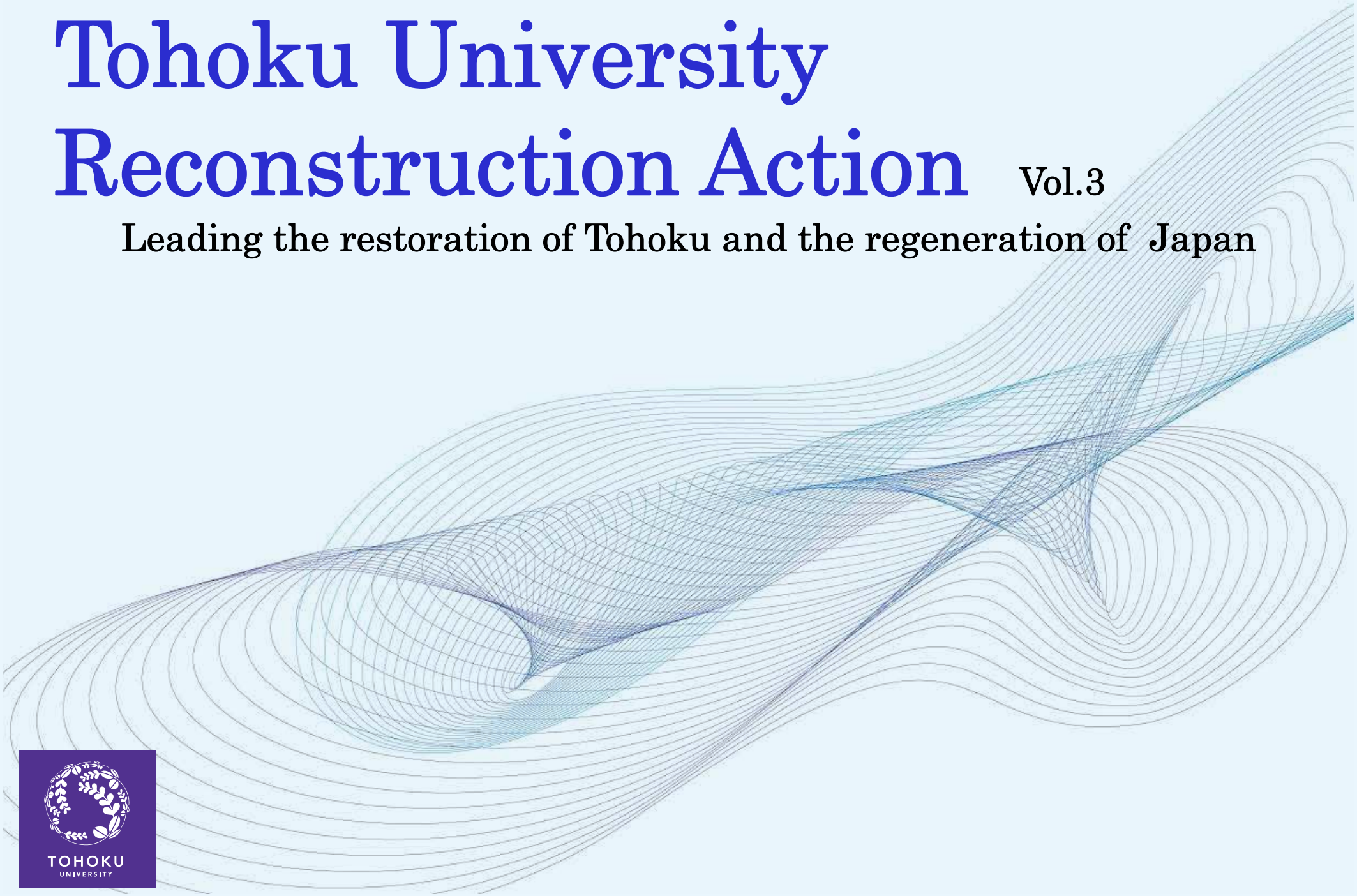
Tohoku University Reconstruction Action Vol.3

Leading the restoration of Tohoku and the regeneration of Japan



TOHOKU UNIVERSITY

CONTENTS

1 Message from the President
2 What happened on March 11, 2011?
3 Eight Projects and Reconstruction Action 100+
4-5 International Research Projects on Disaster Science
6-7 Project for the Reconstruction of Community Health Care
8-9 Project for Environmental Energy
10-11 ICT Reconstruction Project
12-13 Tohoku Marine Science Project
14-15 Radioactive Decontamination Project
16-17 Regional Industries Restoration Support Project
18 Industry-University Collaboration Development Project for Reconstruction
19-20 Reconstruction Action 100+

Message from the President

The Great East Japan Earthquake, which occurred on March 11, 2011, caused high-intensity ground shaking, a massive tsunami and a serious nuclear power plant accident, resulting in a disaster of a scale unprecedented in the history of Japan.

Tohoku University is well aware that its mission as one of the universities in the center of the disaster area is to fully commit itself to recovery from the disaster. It is our aim to create new wisdom so as in order to strongly support the rebirth of the region. Efforts will be focused on establishing new industries through cooperation with businesses and government agencies to increase employment and revitalize the Tohoku region. The university hopes that these efforts will also serve as a driving force or an engine to stimulate the stagnant Japanese economy.

The “Tohoku University Reconstruction Action” presented in this brochure is the prototype of the engine that we propose. To start this engine, cooperation between universities, businesses and local governments not only in the affected areas but throughout Japan and also abroad is essential. We believe that we can create a sustainable, energetic, affluent society through combining the results of research and education to date, cutting-edge technologies, and the know-how to apply these results and technologies in practical settings, in such a way so as to provide maximum benefit to society.

To overcome this difficult situation, efforts by a single university alone would be insufficient. It is essential to build a cooperative system involving the whole of Japan and additional global resources. Your support in these efforts would be highly appreciated.

Susumu SATOMI
President ,Tohoku University

The panoramic view of Sendai City, Jun 2011

What happened on March 11, 2011?

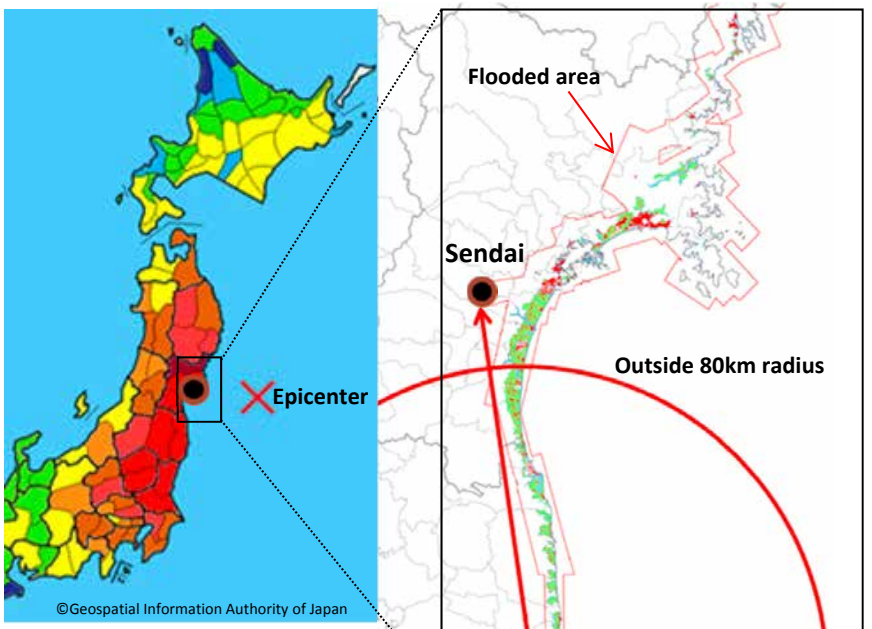
Multi-hazards - Mega Earthquake, Mega Tsunami and Nuclear Power Plant Accident

On March 11, 2011, at 14:46, an earthquake of magnitude 9.0 occurred and the intense shaking lasted about three minutes. The epicentral area was located off the coast from Iwate to Ibaraki. About 30 to 60 minutes after the earthquake, a massive tsunami hit a wide area along the coast of the Pacific Ocean extending from Aomori to Chiba Prefectures. With the wave run-up height exceeding 40 meters in some places, the tsunami caused devastating damage to coastal areas. In Fukushima, a nuclear power plant was destroyed by the earthquake and tsunami, cutting off the external power source and resulting in the failure of the cooling system. This eventually led to the meltdown of a number of reactors.

The earthquake and tsunami caused 15,883 deaths, with 2,671 people still listed as missing, and 398,649 buildings were completely or partially destroyed. (Source: "Koho Shiryo (Publicity Bulletin)" dated on Jun 10, 2013 issued by Emergency Disaster Countermeasures Headquarters, National Police Agency of Japan). The total number of evacuees, including those who had to evacuate or relocated due to the nuclear power plant accident that was triggered by the earthquake and tsunami disaster, reached about 470,000 people on the third day after the disaster. Even now, about 298,000 people still have to evacuate. (Source: Data dated on Jun 6, 2013 provided by the Reconstruction Headquarters in response to the Great East Japan Earthquake of the Reconstruction Agency).

Over two years passed by since the disaster; the center of Sendai City, where Tohoku University is located, seems to regain its composure.

However, when looking at the whole of the Tohoku region, the full-scale restoration is still ongoing, and people have pointed to the delay in the recovery process. The restoration of society infrastructures, including disposing of debris, removing salt from farmlands devastated by seawater, constructing/reconstructing of breakwaters, and improving of roads, is progressing well. However, the affected people have little or no real sense of the restoration in regard of their lives. Works toward recovery and reconstruction from the disaster were really yet to start.



- Magnitude (Richter Scale) : M 9.0
- Maximum Seismic Intensity: 7
- Total flooded area: 561 km²

©Geospatial Information Authority of Japan

Coast area of Miyagi Prefecture, aftermath of the disaster

May, 2013

The disaster-affected areas have taken steps slowly toward recovery.

Eight Projects and Reconstruction Action 100+

Institute for Disaster Reconstruction and Regeneration Research

As a university located in the center of the disaster-affected area, Tohoku University ‘s mission is to fully commit itself to recovery from the disaster.
As seeking to play a leading role in reconstructing Tohoku and in regenerating Japan, we hope to act as an engine and a driving force that will revitalize Tohoku region and stimulate Japan.

To accomplish the aim, Tohoku University established the Institute for Disaster Reconstruction and Regeneration Research -IDRRR- in April 2011, the aftermath of the disaster. In cooperation with the government and ministerial agencies, local governments and citizens, and institutions and companies in Japan and abroad, we have promoted and supported “Eight Projects,” and “Reconstruction Action 100+.”

What Tohoku University aims for is “ Restoration and Innovation.” While contributing to the rebuilding of the affected people’s lives, we will work on advanced research and human resources development that will lead to the creation of a new future for Tohoku and Japan. We are conducting a broad range of activities contributing to the recovery from the Great East Japan Earthquake by bringing together the wisdom of a comprehensive university.

Organization Chart

Director / President

Steering committee

Managing committee

Planning and Promotion Office
Chief / Executive Vice President for Earthquake Disaster Reconstruction

- Planning / Promotion
- Liaison
- Public relations
- Progress management
- Organizing a symposium
- Overall coordination

Eight Projects

1. **International Research Projects on Disaster Science**
2. **Project for the Reconstruction of Community Health Care**
3. **Project for Environmental Energy**
4. **ICT Reconstruction Project**
5. **Tohoku Marine Science Project**
6. **Radioactive Decontamination Project**
7. **Regional Industries Restoration Support Project**
8. **Industry-University Collaboration Development Project for Reconstruction**

Reconstruction Action 100+
More than 100 various voluntary projects

IRIDeS was invited to the World Ministerial Conference on Disaster Reduction in Tohoku. IRIDeS presents study results on disaster science to the world.

Tohoku University hosted the 8th APRU (Association of Pacific Rim Universities) Research Symposium on Multi-hazards around the Pacific Rim in Sep 2012.

International Research Projects on Disaster Science（1）

The International Research Institute of Disaster Science - IRIDeS - its aim is to become a global interdisciplinary center for the study of Disaster Science.

Background

In the Tohoku region, earthquakes centered in the waters off Miyagi Prefecture occur in periodic intervals. Tohoku University has conducted studies on disaster prevention to be prepared for these earthquakes. The Great East Japan Earthquake, however, is a low-frequency mega disaster consisting of earthquake, tsunami, and nuclear power plant accident. It revealed the weaknesses and limitations of conventional scientific and technological systems.

In the wake of the disaster, it is significant that improving innovation disaster preparedness and risk management and newly prepare for mega disasters.

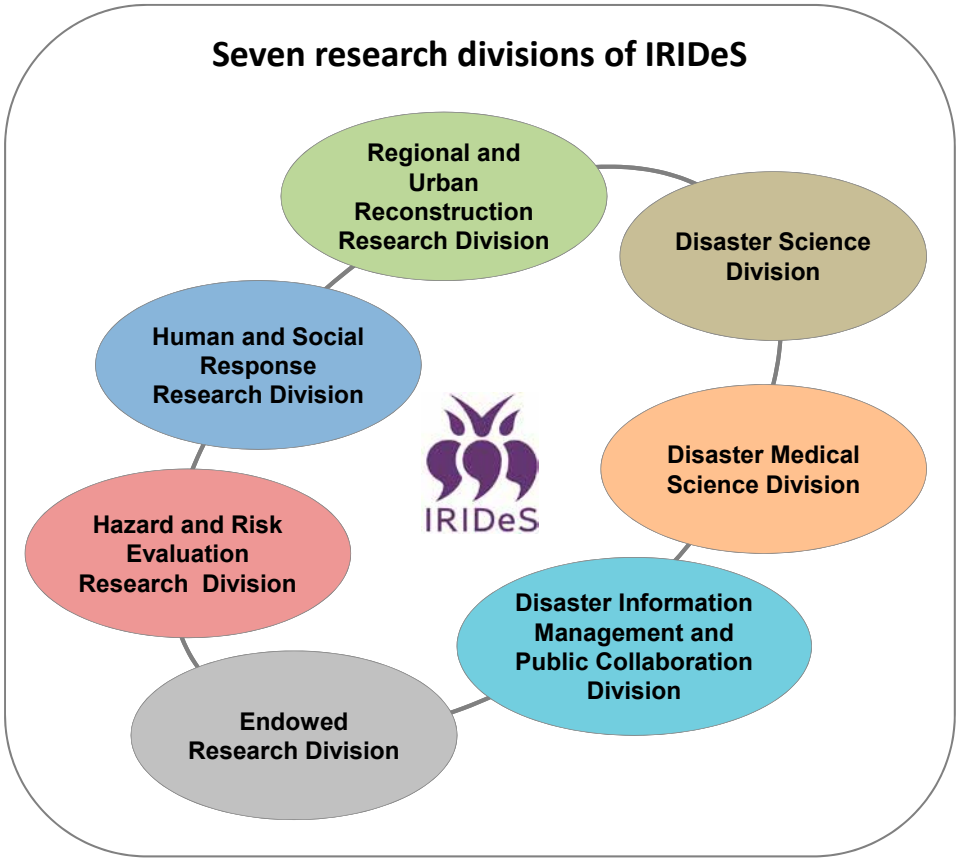
Mission

The International Research Institute of Disaster Science -IRIDeS-, a global research center for Disaster Science, will subsume the lessons from the 2011 Tohoku earthquake and tsunami disaster and the findings of the world-leading research into our societies.

IRIDeS will create and cultivate a new academic discipline of practical disaster mitigation that aims to reduce or avoid the potential losses from natural hazards, to assure prompt assistance to victims, to achieve rapid and effective recovery, and to establish disaster-resilient social systems.

Method

IRIDeS collaborates with national and international research institutes, organizations, and local governments stricken by the disaster. In seven research divisions, IRIDeS works on various studies to creating a cross-discipline of practical disaster mitigation.



IRIDeS
International Research Institute of Disaster Science

IRIDeS logo is designed by inverting the Japanese character of disaster（災）, based on the idea of Japanese saying “Turning a misfortune into a blessing.” It represents our mission of learning the lessons from the Great East Japan Earthquake and pursuing effective disaster management to build sustainable and resilient societies. The name of the institute is abbreviated as IRIDeS and pronounced ee-ree-dis based on irides, the plural of iris, which symbolizes “Hope and Nobility.”

International Research Projects on Disaster Science（2）

In preparation for the United Nations World Conference on Disaster Reduction—The role of IRIDeS

It was decided that the United Nations World Conference on Disaster Reduction will be held in Sendai City in March 2015. Sendai City and IRIDeS have made great efforts to attract the conference to the city. In May 2013, members of IRIDeS and Ms. Okuyama, the Mayor of Sendai, participated in the fourth Session of the Global Platform for Disaster Risk Reduction held in Geneva, Switzerland. About 3,500 people representing governments, international organizations, non-governmental organizations and others from more than 170 countries took part in the meeting and discussed wide-ranging topics about disaster reduction and mitigation.
At the meeting, IRIDes made a statement to express gratitude for the disaster assistance from all over the world, the necessity of Disaster Science, and the role of IRIDeS at the UN World Conference, 2015.
IRIDeS will make further progress in Disaster Science studies, and contribute to the international society by sharing the experiences and lessons of the disaster with the world. We will continue to efforts for the risk reduction of future disasters.

IRIDeS presented industry-academia-government collaboration in disaster reduction and mitigation at the display booth of the Global Platform, May 2013.

APRU-IRIDeS Multi-Hazards Program starts

Founded in 1997, APRU (Association of Pacific Rim Universities) is an international alliance of 45 leading research universities based in 16 Pacific Rim countries. APRU plays an important role by fostering cooperation among the member universities to promote the betterment of society along the Pacific Rim.

Tohoku University hosted the 8th APRU Research Symposium on Multi-hazards around the Pacific Rim, welcoming nearly 100 faculty members and students from 12 countries, in September 2012.

To mark the second anniversary of the Great Eastern Japan Earthquake and Tsunami, APRU and Tohoku University launched the APRU-IRIDeS Multi-Hazards Program in April 2013, and IRIDes has acted as the hub of the program. The program focuses on strategies to deal with low-frequency high impact disasters and on the role of universities in disaster management. IRIDeS hosted and organized the inaugural Multi-Hazards Summer School in July 2013.


APRU-IRIDeS Multi-Hazards Summer School , July 2013.
IRIDeS welcomed 31 APRU members from 9 countries.

International Research Institute for Disaster Science, Tohoku University
Email: contact@irides.tohoku.ac.jp
http://irides.tohoku.ac.jp/eng/

Project for the Reconstruction of Community Health Care（1）

Rebuilding community medicine and establishing a modern biobank

Background

When the Great East Japan Earthquake hit the Tohoku region, many medical facilities in coastal areas were lost due to the tsunami. While many affected people were left untreated, the number of medical staffs who lost their jobs increased. In addition, valuable medical documents and patients' records were also lost. Before the disaster, the coastal areas in the Tohoku region had had the problem of a shortage in the number of medical staffs and facilities. Tohoku University School of Medicine and Hospital have fulfilled the central role in dispatching doctors to the Tohoku area, in particular, Miyagi Prefecture, and continued to support to the community medical system to meet the local demand.

In this project, our efforts will be focused on contributing to the improvement of the training system for healthcare professionals with Tohoku University Hospital as its core. We also aim to contribute to the recovery community medicine networks to provide affected people with medical services, the establishment of an advanced medical system, including the use of a database of medical information, and the setting up of industries in the Tohoku region.

Mission of the training center

At **the Comprehensive Training Center for Community Medicine**, medical professionals from disaster-affected areas will learn about cutting-edge medical care. It aims to contribute to the rebuilding of community medicine and the training of professionals, capable of taking a leading role in community and disaster medicine in disaster-affected areas upon completion of their training.

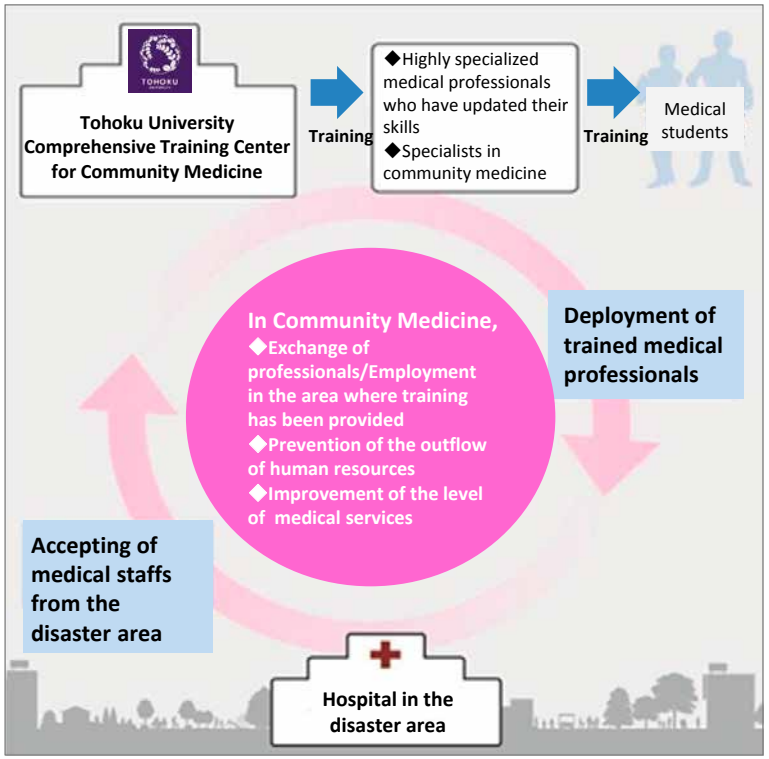
Method

The Comprehensive Training Center for Community Medicine accepts medical staffs affected by the Great East Japan Earthquake, and offers them opportunities for continuous training at Clinical Skills Lab, a training center equipped with sophisticated simulators,; and has developed a circulation system under which medical professionals, who have improved their knowledge and skills through training, are offered an opportunity to work in community medicine settings.

Further, to cultivate a new generation of medical professionals to engage in community and disaster medicine, the center invites medical experts in the field to impart their knowledge and skills to students .

Clinical Skills Lab has been used by a total of 8,900 users last year.

The center runs workshops at district hospitals to support the community medicine.



Comprehensive Training Center for Community Medicine, Tohoku University
Email: ctc@med.tohoku.ac.jp
http://www.ctc.med.tohoku.ac.jp/ (in Japanese)

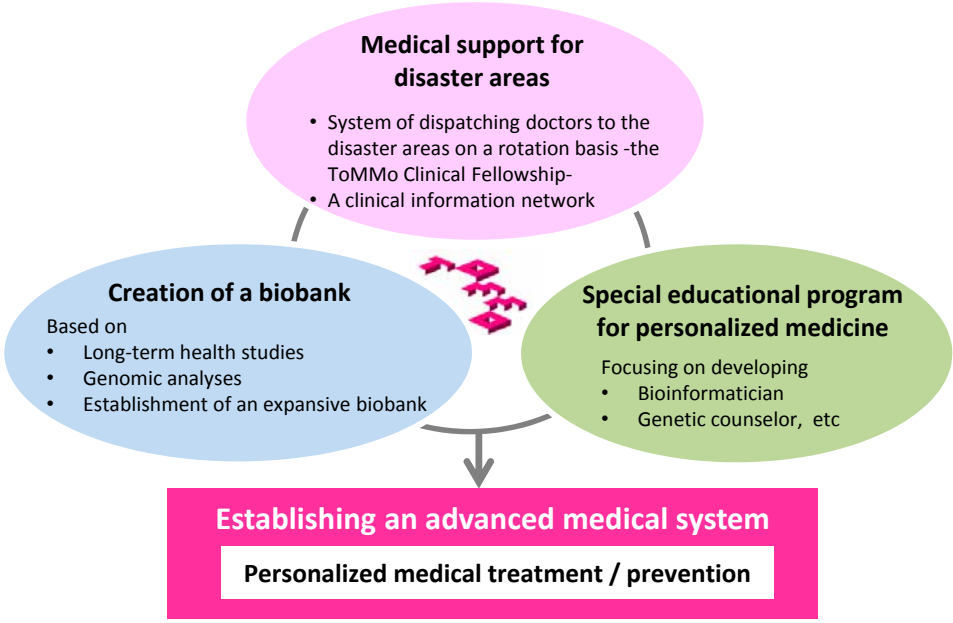
Project for the Reconstruction of Community Health Care（2）

Mission of ToMMo

Tohoku Medical Megabank Organization -ToMMo- will develop a biobank combining medical and genome information during the process of rebuilding the community medical system, and supporting health and welfare in the disaster areas. Based on the findings of the analysis of the biobank, ToMMo will create new medical services, and aims for the realization of the new generation of medical systems born in the Tohoku region.

Method

The Tohoku Medical Megabank Project consists of three main programs: medical support for disaster areas; creation of a biobank combining medical and genome information; and special educational program designed for a variety of highly specialized professionals and experts such as researchers of bioinformatics and genetic counselors. Through these programs, ToMMo actively promotes the establishment of an advanced medical system with the aim to provide personalized medical treatment and prevention in the future.



ToMMo conducts cohort studies of 150,000 people

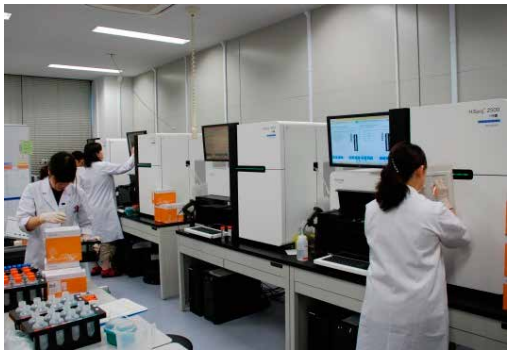
It is concerned that residents in the disaster areas affected may suffer from PTSD, infectious diseases, and other ailments in the future. This is because an increase in the number of such illnesses has been reported in other tsunami stricken areas.

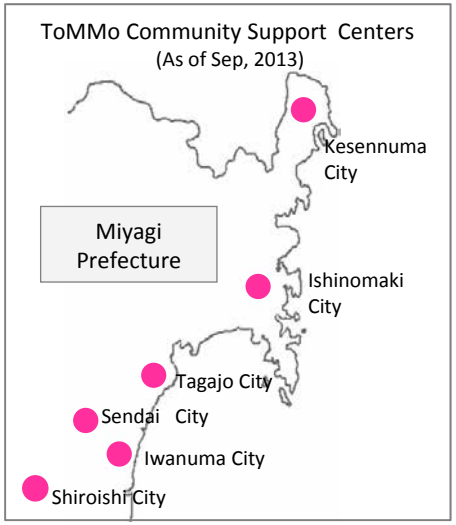
This project will continuously study the health condition of residents in the disaster areas and contribute to the early detection and treatment of diseases.

The ten-year study will be conducted in the two Prefectures of in both Miyagi and Iwate, in cooperation with Iwate Medical University Tohoku Medical Megabank Organization. This project organizes a community residents' cohort study of around 80,000 people in the prefectures.

In July 2013, a three-generation cohort study, that will include around 70,000 participants of three generations – expectant mother, the child to be born, its brothers and sisters, its father and grandparents – has begun.

ToMMo has established six community support centers throughout Miyagi prefecture as a hub for these activities.





Tohoku Medical Megabank Organization, Tohoku University
Email: megabank-shomu@bureau.tohoku.ac.jp
http://www.megabank.tohoku.ac.jp/english/

Project for Environmental Energy（1）

Promoting of advanced disaster-resistant communities with next-generation energy sources

Background

The energy supply systems in the Tohoku region, and indeed in the whole of Japan, were significantly damaged due to accidents at nuclear power plants, disruption of operation at thermal power plants, and other problems caused by the tsunami. This has focused attention on energy security in the event of disasters, particularly from the perspectives of planning reconstruction and promoting industry. Several local governments in the disaster affected area have included an eco-town plan using clean energy sources in their reconstruction plans. In the future, it will be essential to develop new clean energies and establish an energy management system to ensure a steady power supply.

Mission

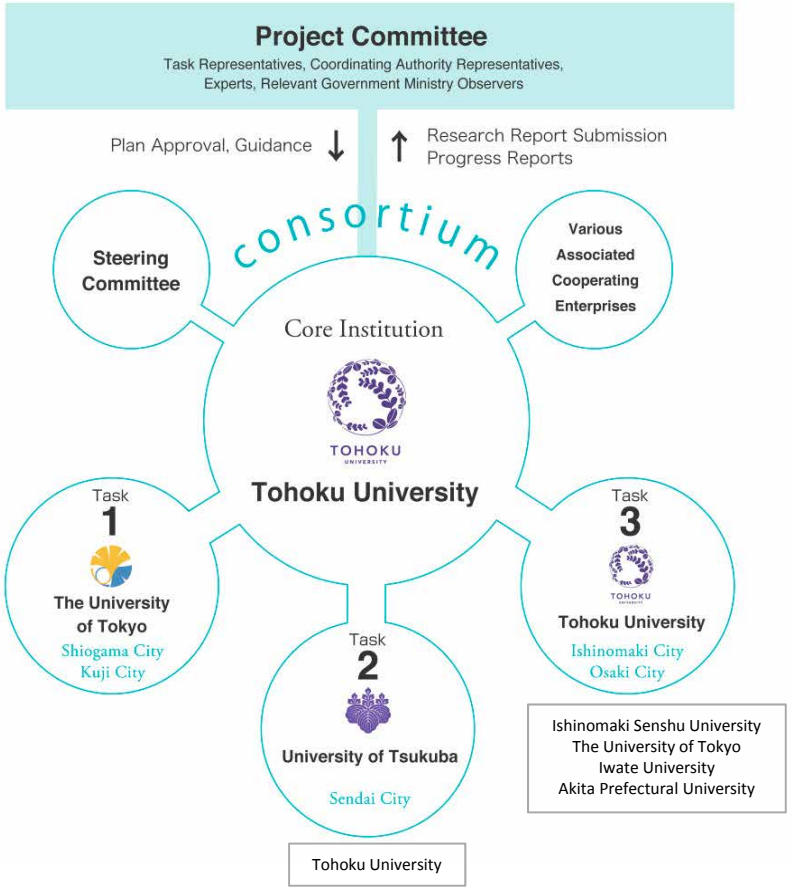
This project will work in research and development on clean energy technology in order to fulfill its aim which is to help promote the recovery of the Tohoku region and the solution of Japan's energy problems. Based on the efforts of R&D, this project will make concrete contributions to make next-generation energies and energy management systems pervade society and lead the recovery of Tohoku region.

Method

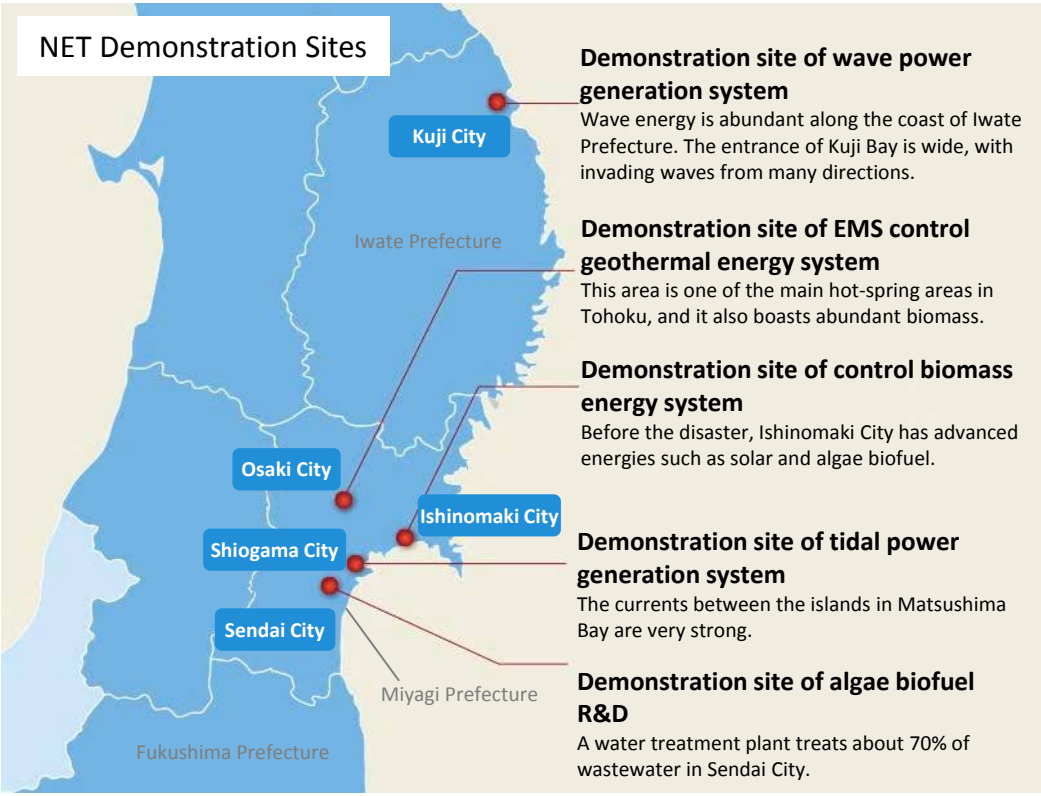
Tohoku University plays a central role as the core institution of **the consortium on Next-generation Energies for Tohoku Recovery -NET-** which includes universities and local governments stricken by the Great East Japan Earthquake. The consortium members tackle the following three tasks.

Research Tasks

1. Research and development on wave power and other ocean renewable energies applicable to the Sanriku coast
2. Research and development on using algae biofuels
3. With a focus on renewable energy, research and development on integrated community energy control systems enabling human and vehicle mobility



Project for Environmental Energy（2）



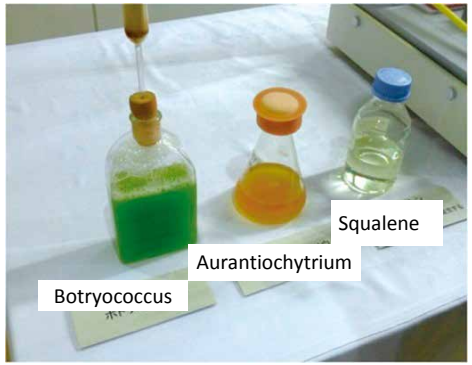
Demonstration site of wave power generation system
Wave energy is abundant along the coast of Iwate Prefecture. The entrance of Kuji Bay is wide, with invading waves from many directions.

Demonstration site of EMS control geothermal energy system
This area is one of the main hot-spring areas in Tohoku, and it also boasts abundant biomass.

Demonstration site of control biomass energy system
Before the disaster, Ishinomaki City has advanced energies such as solar and algae biofuel.

Demonstration site of tidal power generation system
The currents between the islands in Matsushima Bay are very strong.

Demonstration site of algae biofuel R&D
A water treatment plant treats about 70% of wastewater in Sendai City.



The algae biomass such as Botryococcus and Aurantiochytrium shows promise as one of new alternative energies.

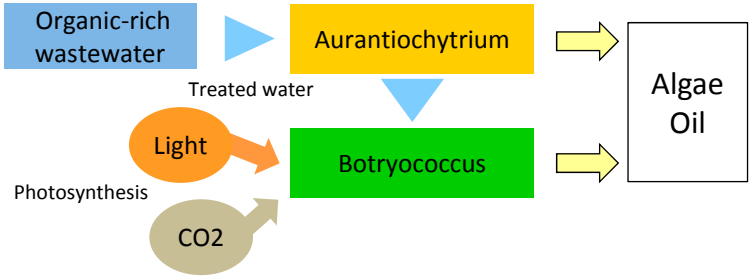
Botryococcus is being cultivated at the lab.

Task 2

Demonstration test of algae biofuel starts

The demonstration test to research and develop on algae biofuel started in April 2013.
Located on a coast of Sendai City, Miyagi Prefecture, a wastewater treatment plant was devastated by the disaster in 2011.
While contributing to the restoration of the plant, we will find a means for producing algae oil from wastewater. Research shows that substances present in wastewater can be used to produce algae biomass. This project is the first trial of its kind in the world. In order to achieve this research task, a joint-research Laboratory between Tohoku University, University of Tsukuba, and Sendai City was established at the plant. We are working on together with the aim of establishing technologies for producing new energy and putting its into practical use in ten years.

Production system of Algae Oil



Reference: Website of M.M.Watanabe & K.Kaya Lab, Univerisity of Tsukuba

Tohoku Recovery Next-Generation Energy Research and Development Organization
Email: net@mail.kankyo.tohoku.ac.jp
Web: http://www.kankyo.tohoku.ac.jp/net/english/

ICT Reconstruction Project（1）

Toward the achievement of disaster-resistant ICT networks

Background

Following the Great East Japan Earthquake, the vulnerability of our information communication technology -ICT-, which could be seen in the disruption of communication lines, the failure of information gathering, and the insufficiency of information, was revealed, exposing issues that need to be addressed.

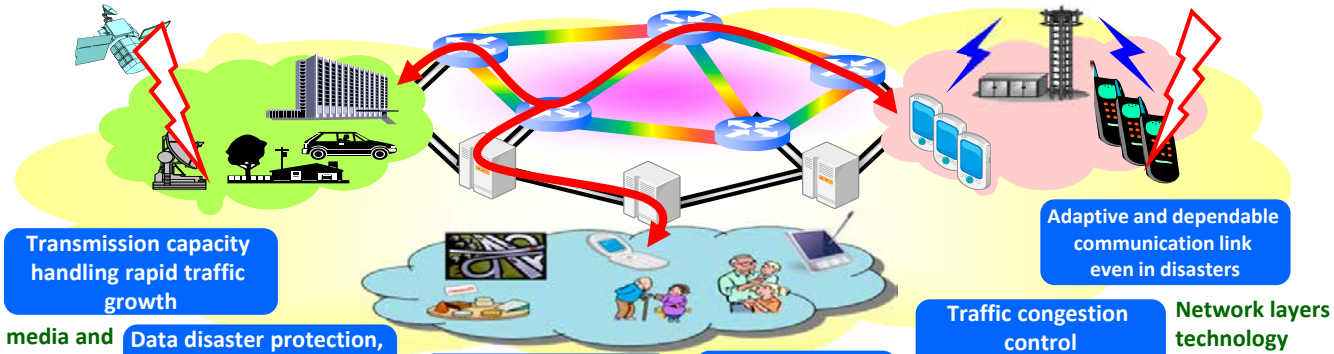
Mission

In response to these issues, Tohoku University will establish a center for development and demonstration of disaster-resistant ICT infrastructure. We will achieve ICT which makes society safe and secure, and will become a base for research institutes and industries in the information and communication fields.

Method

Tohoku University established **the Research Organization of Electrical Communication -ROEC-** which is a cross-cutting organization. ROEC is working toward the achievement of disaster-resistant ICT networks. Further, in April 2012, the world-leading research center named Resilient ICT Research Center was established at Tohoku University, based on the comprehensive collaboration arrangement between Tohoku University and the National Institute of Information and Communications Technology. The center has been making steady progress in addressing the issues and endeavors to realize disaster-resistant ICT and contribute to the revitalizing of regional economy in the disaster areas through the promotion of the Industry-academia-government collaboration.

Establishment of a center for development and demonstration of disaster-resistant ICT infrastructure



Collaboration with local governments and universities in Tohoku region

All Japan network Industry-academia-government collaboration

Global collaboration network

Creative reconstruction of disaster areas using ICT

- ◆Construction of disaster-resistant safe and secure future city using ICT
- ◆Promotion of local industries through research & development of ICT

Industry-academia and global center in ICT area

- ◆Launch and promotion of new industries in the fields of ICT and electronics
- ◆World-leading research & development of innovative ICT technology

ICT Reconstruction Project（2）

Message Transmission without Cellular Coverage—Message relay demonstration utilizing smartphones

At the time of the disaster in March 2011, the phone lines including cellphones in the disaster areas were tied up or restricted due to the flood of calls to confirm anyone's safety.

A research group at the graduate School of Information Sciences, Tohoku University, conducted an experiment using 27 smartphones at the campus, Tohoku University and successfully relayed messages using only the wireless connection -WiFi- capability without using a cellphone carrier network.

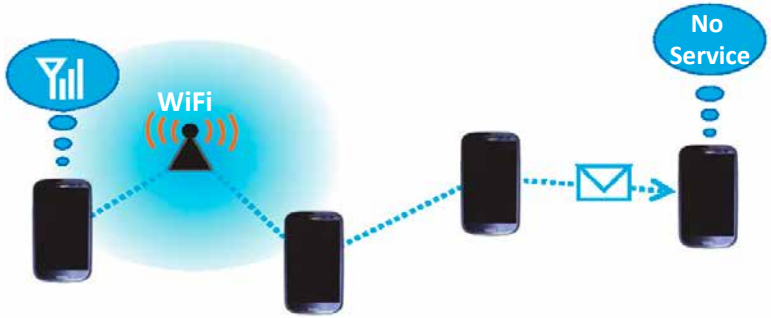
This new technology utilizes a smartphone someone is carrying and turns it into a router to create a network of WiFi-hotspots. This is the world's first technology, in which the smartphones utilize information such as remaining battery, accelerometer, and information of other surrounding smartphones information to decide the appropriate transmission mode. This technology will enable users to exchange messages even though communication lines are cut off.

The research group has succeeded in the second experiment relaying messages over 2.5 kilo meters using 30 smartphones in downtown Sendai City.

Smartphone

Display screen image of the application

The experiment in downtown Sendai City



The range of smartphone -to- smartphone communication distance is approx. 100 meters.

Research Organization of Electrical Communication, Tohoku University
Email: roec-web@riec.tohoku.ac.jp
Web: http://www.roec.tohoku.ac.jp/en/

Tohoku Marine Science Project （1）

To restore a bountiful ocean in the Tohoku region

Background

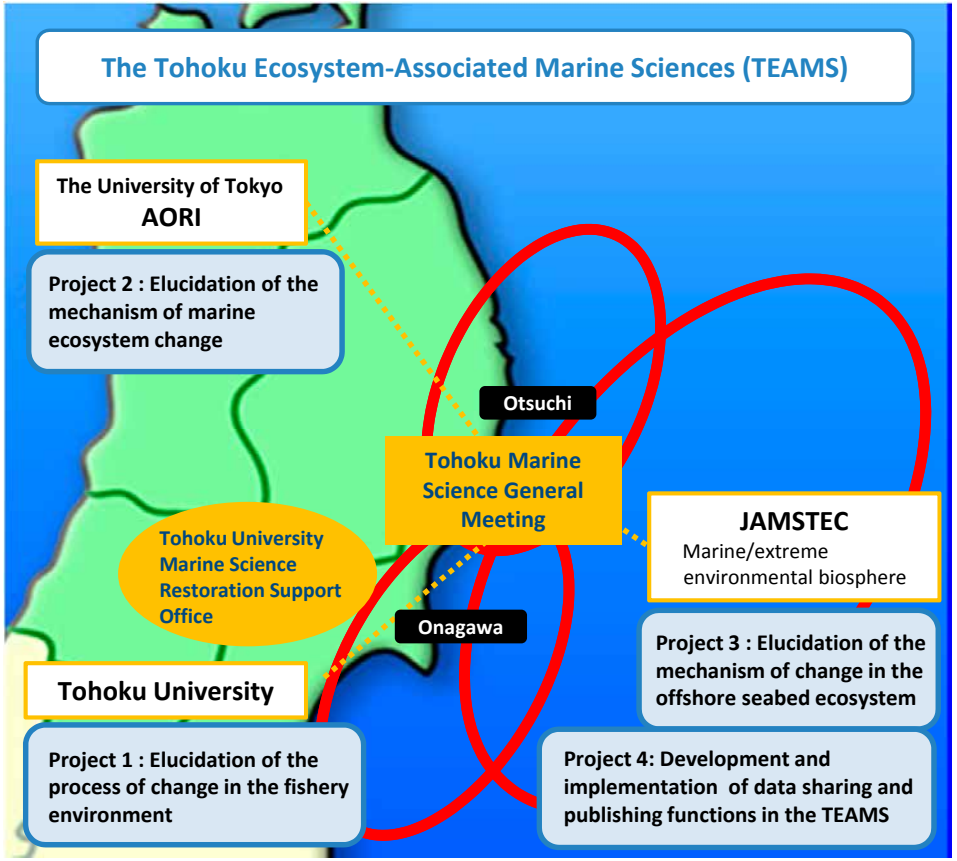
The Pacific Ocean off the Sanriku Coast, northwestern Pacific, has been renowned as one of the most fertile fishing grounds in the world. The area has also boasted an aquaculture industry such as shellfish, seaweed cultivation. However, the great earthquake and massive tsunami that occurred on March 11, 2011, affected and significantly damaged the marine environment, which provides us with the ocean's bounty. It was totally unknown how seriously the marine ecosystem had been affected by the pile-up of a large amount of debris, and the loss of seaweed beds and tidelands that serve as habitats for organisms. The environment was also negatively affected by sand and mud deposited on reefs, and the destruction of transitional zones between land and sea due to ground subsidence. Moreover, there has been a concern that heavy oil and radioactive substances caused marine pollution.
To achieve recovery of the fishing industry and restoration of the affected areas, it is essential to conduct in-depth surveys to identify the extent of the damage and to launch new industries to guarantee the future of the region.

Mission

Tohoku Ecosystem-Associated Marine Science -TEAMS- will support the recovery of the fishing industry in the Tohoku region heavily damaged by the 2011 disaster, by conducting research surveys for promoting the recovery of marine ecosystem and the regeneration of the fertile fishing ground.

Method

The TEAMS is conducted with Tohoku University as its representative and the University of Tokyo's Atmosphere and Ocean Research Institute (AORI) and the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) as deputy representatives, with the collaboration of Kitasato University, Tokyo University of Marine Science and Technology, Iwate University, and Tokai University. Under the collaboration of these research institutes, the "Tohoku Marine Science General Meeting" was established to conduct four research projects to survey the impacts of the disaster on the marine environment and ecosystem. Of these four projects, Tohoku University has been assigned to Project 1.



Tohoku Marine Science Project （2）

Elucidation of the process of change in the fishery environment

Theme1 : Surveys on the fishery environment
(Examining the impacts of the disaster and building an observing system ）

■Environmental research on a regular basis using a Tohoku University research vessel

■Building a real-time observing system for marine environment

Theme 2 : Surveys on the ecosystem conservation
(Elucidation of the recovery process of costal ecosystem destroyed by tsunami ）

■Reef ecosystem destroyed by tsunami

■Submersible survey

Theme3 : Surveys on the fisheries and tidal zone life
(Supplying seeds and studying a sustainable production management system ）

■Elucidation of the recovery process

■Surveys on fishing resources

Theme4 : Surveys on the propagation and aquaculture environment
(Supplying seeds and establishing a sustainable production management system)

■Promotion of a basic research on the propagation and aquaculture and contribution of the restoration of the marine industry

Theme5 : Current situation surveys on the marine environment
(in cooperation with Kitasato University)

Marine Science Restoration Support Office, Tohoku University
Email: agr-marin@bureau.tohoku.ac.jp
Web: http://www.agri.tohoku.ac.jp/teams/index.html
(in Japanese)

Radioactive Decontamination Project （1）

Recovery of the living environment and examining the effects of the radioactivity

Background

The spread of radioactive substances caused by the accident at TEPCO's Fukushima Daiichi nuclear power plant resulted in a far-reaching serious radioactive contamination stretching from Fukushima Prefecture. In addition to the effect on local residents' health, it has causes contamination of agricultural and marine products, that in turn had a massive impact on both consumers and producers livelihoods. Unresolved issues such as effects on ecosystems and health problems of human bodies caused by exposure to radioactive substances still remain.

Mission of development of technology to restore the living environment contaminated by radioactive substances

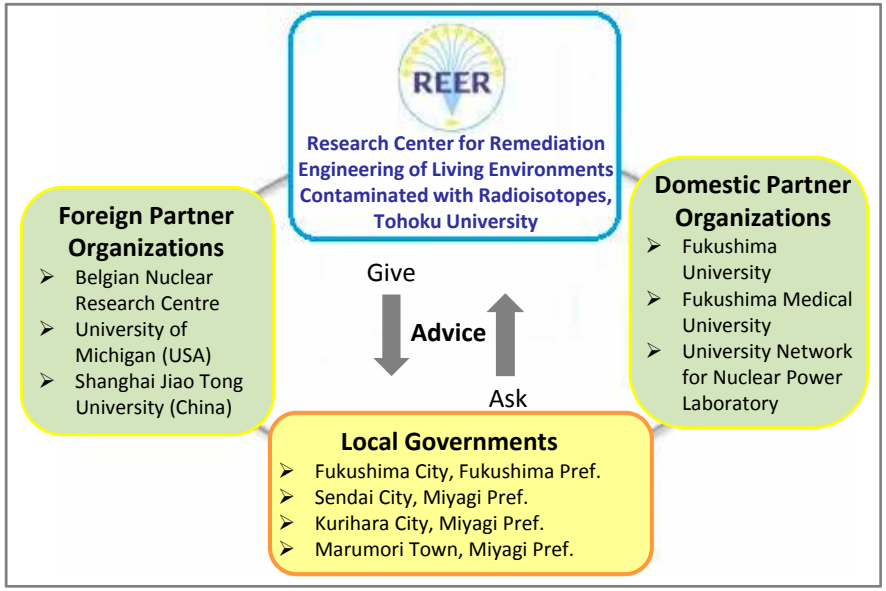
The nuclear accident forced over 140,000 people living in Fukushima to evacuate their homes (Source: Fresh report on the situation of damage caused by the Great East Japan Earthquake vol.1003 dated on August 7, 2013 issued by Disaster Headquarters, Fukushima Prefecture). What is needed to be done so that the refugees can return to their old lives? How to remove radioactive substances, restore the agriculture, forestry and fisheries industry, and secure food safety? We will promote developing technologies for the recovery of the living environment.

Method

The Research Center for Remediation Engineering of Living Environments Contaminated with Radioisotopes -REER- struggles with the development of the three technologies shown below. The REER has a branch office in Fukushima City, in cooperation with Fukushima University and Fukushima Medical University to identify technologies needed by municipalities. The results will be reflected in technology development.

Three objectives of technology development

1)Development of new technologies to extract and concentrate radioactive cesium contained in contaminated soil and to use collected radioactive substances effectively
2)Development of cultivation methods to grow radiation-free agricultural products
3)Development of large-aperture gamma ray detection technology for rapid contamination detection



The REER has successfully developed a large-aperture g-ray detector which is capable of measuring radioactivity in a whole foodstuff.

Research Center for Remediation Engineering of Living Environments Contaminated with Radioisotopes, Tohoku University
Web: http://reer.qse.tohoku.ac.jp/ (in Japanese)

Radioactive Decontamination Project （2）

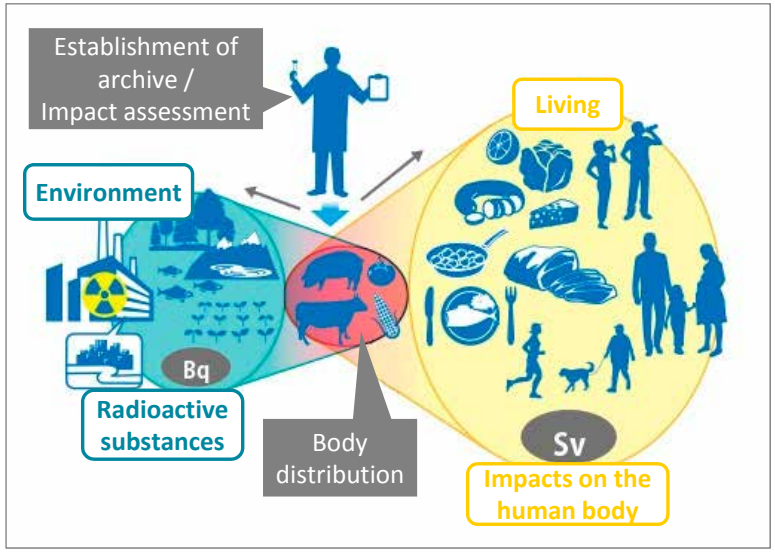
Mission of establishment of tissue archives of animals contaminated by radioactive substances

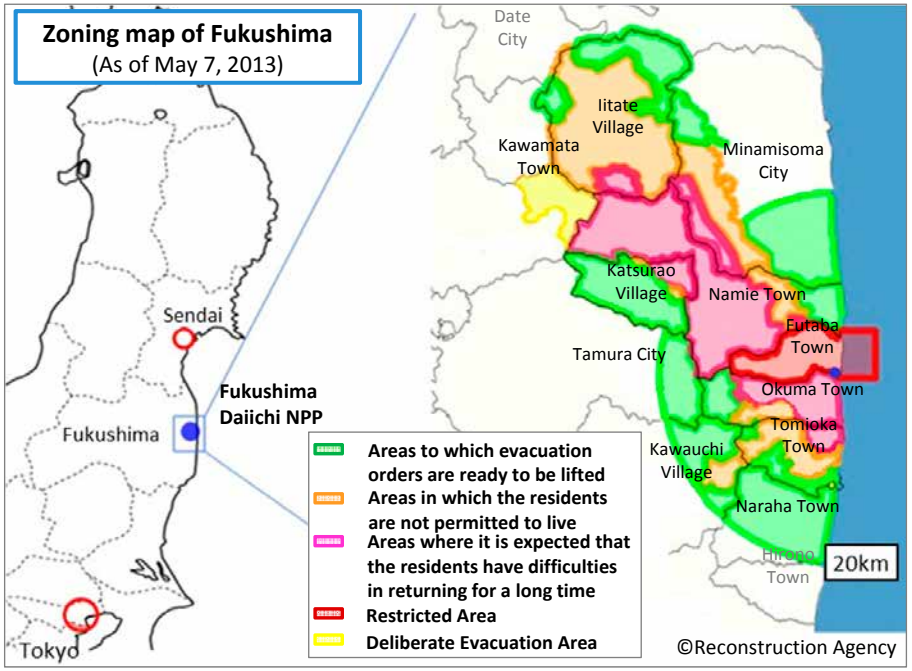
This project aims to reveal the radiation impact on environment and animate beings including human, through assessing the distribution of artificial radionuclides in animals of the Restricted Area including cattle and wild animals, and constructing a tissue bank. Then, we will contribute to improvement in public health and radiation safety.

Method

In response to the accident at the Fukushima Daiichi nuclear power plant, a 'Restricted Area' had been designated in the 20km radius around the nuclear plant in April 2011. Approximately 3,400 cows, 31,500 pigs, and 63,000 chickens had been left in the area. In May 2011, the Japanese government ordered Fukushima Prefecture to euthanize farm animals, in order to forestall the consumption of radio-contaminated meat.

We have collected tissues from those farm and wild animals and the water and the soil in the evacuation zone, and made dose assessments of deposited radionuclides in animals. Furthermore, we have worked to establish a tissue archives of animals, in order to utilize the findings for the future research of internal exposure and the prevention of radiation exposure.





The evacuation zoning has been under review since April 2013, and zoning for 11 municipalities have been rearranged.

Total number of samples
(As of June 16,2013)

- Cows : 238
- Pigs : 57
- Monkeys: 22
- Boars: 5
- Horses: 3

The research group found the detailed systemic distribution of radionuclides in cattle attributed to the Fukushima NPP accident.

Department of Pathology, Institute of Development, Aging and Cancer, Tohoku University
Web: http://www2.idac.tohoku.ac.jp/hisaidoubutsu (in Japanese)

Regional Industries Restoration Support Project（1）

To provide continuous supports to the restoration of industries and communities in the Tohoku region

Background

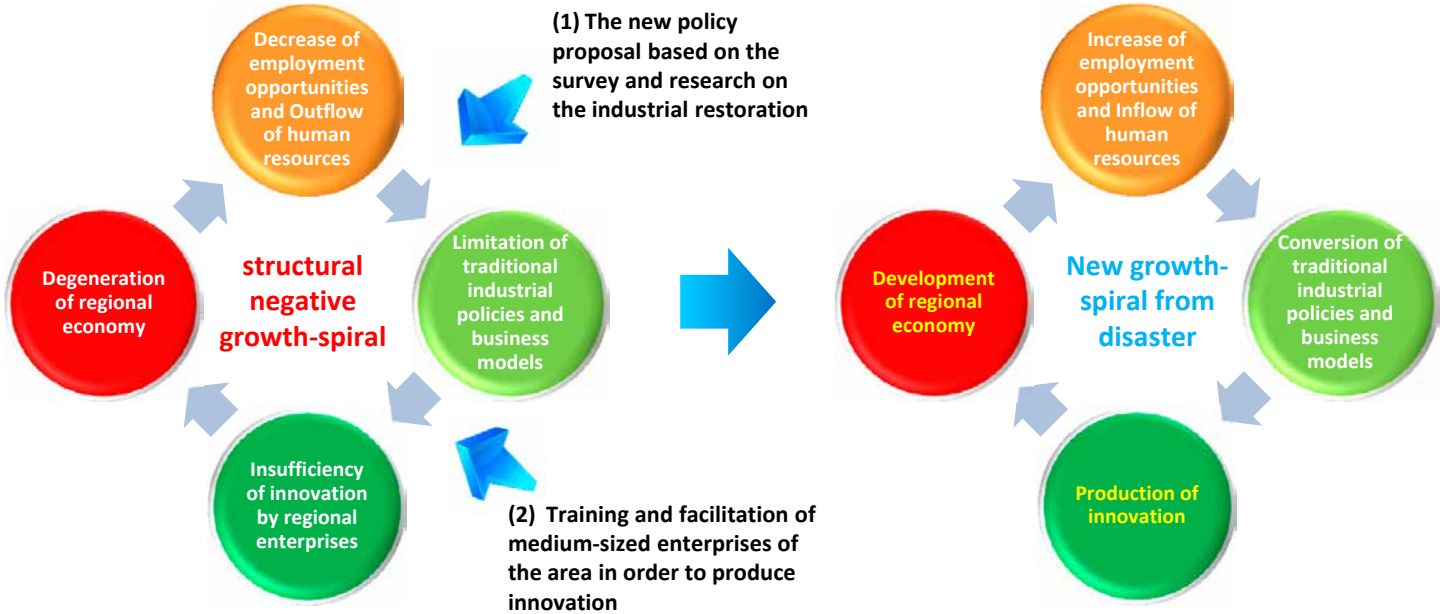
In order to restore the stricken areas, it is insufficient to reconstruct only buildings and infrastructures. There are lots of social problems which cannot be solved by buildings. What must be necessary for the reconstruction of regional industries and communities are clarifying issues and finding solutions through the continuing research study of regional industries and communities, and developing human resources capable of making innovation happen.

Mission

Regional Innovation Research Center will continuously work on the research study and development of human resources to support the restoration of industries and communities in the Tohoku region, by conducting 1) **the Regional Industry Restoration Research Project** and 2) **the Regional Innovation Producer School**.

Method

1) In **the Regional Industry Restoration Research Project**, researchers continuously investigate the progress of reconstruction and contemplate what kind of industries and communities should be desired in the new Tohoku region. Based on the research, the policy proposals and information have been published from the perspective of the disaster-affected areas.
2) **The Regional Innovation Producer School** provides training programs designed for executives, successors of local companies and next-generation of business persons in order to develop their abilities of making innovation happen. Through this school we support the creation of new value and activities leading toward an increase of new job opportunities in the Tohoku Region through developing human resources that can contribute to the revitalization of the regional industries.



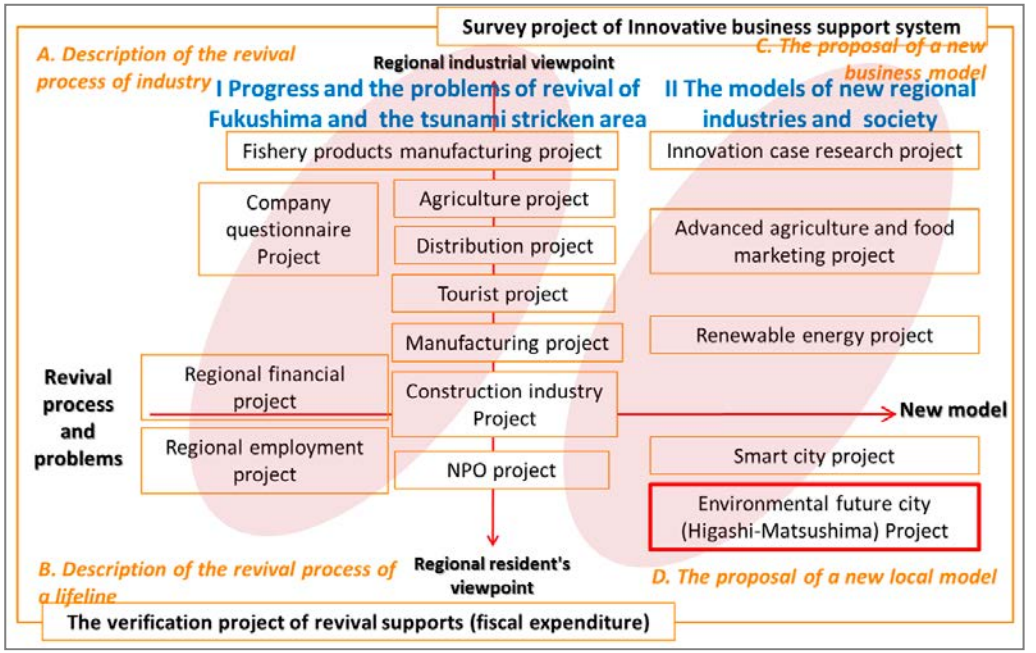
Regional Industries Restoration Support Project（2）

Development of survey and research activities for the restoration of regional industries

The activity of the survey and research projects consisted of 12 sub projects in the fiscal year 2012. A questionnaire survey for 30,000 local companies in the disaster areas to assess what state these companies are in, revealed that they had financial problem due to the disaster.
In the fiscal year 2013, 17 sub projects will be launched.

Symposium in Oct, 2012

Publication of research results in Mar, 2013

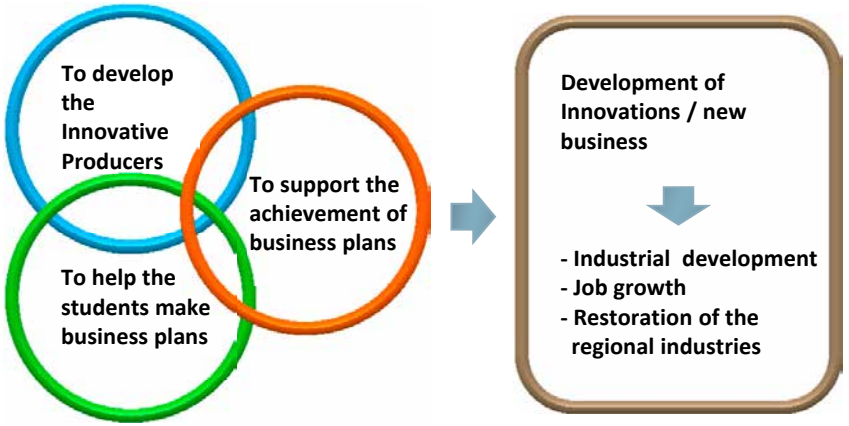


■The activity of the survey and research project plans in the fiscal year 2013

Regional Innovation Producer School

The Regional Innovation Producer School provides many opportunities for students to develop knowledge, skills, and mind to make innovative business plans, and supports the whole process of their achievements even though their course is over.
In September 2013, this school accepted 40 students and established two satellite campuses in Iwate and Fukushima.

■The activity of the Regional Innovation Producer School , in the fiscal year 2012



Regional Innovation Research Center, Tohoku University
Email: rirc@econ.tohoku.ac.jp
Web: http://www.econ.tohoku.ac.jp/econ/english/rirc/

Industry-University Collaboration Development Project for Reconstruction

To achieve practical application of science and technology innovations developed in the Tohoku region

Background

Many companies in the Tohoku region have been facing financial, technological, human resource-related and various other kinds of difficulties since the Great East Japan Earthquake. With the aim of fostering innovation and strengthening the industrial infrastructure, which serves as the basis for the economic revitalization of the disaster-affected areas, it is needed making effective use of technological intellectual property owned by Tohoku University, promoting and strengthening of cooperation between industry and the university to support the regional economy, and commercialization of products jointly developed through the cooperation.

Mission

Under the cooperation with regional municipalities and organizations, Tohoku University will make active use of the state measures aimed at restoration. In order to achieve the industrial rehabilitation of the disaster-affected areas, we will support companies in the areas, and work towards the commercialization of our technological intellectual property within the framework of the industry-academia-government collaboration.

Method

Tohoku University has joined the following four industry-academia-government collaboration projects.

1) Tohoku Innovative Materials Technology Initiative for Reconstruction

Tohoku University promotes this project as a research hub in collaboration with regional universities and businesses. The project aims to create innovative technological advances for practical uses in three technology fields that Tohoku University is currently leading globally.

This project focuses on the development of innovative materials that incorporate world class cutting-edge technology and intends to further advance the development of Tohoku's material industry, thus contributing to the reconstruction of the Tohoku region.

（URL：http://www.tohoku-timt.net/english/index.html）

2) Tohoku Innovation Project in the field of science and technology

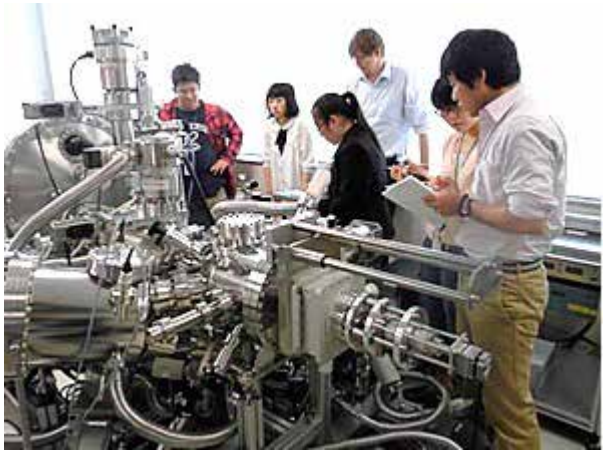
-- Cluster Formation Project for next-generation car industries

-- Cluster Formation Project for medical device industries

（URL: http://sendai-cyber.icr-eq.co.jp/en/index.html）

3) Reconstruction Promotion Program

4) Establishment of the industry-university-government cooperative Open Innovation Center in the material field



■Tohoku Innovative Materials Technology Initiative for Reconstruction

Industry-University Cooperation Division,
Research Cooperation Department, Tohoku University
Tel: ：+81-22-217-5907
Email: sangaku@bureau.tohoku.ac.jp

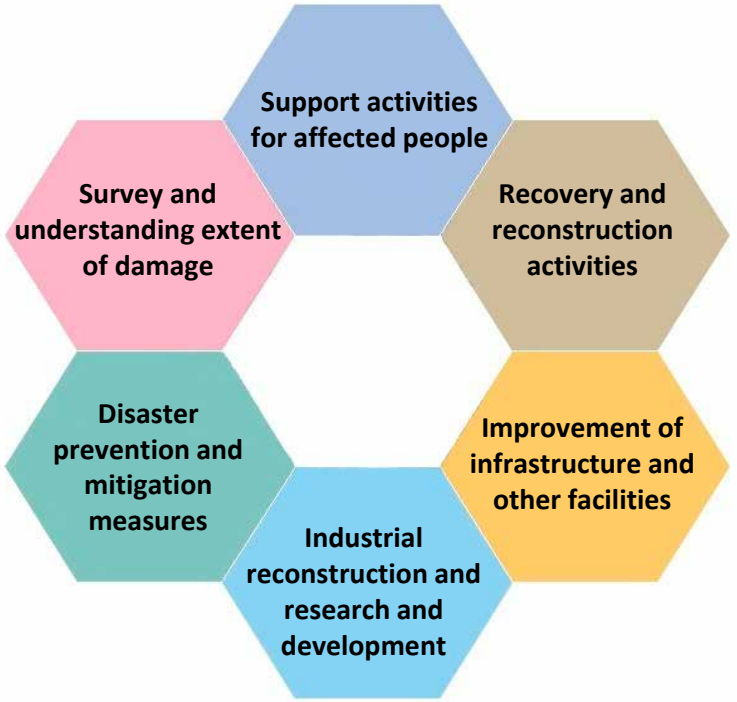
Reconstruction Action 100+ （1）

"Reconstruction Action 100+(Plus)" is the generic name of more than 100 various voluntary projects to support the reconstruction and revitalization process in which Tohoku University's faculty members have engaged in.

Immediately after the Great East Japan Earthquake occurred, we arrived at the disaster affected areas and started support activities. Tohoku University Hospital sent emergency medical teams to the areas and carried out medical activities, and the experts on earthquake and tsunami conducted field surveys.

Reconstruction Action 100+ was born from our thoughts made by asking ourselves what we should do for the recovery from the disaster and for the regeneration of Tohoku and Japan.

While taking advantage of our own knowledge and specialty, we are promoting those wide range activities as follows.



Development of the training program for the religious professionals

The 3.11 tsunami cost many lives. It further resulted in serious psychological damage among people in the affected areas, especially, family members of the victims and survivors of the tsunami.

Since the disaster, a volunteer group consisting of religious professionals like Buddhist monks, Christian ministers, medial professionals, and religions scholars have visited the affected areas to support the affected people. They soon realized that psycho-spiritual relief work can offer comfort, soothe psychological pains and can help to get through the loss of loved ones.

Tohoku University launched a new counseling skills training program for religious professionals who offer practical spiritual care based on a variety of religions and denominations.

http://www.sal.tohoku.ac.jp/p-religion/diarypro/diary.cgi?no=91

Grass-roots radiation monitor in Fukushima

This project was launched by Miharu Town Hall in Fukushima Prefecture and volunteers of Tohoku University, with the aim to watch the growth of Miharu's children.

The town was richly endowed with nature, and peaceful. However, the Fukushima nuclear power plant accident of March 2011 made things turn around. People in the town have been deeply concerned about radioactive contamination and rumors since then.

The project members regularly do radiation monitoring at the playgrounds of all schools in the town. Also, they distribute personal dosimeters to about 1,400 children in the town and check its radiation dose.

Reconstruction Action 100+ （2）

International planning studio for the reconstruction

From January to June 2012, an international planning studio was held and 80 representatives from Princeton University, Columbia University, UCLA, EPFL, Seika University, and Tohoku University took part in.

Each university worked on the planning of the landscape in the coast area, Sendai City, with the aim of disaster reduction and the mourning.
Those proposals were submitted to Sendai City for the further reconstruction of the area.

Joint inspection of the target area, Mar 2012

Agricultural Reconstruction Project

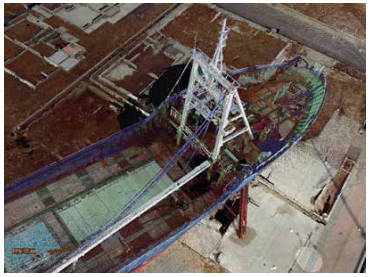
The Tohoku region boasts a beautiful natural and the agriculture, forestry and fisheries industry. However, the 3.11 earthquake and tsunami caused a lot of damage in the rich farmlands and fishing grounds. For the disaster recovery of the Tohoku region, the restoration of those industries carries great weight.
Agricultural Reconstruction Project consisting of a total of 36 activities assists in restoration of the agriculture, forestry and fisheries industry, such as planting rape blossoms in farmlands damaged by seawater, supporting reconstruction of oyster farms, and saving the farm animals in the evacuation zone surrounding the Fukushima Daiichi nuclear power plant.

The rape blossoms project has been armed with citizen volunteer.

Establishment of the digital archive of disaster remains

A building pushed over sideways, a large vessel remaining stranded ashore, and … Such “disaster remains” still reminds us of the violence of the tsunami and the devastating damage. Opinions have been divided over whether those remains should be preserved or removed.
Some people believe, “It is necessary to conserve the disaster remains in order to keep its memory from fading, as well as through words and footage about the catastrophe.”
On the other hand, some people who lost relatives or friends at such sites have demanded the structures be removed, saying, “Even a glimpse of the building is painful because they always remind us of the disaster.” However, leaving these wrecked structures disturb the reconstruction process, and the preservation is also very costly for local governments.
As time passed, these disaster remains have been demolished one after another. The Tohoku University Museum has taken pictures of the remains by laser scanner and created 3D computer-generated images before the remains are dismantled. With the aim to pass the lessons from the disaster to future generations, we will establish the digital archive of disaster remains.

A vessel scanned by a 3D laser scanner



3D computer-generated image of a vessel

Institute for Disaster Reconstruction and Regeneration Research,
Tohoku University

2-1-1 Katahira, Aoba-ku, Sendai 980-8577 JAPAN
E-mail: skk-som@bureau.tohoku.ac.jp
http://www.idrrr.tohoku.ac.jp/ (in Japanese)

Tohoku University Reconstruction Action

Vol. 3

Printed in October 2013