collaboration between Japanese government agencies. JST initially calls for research proposals from Japanese research institutions. At the same time, Ministry of Foreign Affairs (MOFA)/JICA receives requests from developing countries for ODA technical cooperation for international joint research. It is essential for the Principal Investigator (PI) in Japan to coordinate with researchers in the developing country in order to confirm the details of the joint research. It is a requirement that official requests for ODA technical cooperation be submitted by the research institution in the developing country to MOFA, via the ministry or agency in the developing country responsible for ODA technical cooperation.

Preparation for an International Joint Research Project

To implement the international joint research, a Record of Discussions (R/D) must be signed by the developing country and JICA to confirm that they agree on the details of the ODA technical cooperation. In addition a memorandum of understanding (MOU), or similar document concerning the joint research, of which details shall match the R/D and JST's Contract Research Agreement, must also be signed between the research institutions (parties concerned). JST normally concludes the Contract Research Agreements with the research institutions to which the principal investigator and main researchers are affiliated in Japan.

Evaluation by JST and JICA

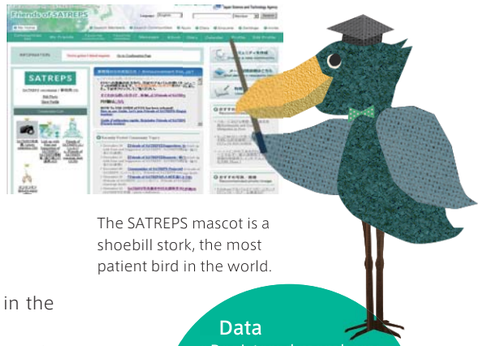
The SATREPS program functions through research funding from JST and technical cooperation funding from JICA, so projects are reviewed by both JST and JICA, acting in collaboration. JST reviews the whole of the international joint research project, both in Japan and in the developing country, from the perspective of the project outcome contributing to the resolution of global issues, and from the perspective of the project advancing science and technology. JICA evaluates the joint activities of the principal investigator and other researchers including the counterpart research institutions' researchers from an ODA project perspective, confirming that the project has contributed to developing human resources and enhancing capacity in the developing country, and has contributed to the development topic.

Friends of SATREPS Online Community

Friends of SATREPS is an online community (SNS) for people involved in SATREPS projects and for anyone else concerned with the future of our earth and human society. It provides a platform that supports and encourages links between members worldwide. Registration is free of charge.

URL https://fos.jst.go.jp/

Friends of SATREPS Search



The SATREPS mascot is a shoebill stork, the most patient bird in the world.

■ Members are a rich source of information about life and culture in the field. Discoveries and encounters are not limited to research topics.
■ Stay up to date on developing country news. Communication channels built between researchers, companies, and other entities can remain in place after a research project finishes.

Data
- Registered members: Over 3,300
- Communities: Approx. 240
- Countries involved: Approx. 90

(as of February 2012)

Through Friends of SATREPS, you can:

Receive news and information about related events

Receive news about the SATREPS program, current projects, and information about related events.

Cooperate with current projects

Take part in SATREPS community by finding ways to cooperate with one of the current projects. Ideal for students with an interest in the environment or for companies/NGOs involved in related initiatives.

Work on preparations for new projects

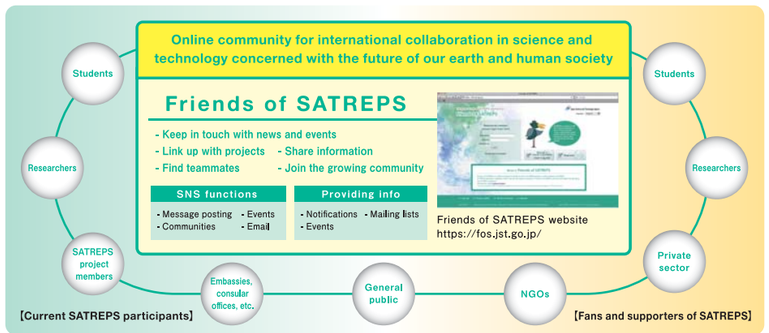
Put together a project team for a new SATREPS project proposal, find teammates, and brainstorm on proposal details.

Share information and ideas

Share information and ideas with community members on topics such as environment and energy issues, bioresources, control of infectious diseases, and natural disaster prevention.

Voices of Friends of SATREPS members

- "I used to work on ground-water projects in Africa. Now I'm hoping to put that experience to use again and meet lots of new people, too." (Engineer, Japan)
- "Communication is one of a researcher's jobs, but it's easily forgotten when the research work is interesting. Friends of SATREPS is a great opportunity to keep communicating." (Researcher, Japan)



- "I'm interested in business at the base of the pyramid, and particularly in how governments, companies, and NGOs collaborate to make BOP businesses work." (Student, Japan)
- "I am a teacher of English. I am much interested in protecting the earth and environment." (Educator, Algeria)
- "I have four children, and I'm very concerned about what the world will be like when they grow up." (NGO worker, Japan)

Find us on Facebook and Twitter. Facebook: http://www.facebook.com/Friends.of.SATREPS
Twitter: http://twitter.com/satreps

Messages from SATREPS Interns

"What does SATREPS mean to you?"

SATREPS university student interns learn about projects being undertaken in various countries, and then use their own words to communicate what they have learned to many other people. We invited our interns to depict in a sketchbook what SATREPS means to them.

Broadening horizons through all kinds of encounters

International Legal Studies 4th year student
Sophia University Faculty of Law
Chisato Nasu

When I heard it had to do with science and technology, I was a little worried at first that I might not be of much use, but as I got used to telling other people about projects in a way that they could understand too, I found that meeting all sorts of people in various situations was helping to broaden my horizons, and that I too was gaining a lot from the experience. To me, SATREPS was the "beginning" of many fascinating encounters.

Power to protect the future, connect to the future, work for the future

Division of Arts and Sciences 2nd year student
International Christian University College of Liberal Arts
Takuya Ito

The future is in the hands of young people—that's one of the things I've learned through SATREPS. The earth is our only home, and we have a duty to protect its future and pass it on to the next generation. SATREPS nurtures the "power to the future" that we need as young people inheriting the future. It is our power that can connect the world and create the future.

Opening my eyes to bring the world much closer

Division of Arts and Sciences 2nd year student
International Christian University College of Liberal Arts
Ikumi Sugie

I knew very little about science, technology and international cooperation, but serving as a SATREPS intern brought such subjects much closer to me. The more I learn about the projects being carried out in different countries, the more I feel my eyes are being opened to the world. I see SATREPS as a magical forum that connects people to the big wide world out there.

Opportunity to meet the world

Division of Arts and Sciences 2nd year student
International Christian University College of Liberal Arts
Hikari Dateyama

It was a university course that I took quite by chance that led to my becoming a SATREPS intern, but that chance opportunity enabled me to learn a lot about the world. It's also often through chance opportunities that SATREPS projects are born, and it's these little opportunities that shape the future world. SATREPS taught me about the tremendous potential that such small opportunities can have.

Showing us the way ahead

Division of Arts and Sciences 2nd year student
International Christian University College of Liberal Arts
Kumiko Dojo

SATREPS has opened my eyes to the world of research and connected me to that world. Through this internship, I've learned about all sorts of research, gained knowledge, and met many people, and I'm sure I'll continue to do so. I also feel that as cooperation between countries becomes more and more necessary, SATREPS can set a great example to Japan and other developed countries. I see SATREPS as being at the forefront, showing us—me, Japan, the world—the way ahead.

A bridge connecting points that would otherwise remain apart

Division of Arts and Sciences 2nd year student
International Christian University College of Liberal Arts
Hironori Motoki

To me, SATREPS serves as a bridge connecting points—university students and professors, science and humanities, developed and developing countries—that would otherwise remain apart. It can take you away from the world you know to show you a world you never knew existed. Thanks to SATREPS, I've been able to experience that kind of awakening.

Rekindling a sense of excitement

Division of Arts and Sciences 1st year student
International Christian University College of Liberal Arts
Hiroshi Ichige

I was really thrilled by my first encounter with SATREPS. All that amazing science and technology, moments when Japan connects with the world, projects connecting to the future—everything I encountered through SATREPS rekindled a sense of excitement that I had almost forgotten. I now want to communicate that excitement to others.

Looking at the common ground of science and the world

Division of Arts and Sciences 1st year student
International Christian University College of Liberal Arts
Takumi Kimura

Science and technology play an indispensable role in our lives now, and it was through this internship with SATREPS that I learned how science and technology is being used to aid developing countries. The great thing about SATREPS is the way it gives me a real time glimpse at the way the common ground between science and the world is expanding.

Picking up the pieces after 3/11

～ Spanning borders between countries and disciplines to confront massive earthquakes ～

Science and Technology Research Partnership for Sustainable Development

Under the FY2008 SATREPS natural disaster prevention project titled "Multi-disciplinary Hazard Reduction from Earthquakes and Volcanoes in Indonesia," over 200 Indonesian and Japanese researchers in both science and humanities disciplines are working together to reduce disaster risks, focusing on the following themes: (1) earthquake forecast; (2) volcano eruption forecast; (3) tsunami hazard map creation, simplified quake-proofing technologies and other hard aspects; (4) communication of information and other soft aspects; (5) disaster prevention education; (6) cooperation with government.

The Great East Japan Earthquake of March 11, 2011 prompted a re-examination of earthquake research priorities. To find out more, eight SATREPS interns interviewed Prof. Kenji Satake, the principal investigator for the research project on January 13, 2012.

Principal investigator: Prof. Kenji Satake, Earthquake and Volcano Information Center, Earthquake Research Institute, The University of Tokyo

Born in 1958 in Tokyo. Devoted himself to mountaineering at Hokkaido University as a member of the Alpine Club. The eruption of Mount Usu and the Japan Sea Earthquake of 1983 inspired an interest in volcanoes, earthquakes, and tsunamis. After earning a doctorate, he spent seven years in the USA studying earthquakes and tsunamis that had occurred worldwide, but was prompted to return to Japan by the Great Hanshin-Awaji (Kobe) Earthquake of 1995 to study active faults and tsunami sediments for evidence of earthquake and tsunamis that had occurred several hundred to several thousand years ago. He continues to focus on research into massive earthquakes and tsunamis.

How do you forecast earthquakes?

Chisato Nasu: To what extent do you think this project will enable you to forecast earthquakes in Indonesia?

Prof. Satake: It's difficult to forecast every earthquake accurately. In Japan, for example, three M4 quakes occur every day, so you would be correct if you said that an earthquake is going to occur, but you have to be able to say when and where exactly it's going to strike, and how strong it's going to be. Where time of occurrence is concerned, there are long-term and short-term forecasts. For short-term forecasts, you use telltale signs of imminent activity to predict the earthquake will occur, say, in several hours' time or within a week, but this is still difficult. Long-term forecasts are a completely different matter, since you base them on active faults and other historical evidence of past earthquakes. If, say, you've been able to determine that an earthquake occurs once every 1,000 years, and about 1,000 years have passed since the previous quake, you can predict that the next quake will occur soon. All sorts of research on active faults and plate boundaries was carried out after the Great Hanshin-Awaji Earthquake of 1995, and as a result, it was possible to predict with 99% certainty that a powerful M8 earthquake would occur within the next 30 years off the coast of Miyagi Prefecture where the 3/11 quake actually occurred. This project has shed quite a lot of light on Indonesia's past earthquake history, and so my answer to your question is that we've accumulated the data required to make long-term forecasts.

Hironori Motoki: Both volcano eruptions and earthquakes are natural phenomena, but what is the relationship between them?

Satake: They are basically caused by the same thing. Plate movement causes the formation of active faults, and earthquakes occur as a result. And magma rises up from the boundaries between plates, causing volcanic eruptions. Earthquakes and eruptions don't necessarily occur at the same time, and we still don't understand detailed mechanisms, but we see them as being connected in some way. For example after the Yogyakarta earthquake occurred in Java in 2006, Mount Merapi erupted.




What are the pros and cons of cooperation between specialists in sciences and humanities?

Takumi Kimura: If you divide academia broadly into sciences and humanities, I think that earthquake research would fall on the side of science. This project, however, incorporates knowledge on the humanities side too. What are the merits of spanning this divide between science and humanities?

Satake: Earthquake researchers tend to think that if they can nail earthquake prediction, earthquake casualties can be avoided, but that's just not the case. You also need to be able to forecast the type of tremors that will occur, and know how to construct houses that are able to withstand earthquakes, and such like. Sociologists and other humanities specialists investigate psychological aspects such as how people react to alerts and flee for safety. We also needed to research Islamic religious concepts for this project. Our aim is to actually reduce casualties and damage by bringing all these disciplines together and applying them to policymaking, rather than just being satisfied with the science as an end in itself.

Kumiko Dojo: Does Indonesia see disasters in a different way from Japan?

Satake: Where the Mount Merapi eruption was concerned, an elder who conducts religious rituals as a means of appeasing the mountain was a major influence. Many people are also readier to put their faith in local knowledge than in what the government or scientists say. You can't reduce disaster risks unless you base the way you communicate information on a sound understanding of such factors.

Takuya Ito: Are any attempts being made to equip local community leaders with appropriate scientific knowledge?

Satake: Of course. We're also researching education and the dissemination of information sociologically. At the time of 3/11, the Meteorological Agency issued a tsunami alert three minutes after the quake occurred, and it had the technology to forecast tsunami height in detail—3 m, 6 m, or 10 m, but the problem was that we hadn't considered how people should adjust the way that they evacuate according to whether the prediction is for 3 m or 6 m. It's not good enough just to unilaterally provide information.

Ito: So one advantage of taking a combined science and humanities approach is that you can develop measures that also consider aspects such as the sharing of information. It would have been great if this project's approach had been applied to 3/11.

Satake: I agree. We've long said that it's not enough just to study earthquakes, but have we heeded our own advice in Japan in this respect? We had thought that Japan was setting an example, but the 3/11 disaster has forced us to rethink our approach to date.

Chisato Nasu
International Legal Studies, 4th year student
Sophia University Faculty of Law

Takuya Ito
Division of Arts and Sciences 2nd year student
International Christian University College of Liberal Arts

Kumiko Dojo
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International Christian University College of Liberal Arts

Hikari Dateyama
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Hironori Motoki
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Ikumi Sugie
Division of Arts and Sciences 2nd year student
International Christian University College of Liberal Arts

Hiroshi Ichige
Division of Arts and Sciences 1st year student
International Christian University College of Liberal Arts

Takumi Kimura
Division of Arts and Sciences 1st year student
International Christian University College of Liberal Arts

Dojo: I'd also like to ask about the benefits of linking government ministries and agencies.

Satake: Japan and Indonesia are very similar in that all sorts of ministries and agencies are involved in disaster prevention. This means that ensuring the horizontal sharing of information is vital.

Hiroshi Ichige: Are relevant Japanese branches of government being told about the need to incorporate a humanities approach?

Satake: We didn't have anything to do with it, but the Meteorological Agency and Central Disaster Prevention Council conducted a questionnaire survey on when people who heard the tsunami alerts actually heard them and how they responded. Also, the network that we have built up with humanities specialists for this project has proved useful for 3/11 field research.

Kimura: Has the mindset of earthquake researchers changed since 3/11?

Satake: It's changed dramatically. We had forecast the probability of an M7.5–8 quake striking off the Miyagi Prefecture coast, but what actually occurred was an M9 quake with thirty times the energy. In that sense, we just hadn't anticipated such a possibility.

Ichige: I think that public attitudes have also changed. I was in Ibaraki Prefecture at the time of the quake, and I was really panicked by it. The experience brought home to me the importance of providing emotional care.

Nasu: I think that dealing with psychological aspects is really difficult. Are there any measures being taken?

Satake: The most effective measure taken in Indonesia has been to teach teachers. The teachers then teach the children, and they pass on the scientific knowledge they've gained to their parents.

Kimura: I too thought about that aspect when I visited the disaster zone after the quake. I couldn't help feeling that perhaps we're relying too much on technology recently, that it's risky putting too much faith in, say, tsunami alerts.

Satake: 20,000 people were killed by 3/11, but they died for various reasons. Some were elderly people who were unable to escape, while others died attempting to rescue elderly relatives, and so I don't think that putting too much faith in technology was the only cause of death.

Kimura: Were there any difficult aspects to the cooperation between science and humanities implemented in this project?

Satake: There are over 200 researchers involved in this project, and while the leaders of each group are able to share the same awareness, extending that to everyone involved in the project is difficult.

What does Japan stand to gain from this project?

Ikumi Sugie: A distinguishing feature of SATREPS projects is that they're designed to bring benefits to Japan as well, rather than being just one-way assistance to developing countries, aren't they?

Satake: 3/11 was the first M9 earthquake to occur in Japan in 1,000 years. Only five earthquakes of such strength have occurred worldwide since the start of the 20th century. One of those was the 2004 Sumatra quake, and then there were the Alaska and Chile earthquakes in the 1960s. So you see, such a quake will occur only once in 1,000 years in the same place, but if you're looking at ten places, one will occur in one of those places every 100 years. As such, the greatest benefit of conducting research in various places is that you can get your hands on much more data. The same goes for volcano eruptions. By increasing your points of reference, you can boost the overall precision of forecasts and hopefully reduce disaster risks.

Dojo: Japan suffered extensive damage even despite having fairly well-developed earthquake countermeasures. Does Japan stand to gain anything from the findings of this project in Indonesia in terms of earthquake countermeasures?

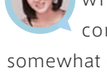
Satake: I feel that both countries stand to gain a lot in that respect by sharing information on the reasons and circumstances behind the casualties and damage caused in each case.

Hikari Dateyama: Are there any aspects of recovery from the Sumatra quake or 3/11 that connect with the goals of your project?

Satake: Some researchers have been studying sociological aspects of the recovery process, and I think their findings can eventually be applied to 3/11. However, there are considerable differences between Indonesia and Japan, since Indonesia is much more dependent on foreign aid.

What are the most important outcomes of this project?

Sugie: Lastly, I'd like you to come up with a single kanji character that you think best symbolizes the achievements of this project.



Satake: That would be 際 (sai), which is equivalent to the prefix "inter-" in English, as in "international" (koku-sai in Japanese) or "interdisciplinary" (gaku-sai in Japanese), and means "between" or "beyond."

Sugie: Between and beyond nations and disciplines. That sums it up neatly. Thank you very much for giving us your valuable time today.

Post-interview impressions provided by the interns

Dateyama: When I compared the speed with which recovery was accomplished in Indonesia and Japan, I was struck by the fact that Indonesia's recovery was perhaps faster precisely because its lifelines were from the start not nearly as developed as Japan. Professor Satake pointed out that how you define the aims of recovery is also an issue, and this was brought home to me by the fact that temporary housing for tsunami victims in Indonesia has effectively become permanent housing.

Motoki: I think that everyone is more aware of the risks after 3/11, but up to now people haven't really taken the matter into their own hands. Hopefully, people will from now on take a more active interest in earthquakes and the knowledge they need to prepare for them.

Nasu: I was struck by the breadth of knowledge with which earthquake research needs to concern itself. I was a little disturbed by the somewhat excessive mood of self-restraint after 3/11. I feared that if the economy slowed down as a result, we'd start seeing problems in shipping supplies to the disaster zone. I think that education has an important role to play in changing such attitudes.

Ichige: The thing that made me happiest today was to learn about how studying earthquakes in Indonesia can also bring benefits to Japan. The idea of collecting data over a wide area really struck me as making good sense.

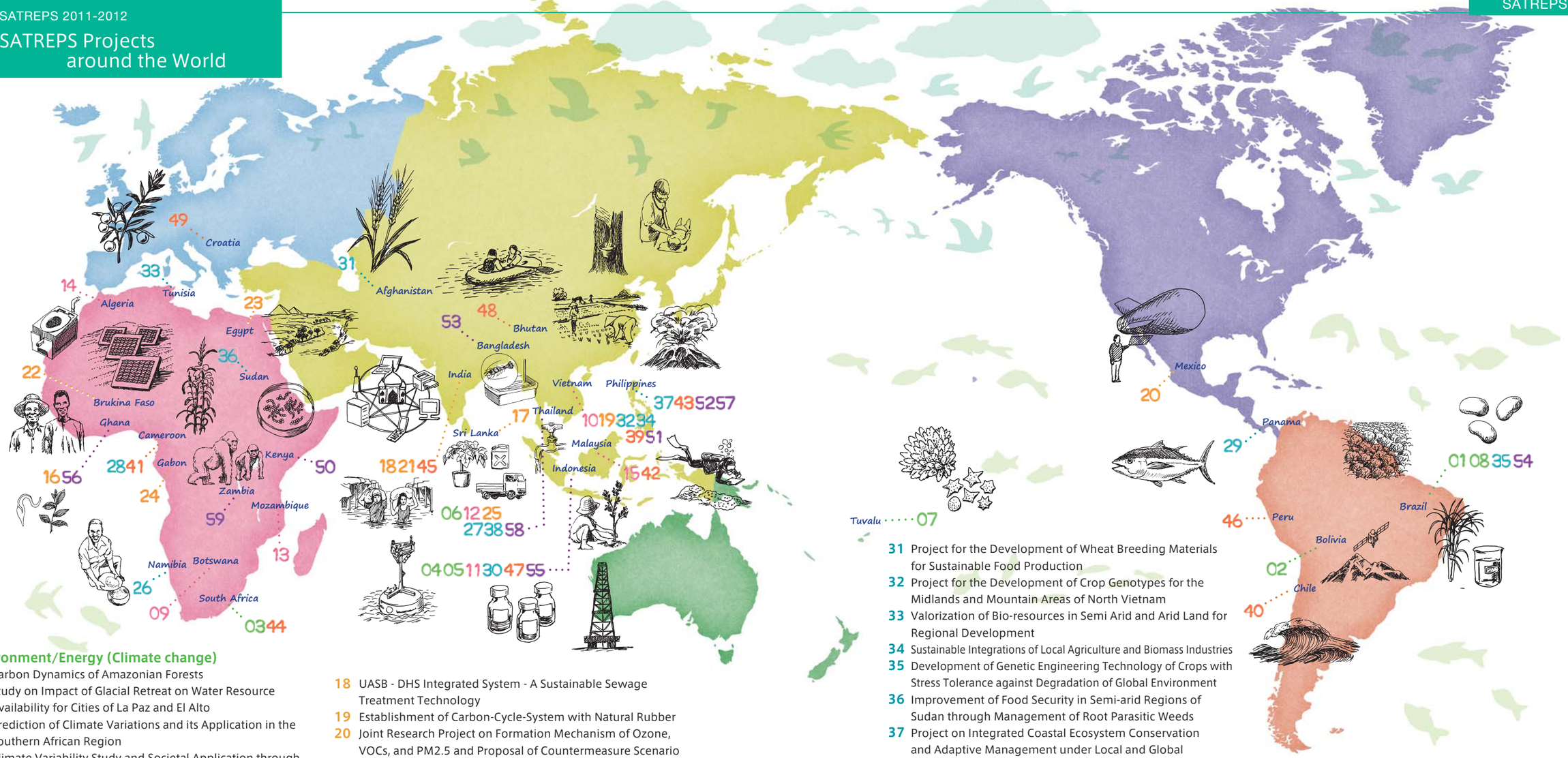
Kimura: 2011 was a watershed year for me too. 3/11 was an event that I feel I want to go on thinking about into the future. I'm from Shizuoka, where we've been told for decades now that a Tokai earthquake is bound to occur sometime soon, and that's why earthquake prediction research is fascinating to me.

Dojo: I'm on the science side of things, and up to now I've always thought that it's enough just to carry out research, so it was useful to learn that making the best use of research outcomes also requires paying attention to psychological and educational aspects. I realize now that it's particularly important to think about how people are going to behave in a crisis situation, and that's an aspect I want to focus on from now on.

Ito: I spent a month last summer as a volunteer in the 3/11 disaster zone, and I was struck by the strength of the people. I think that the sociological study of communities and industry before the quake and how to link that to future development is a wonderful research theme. I'd like to see Japan putting its research to good use for future quakes, and making a name for itself worldwide as a leading authority on recovery from disasters.

Sugie: Hearing about how information and awareness regarding disaster prevention can affect the extent of earthquake damage and casualties made me more aware of the need to study psychological and educational aspects. I now realize how important it is to look at the issue from many different perspectives, rather than just focusing on one aspect.

SATREPS Projects around the World



Environment/Energy (Climate change)

- 01 Carbon Dynamics of Amazonian Forests
- 02 Study on Impact of Glacial Retreat on Water Resource Availability for Cities of La Paz and El Alto
- 03 Prediction of Climate Variations and its Application in the Southern African Region
- 04 Climate Variability Study and Societal Application through Indonesia - Japan "Maritime Continent COE" - Radar-Buoy Network Optimization for Rainfall Prediction
- 05 Wild Fire and Carbon Management in Peat-forest in Indonesia
- 06 Integrated Study Project on Hydro-Meteorological Prediction and Adaptation to Climate Change in Thailand (IMPAC-T)
- 07 Eco-technological Management of Tuvalu against Sea Level Rise
- 08 Research on Ethanol Production from Sugarcane Wastes

Environment/Energy (Low carbon society/energy)

- 09 Information-based Optimization of Jatropha Biomass Energy Production in the Frost- and Drought-prone Regions of Botswana
- 10 Multi-beneficial Measure for Mitigation of Climate Change in Vietnam and Indochina Countries by Development of Biomass Energy
- 11 Pilot Study for Carbon Sequestration and Monitoring in Gundih Area - Central Java Province, Indonesia
- 12 Development of New Biodiesel Synthesis in Thailand
- 13 Sustainable Production of Biodiesel from Jatropha in Mozambique
- 14 Sahara Solar Energy Research Center (SSERC)
- 15 Development of Low Carbon Society Scenarios for Asian Regions

Environment/Energy (Global-scale environmental issues)

- 16 Enhancing Resilience to Climate and Ecosystem Changes in Semi-Arid Africa: an Integrated Approach
- 17 The Project for Development of Pollution Control and Environmental Restoration Technologies of Waste Landfill Sites Taking into Account Geographical Characteristics in Sri Lanka
- 18 UASB - DHS Integrated System - A Sustainable Sewage Treatment Technology
- 19 Establishment of Carbon-Cycle-System with Natural Rubber
- 20 Joint Research Project on Formation Mechanism of Ozone, VOCs, and PM2.5 and Proposal of Countermeasure Scenario
- 21 Research Partnership for the Application of Low-Carbon Technology for Sustainable Development
- 22 Improving Sustainable Water and Sanitation Systems in Sahel Region in Africa: Case of Burkina Faso
- 23 Sustainable Systems for Food and Bio-energy Production with Water-saving Irrigation in the Egyptian Nile Basin
- 24 Conservation of Biodiversity in Tropical Forest through Sustainable Coexistence between Human and Wild Animals
- 25 Research and Development for Water Reuse Technology in Tropical Regions

Bioresources

- 26 Flood- and Drought-Adaptive Cropping Systems to Conserve Water Environments in Semi-arid Regions
- 27 Development of Aquaculture Technology for Food Security and Food Safety in the Next Generation
- 28 Establishment of Sustainable Livelihood Strategies and Natural Resource Management in Tropical Rain Forest and its Surrounding Areas of Cameroon: Integrating the Global Environmental Concerns with Local Livelihood Needs
- 29 Comparative Studies of the Reproductive Biology and Early Life History of Two Tuna Species for the Sustainable Use of these Resources
- 30 Project for Development of Internationally Standardized Microbial Resource Center to Promote Life Science Research and Biotechnology
- 31 Project for the Development of Wheat Breeding Materials for Sustainable Food Production
- 32 Project for the Development of Crop Genotypes for the Midlands and Mountain Areas of North Vietnam
- 33 Valorization of Bio-resources in Semi Arid and Arid Land for Regional Development
- 34 Sustainable Integrations of Local Agriculture and Biomass Industries
- 35 Development of Genetic Engineering Technology of Crops with Stress Tolerance against Degradation of Global Environment
- 36 Improvement of Food Security in Semi-arid Regions of Sudan through Management of Root Parasitic Weeds
- 37 Project on Integrated Coastal Ecosystem Conservation and Adaptive Management under Local and Global Environmental Impacts in the Philippines
- 38 Innovation on Production and Automotive Utilization of Biofuels from Non-food Biomass

Natural Disaster Prevention

- 39 Development of Landslide Risk Assessment Technology along Transport Arteries in Viet Nam
- 40 Enhancement of Technology to Develop Tsunami-resilient Community
- 41 Magmatic Fluid Supply into Lakes Nyos and Monoun, and Mitigation of Natural Disasters in Cameroon
- 42 Research and Development for Reducing Geo-Hazard Damage in Malaysia caused by Landslide & Flood
- 43 Enhancement of Earthquake and Volcano Monitoring and Effective Utilization of Disaster Mitigation Information in the Philippines
- 44 Observational Studies in South African Mines to Mitigate Seismic Risks
- 45 Information Network for Natural Disaster Mitigation and Recovery
- 46 Enhancement of Earthquake and Tsunami Disaster Mitigation Technology in Peru
- 47 Multi-disciplinary Hazard Reduction from Earthquakes and Volcanoes in Indonesia
- 48 Study on GLOFs (Glacial Lake Outburst Floods) in the Bhutan Himalayas
- 49 Risk Identification and Land-use Planning for Disaster Mitigation of Landslides and Floods in Croatia

Infectious Diseases Control

- 50 Development of Rapid Diagnostics and the Establishment of an Alert System for Outbreaks of Yellow Fever and Rift Valley Fever in Kenya
- 51 Determine the Outbreak Mechanisms and Development of a Monitoring System at Food Administration for Multi-drug Resistant Bacteria
- 52 Comprehensive Etiological and Epidemiological Study on Acute Respiratory Infections in Children
- 53 Research and Development of Prevention and Diagnosis for Neglected Tropical Diseases, Especially Kala-Azar
- 54 New Diagnostic Approaches in the Management of Fungal Infections in AIDS and Other Immunocompromised Patients
- 55 Identification of Anti-Hepatitis C Virus (HCV) Substances and Development of HCV and Dengue Vaccines
- 56 Studies of Anti-viral and Anti-parasitic Compounds from Selected Ghanaian Medicinal Plants
- 57 Prevention and Control of Leptospirosis in the Philippines
- 58 Research and Development of Therapeutic Products against Infectious Diseases, especially Dengue Virus Infection
- 59 Establishment of Rapid Diagnostic Tools for Tuberculosis and Trypanosomiasis and Screening of Candidate Compounds for Trypanosomiasis

Environment/Energy
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Environment/Energy
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Environment/Energy
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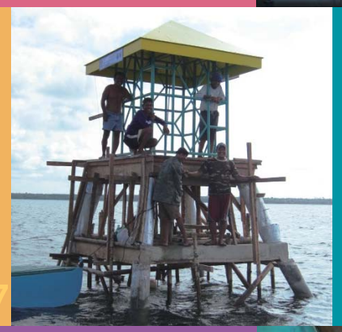

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SATREPS 2011-2012

Environment/Energy (Climate change)

01 = Carbon Dynamics of Amazonian Forests =

Health Checkup for the World's Lungs: Measuring the Carbon Stocks in the Amazon Forests

Principal Investigator Research Coordinator, Dr. ISHIZUKA Moriyoshi / Forestry and Forest Products Research Institute (FFPRI)

Incorporating forest protection into international climate change standards

CO_2 emissions resulting from the deforestation and degradation of tropical forests in the Amazon and other regions are estimated to account for nearly 20% of global emissions from human activities. There are moves to internationally recognize prevention of deforestation as a part of climate change schemes. To achieve this, however, it will be necessary to establish technologies for assessing the degree to which emissions can be reduced by preventing deforestation. This project focuses on the forests of the central Amazon region in an effort to develop technologies for measuring carbon stocks and their changes (emissions/uptakes) in forests over a large area.


Measuring biomass of a tree trunks, branches, leaves, and roots

Carbon stock measurements using satellite data help to clarify the dynamics of the Amazon forest

Research on the forest structure, carbon stock, etc. was conducted at approximately 1,500 locations in the central Amazon. Remote-sensing techniques were used to reveal the connection between the forest carbon stocks and the unique Amazon environment — such as a seasonal flooded forest which is inundated when the water level rises during the rainy season. The project aims to map carbon stock in the Amazon forests.


Forest Management Site of National Institute for Amazon Research (INPA) in Brazil. Working with the graduate students at INPA, researchers are studying topics such as soil water content along topographic gradients and fine root dynamics.

Counterpart Institutions	National Institute for Amazon Research (INPA), National Institute for Space Research (INPE)
Collaborators	Institute of Industrial Science, the University of Tokyo (IIS)
Research Period	4 Years **Adoption Fiscal Year** FY 2009

02 = Study on Impact of Glacial Retreat on Water Resource Availability for Cities of La Paz and El Alto =

Monitoring from an Eye in Space: Securing Water for a City of 2 Million Above the Clouds

Principal Investigator Prof. TANAKA Hitoshi / Graduate School of Engineering, Tohoku University

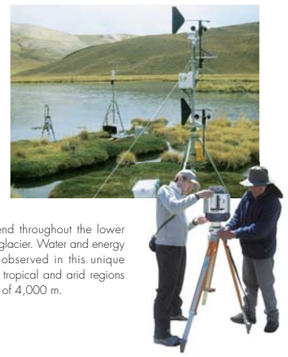

The Condoriri Glacier, the major source of water for the cities of La Paz and El Alto

Climate change is threatening an enormous reservoir of pure water with extinction

Climate change is causing the glaciers in Bolivia to melt, and there are concerns that water resources may run dry in the future. One study found a 56% glacier loss in the past 50 years. This project will work to develop monitoring techniques for securing sustainable water resources. Efforts will focus on determining the amount of glacier melting that will occur in the future and predicting the changes in water demand accompanying climate change. The project will also consider sediment management, water quality surveying and the construction of water supply systems, and will include modeling to support water resource policy from a multifaceted perspective.

Water resources viewed from a multifaceted perspective to create new management models

Satellite data will be used to analyze changes in glacier area in Bolivia and the ice and snow area in the Andes highlands. The project will also predict the accumulation of sediment in reservoirs, study water quality, consider the issue of water resources in the capital La Paz and the neighboring city of El Alto, survey water supply systems and so on. The results of each study will be integrated and used in the creation of water resource management models for La Paz and El Alto.


Wetlands extend throughout the lower reaches of the glacier. Water and energy cycle will be observed in this unique environment of tropical and arid regions at an elevation of 4,000 m.

Counterpart Institutions	San Andrés Main University's Instituto de Hidráulica e Hidrología (IHH-UMSA), etc
Collaborators	Fukushima University, Tokyo Institute of Technology
Research Period	5 Years **Adoption Fiscal Year** FY 2009

03 = Prediction of Climate Variations and its Application in the Southern African Region =

The "Virtual Earth" Will Change Agriculture in South Africa

Principal Investigator Head of Laboratory, Dr. YAMAGATA Toshio / Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

Predicting climate variations up to a year in advance to mitigate the effect of abnormal weather

The southern African region is vulnerable to abnormal weather and researchers are trying to improve skills of seasonal forecasting to mitigate the impacts of abnormal weather. Specifically, they are using ***a high-resolution ocean-atmosphere coupled model (SINTEX-F)*** (a virtual earth on the Earth Simulator supercomputer that reproduces interactions between the atmosphere and oceans) to predict global climate variations up to one year in advance. These prediction results will be used to conduct downscaling seasonal prediction for southern Africa.


Farmers in Limpopo Province benefit from forecasts.

Seasonal prediction skills will also be applied in Japan

This project has clarified the mechanism of ***the subtropical dipole modes*** in the southern Indian Ocean and the South Atlantic, which induce abnormal weather in South Africa. It also successfully predicted heavy rainfalls during the summer of 2010-2011. In the future, this technology will be applied to agriculture, etc. in southern Africa and seasonal prediction in Japan.


Table Mountain in Cape Town. Improved seasonal predictions achieved by this project will contribute to the production of wine grapes grown at the base of the mountain.

Counterpart Institutions	Applied Centre for Climate and Earth Systems Science (ACCESS), etc
Collaborators	The University of Tokyo
Research Period	3 Years **Adoption Fiscal Year** FY 2009

04 = Climate Variability Study and Societal Application through Indonesia - Japan "Maritime Continent COE" - Radar-Buoy Network Optimization for Rainfall Prediction =

Islands and Seas of Indonesia "Maritime Continent" Control Global Climate

Principal Investigator Dr. YAMANAKA Manabu / Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

Observing maritime climate and precipitating clouds over Indonesia, the heart of global atmospheric circulation

The Indonesian Archipelago, called "maritime continent", plays a role of dam on the warm water that flow from the Pacific Ocean to the Indian Ocean, resulting in the world's largest cloud activity and rainfall, and pumping the warm humid air upward and poleward like the "heart" in global atmospheric circulation. Variations in the seas and clouds of Indonesia may trigger abnormal climate such as droughts and heavy rains in different parts of the world through changing the atmospheric and oceanic circulations. By optimizing the observation network on islands and seas in Indonesia and developing capability of observation techniques such as radars and buoys, it becomes possible to improve the accuracy of climate predictions for the whole world. Such improvements of observations and predictions are also needed in Indonesia to mitigate flooding and drought damage and for use in policymaking, in order to achieve climate-adapted social infrastructure and industrial development.


TRITON (TRIangle Trans-Ocean buoy Network), developed by Japan, is used by Indonesian technicians.

Establishing the first optimized atmosphere-ocean observation network in Earth's equatorial region

This project will promote the creation of an observation network for climate on both land and sea, including improved radar observation techniques for monitoring clouds and rainfall and compactized buoys for measuring marine climate and seawater temperature. Optimizing the observation network over the Indonesian maritime continent, which holds the key to year-by-year fluctuations in global climate, will certify Japan's leading position in climate change research and push up Indonesia into the leading countries as well.


TRITON buoy on board an Indonesian research vessel. Similar training and cutting-edge observations are underway for land-based radar as well, greatly improving the accuracy of observations on both land and sea.

Counterpart Institutions	Agency for the Assessment and Application of Technology (BPPT), Agency for Meteorology, Climatology and Geophysics (BMKG), National Institute of Aeronautics and Space (LAPAN)
Collaborators	Kyoto University, Kobe University
Research Period	5 Years **Adoption Fiscal Year** FY 2009

05 = Wild Fire and Carbon Management in Peat-forest in Indonesia =

Preventing a Spark from Setting Off the Global Ammunition Dump

Principal Investigator Prof. OSAKI Mitsuru / Graduate School of Agriculture, Hokkaido University

The peat accumulated beneath a tropical peat swamp forest could be ignited and burn down the forest

Enormous quantities of carbon are stored in peatlands in the low marsh areas of Indonesia. If drainage channels are dug in the peat and the deposits of vegetation dry out, both hot combustion (peat fires) and cold combustion (microbial decomposition) occur, releasing large quantities of carbon into the atmosphere and resulting in a loss of the biodiversity. Moreover, the carbon monoxide and fine particles released would threaten the health of residents. This project aims to develop water management appropriate for the region, restore the forests, create an early fire detection system using satellites, and establish measures for rapidly extinguishing fires — all measures that are needed to restore these peat marshes. The data will be integrated with satellite GIS data to build carbon flux models that will contribute to creating REDD-plus* and MRV** standards.

* REDD-plus: Reducing Emissions from Deforestation and forest Degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries ** MRV: Measurement, Reporting, and Verification


Trees selected by means of water resistance tests conducted to determine the tree species suitable for wetlands

Building a system for comprehensive management of peatland, inhibition of carbon release and carbon management

The world's only MRV system capable of accurately determining carbon emissions from peatland was created by integrating ground and satellite data. This system will be used with REDD-plus to restore and maintain the tropical peat swamp forests that are the earth's most important carbon sinks and treasure troves of biodiversity.

Carbon absorption and emissions (flux) observations reveal that emissions resulting from biodegradation in past forest fire sites are extremely large, more than five times those of forests that have had comparatively little impact from fire.

Counterpart Institutions	National Standardization Agency of Indonesia (BSN), University of Palangka Raya (UNPAR), Indonesian Institute of Sciences (LIPI), State Ministry of Research and Technology (RISTEK), Indonesian National Institute of Aeronautics and Space (LAPAN), Forest Research and Development Agency (FORDA), Agency for the Assessment and Application of Technology (BPPT)
Collaborators	Japan Aerospace Exploration Agency (JAXA), The University of Tokyo, Ehime University, etc
Research Period	5 Years Adoption Fiscal Year FY 2008

06 = Integrated Study Project on Hydro-Meteorological Prediction and Adaptation to Climate Change in Thailand (IMPAC-T) =

Resolving Water-related Issues in Thailand through Observation and Prediction

Principal Investigator Prof. OKI Taikan / Institute of Industrial Science, The University of Tokyo (IIS)

Establishment of a support system for resolving water-related issues caused by climate change

Water-related disasters such as flood and drought have expanded, and may become even more serious as a result of climate change, changes in land use and so on. This project will propose effective techniques for management of water resources and models for water-related disaster mitigation, and will create support systems for policy implementation. The existing rainfall observation networks of the Thai Meteorological Department and the Royal Irrigation Department and local survey information will be used to enhance accuracy of numerical simulations, and an integrated system for hydrological information will be proposed that the estimation of variability of the hydrological cycle accompanying climate change and changes in land use.

Search for the adaptation through the survey of flood of the Chao Phraya River

Study of the operational status of an drainage treatment facility on the left bank of the Chao Phraya River

A system for accumulating observational data and a system that integrates the observational data and water resource management models were established. In 2011, emergency survey of flood of the Chao Phraya River was implemented, and contributed to the planning of adaptation. In the future, these data will be integrated, together with historical data.


H08 numerical simulation was installed and run for the Chao Phraya River as an example on workshop participants' laptops.

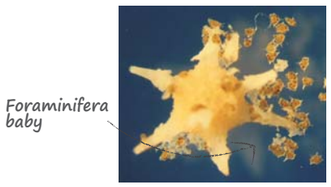
Counterpart Institutions	Kasetsart University (KU), Thai Meteorological Department (TMD), Royal Irrigation Department (RID), etc
Collaborators	Kyoto University, Tohoku University
Research Period	5 Years Adoption Fiscal Year FY 2008

07 = Eco-technological Management of Tuvalu against Sea Level Rise =

Protecting Tuvalu, Island of Beautiful Coral Reefs and Star Sand, from Sinking

Principal Investigator Prof. KAYANNE Hajime / Graduate School of Science, The University of Tokyo

Rise in sea level and loss of creatures that produce sand



Asexual reproduction by foraminifera (common name: star sand)

Tuvalu is at risk of submerging due to rising sea levels caused by the effects of climate change. The natural environment has been degraded by population increase and economic development, resulting in progressive deterioration of the coral reefs and a drop in the capacity of the ecosystem that creates the deposits that constitute Tuvalu's native soil. As a result, there is a need to understand the mechanism that forms and maintains the island and consider the ecosystem, and then devise policies to increase the island's restorative capabilities. These policies can be applied not only to Tuvalu but to atolls throughout the world, and to the islands off the coast of the Japanese mainland.

Development of technologies to aid coral and foraminifera propagation

A study of the topography, ecosystem etc. of Funafuti Atoll was conducted, and a map was prepared showing the distribution of coral and foraminifera and the production, movement and deposition of sand by these organisms. In addition, experiments to raise and propagate foraminifera were conducted successfully. This study will aid in efforts to maintain the national territory while restoring the ecosystem, and in formulating measures to combat coastal erosion and coastal management plans.


Surveying the topography of the shallow seafloor near the shoreline with GPS in hand. This was an enthusiastic collaborative effort by a young Japanese researcher and a Tuvalan counterpart, chest-deep in the sea.

Counterpart Institutions	Tuvalu's Department of Environment, Deparment of Fisheries, Department of Lands and Survey
Collaborators	National Institute for Environmental Studies (NIES), Ibaraki University, University of the Ryukyus
Research Period	5 Years Adoption Fiscal Year FY 2008

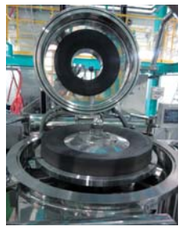
08 = Research on Ethanol Production from Sugarcane Wastes =

Sugarcane Wastes: Producing Sustainable Energy from Residues

Principal Investigator Director, Dr. SAKANISHI Kinya / Biomass Technology Research Center (BTRC), National Institute of Advanced Industrial Science and Technology (AIST)

Contribution to mitigating climate change by using existing resources effectively

There is increasing demand for bioethanol fuel produced from grains and sugars, as an effective means for mitigating climate change without increasing the amount of CO_2 in the atmosphere. However, there can be problems such as deficiency of raw materials due to competition with food and feed use, rising food prices, and deforestation due to increased cultivation area of crops. For these reasons, research and development is underway for the production of fuel ethanol from the bagasse, which are remains after the sugarcane is crushed to collect cane juice, and wastes like straws. As bagasse or straws have rigid structure, research for fine gridinig to break down the structure and so on is underway.


Fine grinding equipment at the National Institute of Advanced Industrial Science and Technology (AIST)

Construction of optimum fuel ethanol production system for the use of bagasse and straws

In order to reduce the time needed for the fine grinding process, technologies that involve alkaline additives and so on are being studied. In addition, a fungal strain that produces enzymes necessary for hydrolysis has been successfully developed, to reduce the cost of the process. The goal of this project is to contribute to mitigating climate change through sustainable fuel production, and deployment in other regions such as Southeast Asia is also planned.

Brazil is already producing ethanol from sugar cane juice, but the use of wastes will result in more effective climate change prevention.

Counterpart Institutions	Federal University of Rio de Janeiro (UFRJ), Federal University of Santa Catarina (UFSC)
Collaborators	None
Research Period	3 Years Adoption Fiscal Year FY 2008

SATREPS 2011-2012

Environment/Energy
(Low carbon society/energy)

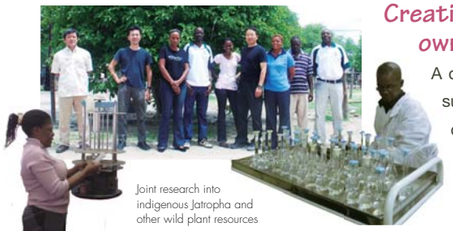
09 = Information-based Optimization of Jatropha Biomass Energy Production in the Frost- and Drought-prone Regions of Botswana =

Using the Energy Hidden in Plants in the Arid Regions of Botswana

Principal Investigator Associate Prof. AKASHI Kinya / Faculty of Agriculture, Tottori University

Jatropha: an ideal biofuel utilizing the environmental tolerance of wild plants

Crops in Botswana grow slowly due to dryness and cold-weather, and this is a barrier to the achievement of a low carbon society based on bioenergy. However, the country has an abundance of wild plants that can withstand dryness and winter cold. It also has large numbers of Jatropha trees, whose seeds have abundant quantities of an oil considered to hold great promise as a biofuel. The goal of this project is to utilize these resources to develop Jatropha varieties that are resistant to dryness and cold weather and offer high productivity, as well as to develop methods of cultivating these varieties. In this way, a biological approach will help to achieve a low carbon society.



Joint research into indigenous Jatropha and other wild plant resources

Creating a bioenergy production model based on the country's own biological resources

A database of biological resource data relating to Jatropha will be constructed and suitable varieties will be developed. Moreover, in this arid region that is subject to cold weather, efforts will be made to establish a cultivation system that is flexible with respect to climate change. The project will work to build a sustainable bioenergy production model using plant genetic resources that are indigenous to Botswana.

Site of defoliant warehouse at Da Nang International Airport

Counterpart Institutions	Energy Affairs Division (EAD) in the Ministry of Minerals, Energy and Water Resources (MMEWR), Department of Agricultural Research (DAR) in the Ministry of Agriculture, University of Botswana (UB)
Collaborators	University of the Ryukyus, RIKEN
Research Period	5 Years
Adoption Fiscal Year	FY 2011

The cultivation and genetic characteristics of indigenous Jatropha will be analyzed. Based on the results, an integrated database will be constructed to aid in technical development for biofuel production.

10 = Multi-beneficial Measure for Mitigation of Climate Change in Vietnam and Indochina Countries by Development of Biomass Energy =

Four Birds with One Stone: Energy Production System Resolves All Problems at Once

Principal Investigator Research Prof. MAEDA Yasuaki / Research Organization for University-Community Collaborations, Osaka Prefecture University

Revitalizing devastated land + Preventing atmospheric pollution + Creating jobs + Mitigating climate change

Vietnam faces serious problems: the 9 million ha of land contaminated with defoliants or devastated by activities such as slash-and-burn agriculture, the atmospheric pollution in urban areas resulting from rapid economic development, and the poverty in mountainous regions. The goal of this project is to plant trees in the devastated land and use them to produce oil as a feedstock for fossil-fuel alternatives, manufacturing clean fuels that can be used in urban areas. Not only would this resolve three issues at once — *revitalize devastated land, prevent atmospheric pollution and create local jobs* — it would also create a biomass energy production and utilization system that would be an effective means of *mitigating climate change*.

Top: Motorcycles in Hanoi, Bottom: Devastated land abandoned after slash-and-burn agriculture in a mountainous region

Establishing a production process and making the technology available to neighboring countries

After studying the devastated land and cleaning the contaminated soil, trees will be planted to produce inedible oil in order to manufacture biodiesel fuel that is energy efficient and produces little waste, which will then be used for the public transport system. Technical development will address issues such as vehicle exhaust emissions, and the technologies will be made available to neighboring countries.

Garbage collection vessel at Ha Long Bay that runs on biodiesel fuel

Counterpart Institutions	Vietnam National University, Hanoi (VNU-Hanoi), etc
Collaborators	Ehime University, Osaka City University, Japan International Research Center for Agricultural Sciences (JIRCAS)
Research Period	5 Years
Adoption Fiscal Year	FY 2011

11 = Pilot Study for Carbon Sequestration and Monitoring in Gundih Area - Central Java Province, Indonesia =

CO_2 with Natural Gas Production Should be Sealed Deep Inside the Earth

Principal Investigator Prof. Matsuoka Toshifumi / Graduate School of Engineering, Kyoto University

The mission is to resolve CO_2 emissions problems associated with natural gas production

Indonesia plans to reduce CO_2 emissions by 26% by the year 2020. However, the large quantities of CO_2 that are released into the atmosphere during production of natural gas in gas fields is seen as a problem for the achievement of this goal. This problem can be resolved by creating a system for carbon dioxide capture and storage (CCS) technology — in which the CO_2 that is emitted during natural gas production is captured and sealed into the ground — as a means of directly reducing CO_2 emissions. This project will conduct research and development of CO_2 underground storage and monitoring technologies in the Gundih gas field in Central Java, where natural gas production is scheduled to begin.


A drill rig in preparation for natural gas production

Imaging the subsurafce CO_2 storage is indispensable for the safe operation of CCS

The project goal is to develop technologies for geologically and geophysically evaluating deep subsurface CO_2 storage in and around the gas fields and for monitoring injected CO_2 movement for ascertaining the distribution and behavior of CO_2 in the storage. The achievements will be used to systematize CCS technologies for safe underground storage of the CO_2 that is emitted during natural gas production, helping to reduce CO_2 emissions on a global scale.


Indonesian and Japanese joint research team standing in front of a drill rig that is prepared to produce natural gas. The team was visiting the site to formulate research plans.

Counterpart Institutions Institute Teknologi Bandung (ITB), etc
Collaborators Akita University, The University of Tokyo, University of Toyama, Waseda University, Kyushu University, Japan Petroleum Exploration Co., Ltd. (JAPEX), Fukada Geological Institute (FGI)
Research Period 5 Years **Adoption Fiscal Year** FY 2011

12 = Development of New Biodiesel Synthesis in Thailand =

New "HiBD" Biofuel Can Use Waste Food Oils, Animal/Vegetable Fats and Oils, Etc.

Principal Investigator Prof. ASAMI Kenji / Faculty of Environmental Engineering, The University of Kitakyushu

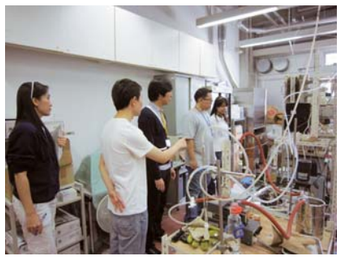
Manufacturing High Bio Diesel from biomass resources (oils and fats, etc.)

Currently we rely on fossil fuels for most of our primary energy needs, but this is seen as a cause of climate change. For this reason, oils, fats, and other biomass resources have attracted a great deal of attention as new and environmentally friendly sources of energy. The goal of this project is to manufacture high quality light diesel oil (HiBD : High Bio Diesel) from waste food oils, almost all of which are treated as industrial wastes, and from natural oils and fats. The project will work to develop simpler, highly efficient processes and deploy them in Thailand and Japan.


HiBD cracked oil (purified oil) derived from waste food oil

Successful use of low quality oils as fuel

The project has succeeded in developing a method for the manufacture of light diesel oil that works smoothly even when using waste food oils, other very poor quality oils, and crude oils that still have many impurities derived from the raw materials. In the future, the project will also investigate the possibility of using coconuts and other oil plants that are cultivated in large quantities in Southeast Asia for the manufacture of light oil.


Training of researchers from Chulalongkorn University (Thailand)

Counterpart Institutions Chulalongkorn University (CU)
Collaborators Kitakyushu Foundation for the Advancement of Industry Science and Technology (FAIS), Kitakyushu International Techno-Cooperative Association (KITA), Nippon Institute of Technology (NIT)
Research Period 4 Years **Adoption Fiscal Year** FY 2010

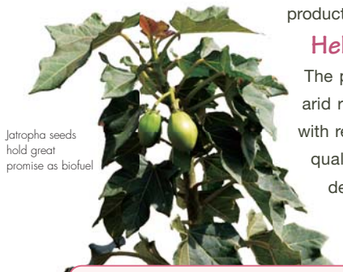
13 = Sustainable Production of Biodiesel from Jatropha in Mozambique =

Creating Environmentally Friendly Fuel from Land Unsuitable for Agriculture

Principal Investigator Prof. IMOU Kenji / Graduate School of Agricultural and Life Sciences, The University of Tokyo

Enriching the people and forests of Mozambique through biodiesel fuel production

In this project, biodiesel fuel plants will be cultivated in the arid regions in southern Mozambique that are not suitable for crop cultivation, in an effort to reduce CO_2 emissions, improve the lives of local residents through the creation of industry and so on. At the same time, the solid fuels that are produced as a byproduct will be made available for use in place of the firewood and charcoal that are currently major sources of fuel in Mozambique, thereby reducing tree cutting and preventing deforestation. This is an effort to build a sustainable production system by ensuring both economic viability and a positive environmental impact.


Jatropha seeds hold great promise as biofuel

Helping to improve the environment through the cultivation of Jatropha

The project is studying the breeding of varieties of Jatropha, a biodiesel fuel suitable for cultivation in arid regions, as well as cultivation methods that are low-risk with regard to climate change. Technologies for inspecting the quality and safety of the manufactured fuel are also being developed. The project is being conducted with a view to future industrialization of fuel production and deploying the approach to other countries in Africa.


When trees are cut down to produce firewood and charcoal, the land is left devastated. Similar practices are a serious problem in various parts of Africa.

Counterpart Institutions Eduardo Mondlane University (UEM), etc
Collaborators Kanazawa Institute of Technology (K.I.T.), Kurume University, Nippon Biodiesel Fuel Co., Ltd. (NBF), Association of African Economy and Development (AFRECO)
Research Period 5 Years **Adoption Fiscal Year** FY 2010

14 = Sahara Solar Energy Research Center (SSERC) =

Transforming the Desert into an Energy Treasure-House with Sunlight, Sand, and Superconductors

Principal Investigator Visiting Prof. KOINUMA Hideomi / Graduate School of Frontier Sciences, The University of Tokyo

A major power project that uses the most abundant raw material on earth

Deserts such as the Sahara Desert, the world's largest, cover vast areas of land, have an abundance of sunlight, and are a treasure-house of sand that contains large quantities of silica, the raw material for silicon. In this project, *solar breeders* (silicon factory + photovoltaic power plant) will be constructed in the desert, and the power that is produced will be used to construct more solar breeders. Then high-temperature superconducting power transmission systems that have little power transmission loss will be used to send the power to various parts of the world. The project represents an attempt to provide an ultimate solution to the world's energy problem by transforming barren deserts into a new energy resource.

Studying purification of silica in sand and silicon manufacture in preparation for the project


A circular farm that uses groundwater in the desert. Electricity is needed to pump up the groundwater.

Currently, the establishment of basic data is underway in anticipation of the project's realization from cooperative basic research. Instead of introducing bultin technology, Japanese and Algerian researchers work together to discover new knowledge, including the development of new technologies for efficiently converting silica into silicon. Collection of the basic data required to enable high-temperature superconducting cables to pass through desert regions, and studies to analyze and separate the components of Sahara sand and to identify its untapped resources are also proceeding.


Everything you see, all the way to the horizon in every direction, is raw material for photovoltaic cells.


With people living at an oasis in the Sahara Desert

Counterpart Institutions University of Science and Technology, Oran (USTO), etc
Collaborators The University of Tokyo, Hirosaki University, National Institute for Materials Science (NIMS), Tokyo Institute of Technology, Chubu University, National Institute of Informatics (NII)
Research Period 5 Years **Adoption Fiscal Year** FY 2010

15 = Development of Low Carbon Society Scenarios for Asian Regions =

Achieving a Low Carbon Society, the Scenario for a Future Vision

Malaysia

Principal Investigator Prof. MATSUOKA Yuzuru / Graduate School of Engineering, Kyoto University

Using statistics to paint a picture of the low carbon society of 2025

Palm oil factory

Malaysia is the world's top producer of palm oil, which can be used as a biofuel.

To achieve reductions in greenhouse gases worldwide, effective measures in emerging nations are indispensable. In a special economic zone in Malaysia known as Iskandar Malaysia, data on the economy, society and technology for creating a low carbon society will be gathered and analyzed for five categories (power generation, industry, transportation, commercial, and residential), creating an integrated assessment model and scenarios for achieving a low carbon society in 2025. The project will also provide assistance in devising solutions to the problems of atmospheric pollution, waste treatment management, and poverty and other social problems in connection with the establishment of a low carbon society.

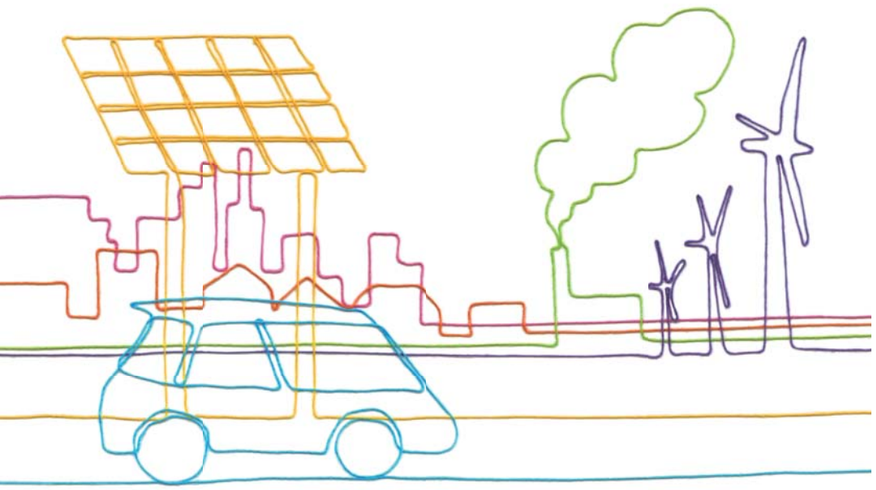
From Iskandar, which holds the key to a low carbon society, to the entire Asian region

This project will prepare a policy roadmap based on the quantitative analaysis and, in the process of implementing this policy roadmap, will work to improve the practicality and effectiveness of methods. Disseminating the achievements of research in Iskandar Malaysia, which symbolizes the growth of Asia, will help to achieve a low carbon society in Asia as a whole.

Constructing a low-carbon society

Malaysia is experiencing rapid growth and cities are developing throughout the country. It is essential to incorporate the low carbon perspective into developments at the planning stage.

Counterpart Institutions	Universiti Teknologi Malaysia (UTM), etc
Collaborators	National Institute for Environmental Studies (NIES), Okayama University
Research Period	5 Years Adoption Fiscal Year FY 2010



SATREPS 2011-2012

Environment/Energy (Global-scale environmental issues)

16 = Enhancing Resilience to Climate and Ecosystem Changes in Semi-Arid Africa: an Integrated Approach =

The Ghana Model: Creating Resilient Communities that Cope with Abnormal Climates

The Volta, the major river in northern Ghana

Principal Investigator Deputy Executive Director, Prof. TAKEUCHI Kazuhiko / Integrated Research System for Sustainability Science (IR3S), The University of Tokyo

Adaptation strategies for mitigating impacts of climate and ecosystem changes on developing societies

Coping with global climate and ecosystem changes requires developing countries with weak socioeconomic and resource management infrastructures to devise adaptation strategies. This project aims to develop integrated strategies to build a management base that is resilient to the changes and maintains certain socioeconomic and resource levels. Based on the research on rainfall, abnormal climates, ecosystems, and governance in the undeveloped, semi-arid northern Ghana, the project suggests that the effective strategy involves rural development and floods and droughts risk management along the Volta River, which should also lead to alleviate the economic disparity between the north and the rapidly growing southern Ghana.


Community development to cope with flooding

Disseminating the integrated resilience strategy widely across Africa

The project investigates climate and ecosystem changes and major crops through field survey and modelling, assesses impacts of the changes on agriculture and rural development, and develops infrastructure and local capacity to cope with flooding and droughts. The research process leads to integrated strategies that enhance resilience of farming communities in northern Ghana to climate and ecosystem changes and immanent disasters. These strategies are made available as the **"Ghana Model"**, which will be applicable to semi-arid regions across Africa.


Japanese researchers, local government representatives, and farmers are working on agriculture that enhances resilience to disasters.

Counterpart Institutions	University of Ghana (UG), University for Development Studies, Ghana (UDS), Ghana Meteorological Agency (GMet)
Collaborators	Kyoto University, United Nations University (UNU)
Research Period	5 Years **Adoption Fiscal Year** FY 2011

17 = The Project for Development of Pollution Control and Environmental Restoration Technologies of Waste Landfill Sites Taking into Account Geographical Characteristics in Sri Lanka =

Environmental-Friendly Solid Waste Management

Principal Investigator Prof. TANAKA Norio / Institute for Environmental Science and Technology, Saitama University

Develop site-specific pollution control and remediation techniques for waste disposal sites utilizing locally-available materials

Unregulated waste dumping is a crucial contributor to social and environmental problems in developing countries. The project aims are 1) to carry out monitoring of soil and groundwater pollution, and perform environmental risk assessment at waste dumping sites and surrounding areas, 2) to develop site-specific pollution control and remediation techniques for waste dumping sites utilizing locally available geo-/bio-materials, and to evaluate the developed techniques through small-scale pilot experiments, and 3) to propose a guideline for sustainable design and construction of waste dumping sites that is specifically linked and applicable to the waste management system in Sri Lanka.


Field survey at open dump by SATREPS members

Development of sustainable techniques to prevent contamination, with verification based on small-scale field experiment

Solid waste management at local municipalities and soil and groundwater monitoring at selected disposal sites are being investigated. Utilizing locally-available materials, low-cost and site-specific pollution control and remediation techniques for waste dumping sites are developed. A small-scale field experiment including these techniques will also be carried out. Integrating the results from these studies, applicable guidelines for the design and maintenance of solid waste disposal sites will be proposed to the Sri Lankan government.


Laboratory measurement of landfill gases. The measured data provides us with information on buried waste characteristics.

Counterpart Institutions	University of Peradeniya (UOP), Univeristy of Ruhuna (UOR), Institute of Fundamental Studies (IFS), National Solid Waste Management Support Center (NSWMSC), Central Environmental Authority (CEA)
Collaborators	Center for Environmental Science in Saitama (CESS), National Advanced Industrial Science and Technology (AIST), Waseda University
Research Period	5 Years **Adoption Fiscal Year** FY 2010

18 = UASB - DHS Integrated System — A Sustainable Sewage Treatment Technology =

Restore the Holy Rivers by Japanese Environmental Technology

Principal Investigator Prof. HARADA Hideki / Graduate School of Engineering, Tohoku University

Born in Japan and grown-up in India, DHS is set to become a de facto standard for wastewater treatment

Contamination of water environments represents a serious threat to the public health in developing countries. To restore safe and pleasant water environments, the Down-flow Hanging Sponge (DHS) Reactor, a new sewage treatment technology that has minimal energy consumption and is applicable to developing countries, will be brought on line. The proposed technology is an original one developed in Japan, and the project marks the first time that this environmental preservation technology is being used to help improve the environment of a developing country. The project site is a sewage treatment plant in the city of Agra, very near to the Taj Mahal, India's greatest treasure. This is an indication of the great expectations of the Indian government for this technology.

Prototype DHS plant in India

Aiming to become the de facto world standard: Innovative technology can purify the world's water

An actual DHS system capable of treating water for a population of 28,000 will be installed at a sewage treatment plant in Agra, and demonstration tests will be conducted by the international joint research consortium between India and Japan. Design guidelines and O&M manual will also be prepared for the purpose of disseminating this technology first along the Yamuna River and the Ganga River, and then throughout India and to other parts of Asia, Africa and Central and South America as well.


Japanese and Indian project team members survey a sewage treatment plant in Agra where an actual DHS system is scheduled for construction.

Counterpart Institutions	Ministry of Environment & Forests's National River Conservation Directorate (NRCD), etc
Collaborators	Kisarazu National College of Technology, Nagaoka University of Technology
Research Period	5 Years **Adoption Fiscal Year** FY 2010

19 = Establishment of Carbon-Cycle-System with Natural Rubber =

Focus on Natural Rubber as a Recyclable Biological Resource

Principal Investigator Prof. FUKUDA Masao / School of Engineering, Nagaoka University of Technology

Reducing CO_2 emissions by replacing synthetic rubber with natural rubber

Synthetic rubber is made from fossil fuels, and enormous quantities of CO_2 are emitted during its manufacture and use. In order to replace synthetic rubber with natural rubber — which comes from plants that capture CO_2 — as a measure against global warming, this project seeks advancement in the technology to purify natural rubber to expand the range of its application. The project also aims to develop new materials derived from purified natural rubber that can be used for ultra-lightweight tires and so on. With the introduction of the energy-recovering wastewater treatment technology and the production system of biofuel from rubber tree waste, a basis for a next-generation natural rubber industry will be established.

Harvesting natural rubber latex from a hevea rubber tree

Creating new industries through high-performance rubber and advanced polymers

Concurrent with research aimed at developing high-performance natural rubber for conventional applications, advanced technologies for producing high-performance polymers from natural rubber for new applications such as materials for batteries and vehicle bodies are also being developed. Work is also underway to develop new method for quality evaluation of natural rubber. The approach to upgrade wastewater and waste treatment systems will reduce the environmental burdens at production sites.


Collecting the natural rubber latex harvested

Counterpart Institutions	Hanoi University of Science and Technology (HUST), Rubber Research Institute of Vietnam (RRIV)
Collaborators	National Institute for Environmental Studies (NIES), Tokyo National College of Technology
Research Period	5 Years **Adoption Fiscal Year** FY 2010

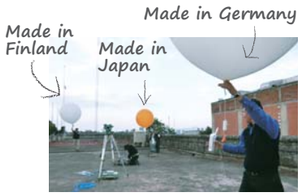
20 = Joint Research Project on Formation Mechanism of Ozone, VOCs, and PM2.5 and Proposal of Countermeasure Scenario =

Scenarios to Resolve Air Pollution Problems Associated with Modernization

Principal Investigator Prof. WAKAMATSU Shinji / Faculty of Agriculture, Ehime University

Comprehensive analysis of the differences between Japan and Mexico in order to devise air pollution measures

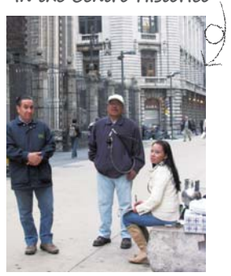
Up until the early 1990s, Mexico City suffered serious air pollution caused by automobile exhaust, but environmental improvement projects managed to avert a crisis. In recent years, however, a new type of air pollution has become a problem: ozone and other chemical substances react with one another and produce health hazards. This project will compare the situation in Mexico and Japan — in terms of air pollution sources, climate, topography, inflow of polluted air from neighboring countries and outflow from Mexico to other countries — in order to propose effective air pollution measures.



Measurements conducted simultaneously with rawinsonde (upper air observation) equipment at the Servicio Meteorológico Nacional in Mexico

Using Mexico as the point of departure for cleaning up the world's air

The project is working to develop systems for measuring the composition of air polluting substances and systems for measuring the effect on the human body. In the future, these techniques will be rolled out from Mexico, one of the leading countries of Central and South America, to neighboring countries, in order to improve the air environment both regionally and globally.



Personal exposure survey conducted in the Centro Historico. A study of air pollution on a street that was recently designated a no-car zone. Each researcher carried a measuring unit to determine how much air pollution is being inhaled.

Counterpart Institutions	National Center for Environmental Research and Training (CENICA)
Collaborators	National Advanced Industrial Science and Technology (AIST), Osaka Prefecture University, National Institute for Environmental Studies (NIES), Center for Environmetal Science in Saitama (CESS), etc
Research Period	5 Years
Adoption Fiscal Year	FY 2010

21 = Research Partnership for the Application of Low Carbon Technology for Sustainable Development =

Opening the Door to a Low Carbon Society: Japanese Technologies Change Indian SMEs

Principal Investigator Director General, Prof. SUZUKI Yutaka / Kansai Research Centre, Institute for Global Environmental Strategies (IGES)

Applying Japanese low carbon technologies to small and medium-sized enterprises in India

India is the world's third largest emitter of greenhouse gases. Conversely, this also means that there is the potential for substantial reduction in emission. To this end, an effort is underway to introduce Japanese low carbon technologies to small and medium-sized enterprises in India. This project will determine the needs of small and medium-sized enterprises, analyze the factors which lead to successful technology application, propose specific strategies on assessment systems for costs and investment periods, as well as conduct a study to select technologies that have high energy-saving effect and are highly applicable to India.

Searching among case studies of technology introduction to locate technologies that match Indian needs

Interview with personnel responsible for equipment/facility about existing system and operations

In addition to inspection tours by Indian researchers to relevant Japanese facilities, case studies of the introduction of technologies in a number of industrial sectors will be collected and the process of introduction, differences in preconditions and so on will be identified to develop mechanisms for the application of low carbon technologies in accordance with Indian needs. Pilot projects will be implemented on a trial basis to enable the Indian side to select the most appropriate technologies for them.

Study and measurement of equipments and facilities. The current situation and needs of small and medium-sized enterprises will be determined through interviews and measurements, etc. in an effort to probe the applicability of Japanese low carbon technologies.

Counterpart Institutions	The Energy and Resources Institute (TERI), etc
Collaborators	Kyoto University
Research Period	4 Years
Adoption Fiscal Year	FY 2010

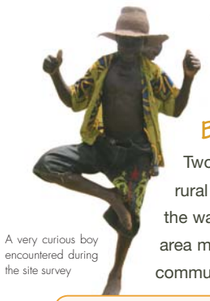
22 = Improving Sustainable Water and Sanitation Systems in Sahel Region in Africa: Case of Burkina Faso =

Don't Collect and Don't Mix: Clean Toilets for the "Land of Upright People"

Principal Investigator Prof. FUNAMIZU Naoyuki / Graduate School of Engineering, Hokkaido University

Low cost and safety through a pipeless network

Burkina Faso is one of the poorest countries in the world, with 27.2% of the population at the poverty level. Many people become sick from water-borne diseases because the infrastructure for clean water is not in place. There are many conditions needed for the water facilities that are introduced: for example, they must be able to withstand the harsh climate, and they should be easy to maintain at a low cost. The goal of this project is to create a system that does not collect wastewater in a single location but rather treats water on-site, and that separates water by use and quality rather than mixing it all together, in order to achieve a sanitary system with low costs. The new type of system to be developed to provide water and sanitation will not require a large-scale water distribution pipe network.



A very curious boy encountered during the site survey

Bringing composting toilets to Africa to turn human waste into fertilizer

Two models were proposed to match the population density and infrastructure level. The rural area model converts human waste into fertilizer with ***composting toilets*** and uses the wastewater for irrigation, only disinfecting and filtering the water for drinking. The urban area model uses vehicles to collect human waste, and wastewater is collected by individual communities. The technologies needed for each process are currently under development.

Prototype of low-cost composting toilet

Drawing water in the vegetable fields. Human waste is converted into fertilizer and wastewater is reused in order to boost vegetable production and raise income levels.

Counterpart Institutions	International Institute for Water and Environmental Engineering (2iE)
Collaborators	The University of Tokyo, Kochi University of Technology (KUT)
Research Period	5 Years
Adoption Fiscal Year	FY 2009

23 = Sustainable Systems for Food and Bio-energy Production with Water-saving Irrigation in the Egyptian Nile Basin =

Sustainable Farming: Using Limited Water Resources to Resolve Food Issues

Principal Investigator Prof. SATOH Masayoshi / Graduate School of Life and Environmental Sciences, University of Tsukuba

Water conservation as a strategy for creating new water resources to turn deserts into farmland

The arid country of Egypt is totally dependent on the Nile River, and is experiencing a continuous rise in population. Consequently, food production and job creation are pressing issues. But the capacity of food production in the Nile Delta, the traditional major agricultural region, is limited, and the available water resources in the Nile River have already reached their limit. Therefore the goal of this project is to rationalize water use in existing farms in the Delta region in order to send water to the surrounding desert regions, enabling farmland development and thereby increasing food production. Efficient and sustainable methods of using irrigation water and farmland will be constructed for this purpose.

The Nile delta plain has been a food producing center since ancient times.

Examining water and farming in the Nile Delta to work out the proper approach for farming communities

The water consumption by various crops, water quality, salt damage, the water management behavior of farmers, crop growth and so on are being observed and analyzed. In FY 2010, corn and sugar beet were cultivated using various irrigation methods, and the results were analyzed from three perspectives: crop production, soil and meteorology. Agriculture and water management models for arid regions will be established with the aim of achieving an efficient and sustainable farming system.

Water brought from the Nile River is ultimately used to irrigate farmland by means of pumps. In Egypt, where there is little or no rainfall, this water is the farmers' only hope.

Counterpart Institutions	Cairo University (CU)
Collaborators	Tottori University
Research Period	5 Years
Adoption Fiscal Year	FY 2008

24 = Conservation of Biodiversity in Tropical Forest through Sustainable Coexistence between Human and Wild Animals =

Creating a Future in which Human Beings and Wild Animals can Live in Harmony in the Tropical Forests of Africa

Principal Investigator Prof. YAMAGIWA Juichi / Graduate School of Science, Kyoto University

A project that resonates with Japan, where people have lived in harmony with nature since ancient times

In Gabon, where forests make up 80% of the national land area, a rich natural environment inhabited by gorillas and other wild creatures has been preserved. The country is working to develop ***eco-tourism*** that balances nature conservation with a contribution to the local economy, but lack of knowledge and technology on the part of both researchers and neighboring residents is a problem. This project will study the ecosystems and analyze the genetic diversity of Moukalaba-Doudou National Park, which has a particularly high level of biodiversity, and work to habituate gorillas and chimpanzees to human beings, prepare a guidebook to plant and animal life, train tour guides, provide environmental education to residents and so on.

Infant gorillas play happily in a group that is becoming habituated to human beings.

Viewing tropical forests from a comprehensive perspective in search of the proper path for eco-tourism

A laboratory has been set up at the Research Institute of Tropical Ecology (IRET) in Gabon to study the distribution and diversity of fauna and flora in the park. Efforts to habituate animals to human beings and studies of the society and economic status of neighboring areas will be conducted on an ongoing basis, in an effort to preserve biodiversity in the tropical forest through the coexistence of wild animals and human beings in harmony.

In training on the island of Yakushima, researchers from Gabon engage in conservation activities together with members of the Yakushima Biodiversity Council.

Counterpart Institutions	Ministry of Higher Education, Scientific Research and Technological Development's Research Institute of Tropical Ecology (IRET), National Center of Scientific Research and Technology (CENAREST), etc
Collaborators	Chubu Gakuin University, Kagoshima University, Yamaguchi University
Research Period	5 Years **Adoption Fiscal Year** FY 2008

25 = Research and Development for Water Reuse Technology in Tropical Regions =

Recycling Water in Tropical Regions to Secure Safe and Reliable Drinking Water

Principal Investigator Prof. YAMAMOTO Kazuo / Environmental Science Center, The University of Tokyo

Seeking technologies for water recycling at a purification facility to meet the rapidly increasing demand for water

Water demand in Thailand is increasing rapidly due to industrialization, urbanization and so on. However, water resource quantities are unstable, and there are problems with sanitation as well. For this reason, an effort is underway to purify and reuse water that has been used once, in order to secure an adequate quantity of water. The goal of this project is to construct three types of water purification facility suited to the tropical climate and local conditions in Thailand: energy conserving distributed facilities, solar-powered facilities, and facilities that treat water while at the same time producing bioenergy. Demonstration plants have already been set up at locations such as a university campus in Thailand, and development of water recycling technologies is underway.

Demonstration plant set up at Chulalongkorn University to conduct test production of recycled water and biogas from campus wastewater and food wastes

Experiments and data collection are performed in the same environment as the site to aid in technical development

Water analysis equipment was set up in Thailand to establish a research and development center. In addition to testing and data gathering in Japan, work using test plants is progressing at a Thai university campus and other locations in order to develop new technologies. The test plants for recycling water within local areas will be installed at locations such as factories and residential facilities.

Water quality survey at the Chao Phraya River. The data will be made available on a water quality information platform currently under development, in order to make it easy for the general public to learn how good the water quality is.

Counterpart Institutions	Environmental Research and Training Center (ERTC), Chulalongkorn University (CU), Kasetsart University (KU)
Collaborators	Tohoku University, Ritsumeikan University, Waseda University,Yamagata University
Research Period	4 Years **Adoption Fiscal Year** FY 2008

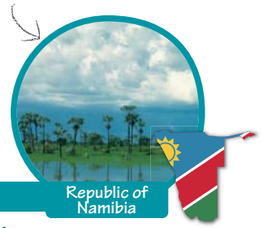
SATREPS 2011-2012

Bioresources

Oasis in desert: Seasonal wetland during rainy season

26 = Flood- and Drought-Adaptive Cropping Systems to Conserve Water Environments in Semi-arid Regions =

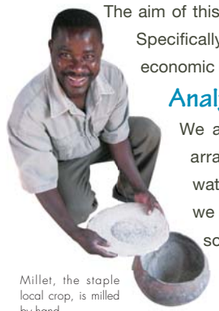
Design Agriculture to Withstand Flooding and Droughts: New Farming Techniques for Semiarid Zones



Principal Investigator Prof. IIJIMA Morio / Faculty of Agriculture, Kinki University

Agriculture that supplies a constant yield in years with flooding and droughts

Many areas of southern Africa suffer from food shortages as a result of flooding and drought. The instability of seasonal wetlands that is formed during the rainy season is forcing the desert nation of Namibia to redesign its agriculture to ensure sufficient food supplies. The aim of this project is to develop new agricultural techniques that supply a constant yield even in years of flooding and drought. Specifically, rice, a newly introduced crop, is being grown with pearl millet, the local staple, to assess water requirements and economic feasibility, and develop a new cultivation model.



Millet, the staple local crop, is milled by hand.

Analyzing data on water, farming, and wetlands to introduce a new cultivation model

We are investigating appropriate mixed cropping combinations and arrangements to ensure economic water use. By investigating wetland water quantity and the degree of dependence of crop growth on flooding, we aim to establish and introduce a new sustainable cultivation model in southern Africa that both protects the aquatic environment and makes maximum use of seasonal wetlands to help raise the living standards of subsistence farmers.

Rice grown and harvested at the University of Namibia (left) and pearl millet grown by local farmers (right). We are developing a new cultivation method that ensures stable yields of both crops.

Counterpart Institutions	University of Namibia (UNAM)
Collaborators	Nagoya University, Research Institute for Humanity and Nature (RIHN), The University of Shiga Prefecture (USP)
Research Period	5 Years Adoption Fiscal Year FY 2011

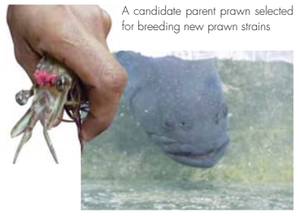
27 = Development of Aquaculture Technology for Food Security and Food Safety in the Next Generation =

A Team Effort between Thailand and Japan to Open Up New Horizons in Aquaculture

Principal Investigator President, Dr. OKAMOTO Nobuaki / Tokyo University of Marine Science and Technology (TUMSAT)

Next-generation of aquaculture system promises solutions to current issues

Aquaculture has boomed in recent years worldwide, and now accounts for almost 50% of all fishery produce. However, fish farms face great many problems, including frequent disease outbreaks, securing stable supplies of feed, and maintenance of safety, and there is an urgent need for next-generation technologies that address these problems. As the leaders of Asia's aquaculture industry, Thailand and Japan have teamed up to leverage biotechnology to develop new systems for boosting production of groupers, sea bass, prawn and other commercially important varieties of seafood. In particular, molecular breeding, surrogate broodstock technology, immunization/vaccines, development of feed alternatives, establishment of stricter seafood safety protocols will be the focus.



A candidate parent prawn selected for breeding new prawn strains

A giant grouper weighing over 100 kg being reared at Krabi Coastal Fisheries Research and Development Centre. This is the tastiest grouper species.

Focus also on creation of improved strains as a new departure in aquaculture

This project aims to leverage molecular genetic findings to develop strains that grow rapidly and are resistant to disease and stress. We will also attempt to use certain species of fish as surrogates to produce the gametes of species that have so far proven difficult to culture, as well as developing technologies for other aspects of aquaculture, including the production of alternatives to fish meal as feed, prevention of infectious diseases, and assurance of food safety.

A trained technician eyes the future. Reliable breeding techniques are the strength of this SATREPS project.

Counterpart Institutions	Department of Fisheries (DOF), Kasetsart University (KU), Chulalongkorn University (CU), Walailak University (WU)
Collaborators	National Research Institute of Aquaculture, Fisheries Research Agency (FRA), Japan International Research Center for Agricultural Sciences (JIRCAS)
Research Period	5 Years Adoption Fiscal Year FY 2011

28 = Establishment of Sustainable Livelihood Strategies and Natural Resource Management in Tropical Rain Forest and its Surrounding Areas of Cameroon: Integrating the Global Environmental Concerns with Local Livelihood Needs =

Protecting Tropical Rainforest through Raising Living Standards of the Local Population

Principal Investigator Prof. ARAKI Shigeru / Center for African Area Studies (CAAS), Kyoto University

Protecting a storehouse of global warming gases from the extinction

People concern the protection of tropical rainforests as storage of carbon that causes global warming. However in the Congo basin of Africa, 60 million people in this region depend on the rainforest for fuel, food, medicines and construction materials. This project accordingly aims to both protect the rainforest from extinction, while also raising the living standards of the region's local populations through introducing new crops and farming techniques to support sustainable agriculture, implementing the planned utilization of forest resources, practicing sound soil management based on nutrient dynamics, and drawing up guidelines for sustainable rainforest management.

Soil in the village of Andom near Bertoua

Cassava tubers grow in the surface dark horizon, and it is thus important to protect this soil.

Raising living standards by bolstering traditional cassava production

We are aiming to raise living standards by bolstering cassava* production and establishing sales channels for foodstuffs, alcoholic and other beverages manufactured from surplus cassava produce. We will also reassess non-timber forest products as an alternative to the over-exploitation of timbers. The project's findings will be applied to the construction of land scape and environmental protection models for both forest and its contact zones.

Processing cassava

Women processing cassava on a rock outcrop 1.5 km out of their homes. Dust is a big problem in the dry season, and many women travel 1-2 km from the road to process cassava on rock outcrops and riverbanks.

The people of Gribe, a mix of hunters/gatherers and farmers, were asked to participate in discussions about the construction of a base for researching non-timber forest products.

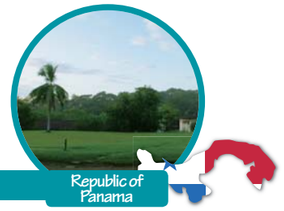
Meeting in Gribe about construction of a research station

Counterpart Institutions	Institute of Agricultural Research for Development (IRAD), University of Yaounde, University of Dschang, University of Douala
Collaborators	None
Research Period	5 Years Adoption Fiscal Year FY 2010

* Cassava is a food crop cultivated widely in tropical regions. Tapioca is made from cassava.

29 = Comparative Studies of the Reproductive Biology and Early Life History of Two Tuna Species for the Sustainable Use of these Resources =

Supporting Sustainable Fisheries and Aquaculture of Tuna, One of Japan's Best-loved Foods



Principal Investigator Prof. SAWADA Yoshifumi / Fisheries Laboratory, Kinki University

Elucidating the riddles of tuna growth to create the foundation for full life cycle tuna farming

Yellowfin and Pacific bluefin tuna are caught by many countries including Panama and Japan, but overfishing and climate change are driving a decline in catches. Bluefin tuna were *first reared from eggs* in Japan, and here we are leveraging Japanese technology to improve the resource management technology essential to sustainable fisheries of both species, and also seeking to establish the foundation for the aquaculture of yellowfin tuna. We are focusing in particular on elucidating the reproductive biology of both species and ecology of larvae and juveniles, and developing technologies for monitoring and predicting stocks as well as basic tuna culture technologies.

Adult yellowfin tuna at the Achotines Laboratory

Elucidating reproductive ecology and early life history of yellowfin and Pacific bluefin tuna through rearing experiments

Experiments to elucidate mechanisms of reproduction and growth and survival of yellowfin and Pacific bluefin tuna were launched in May 2011 at research stations in Panama and Kinki University respectively. We will use our findings to support sustainable fisheries and aquaculture of tuna in Panama, Japan, and the whole world by applying them to the prediction of changes in future stocks of both species and development of yellowfin tuna culture technologies.

Yellowfin tuna growth stages

Counterpart Institutions	Autoridad de Recursos Acuáticos de Panamá (ARAP), Inter-American Tropical Tuna Commission (IATTC)
Collaborators	None
Research Period	5 Years Adoption Fiscal Year FY 2010

30 = Project for Development of Internationally Standardized Microbial Resource Center to Promote Life Science Research and Biotechnology =

Invisible Rainforest Treasures: Searching for Biotechnology Building Blocks of the Future

Principal Investigator Director, Dr. SUZUKI Ken-ichiro / Biological Resource Center, National Institute of Technology and Evaluation (NITE)

Samples of microalgae collected from nature using cotton buds. A medium is added to these tubes to try culturing the microalgae.

Utilizing the microorganisms that underpin rich tropical ecosystems in a diversity of industries

Indonesia boasts the second richest biodiversity in the world, and the conservation of its biological resources is a matter of keen interest. However, no system yet exists for the sustainable use of Indonesia's microbiological resources, which are being viewed eagerly for potential application in agriculture and environmental technology. This project aims to establish a microbial resource center to accommodate microorganisms for their utilization in life sciences and biotechnology studies. Newly discovered useful microorganisms will also be added to the collection and the database available to the world so as to contribute to resource conservation and development of new industries.

Supporting developing countries through the Sleeping Microbial Beauties Project

The goal of the Sleeping Microbial Beauties Project is establishment of a microbial resource center which holds diverse microorganisms characteristic for Indonesia. The microbial resources are correctly identified and preserved for utilization in agriculture and industries. The management skill of the center for utilization of materials is transferred as well as the knowledge and techniques for isolation, preservation and taxonomy of microorganisms. The project will contribute to the conservation of biodiversity and discovery of valuable microorganisms.

Sampling river water from a boat to collect water-dwelling microorganisms (in this case, microalgae)

Counterpart Institutions	Research Center for Biology of Indonesian Institute of Sciences (RCB-LIPI), etc
Collaborators	RIKEN, The University of Tokyo
Research Period	5 Years **Adoption Fiscal Year** FY 2010

31 = Project for the Development of Wheat Breeding Materials for Sustainable Food Production =

Sowing "Seeds of Hope" in Afghanistan, Wheat Seed is Food for Life!

Wheat breeding field of MAIL's in front of Darul Aman Palace in Kabul

Principal Investigator Prof. BAN Tomohiro / Kihara Institute for Biological Research, Yokohama City University (YCU)

Development of new wheat varieties deploying novel genes conferring resistance to drought and disease from Afghan local germplasms

In Afghanistan, where over 20 years of civil war have destroyed not only croplands, but all foundations of society, restoring stability to everyday life requires reconstruction of the infrastructure and knowledge of human capacity for sustainable wheat production, the nation's staple food. This project aims to leverage Japan's science, technology, and postwar reconstruction experience to lay the groundwork for their own wheat breeding system and materials with conserving and screening the germplasms of Afghan wheat landraces developing new materials deploying resistance to drought and disease. It will improve their technologies to develop wheat varieties as 'Wheat Seeds of Hope' to be adapted to marginal lands in Afghanistan to come true their sustainable wheat production and conservation of environment and biodiversity.

Harvesting a local variety of wheat in Afghanistan

Capacity development of young scientists who can conserve their national genetic resources of wheat

We are conducting research and education of plant science with developing new genetic and breeding techniques for wheat improvement to reveal genetic diversity of Afghan wheat landraces. It will open the way to improve high-yielding wheat with good bread making quality and highly adaptability by crossing with modern varieties. In autumn 2011, around 350 accessions of Afghan wheat landraces, which were collected in 1955 by Dr. Hitoshi Kihara and has been conserved in Japan, returned to their homeland for the first time in half a century to be sown in Kabul. Looking ahead, we aim to reconstruct the Agricultural Research Institute of Afghanistan and contribute to the sustainable wheat production and stable supply in Afghanistan as 'Food for Life'.

Accessions of the Afghan wheat landraces growing in their homeland for the first time in half a century in Badam Bagh experiment field, Kabul

Counterpart Institutions	Ministry of Agriculture, Irrigation and Livestock (MAIL), etc
Collaborators	RIKEN, Tottori University
Research Period	5 Years **Adoption Fiscal Year** FY 2010

32 = Project for the Development of Crop Genotypes for the Midlands and Mountain Areas of North Vietnam =

Developing New Promising Lines of Rice to Boost Food Security in Vietnam

Principal Investigator Prof. YOSHIMURA Atsushi / Faculty of Agriculture, Kyusyu University

Improving food self-sufficiency by applying Japanese genome technology of rice

Vietnamese economy has grown rapidly in recent years, but in the northern area, food shortages, income disparities and other problems still exist. Food self-sufficiency is particularly low in northern mountainous regions, where yield of rice is limited. This project aims to apply efficient breeding technology that utilize rice genomics to develop new promising lines of rice that show short growing duration, high yield, and resistance to disease and insect pests. The project will contribute to ensure food production in the midlands and mountainous areas of Vietnam, eventually boosting food self-sufficiency to 90%.

Use of vacuum pump emasculation (removal of anthers to prevent self-pollination) in Vietnam for the first time to carry out hybridization of rice in large-scale

Leveraging rice genomics to drive next-generation breeding research in rice

We have succeeded in identifying several genes of rice, and aim to hybridize promising lines carrying these genes to create new lines with more desirable characters. We are also searching related cultivation methods for ensuring the adaptability of the newly developed lines in the midlands and mountainous areas of northern Vietnam.

Visiting scientists from Vietnam conduct experiments for DNA extraction of rice

Counterpart Institutions	Hanoi University of Agriculture (HUA), etc
Collaborators	Nagoya University
Research Period	5 Years **Adoption Fiscal Year** FY 2010

33 = Valorization of Bio-resources in Semi Arid and Arid Land for Regional Development =

Harnessing the Powers of Plants Capable of Surviving in the Desert

Principal Investigator Prof. ISODA Hiroko / The Alliance for Research on North Africa (ARENA), University of Tsukuba

Developing drugs and foods by making effective use of plants adapted to harsh environments

Plants growing in arid and semi-arid habitats such as desert contain many unique components that enable them to adapt to harsh environments, but little research has been carried out on those components and their potential usefulness. Under this project, we are collecting and analyzing plants growing in Tunisia, which has a range of arid habitats, based on local traditional knowledge regarding medicinal properties to identify and investigate new functional components and consider their industrial application. We will also simultaneously assess economic feasibility and develop local production bases and technologies for the sustainable use of plant resources and local economic development.

Investigating plant density to estimate resources presumption of useful plants

Amazing functional components discovered in arid land plants

We have discovered potential anti-oxidant, anti-cancer, anti-allergy and other functional components in olive and medicinal plants found in Tunisia, and are seeking to apply the findings to industry through water- and soil-related production base improvements, economic feasibility studies and production technology development. We aim to contribute through our research to the worldwide development of sustainable, food resources circulation system and prevention of desertification.

Olive

We not only analyze the properties of extracted components in detail, but are also developing methods for extracting and identifying functional components for evaluation at the genetic level.

Counterpart Institutions	Center of Biotechnology of Sfax (CBS), etc
Collaborators	Kyoto University, Tokyo Institute of Technology
Research Period	5 Years **Adoption Fiscal Year** FY 2009

34 = Sustainable Integrations of Local Agriculture and Biomass Industries =

Integrating Agriculture with Locally Self-sufficient Bioenergy Generation in Asia

Principal Investigator Prof. SAKODA Akiyoshi / Institute of Industrial Science, The University of Tokyo (IIS)

Supporting local agricultural development in Asia through biomass technology

Population growth in Vietnam has led to a number of serious problems including food and energy shortages, environmental degradation, and poverty. We are seeking to address these problems by designing systems and developing relevant technologies for ***integrating locally self-sufficient, sustainable agriculture with sustainable energy in the form of biomass***. We are focusing in particular on the construction of a plant that puts these ideas to the test by manufacturing bioethanol from rice straw and biogas from domestic animal manure.

Conducting an environmental survey in a farming village on the outskirts of Ho Chi Minh City

From experimentation to verification: operating a biomass plant with sights on practical implementation

We installed an experimental bioethanol plant on the grounds of Ho Chi Minh City University of Technology and are conducting pilot operations while providing local personnel with on-site technical training. We plan to also install a plant for testing biogas-related technology, and are continuing research both in Japan and Vietnam aimed at creating a viable system.

The biomass plant installed on the grounds of Ho Chi Minh City University of Technology to test technology for the locally self-sufficient production of bioethanol from rice straw

Counterpart Institutions	Hochiminh City University of Technology (HCMUT), etc
Collaborators	National Agriculture and Food Research Organization (NARO)
Research Period	5 Years **Adoption Fiscal Year** FY 2009

35 = Development of Genetic Engineering Technology of Crops with Stress Tolerance against Degradation of Global Environment =

Biotechnology to Generate a Drought-resistant Soybean

Principal Investigator Dr. YAMAGUCHI-SHINOZAKI Kazuko / Japan International Research Center for Agricultural Sciences (JIRCAS)

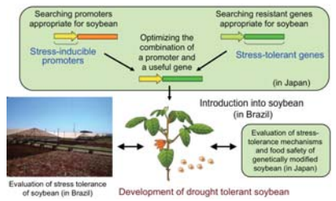
Overcoming drought as an obstacle to soybean production

Drought damage in Brazil

For Brazil, soybean is an important export crop, but its yield has suffered badly in recent years as a result of drought. This project aims to develop strains capable of withstanding drought by applying the outcomes of research on model plants and using gene sequencing to probe the soybean genome for genes conferring resistance to drought and elucidate mechanisms for controlling those genes. We will use the outcomes of our research to develop new soybean strains for cultivation and evaluation to select strains showing greatest resistance to drought.

Identification and application of genes conferring drought resistance to the molecular breeding of soybean capable of withstanding drought

We analyzed the functions of genes conferring drought resistance in a model plant (Arabidopsis thaliana), and pinpointed soybean genes displaying the same properties. We also comprehensively analyzed the expression of soybean genes under stress. Moving forward, we plan to identify the best combination of drought resistance genes and DNA segments that modify their expression, and introduce that combination into soybean.



Strategy for the use of genetic engineering technologies to develop drought-resistant soybeans. Experiments are being conducted in both open fields and greenhouses.

Counterpart Institutions	Brazilian Agricultural Research Corporation-National Soybean Research Center (Embrapa Soybean)
Collaborators	The University of Tokyo, RIKEN
Research Period	5 Years **Adoption Fiscal Year** FY 2009

36 = Improvement of Food Security in Semi-arid Regions of Sudan through Management of Root Parasitic Weeds =

Managing Striga (Witchweed)

A field of sorghum devastated by Striga

Principal Investigator Prof. SUGIMOTO Yukihiro / Graduate School of Agricultural Science, Kobe University

Parasitic plants cause enormous damage to crops in arid regions

Sudan has vast areas of potential cropland, but has been suffering from the devastating effects of the root parasitic weeds of the genus ***Striga***, commonly known as ***witchweeds***. The parasites are widespread in the arid and semiarid regions in Africa on economically important food crops, sapping them of nutrients and water and thus causing serious losses in grain yields. The aim of this project is to i) identify novel compounds or microorganisms capable of modulating Striga germination, ii) develop effective management strategies and iii) introduce crops resistance to the parasites.

Striga flowering on sorghum, a grain crop that it parasitizes

Combining traditional knowledge and cutting edge technology to manage Striga

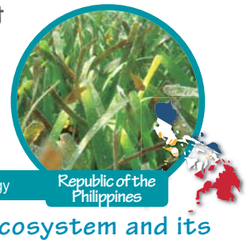
We, in collaboration with Sudanese scientists, are developing substances that induce self-destruction in Striga and conducting research on reducing damage by appropriate water management. We interviewed local inhabitants to acquire knowledge on traditional Striga and crop management practices. Farmers field schools have been initiated to transfer available Striga management technologies. We are aiming to boost and stabilize food production in Sudan, and eventually spread the developed technologies across sub-Saharan Africa.

Japanese knowledge regarding Striga being passed on to Sudanese researchers at a laboratory established by the project in the Sudan University of Science and Technology

Counterpart Institutions	Sudan University of Science and Technology (SUST)
Collaborators	None
Research Period	5 Years **Adoption Fiscal Year** FY 2009

37 = Project on Integrated Coastal Ecosystem Conservation and Adaptive Management under Local and Global Environmental Impacts in the Philippines =

Conserve Rich Coastal Ecosystems with High Biodiversity Sustaining Local Community Livelihoods



Principal Investigator Prof. NADAOKA Kazuo / Graduate School of Information Science and Engineering, Tokyo Institute of Technology

Comprehensive assessment of environmental stresses on coastal ecosystem and its responses towards a new conservation scheme development

The Philippines is among the world's richest in coastal ecosystems, but has suffered rapid degradation due to combined effects of uncontrolled tourism developments, overfishing, exploitation in adjacent watershed areas, global climate changes and others. This project is aiming at comprehensive assessment of these environmental stresses on coastal ecosystem and its responses, and socioeconomic factors in local communities causing these stresses, and thereby at developing a new conservation and adaptive management scheme both for the sustainable development of local communities and coastal ecosystem conservation.

A continuous and comprehensive environmental monitoring system deployed in Bolinao, Luzon

A new scheme proposal for conservation and adaptive management of coastal ecosystems under local and global environmental impacts

We carried out intensive joint surveys at five focus sites and associated numerical simulation studies for comprehensive assessment of various environmental stresses on the coastal ecosystem of each site. We are developing an integrated decision support system which may be effectively used by, e.g., local communities for their sustainable developments including marine protected area managements and thereby for mitigating environmental stresses and promoting coastal ecosystem conservation and recovery.

Conducting a biological survey at Laguindingan, Mindanao

Counterpart Institutions	Marine Science Institute of the University of the Philippines-Diliman (UPMSI), etc
Collaborators	Hokkaido University, The University of Tokyo, Kochi University, etc
Research Period	5 Years **Adoption Fiscal Year** FY 2009

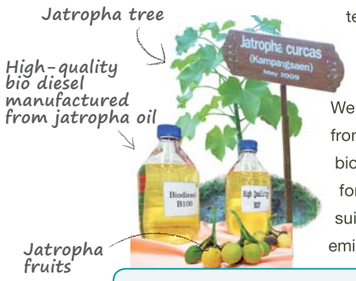
38 = Innovation on Production and Automotive Utilization of Biofuels from Non-food Biomass =

Reducing CO_2 Emissions with Vehicle Biofuel Made from Nonedible Vegetable Oil

Principal Investigator Dr. YOSHIMURA Yuji / Research Center for New Fuels and Vehicle Technology (NFV) of the National Institute of Advanced Industrial Science and Technology (AIST)

Using Jatropha as a biofuel feedstock that does not compete with food crops

The utilization of biofuels in the transportation sector could help to mitigate global warming, but because of the risk that production of biofuels derived from grains or vegetable oil will compete with food crops, there is a demand for manufacturing technologies that exploit nonfood sources of biofuel. For this project we are cooperating with Thailand, which is the Asian automotive production hub, to develop the production technologies of fuels from Jatropha, an inedible plant. We are also conducting engine tests and developing the automotive utilization technologies, as well as estimating CO_2 emission reduction benefits through life cycle assessments.

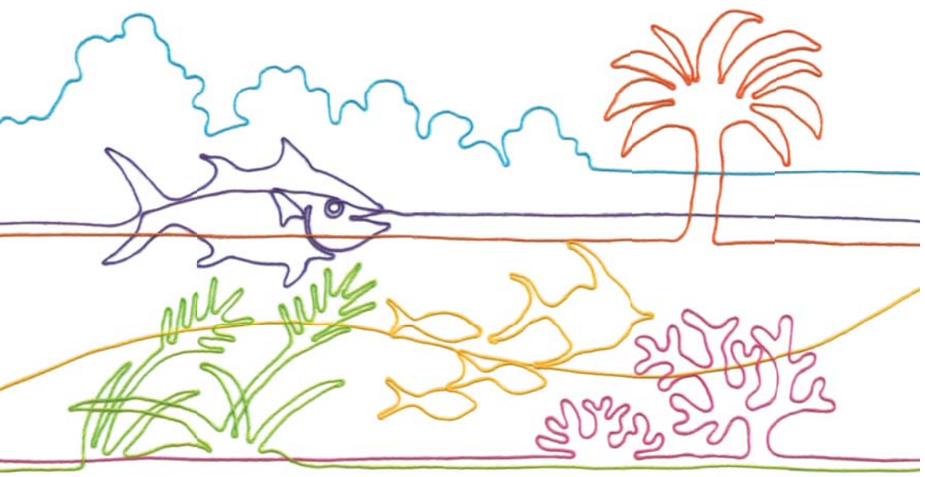


Successful production of high quality biodiesel that meets East Asia Summit biodiesel quality recommendations

We have succeeded in manufacturing high quality biodiesel from Jatropha oil on a pilot plant scale (1 ton/day), producing biodiesel that meets East Asia Summit quality recommendations for the transport biodiesel. We plan to evaluate our products suitability as a vehicle fuel by conducting engine and exhaust emission tests as well as the automotive durability tests.

The pilot plant for manufacturing high-quality biodiesel (1 ton/day) installed on the grounds of the Thailand Institute of Scientific and Technological Research

Counterpart Institutions	National Science and Technology Development Agency (NSTDA), etc		
Collaborators	Waseda University		
Research Period	5 Years	**Adoption Fiscal Year**	FY 2009



SATREPS 2011-2012

Natural Disaster Prevention

39 = Development of Landslide Risk Assessment Technology along Transport Arteries in Viet Nam =

Reducing Landslide Disasters that Block Sustainable Development across the Country

Principal Investigator: Executive Director, Dr. SASSA Kyoji / International Consortium on Landslides (ICL)

Finding a way to reduce landslide disasters is essential for national development

Vietnam, Laos, Myanmar and other countries in the mountainous areas of the Greater Mekong Subregion are subject to frequent slope disasters caused by a combination of weak ground and heavy rain during the rainy season that are characteristic of tropical regions. Finding a way to reduce landslide disasters that damage roads and other infrastructure is a pressing issue in Vietnam which has currently pursued nationwide land development. Japanese science and technology — which lead the world in the study of the landslides — will be used to develop technologies for assessing the risk of landslide disasters, thereby contributing to sustainable development in Vietnam.

Damage to residences from landslides in Son La, the capital of Son La Province in Vietnam

Formation of a disaster research network and monitoring of landslide disasters

The goal is to develop technologies for assessing landslide risk on slopes along arterial roads in the central region and the north-west region, where disasters frequently occur in mountainous communities and along lifelines. Disaster mitigation measures that include early warning, land use planning and personnel training will also be conducted. An effort will also be made to create a landslide disaster research network for mountainous areas in the Greater Mekong Subregion.

In Vietnam and other countries in the Greater Mekong Subregion, ensuring safety from damage to arterial roads and railways caused by landslides is a basic condition for sustainable development. For this reason, Japanese scientific and technical assistance is needed.

Counterpart Institutions	Institute of Transport Science and Technology (ITST) of Ministry of Transport (MOT)
Collaborators	Tohoku Gakuin University (TGU), Forestry and Forest Products Research Institute (FFPRI)
Research Period	5 Years　Adoption Fiscal Year　FY 2011

40 = Enhancement of Technology to Develop Tsunami-resilient Community =

Collaboration with Chile to Prevent Future Tsunami Tragedies

Principal Investigator: Research Director, Dr. TOMITA Takashi / Asia - Pacific Center for Coastal Disaster Research (APaC-CDR) of the Port and Airport Research Institute (PARI)

Evacuation drill in Antofagasta, Chile

Create tsunami-resilient communities through an early warning and tsunami observation network

In Japan, higher tsunamis than those envisaged in each of the regional disaster management plans struck the Tohoku region, where tsunami countermeasures were the most advanced in Japan, and caused devastating damage. Tsunami impacts on structures and the dangers of tsunami-induced debris have been recognized as a result of this disaster. In the joint research project between Chile and Japan, precise tsunami warning methods including a tsunami observation network will be developed and proposed in Chile. Programs will be also investigated to create tsunami resilient communities in order to prevent loss of life due to tsunamis.

Analyze past damage and prepare for possible tsunami damage

Information and data on tsunami damage that occurred in both countries will be summarized, and methods to estimate tsunami damage will be developed, validating the estimates by reproducing the damage through computer simulations. In addition, earthquakes and tsunamis likely to occur in Chile in the future will be estimated, and measures will be proposed to prevent and mitigate damage by the tsunamis envisaged. The goal of the research project is to enhance technologies to develop tsunami-resilient communities for the benefit of people in Chile, Japan and other tsunami-prone areas.

The town of Dichato, which was inundated by the tsunami in Chile in 2010. Many people sought refuge and escaped with their lives.

Counterpart Institutions	Pontifical Catholic University of Chile (PUC)
Collaborators	Kansai University, Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Yamaguchi University
Research Period	4 Years　Adoption Fiscal Year　FY 2011

41 = Magmatic Fluid Supply into Lakes Nyos and Monoun, and Mitigation of Natural Disasters in Cameroon =

Probing the Mystery of Limnic Eruptions that Release Clouds of CO_2

Principal Investigator: Prof. OHBA Takeshi / School of Science, Tokai University

Limnic eruption: a horrifying disaster that took 1,800 lives

Cameroon has many volcanos, some of them with lakes in their craters. In the 1980s, limnic eruptions occurred at two crater lakes, Lake Nyos and Lake Monoun, in which large quantities of CO_2 that had collected on the lake bottom suddenly erupted to the surface. 1,800 residents in the three villages at the foot of the volcano died from lack of oxygen, and there are concerns that the gas disaster may recur. This project will study both lakes and attempt to determine the CO_2 flows and explain the eruptions that occurred in the past. In addition to simulating limnic eruptions and determining the mechanism that causes them, an organization for monitoring the lakes will be established and comprehensive measures to prevent future disasters will be proposed.

Sampling of deep layer lake water

Comprehensive study of two crater lakes in search of clues that will help explain the phenomenon

Analysis is being conducted from various perspectives, including lake water observation, study of CO_2 concentration, reaction analysis with surrounding rocks, and explanation of the CO_2 supply system. The goal is to establish an organization to continue and expand lake observation and study in order to predict gas disasters at both lakes.

Children watch with great interest

Large fountain from a CO_2 degassing pipe in Lake Nyos

Counterpart Institutions	Institute for Geological and Mining Research (IRGM)
Collaborators	Toyama University, The University of Tokyo, Osaka University, Kumamoto University, National Research Institute of Earth Science and Disasrer Prevention (NIED)
Research Period	5 Years　Adoption Fiscal Year　FY 2010

42 = Research and Development for Reducing Geo-Hazard Damage in Malaysia caused by Landslide & Flood =

Use of Satellites to Predict and Reduce the Occurrence of Landslides and Flooding

Principal Investigator: Prof. NISHIO Fumihiko / The Center for Environmental Remote Sensing (CEReS), Chiba University

Urbanization and concentrated heavy rains caused by climate change result in serious disasters

Landslides and flood damage have occurred frequently on the Malay Peninsula in recent years, due to rapid urbanization and concentrated heavy rains thought to be caused by climate change. Disaster studies and observational data are insufficient, hampering the implementation of disaster mitigation policies. To resolve this situation, this project will focus on regions that have experienced significant urbanization. Through a study of existing data, on-site observations and observations using Japanese satellites, the project will seek ways to reduce the occurrence of landslides and flooding. The data obtained through observation will be used to create a landslide and flooding hazard map and an early warning system, so that Japanese science and technology can be of benefit to other East Asian nations.

Concurrently with data evaluation, designing a system to help predict and reduce disasters

Topographical factors relating to landslides and flooding, a history of disasters that have occurred, and rainfall and other statistical data will be collected and evaluated and used to create a statistical database. In addition, a system will be established to aid in disaster mitigation through assessment of high-risk and particularly dangerous regions, the creation of maps, and the implementation of proactive measures, early warning, evacuation and so on.

Middle reaches of Kelantan River: During flooding, water level rises to the floors of houses

Collapse of base of power line tower: slope failures occur frequently, causing road damage and blockages and damaging power line towers and thereby threatening the social infrastructure.

Counterpart Institutions	Multimedia University (MMU), Universiti Sains Malaysia (USM),Universiti Tenaga Nasional (UNITEN)
Collaborators	The University of Tokyo, National Research Institute of Earth Science and Disaster Prevention (NIED), VisionTech Inc. (VTI), Public Works Reserch Institiute (PWRI)
Research Period	5 Years　Adoption Fiscal Year　FY 2010

43 = Enhancement of Earthquake and Volcano Monitoring and Effective Utilization of Disaster Mitigation Information in the Philippines =

A Minute Sooner Can Make the Difference: Real-Time Observation of Earthquakes and Volcanos

GPS measurements for monitoring earthquake and volcanic activity on Mindanao

Principal Investigator Principal Senior Researcher, Dr. INOUE Hiroshi / Earthquake Research Department, National Research Institute for Earth Science and Disaster Prevention (NIED)

Prompt and accurate monitoring data to enable appropriate disaster response

Monitoring instruments installed on the Taal volcano

The Philippines are in a Western Pacific Plate subduction zone. As in the case of Japan, earthquake and volcano disasters occur frequently, and therefore disaster measures and prediction techniques are urgently needed. Accordingly, a real-time earthquake and earthquake intensity observation network will be introduced to enable prompt and accurate estimates of earthquake motion distribution and damage, crustal movement observations for assessing the potential for earthquakes on the island of Mindanao, and integrated earthquake, crustal movement and electromagnetic observations of Taal and Mayon volcanoes in order to determine and predict underground magma activity.

The results of research will be made available on a portal site and used for disaster information sharing and awareness of the community

Development and installation of the system is progressing smoothly, and work has begun on constructing a disaster prevention information portal site to make the observed earthquake and volcano data available. Simple earthquake-resistance diagnostic tools for the general public are also being created to promote disaster preparedness. Tsunami disaster preparedness efforts have also begun, based on the lessons learned in the Great East Japan Earthquake. The ultimate objective is to improve disaster preparedness at the national, regional, local government and community level in the Philippines.

The information of the earthquake source will be used for rapid estimate of the ground shaking damage and tsunami.

Counterpart Institutions	Philippine Institute of Volcanology and Seismology (PHIVOLCS)
Collaborators	Kyoto University, Tokai University
Research Period	5 Years **Adoption Fiscal Year** FY 2009

45 = Information Network for Natural Disaster Mitigation and Recovery =

A Trump Card in Disaster Planning: Full Use of Information Networks

Principal Investigator Prof. MURAI Jun / Faculty of Environment and Information Studies, Keio University

Meteorological and earthquake data are collected continuously and shared via a global network

The use of data in the event of a natural disaster has long been an issue of crucial importance worldwide. The data is used to reduce the extent of damage by identifying early signs and indications of impending disasters, determining the situation immediately after a disaster has occurred, ensuring prompt and appropriate resource allocation during relief operations and so on. However, an effective infrastructure for the use of such data has not yet been established. The goal of this project is to use Japan and India, countries that are beset by natural disasters, as examples to establish an infrastructure for ongoing collection and analysis of weather hazard and earthquake data utilizing global information networks, and to develop the communication and other technical infrastructures for use in an emergency.

Briefing at the National Geophysical Research Institute (NGRI)

Research is proceeding smoothly. Technology transfer to other countries is planned.

The specifications for the meteorological sensors crucial to monitoring weather conditions were established and IT strong-motion seismograph systems that can measure building-specific vibrations were developed. In addition, preparations for the development of communication services with disaster areas and the establishment of specifications for disaster response information systems were also implemented. The deployment of these systems to relevant countries is also planned.

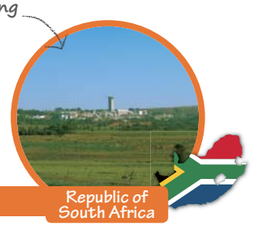
A weather sensor developed in Japan installed at IITH in Hyderabad, linking with the India Meteorological Department (IMD). In the future, the same type of sensor will be installed in the surrounding regions to gather data via the Internet.

Counterpart Institutions	Indian Institute of Technology Hyderabad (IITH), etc
Collaborators	The University of Tokyo
Research Period	5 Years **Adoption Fiscal Year** FY 2009

44 = Observational Studies in South African Mines to Mitigate Seismic Risks =

Observe Earthquakes at Proximity at 1-3 km Depths from Earth's Surface

The mine shaft at KDC mine extending down to 3 km from earth's surface



Principal Investigator Prof. OGASAWARA Hiroshi / College of Science and Engineering, Ritsumeikan University

Earthquakes caused by rock mass failure induced by mining

Among many mines in the Republic of South Africa, gold mines are excavated to particularly great depths. Mining causes stress concentration to rock mass. The rupture results in **mine earthquakes**, posing a serious risk. For safe mining, risk of mine earthquakes must be accurately assessed and mining must be planned to minimize the risk. The outcome of this study is also expected to be applicable to assessment and prediction of natural earthquake, a major issue for Japan as well.

Gathering observational data at proximity, improve the accuracy of seismicity assessment

Based upon geological structure and mining schedule, we can anticipate to some degree hypocenters and magnitudes of mine earthquakes. Installing observation instruments in advance at the proximity, we elucidate preparation and generation of earthqauakes. In addition, national observation network on earth's surface will also be upgraded. Through these steps, an effort will be made to improve the accuracy of earthquake hazard assessment.

Researchers, mining rock engineers, geologists and surveyors. Several times the number of people shown here collaborated to establish the dense monitoring network.

Counterpart Institutions	Council for Science and Industrial Research (CSIR), Council for Geoscience (CGS)
Collaborators	The University of Tokyo, Tohoku University, National Institute of Advanced Industrial Science and Technology (AIST), etc
Research Period	5 Years **Adoption Fiscal Year** FY 2009

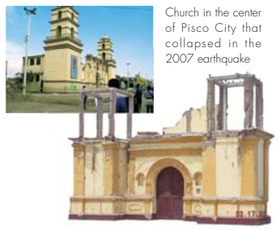
46 = Enhancement of Earthquake and Tsunami Disaster Mitigation Technology in Peru =

Standing Up to Earthquakes and Tsunamis: Joining Hands with Peru across the Pacific

Principal Investigator Prof. YAMAZAKI Fumio / Graduate School of Engineering, Chiba University

Support that only another earthquake-prone nation can provide

Like Japan, Peru is located in the circum-Pacific seismic zone and subject to frequent earthquakes and tsunamis. The 2007 earthquake and tsunami caused major damage. Efforts are underway to study and develop effective technologies for evaluating the risk of disasters caused by future earthquakes and tsunamis and mitigating the damage caused by these disasters. In this project, researchers will develop seismic source models based on past major earthquakes, conduct tsunami simulations, study building earthquake-resistance, develop retrofitting technologies and so on. An effort will also be made to promote comprehensive earthquake and tsunami damage prediction and disaster mitigation technologies that take into account regional attributes.



Church in the center of Pisco City that collapsed in the 2007 earthquake

Determination of regional attributes and establishment of effective disaster mitigation plans for earthquakes in Peru

Model case studies of major earthquakes that have occurred in the past will be selected to predict earthquake motions resulting from plate boundary earthquakes off the coast of Peru and promote tsunami damage assessment. Study of the earthquake resistance of buildings including historical structures is progressing smoothly, and satellite images have been used to prepare land use maps. These results will be integrated to establish effective disaster mitigation plans that are appropriate for the region.

Observations of microtremors in Lima, using equipment provided in this project. This makes it possible to assess ground shaking in the event of an earthquake.

Counterpart Institutions	Japan-Peru Center for Earthquake Engineering and Disaster Mitigation (CISMID) of National University of Engineering (UNI)
Collaborators	Tohoku University, Building Research Institute (BRI), Tokyo Institute of Technology
Research Period	5 Years **Adoption Fiscal Year** FY 2009

47 = Multi-disciplinary Hazard Reduction from Earthquakes and Volcanoes in Indonesia =

Standing Up to Earthquakes, Tsunamis and Volcanoes: Combining the Capabilities of Science and Society

Principal Investigator Prof. SATAKE Kenji / Earthquake Research Institute, The University of Tokyo

250 researchers gather to work on comprehensive disaster prevention measures

Indonesia is very similar to Japan in that it has many volcanoes and is subject to frequent earthquakes. Nearly 250 researchers from the two countries are pooling knowledge and technologies to establish an unprecedented comprehensive disaster prevention setup. These researchers will not merely conduct research on forecasting earthquakes, tsunamis and volcanic eruptions as has been done in the past; they will establish channels for the prompt communication of disaster information, promote measures to counter ground liquefaction and the like, and support the creation of a disaster-resilient society from a variety of perspectives. The results of their research will be reflected in disaster education, public awareness campaigns and even national policy, in an effort to improve overall earthquake and volcano disaster preparedness.

Disaster prevention technologies created through joint research can be fed back to Japan

Eruption of the Merapi volcano. The pyroclastic flow reached approximately 4 km from the vent.

The project has already succeeded in clarifying the earthquake history through a study of active faults, as well as preparation of a detailed tsunami hazard map, successful short-term forecasting of volcanic eruptions, field testing of tsunami control forests and other achievements. The ultimate goal of the project is to mitigate earthquake, tsunami and volcanic eruption disasters in both Indonesia and Japan.

A study of the Lembang fault on the outskirts of Bandung. A trench was excavated at the base of the fault escarpment at the rear. The study of the geological layers revealed that an earthquake had occurred several thousand years ago.

Counterpart Institutions	Indonesian Institute of Sciences (LIPI)
Collaborators	Tohoku University, Nagoya University, Kyoto University, Fuji Tokoha University
Research Period	3 Years Adoption Fiscal Year FY 2008

48 = Study on GLOFs (Glacial Lake Outburst Floods) in the Bhutan Himalayas =

Protecting the Land of Happiness from Glacial Lake Outbursts: A Disaster Resulting from Climate Change

The automatic weather station installed in the altitude of 5300 m

Principal Investigator Prof. NISHIMURA Kouichi / Graduate School of Environmental Studies, Nagoya University

First in the world to develop scientific approaches to glacial lake outburst

There have been concerns in Bhutan and Nepal in recent years about the danger of *glacial lake* outburst floods resulting from the effects of climate change. To deal with this issue, satellite images are being analyzed to assess the degree of danger posed by glacial lakes. If a glacial lake is assessed as posing a danger, researchers will actually visit that lake and conduct surveys of the surrounding area and measure the water depth. They will also focus on the moraine* that is damming up the glacial lake, analyzing its internal structure and then conducting flood simulations in order to prepare a hazard map and construct an early warning system. * Moraine: accumulation of stones and gravel carried by glaciers

Children in a mountain village

Demonstration of the effectiveness of Japanese satellites; outburst measures will be expanded on a global scale

As of November 2010, approximately 60% of the glacial lakes within Bhutan had been identified and analyzed, demonstrating that Japan's Advanced Land Observing Satellite (ALOS) is very effective for analysis. The results of the study raise the possibility that there are more glacial lakes than predicted, and the study provided material for use in determining exactly which glacial lakes pose a danger. These results indicate the importance of worldwide measures to deal with glacial lake outbursts.

Study of a glacial lake at 5,000 m elevation. In addition to rowing out in a rubber dinghy to measure the water depth, the researchers checked for factors that cause lake outburst, studied the strength of the moraine and so on.

Counterpart Institutions	Department of Geology and Mines in the Ministry of Economic Affairs (DGM), etc
Collaborators	Japan Aerospace Exploration Agency (JAXA), Earth System Science Co., Ltd. (ESS)
Research Period	3 Years Adoption Fiscal Year FY 2008

49 = Risk Identification and Land-use Planning for Disaster Mitigation of Landslides and Floods in Croatia =

Reducing the Danger of Landslides and Flooding in Fault Zones on the Adriatic

Principal Investigator Prof. MARUI Hideaki / Research Institute for Natural Hazards and Disaster Recovery, Niigata University

Japan provides assistance for problems resulting from unique topography and geology

Croatia is in a region with a concentration of ground strain, and with a complex topography and geological structure. For this reason, earthquakes occur frequently, as do landslides and localized flooding. Accordingly, Japanese science and technology — which leads the world in the field of disaster preparedness — is being applied to Croatia in research aimed at mitigating landslides and flooding. Specifically, this project focuses on developing regions and places with significant social value and promotes the establishment of land use planning policies to mitigate disasters.

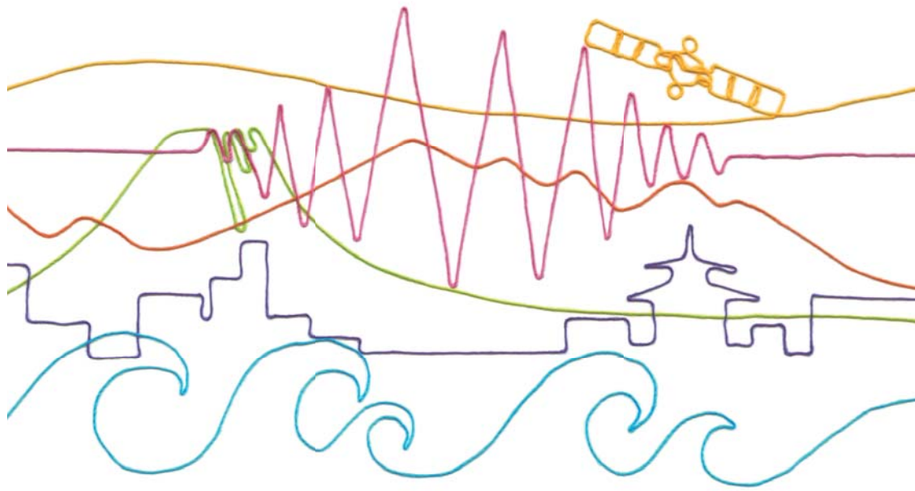
Use of a 3D laser scanner to measure the location of rock blocks with a high risk of collapse that are scattered across the steep slopes of the Adriatic coast (example of measurements made in Duće, on the outskirts of Split)

Accurate determination of natural conditions in the country and development of useful tools

As specific achievements, a comprehensive movement observation system was put in place in typical landslide zones and an early warning system was introduced. In addition, the prototype for a *"landslide re-creation test unit"* that is effective in predicting the movement distance of landslide soil mass was manufactured. Furthermore, the at-risk areas for landslide and flood disasters were classified by characteristics in an effort to help achieve sustainable national land development.

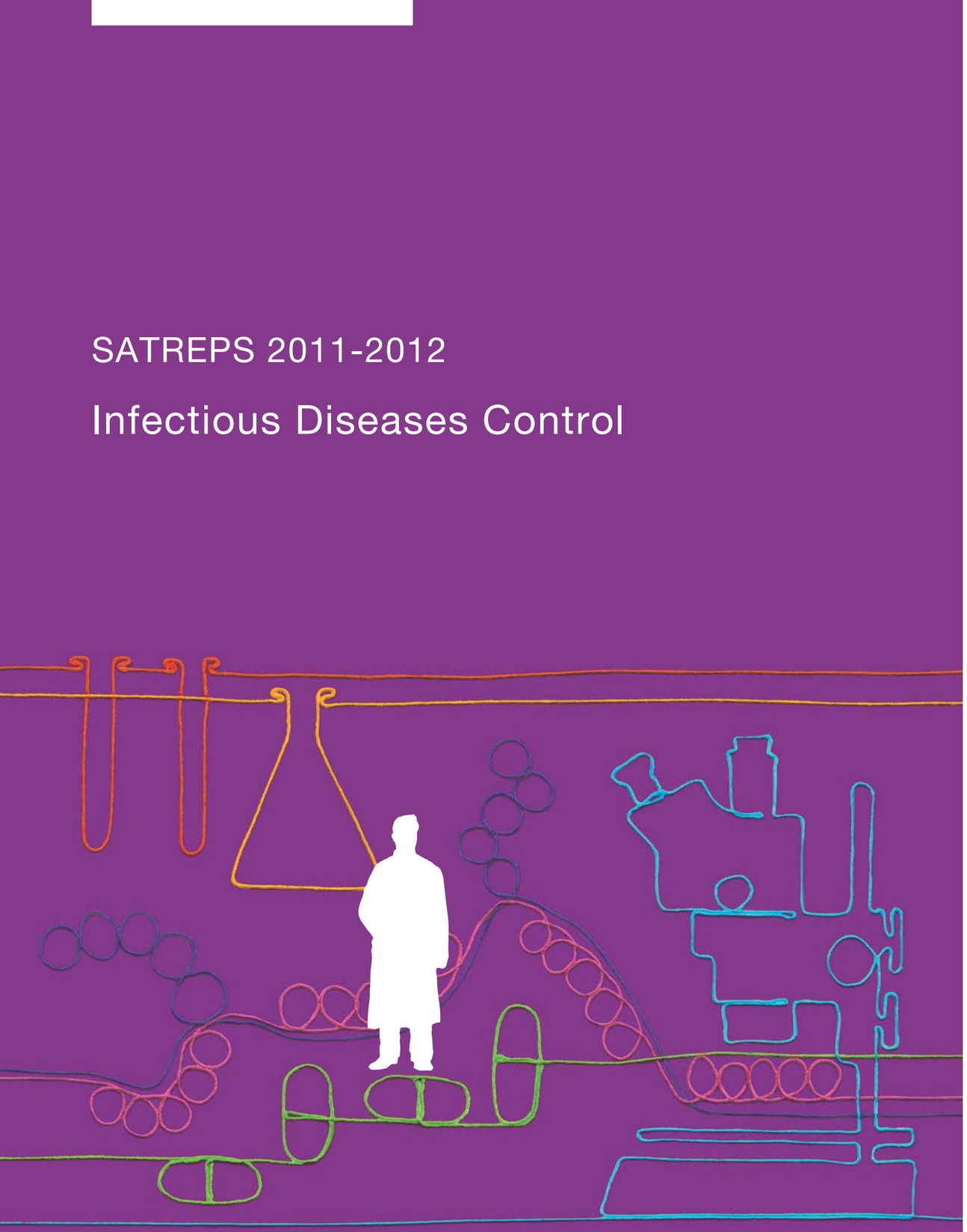
Training using a landslide re-creation test unit. The trainees learn techniques for analyzing the movements of landslides in Croatia using a unique test unit developed in Japan.

Counterpart Institutions	University of Split (UNIST), University of Rijeka (UNIRI), University of Zagreb (UNIZAG)
Collaborators	International Consortium on Landslides (ICL), Kyoto University
Research Period	5 Years Adoption Fiscal Year FY 2008



SATREPS 2011-2012

Infectious Diseases Control



50 = Development of Rapid Diagnostics and the Establishment of an Alert System for Outbreaks of Yellow Fever and Rift Valley Fever in Kenya =

Using Mobile Phones to Ensure Speedy Vigilance and Warning in the Spread of Arboviral Diseases

Principal Investigator Prof. MORITA Koichi / Institute of Tropical Medicine, Nagasaki University

Applying Japanese diagnostic techniques for the detection of various infectious diseases in Africa

Outbreaks of zoonotic ***arboviral diseases**** including yellow fever and Rift Valley fever, are frequent in Kenya and other African countries. We will apply diagnostic technology that has been developed in Nagasaki University to create speedy, low-cost and simplified diagnostic kits for the use of regional healthcare facilities and communities in Kenya. The kits will identify outbreaks of the diseases. We eventually plan to build an early warning system for alerting the central government through the use of mobile phones to help early containment of outbreaks. We will share information about them with WHO and other organizations. We plan to share this technology in neighboring countries to create an international early containment network for the diseases.

Developing speedy arbovirus (yellow fever, Rift Valley fever, etc.) diagnostic kits with the Kenya Medical Research Institute (KEMRI)

Building a sustainable nationwide emergency disease response network

We are applying molecular techniques to analyze pathogen samples collected in the field and designing matching antigens for diagnosis to create speedy, low-cost and simplified diagnostic kits. We will also build a network for speedy 2-way communication between regional medical facilities and central government agencies, and put together a model early warning system for the speedy feedback of frontline diagnosis results.

African forestland harbors many arboviruses.

Counterpart Institutions	Kenya Medical Research Institute (KEMRI)		
Collaborators	None		
Research Period	5 Years	**Adoption Fiscal Year**	FY 2011

* Viral diseases spread to people and vertebrate animals through arthropod vectors such as mosquitoes and ticks.

Pig breeding in the suburb of Hanoi

51 = Determine the Outbreak Mechanisms and Development of a Monitoring System at Food Administration for Multi-drug Resistant Bacteria =

Elucidating the Mechanisms behind Super Resistant Bacteria, and Stemming Their Spread

Principal Investigator Guest Prof. YAMAMOTO Yoshimasa / Osaka University Global Collaboration Center (GLOCOL)

Tackling the worldwide threat of super resistant bacteria

With the emergence in recent years of ***super resistant bacteria*** that display resistance to therapeutic drugs, the number of untreatable infectious diseases is rising rapidly worldwide. The emergence of such bacteria is thought to have been driven by excessive use of antibiotics in livestock and fisheries industries as well as healthcare. The spread of super resistant bacteria beyond national borders necessitates a global response. This project is focused on Vietnam, where the number of people infected with drug-resistant bacteria is growing dramatically. We are analyzing infection mechanisms, and aim to identify and investigate improper use of antibiotics and other factors causing the spread of super resistant bacteria.

Work at a duck farm located away from human habitation

Multifaceted analysis of the factors driving emergence of super resistant bacteria

We are analyzing the factors and mechanisms driving the emergence of super resistant bacteria from anthropological perspectives that consider socioeconomic factors in Vietnam as well as from microbiological and pharmacological perspectives. Based on our findings, we plan to help curb the worldwide spread of super resistant bacteria by building a resistant bacteria monitoring system.

Antibiotic sensitivity experiment: once a bacterium develops multiple drug resistance, almost no antibiotics are effective against it.

Counterpart Institutions	National Institute of Nutrition (NIN), etc		
Collaborators	Osaka Prefectural Institute of Public Health, Osaka Prefecture University		
Research Period	5 Years	**Adoption Fiscal Year**	FY 2011

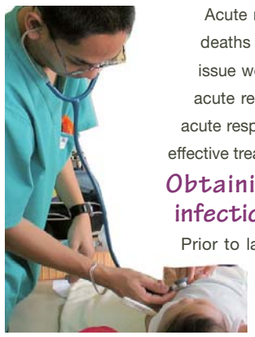
52 = Comprehensive Etiological and Epidemiological Study on Acute Respiratory Infections in Children =

Saving Children in Developing Countries from Death by Pneumonia

Principal Investigator Prof. OSHITANI Hitoshi / Graduate School of Medicine, Tohoku University

Preventing acute respiratory infections from developing serious conditions deadly to infants

Acute respiratory infections are the leading cause of death of infants in developing countries. Reducing the number of deaths from pneumonia and other serious acute respiratory infections with high mortality rates is a particularly urgent issue worldwide. For this project, we are collecting basic data such as demographic data, incidence and mortality rate of acute respiratory infections in areas of the Philippines with particularly high infant mortality, and identifying etiologies of acute respiratory infections including fatal cases. Based on our results, we plan to develop control strategies including more effective treatment protocols, preventive interventions and other measures to reduce mortality and prevent serious infections.



Examining an infant with pneumonia at a regional hospital in the Philippines

Obtaining reliable data to develop control measures for acute respiratory infections in children that can be applicable to other developing countries

Prior to launching our research, we selected project hospitals and set up laboratories. Since poor people are often unable to visit hospitals for consultation, we actively visit homes in local communities to collect basic data. The outcomes of our research will be applicable to other developing countries, and will hopefully contribute to combating acute respiratory infections in children globally.

Collecting data in local communities. We are investigating poverty, hygiene, and other factors posing a risk of acute respiratory infections, and assessing risks alongside pathogens found in local communities.

Counterpart Institutions	Department of Health – Research Institute for Tropical Medicine (RITM)		
Collaborators	None		
Research Period	5 Years	**Adoption Fiscal Year**	FY 2010

53 = Research and Development of Prevention and Diagnosis for Neglected Tropical Diseases, Especially Kala-Azar =

Fighting against NTDs*; Long Ignored as a Malady of the World's Poorest People

Principal Investigator Associate Prof. NOIRI Eisei / The University of Tokyo Hospital

Kala-azar, a lethal disease caused by parasites

Kala-azar** is a serious disease that infects another 300,000 of the world's poorest people every year. It has long been ignored in Bangladesh and other countries where it mainly afflicts the poorest people, and is not only a health hazard, but also a major obstacle to socioeconomic development. This project aims to establish genetic diagnostic, immuno-diagnostic, urine test and other diagnostic techniques tailored to local conditions, and get to grips with the malady.

CDC light traps used to capture sand flies for research

Launch of research aimed at introduction of Japanese diagnostic, treatment, and disease control techniques

We plan to introduce loop-mediated isothermal amplification (LAMP), a highly precise genetic diagnostic technique, together with simplified diagnosis based on analysis of specific proteins in urine, and other techniques developed in Japan suitable for localities that lack sophisticated equipment. We will also conduct research on drugs with only light side effects, and on drug-resistant parasites, as well as studying the behavior of the sand fly, the insect vector of kala-azar, and exploring means of preventing the spread of the disease.

A joint international research team of SATREPS investigating sand fly behavior in Trishal, a subdistrict of the district of Mymensingh in northern Bangladesh

Counterpart Institutions	International Center for Diarrheal Diseases Research, Bangladesh (ICDDR,B), etc		
Collaborators	Aichi Medical University		
Research Period	5 Years	**Adoption Fiscal Year**	FY 2010

* NTDs ; Neglected Tropical Diseases ** Kala-azar, also known as black fever, is a zoonotic disease affecting internal organs that is caused by protozoan parasites of the Leishmania genus. Symptoms include fever, severe anemia, abdominal swelling, desiccation, and blackening of the skin.

54 = New Diagnostic Approaches in the Management of Fungal Infections in AIDS and Other Immunocompromised Patients =

Researching New Diagnostic Techniques for Protecting Immunocompromised Patients from Fungal Infections

Principal Investigator Prof. KAMEI Katsuhiko / Medical Mycology Research Center (MMRC), Chiba University

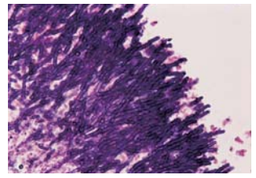
Enabling accurate, speedy, and sensitive identification of causative fungi for early diagnosis and treatment

Fungal infections caused by yeasts and molds not only adversely affect quality of life, but can also often be fatal. HIV infection depresses immune functions, thus increasing susceptibility to fungal infections, and in Brazil where over 730,000 people are HIV-positive, addressing such infections is an important issue. Under this project, fungal infection data are being collected from people living with HIV and other immunosuppressive diseases and researched to develop simplified diagnostic and identification techniques based on gene sequencing data and DNA chips for strain identification developed by Chiba University's Medical Mycology Research Center (MMRC).

Laboratory of Molecular Epidemiology and Medical Mycology at the University of Campinas

Application of development outcomes to other regions and diseases

Diagnostic and identification techniques and technologies are being transferred steadily to Brazil. After analysis, we will also share epidemiological and diagnostic technique outcomes obtained in Brazil with the world through the Internet and academic journals. Since these outcomes can be applied to the diagnosis and treatment of other infectious diseases in South America, they should help advance treatment of infectious diseases.



Lung tissue affected by aspergillosis. The aspergillosis mycelia spread out, destroying the lung.

Counterpart Institutions	Sao Paulo State University of Campinas (UNICAMP)		
Collaborators	None		
Research Period	3 Years	**Adoption Fiscal Year**	FY 2009

55 = Identification of Anti-Hepatitis C Virus (HCV) Substances and Development of HCV and Dengue Vaccines =

Creating Drugs from Plants to Combat Hepatitis C and Dengue Fever

Principal Investigator Prof. HOTTA Hak / Graduate School of Medicine/School of Medicine, Kobe University

Technical cooperation to confront two rampant infectious diseases

Researchers are using the latest technologies to isolate candidate substances with antiviral properties from plants traditionally used in many different parts of Indonesia to treat diseases, and to identify useful natural compounds.

Although an estimated 170 million people worldwide are chronically infected with **hepatitis C virus (HCV)**, no vaccine has yet been developed for **HCV**. Dengue fever too is feared to be spreading beyond tropical zones. New treatment and prevention measures for these two infectious diseases are urgently required. This project aims to develop drugs that are effective against HCV from endemic Indonesian and Japanese plants, and to use genetic engineering to develop vaccines for HCV and dengue.

New plant-derived hepatitis C drugs and vaccines created using genetic engineering

We are investigating the effects of substances extracted from plants of both countries on HCV replication with the aim of identifying effective substances and elucidating the mechanisms by which they are effective. We are also seeking to identify candidate DNA vaccines that provide higher than normal immunity to HCV and dengue, and based on this research, create recombinant vaccines and carry out experiments that will hopefully contribute to the creation of novel vaccines for treatment and prevention of these diseases.

Collecting traditional medicinal plants in remote parts of Indonesia

Medicinal plant

Counterpart Institutions	University of Indonesia (UI), Airlangga University (AU)		
Collaborators	National Institute of Biomedical Innovation (NIBIO)		
Research Period	4 Years	**Adoption Fiscal Year**	FY 2009

56 = Studies of Anti-viral and Anti-parasitic Compounds from Selected Ghanaian Medicinal Plants =

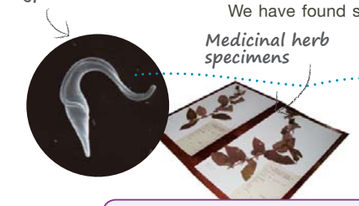
Leveraging the Power of Traditional Herbs to Create Drugs Fitting for Combating Infectious Diseases in Ghana

Principal Investigator Prof. YAMAOKA Shoji / Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University (TMDU)

Finding substances in Ghanaian herbs that are effective against infectious diseases

Understanding and availability of advanced healthcare is still limited in Ghana, and lack of modern therapies is driving the spread of HIV, malaria and other diseases. To address this problem, we are seeking to isolate substances effective in suppressing the replication of viruses and multiplication of parasites from herbs native to Ghana that have been traditionally used as therapies for infectious diseases. We aim to develop sustainable therapies tailored to Ghana's circumstances by elucidating the mechanisms by which beneficial substances exert their effects.

Discovering beneficial herbs and identifying the effective substances they contain



We have found several herb extracts that are effective against viral infections, and have also isolated candidate plant extracts capable of suppressing the multiplication of *Trypanosoma brucei*, the parasitic protozoan that causes sleeping sickness. We will analyze these extracts to identify the effective substances and determine how they exert their effects, with the eventual aim of reducing the incidence of infectious diseases and mortality rate in Ghana.

Young Ghanaian researchers receiving training from Japanese specialists at the Noguchi Memorial Institute for Medical Research's Parasitology Department

Counterpart Institutions	Noguchi Memorial Institute for Medical Research (NMIRM), Center for Scientific Research into Plant Medicine (CSRPM)
Collaborators	Nagasaki International University
Research Period	5 Years **Adoption Fiscal Year** FY 2009

57 = Prevention and Control of Leptospirosis in the Philippines =

Controlling Leptospirosis, a Neglected Disease

Principal Investigator Prof. YOSHIDA Shin-ichi / Faculty of Medicine Sciences, Kyushu University

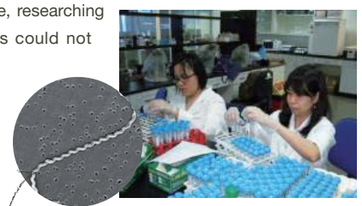
Getting to grips with a deadly infectious disease in the Philippines

Leptospirosis is a zoonotic infectious disease with a worldwide distribution in tropical and subtropical regions that causes multiple organ failure—including jaundice, renal failure and pulmonary hemorrhage—in humans, but since little research has been reported, few are aware of how serious an illness it is. The purpose of this project is to research the incidence of leptospirosis in people, livestock, and wild rodents, and develop a diagnostic kit and DNA vaccine. We will also disseminate information and educate people to prevent the spread of leptospirosis.

The leptospirosis laboratory of the College of Public Health, University of the Philippines–Manila

Stronger cooperation between Japan and the Philippines promises progress

We have started examining the blood serum of suspected leptospirosis patients, and are testing the effectiveness of DNA vaccines. Surveying infection incidence, researching environmental risks, and conducting educational activities could not be done without Philippine cooperation, and the good relationships between teams from Japan and the Philippines aids in the progress of this issue.



Project staff processing samples at the Philippine Carabao Center

Counterpart Institutions	University of the Philippines Manila (UP Manila)
Collaborators	Chiba Institute of Science (CIS)
Research Period	5 Years **Adoption Fiscal Year** FY 2009

58 = Research and Development of Therapeutic Products against Infectious Diseases, especially Dengue Virus Infection =

Creating Drugs Effective against the Dengue Virus from Human Beings

Principal Investigator Prof. IKUTA Kazuyoshi / Research Institute for Microbial Diseases (RIMD), Osaka University

Preventing the further spread of dengue fever in Southeast Asia

Dengue fever is a viral disease spread by mosquitoes that infects 50 million people living in the tropics every year, with 250,000 suffering seriously as a result, but no effective therapies have yet been discovered. We are studying patients and microorganisms from Thailand to contribute to the development of drugs effective against dengue fever. Since the human body creates proteins (antibodies) to combat the dengue virus, we are investigating these proteins to find any that appear particularly effective against the virus. We are also searching microorganisms prevalent in Thailand for compounds that block the virus.

Using mice to assess the effectiveness of discovered antibodies

Conducting experiments to develop new drugs following the successful creation of antibodies

We have succeeded in creating many human-derived antibodies against the dengue virus, and have also set a course of action for research on influenza virus and botulinum toxin. We will now conduct animal and other experiments to assess the effectiveness of antibodies showing the most potential with the aim of developing new therapeutic drugs.

We have provided repeated training to transfer advanced Japanese technology for creating antibodies from the blood cells of Thai dengue patients to help develop possible therapies.

Counterpart Institutions	Ministry of Public Health・National Institute of Health (NIH), Mahidol University
Collaborators	None
Research Period	4 Years **Adoption Fiscal Year** FY 2008

59 = Establishment of Rapid Diagnostic Tools for Tuberculosis and Trypanosomiasis and Screening of Candidate Compounds for Trypanosomiasis =

Speed, Accuracy, and Low Cost Vital to Treating Trypanosomiasis and Tuberculosis

Principal Investigator Prof. SUZUKI Yasuhiko / Research Center for Zoonosis Control, Hokkaido University

Preventing spread of infection through fast and accurate diagnosis

Tuberculosis, one of the most serious infectious diseases in Zambia, is a zoonotic disease that is expected to spread because it has developed resistance to existing therapies. Another major disease is malaria, but misdiagnosis of *trypanosomiasis* and other similar ailments as malaria often leads to death as a consequence of failure to provide appropriate treatment. Early diagnosis and appropriate treatment is essential to preventing the spread of these diseases. For this project, we are seeking to adapt highly sensitive, speedy and low-cost diagnosis systems developed largely in Japan to the diagnosis of tuberculosis and trypanosomiasis, and at the same time develop drugs to treat trypanosomiasis.

Introducing examination methods developed in Japan to Zambia

Successful development of diagnostic techniques and discovery of many potential therapeutic drugs

Our research led not only to the successful development of speedy techniques for diagnosing tuberculosis and trypanosomiasis, but also to the synthesis of over 100 candidate substances with potential to become therapeutic drugs, and we are now assessing their effectiveness. We plan to transfer these outcomes to Zambia, and improve its research and development capabilities.

We are studying Trypanosome prevalent in animals, and sequencing the genes of those likely to infect humans so as to boost the precision of our diagnostic techniques.

Counterpart Institutions	University Teaching Hospital (UTH)
Collaborators	Tottori University, etc
Research Period	4 Years **Adoption Fiscal Year** FY 2008

SATREPS Principal Investigators


Brazil

ISHIZUKA Moriyoshi
Forestry and Forest Products Research Institute

01 Health Checkup for the World's Lungs: Measuring the Carbon Stocks in the Amazon Forests


Bolivia

TANAKA Hitoshi
Graduate School of Engineering, Tohoku University

02 Monitoring from an Eye in Space: Securing Water for a City of 2 Million Above the Clouds


South Africa

YAMAGATA Toshio
Japan Agency for Marine-Earth Science and Technology

03 The "Virtual Earth" Will Change Agriculture in South Africa


Indonesia

YAMANAKA Manabu
Japan Agency for Marine-Earth Science and Technology

04 Islands and Seas of Indonesia "Maritime Continent" Control Global Climate


Indonesia

OSAKI Mitsuru
Graduate School of Agriculture, Hokkaido University

05 Preventing a Spark from Setting Off the Global Ammunition Dump


Thailand

OKI Taikan
Institute of Industrial Science, The University of Tokyo

06 Resolving Water-related Issues in Thailand through Observation and Prediction


Tuvalu

KAYANNE Hajime
Graduate School of Science, The University of Tokyo

07 Protecting Tuvalu, Island of Beautiful Coral Reefs and Star Sand, from Sinking


Brazil

SAKANISHI Kinya
Biomass Technology Research Center, National Institute of Advanced Industrial Science and Technology

08 Sugarcane Wastes: Producing Sustainable Energy from Residues


Botswana

AKASHI Kinya
Faculty of Agriculture, Tottori University

09 Using the Energy Hidden in Plants in the Arid Regions of Botswana


Vietnam

MAEDA Yasuaki
Research Organization for University-Community Collaborations, Osaka Prefecture University

10 Four Birds with One Stone: Energy Production System Resolves All Problems at Once


Indonesia

MATSUOKA Toshifumi
Graduate School of Engineering, Kyoto University

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Thailand

ASAMI Kenji
Faculty of Environmental Engineering, The University of Kitakyushu

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IMOU Kenji
Graduate School of Agricultural and Life Sciences, The University of Tokyo

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Algeria

KOINUMA Hideomi
Graduate School of Frontier Sciences, The University of Tokyo

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Graduate School of Engineering, Kyoto University

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Integrated Research System for Sustainability Science(IR3S), The University of Tokyo

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Institute for Environmental Science and Technology, Saitama University

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Graduate School of Engineering, Tohoku University

18 Restore the Holy Rivers by Japanese Environmental Technology


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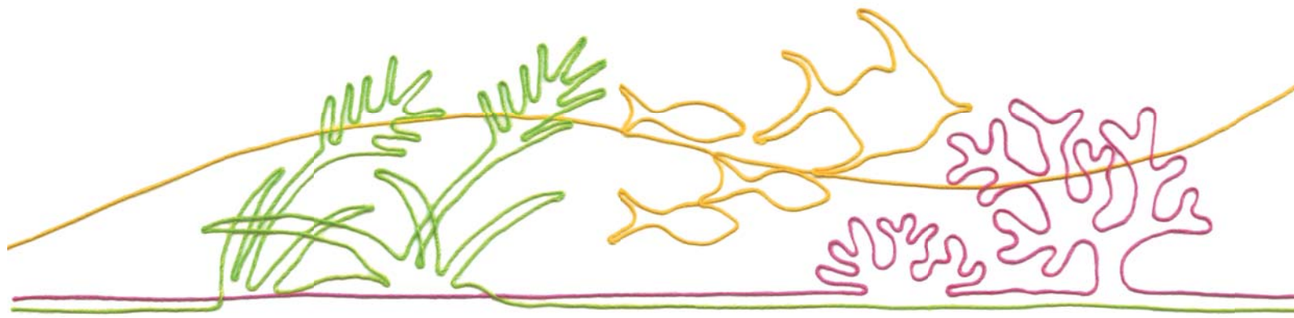

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