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SATREPS is a joint research program between Japan and developing countries that aims to find solutions to issues of a global scale, such as global warming, bio-resources, natural disasters, and infectious diseases. It is part of Japan’s “science and technology diplomacy” collaboratively pursued by the science and technology sector and the diplomatic sector to promote mutual development. Global issues become more and more complex every year, and they tend to hit developing countries particularly hard. They have gone beyond the stage where they can be solved by any single country alone. Their solutions will require international innovations and research outcomes in science and technology to be fed back into the community, as well as the development of human resources and upgrading of research capabilities.

In September 2015, the United Nations Sustainable Development Summit was held at U.N. headquarters. This Summit culminated in the adoption of the Sustainable Development Goals (SDGs), a collection of goals for the international community to work together to achieve by 2030. The SDGs are an important guideline for the elimination of poverty and the realization of sustainable growth by 2030. They emphasize the importance of global partnerships among all parties working to achieve them. The intention of SATREPS is to contribute to the international community as it aims to achieve sustainable development through the SDGs, by having researchers from Japan and developing countries work together on issues, creating new knowledge and technologies based on local needs, which can be put to use in the actual community.

JST, AMED and JICA will continue to engage in global issues together with developing countries and, by building strong bonds of trust, pursue the creation of new values in science and technology.

The 2030 Agenda for Sustainable Development, consisting of 17 Sustainable Development Goals (SDGs) and 169 targets, was unanimously adopted by the United Nations General Assembly on September 2015. The SDGs encompass challenges that affect all of humanity and our planet. For Japan, the resolution of these issues is closely linked to the realization of Society 5.0 and the Fourth Industrial Revolution described in the Fifth Science and Technology Basic Plan, which is one of Japan’s growth strategies. They are also the basic principles of Japan’s contribution to developing nations and the international community at large.

In June 2016 the United Nations held for the first time a forum focused on how science, technology and innovation (STI) can help achieve the SDGs. There are strong expectations that STI can provide the scientific grounding for tackling various challenges concerning sustainability that humanity faces today and for making better policy decisions.

To enable STI to help realize the SDGs, it is vital to ensure collaboration among all the diverse stakeholders, such as government agencies, universities, research centers, non-government organizations, and business enterprises. The Japan Science and Technology Agency will take advantage of all its many functions—including think tank, research and development, collaboration with industry and academia, people development, and science communication—to contribute actively to SDG initiatives in Japan.
### Number of Projects by Region/Research Area

<table>
<thead>
<tr>
<th>Region</th>
<th>Global-scale Environmental Issues</th>
<th>Low Carbon Society/Energy</th>
<th>Bioresources</th>
<th>Disaster Prevention and Mitigation</th>
<th>Infectious Diseases Control</th>
<th>Total</th>
<th>Ongoing Projects</th>
</tr>
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<tbody>
<tr>
<td>Asia</td>
<td>11</td>
<td>7</td>
<td>11</td>
<td>6</td>
<td>4</td>
<td>45</td>
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<td>Middle East</td>
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<tr>
<td>Europe</td>
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<td>1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Africa</td>
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<td>7</td>
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<td>4</td>
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<tr>
<td>Latin America</td>
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<td>3</td>
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<td>2</td>
<td>10</td>
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<tr>
<td>Oceania</td>
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<td></td>
<td></td>
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<td>0</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19</strong></td>
<td><strong>14</strong></td>
<td><strong>21</strong></td>
<td><strong>14</strong></td>
<td><strong>13</strong></td>
<td><strong>81</strong></td>
<td><strong>168</strong></td>
</tr>
</tbody>
</table>

* Ongoing projects involving more than one partner country are included in the count for each region involved, but only counted as a single project in the totals. Consequently, the totals given for the number of ongoing projects may be less than the sum of the number of projects in individual regions/research areas in the table.

* SATREPS projects in the field of Infectious Diseases Control have been transferred to AMED - the Japan Agency for Medical Research and Development. (As of April 1, 2015.)
Issues that affect more than a single country or region, and cannot be resolved without international collaboration. 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 among the Japan Science and Technology Agency (JST) and the Japan Agency for Medical Research and Development (AMED), which provides competitive research funds for science and 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*1 and lead to research outcomes of practical benefit to both local and global society*2.

*1 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.

*2 Utilization of research outcomes: The research projects should lead to future social and economic benefits, achieved by using newly obtained knowledge and technology to enhance government services or to develop products that can be deployed in the market.

Today the Sustainable Development Goals (SDGs) are a focus of worldwide attention, requiring urgent collaborative solutions to challenges including climate change, food security, and so on. The SATREPS program contributes to the SDGs and the tackling of these challenges by supporting joint research between Japan and a diverse range of developing countries. The program not only aims at making significant scientific findings, but also creates a path for important joint research results to reach society in local communities and beyond as part of Japan’s official development assistance (ODA). SATREPS is a shining example of Japan’s hands-on science and technology diplomacy and a valuable component of our foreign policy.

Why “Science & Technology Diplomacy”? At one time, the involvement of the Ministry of Foreign Affairs (MFA) in science and technology was largely in the area of security issues, such as nuclear non-proliferation and chemical weapons. Then, when I was a member of the Cabinet Office’s Council for Science and Technology Policy, I noted that the country was not set up to make a sufficient contribution to developing countries in the area of science and technology. This can be seen in the fact that Japan was making fewer agreements to cooperate on science and technology with developing countries than other advanced countries made. From my perspective as an expert in international politics, I was convinced that science and technology diplomacy needed to be greatly expanded in order to strengthen Japan’s influence around the world.

What role does SATREPS play in science & technology diplomacy? SATREPS has a government science and technology budget allocation to the conventional ODA (official development assistance) budget. It is a program that supports international joint research in the field of science and technology through partnerships with researchers in Asia, Africa, Latin America, etc. A large number of projects are now operational, and as a result researchers in many countries are already collaborating with Japanese researchers to address global issues. These partnerships are building close relationships between Japan and countries that are geographically very distant. As part of this program, it is particularly important to achieve three objectives: 1) Training young researchers and researchers who can work internationally, 2) Innovation, and 3) Ensuring that outcomes can make a lasting contribution to society in the developing country.

SATREPS finds solutions to global challenges and trains researchers of the future. The world faces a range of issues including natural disasters such as earthquakes and tsunamis, as well as global warming, environment and energy issues, food crisis due to a growing population, and spread of infectious diseases. In order to build a sustainable society while making use of limited natural resources, not only Japan but the entire world needs to make collective efforts to promote R&D aimed at finding solutions to these issues. In SATREPS, researchers in Japan collaborate with researchers in partner countries tackling concrete issues to implement R&D projects for solving these issues and returning their achievements to actual society. At R&D sites in partner countries, we encouraged Japanese graduate students and young researchers to play an active role as a member of the team. SATREPS is also committed to training broad-minded researchers with a global perspective.
**Research Fields**

SATREPS projects typically share the following characteristics:

- To envisage their outcomes being applied to the benefit of broader society as well as in the developing country
- To cover topics in developing countries for which research and development to resolve an issue is particularly necessary, and for which capacity building of researchers is required.
- To contribute to the resolution of global issues and scientific and technological progress

*4 project is not eligible if it consists merely of transfer of Japanese technology without entailing any joint research, or solely of surveys and other simple operations that do not make any contribution to the advancement of science and technology, or it if produces outcomes that can only be of benefit to one particular country.

### Environment/Energy

This research area aims to resolve environmental and energy issues occurring on a global scale triggered by deterioration of ecosystems and biodiversity, increased pollution, concentration of urban population, increased production and consumption activities, and climate change.

- **Low Carbon Society/Energy**
  - To address global environmental challenges like adaptation to climate change and conservation of ecosystems, there is a need for multipronged initiatives including scientific clarification of existing conditions, development of technologies that contribute effectively to solving problems, and dissemination and application of results. SATREPS’s goal is to carry out fundamental and technological research aimed at solving environmental problems in collaboration with relevant research organizations and related organizations in developing countries, and to apply the outcomes to benefit society.

*Examples of eligible project areas*

- Clean and efficient energy utilization technology, energy saving technology utilizing strategies such as high-efficiency equipment or energy recycling, and energy system for implementing low carbon approaches, etc.
- Utilization of renewable energies including solar, wind, wave, ocean energy, geothermal, biomass, etc.
- Creation of low carbon, resource recycling cities and regions using ICT, IoT, and AI smart cities, smart communities, smart agriculture, transportation networks, and next generation infrastructure.
- Key technologies for carbon capture, use and storage (CCUS), resource recycle, urban mining, development, sustainable use of natural resources such as fossil fuels and minerals

### Global-scale Environmental Issues

This research area aims to resolve environmental and energy issues occurring on a global scale triggered by deterioration of ecosystems and biodiversity, increased pollution, concentration of urban population, increased production and consumption activities, and climate change.

- **Reconstruction and restoration of environments damaged by large-scale disasters**
- **Sustainable use of natural resources**
- **Climate change prediction, adaptation or mitigation**

### Disaster Prevention and Mitigation

To address global environmental challenges like adaptation to climate change and conservation of ecosystems, there is a need for multipronged initiatives including scientific clarification of existing conditions, development of technologies that contribute effectively to solving problems, and dissemination and application of results. SATREPS’s goal is to carry out fundamental and technological research aimed at solving environmental problems in collaboration with relevant research organizations and related organizations in developing countries, and to apply the outcomes to benefit society.

*Examples of eligible project areas*

- **Sustainable use of natural resources**
- **Reconstruction and restoration of environments damaged by large-scale disasters**
- **Sustainable use of natural resources**
- **Climate change prediction, adaptation or mitigation**

### Low Carbon Society/Energy

This research area consists of energy conservation, protection of the utilization of renewable energies, and research and development of smart society: research outcomes can potentially be utilized to cut greenhouse gas emissions and realize a low carbon future.

*Examples of eligible project areas*

- Clean and efficient energy utilization technology, energy saving technology utilizing strategies such as high-efficiency equipment or energy recycling, and energy system for implementing low carbon approaches, etc.
- Utilization of renewable energies including solar, wind, wave, ocean energy, geothermal, biomass, etc.
- Creation of low carbon, resource recycling cities and regions using ICT, IoT, and AI smart cities, smart communities, smart agriculture, transportation networks, and next generation infrastructure.
- Key technologies for carbon capture, use and storage (CCUS), resource recycle, urban mining, development, sustainable use of natural resources such as fossil fuels and minerals

### Infectious Diseases Control

People and goods now cross national borders so frequently that the threats of HIV/AIDS, malaria, Dengue fever, tuberculosis, highly pathogenic influenza, Ebola hemorrhagic fever, COVID-19 and other emerging and reemerging infectious diseases are not confined to developing countries. Japan is keen to boost international cooperation regarding infectious diseases that have the potential to enter Japan, in order to accumulate knowledge of the same in an actual outbreak.

*Examples of eligible project areas*

- Zoonoses such as avian influenza, rubella and others
- Epidemiology, diagnostics, vaccines and therapeutics for the detection and control of emerging and re-emerging infectious diseases including HIV/AIDS, Ebola hemorrhagic fever, prionosis and parasitic like malaria, Dengue fever, tuberculosis and inactivates resistance to antibiotics in carbapenem and colistin

### Bioresources

Bioresources provide us with foods, medicines, animal feeds, textiles, energy, and much more, but sustainable production is threatened increasingly by problems such as desertification, salinization of agricultural land, pests, unstable temperatures, and unreliable rainfall. This research area concentrates on collaborative research that can point the way to sustainable means of production and utilization.

*Examples of eligible project areas*

- Sustainable production and utilization of bioresources (resource management and biomass cultivation and utilization, plant based, animal and microbial resources, production systems, etc.)
- Evaluation and effective utilization of bioresources (using biodiversity for search, identification, and production of useful substances from bioresources, except for human drug development)

### Research Supervisors

**Research Supervisor**

- **YAMAGUCHI Yoshi**

**Research Supervisor**

- **TAKAMURA Keiko**

**Research Supervisor**

- **ASANUMA Shuichi**

**Research Supervisor**

- **MASUDA Misa**

**Research Supervisor**

- **NAGAMINE Tsukasa**

**Research Supervisor**

- **SHIKAZONO Naoki**

**Research Supervisor**

- **KAMIMOTO Masayuki**

**Research Supervisor**

- **TSUTSUMI Atsushi**

**Research Supervisor**

- **TAKARA Koaru**

**Research Supervisor**

- **ASAEDA Takashi**

**Research Supervisor**

- **WATANABE Haruo**

**Program Officer**

- **KITA Kiyoshi**

**Program Officer**

- **YAMADA Akio**

**Program Officer**

- **MORIKANE Keita**

**Program Officer**

- **AIGA Hirotsugo**
The Cooperation among JST, AMED and JICA

Competitive Research Funds/ODA Technical Cooperation Projects

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

It is expected that the promotion of international joint research activities under this program will enable Japanese research institutions to conduct research more effectively in fields and targets where it is advantageous to implement the research in developing countries. Meanwhile, it is hoped that for research institutions in the developing countries (primarily universities and research institutions focusing on activities for public benefit, but excluding those related to military affairs), the establishment of research center facilities and the development of human resources through joint research activities will make it possible to develop self-reliant, sustainable research systems.

JST and AMED will provide financial support to the Japanese research institutions for the project activities in Japan and JICA will provide financial support to the research institutions in the ODA recipient countries within the framework of technical cooperation projects.

As JICA supports the partner country with ODA under the technical cooperation framework, the country is required to depend on its own efforts. Consequently, the local institution’s costs incurred for the project (labor, office rent, consumables by local researchers, operation and maintenance of equipment provided, domestic transportation fees for local researchers, conference attendance allowances, and other miscellaneous costs) should in principle be covered by its own country.

Applications of Research Proposals and ODA Technical Cooperation

JST and AMED invite researchers at universities and research institutes in Japan to submit research proposals in specific research areas. While JST and AMED select proposals, requests are received from developing countries for ODA technical cooperation for the international joint research project, and Ministry of Foreign Affairs (MOFA) reviews these requests in conjunction with JICA in Japan. Therefore, it is essential for the Principal Investigator (PI) in Japan to coordinate with researchers in the ODA recipient country in order to confirm the details of the joint research when making an application to JST and AMED. Official requests for ODA technical cooperation must be submitted by the research institution in the recipient country to MOFA by the specified deadline, via the ministry or agency in the recipient country responsible for ODA and the local Japanese embassy.

Selection of SATREPS Projects (Provisional)

The selection process for research projects at JST/AMED and the screening process for ODA technical cooperation at MOFA/JICA are interlinked. The applications submitted to JST/AMED by the Japanese PI and to MOFA (local Japanese embassy) for ODA technical cooperation must be provisionally selected in order for the research project to be supported under the program.

Preparation for an International Joint Research Project

To implement the international joint research, a Record of Discussions (R/D) must be signed by the research counterpart(s) in 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 about the joint research must also be signed between the research institutions (parties concerned) in Japan and the ODA recipient country.

Evaluation by JST, AMED and JICA

Projects are reviewed by JST, AMED, and JICA, acting in collaboration. JST/AMED evaluate the whole of the international joint research project, both in Japan and in the developing country, from the perspective of the project outcome benefiting society by contributing to the resolution of global issues, and from the perspective of the project advancing science and enhancing capacity in the developing country, and has contributed to the developing country’s needs.

* Provisionally selected: At this stage, discussion of details with the counterpart research institution or circumstances in the developing country may still result in small modifications to the project name or description, a shorter project term, or even termination of a newly-selected research project. For that reason, the project is described as provisionally selected.
In addition to the research benefit of being able to elucidate the toxicological impact etc. of types of environmental pollution not seen in Japan today, this project provides the opportunity to train students and young researchers, and has the potential to produce outcomes that enhance Japan’s presence in Africa by contributing to the alleviation of environmental pollution.

In addition to the project’s potential to remediate the environment and restore human and animal health by working through cross-disciplinary research activities including the elucidation of lead contamination mechanisms and risks, the development of environmental remediation techniques, the implementation of educational activities to prevent future contamination, and the visualization of economic losses, etc., it is training human resources through the joint research process.

Mining is the driver of Zambia’s economic growth, but it is increasing the severity of hazardous metal contamination in humans and in livestock, and of environmental contamination triggered by the development of mining. There are strong hopes that anti-contamination measures will provide a solution, but the extent of contamination had not been elucidated, and in this situation, government policies to combat contamination remain undecided.

During the project period, the project exchanged memoranda with international agencies working on environmental remediation and medical support. As a result, research expertise and statistical data on lead contamination obtained by the project has become part of the scientific basis behind the medical and environmental remediation activities. Furthermore, assessments of health and economic impact, along with effective environmental remediation technologies etc. obtained by the project will eventually be submitted to the Zambian government in the form of proposals for countermeasures. They will raise awareness of environmental pollution in Africa, leading potentially to solutions for the issues.

Visualizaion of Impact and Geo-Ecological of Chronic/Latent Chemical Hazard Remediation

Involvement of experts in multiple fields helps resolve pollution issues

Water and soil pollution, along with high levels of lead contamination in human and animal bodies had been found in the area around the Kabwe mine in the Zambian Central Province. However, the contamination mechanism had not been identified, and the specific effects on human health and the socioeconomic impact were still unclear. This project brought together experts in multiple fields to provide a composite approach by 1) explicating contamination mechanisms, 2) assessing health risk and economic risk, and 3) developing environmental remediation techniques, in order to produce real solutions to the issues of pollution and the serious risk to health.

Project data and expertise tied into practical support

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Advantage of Joint Research

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Research Field

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Background to SATREPS research proposal

Hokkaido University and the University of Zambia have a relationship that dates back some 37 years (as of 2020). When Professor Ishizuka visited the University of Zambia in 2007, she was invited as a specialist in toxicology to research the lead contamination in Zambia. Since then, she has been involved in joint research for over 10 years. The research setup and network steadily took form over the years, including the appointment to the University of Zambia teaching staff of a Zambian veterinarian whose doctoral work was awarded by Hokkaido University. Hearing about SATREPS from engineering researchers engaged in pollution issues, it was decided to submit a proposal to SATREPS to take the joint research a step forward.

Interim Period

Leading up to signing R/D, CRA

Formal approval

After a project has been selected, it is required that the research institute in the partner country reaches agreement on project details with JICA within the framework of technical cooperation, for the SATREPS project to be formally adopted and international joint research can commence. In the provisional selection period after selection and before formal approval, the principal investigator and JST (AMED) meet several times, and the principal researcher typically travels to the partner’s institute to discuss details in preparation for signing the R/D (Record of Discussion) and CRA (Collaborative Research Agreement). This process takes about a year.

1st year

Kick off meeting

2nd year

The first JCC

3rd year

Mid-Term Evaluation

JCC

4th year

JCC

5th year

JCC

The final JCC

Terminal Evaluation

Press and publicity activities

In July 2016 and October–November 2018, the Japanese media carried a substantial number of reports outlining the project and describing the contamination issue in Kabwe. In Zambia, major newspapers carried articles in December 2018, and the project was given news coverage on the national broadcasting network in August 2019.

In addition to informing the press, we are constantly working to communicate what can be done about lead contamination. Wearing masks and washing hands is an effective measure against contamination by lead dust as well as against infection, so we created an educational video about masks and hand-washing. With help from the Japanese embassy, the video was distributed to provinces throughout Zambia by the Zambian government.

Preparing for formal approval of the project

A large number of Zambian government agencies are involved in the project, so it took some time to reach agreement and complete the procedures. From past experience, taking directly to the people at the top of the organization is an effective way of moving smoothly through this stage, so we produced and shared clear explanations of the outcomes expected from the project, and the significance of participation by a Japanese institute. This approach facilitated agreement on the Zambia side.

Equipment provision/Training human resources in partner country

A monitoring lab was established at the University of Zambia, where we installed precision instruments and other equipment for surveying and analysis. The setup was designed to enable analysis of samples taken from contaminated districts... This provides a strong contribution to building research capacity in terms of human resources on the Zambia side.

Young researcher’s comments

I have been stationed long-term in Zambia, working on field research and liaison with government agencies, and handling technical transfer of research expertise. There are times when a sense of values differing from what I would expect in Japan adds difficulty to the tasks, but listening to the thoughts and ideas of the joint researchers and making a specific point of respecting the local culture has enabled us to build a good relationship for cooperation.

Press and publicity activities

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Principal investigator’s comments

We aim to contribute to resolving local issues, and to raise awareness of environmental pollution in Africa so that the project outcomes can extend overseas.

Environmental challenges are difficult to resolve by only tackling a single field, so collaboration between a number of fields is a key factor. This project involved collaboration between a large number of experts, with interconnecting expertise ranging from fundamentals to social implementation, a combination that can surely be applied to other issues, too. Regarding changes after medical treatment and environmental remediation, it is necessary to continue acquiring measurement data to provide verification of effectiveness. Consequently, the research will be continued after the termination of the SATREPS project.

Counterpart training.

Learning about lead contamination countermeasures in Japanese mines

Learning analysis techniques in monitoring lab at University of Zambia

International symposium hosted by the project

Short break with maize juice and orange juice between sampling tasks.

Kampai Project

Kabwe mine district

At the JCC researchers warmly welcomed by children when surveying local elementary schools.

The nickname derives from the wish for both countries to be able raise their glasses and smile at the end of the project as they say “KAMPAI!” (It also stands for the KAbwe Mine Pollution Amelioration Initiative.)

Partner country principal investigator’s comments

In the KAMPAI project, we assessed lead exposure levels of residents, including women and children, in matrices such as blood and urine. Survey results showed clearly that lead levels have an impact on the surrounding environment and on the human body.

In order to be able to propose effective measures, the project will continue to participate in lead contamination impact surveys and environmental remediation activities.

Environment and Energy (Global-scale Environmental Issues)
Technology Development of Steam-spot Detection and Sustainable Resource Use of Geothermal Power Generation in Indonesia

Indonesia has a population of over 200 million, and a massive demand for electricity. Decarbonization is a national policy objective, and the country hopes to make use of geothermal energy as a renewable energy source associated with Indonesia's large number of active volcanoes. One difficulty with this approach has been the requirement for large-scale test drilling to find locations underground that have an abundance of geothermal energy resources. Such drilling involves a large initial investment and has a high risk of failure, and as a result, geothermal power generation did not grow as fast as originally expected.

Advantage of Joint Research

Indonesia conducts a great deal of research in the field of geothermal energy research. Partnering with Institute of Technology Bandung (ITB), where there were already many projects involving groups of Japanese researchers, provided the opportunity to train young researchers and to make advances in globalization of research. Use of turbines in geothermal energy projects may also lead to future business for Japanese companies.

Research Field

Indonesia conducts a great deal of research in the field of geothermal energy research. Partnering with Institute of Technology Bandung (ITB), where there were already many projects involving groups of Japanese researchers, provided the opportunity to train young researchers and to make advances in globalization of research. Use of turbines in geothermal energy projects may also lead to future business for Japanese companies.

Technology developed for precise identification helps cut initial costs

Identifying locations suitable for geothermal energy production usually requires deep drilling, incurring high initial costs. Moreover, test drilling sometimes fails, and the combination of high initial costs and large operating risk meant that new exploration had not made much progress. This project combined remote sensing techniques with geochemistry and mineralogy techniques to develop technology that could identify optimal locations (steam spots) for geothermal energy production with greater precision. The aim was for technology that cut both initial costs and operating risk, thereby contributing to the progress of geothermal exploration in Indonesia.

Optimization systems help ensure long-term use of geothermal energy

The project developed technology for precisely identifying optimal locations (steam spots) for geothermal energy production. This reduces the number of exploratory drillings required, which can cut initial costs. The project also developed environmental monitoring technology that enables use of geothermal energy in harmony with the environment, and optimization systems that help to ensure that the geothermal energy can continue to be used in the long term. These technologies make it possible to increase the proportion of Indonesia's energy provided by geothermal energy sources, which can help to meet the country's expected growth in demand for energy, and can potentially help to achieve large cuts in carbon dioxide emissions.

Reference data: https://www.jst.go.jp/global/kadai/h2601_indonesia.html
Background to SATREPS research proposal

Professor Koike already had strong ties with Institut Teknologi Bandung (ITB) in resources engineering and earth sciences, and four of the teaching staff at ITB gained their doctorates under Prof. Koike. The first collaborative research began in 2004 with a geostatistical assessment project of coal resources, and the relationship has grown since then, including collaboration in conference organization and jointly-authored papers. After hearing that a proposal from the same department as Prof. Koike in Kyoto University had been selected as a SATREPS project, this joint research project was planned and proposed, aiming to deepen a joint research on sustainable energy, and to boost the strength of research at ITB through an initiative taking a comprehensive approach to geothermal energy research.

Equipment provision

As part of the project we deployed twelve different types of state-of-the-art measurement/analysis equipment, including scanning electron microscope and chromatographs and three types of software. These are in full use. In addition to their use by ITB, they handle requests for analysis from other entities, including universities and research institutes throughout Indonesia, and police and customs agencies. Costs of consumables and maintenance are secured by ITB, and the instruments are kept ready for use at all times.

Training human resources in partner country

In order to train people to handle geothermal exploration in Indonesia, a broad range of training is provided, including inviting over ten Indonesian trainees to Japan each year, including ITB graduate students, young researchers, and young private sector engineers. In addition to classroom learning, trainees get practical training through field surveys in Oita Prefecture, practice analyzing samples, and give presentations of their results.

Private sector collaboration

Tie-ups with a number of companies in the partner country led to jointly-conducted field survey results being published in international journals, and to locations pinpointed by the project being adopted as new drilling sites. During the project, we also able to extend the research to other districts, providing additional sites for verifying the accuracy of steam spot detection, and making it easier to implement our research outcomes in society. Japan-side companies also helped us to resolve a number of problems concerning geothermal energy exploration and cooperated in numerical simulations, etc.

Interim Period

Leading up to signing R/D, CRA

1st year

The first JCC Kick off meeting

Project logo.

The nickname “BAGUS” is an Indonesian phrase meaning “Very Good.”

2nd year

JCC

JST/AMED and JICA collaborate and cooperate on project evaluation. See p.13 for more information about the perspectives employed in evaluations.

Before signing R/D, CRA

When we started organizing the project, communication with the ITB side was almost completely based on email. But with email, it was difficult to discuss things in depth, and everything took a long time. Convinced that direct meetings were important for reaching a consensus, soon after provisional selection was announced, we invited the key ITB members to Kyoto University to discuss research objectives, content, schedule, equipment and software required, and the outcomes that we hoped to obtain. We conducted the discussion of these and other topics over two full days that were packed with meetings.

After that, we kept in close contact, giving full respect to each other’s culture, including ensuring that schedules took the partner’s regular events and customs into account. This approach ensured that the research proceeded on schedule, and was vital in ensuring that we were able to achieve the outcomes on time.

3rd year

JCC Mid-Term Evaluation

JCC (Joint Coordination Committee) is the highest decision-making body for the project, bringing together all the project stakeholders in a key meeting each year to hear reports on the project’s progress, subsequent schedule, etc., and to discuss and make decisions on behalf of the project.

The nickname “BAGUS” is an Indonesian phrase meaning “Very Good.”

Principal investigator’s comments

In addition to promoting geothermal energy production and fulfilling our mission of contributing to low carbon society, arranging for joint researchers from Indonesia and other countries to conduct research in collaboration with Japan is boosting networking between researchers and strengthening alliances. We hope to develop this project into world-leading research. The outcomes obtained by the SATREPS project will provide a foundation for extending both the research and research networks through initiatives such as the development of technology for exploring deeper parts of reservoirs to enable an increase in the generating capacity in districts that have already been explored. They also provide a foundation for further joint research with Egypt, Mozambique, and other countries.

Partner country principal investigator’s comments

The aim of the BAGUS project was to reduce costs and reduce the risk of failed exploration in order to realize relatively inexpensive but precise technology meeting the needs of geothermal resource exploration in Indonesia.

By means such as introducing state-of-the-art experimental equipment and software, the activities of the BAGUS project have led to the development of science and technology, the enhancement of exploration techniques, and of course, training of ITB people. The people who have been trained are now working as engineers or as university teaching and research staff in the field of geothermal energy.
Achieve sustainable agriculture through active use of real-time data and halophytes!

Selection of crops for circular halophytes mixed farming (CHMF) and utilization of real-time data

Years of irrigation-based agriculture have shrunk the Aral Sea, and salt damage and drought are becoming increasingly severe in the surrounding area. This project is designed to use climate data and information from earth observation satellites to grasp conditions in the area around the Aral Sea: the amount of usable water, the amount of evapotranspiration, and the status of crop growth. In addition, we will work to prevent the worsening of salinity problems by developing a sustainable agricultural model that combines appropriate irrigation management methods, halophyte-based biological restoration of saline soil, and cultivation of crop species that use water efficiently.

Development of a circular business model for managing agricultural land, water, and salt

We will explore and propose optimal combinations of crop species from the standpoints of resistance to drought and salt, ability to remove salt from soil, and efficient use of water, in order to realize resource-efficient, sustainable agriculture through irrigation and drainage management based on the amount of water resources available, the amount of evapotranspiration taking place and the status of crop growth, and through active cultivation of halophytes in salinity-affected areas.

Establishment of Integrated Forest Management System Model for Conservation of Mountain Forest Ecosystems in the Andean-Amazon region by sustainable forest management

Develop forest management systems that support the conservation and use of forest ecosystem services

There are concerns about the deterioration of ecosystem functions in mountain forest ecosystems from the Andes Mountains to the Amazon Basin as a result of disturbances caused by human activities and a lack of water resources due to climate change. Through understanding the effects of increasing forest fires and logging, and with an understanding of the amount of water resources available for supply, we aim to develop a forest management system that enables local residents to receive ecosystem services while conserving the forest, and to apply that system in a way that benefits society by creating tools to support decision-making for use in management of water and forest resources by local residents.

Achieve sustainable conservation and use of mountain forest ecosystems through participation by local residents

Develop an integrated forest management system that makes it possible to present forest allocation that balance the resource usage needs of residents with the conservation of ecosystems. We anticipate that the use of this system will encourage local residents to conserve the fragile forest ecosystems of the Andes-Amazon region and to use ecosystem services in a sustainable fashion.

Development of Management Systems for Multiple Utilization of Biodiversity in the Tropical Rainforests in Sarawak =

Solve the challenges facing the Andean-Amazon region by sustainable forest management

Proposal an action plan for mitigating marine plastic debris to the Thai government

The Southeast Asian region is thought to be a hotspot for marine plastic pollution. However, the influence of marine plastic on the ecosystem and human activity is not yet sufficiently clear. This project establishes a research center in Thailand to survey the ways in which plastic waste is released into the oceans and the impact of the debris on the ocean environment. It also aims to monitor the routes of marine plastic debris from land to the ocean and the volume of plastic emitted, and to forecast future levels of marine microplastic emissions.

Development of Innovative Climate Resilient Technologies for Monitoring and Controlling of Water Use Efficiency and Impact of Salinization on Crop Productivity and Livelihood in the Aral Sea Region =

Discover how plastic wastes are released into the oceans and clarify their impact on the ocean environment

Researching ways in which plastic wastes are released into the oceans and the impact of marine plastic debris on the environment

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Proposing an action plan for mitigating marine plastic debris to the Thai government

The project will support Thailand's government in formulating a policy for reducing marine plastics based on scientific knowledge. It will also roll out the initiative in Thailand to other surrounding nations and contribute to sustainable reduction of marine plastics in Southeast Asia. Among other things, this research center is expected to play a role in demonstrating the scientific basis for bolstering policies for reducing marine plastics.

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Create sustainable futures by integrating practices by people in local communities with interdisciplinarity science

Improving sustainability of the natural environment and resources through integrated natural resource management

The life and livelihood of people in rural villages of Malawi, which is among the least developed countries, depends on the diverse natural resources supported by the country’s rich natural environment. By integrating the latest in resource management sciences and effective initiatives based on the traditional knowledge and skills of local communities through transdisciplinary research, this project takes adaptive approaches to improving and reinforcing the management systems of diverse resources that have been handled separately up until now, and builds integrated resource management systems that take advantage of synergies emerging from integration. * Transdisciplinary research is adaptive processes of co-production of knowledge, driven by repeated trials and feedbacks with close collaboration of diverse stakeholders, including practitioners and innovative practitioners both within and outside local communities.

Improve people’s lives and well-being with integrated resource management systems

This project will build integrated management systems of diverse resources supported by the rich natural environment through collaboration between practitioners in local communities and scientists, and establish a framework for effective decision making and actions led by community members to achieve sustainable natural resource management. Thereby, the project is expected to contribute to improving the quality of life and well-being of people.

Research Institutions in Malawi
- University of Malawi Chancellor College / Lilongwe University of Agriculture and Natural Resources / Department of Forestry
- University of Malawi / College of Medical and Allied Sciences
- Natural Resources Institute / National University of Agriculture, Malaysia

Research Institutions in Japan
- National Institute of Agro-Environmental Sciences

Research Period
- 3 Years

Sustainable Replantation of Oil Palm by Adding Value to Oil Palm Trunk through Scientific and Technological Innovation

Stop disorderly expansion! Utilize oil palm trunks for sustainable plantations

Malaysia produces approximately 30% of the world’s palm oil. Oil palm trunks (OPT), trunks of oil palm trees that are felled at the end of their lives, are left on the ground, causing issues that include the spread of soil-borne diseases, greenhouse gas emissions from decomposition, and deforestation as tropical forest is cleared to make way for new plantations. This project is conducting scientific and economic assessments of the impact of OPT abandonment, and attempts to transform OPT into a more valuable resource by developing technology for producing a range of high-value-added products, including biogas and biodegradable materials.

Sustainable plantation management and creation of new industries through OPT technology

This project is based on collaboration between industry, government, and academia in Malaysia and Japan. It aims to raise the resource value of oil palm trunks and create new industries by developing technologies that utilize OPT to produce high-value-added products. This contributes to the achievement of sustainable plantation management by facilitating the removal and use of felled OPT and making replantation possible within existing palm plantations.

Research Institutions in Malaysia
- Universiti Teknologi Malaysia / Institute of Biological Resources and Biotechnology (IBRB) / Faculty of Agriculture (FAU) / Research & Development Centre for Agricultural Sciences (RDCAS) / Malaysian Palm Oil Board (MPOB)
- Research Institute of Natural Resources and Environment (RINRE) / Universiti Putra Malaysia / University of Malaya / National University of Malaysia / National Institute of Environmental Studies / Paciﬁc Corporation / NISSIN SHUJI CO., LTD.

Research Institutions in Japan
- National Institute of Agro-Environmental Sciences

Research Period
- 3 Years

Advanced and Sustainable Methods on Water Utilization Associated with Greening Potential Evaluation

Create sustainable agropastoral practices in the Djibouti desert through developmental management of water resources

Assessing water resources/greening potential and demonstrating agropastoral practices

Most of Djibouti is a harsh desert environment, and the country’s food self-sufficiency ratio is only about 13 percent by value. This project aims to ascertain the distribution, circulation pathways, and sustainable usage levels of Djibouti’s water resources over a wide area and from a three-dimensional perspective, and expand the area where agropastoral practices are used. Satellite images and UAV images taken throughout Djibouti are used to assess the current situation based on the relationship between water resources and greening/potential sheep farming potential. The project also aims to propose water-saving agropastoral models as an extension of the oasis farming model by developing useful plants and feed crops, along with greens going through effective use of urban waste.

Making efficient use of water resources to enhance arid areas by greening wasteland and by creating agropastoral land

This project aims to identify optimal areas for greening and to extend the use of sustainable agropastoral practices suitable for arid lands by conducting demonstrations at suitable locations. The process involves determining the circulation of water in Djibouti as a whole, and, by extension, groundwater flow systems throughout Africa, and identifying other arid lands with potential for implementation of the techniques.

Research Institutions in Djibouti
- University of Djibouti / Center for Studies and Research of Djibouti / Ministry of Agriculture, Water, Fisheries, Livestock and Marine Resources of Djibouti
- Tokyo University of Agriculture / Kyoto University / The University of Tokyo / Ehime University / The University of Tokyo / Tokyo University of Agriculture / Ryukoku University / Faculty of Environmental Technology Corp. / General Consultants Global Co., Ltd.

Research Institutions in Japan
- National Institute for Environmental Studies / Panasonic Corporation / NISSIN SHOJI CO., LTD.

Research Period
- 3 Years

Establishment of Environmentally Sound Management of Construction and Demolition Waste and Its Wise Utilization for Environmental Pollution Control and for New Recycled Construction Materials

Recycle 50% of construction and demolition waste

Sound management and recycling of construction and demolition waste, and development of new technology

The volume of construction and demolition waste (CDW) produced from urban development is rapidly increasing in Asian countries including Vietnam. This project will promote sound management and recycling of construction waste in Vietnam by establishing guidelines for treatment of construction waste and standard of quality for recycled materials, and development of technologies for using the materials (water purifi cation and permeable subbase). We will propose a strategic business model to boost recycling and review its effectiveness with a local pilot program.

A resource circulation system that can realize Vietnam’s national strategy

Vietnam’s national strategy goal for 2025 is to recycle 50% of CDW. We aim to contribute by building a platform for a resource circulation system for sound management and recycling of CDW in Hanoi, and the technical and business application of the new technologies and business models.

Research Institutions in Vietnam
- Hanoi University of Civil Engineering (HUC) / Ministry of Construction (MOND) / Institute of Strategy and Policy on Natural Resources and Environment (ISPONRE) / Geosphere Environmental Technology Corp. / Environmental Consultants Global Co., Ltd.
- Violet Group / Green-Pack Vietnam

Research Institutions in Japan
- Sakuragi University / Center for Environmental Science in Saitama / National Institute for Environmental Studies

Research Period
- 3 Years
Creating the future of African tropical rainforests with local people

Using a combination of indigenous and scientific knowledge to design resource management model with ownership by residents.

Preserve biodiversity with sustainable management of wildlife and non-timber forest products

The establishment of forest resource management based on proactive participation by local residents will promote preservation of biodiversity in the rain forests of Congo Basin. Also, utilization of diverse forest resources including wildlife and non-timber products as well as improvement in lives of local residents through commercialization of forest products can be achieved in a sustainable manner.

Development of Next-Generation Sustainable Land Management (SLM) Framework to Combat Desertification - An innovative transdisciplinary approach to fighting desertification

Proposing a framework for next-generation sustainable land management (SLM)

The project will propose a framework for next-generation SLM in Ethiopia, incorporating effects such as enhanced prevention of soil erosion, improvement of land productivity and increasing local residents’ incomes. Research sites will be set up in three different areas (highland, midland and lowland) in the Upper Blue Nile Basin, which suffers from serious soil erosion caused by rainfall so as to develop practices and technologies for improving land productivity by reducing soil erosion and introducing crop-livestock production systems as well as linking such efforts to improving the livelihoods of local residents.

Contribution to reduction of soil erosion, improvement of land productivity and local residents’ livelihoods

Various SLM practices targeted to fight desertification have been implemented in many areas of the world, but their sustainability and effectiveness are being questioned. Hence this project aims to develop improved SLM technologies and approach that could address the major limitations of the currently implemented SLM practices and then to propose them to be used in the study sites and beyond such as to the entire Blue Nile Basin and other arid regions of the world that are experiencing similar problems.

Comprehensive Assessment and Conservation of Blue Carbon Ecosystems and Their Services in the Coral Triangle (Blue CARES) - Contribute to the conservation of coastal ecosystems and mitigation of global warming through blue carbon!

Elucidation of blue carbon dynamics and assessment of ecosystem services based on new methodologies and framework

Focusing on blue carbon, which is biological carbon sequestered by coastal-marine ecosystems, in the Philippines and Indonesia located in the Coral Triangle as the world center of biodiversity, this project aims to evaluate and predict the functions and dynamics of the blue carbon ecosystems for the carbon capture and sequestration. For this purpose, we will develop an innovative and integrated monitoring/modeling system and carry out the comprehensive assessment of blue carbon ecosystem services. In addition, a “core-and-network” system will be built for sustainable nation-wide network-based monitoring, and associated human resource development.

Establish and propose “Blue Carbon Strategy” and develop a framework for its implementation

Based on various surveys, model system development and analyses, the project will establish and propose “Blue Carbon Strategy”, with its effective implementation scheme arrangement, as a local-global integrated strategy to conserve coastal ecosystems and improve their resilience, which will enhance blue carbon sequestration, and thereby contribute to improving the global environment.

Strengthening of the Environmental Radiation Control and Legislative Basis for the Environmental Remediation of Radioactively Contaminated Sites - Enable safe and effective management of the Chernobyl Exclusion Zone

Enhance monitoring for understanding changes in the dynamics of radionuclides that may be caused by recent environmental changes

The Exclusion Zone surrounding Chernobyl Nuclear Power Station is contaminated by radionuclides from various other radioactive materials, which are still having a devastating impact even 31 years since the accident. The water level of the Chernobyl Cooling Pond is diminishing 8 m lower level since the circulation pump has been stopped in 2014, that will provide changes in the water environment and surrounding ecosystems. In addition, there is concern that the frequent occurrence of forest fires will also have an impact on the transport of radioactive materials. The project aims to support the enhancement of monitoring and prediction of the environmental dynamics of radionuclides by taking the above-mentioned factors into account.

Strengthening the management of the Exclusion Zone through enhanced monitoring and model predictions

Recently, the Ukrainian Government provides the efforts to restructure the Chernobyl Exclusion Zone with the aim of more effective land utilization rather than the resettling of refugees, since radioactive nuclides with a far longer lifetime than cesium-137 exist in this area. Land use purposes under consideration include waste management, operation of solar panels and designation as a wildlife reserve to protect the wild animals that have increased in population. It is expected that the findings of this project, such as environmental dynamics of radionuclides materials and estimated exposure to radiation of workers that enter this area, will be useful in facilitating the effective management of the Exclusion Zone.
Damage assessment based on human eyes and sensors to mitigate economic losses to agricultural producers

Development and implementation of an efficient method for damage assessment utilizing spatial information

Specifically targeted at Indonesia, which has launched an agricultural insurance system for rice producers, the project aims to "contribute to future food security on an international basis by supporting the improvement of agricultural insurance as a means of adapting to climate change, thus increasing the adoption of agricultural insurance." It also aims to realize the implementation of objective and efficient damage assessment covering wide area, the core of agricultural insurance system, by establishing a new assessment method utilizing spatial information from such as satellites, drones, GIS and other sources.

Enhancement of agricultural insurance system as a means of adapting to climate change and realization of sustainable agriculture

A more efficient damage assessment method can be built by utilizing satellites and drones, compared to assessment methods relying on eye inspection. By improving insurance system to meet the needs of Southeast Asia and increasing their adoption, economic damage from climate change to agricultural producers can be mitigated, thereby contributing to the establishment of a support system to ensure sustainable production and food security.

Development and implementation of a new adaptation strategy to reduce present water risks and future climate damage

Applying observation and forecasting technology to flood risk management transdisciplinarily

The advance of climate change is concerned to increase flood risk such as the large scale flooding that occurred in the Chao Phraya River Basin in the Central Thailand in 2011. To reduce these risks, we are working to combine in-situ and satellite observations with numerical simulation technology to provide early warning information, encourage appropriate land usage, combine an effective range of initiatives such as changes in operational rules for reservoirs, and promote dialog with government, citizens, and other stakeholders to construct an adaptation strategy that provides the maximum benefit to society at large.

Contribution to the development and realization of an appropriate adaptation strategy, ideally with the potential for expansion to neighboring countries

We aim to contribute to the smooth construction and realization of a climate change adaptation strategy for the Kingdom of Thailand by developing the technologies and co-design methods required to develop an integrated adaptation strategy, establishing best practices, and fostering human resources in the field of adaptation. In addition, we aim to propose effective, sustainable solutions to climate change that can also be applied in neighboring Southeast Asian nations.

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Increase of water resources in the Tonle Sap Lake

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Absorb carbon dioxide by means of mineral carbonation, and clean up the environment at the same time

Develop a carbon recycling system using mineral carbonation as a step toward climate neutrality. The cement industry is taking various approaches to the reduction of CO₂ emissions. Our approach is to focus on process-related CO₂ emissions that account for 60 percent of the industry’s CO₂ emissions, and to develop a carbon recycling system based on performing mineral carbonation of alkaline by-products and waste materials. The resulting carbonates are recycled for use in cement production. Resources that cannot be recycled are used as environmental purification materials, thereby creating a new circulation loop.

Use mineral carbonation to reduce carbon emissions, and contribute to the circular economy with environmental purification materials. We are advancing toward carbon neutrality by developing technologies with low CO₂ marginal abatement costs for making equipment that can easily be procured, operated, and maintained by entities in developing countries. In addition, low-cost, useful products like environmental purification materials made from alkali by-products and waste products are being developed, and it is expected that they will be used also for the treatment of acid mine drainage.

Discover the power of microbial symbiosis and help realize a resource-recycling society. We are advancing toward carbon neutrality by developing technologies with low CO₂ marginal abatement costs for making equipment that can easily be procured, operated, and maintained by entities in developing countries. In addition, low-cost, useful products like environmental purification materials made from alkali by-products and waste products are being developed, and it is expected that they will be used also for the treatment of acid mine drainage.

Establish a holo-biont resource research center to study combination of duckweed and coexisting microorganisms. Contribute to the construction of a sustainable society by utilizing plants in the Lemnaceae family (duckweeds), which have high resource value and can grow in contaminated water where there is a high concentration of CO₂. Specifically, (1) create a biobank of complex organisms consisting of duckweed and coexisting microbes, (2) understand and enhance microbial symbiosis that accelerates the growth rate of duckweed, (3) develop low-carbon water treatment technologies and duckweed production technologies, (4) manufacture biofuels, bioplastics, and livestock feeds, and (5) improve edible duckweed productivity and develop highly functional foods.

Solving issues to achieve optimum development of the Great Rift Valley’s unique geothermal systems. Kenya is in the process of switching its main source of power from hydropower, which is unstable due to frequent droughts, to geothermal power, which has high power generation potential and enables stable supply. This project aims to resolve issues at every stage, from planning through to actual energy use, and promote sustainable geothermal energy use in Kenya and surrounding nations through the utilization of hybrid exploration geophysics, development of models of geothermal systems unique to the Great Rift Valley, and establishment of methods of dealing with scaling in order to improve the operational efficiency of power plants, as well as by proposing scenarios for improving acceptance of geothermal heat use by society. Contributing to achieving SDGs by utilizing geothermal heat, a stable, renewable energy source. The outcome of this project is expected to contribute to achieving the Kenyan government’s goal of increasing the capacity of geothermal power generation facilities to 5,000MW by 2030 as well as to contribute to the government’s Kenya Vision 2030 economic development plan to turn Kenya into an industrial nation. Kenya’s renewable energy-based power generation makeup will also contribute to global environmental conservation.
# Development of Advanced Hybrid Ocean Thermal Energy Conversion (OTEC) Technology for Low Carbon Society and Sustainable Energy System: First Experimental OTEC Plant of Malaysia

## Achieve sustainable power supplies using temperature differences in the ocean

Develop an OTEC Malaysia Model with an innovative hybrid ocean thermal energy conversion system at its core. This project will conduct a demonstration of an innovative hybrid ocean thermal energy conversion system (H-OTEC) in Malaysia, a nation that has great potential for ocean thermal energy conversion. The hybrid OTEC system can resolve issues seen with conventional systems such as the cost of heat exchangers and the need for anti-fouling measures. There are high expectations for the system’s ability to desalinate seawater at the same time as generating energy. This project also aims to investigate the economic viability and construct models of systems that can utilize the desalinated water produced by OTEC for other purposes in addition to power generation. Furthermore, the project is planning to establish an evaluation system for assessing the suitability of the OTEC technology for industrial rollouts.

### Making available new sources of clean power and safe water supplies

Deep ocean water utilized by hybrid OTEC has high added value, including nutritional value. Availability of deep ocean water can jumpstart the creation of new industries in areas such as farming and fishing, permitting the construction of a sustainable, low carbon Malaysia OTEC system that is advantageous to local industry in Malaysia. This model can then be rolled out to other parts of the world, including other Asian and Pacific countries.

## Development and Dissemination of Innovative Oil-Extracting Technology from Crop Process Residue for Rural Electrification and Value Addition of By-products

Utilize agricultural residues for rural electrification and achieving a low carbon society!

Develop technologies for extracting fuel oil from agricultural residues and efficiently using by-products. Rural areas in Tanzania have a low electrification rate, but demand is increasing for electric power to charge the growing number of mobile phones, and to provide lighting, enabling children who work on farms during the day to study at night. Many kinds of agricultural residue, such as rice bran, contain good-quality oil. This project will develop technology using CO2-expanded hexane to extract unique oils for power generation that are energy-saving and have a low environmental impact. It will also develop technology for producing high-added-value products from extraction residues.

### Contributing to the supply of power in rural Tanzania by extracting oil from agricultural residues

This project aims to contribute to the rural electrification of Tanzania using renewable energy and provide a model for achieving a sustainable, low carbon society. Generation of electricity using extracted oil from oil-bearing agricultural residues will provide power to rural areas. Manufacture of products such as soap from part of the extracted oil will also open the way to employment and cash earnings in rural areas.

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**Research Institutions in Malaysia**
- University of Technology, Malaysia (UTM)
- University Putra Malaysia (UPM)
- University of Malaya
- University Kebangsaan Malaysia
- University Malaysia Terengganu

**Research Institutions in Japan**
- Tohoku University
- The National Institute of Advanced Industrial Science and Technology (AIST)
- Saga University
- The University of Tokyo
- AIST

**Research Period**
- 5 Years

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**Research Institutions in Tanzania**
- University of Dar es Salaam / Sokoine University of Agriculture

**Research Institutions in Japan**
- Chiba University / University of Tsukuba / Okayama University / Kyushu University / Nippon Engineering Consultants Co. / Mitsubishi UFJ Research and Consulting Co.

**Research Period**
- 5 Years
25 = Comprehensive Conversion of Biomass and Waste to Super Clean Fuels by New Solid Catalysts = Producing liquid fuel from botanical resources to solve both resource scarcity and global warming simultaneously!

Development of gasification and catalyst technologies to convert biomass resources into liquid fuel

In Thailand, a tropical agricultural country, large amounts of agricultural residues including those from processing of agricultural products are being produced. The project aims to create new solid catalysts to convert gas to liquid fuel. We will not only develop technologies for characterization of resources, conversion to gas suitable for catalytic reaction, and catalytic conversion of gas to diesel, gasoline, LPG or methanol, but will build a platform for the social implementation of these technologies through verification of product utilization characteristics as well as human resource development.

Contribute to solving resource and environmental issues by producing liquid fuel from renewable energy resources as an alternative to fossil fuels. Alternative fuels to fossil fuels and chemical products from abundant biomass resources are produced in Thailand. The obtained biofuels will serve to improve Thailand’s energy self-sufficiency ratio, promote agriculture and rural communities, and conserve the environment of Thailand. In the future, it will also contribute to the development of fuel production technologies from biomass that does not compete with the food supply and prevent global warming by the use of alternative fuels to fossil fuels.

Contribution to environmental preservation and economic development by converting unusable land into sustainable biomass production sites. We believe that the revegetation and sustainable utilization of grass wasteland in Indonesia will serve as a globally deployable model for converting land devastated by the felling of natural forest into biomass and renewable energy resources as an alternative to fossil fuels.

Research Institutions in Thailand
- Chulalongkorn University / Northern Renewable Energy Co., Ltd / PTT Energy
- University of Toyama / JAPAN COAL FRONTIER ORGANIZATION (JCOAL) / NISSIN Corporation / Furumori Shokai Co., Ltd
- Research Period 8 Years

Research Institutions in Japan
- University of Toyama / JAPAN COAL FRONTIER ORGANIZATION (JCOAL) / NISSIN Corporation / Furumori Shokai Co., Ltd
- Research Period 8 Years

Research Institutions in Indonesia
- National Research and Innovation Agency (BRIN)
- Research Research Center for Plant Conservation, Research Center for Biology, Research Center for Biotechnology, Research Center for Biomaterials, Research Center for Sustainable Humanosphere, Graduate School of Agricultural Science
- Research Period 5 Years

26 = Smart Cities Development for Emerging Countries by Multimodal Transport System Based on Sensing, Network and Big Data Analysis of Regional Transportation = Create revolutionary solution for severe traffic congestion in super power India

Realizing a modal shift of urban transportation towards a low-carbon society through traffic analysis

With the rapid economic growth in emerging countries, particularly India, the negative impacts of increasing transportation congestion such as environment disruption and traffic accidents have become a growing social concern. The actual traffic conditions are difficult to grasp at present. The project aims to grasp the situation of urban traffic by utilizing the image recognition technologies using AI and analyzing big data collected with the latest sensing technologies. The objective is to realize low carbon, smart mobility society by building a multi-modal system which utilizes appropriate transportation in city with usage of public transportation with sufficient feeder.

Accelerating a modal shift in India and building a sustainable urban transport system

Starting with the larger cities of India, the project aims to establish a reliable and common approach for grasping the traffic situation across India by building a system that effectively utilizes mobile devices which has been already widely used in the countries. This project will lead to the formation of a consortium to realize urban transportation systems suitable for emerging countries and facilitate a modal shift.

Converting microalgae produced from sewage into fuel and fertilizer using new solvent extraction methods

Although mass culture of CO2-absorbing microalgae from sewage was successfully achieved in the Republic of South Africa, in order to convert these into fuel, a driving process which uses fossil fuels is required, leading to a contradictory state in which the process actually increases net CO2 emissions. To solve this problem, we are developing a fuel conversion (extraction) device that uses a new solvent known as liquefied CO2, which we will install at the local site. Microalgae residue is mixed with wood chips and formed into masts, which are used as fertilizer. To ensure these technologies take off in the Republic of South Africa, we are also working to construct a sustainable environmental business model and train local personnel.

Reduction of CO2 on a global scale using microalgae, which possess outstanding photosynthesis capabilities.

The new extractant allows conversion of microalgae fuel in warm water at a temperature of less than 100°C. Furthermore, residue that has been converted to fertilizer can help enrich soil by recovering nitrogen and phosphorus from sewage. If the business model and personnel training methods related to these technologies can be expanded to other regions, this project has the potential to contribute to the improvement of the energy economy and the aquatic and geo-environment on a global scale.

Research Institutions in South Africa
- Durban University of Technology / Oryx Energy Municipality / The Agricultural Research Council / Technology Innovation Agency
- Research Institutions in Japan
- Nagoya University / Tokyo University of Agriculture and Technology / Asahi Shukutsu University
- Research Period 5 Years
29 = Eco-engineering for Agricultural Revitalization Towards improvement of Human nutrition (EARTH!): Water Hyacinth to Energy and Agricultural Crops

Use aquatic plant biomass as a valuable resource, and solve ecosystem, social, and health problems all at once

Help improve health and nutrition in Ethiopia to address the wide-ranging issue of “hidden hunger”

We aim to build a sustainable water hyacinth management system using ICT, providing a model for approaches using water hyacinth to eventually solve ecosystem and social problems. In addition, the development of spinulina-derived dietary supplements and adoption of such supplements in Ethiopia will help to alleviate the country’s health and nutrition problems.

Development of technologies for converting water hyacinth to energy, nutrients and agricultural products

Utilizing remote sensing and AI technology, the project will develop a sustainable harvesting model for water hyacinth, which is partly choking Ethiopia’s largest lake, Lake Tana. The aim is to use methane fermentation to recover energy and nutrients from the harvested water hyacinth, use the recovered energy and nutrients for mass cultivation of microalgae (spinulina) that are attracting attention as a superfood, and develop nutritional supplements derived from spinulina together with local companies. Integrating interdisciplinary research conducted in Japan, we will work to establish technologies for the effective utilization of water-based valuable materials as resources.

Development of new technological systems that control major diseases affecting bananas and cacao

Banana and cacao are important crops for food security and economic development in developing countries, but they are subject to intractable diseases for which control methods have not been established. In order to rein in these diseases, we propose to introduce comprehensive disease control management systems by developing diagnostic kits and disease outbreak prediction apps, and by optimizing methods of biological soil disinfection, fertilizer management and cultivation management. In addition, we intend to collect various fungi, including pathogens, from banana and cacao plantations, to construct a microbe library integrating microbial resources from both crops.

Contribute to sustainable banana and cacao production by developing disease management systems

The Philippines is a major producer of bananas for export, and is also focusing on cacao production. By preventing diseases in these crops, which are both considered important crops throughout the world, and by achieving sustainable production, we aim to prevent economic losses stemming from decreased crop yields. In addition, we aim to help reduce environmental pollution and damage to the health of the local population resulting from improper application of agricultural chemicals.

Project for Development of Complex Technologies for Prevention and Control of Rubber Tree Leaf Fall Diseases

Protect rubber trees from leaf fall diseases by using a multifaceted scientific approaches

Connect rubber-producing countries and consuming countries through early-stage measures against rubber tree leaf fall diseases

Infection of rubber leaf fall diseases has been widely spread in Southeast Asian countries and causes serious damage to rubber production. Through cooperation with Indonesian Rubber Research Institute and Universitas Indonesia, we aim to exterminate the disease by chemical and microbial pesticides, establish a genome-assisted breeding technology, and detect infected areas in the early stages by using images from satellites and drones, and prevent leaf blight and control the spread of infections. Through this link between Japan and Indonesia—producing countries, we will also produce research leaders who can contribute to breeding that takes advantage of modern science and technology as well as local resources.

Enabling stable supply of natural rubber that meets growing global demand

Southeast Asia supplies more than 90 percent of the world’s natural rubber. Because Southeast Asia rubber trees are reproduced by clonal propagation, they end up being infected with the same diseases. By sharing the technology we develop with countries that produce natural rubber, this project will contribute to realizing stable supplies of natural rubber that meet the world’s demand and stable livelihoods for rubber farmers.

Restoration of Pastureland by Effective Usage of Wild Forage Plants based on Traditional Knowledge of Nomadic Mongolians

Boost the sustainability of Mongolian livestock farming using traditional knowledge of nomadic Mongolians

Using traditional knowledge of nomadic Mongolians to maintain the health of livestock and restore Mongolia’s degraded grasslands

This project gathers the rich oral knowledge and traditional names of nomadic Mongolians regarding Mongolian grassland flora’s effectiveness in restoring livestock health and degraded grasslands, selects useful grassland flora, and scientifically demonstrates their usefulness by investigating the chemical compounds and new genes that give them their restorative effectiveness. It also preserves grasslands and livestock health using grassland flora that grows well and is effective in maintaining good health by ‘diagnosing’ exhausted Mongolian grasslands and ‘treating’ them by establishing and deploying methods of cultivation for the selected flora.

Improving livestock farming productivity through more extensive use of pasture that is resistant to climate change and maintains good health

This project will develop the pastoral livestock farming industry through restoration of degraded Mongolian grasslands that have been improved through the scientific use of traditional knowledge of nomadic Mongolians and the spread of grassland flora that improves the productivity of grasslands degraded by overgrazing and contributes to livestock health. The application of this methodology will contribute to the revitalization of nomadic pastoral industries facing similar issues around the world.
### 33. Strengthening of Resilience in Arid Agro-Ecosystems Vulnerable to Climate Change, Through Research on Plant Resources and Technological Applications

#### Address climate change with quinoa, a highly nutritious crop that withstands harsh environments

**Developing and disseminating sustainable quinoa production technologies to cope with climate change**

Quinoa is highly nutritious, and it is the only crop that can be cultivated in the highlands of Bolivia that lie at an elevation of approximately 4,000 meters, an extremely unfavorable environment with saline soil, droughts, and frost. However, quinoa production is currently at risk due to issues such as soil erosion caused by frequent extreme weather and the expansion of farmlands. This project develops and introduces sustainable quinoa production technologies through the establishment of genetic resources for quinoa, development of new breeding lines with enhanced resilience, management of fallow land, and coordinated crop-livestock production.

**Contributing to global food security with a superfood native to the Andes**

This project will contribute to stable food production and improved national income in Bolivia through the development and spread of sustainable quinoa production technology. Global food security is expected to be enhanced through the application of technology developed in this extremely adverse environment to other regions and throughout the world at risk of desertification, as well as to a wide variety of farming environments.

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### 34. The Acceleration of Livestock Revolution in Thailand aiming to be the Kitchen of the World through the Development of Novel Technologies for Stable Livestock Production and Food Safety

**Achieve sustainable livestock production by a new infectious disease control technology**

Establishing a new system for infectious disease control in livestock and developing a safe meat production technology

Foot-and-mouth disease (FMD) and other major livestock infectious diseases are causing export restrictions and decline of livestock productions. This project, in Thailand who aims to be the Kitchen of the World, applies experiences learned from controlling FMD outbreak in Miyazaki Prefecture. In cooperation with government agencies and veterinary universities, a multi-diagnostic system for major infectious livestock diseases and a food poisoning bacteria elimination technology from the pork are to be developed, and an epidemic prevention system based on the disease dissemination mathematical model is to be established. Through these research and training programs, this project strives to foster experts who can contribute to livestock epidemic prevention in the globalized era.

**Promoting a stable and sustainable livestock production and a safe meat supply**

This project establishes technology for controlling livestock infectious diseases such as FMD in Thailand. Thailand, who plays a leading role in ASEAN, will influence the neighboring countries after implementing this technology that consequently contributes to a stable and safe livestock supply worldwide.

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### 35. Development of Climate Change Resilient Innovative Technologies for Sustainable Wheat Production in the Dry and Heat Prone Agro-ecologies of Sudan and Sub-Saharan Africa

#### Contribute to resolving food shortages by developing heat-tolerant wheat

**Quickly breed high-quality wheat lineages adaptable to Africa’s climate**

Demand for what is on the Sub-Saharan Africa, but production is falling to meet this demand. This project employs heat-tolerant lineages derived from wild relatives to identify their quantitative loci and developing selection markers, and then developing lineages with no quality degradation. It will also develop technology for tolerance selection using metabolite indicators, as indicators, and growth models matching future climate change scenarios. To achieve this, the project will set up molecular breeding facilities and an innovation platform in Sudan.

**Contribute to resolving food scarcity in Africa by creating varieties that can withstand harsh climates**

The project will develop highly accurate selection technology at the molecular breeding facilities that are established, and enable speedy dissemination of new varieties through an innovation platform. It is expected to contribute to food security by developing varieties of wheat suited to the dry and heat-prone agro-ecologies of Sub-Saharan Africa, which are expected to experience even harsher conditions in the future.

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### 36. Utilization of Thailand Local Genetic Resources to Develop Novel Farmed Fish for Global Market

#### Build Thailand’s status as the Kitchen of the World by farming local fish and shellfish

Select useful groups from fish and shellfish native to Thailand for breeding and preservation

Production of food resources from fish farming is important because half the marine products used for food in the world come from fish farming. This project will conduct genome-based breeding to select for useful traits in Asian sea bass and banana prawns, which are indigenous to Thailand. The aim is to make these species into major farmed marine products that can hold a top position in the international market, as well as to develop infectious disease prevention methods, fortified feed, and all-female prawn production technology. The project will also develop technology for preserving diverse genetic resources in perpetuity and for regenerating the species from these resources at any time.

**Contribute to food security by developing farming methods, including domestication**

The project will develop production technologies (genome-based breeding and vaccines, etc.) for Asian sea bass and banana prawns, including domestication, in order to make both species into major marine products on the international market. It will be possible to preserve gene resources in perpetuity on the cellular and tissue level. The project aims to lead to a stable supply of highly nutritious fish and shellfish farmed in a way that has a low impact on the natural ecosystem.
37 = Development of Harmful Algal Bloom Monitoring Methods and Forecast System for Sustainable Aquaculture and Coastal Fisheries in Chile

Develop red tide forecast system to reduce damage in Chile

Characterize the relationship between algal bloom dynamics and its microorganism composition
In recent years, large scale red tides in Chilean coastal waters cause serious damages to fisheries, the second largest industry of the country. This project aims to identify microorganisms that propagate prior to red tide formation and termination, which are expected to serve as bloom dynamic indicators. We will design a portable monitoring device that utilizes the microbiological indicators and collect monitoring data to develop a forecast model. The system will be developed by collaboration between industry, government, and academia, and utilized to prevent damage from red tides.

Damage mitigation using bloom forecast system developed by Industry-Government-Academia Collaboration
This project aims to elucidate the mechanism of occurrence and termination of red tides, and to develop red tide dynamics forecast system. The system will provide the forecast to fishery operators, and the information will be utilized to mitigate damage by red tides. We will also devise red tide countermeasure proposal based on scientific evidence through industry, government, and academia collaboration, and submit it to Chilean government.

38 = Strengthening Rice Breeding System based on Genomic Technology and Information in Myanmar =

Rice genome breeding system for developing rice plant for non-irrigated area
Develop and spread high performance rice plant adaptable for rice farming in non-irrigated area
Various styles of rice farming are operated in Myanmar, with non-irrigated rice farming depending on rainfall in plowed fields comprising about 50% of rice fields in the country. This project aims to enhance rice genome breeding system to develop and spread high performance rice cultivars for non-irrigated areas adapted to the social, economic and environmental condition of Myanmar. Useful genes for traits such as short growth period, high yield, pest resistance, and environmental stress resistance to regionally adapted type of rice will be introduced.

Apply rice genome science to contribute to stability in Asia and reduce global famine
Improving the livelihood in rural Myanmar with promotion of rice genome science and plant breeding is an urgent issue. Contribution to reduction of famine on a global scale can also be expected from the spread of the newly developed high-performance rice plant adapted for non-irrigated areas in Myanmar and around the world.

39 = Developing Countermeasures Against Striga to Conquer Poverty and Improve Food Security =

Getting back our food that is being robbed by root parasitic weeds!
Analysis of root parasitic weeds from a chemical perspective to provide information that facilitates development of an integrated management strategy
Striga is a genus of root parasitic weeds that parasitize grass crops, depriving them of nutrients and water. They have serious effects on global food production, particularly in Africa where agricultural damage amounts to over one trillion yen a year. This project aims to elucidate striga’s germination mechanism to develop a management strategy for use in Sudan where people are suffering from the devastating damage caused by striga. We will also engage in the selection of resistant species and search for useful substances produced by striga to make use of them as biological resources. The findings of the project will be shared with local farmers to establish an effective integrated management strategy.

Increased food production through parasitic weeds control and creation of a new biological resource
A germination inhibitor will promote germination of striga seeds in fields without any host species present, while resistant crop species will reduce the proliferation of the parasite. The striga plants that survive will be used as raw material for extracting useful substances. This integrated strategy can be applied to manage other root parasitic weeds in the fight to overcome biotic constraints to global food production.

40 = Breaking through in Nutrient Use Efficiency for Rice by Genetic Improvement and Fertility Sensing Techniques in Africa =

Challenges for Rice production with limited soil nutrients – Endeavor to increase yield under harsh conditions
To increase the rice yield under low fertility conditions through rapid diagnosis of soil fertility and the development of nutrient-use-efficient breeding lines
Madagascar is one of the largest rice producers in Africa with a per capita rice consumption twice as high as that of Japan. Its rice productivity, however, remains stagnated to date because of the lack of fertilizer input and nutrient-poor soils occurring in many areas of Africa. The project aims to develop rice production techniques to realize high yield even under low fertility conditions by combining fertilizer application techniques suited to the soil nutrient characteristics of the field and new breeding lines with high nutrient use efficiency. It will also evaluate the impact that the adoption of such techniques has on the income and nutritional status of local farmers.

Toward the stabilization of African food production and a paradigm shift in agriculture
The project will contribute to stabilizing food production in Africa by disseminating rice production techniques suited to the poor fertility soils common in Madagascar and elsewhere in Africa. Furthermore, the development of techniques to raise crops with high nutrient use efficiency is expected to help promote the conversion from resource intensive to a resource-saving and sustainable agriculture.
Promote local production and consumption of fertilizers using indigenous phosphate rock, and be free from imported ones.

Development of domestically produced fertilizers using low-grade phosphate rock and improvement of fertilizer application techniques

Soil fertility is low in Africa and agricultural productivity is accordingly low, particularly because of the lack of phosphorus. In addition, fertilizers are very expensive in Africa compared to other parts of the world. The project will make use of low-grade phosphate ore produced but underutilized in Burkina Faso to develop domestically produced and reasonably priced fertilizers. It will also look to improve fertilizer application techniques and evaluate the possibility of spreading the proposed fertilizer product. It will also consider techniques to directly apply phosphate rock to propose an integrated strategy for the utilization of phosphate rock as an important natural resource of Burkina Faso.

Contribute to the stable food production of Africa by developing and spreading a domestically produced fertilizer.

The project aims to improve agricultural productivity by developing and spreading domestically produced and reasonably priced fertilizers by making use of low-grade phosphate rock currently underutilized in Burkina Faso. Going forward, the outcomes of the project are expected to spread across Africa and beyond to contribute to stabilizing food self-sufficiency in Africa and fertilizer security in Japan and other countries of the world facing the depletion of phosphate resources.

Optimizing Mariculture based on Big Data with Decision Support System

Using big data to advance marine culture and capture

Marine culture and capture in Indonesia have a high potential for job creation and the development of fish communities. Their production, however, is unstable because of difficulties in adapting to the environmental changes caused by climate change. The project will generate big data by quantifying and digitizing the marine environment and traceability of marine products by utilizing ICT* and analyze the generated data to establish marine culture and capture technologies based on a scientific analysis of big data. In addition, a cloud-based service will be developed and rolled out through Indonesia as a decision-making support system.

Contribute to the development of fishing communities and global food security through advancement of marine culture and capture

Advancement of marine culture and capture will help invigorate economic circulation in fishing communities, opening up opportunities for higher education and freedom of occupational choices to local people, which in turn will help mitigate poverty and close economic gaps. Moreover, ensuring stable and systematic marine production in Indonesia, which has the second-longest coastline in the world, will contribute to global food security.

Valorization of Bio-resources based on Scientific Evidence in Semi- and Arid Land for Creation of New Industry

Basic design for commercialization and process of industrialization

Focusing on the plenty of bioresources found in Tunisia and Morocco, we implement functional analysis and epidemiologic studies to develop seeds of technology for the development of food and cosmetic products, and technologies of authentication of origin of products and their type towards the development of new products. We also conduct ecological studies and analysis of the production, export and consumption i.e. value chain of local products. Through this comprehensive approach, we implement an integrated studies based on scientific evidence for the development of seeds for technology and contribute to develop high value-added functional food and pharmaceutical products.

Finally, we aim to create new industries producing materials for development of functional foods and medicinal cosmetics through the collaboration with private sector.

Establishment of scientific evidence to support the medicinal effects of bioresources and construction of a value chain

By implementing research and development of bioresources based on scientific evidence, we aim to upgrade the production capacity of high value-added agricultural products and to improve technical capability of private sector. In line with the governmental policies targeting the food industry, we will contribute to develop a coherent value chain from production to export, and establish bases for supply and export of high value-added agricultural products in Tunisia and Morocco.

A sericulture revolution in East Africa, powered by Japan’s silkworm and silk expertise

Selecting/breeding mulberry and silkworm species suited to Kenya, developing silk materials

Kenya’s biological resources include mulberry trees, silkworms, and wild silkworms. We are working to study Kenya’s native mulberry species in detail in order to select those most suited to the nation’s climate and to achieve further improvement through breeding. We also aim to crossbreed Kenya’s disease-resilient subcultural silkworm species with Japanese species that have been bred over many years to achieve high silk productivity, in order to develop a species that possesses both these qualities for commercial use. If this succeeds, we will work to derive usage value from Kenyan native wild silkworms as a new silk material.

Development of a research and technology platform in Kenya for mass production of high-quality silk

We aim to establish a sericulture research center staffed with talented young researchers capable of leading independent Kenyan research and development, and to develop a technological platform capable of mass-producing high-quality Kenyan silk that rivals overseas products. Furthermore, we hope that the technologies developed in the research center will be deployed on a societal level through transfer to manufacturers and private companies.
Develop and disseminate pest management technologies and systems for producing healthy seedlings

In recent years, climate change and the rapid acceleration of global trade have led to increasing crop damage from invasive pests worldwide, with South East Asian cassava crops no exception. We aim to develop pest management technologies for use in Vietnam, Cambodia, and Thailand, including crop disease diagnosis kits and biological control for insect pests, as well as systems for ensuring the production and cultivation of healthy seedlings. Furthermore, we will work to construct a sustainable production system that utilizes healthy seedlings by developing a market-based “triple-win” dissemination model that benefits the private sector, farmers, and government.

Stabilization and increase of cassava production will vitalize the regional economy in South East Asia.

This project will serve as a model case for practical cooperation between related countries to address cross-jurisdictional issues. Increased revenue from cassava will benefit partner countries by raising the income of small-scale farmers, boosting employment at processing plants in the region, serving as a source of foreign currency, providing biomass for use, and offering policy options, while also delivering major benefits for Japanese companies engaged in cassava-related business, both in Japan and partner countries.

Discovering and mass-culturing high-value microalgae using new technologies

Microalgae are capable of producing powerful antioxidants such as astaxanthin. Both aesthetically and functionally beneficial, they are truly worthy of the title “aquatic jewels.” Malaysia is one of the most biologically diverse nations, and habitat to a vast population of microalgae species. Our goal is to establish advanced microalgae mass-culture reactors suited to tropical eco-climate conditions using targeted high-value microalgae coupled with innovative growth-promoting substances from Malaysia.

Contributing to the development of environmentally-friendly aquaculture industries through innovative microalgae mass-culture technologies

The rapid growth of aquaculture industry has led to the discharge of large volumes of sludge and sewage into the natural environment causing degradation to ecosystems. The proactive recovery of rich nutrients from the sludge and sewage can be utilized for the mass-culturing of high-value microalgae species, empowering a new recycling system that provides economic initiative while simultaneously preserving the natural ecosystem.
47 = Development of Integrated Expert System for Estimation and Observation of Damage Level of Infrastructure in Lima Metropolitan Area

Use sensors to create a system that immediately assesses damages from earthquakes and tsunamis!

Earthquake and tsunami disasters occur suddenly, and their effects are widespread. In order to respond effectively to a disaster, it is important to get an overall picture of the damage as soon as possible. However, people usually gather information about the status of earthquakes or tsunami, and about damage to buildings and infrastructure, etc., by checking each aspect separately, mainly using visual inspection and manual processes. By making full use of modern sensor technology, we intend to develop a system that can grasp the whole picture of the scope of the damage as quickly as possible after the occurrence of a disaster and rapidly integrate the findings into a geographical information system with display capabilities.

Immediate grasping the full extent of damage caused by an earthquake or tsunami makes it possible to take appropriate measures.

Project Description

- Development of a disaster information integration system—capable of quickly grasping information about the occurrence of earthquake and tsunami disasters and about ensuing damage to buildings and infrastructure, integrating that information, and displaying it in real time to people in charge of implementing disaster countermeasures—could contribute to a significant reduction in the number of people harmed or killed because they failed to flee in time, and would likely be adopted in earthquake-prone countries around the world.

The Project for Technology Development on Life Time Management of Road and Bridge for Strengthening Resilience in Thailand – Harmonious balance between people and technology to ensure the safety of road networks

48

Develop technologies and human resources that can make roads and bridges last a long time.

This project aims to develop technologies for properly assessing the effects of salt damage, scouring, and heavy loads on road structures, and technologies that provide strong protection for bridges against salt damage, scouring, and heavy loads. Additionally, we will establish an educational curriculum for cultivating highly capable road management engineers who have a solid command of said technologies, and we will invest a good deal of energy in developing human resources. Taking into account harmony between technology and people, this research will eventually result in an infrastructure maintenance method that is effective for the road structures of Thailand.

Help solve the worldwide problem of aging road infrastructure!

The technology developed through this project will extend the life of roads and bridges that make up the Asian Highway Network, which in turn will contribute to improving the safety and reliability of the ASEAN road network. Moreover, we are confident that the results of this research will contribute greatly to streamlining maintenance methods for decipptinf infrastructure in Japan.

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Research Institutions in Thailand

- Kasetsart University / Department of Highway / Chulalongkorn University
- Kasetsart University / Home & Land Use Planning / Niphon School of Planning / Chulalongkorn University
- Kasetsart University / Department of Civil Engineering / Mahidol University
- Kasetsart University / Department of Civil Engineering / Mahidol University

Research Period

- 5 Years

49 = Development of a Hybrid Water-Related Disaster Risk Assessment Technology for Sustainable Local Economic Development Policy under Climate Change

Predict sustainable local economic development scenarios based on interdisciplinary assessment of water-related disaster risk

Hybrid water-related disaster risk assessment combining climatic, hydrological, agricultural, and economic models

It is feared that frequent water-related disasters in the Republic of the Philippines brought on by future climate change will hinder sustainable development of regional cities and exacerbate overconcentration in Metro Manila. This project creates hybrid water-related disaster risk assessment models that combine future climate change, hydrological, agricultural, and economic models and conducts an objective assessment of the effectiveness of investing in disaster prevention measures in the Pampanga River basin and the Pasig-Marikina River and Laguna Lake basins in the environs of Metro Manila.

Contributing to sustainable economic development through policy recommendations based on water-related disaster risk assessment

Utilizing hybrid water-related disaster risk assessment models for these river basins, this project will predict future economic development scenarios in line with disaster prevention measures formulated in advance and present policy recommendations for enhanced resilience to water-related disasters caused by climate change and sustainable economic development through balanced national development.

Project Description

- Development of an integrated, hybrid water-related disaster risk assessment capable of understanding disaster occurrence scenarios based on interdisciplinary assessment of water-related disaster risk assessment models—combining future climate change, hydrological, agricultural, and economic models—will enable the project to propose suitable disaster countermeasures for sustainable local economic development policy under climate change.

Research Institutions in Japan

- The University of Tokyo / The National Institute of Advanced Industrial Science and Technology / Tohoku University / Chiba University / Tokyo Institute of Technology / Nagoya University
- The University of Tokyo / Kyoto University / University of Shiga Prefecture / Nagoya University

Research Period

- 5 Years

50 = Development of Early Warning Technology of Rain-Induced Rapid Long-lasting Landslides

Predict catastrophic landslides a day in advance

Developing a system for transmission of early warning information about long-travelling landslides and support of risk assessment

Landslides occur frequently in Sri Lanka, where there has been a marked increase in torrential rainfall with the onset of climate change. In order to make it possible to predict a day in advance the occurrence and range of rapid and long-travelling landslides, which are particularly severe, this project develops a system for early transmission of information predicting landslides and for supporting risk assessment incorporating technology that predicts maximum accumulated rainfall within a 500-meter grid. It takes into consider inclusion of the occurrence of orographic turbulence in mountainous areas, and predicts the occurrence, spread, and range of landslides due to unsaturated seepage in highly watered soil on hillsides in tropical forests.

Contribute to disaster prevention in monsoon region countries subject to frequent disasters due to torrential rainfall

- Developing a system for early warning information about long-travelling landslides and support of risk assessment

The technology developed in this project, which predicts rainfall and the occurrence and range of landslides, is expected to be used in various fields, such as in mitigation of rapid and long-travelling landslides, food control, and disaster prevention in rural and urban areas in Sri Lanka, as well as in other Southeast Asian nations in monsoon regions, where similar disasters are common.

Project Description

- This project aims to develop a technology capable of predicting rainfall and the occurrence and range of landslides at the earliest possible time after occurrence, in order to enable the dissemination of information about the occurrence of landslides that affects the lives and property of the population. The technology developed in this project is expected to be used in various fields, such as in mitigation of rapid and long-travelling landslides, food control, and disaster prevention in rural and urban areas in Sri Lanka, as well as in other Southeast Asian nations in monsoon regions, where similar disasters are common.
51 =  Construction and maintenance of soil admixtures for rural roads in Ethiopia

Constructing passable, maintainable, and affordable roads in rural Ethiopia

Developing methods for constructing roads on expansive soil by using soil admixtures derived from local plants

Many parts of Ethiopia remain hard to access due to a lack of well-maintained rural roads. Expansive soil, a typical problematic soil spread across Africa, makes it difficult to construct and maintain rural roads. This project will identify physical mechanisms of the expansive soil and develop soil admixtures derived from local plants to improve the stability of unpaved roads. The goal is to find simple and convenient methods to construct roads without relying on expensive machinery and to develop an operational model in collaboration with local governments and communities.

Improving year-round accessibility in rural areas of sub-Saharan region

The project seeks to identify local plants that can be used for soil admixtures and apply them to the expansive soil in constructing rural roads. In the future, this road maintenance method can solve the expansive soil problem found all over Africa. By incorporating different local conditions and improving the method as a comprehensive approach for the region, this project can increase accessibility for all-weather roads in sub-Saharan Africa.

52 = Regional Resilience Enhancement through Establishment of Area-BCM at Industry Complexes in Thailand

Enhance regional resilience through visualization of disaster risks with industry, government, and academia collaboration

Contribute to building a resilient regional community against disasters by visualization of disaster risks and introduction of Area-BCM

The 2011 floods in Thailand resulted in inundation of overseas production bases, disruption of distribution systems, and suspended production due to inability of employees to commute, etc., causing a significant impact on Japanese industries such as production adjustment. This project focuses on Thailand’s key role in the global supply chain, develops an Area-BCM tool that visualizes the impact of disaster risks on industry by region, and implements the system in industrial parks and surrounding areas to build an operational framework to help build a disaster-resilient regional community.

Make Area-BCM an international standard to achieve sustainable social and economic development in Asia region

We will visualize the impact of disaster risks on industry using a scientific method, and ensure business continuity through industry, government, and academia collaboration including the regional community. In the future, we aim to spread Area-BCM to ASEAN nations by making it an international standard and contribute to the reduction of global supply chain disruption risk and realization of sustainable social and economic development in the Asia region.

53 = Project for Evaluation and Mitigation of Seismic Risk for Composite Masonry Buildings in Bhutan

Protection of traditional Bhutanese architecture made with rammed earth and stone masonry techniques from earthquake damage

Preparing for future earthquakes by developing and spreading earthquake risk evaluation and seismic protection techniques

In Bhutan, most residential and public buildings are made of rammed earth and stone masonry except for some reinforced concrete buildings up to five stories high and brick buildings up to two stories seen in the capital and other larger cities. The project aims to support the development of a quake-resistant community through the development of an seismic protection policy obtained by a seismic research in Bhutan to make traditional Bhutanese masonry buildings earthquake resistant. This scope will be realized by producing a manual for disaster mitigation education taking into consideration the results of earthquake hazard evaluation, and by holding seminars for engineers and construction builders as well as local residents.

Contribute to building safe and secure communities through the development of technologies for disaster mitigation in Bhutan

Contribute to raising people’s awareness of disaster prevention by developing and implementing an adaptive seismic protection policy based on full-scale experiments and a disaster mitigation education manual for Bhutan’s government agencies responsible for disaster management. The technologies to be developed through this project may be applied in other countries as a model for overcoming the risks of disasters due to seismic vulnerability of traditional buildings made of earth and stones.
**55 = Hazard Assessment of Large Earthquakes and Tsunamis in the Mexican Pacific Coast for Disaster Mitigation =**

Exploting the science of slow earthquakes to mitigate disasters from megathrust earthquakes and tsunamis

Forecasting the size of future megathrust earthquakes and tsunamis by exploiting the new technology of offshore and onshore geophysical observations. We aim to assess the potential for megathrust earthquakes in the coastal region of the Guerrero state by establishing the first Mexican seafloor geodetic and seismic network to obtain slow earthquake data. After analyzing the onshore data as well as the landward data, such as onshore GNSS* stations and seismic stations, we will develop scenarios for the earthquake and tsunami hazard, an earthquake/tsunami hazard map, and a tsunami evacuation sign to aid in safely evacuating the residents. The development of disaster education programs will help mitigate disasters with the inclusion of Mexican cultural perspectives and actions to be taken.

**Utilization of the new knowledge on slow earthquakes to mitigate the disasters from future megathrust earthquakes and tsunamis**

Understanding the similarities and differences between slow and megathrust earthquakes in Japan and Mexico will contribute greatly to understanding the fundamental physics of megathrust earthquakes and tsunamis in Japan’s Nankai Trough region as well as the Mexican subduction zone. Furthermore, initiatives aimed at mitigating damage in the event of a megathrust earthquake will aid in the sustainable development of Japanese society by ensuring the lives and belongings of citizens are protected in the event of a future megathrust earthquake centered in western Japan.

**Research Institutions in Mexico**
- Instituto de Geofísica / Universidad Nacional Autónoma de México (UNAM)
- Centro Nacional de Prevención de Desastres (CENAPRED)
- Kyushu University / The University of Tokyo / Tohoku University / Kobe University

**Research Institutions in Japan**
- Kyoto University / The University of Tokyo / Tohoku University / Niigata University

**Research Period** 5 Years

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**56 = Integrated Research on Great Earthquakes and Disaster Mitigation in Nepal Himalayas =**

Prepare Kathmandu Valley of Nepal for a future earthquake disaster!

Tackle scientifically Nepal’s future great earthquake and its hazards

Focusing on a future great earthquake expected in Nepal Himalayas, and the highly populated and vulnerable Kathmandu Valley, we aim to provide scientifically advanced seismic hazard information and build fundamentals to mitigate earthquake disaster based on this information, by conducting researches on earthquake potential evaluation, ground motion prediction, seismic hazard assessment, earthquake observation system, and education and policies. For this aim, we also utilize data and research findings from the 2015 Gorkha earthquake.

Build fundamentals for earthquake disaster mitigation based on advanced hazard information

By integrating the research outcomes such as the source model of a future great earthquake, predicted ground motions from the future earthquake, and observations by the enhanced seismic network, we aim to obtain scientifically advanced earthquake hazard information. In addition, developing personnel and policies for communicating this information to the Nepali society will lead to fundamentals for the mitigation of future earthquake disaster in the Kathmandu Valley.

**Research Institutions in Nepal**
- Department of Mines and Geology, Ministry of Industry
- Research Institutions in Japan
  - The University of Tokyo / Kochi University / OYO Corporation

**Research Period** 5 Years

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**57 = Technical Development to Upgrade Structural Integrity of Buildings in Densely Populated Urban Areas and its Strategic Implementation towards Resilient Cities =**

mitigate earthquake damage in densely populated urban areas!

Develop techniques for seismic evaluation and retrofit of buildings, and propose efficient methods of upgrading their structural integrity.

Although Bangladesh is located in a seismically active region, its capital city Dhaka is one of the world’s most vulnerable urban centers due to its unregulated and dense urban layout with low-quality building structures. In addition, building design and construction practices as well as structural characteristics differ significantly from those in Japan. To improve Dhaka’s earthquake resilience, we aim to jointly develop seismic evaluation and retrofit techniques suitable for buildings in Bangladesh, and upgrading scenarios of urban planning for efficiently deploying them on a societal level.

Achieve safe and secure Dhaka through development of earthquake resilience technology

By upgrading Dhaka’s building performance and urban center’s resilience against earthquake damage, we aim to develop a safe and secure city and civil infrastructures for stable economic activity. As the techniques developed through this project address urban and building-related issues that are also commonly found in other developing countries, their worldwide dissemination has the potential to contribute to the safer global society.

**Research Institutions in Bangladesh**
- Housing and Building Research Institute / Public Works Department / Bangladesh University of Engineering and Technology / Ahsanullah University of Science and Technology / University of Asia Pacific / Bangladesh National University / Dhaka University / Bangladesh University of Engineering and Technology

**Research Institutions in Japan**
- Kyoto University / The University of Tokyo / Tohoku University / Niigata University

**Research Period** 5 Years
Infectious Diseases Control

SATREPS projects in the field of Infectious Diseases Control have been transferred to AMED - the Japan Agency for Medical Research and Development. (The transfer took place on April 1, 2015. Projects that terminated before that date were not transferred.)
Use native biological resources to create medicines for tropical infectious diseases

This project will explore the natural microbial resources of Southeast Asia to discover compounds that might serve as new drugs to fight infectious diseases that cause problems on a global scale, like malaria or tuberculosis. Moreover, it will alter the structure of such compounds to improve their therapeutic effectiveness and safety, and develop them as pharmacological agents intended for human use. In addition to transferring technologies that are essential for drug discovery and development—including technologies for maintaining and using microbial resources, searching for compounds, synthesizing chemical compounds, and testing for safety—the project will develop relevant human resources and aims for project outcomes to be achieved so that middle- and low-income countries can conduct drug discovery that makes use of microbial resources.

Establish technologies and construct societies capable of using abundant biological resources to develop medicines

This project will establish an international network and a basis for drug development using each country’s own resources together with other Southeast Asia partner countries. The drug discovery platform will also be available for use by Japan to develop new remedies for various ailments. It is expected that new drugs for fighting infectious diseases will be adopted for use in society after undergoing clinical trials.

Interdisciplinary Research for an Integrated Community-directed Strategy for Sustainable Freedom from Malaria

Eradicate malaria in tropical Africa through integrated social and biomedical science research in collaboration with endemic community members

Developing an integrated elimination strategy through field testing and multi-disciplinary monitoring

To address issues such as asymptomatic infection, insecticide-resistant malaria vector mosquitoes, and inappropriate prevention behavior, this project will verify the effectiveness of new vector mosquito control methods and behavioral economic interventions to induce changes in human behaviors. The immediate aim is eliminating malaria along the Lake Victoria basin in Kenya, where malaria is highly endemic. Drawing on diverse perspectives from multiple disciplines including molecular epidemiology, genetics, serology, vector entomology, and socio-economics, this project will monitor the infection and onset of malaria and examine the true nature of asymptomatic infection and heterogeneity of transmission. Deployment of the integrated strategy over an extended area contributes to malaria elimination and breaks the pernicious cycle of poverty

This project will develop a community-directed strategy based on an understanding of the mechanism of malaria transmission at the individual and community levels and field-proven interventions to reduce the transmission of malaria in the targeted areas. The strategy will be rolled out over an extended area in the “malaria belt” of tropical Africa and contribute to the demise of the pernicious cycle of poverty and malaria.

Control of Tuberculosis and Glanders

Collaboration between medical and veterinary sciences to control bacterial zoonotic diseases

Mongolia is one of the countries where tuberculosis flourish seriously in the world. However, little is known about the epidemiology of tuberculosis in animals and the spread of drug-resistant strains among humans has become a serious public health concern. Recently, there is an increasing incidence of glanders, a contagious disease that causes respiratory infection in horses. This project conducts epidemiological surveys and development of rapid diagnostic methods for tuberculosis and glanders, both of which are zoonotic bacterial diseases in Mongolia. Through collaboration between veterinary and medical researchers, enhancing the efficiency of laboratory diagnosis for the control of tuberculosis or glanders in animals and humans.

The project will develop simple and highly sensitive molecular diagnostic methods for Mycobacterium bovis and Burkholderia mallei, and establish a method for rapidly and comprehensively detecting drug-resistance-related genetic mutations of Mycobacterium tuberculosis, and will evaluate their effectiveness in Mongolia. Implementation of the newly developed methods is expected to improve both animal hygiene and public health.

Establishment of the "Bench to Bedside" Feedback System for Sustainable ART and the Prevention of New HIV Transmission in Vietnam

Stop HIV/AIDS! Aim to expand effective treatment and prevention!

Establish HIV treatment monitoring system and verify effective prevention methods

It is thought that there are 220,000 to 280,000 people infected with HIV in Vietnam. As an emerging economy, Vietnam has a policy of providing HIV treatment at district-level hospitals through the nation’s health insurance system, but many issues remain. This project will create a monitoring system focused on antiretroviral therapy (ART) and on capturing drug-resistant viruses at district-level hospitals in Northern Vietnam. It will also verify the effectiveness of pre-exposure prophylaxis (PrEP), which helps to prevent increases in the number of newly infected people, as well as conducting basic medical analysis aimed at designing anti-HIV vaccines.

Make Northern Vietnam’s HIV treatment monitoring system a model for the world!

Many developing countries are now shifting from providing HIV treatment through support from overseas donors to providing it through health insurance, in the same way as Vietnam. The HIV treatment monitoring system and effective prevention methods achieved through this research will contribute to a reduction in new HIV infections in Vietnam, and serve as a useful model for the global fight against HIV/AIDS.
62. Epidemiology of Zoonotic Virus Infections in Africa =

Search for viruses! Prepare for zoonotic infections!

Detecting viruses and antibodies, and understanding the endemcity of zoonoses in humans and animals

Many zoonotic infections occur in Zambia and in the Democratic Republic of the Congo. This research aims to make practical use of our rapid viral hemorrhagic fever diagnostics, and to perform genetic diagnostics of hemorrhagic fever patients to search for unknown causative viruses. Detection of zoonotic viruses and virus specific antibodies from wild animal, livestock, poultry, arthropod, and human specimens will be attempted, as well as research on epidemiological factors related to viral zoonoses.

Fighting zoonotic infections by establishing diagnostic methods and elucidating the ecology of zoonotic viruses

This project will establish advanced methods of diagnosing viral infections and contribute to the infection control measures. It is expected to discover new viruses, and the distribution of zoonotic viruses which will give a better understanding of transmission routes to the human society. These activities will increase local capacity of infectious disease diagnosis and strengthen research foundations contributing to African research/education network.

63. Integrated Research and Development Towards Chagas Disease Control =

Protect people from Chagas disease with genetic analysis of pathogens and development of therapeutic compounds

Identify protozoa gene that leads to the disease and develop a new drug

Chagas disease epidemic in Latin America shows various symptoms by region, such as heart and digestive system disorders, but not much research has been conducted on its mechanism. Only two types of drugs are available, and due to effectiveness and side effect issues, development of a new drug is being sought. This project will analyze the parasite’s virulence gene related to the pathologic process of the disease, construct chronic stage animal model, compose and develop a new drug, and build a collaboration framework with National Scientific Research Center of El Salvador (CICES).

Contribute to global control of Chagas disease with Japanese seeds

We will identify the gene related to pathogenic factor with pathogen genome and genetic analysis to promote understanding of the disease and enable clinical application. Training of young researcher, and control of Chagas disease in the endemic areas including El Salvador can be expected from development of a new drug in Japan.

64. The Establishment of the One Health Prevention and Treatment Network Model for the Elimination of Rabies in the Philippines =

No more rabies: break the chain of infection with a simple diagnosis kit

Control rabies with a quick and simple diagnosis method and “One Health” network

Rabies is an often deadly infectious disease that can be controlled. The complex diagnosis method made definitive diagnosis frequently unavailable in the endemic area, resulting in casualties from lack of appropriate treatment. This project aims to eliminate rabies by diagnosis without craniotomy procedure using whiskers/sinus hair, identification of specific biomarker for treatment, development of early diagnosis method, and building One Health network model that shares diagnosis information on animals and humans leading to effective prevention.

Contribute to elimination by spreading new diagnosis method and One Health network model

This project will eliminate rabies deaths from the Philippines by building a treatment and prevention network with collaboration between doctors and veterinarians incorporating the new diagnosis system under One Health care perspective. This will also contribute to achievement of WHO and OIE’s “Zero by 30. The Global Strategic Plan to Prevent Human Deaths from Dog-Transmitted Rabies by 2030” by spreading the network to surrounding countries.

65. Establishment of a Research and Reference Collaborative System for the Diagnoses of Fungal Infections including Drug-Resistant Ones both in Brazil and Japan =

Enabling rapid detection of drug-resistant fungi that cause refractory infection

Developing a method for rapid detection of drug-resistant fungi through investigating their resistance mechanisms

Fungal infections often occur in immune compromised patients and/or patients with chronic lung diseases such as pulmonary tuberculosis. Drug resistant fungi have been emerging in recent years due to long-term use of antifungal drugs and other factors. While the epidemiological information regarding drug-resistant fungi in Brazil is not clear at the moment, it may potentially have a significant impact as the number of patients with pulmonary tuberculosis is large in Brazil. The project aims to clarify the prevalence of drug-resistant fungi, elucidate their resistance mechanisms and develop a rapid detection method. We will also work to build a framework for collaboration among research institutions.

Development of a system for diagnosing fungal infection and a framework for research collaboration in fungal infection diagnosis

Specific outcomes such as the establishment of a fungus bank to preserve drug-resistant fungal strains and conduct networking with other related institutions and facilities will enhance the university’s function as a research center for fungal infection, which in the future will lead to the establishment of a framework for research of fungal infection including that caused by drug-resistant fungi. Outcomes of this project can be applied to Japan and other countries.
Investigate the Relationship Between Intestines and Pathogens and Devise New Countermeasures Against Infectious Diseases!

Help control infectious diseases by tracking outbreak trends more closely and carrying out research at the genetic level.

The Republic of Ghana is facing a grave situation concerning the spread of cholera, AIDS and other infectious diseases. Ebola hemorrhagic fever outbreak in nearby is also a threat. The country is in urgent need of effective countermeasures against infectious diseases. The purpose of the study is to support Ghana’s efforts to strengthen disease surveillance and simultaneously improve testing and diagnostic techniques for major infectious diseases. Research will also be carried out to determine what gene types of host and gut microbiota make a person susceptible to what pathogen types in order to identify factors involved in infection and understand the mechanisms of immune response.

Develop a new method of combatting infectious diseases based on knowledge of intestinal flora

Intestinal bacteria play an important role in host immune responses. The study will analyze the genomes of intestinal flora to ascertain whether there is a correlation between intestinal flora and resistance to infectious diseases. The study will enable the development of disease control measures utilizing genome-level information and is expected to help establish new strategies for combatting infectious diseases.

Investigate the actual state of affairs concerning infectious diseases and improve testing and diagnostic techniques

The Gabonese Republic, located in Central Africa, is facing serious difficulties with viral infection, but there is no accurate information on the actual conditions. It is vital to identify the causal viruses, investigate outbreak conditions, and ascertain transmission pathways when devising countermeasures. The Study seeks to develop and disseminate techniques for quickly identifying and understanding the causative agents of infections. This will help control the spread of infectious diseases as soon as possible. Research will also be made to explore the characteristics and infection sources of unidentified pathogens.

Develop a simple and low-cost diagnostic method, thereby contributing to worldwide disease control

The rapid diagnostic system for viral infections to be developed by the Study will be simple and low-cost, allowing it to be used widely in any developing nation. If it is adopted by African nations, it will be possible to effectively suppress the spread of infectious diseases that accompany the movements of people and commodities, thereby contributing to worldwide disease control.
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* SATREPS projects in the field of Infectious Diseases Control have been transferred to AMED – the Japan Agency for Medical Research and Development (The transfer took place on April 1, 2015. Projects that terminated before that date were not transferred.)
Terminated Projects

Carbon Dynamics of Amazonian Forests

Study on the impact of glacier retreat on water resource availability for the cities of La Paz and El Alto

Prediction of climate variations and its application in the South American region

Climate variability study and societal application through Japan - "Marine Continent Extremes of Glacial and Holocene Climate Variability" - Network of Excellence for Rapid Prediction

Wildfire and carbon management in post-fire ecosystem in Indonesia

Integrated study on hydro-meteorological prediction and adaptation to climate change in Thailand (BANF-1)

Eco-technological management of Tuvalu against sea level rise

Research on forest production from sugarcane waste

Research on the integration of spatial environmental analysis and advanced metal recovery to ensure sustainable resource development

Hydro-microbiological approach for water security in Kathmandu Valley, Nepal

Establishment of Quantum-Cycle System with Natural Rubber

Joint Project on functionalization of rubber: GVCs, and PM2.5 and Proposal of Countermeasure Scenarios

Research partnership for low carbon technology for sustainable development

Development of Sustainable and Water-saving Systems in Sahel region in Africa: Case of Burkina Faso

Sustainable Systems for Food and Bio-energy production with water saving irrigation in the Egyptian Nile Basin

Conservation of biodiversity in Tropical forest throughout sustainable coherence and interlinking of Wetlands

Research and development for water reuse technology in tropical regions

Technology development of urban site detection and sustainable resource use for large enhancement of geothermal power generation in Indonesia

Sustainable development of Rural area by effective utilization of rice wastes with highly efficient fuel cell technology

Development of a model system for plasticized bio catalytic conversion of biomass wastes and following liquid fuel production in Indonesia

Prevention of green economic growth on palm oil industry for biodiversity conservation

Information based optimization of jatoba biomass energy production in the frost- and drought-prone regions of Borneo

Multi-functional biomasses for mitigation of climate change in Vietnam and Indonesia

Country by development of biomass energy

Pilot study for carbon sequestration and monitoring in Sundarbans area, Central, Java Province, Indonesia

Sustainable jhalop Forest Product in Mozambique

Sahasara Solar Energy Research Center

Development of Low Carbon Society scenarios for Asian regions

Development of New Biofuel Synthesis in Thailand

Establishment of Cryogas Bank System for Vietnamese Nan Pigs Resources and Sustainable Production of Green Energy

Development of Aquaponics combined with open culture adapting to arid regions for sustainable food production

Development and adaptation of Latin American low input rice production system through Genetic improvement and advanced field management technologies

Innovative rice production systems (iRRI). Integrated rice-straw energy conversion to produce Bioenergy utilization using super micro bikes for fuels and Chemical production

The Promotion of rice research for take-home breeding and cultivation technology development in Kenya

Diversity Assessment and Development of sustainable use of Morinda Genus Resources

Flash and drought-resistant cropping systems to conserve water environments in semi-arid regions

Development of aquaculture technology for food security and food safety in the next generation

Establishment of Sustainable livelihood strategies and Natural resource management in hill forest eco-rural communities and in surrounding areas of Cameroon

Integrating the global environmental concerns with local livelihoods

Completion of studies of the impact of climate change on the life history of two zoonotic tick species. Odontobius reticulatus and Pacific Blaine Ticks for the sustainable use of these resources

Development of international standardized microbial resource center to promote microbial science and research in India

The Project for the development of wheat breeding materials for sustainable food production in Afghanistan

Development of crop genotypes for the mountains and mountainous areas of North Vietnam

Innovation on production and automation of Barkers from non-forest biomasses

Valorization of Bee resources in semi-arid Andes and for land reforestation development

Development of natural resources in the area of low lands and beekeeping industries in Indonesia

Development of Genetic engineering technology of crops with stress tolerance against degradation of global environment

Improved crop genotypes in semi and regions of Sudan through management of root para sites

Integrated coastal ecosystem conservation and adaptive management under local and global environmental impacts

Application of state of the art technologies to strengthen research and response to severe, tropical, and infectious diseases

Development of comprehensive disaster risk prevention and development in the logistics of risk management

Integrated study on construction of multidisciplinary disaster causes by ejection of volcanic products

Research project on disaster prevention/mitigation measures against floods and storm surges in Bangladesh

Earthquake and Tsunami Mitigation in the Marmara region and disaster education in Turkey

Development of Land risk management technology along transport arteries in Vietnam

Research on project to enhance technology to develop tsunami-resilient buildings

Magnetic fluid supply into lakes Nyos and Monoun, and mitigation of natural disasters through capacity building in Cameroon

Improving Aquaculture technology: High damage in Malaysia caused by landslide and flood

Impact of climate change on ecosystem services and wildlife monitoring and effective utilization of disaster mitigation information in the Philippines

Observational studies in south african and mitigate seismic risks

Information network for natural disaster mitigation and recovery in India

Project for enhancement of research on Indian and Tsunami disaster mitigation technology in Peru

Multi-disciplinary hazard reduction from earthquakes and volcanoes in Indonesia

The study on GLOFs (Glacial Lake Outburst Floods) in the Bhutan Himalaya

Project for risk identification and land use planning for disaster mitigation of floods and floods in Croatia

Integrated application of human and Pathogen genomic information for Tuberculosis control

Surviving Landscapes ofContinentat and urban Ari and anti-emic agents by utilizing Diversity of Indonesian bio-resource

Ecological management of flood and their influence in river-basins related and other Vibrio diseases

Epidemiological study on Animal poxvirus Disease in Maligna and development of effective diagnostic measures

Development of innovative research technology in Genetic of Malaria and other Parasites and PDR for containment of their expanding endemicity

Establishment of an Early warning system for infectious Diseases in Southern Africa

Integrating climate change and infectious diseases in South Africa

Surveillance of Viral infections in Africa

Comprehensive biological and Epidemiological study on Arboviral Respiratory infections in children: Preventing the impact of the avian H5N1 pandemic and OIV vaccines

Development of rapid diagnostics and the establishment of an air system for the outbreak of Yellow fever and West Nile fever in Kenya

Development of new diagnostic approaches in the management of fungal infections in AIDS and other immunocompromised patients

Identification of anti Hepatitis C Virus (HCV) substrains and Development of HCV and Dengue vaccines

The studies of Arboviral and anti-viral compounds from selected Ghanaian medicinal Plants

Prevention and control of Leptospirosis in the Philippines

Research and Development of Therapeutic Products against Infectious Diseases, especially Dengue Virus infection

Elevation of diagnostic tools for Tuberculosis and Typhoid and Screening and selection of Candidate Compounds for Typhoid
In order to mitigate and adapt climate change risks such as flood disaster and poor rice crop in Indonesia, we have established a Maritime Continent Center of Excellence (MCCOE) and have built-up counterpart researchers’ capacities on marine (buoy) and land (radar) observations during the project period (2009-2014). There were some challenges on seamless monitoring due to the change of administration and generation in Indonesia, they have continued their efforts to make operational radar network and scientific paper publications. A multinational project (YMC 2017-2019) is now planning and preliminary activities have been started (see photos). Through these activities, we hope to be enriched their research activities and to be improved international collaboration, as well as scientific and social benefits.

Principal Investigator: Dr. Manabu D. YAMANAKA  
Japan Agency for Marine-Earth Science and Technology (JAMSTEC)  
Adopted: FY2009  
Country: Republic of Indonesia  
Research Institutions in Indonesia: Agency for the Assessment and Application of Technology (BPPT) / Agency for Meteorology, Climatology and Geophysics (BMKG) / National Institute of Aeronautics and Space (JAXA) / Research Institutions in Japan: JAMSTEC / Kyoto University / Kobe University

TB testing being conducted at a properly maintained BSL3 facility (top) A UTH TB Laboratory researcher (Mr. Eddie Solo) under the JSPS RONPAKU Program is receiving guidance from Prof. Suzuki at Hokkaido University Research Center for Zoonosis Control one to three month every year to get a Ph.D. degree.

Principal Investigator: Prof. Yasuhiko SUZUKI  
Research Center for Zoonosis Control, Hokkaido University  
Adopted: FY2008  
Country: Republic of Zambia  
Research Institutions in Zambia: University Teaching Hospital (UTH) / University of Zambia (UNZA) / Research Institutions in Japan: Hokkaido University / Tottori University / Fujita Health University / Obihiro University of Agriculture and Veterinary Medicine

Lima Metropolitan is expecting a big earthquake in the near future  
Several researches indicate that Lima Metropolitan Area, the capital of Peru, is expecting a big earthquake. In order to mitigate this natural hazard, several Peruvian researchers, including Dr. Selene Quispe, are investigating the effect of the subsurface structure on site response. More than 5 years and still they are conducting several microtremor measurements in order to understand how the sedimentary layers control the amplification of the soil during an earthquake, as well as to identify the places that might sustain severe damage because of the subsurface soil condition during a strong ground motion in Lima city.

Measurements in order to characterize the deep structure of Lima Metropolitan Area  
Currently, Dr. Quispe is conducting several microtremor measurements in order to characterize the deep structure in Lima Metropolitan Area, since this information is still unknown in this place. In her doctoral thesis submitted to the Tokyo Institute of Technology, she concluded that the deep structure has a big contribution on the site response, but the results that she got during the doctoral course are still preliminary. Microtremor measurements have been conducted in some places around Lima Metropolitan Area, and currently she is processing the data that she got from these measurements. From this research is expected the new results have a big contribution to the state of the art of the Earthquake Engineering as it exists in Peru today.
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