Report of the APRU-IRIDeS Multi-Hazards Program 2014 Summer School

22-25 July 2014

Tohoku University

Sendai, Japan

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Background

The Association of Pacific Rim Universities (APRU) and the International Research Institute of Disaster Science (IRIDeS) in Tohoku University launched the APRU-IRIDeS Multi-Hazards (MH) Program in April 2013. The Pacific Rim region has high risks to natural disasters and the universities and research institutes in the region are expected to contribute to reducing disaster vulnerability and risks and strengthening disaster management capacity to tackle these challenges. The Program aims to harness the collective capabilities of APRU universities for cutting-edge research on disaster risk reduction (DRR) as well as contribute to international policy making processes on DRR. The Summer School is one of the key activities under the MH Program.

APRU is a network of 45 premier research universities from 16 economies around the Pacific Rim. The leaders of Caltech, UC Berkeley, UCLA and USC brought together the leaders of the region's research universities and founded this network in 1997. APRU aims:

- To create an association of premier research universities around the Pacific Rim region.
- To foster cooperation in education and research among these universities in areas of major importance to the Pacific Rim community including but not limited to economic development, science and technology, human resource development, education and environmental protection.
- To represent these universities and/or their interests collectively in discussions or meetings with, or assist any of these universities in making any representation or recommendation to any, advisory or supervisory authority, whether local or foreign, which are in or concerned with areas relating to education and research in the Pacific Rim region.
- To provide a forum for these universities to meet, discuss, resolve, evaluate, canvass, comment upon and generally to deal with any issue or matter concerning or generally related areas of importance to the Pacific Rim community.
- To enable these universities to become effective contributors to the development of a prosperous and integrated Pacific Rim community.
- To contribute to the economic, scientific and cultural advancement of Pacific Rim economies.

Currently, APRU member universities together have around two million students, more than 120,000 faculty members and research capabilities related to the key challenges facing the region. APRU seeks to advance the aspirations of its members and contribute to global society by:

1. Shaping Asia-Pacific Higher Education and Research,
2. Creating Asia-Pacific Global Leaders and
3. Partnering on Solutions to Asia-Pacific Challenges.

The IRIDeS at Tohoku University was established in April, 2012 as a newly integrated interdisciplinary research team. Together with collaborating organizations from many countries and with broad areas of specializations, the IRIDeS conducts leading research on natural disaster science and disaster mitigation based on past lessons in disaster management from Japan and worldwide. The IRIDeS aims to contribute to ongoing recovery/reconstruction efforts in the affected areas, conduct action-oriented research, and pursue effective disaster management to build sustainable and resilient societies. The IRIDeS also provides secretariat services as the regional program hub to the MH Program.

The key activities of the MH Program include the following:

- Organization of the annual summer school
- Organization of the annual APRU MH Symposium
- Fostering collaboration in disaster research and information/data sharing among APRU members
- Contribution to DRR discussions at international and regional levels and to a policy-making process

The 2014 summer school entitled "*Prepare for high impact disasters: towards the UN World Conference on Disaster Risk Reduction*" was organized on July 22–25, 2014 at Tohoku University and attended by 47 participants from seven countries. This year's summer school consisted of a seminar with a series of presentations as well as group discussions on campus safety and regional priorities in DRR. A field trip was also conducted to Kesennuma City, which was very severely affected by the 2011 disaster. This was an opportunity to learn about the experiences of the affected city and people as well as the recovery progress and efforts by local citizens. The APRU and IRIDeS will organize the MH summer school in 2015 as well and look forward to discussing together future DRR strategies, academic contributions to a global importance, and learning from each other's experiences in disaster management with participants from all over the world.

ACKNOWLEDGEMENT

As the main organizer of this summer school, the IRIDeS would like to extend its sincere appreciation to the participants and speakers who shared wonderful experiences and knowledge regarding DRR issues from different perspectives. Their involvement and participation contributed significantly to this event's success. In addition, the IRIDeS received tremendous support from the Tohoku Forum for Creativity, the IPPO IPPO NIPPON project, the APRU secretariat based in Singapore, and Tohoku University. The organizer is also grateful for valuable suggestions and advice provided by the IRIDeS faculty members on program development and planning.

Finally, this summer school could never have been implemented without the hard work and considerable support of the International Exchange Division of Tohoku University, the Administrative Office of IRIDeS, and the International Regional Cooperation Office of IRIDeS.

OPENING REMARKS

Prof. Susumu Satomi

President of Tohoku University

It is a great pleasure for me to welcome you to Tohoku University for “APRU-IRIDeS Multi-Hazards Summer School Program”. I am pleased to meet all of you who gathered from various countries for this event.

It has been already three years since the Great East Japan Earthquake and Tsunami happened on March 11, 2011. It was the largest disaster event in the Japanese history. Due to the warm support from all over the world, the recovery efforts have greatly progressed in collaboration with the communities, the governments, NGOs, the private sector and academia. Tohoku University has been also playing an important role in the recovery process especially by providing technical assistance. One of the objectives of this summer school is to share our experiences from the disaster. I hope this summer school will give you an opportunity to consider and discuss what we can do to strengthen the disaster risk reduction capacity.

The establishment of the International Research Institute of Disaster Science (IRIDeS) under Tohoku University is one of our commitments to share our knowledge and experiences globally. IRIDeS also launched the Multi-Hazards Program together with APRU last year. IRIDeS became the program hub and provides the secretariat service. This summer school is one of the major events under the Multi-Hazards Program.

We are living in a disaster prone region. Last year, the Typhoon Haiyan caused tremendous damage in the Philippines. We are facing to various disaster risks due to urbanization, climate change, and development issues. We have to tackle these issues in collaboration with various stakeholders. We must remember that universities and research institutes have a critical role to play in disaster risk reduction. For example, we are also encouraged to strengthen the disaster preparedness capacity on campus. We have a responsibility to protect the lives of students and staff from future disasters. I look forward to hearing your inputs on the campus safety based on the group discussion during this program.

In March 2015, the UN World Conference on Disaster Risk Reduction will be held in Sendai. We expect more than 6000 people will participate in the conference to discuss the disaster risk reduction strategy and its framework. The global efforts towards disaster risk reduction will be more and more required to build a disaster resilient society.

To conclude, I would like to thank the APRU secretariat for their kind support and cooperation. I wish you every success for this summer school program. Thank you.

Mr. Andre Edelhoff

Program Director for Research & Enterprise Partnership, APRU

It is a great pleasure to welcome you to Sendai for the second edition of the APRU-IRIDeS Multi-Hazards Summer School at Tohoku University. The Association of Pacific Rim Universities is very grateful that Tohoku University offered to host the Multi-Hazards Program at the International Research Institute of Disaster Science (IRIDeS) last year. We are very delighted to have such a well-known and reliable partner working on one of the topics of greatest concern in the Asia-Pacific economies.

We have seen in 2013:

- Cyclone Oswald and Eastern Australia floods, January
- Lushan earthquake, China, April
- Alberta floods, Canada, June
- Southwest China floods and landslides, July
- China-Russia floods, August/September
- Hurricane Ingrid & Manuel, Mexico, September
- Typhoon Fitow and floods, China and Japan, October
- Bohol earthquake, Philippines, October
- Typhoon Haiyan, Philippines, Vietnam, China, Taiwan, November

Those were the most deadliest and most costly natural catastrophes in the Asia-Pacific region and worldwide in 2013 only. Most of them, we still remember. Some of them, we won't forget. 85% of all fatalities in 2013 had to be mourned in Asia. But also half of the global economic losses due to natural catastrophes happened in Asia. Cyclonic storms, earthquakes, fires, flooding, volcanic eruptions, and others have a direct or indirect impact on the daily life of more or less everyone. Therefore, a stronger international and regional cooperation on hazards and especially on multi-hazards is of utmost importance. We need to understand the generation and mechanism behind multi-hazards but also its impact on people and the economy. Hazards do not stop at borders. They are as international as the research collaboration on disaster risk reduction should be. As we all live among the Pacific Rim it is important to establish knowledge action networks on multi-hazards as early as possible to find solutions from which all of us can benefit. Remember the person who sits next to you today; you might need her or his skills for your research project tomorrow.

To establish early career networks among our member universities and beyond as well as partnering on solutions to Asia-Pacific challenges is one of our objectives in APRU. APRU is a university network of 45 research universities based in 16 economies among the Pacific Rim. We are working with 130.000 academics and more than two million

students in America, Asia and Oceania. Our work is focusing on higher education policies and university stakeholder groups, on creating leaders among students and among early career researchers as well as on supporting research networks on the most pressing issues in the Asia-Pacific region. The latter is the matter why we have convened in Sendai for the next couple of days. I am looking forward to lively discussions and an exchange of new experiences and inspiring ideas.

To conclude my opening remarks, I would like to thank the International Research Institute of Disaster Science for hosting this event and special thanks go to Prof Yuichi Ono and Prof Takako Izumi and their team of the International and Regional Cooperation Office for designing the program and taking care of our well-being. You have done a great job.

Prof. Fumihiko Imamura

Director, Prof. of Tsunami Engineering, IRIDeS, Tohoku University

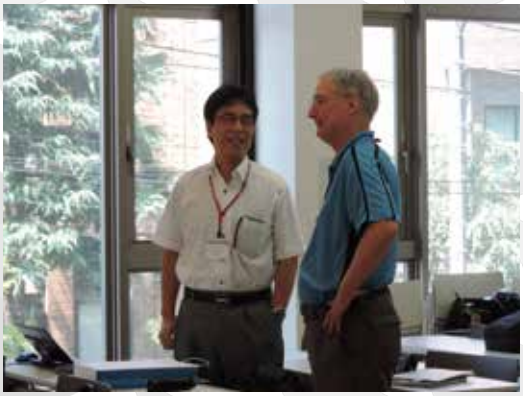
I would like to welcome you to Sendai and to Tohoku University. Thank you for enrolling in the second summer school under the APRU-IRIDeS Multi-Hazards (MH) Program. This summer school aims to share the lessons learned from the 2011 Great East Japan Earthquake and Tsunami (GEJET) and the ensuing recovery process. The school also includes discussions on campus safety issues and their contribution to the UN World Conference on Disaster Risk Reduction to be held in this city in March, 2015. The mandate for us and our institute is to address the critical issues in disaster risk reduction and propose appropriate measures to mitigate the impact and damages caused by a large scale disaster such as the 2011 Tohoku Earthquake and Tsunami.

The International Research Institute of Disaster Science (IRIDeS) was newly established in 2012 at Tohoku University. It currently consists of 70 faculty and 70 staff members, respectively. To mark the second anniversary of the 2011 Tohoku Earthquake and Tsunami, APRU and Tohoku University decided to launch a new program, which is the APRU-IRIDeS Multi-Hazards (MH) Program. The IRIDeS provides its secretariat service as the regional program hub. The program aims to harness the collective capacities of APRU members for innovative research on DRR and recovery, share strategies for coping with campus disaster risk management, contribute to international societies, and cooperate with various stakeholders to formulate policy making processes on DRR.

This year's summer school includes diverse presentations and working group discussions on different topics. It is designed to understand the international DRR mechanism and strategy as well as the lessons learned from the experiences and recovery processes of the 2011 disaster. In addition, on our field trip, you will visit Kesennuma City, which was one of the most severely affected areas. Your visit will coincide with that of the Emperor of Japan. In a group discussion, you are expected to discuss the recommendations toward UNWCDRR, as stated by President Satomi. The conference anticipates a participation of over 6000 people, including representatives from the government, NGOs, international and regional organizations, the private sector, academia, and schools. Academia, in particular, can play a critical role at the conference. Finally, another important goal of the program is to develop an action plan for improving preparedness capacity on campus.

I hope you enjoy the summer school your stay in Sendai. Thank you very much.

PRESENTATION



Introduction to International Research Institute of Disaster Science (IRIDeS) Tohoku University

Makoto Okumura

Deputy Director, Prof. of International Research Institute of Disaster Science, Tohoku University

The experiences of the Great East Japan Earthquake and Tsunami (GEJET) were extremely difficult to overcome. One of the reasons is that it was a complicated disaster comprising the impacts of earthquake, tsunami, and nuclear power corruption. We have relied on and trusted the capacities of science and technology. However, the disaster damage cannot be mitigated only by science and technology. For example, ancient historical documents and records are useful in understanding the history and severity of a disaster. A holistic approach and the involvement of various stakeholders are very important to confront these challenges. Support from and collaboration with the international community is also necessary. Hence, we have included “international” in the name of our research institute.

A year after the catastrophic disaster, Tohoku University established the IRIDeS with the aim of promoting leading research on natural disasters based on lessons learned from GEJET. It also contributes to regional recovery and a new paradigm on disaster management studies. The IRIDeS covers a wide range of research areas from disaster science to medical relief, which makes our institute quite unique.

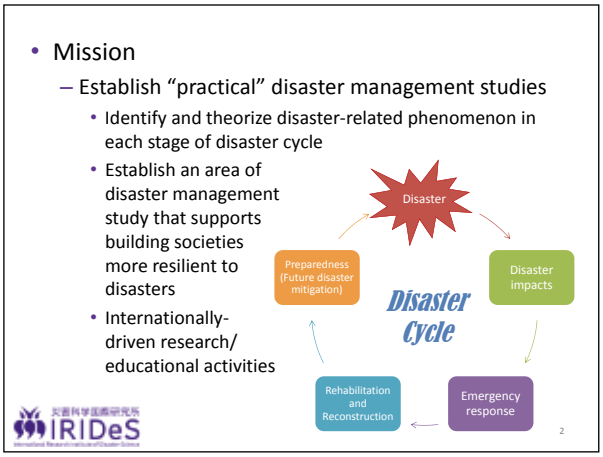
The key concept of disaster management comprises hazard exposure, vulnerability, and resilience. Disasters are caused by human activities and natural phenomena. The interaction between natural hazards and human behavior results in exposure, whereas vulnerability stems from weakness in the human social system. Resilience implies the speed of recovery. The presence of natural hazards cannot be controlled or avoided. Engineering can decrease vulnerability and improve disaster prevention by building facilities to reduce the damage and effects of initial impact. To decrease exposure, land-use control and temporal pre-disaster evacuation are useful and support from social science and urban planning is extremely crucial. To increase resilience, it is necessary to strengthen disaster response capacity and establish insurance and special finance arrangements. Moreover, the involvement of individuals in the disciplines of social science, economics, and medical science are critical. It is extremely important to pay attention to these fields and not just traditional DRR disciplines, such as engineering. Interdisciplinary collaboration and a comprehensive approach are needed, and therefore the IRIDeS was established with an interdisciplinary structure consisting of seven departments and 36 fields.

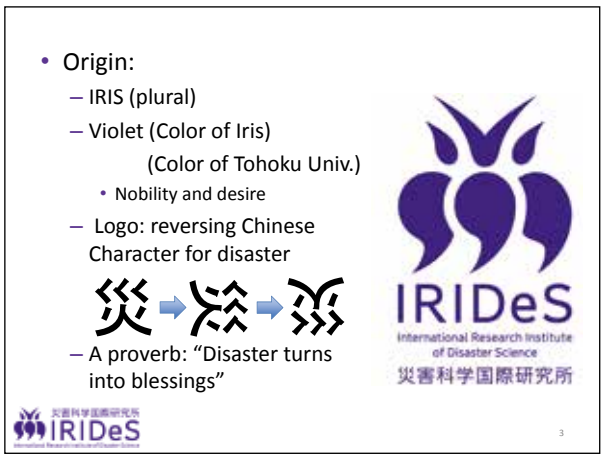
The IRIDeS has both short-term and long-term objectives:

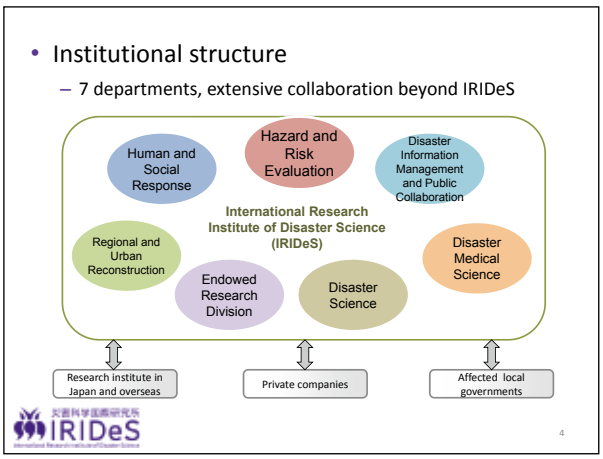
1. Elucidating mechanisms related to global-scale natural disasters and their impacts
2. Restructuring disaster prevention and reduction technologies based on the lessons of the 2011 GEJET
3. Establishing “Disaster Supportology” and re-evaluating disaster management from a historical viewpoint
4. Enhancing disaster resiliency and developing multiple fail-safe systems in regional and urban areas
5. Establishing disaster medicine and medical service systems against catastrophic natural disasters

6. Designing disaster resilient societies and passing knowledge and lessons from disasters

The IRIDeS has been conducting various events and seminars for the public, such as the IRIDeS Friday forum, the GEJET watcher, symposia, and issuing newsletters and annual reports. In addition, unique projects include the archival project known as *Michinoku Shinroku Den*, which collects and archives disaster information based on interviews, data, and photos and aims to establish a global standard for archival science. We are promoting utilization of the system and archiving the data in collaboration with industry, academia, government, and citizens. It is also important for the IRIDeS to enhance its collaboration with government and academia through various activities. Furthermore, it aims to strengthen the educational program by establishing a disaster management program for higher education and to train internationally prominent researchers in the field of disaster management.







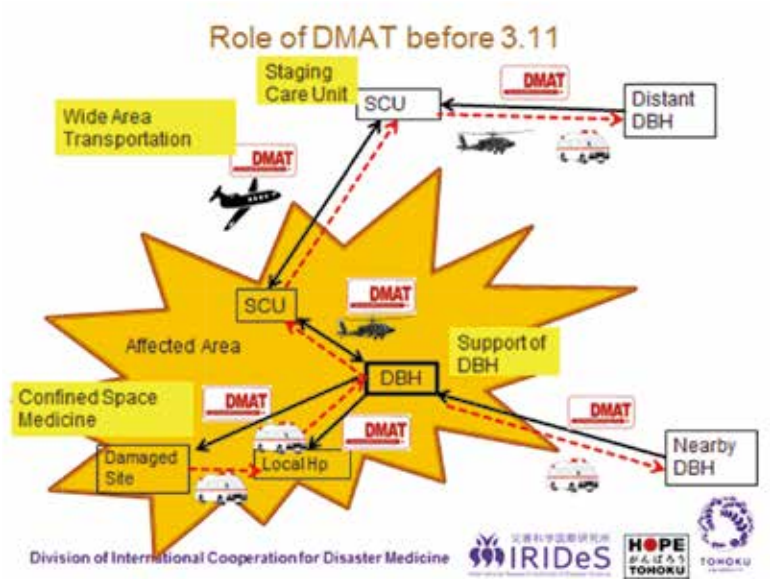
Disaster Medical and Public Health Management as DRR/DRM

Shinichi Egawa

Professor of International Research Institute of Disaster Science, Tohoku University

The world is now facing the increased impacts of disasters. Disaster is always measured by the number of death, injury and the financial losses. But, it is not easy to measure the implementation process and the effect of disaster risk reduction (DRR) and disaster risk management (DRM). As the outcome of International Symposium on Disaster Medical and Public Health Management: Review of Hyogo Framework for Action in May 2014, the disaster health care professionals declared that the community health resilience and well-being should be an explicit outcome of future framework for action.

From the experience of large scale disasters, Japan has established the nation-wide system for disaster medicine. Disaster base hospitals, Japan DMAT, staging care unit and wide area transportation system, emergency medical information system and medical/public health coordinator were established and fully functioned to save the lives of affected people in Great East Japan Earthquake. In the large scale disasters, however, the hospitals themselves can be greatly damaged and there are gaps between the medical/public health needs and relief operations. Coordination of medical and public health relief is a challenging issue. Safe Hospitals should be established in structural, non-structural and functional aspects. Health facilities critically require plans for continuity of health operations/logistics, human resources and prioritized funding strategies.



In Philippines, the shift from the acute mass casualties to the chronic public health problem was also noted. The Department of Health in national government coordinated the domestic and international medical relief in collaboration with World Health Organization. The result was remarkable by avoiding the confusions of information and supply materials, though the number of affected people was so huge. These two experiences in Eastern Asia will give us the insight of future planning of DRR/DRM in health sector.

For better response, it is prerequisite to establish, coordinate and promote “accountability, transparency, oversight, professionalism and registry” among health service providers. In community, engage and empower vulnerable populations including children and disabled to identify their own needs and develop strategies to lower their risks and enhance their resilience. To increase the mental health resilience, individual, family and community support, ethno-cultural and socio-demographic

considerations, connectedness and communication are fundamental risk reduction and risk management.

By improving the baseline of health status, availability and quality of health service, the impact of disaster is mitigated. To do so, public health and medical experts must be engaged in the disaster risk reduction and risk management process at all levels with a mind that current emerging crises demand a paradigm shift within the global community geared toward prevention and preparedness.

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A Web-Based Approach to Global Earthquake Forecasting Online Tools for Global Disaster Risk Management

John B. Rundle

Distinguished Professor and Senior Advisor to APRU MH Program
Departments of Physics and geology, University of California Davis

Great natural disasters are increasing in their impacts primarily because of the movement of growing populations into at-risk regions. In addition, the rising expense of coping with these problems is falling more and more on the public rather than on governments, which are often overwhelmed by the expense and complexity of the problem. The most obvious case of this is Haiti, whose recovery from the 12 January 2010 M7.0 Port-au-Prince earthquake remains problematic. Another example is the second M6.3 Christchurch, NZ earthquake which caused more than $30 billion USD in damages. It has been estimated that it may take 50 to 100 years to fully recover (see, e.g., http://en.wikipedia.org/wiki/2011_Christchurch_earthquake).

The World Wide Web offers many new and unique opportunities to address problems and challenges associated with great natural disasters. These examples of complex natural dynamics often occur as cascading events, such as the failure of the Fukushima reactors following the March 11, 2011 M9.1 Tohoku earthquake. Great destructive events typically involve four phases: Anticipation, Mitigation, Response and Recovery.

The Four Phases of a Disaster

Disaster Phase	Typical Time Scales	Solutions
Anticipation	Months to Decades	Science: Forecasting and Planning
Mitigation	Months to Years	Engineering: Structures and Lifelines
Response	Seconds to Weeks	Social, IT, Medical: Emergency Responders
Recovery	Weeks to Years	Economics, Engineering: Finance and Reconstruction

Figure 1

Each of these phases has time scales associated with them, and each requires distinct approaches and technologies to address them. The Anticipation phase involves forecasting the disaster over a variety of time periods. Intermediate term earthquake forecasting involves time scales of months to decades. Real-time early warning for earthquakes is a special case of Anticipation, but has time scales of only seconds. Real-time warning for hurricane and typhoon landfalls is another special case with time scales of hours. Mitigation occurs over days to years, Response over time scales of hours to weeks, and Recovery over time scales of weeks to years. Solutions associated with these phases utilize special knowledge from a variety of fields in physical science, engineering, social and medical science, and economics and finance.

Modern information technologies have the potential to unify many of these tasks within a common organizational framework. Forecasts are computed using automated computational approaches via data mining and simulations, and are disseminated using IT portal technologies. Planning involves communication and scenario analysis, which can use approaches as diverse as spreadsheet analysis and video gaming. Response involves real-world practice and simulation using first responders and their equipment. And Recovery involves novel financial approaches, financial analyses and market-based approaches. These issues are summarized in the table shown in Figure 1.

Overshadowing all of these areas is the availability of modern IT, and in particular, social networking

technologies. These played an important role in responding to the disaster of the March 11, 2011 Tohoku earthquake (e.g., http://arxiv.org/abs/1109.1618). Other technologies such as Facebook, Google+, and Instagram illustrate the potential for IT to contribute to solutions in the unfolding cascading processes of major disasters. Yet most of these technologies, designed for the public, are often not well suited to the distinct needs of the disaster management communities.

Figure 2

In the lecture, I discussed new approaches to these problems. These approaches, grounded in a variety of modern IT, involve the computation and global dissemination of data from data-driven forecasts, data-mining, and simulation methods. Development and use of portal technologies, collaboration and social interaction websites, will be critical. Computational methodologies are only useful in a modern context if they are implemented with accessible User Interfaces (UIs). Here we discuss the development and use of these methods as exemplified by four websites: www.quakesim.org, www.e-decider.org, www.openhazards.com, and http://social.openhazards.com. Of course, these approaches involve a variety of challenges, which are summarized in Figure/Table 2.

The website www.openhazards.com was organized and initiated to fill the widespread need for global earthquake forecasting, and its communication to the global public. It has since expanded to include other types of disasters, as well as the need for disaster education. Given the fact that governments are finding disaster assistance to be beyond their financial means, it will fall increasingly on the global public to address their own risk management needs. Personal risk management will only be possible if the public has the tools and information to make informed decisions.

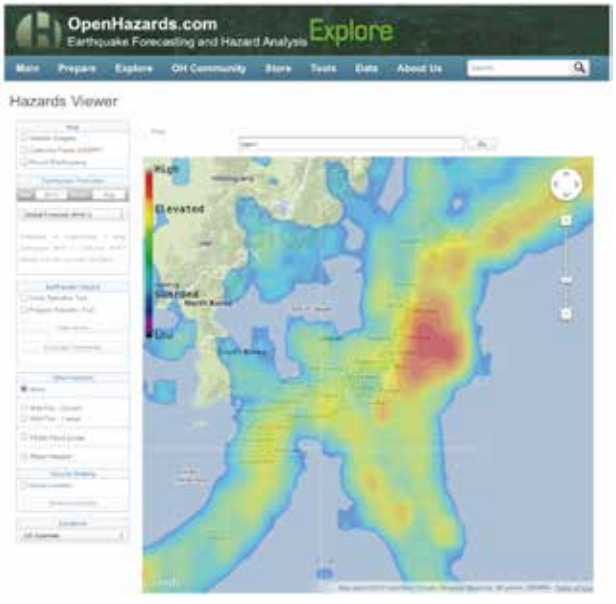


Figure 3

The forecast we originally developed for the Open Hazards site relies on data-driven approaches derived from online earthquake catalogs. We developed a method to use space-time patterns of small earthquakes to forecast large events. Until recently, methods proposed

have been based on rates of small events, either anomalous activation or anomalous quiescence. Our method is based on the proposition that the Gutenberg-Richter magnitude-frequency distribution is a stable statistical distribution over time. The largest events must eventually “fill in” the distribution being formed by the smaller events.

We showed that large event probabilities can be computed via automated methods and back-tested to optimize the few parameters in the model. To illustrate the method, we computed probabilities for large earthquakes M>6 in California and M>7 in Japan from 1980 until the present. An example of the application (“app”) that we developed and made operational on the openhazards site is shown in Figure 3.

Figure 4

Mobile applications also of increasing importance in a web-based approach to risk management. For that reason, we have extended the functions of the earthquake forecast and the home damage estimator to mobile environments. The free app “QuakeWorks” by Open Hazards is now available on the Apple App Store. At the moment, only the iOS7 version is available, but we plan to produce an Android version in the near future. With this app, the user can repeatedly check their seismic hazard as they move around from one location to another. The user can also check the potential damage to any structure of interest.

Finally, I touched on the need for new modes of collaboration through social networking that are needed for initiatives such as the APRU Multihazards program. I discussed the development and use of social.openhazards.com, a collaboration network built on Drupal 6 and Open Atrium technology.

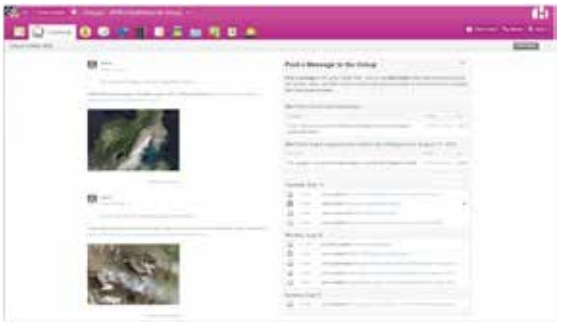


Figure 5

A variety of further developments enhance the site beyond its basic functions, including an advanced search, and features such as an Imageboard (an image gallery), a Chatter Wall (streaming group conversation messages), and an AppFrames feature (allows the user to create apps by linking to external web sites through iFrames). A screenshot of this site is shown in Figure 4. All of these web sites are fully operational, and the interested user can only see their full functionality by visiting them and exploring their various capabilities.

A Brief Overview of Computational Modeling for Multi-Hazards

Eric M. Heien, John Rundle

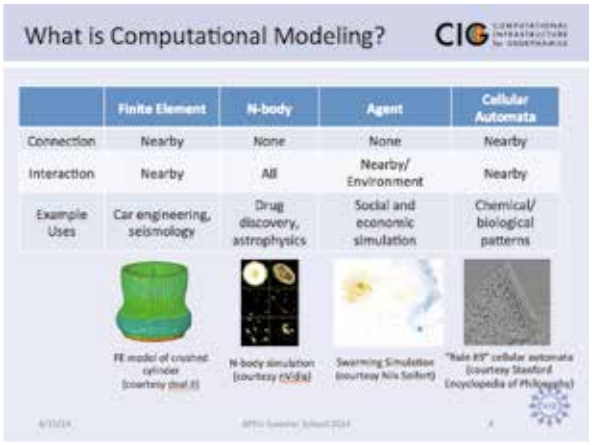
PhD, University of California, Davis

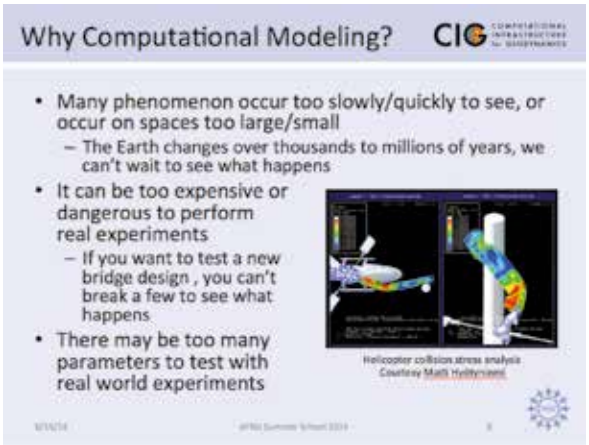
This presentation discussed Computational Modeling and Simulation, specifically the questions of "What is it?" and "Why do we use it?", then its applications to Computational Seismology, and specific examples involving Virtual California and the Computational Infrastructure for Geodynamics.

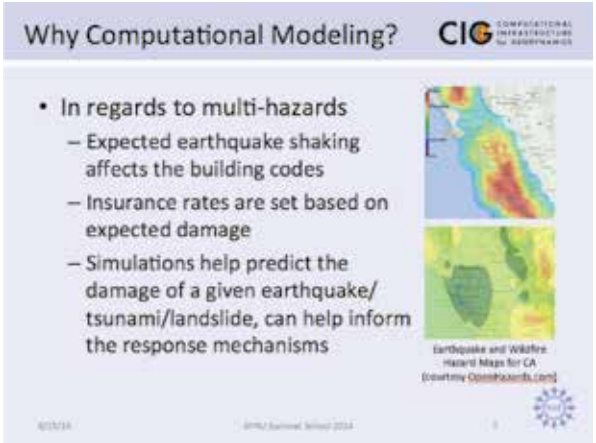
Computational modeling involves approximating the behavior of a system on a computer using a set of well defined rules. The rules are often based on physics equations governing gravity, temperature, stress, pressure, magnetism, etc. Model details are specified through parameters, such as gravity. Where we don't know exact rules we use probabilistic rules and run many simulations. We can try using different rules, different parameters, to quickly experiment with the system.

Many phenomenon occur too slowly/quickly to see, or occur on spaces too large/small. The Earth changes over thousands to millions of years, we can't wait to see what happens, and it can be too expensive or dangerous to perform real experiments. If you want to test a new bridge design, you can't break a few to see what happens. There may be too many parameters to test with real world experiments.

Several slides from the presentation are shown below.







Current Situation (progress) and Challenges in Reconstruction based on the Three-year Experience of the Great East Japan Earthquake and Tsunami

Yasuaki Onoda

Professor of International Research Institute of Disaster Science, Tohoku University

1. Reconstruction

Reconstruction after a disaster is extremely challenging, because the situation and needs are diverse and always changing. Reconstruction activities can be divided into the following ten categories:

a) Relief of victims and provision of shelters
b) Construction and management of temporary houses
c) Careful damage assessment and development of a reconstruction plan
d) Collaborative framework and consensus building on reconstruction implementation
e) Regeneration and maintenance of affected communities
f) Reconstruction and promotion of local industries
g) Coordination of works after the reconstruction stage
h) Management of staff working to implement the reconstruction plan
i) Information and media management
j) Relocation to new housing areas and removal of temporary houses

2. Reconstruction and evacuation plans (1, 3)

Evacuation plans should be prepared before a disaster occurs. However, in case of an unprecedented disaster like GEJET, the original plans must be revised. Unfortunately, in this case, the evacuation plan was only revised following the development of the reconstruction plan.

3. Temporary housing plan and long-term issues (2, 4, 5, 10)

Providing numerous temporary houses becomes necessary within a short period. At the same time, the quality of houses affects the community's sustainability and consensus building. Therefore, the house provision is an extremely complicated and challenging matter requiring urgency as well as detailed planning and consideration.

4. Rational tsunami risk assessment and its adaptation to a reconstruction plan (3, 4, 9)

The basic reconstruction plan developed after GEJET determined that a flood caused by an L1 tsunami (occurrence once per century) could be reduced by seawalls, and the risks of an L2 tsunami (once every 500 to 1000 years) could be reduced by planning in the area where more than a two-meter high wave will not be reached (2-2 rule). However, a result of the tsunami simulation of the ria coast showed that most towns will be flooded with high levels of water by an L2 tsunami. Therefore, residents have no choice but to live in small land areas developed by cutting into a mountain, even though a large seawall was built and a wide plain exists along the coast.

5. Architects and civil engineering consultants: relocation plans to higher ground (3, 4, 5, 7, 8, 10)

In the process of reconstruction planning, architects who assisted the reconstruction from GEJET presented a reasonable suggestion and proposal which follows the basic rules of land development and best uses the existing potential in the relevant area. However, most proposals were not adapted

due to difficulty in management as well as public and private distinction.

6. Design of public housing in the reconstruction stage: avoiding solitary death (4, 5, 7, 8, 10)

After the Great Hanshin-Awaji Earthquake, a number of affected people lost their lives in isolation after moving into the disaster-related public houses. Based on research results, some community-oriented disaster housing complexes are now under construction, such as those in Shichigahama and Kamaishi.

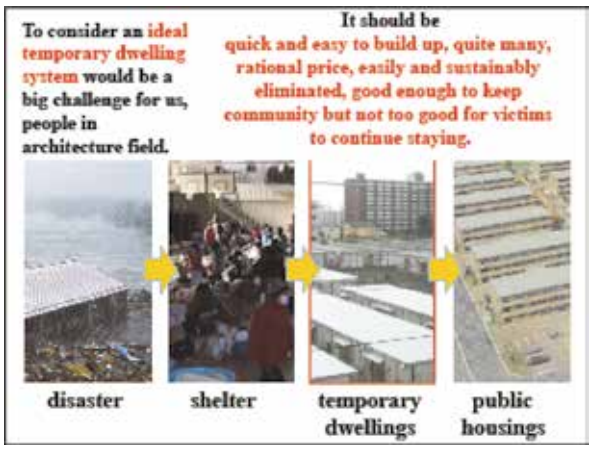
7. Toward creative reconstruction

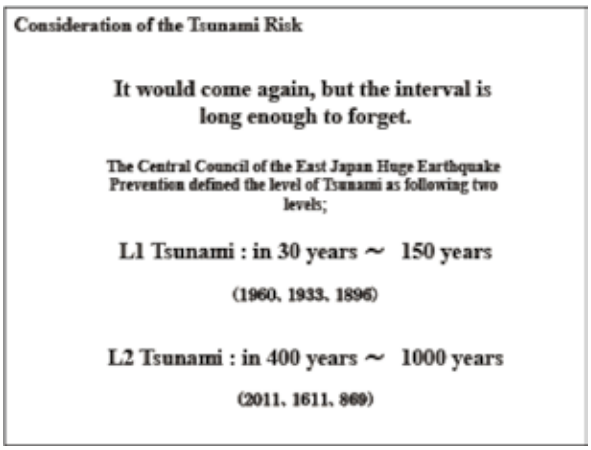
Reconstruction cannot be achieved only through sturdy structures such as seawalls, roads, and disaster housing complexes. It is crucial that reconstructed communities and areas are both valuable and attractive for many generations and generate sustainable livelihood. However, in many cases, project and plan implementation becomes an objective of reconstruction, because municipalities need to implement various and numerous reconstruction tasks. Therefore, environmental concerns and considerations are insufficient and delayed.

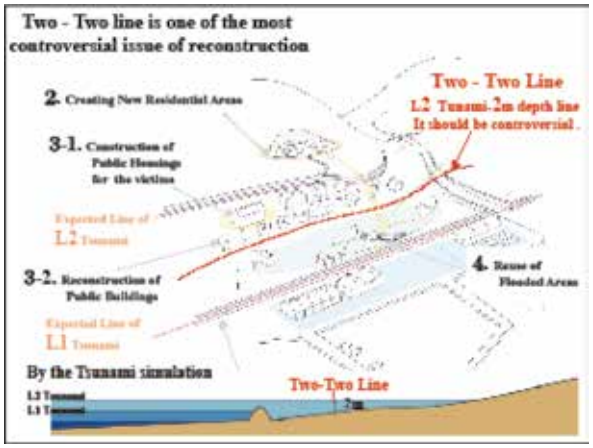
Municipalities relatively successful in the reconstruction process possess the following similarities:

a. Encouraging voluntary life reconstruction by providing detailed information at early stages.
b. Promoting prompt consensus building through rural communities.
c. Actively collaborating with municipality officers and a third party including experts, scholars, and business people.

Based on mutual trust between residents, municipalities, and experts, various issues and challenges can be overcome by implementing detailed and attentive reconstruction works using local resources.







Hyogo Framework for Action 2005-2015 Review from a viewpoint

Osamu Murao

Professor of International Research Institute of Disaster Science, Tohoku University

The presentation by Prof. Murao at the Multi-Hazards Summer School consisted of the following five topics: (1) Meaning of Protection of Cities in the History, (2) Disasters in Japan and Background of Hyogo Framework for Action (HFA), (3) Disaster Management and Disaster Life Cycle, (4) Outline of Hyogo Framework for Action 2005-2015, and (5) A Brief Review of HFA in Japan.

The presentation started with a question, “what is a city?” and referred various risk surrounding a city and how cities in the world had overcome the threat of disasters and enemies (Fig.1 and Fig.2).

Japanese society has made efforts to reduce disaster damage through devastating experiences in its history as a disaster-prone country in the world. The second topic focused on the remarkable disasters in Japan and chronological improvements of disaster management (Fig.3 and Fig.4), followed by the HFA background including International Decade for Natural Disaster Reduction (IDNDR), World Conference on Natural Disaster Reduction 1994 in Yokohama, and World Conference on Disaster Reduction 2005 in Kobe.

Showing “Disaster Life Cycle,” an idea to deal with disaster management, for the third topic, it presented the Five Priorities for Action in HFA associated with it in the fourth (Fig.5).

Finally, the significance of continuous effort (Fig.6) and recent Japanese disaster management activities developed in this century were introduced, such as increasing tsunami evacuation towers (Fig.7) and Disaster Risk Reduction Education Model Projects for Elementary Schools (Fig.8).

Prof. Murao mentioned that the next World Conference on Disaster Reduction will be held in Sendai in 2015, and that IRIDeS will contribute it as an academic organization in the venue.

Fig.1: A City surrounded by various risk

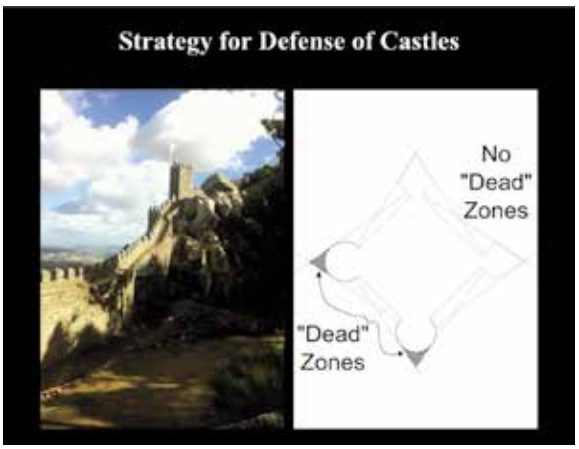


Fig.2: Architectural design for defense

Fig.3: Timeline of critical disaster events in Japan

Fig.4: Shirahige Disaster Prevention Base

Fig.5: HFA Priority 1 on the Disaster Life Cycle

Fig.6: Japanese efforts to disaster reduction

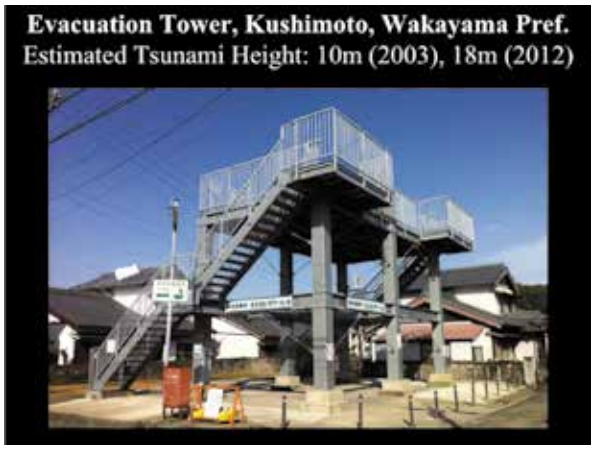


Fig.7: Tsunami evacuation tower

Fig.8: Disaster Reduction Education Model Proj

“KAKEAGARE! JAPAN”
～ Tohoku-originated tsunami disaster prevention action ～

Shunsuke Matsushima

Dentsu, Inc.

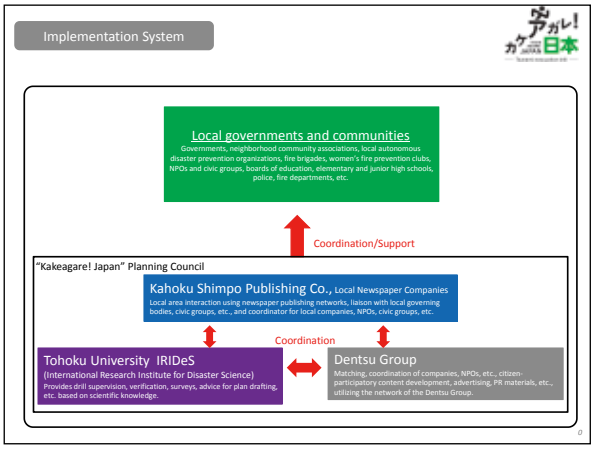
Dentsu group together with IRIDeS and Kahoku Shimpo Publishing, Co. (a local newspaper in Miyagi Pref.) launched “KAKEAGARE! JAPAN” in September 2012 in the aftermath of the Great East Japan Earthquake and tsunami that caused a tremendous loss of life and property. The aim of this project is to use the experience and lessons learned from this major disaster to develop a program of tsunami evacuation drills and create “a culture of evacuation” that habitualizes the practice of evacuation.

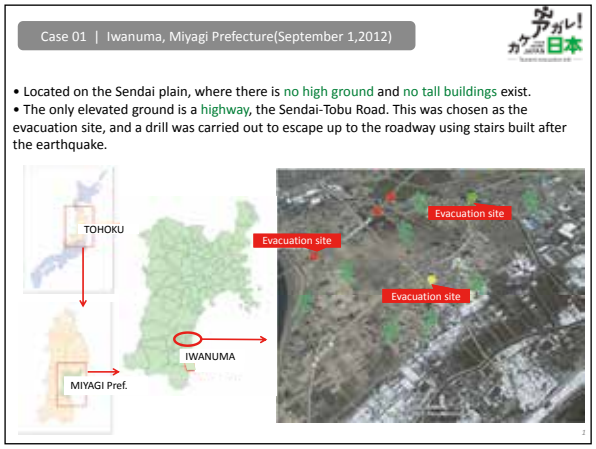
The mission of “KAKEAGARE! JAPAN” is;

1. To provide resolutions to the issues faced by areas regarding tsunami evacuation (create evacuation rules unique to each area).
2. To develop an ongoing tsunami evacuation drill program to be carried out on a regular basis.
3. To promote and to spread the practice of tsunami evacuation drill programs to locations around Japan and around the world where major tsunamis are projected.

“KAKEAGARE! JAPAN” will provide “variable drill programs” for tsunami evacuation. So that communities can freely select and combine to meet the evacuation issues they face due to the characteristics of their area, such as terrain, population, and location of residential districts.

http://kakegare.jp





Towards Disaster Risk Reduction City

Manabu Suzuki

Chief, Bureau of Reconstruction Promotion, Office of Mayor, Tagajo City

Tagajo city is located in the central-eastern region of Miyagi prefecture. It is beside Sendai city, about 12 km away from central Sendai. The population is 62,756 as of June 2014. Total 188 lives were lost and more than 11,000 houses and buildings were damaged at the Great East Japan Earthquake and Tsunami on March 11, 2011. After the earthquake, the large-scale tsunami warning and evacuation announcement were issued, then immediately, the headquarters for disaster control was established. One hour after the tremor, the tsunami (the highest 4.6m) hit the city and one third of the city was inundated by the water. Besides, a fire broke out at the LPG (Liquefied petroleum gas) complex. The situation was very serious and no one was able to go closer to the area. A maximum of 12,000 people went to evacuation sites such as schools. The Self-Defense Forces and fire department started the evacuation support under the snowfall. Factories and offices in the industrial area were almost totally destroyed. The next day, I saw the area submerged by the tsunami water and burned out by fire. I had a feeling of sadness and anger, but I did not know to whom I should direct the feeling. I was just stunned with anxiety and restlessness.

Though Tagajo had tremendous damage by the disaster, all the citizens had a very strong will for reconstruction. The city itself is very small with no other land to move in and no land at a higher place. Therefore, we had no choice but to start reconstruction on the spot, which could not be seen in other damaged towns. We implemented a “Recovery Plan” and set three major goals: 1) Reconstruction of citizens’ lives and industry, 2) Securing safety and security, 3) Sharing the experiences from the Earthquake and Tsunami and enhancing attractiveness of towns. At the same time, we felt there was a need for the city to be strong against disasters in order to start reconstruction on the spot. It was also necessary for the citizens to make use of the lessons learned from the Earthquake and Tsunami. With this in mind, we implemented “Tagajo DRR City Strategy” in November 2013 and made a “Declaration of DRR City.”

There are four major points in the “Tagajo DRR City Strategy”:

1) Developing disaster-resilient city

This approach focuses on the construction of infrastructure, and four strategies are drawn up in detail.

- Building multiple barriers for tsunami
- Developing earthquake-resilient city
- Minimizing flood damage
- Developing disaster response system

A large scale tsunami that comes once in 1000 years cannot be guarded only by infrastructure. Therefore, we implement some projects as multiple-defenses: developing evacuation announcement facilities, constructing evacuation roads, designating temporary escape buildings and building barriers such as seawalls, sea banks and green barriers to reduce the force and speed of tsunami. Another significant project is to develop housing complexes with DRR function. We are developing disaster

public housing complex in an inundated area. To reduce damage of tsunami, the first floor is pilotis structure, and the second floor or more are used as residences. The complex also works as evacuation buildings for neighboring residents. Also, another housing complex which has industrial rehabilitation support function is planned to be developed.

2) Increasing DRR capacity based on self and mutual help

Two strategies are implemented in this approach so that citizens and local communities can cope with disasters by themselves rather than depending fully on local administrations.

- Enhancing self-help ability
- Strengthening community DRR capacity

We developed a DRR handbook, which includes important information in the processes of each disaster response to recovery. This handbook has already been distributed to all the families in Tagajo city.

3) Sharing disaster experience

The aim of this strategy is to utilize, disseminate and pass on the disaster experience to future generations. We established archives called “Tagajo ken-bun-oku” on the internet, which include records, images, disaster experience and so on. We hope to share these information domestically and internationally. Besides, we would like to strengthen DRR education and awareness based on these archives.

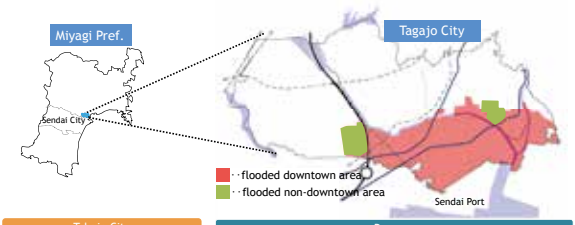
4) DRR technology

This strategy is aimed to maximize companies’ strength and share new technologies introduced after the tsunami disaster. There are mainly three technologies developed: food production technology unaffected by external environment, production of emergency foods with high nutrition value, and evacuating vehicles guide system. We hope to share these technologies in order to repay the people who gave us their support for their kindness and thoughtfulness.

We made tremendous loss due to the tsunami. However, we gained lots of experiences, wisdom, surviving skills as well as incredible support from all over the world. We had strong determination to initiate the DRR measures and change our way of thinking from negative to positive in the process of reconstruction. With our current various DRR efforts, we aim to make Tagajo as a resilient city.

1. Damage by "the Great East Japan Earthquake & Tsunami"

Tagajo, Miyagi



Takajo City

- ◆Location: 12km from downtown Sendai
- ◆Population: 62,000
- ◆Area: 19.65 km²
- ◆Density: approx. 3,100/km² top in Tohoku area
- ◆Traffic: 76,000cars／day

Damage

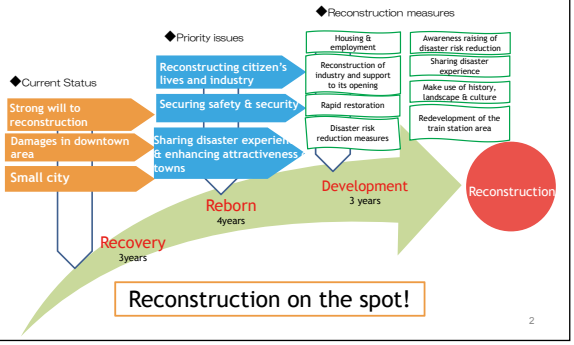
- ◆Max. seismic intensity: 5+
- ◆Flooded area: 662ha(1/3 of the city) → 90% downtown
- ◆Max. height of flood: 4.6m
- ◆Number of Deaths: 188 (citizen 97, non-citizen 91)
- ◆Destroyed houses: over 11,000 (including full, half , partial)
- ◆Approx. 1,400 family have escaped to temporary housing
- ◆Approx. 8,500 cars were floated into the city
- ◆Volume of rubble : 353 kiloton

1

2. Towards reconstruction

Tagajo, Miyagi

Outline of reconstruction plans in Tagajo City



Reconstruction on the spot!

2

3. History of natural disasters in Tagajo City

Tagajo, Miyagi

【Heavy rain】

1986年 8.5 Heavy Rain
Date : Aug. 5, 1986
Cause : Typhoon No.10
Total rainfall : 394mm
Max. rainfall : 97mm/h
Flooded above floor : 2,817 houses
Flooded below floor : 1,468 houses

1994年 9.22 Heavy Rain
Date : Sep. 22, 1994
Cause : low pressure
Total rainfall : 305mm
Max. rainfall : 119mm/h
Flooded above floor : 667houses
Flooded below floor : 903 houses

2000年

2002年 7.11 Heavy Rain
Date : Jul. 11, 2002
Cause : Typhoon No.6
Total rainfall : 171mm
Max. rainfall : 43mm/h

2011年 9.21 Heavy Rain
Date : Sep.22, 2011
Cause : Typhoon No.15
Total rainfall : 310mm
Max. rainfall : 49mm/h
Flooded above floor : 15houses
Flooded below floor : 315houses

【Earthquake & Tsunami 】

869年 Jogan Earthquake (subduction-zone)
Year : 869 (Heian period)
Magnitude : 8.3

1978年 Miyagiken-oki Earthquake (subduction)
Date : Jun. 12, 1978
Magnitude : 7.4
Seismic intensity : 5 (Sendai, Ishinomaki)

2003年 Miyagiken-oki Earthquake (subduction)
Date : May 26, 2003
Magnitude : 7.0
Seismic intensity : 4 (Tagajo)

Miyagiken-hokubu Earthquake (epicentral)
Date : Jul. 26, 2003
Magnitude : 6.2
Seismic intensity : 4 (Tagajo)

2005年 Miyagiken Earthquake (subduction)
Date : Aug. 16, 2005
Magnitude : 7.2
Seismic intensity : 4 (Tagajo)

2008年 Iwate-Miyagi Nairiku Earthquake (epicentral)
Date : Jun. 14, 2008
Magnitude : 7.2
Seismic intensity : 3 (Tagajo)

2011年 Great East Japan Earthquake (subduction)
Date : Mar. 11, 2011
Magnitude : 9.0
Seismic intensity : 5+

5. Tagajo DRR city strategy ①

Tagajo, Miyagi

Strategy for DRR city Mechanism

Developing disaster-resilient city
1 Building multiple barriers for tsunami
2 Developing earthquake-resilient city
3 Minimizing flood damage
4 Developing disaster response system

Increasing DRR capacity based on self and mutual help
5 Enhancing self-help ability
6 Strengthening community DRR capacity

Sharing disaster experience
7 Sharing disaster experience

DRR technology
8 DRR Research Park Program

Strategy for DRR city Future plan

5. Tagajo DRR city strategy ②

Tagajo, Miyagi

1 Building multiple barriers for tsunami

Aim: Facilities & systems have been built as the foundation of local recovery

【multiple defenses image】

【Project】
- Multiple barriers
- Evacuation roads
- Escape towers
- Dissemination of evacuation announcement

2 Developing earthquake-resilient city

Aim: Buildings have earthquake resistant structure

【Project】
- Earthquake resistant roads and bridges
- Earthquake resistant wooden buildings

3 Minimizing flood damage

Aim: Flood damage by heavy rain is reduced

【Project】
- Rainwater draining system
- Rainwater draining pump
- Side ditches

4 Developing disaster response system

Aim: Disaster response system including rescue, evacuation and recovery is established

【Project】
- Evacuation site management manual
- Stockpile facility
- Distribution base for relief supplies

5. Tagajo DRR city strategy ③

Tagajo, Miyagi

5 Enhancing self-help ability

Aim: Disaster preparedness capacity of each citizen is fulfilled

【Handbook】

【DRR education】

【Project】
- DRR education
- DRR handbook
- Tsunami hazard map

6 Strengthening community DRR capacity

Aim: Local DRR capacity as assistance by pubic bodies is increased

【emergency drill】

【Project】
- Local emergency drill
- Voluntary disaster prevention organization

7 Sharing disaster experience

Aim: Disaster experience and records are disseminated

【Project】
- Sharing experience & lessons

8 DRR Research Park Program

Aim: Various DRR technology and products are developed

【Project】
- Promotion of DRR technology development
- Joint meeting of industry, academia and government
- Joint research with private sector and university

【lettuce grown in artificial light】

【Image of DRR technology】

Presentations

Campus Safety: how to secure safety and security toward natural disasters on campus

Takako Izumi

Associate Professor of International Research Institute of Disaster Science, Tohoku University

The United Nations Office of Disaster Risk Reduction (UNISDR) conducted an awareness campaign called “Disaster risk reduction (DRR) begins at school” in 2006–2007. Throughout this campaign, the importance of DRR efforts and countermeasures at schools as well as disaster education were strongly emphasized. However, the demand of disaster preparedness on university campuses was overlooked despite universities being recognized as part of the community. Therefore, once they are heavily inflicted, impacts can be felt beyond campus and also affect communities.

As a network of universities, APRU should be responsible for developing, internationally promoting, and assisting in implementing disaster preparedness on university campuses. The objectives of this study are as follows:

- To conduct a survey of APRU members on the current status of disaster preparedness on campus and identify the challenges and recommendations for the future preparedness plan.
- To promote the need for campus safety and share the best practices with the APRU members.
- To contribute to international events such as the 2015 UN World Conference on Disaster Risk Reduction by sharing the results of campus safety studies and raising awareness on its significance.

In the survey results, the following major challenges were addressed to develop the disaster preparedness capacity on campus:

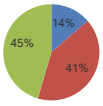
- Securing the necessary budget for DRR measures, particularly for infrastructure enhancement
- A lack of awareness and interest among the campus population in preparing for infrequent catastrophic events

From the various DRR measures, many universities consider prioritizing the implementation of evacuation drills, preparation of response, preparedness, recovery plans, developing the capacity of a response team, and establishing frequent communications between emergency/security offices and faculty members.

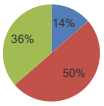
The APRU has received requests through surveys for sharing the best practices of disaster preparedness on campus, assessment tools, manuals and training materials developed by member universities, and conducting a workshop on campus safety. The APRU MH program will work on developing the campus safety program and seek to raise awareness on the importance of disaster preparedness on campuses among the APRU members.

Risk assessment

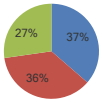
1. Risk assessment



2. DRR strategy based on risk assessment



3. Result sharing of risk assessment



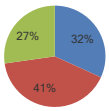
How was it conducted and how was the result used?

- Followed FEMA's guideline
- 5 years cycle and it is used to identify and prioritize potential risk reduction measures and action/work plan
- Top 10 hazards were identified for the campus and mitigation measures have been implemented.

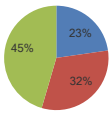
1

Disaster preparedness mechanism/capacity

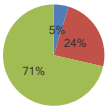
1. Safety confirmation system



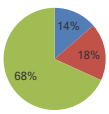
2. Disaster response handbook



3. Disaster-proof structure



4. Awareness-raising activities (drills, guidance etc)



- Disaster response exercise for incident command staff
- Workshop on lab-safety
- Evacuation drill
- Annual preparedness fair, quarterly tests of the emergency notification system
- Public outreach – community preparedness workshop on campus
- Online-fire safety awareness program
- Disaster response manual

2

Practical Education Program for Improving Response Capability to Survive from Tsunami

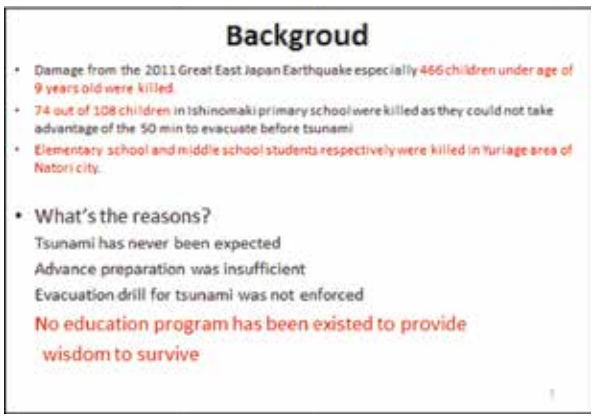
Mari Yasuda

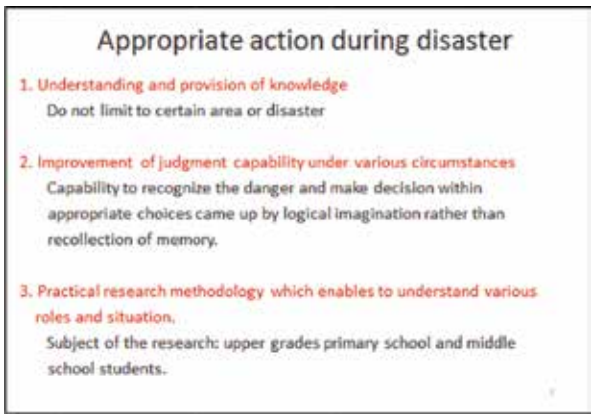
Research Associate of International Research Institute of Disaster Science, Tohoku University

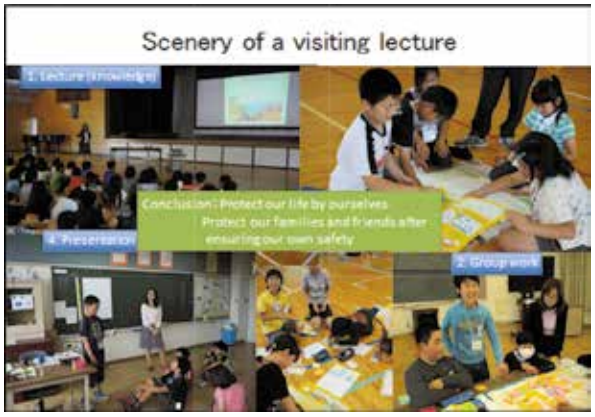
Due to the Great East Japan Earthquake and Tsunami on 11 March 2011, 466 children under the age of 9 years lost their lives. The reasons/problems identified include: a tsunami with that scale has never been expected, advance preparation was insufficient, and evacuation drill for tsunami was not enforced. There was no education program to provide the wisdom to survive, and these situations must be changed.

First, it is necessary to develop adequate textbooks to support learning on disasters and disaster risks. If children have such knowledge and understanding, they can take an appropriate action. Universities and academic institutions have a responsibility for providing necessary support to such initiatives by local governments and schools as well as developing a methodology which enables children/students to understand the mechanism of nature and the occurrence of disaster as well as the need of taking action for evacuation.

In 2014, IRIDeS initiated the YUI project to conduct a DRR education program for the 5th grade of elementary school students. The Program will be organized at 70 schools covering 3,924 students in 2014. So far, it was also conducted in Thailand and Hawaii. After the event, most of the students say “Yes, I can do it by myself” and it proves that the event provided the students with certain level of knowledge and understanding of the importance of “evacuation”. A tsunami is a low frequency disaster, however, it is crucial to continue practicing the efforts of “GENSAI”, or disaster mitigation.







The 3rd UN World Conference on Disaster Risk Reduction ～ Message from Sendai, Tohoku

Kazuyuki Numata

Section Chief, World Conference on Disaster Risk Reduction Preparation Department, Sendai City

The 3rd UN World Conference on Disaster Risk Reduction

The 3rd UN World Conference on Disaster Risk Reduction, organized by the United Nations, will be held in Sendai on 14-18 March in Sendai, Japan with the main objective of developing the next framework after the Hyogo Framework for Action (HFA). The first and second conferences were also held in Japan. As Japan has suffered from many disasters, the international community has expectation of Japan to share their experiences and knowledge. It is expected that the conference will be participated by more than 40,000 people in both the main conference and the related events such as public forums and exhibitions.

Importance of investing continuously in Disaster Risk Reduction

Sendai City has experienced large earthquakes almost every 40 years, thus preparing for earthquakes has been an important issue for the municipality. On 12 June, 1978, the Miyagi-ken-oki Earthquake with a magnitude of 7.4 occurred. As many buildings and brick walls were destroyed, causing many damages and injuries, a major amendment in the Building Standard Law regarding the earthquake resistance standard was made in 1981.

In the Great Hanshin-Awaji Earthquake in 1995, buildings constructed under the old earthquake resistance standard were heavily damaged. From that experience, further reinforcement of the earthquake resistance standard was made in 2000. Sendai City has been making commitments in earthquake-proof retrofit of buildings constructed under the old standard. The city has provided subsidies for earthquake resistance assessment and earthquake-proof retrofit of private-owned buildings. As for city-owned buildings, earthquake resistance surveys and earthquake-proof retrofit have been conducted as well. For school buildings, 100% have been already retrofitted before 2011 and there was no injury among the school children who were in the schools when the Tsunami occurred. In addition, no distinct damage on the city hall building was caused, therefore, the administrative function was not interrupted due to the building damage.

DRR measures in urban infrastructure were implemented beforehand to prepare for the next earthquake off the coast of Miyagi Prefecture.

- Enforcement of urban infrastructure was made based on the lessons learned from the Miyagi-ken-oki Earthquake. The scale of the 2011 Great East Japan Earthquake and Tsunami was much greater than anticipated, but the measures proved to be effective.
- Gas recovered in 37 days. No damages were seen in polyethylene gas pipes, proving its effectiveness.
- As for waterworks, water supply recovered in 18 days, but the sewerage facility suffered huge damage by the tsunami, taking 4 years to recover completely. There was no major damage to earthquake resistant pipes.
- Other than restricting construction of new brick walls which do not satisfy the standard, subsidies for removal of walls and switching to hedges continued. As a result, there were no casualties due to destroyed brick walls in 2011.

Importance of preparation for response procedures under emergencies including needs assessment

The first issue to cope with in the reconstruction process is the disposal of massive rubble generated by the 2011 Tsunami. Incineration was completed in September 2013, and restoration of the rubble site

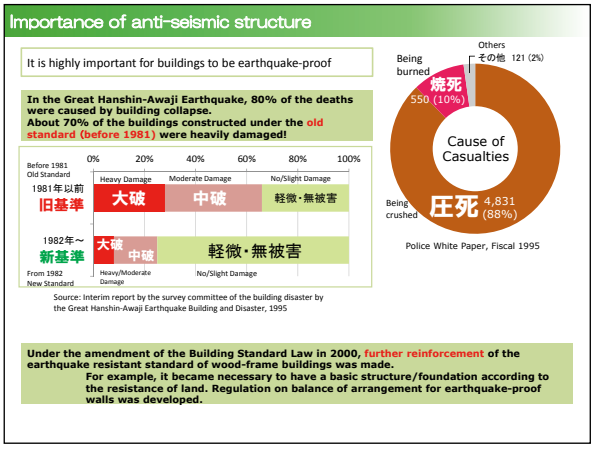
was completed by March 2014. Recycling rate was over 70%. The rubble separation in the process of its collection at the affected sites led to its speedy disposal.

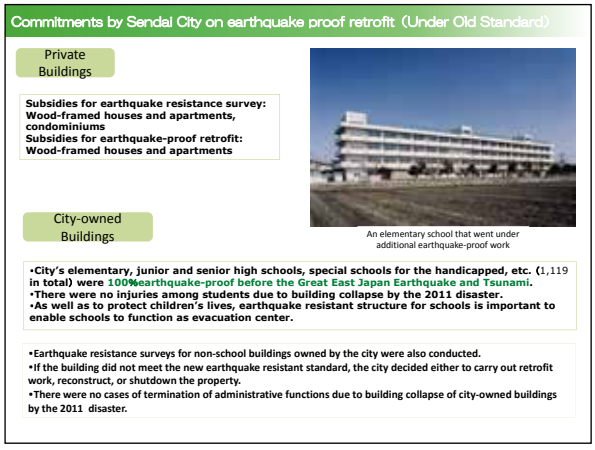
All incineration facilities stopped at the time of the earthquake, and human waste disposal facilities located on the coast areas were totally destroyed by the Tsunami. However, the city began the collection of human waste from the temporary toilets at the evacuation centers on the next day, and started the garbage collection at the evacuation centers 2 days after the disaster. Waste disposal is a fight against time, since hygiene problems arise if time is wasted.

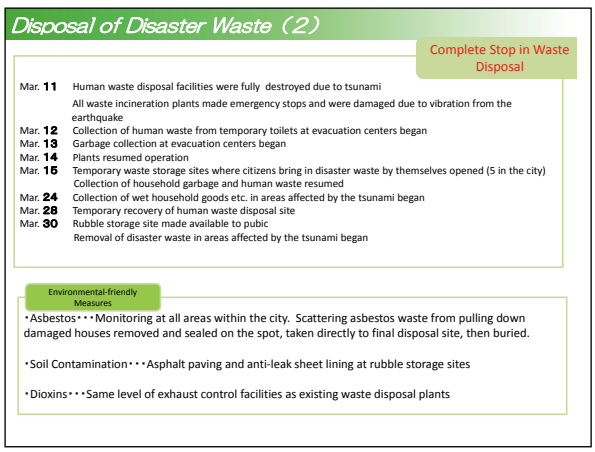
In Sendai City, a disaster waste management plan was developed before 2011. Therefore, the disposal policy could be decided within 1 month after the Tsunami. The city was able to accurately estimate the volume of rubble, since the method was determined beforehand. It is important to have such plan to respond to an emergency immediately after its occurrence.

A factor that made possible the prompt disposal of waste was the collaboration with local suppliers. Sendai city and they had an agreement on disaster response even before the Tsunami and had a cooperation system beforehand.

The most important point in both investment in DRR and disposal of rubble, is the preparation for disasters in normal circumstances. Steady continuous preparation in ordinary times becomes a tremendous power in emergency situations.







GROUP WORK DISCUSSIONS

Group Session 1: Campus Safety, July 23

A safe campus is defined as follows:
"A safe campus is one that provides students the opportunity to pursue their academic potential in an environment free of discrimination, intimidation, or threat to physical or emotional well-being. The safe campus is one that responds to such threats and takes decisive, corrective action to eliminate them. A safe campus is one that is monitored for safety, one where the various dimensions of the environment are routinely evaluated and adjustments are made as appropriate. Creating such an environment is an institutional responsibility and one that requires participation and commitment from multiple parties within the institution" (Rund, J. A., The changing context of campus, *New Directions for Student services*, Volume 2002, Issue 99).

To implement "a safe campus," it is necessary for universities to maintain an environment where students can continue their study and research activities. The universities must also respond promptly to disasters, make regular risk assessments on campus, and try to eliminate or reduce risks if identified. "Campus safety," in this discussion, focuses only on "safety" against natural disasters, excluding human-made disasters, crime, and health issues such as pandemics. While some universities have already developed preparedness/contingency plans and measures, the survey indicates that awareness of the need and importance for disaster preparedness on campus has not been fully recognized. Universities are facing the challenges of understanding and supporting the preparedness activities on campus and/or of securing the necessary budget and human resources to develop preparedness and response plans and other preparedness measures. The APRU MH Program attempts to raise awareness of the campus safety concept and share the good practices, tools, and manuals of campus safety initiatives with the APRU members.

Summary
In this group session, the participants were instructed as follows:
1. Please list the priority efforts to ensure "campus safety."
2. Please develop a checklist to assess the capacity of disaster preparedness on campus.
3. Please develop an action plan to implement "campus safety" at your respective universities.

Priority
In the priority efforts, most groups addressed the need for the following:
- Evacuation drills
- Establishing a backup system of communication
- Securing a budget
- Establishing an alert system

In addition, the need for forming a crisis management and response team, developing a contingency plan, and raising awareness of preparedness were also listed as priorities. It was suggested that since a university can be a part of the community, it should be responsible for raising public safety awareness through community service or training of a disaster and DRR expert. It is important for universities to integrate DRR as a subject in the university degree program and curriculum.

Action Plan

One group developed a concrete action plan to implement campus safety. This included four major activities: hazard, vulnerability, and capacity assessment on campus; developing a preparedness/ contingency plan; consultation and training for the plan; and preparing policies/SOP for implementing the action plan. The assessment will be the first step in initiating the process of campus safety. Another group stressed the importance of assigning a focal person/office who is in charge of campus safety as the first step. Once such an office is appointed, the university must allocate a certain amount of funds and human resources dedicated to managing the campus safety project.

Checklist

A checklist can be a reminder of things to do or points to consider toward achieving a goal. It is used to assess the current capacity of campus disaster preparedness and identify deficiencies.

Major elements proposed by the groups in the list include:

● Campus safety manual	● Response team	● Emergency aid kits
● Evacuation drills	● Tuition fee	● Emergency response equipment
● Hazard, capacity and Risk assessment and information sharing	● University damage assessment team	● DRR training and awareness/advocacy effort
● Disaster countermeasure office	● Increase capacity of lecture recordings	● Develop a pool of trainers
● Stockpile of emergency items	● Equipping staff to work remotely	● Inter-departmental information dissemination protocol
● Building structure (anti-earthquake)	● Identify student volunteers	● Funds allocation
● Emergency alert system	● Hazard identification	● Inter-university information sharing protocol
● Back-up system (electricity and communication)	● Department linkages and collaboration mechanism	● Road safety manual

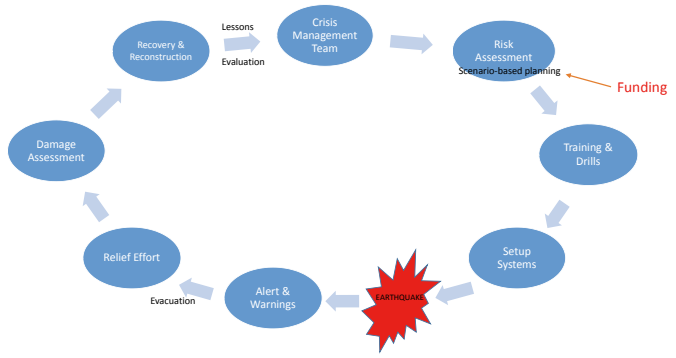
To substantiate the checklist, it must be further reviewed by DRR and safety experts. Thereafter, the APRU MH Program must share the checklist with the APRU members.

GROUP A

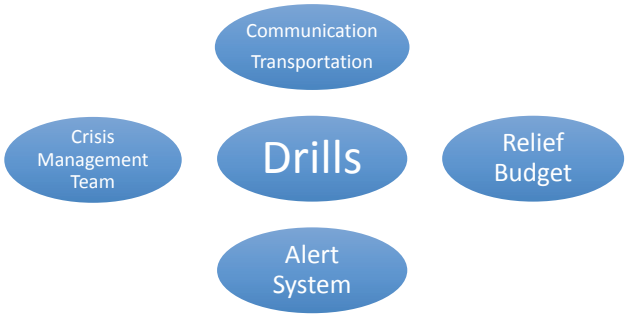
CHECK LIST

Preparedness	Response	Recovery
☐ Handbook	☐ Emergency Alert Systems	☐ Coordinating & Monitoring System
☐ Drills on Evacuation	☐ Backup System - Electrical	☐ University Damage Assessment Team
☐ Risk Assessment	☐ Networking	
☐ Disaster Countermeasure Office	Medical Care - mental health	
☐ Signs	☐ Tuition Fee - Free, Grants, Reduction	
☐ Store House		
Budget Policy		
☐ Building Structures		

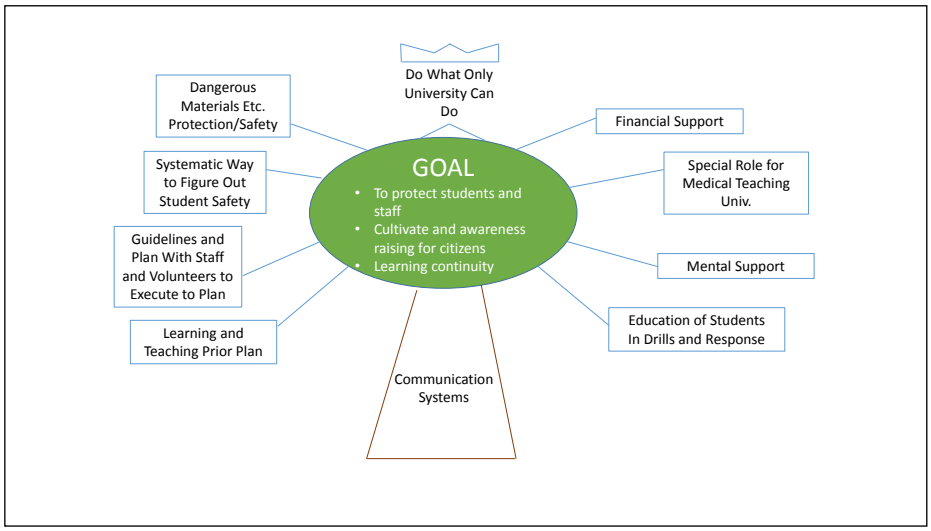
Action Plan



PRIORITY



GROUP B



Online Delivery • Redundancy of systems • Back-up generator • Ensure online access via community centres	**Increase Capacity for Lecture Recordings** • Policy for mandatory recordings of lectures • Video/audio recording devices • Central database	**Equipping Staff to Work Remotely** • Provide staff with devices • How to use • Annual review
Prepare Staff/Students for Assessment Changes • Alternative assessment options • Change university policy	**Identify Network of Leaders – Culture Change** • Education of Staff • Identify student volunteers • Assistance with coaching • Drills	**Communications** • Establish alert system • Parents • Notifications of unsafe buildings

GROUP C

Prepare for High –impact Disasters: towards the UN World Conference on Disaster Risk Reduction, Tohoku University, Sendai City, Japan

Our Goal: To create Resilient University Campus Assumption: The University Campus have set protocol with Local Government Unit

GROUP "C"

MEI ORIKASA
YU YUE
GRACE MOLINA
A. OLARINKOYE AJIBOYE
TABASSAM RAZA

Multi-Hazards Priorities in DRR

Priority	Description
1	Emergency Alert System for University Campus through official medium such as, Radio, TV, University Website, and Social networking sites
2	Development of Contingency Plan i.e., Integrated plan in terms of involving all the department heads for harmonization purposes.
3	Campus –wide simultaneous evacuation drills; Crafting policy to have it in every semester to identify the gaps and fill up to integrate in Action Plan
4	Integrate DRR as one of the subjects in general courses of the university degree program curriculum
5	Emergency Management and public safety awareness through the community service /ROTC/NCCT, etc

Campus Safety Checklist

No.	Description	No.	Description
1.	Hazard Identification	9.	Periodic DRR training and Awareness advocacy
2.	Hazard Assessment	10.	Develop Pool of trainers
3.	Capacity assessment	11.	Inter-departmental information dissemination protocol
4.	Campus safety Manual and other ICT material	12.	Availability of Funds
5.	Department linkages protocol guidelines	13.	Inter-university information dissemination protocol
6.		14.	Road Safety Manual
7.	Emergency Aid Kits in each department	15.	Financial Mechanism
8.	Emergency Response Equipments		

Action Plan 2014 -2020

Activity	Time Frame	Budget	Resources	Key Person
Hazard Vulnerability and Capacity Assessment	8 weeks	Approved by the President and VP Finance and/or Treasurer	Technical and socio economic support from designated department personnel	Head DRRUCC Under President Office
Preparedness, Prevention and Rescue & Response (Development Contingency planning)	4 Weeks	Approved by the President ,VP Finance and/or Treasurer	Experts from Planning, Engineering, Sociology Geography, Geology, Biology, Emergency Mgt Dept, etc Departments	Designated personnel for DRR by the head of each department
Training of the Trainers and evaluation of the Contingency Plan (Dry Run)	12 Weeks	Approved by the President , VP Finance and Treasurer	Experts from Planning, Engineering, Sociology Geography, Geology, Biology Department and etc and students	Designated personnel for DRR by the head of each department
Prepare policies/SOP for Implementation of the Action Pian 2014-2020	8 weeks	Approved by VP Finance and Treasurer	-do-	Designated personnel for DRR by the head of each department

Thank You

GROUP D

PRIORITY — Group D

① Identification of hazards/vulnerability
- Disaster-resilient buildings
- Mutual support
- Emergency communication system
- Relief service/team
- Emergency stockpile
- Personal protective equipment, skills/awareness on what to do
- Clear command structure
- Evacuation drill (Special drill on how to deal with data/hazardous materials)

② Alert system (evacuation need, detection tools)

Checklist — Group D

- Response plan - students
  - senior management
- Recovery plan
- Emergency power system (electricity, water, etc.)
- Guiding sign/map with evacuation route, meeting point
- Emergency announcement on univ. HP (+ back-up communication system)
- Fire distinguisher
- List of students/faculty with contact numbers
- Hazard map
- Crisis management office - internal
  - external
- Regular training program for everyone on campus (New student, staff)
- Monitoring and evaluation on response/recovery → how to prepare for next disaster

Action Plan — Group D

- Assign a focal person on emergency in each building (faculty member)
- Exercise of focal persons drills
- Review the process
- List of focal persons
- Task force of focal persons (Different department/faculty)
- Post-disaster inspection team
- Timeline/*Master plan* (evaluation, expertise from outside)
- Coordinate disaster response/recovery plan with community

Group Session 2: Recommendations for the 2015 UN World Conference on Disaster Risk Reduction

The Third UN World Conference on Disaster Risk Reduction (UNWCDRR) will be held on March 14–18, 2015 in Sendai City, Japan. To consider and adopt the post-2015 framework for DRR, several thousand participants are expected, including distinguished representatives from the government, international organizations, NGOs, the private sector, and other major groups.

The first Preparatory Committee Meeting for UNWCDRR was held in Geneva on July 14–15, 2014. The participating UN member states made an official statement on their DRR initiatives and strategy, and emphasized critical areas in DRR in their own view. In this group session, the statements by region were distributed to each group; for example, one group received the statements made by 15 Asian countries. They were then asked to count the following keywords in each statement and calculate the total number by region to observe which words are most highlighted and emphasized as greatest concerns in their statements: *Link with 2015 SDGs, Link with Climate Change, Link with Science, Link with Conflicts/Wars, Underlying Risk or Vulnerability, Urban Issue, Education, Disaster Data (damage and loss), Mainstreaming DRR, Resilience, Exposure, HFA Monitoring, Early Warning System, Economic Losses, Governance, Disaster Response, Recovery/Reconstruction, Insurance/ Risk Transfer, Capacity Development, Civil Society/NGOs, Local/Community Level, and Regional Level such as Asia and Africa.*

The most highlighted topic in statements was “link with climate change.” Climate change is often considered as one of the reasons for the increasing scale and frequency of meteorological hazards. Therefore, DRR and climate change adaptation have a common goal to prepare for future disasters. Second, “resilience” and “local/community level” are keywords frequently addressed in the statements. It is understood that the majority of member states presenting the statement acknowledged and emphasized the importance of building resilience and the involvement of local stakeholders. “Resilience” can be achieved by the participation of various stakeholders, especially from community and local levels, and with leadership and support on the international and national levels. A first step is to establish and strengthen collaboration among these different stakeholders for raising awareness, developing capacity, exchanging information, and sharing knowledge to build resilience. On the other hand, it was shown that the linkages of DRR to “conflict inclusive,” “exposure,” “health,” and “human rights” are still of less concern and interest among the states. For example, the health–DRR relationship is extremely important for hospital preparedness, maintaining regular health and hygiene conditions, and developing the capacity of facilities, medical staff, systems, and mechanisms. Raising awareness on the importance and needs of these important elements requires support and strong advocacy on an international level. One suggestion of this group session for the post Hyogo framework for Action (HFA) is to highlight the importance of missing essential elements and factors, such as health, and the impact of conflicts on the DRR progress.






Keywords highlighted by each region as greatest concerns in the Statements

OCEANIA & PACIFIC ISLANDS (7)

7 COUNTRY STATEMENTS : (1) DEVELOPED COUNTRIES (Oz, NZ)
(2) SIDS (Cook, Tonga, Samoa, Nauru, Tuvalu)

TOP PRIORITIES : ① CLIMATE CHANGE LINKAGE ② CAPACITY DEVELOPMENT ③ RESILIENCE

SIDS	Oz & NZ
• link disasters to climate change. • call for reduction in GHG emissions • call for capacity development from developed countries • right for survival ⇒ use human rights, justice, language	• building resilience ; improving mitigation (rather than recovery response) • advocates : government ⇔ private sector ⇔ NGO • HFA2 : (1) mainstream DRR into DEV (2) DRR education (3) focus on helping most vulnerable (women, disabilities, children)

AMERICAS (8)

Most Important Concerns

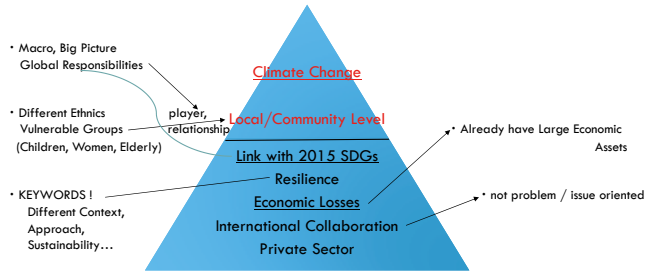
- Integrate DRR with Climate Change (5)
- HFA Monitoring (5)
- Local / Community Involvement (4)

ASIA (15)

TOP PRIORITIES

- Resilience (14 times)
- Link with Climate Change (13)
- Local/Community Level, Mainstreaming DRR, Governance(12)
- Link with 2015 SDGs (11)
- Early Warning System (10)

EUROPE (10)



AFRICA (15)

PRIORITY	DESCRIPTION	DETAILS
HIGH (MOST OF THE COUNTRIES VOICE)	The Region Demands for Climate Change Adaptation and Mitigation along With Mainstreaming DRR and Regional Cooperation; Further There Is Need For Developing Appropriate Methodologies In Estimating Risks, Vulnerabilities and Early Warning System, Emphasizing on Disaster Response That Should Be Gender Sensitive.	Link with Climate Change (6) Link with Science; Mainstreaming DRR; Capacity Development; Regional Level (5) Underlying Risk or Vulnerability (4)
MEDIUM (SOME COUNTRIES VOICE)	There is substantial concerns towards resolutions on conflict/war, urban environment issues, exposure (i.e. people, property and environment), economic losses, recovery and reconstruction, financial mechanism(ex. Insurance and other risk transfer schemes).	Link with 2015 SDGs; Education; Disaster Data; Resilience; HFA Monitoring; Governance; Local/Community Level; International Collaborations; Private Sector(3) Including Conflict; Urban Issue; Exposure; Economic Losses; Recovery/Reconstruction; Insurance/Risk Transfer (2)
MILD (JUST LIMITED COUNTRIES VOICE)	The region also supports the coordination of NGO's and civil society organizations. Moreover, health matter global advocacy is recommended.	Civil Society/NGOs; Health (1)

FIELD TRIP

Field trip to Minami-Sanriku town and Kesennuma city on 24 July 2014

The participants visited the affected areas to learn the damage, impacts and experience of the local people by the Great East Japan Earthquake and Tsunami in 2011. The major places visited included Takano-kaikan, Disaster prevention buildings, Kesennuma Shark Museum, Kesennuma Rias Ark Museum as well as the Tohoku University Kesennuma Satellite.

Jesusa Grace J. Molina
MA Candidate, Center for Development Studies, Faculty of Arts, The University of Auckland

As one of the participants of the 2nd Multi-Hazards Summer School Program, held at Tohoku University in Sendai City from July 22 to 25, 2014, I was able to gain an enhanced understanding of disaster risk reduction and management (DRRM) processes and mechanisms highlighting the lessons and experiences from the 2011 Great East Japan Earthquake and Tsunami. Together with more than 30 participants, comprised of postgraduate students, researchers, and DRRM practitioners, I engaged in dynamic learning and interaction through various methods employed by the program such as interactive lectures, video presentations, group discussions, and field visit. One of the activities I enjoyed most was the field visit held on the third day of the program.

The field trip in Kessenuma became an effective avenue for me to see how the Japanese people were able to concretely put into practice the concepts, theoretical frameworks, and strategies on rehabilitation and recovery presented by the speakers from the government, academe, private sector, and NGO. Our visit to the affected areas and relocation sites, and museums, as well as hearing the testimonies and experiences from the survivors themselves are tangible evidences of how the communities initiated the rebuilding efforts through cooperation and multi-stakeholder partnerships. Although, I have seen the communities wiped out by the tragedy, the survivors are undeniably an epitome of resilience as they were able to gain back sense of normalcy with dignity and in high spirits despite the massive destruction and great losses brought about by the tsunami. I particularly admire the efforts of the curators in the Rias Ark Museum as they were able to exhibit their own photos and personal belongings left by the disaster. Their noble act of sharing these personal things is a proof of how generous they are in spreading awareness and lessons from the disaster for visitors like me. The presence of such an exhibit will serve as a living legacy of the Japanese people's resilience and will continue to inspire the people all over the world to invest in DRRM.

The experience of Kessenuma also highlighted the importance of preparing for worst case scenarios. Rapid onset disasters such as earthquakes and tsunamis can strike anytime and cause large-scale destruction. This should be a significant and constant consideration for all DRRM practitioners from different sectors in initiating planning and decision-making processes. The rising frequency and unprecedented occurrence of big disasters in the recent years should serve as a wake

-up call for the global community to work together and invest in proactive measures to achieve safer and resilient nations.

Danny Marks

PhD Candidate, University of Sydney

I can still vividly remember now the afternoon of the Great Japanese Earthquake even though I was miles away safely living in Bangkok at the time. I was visiting my friend's apartment and we turned on BBC to see the news for the day. To our great surprise, we watched live footage of the colossal tsunami violently hurling car and destroying buildings. I remember being awestruck by the power of nature but also very saddened by how much devastation it could cause.

Just over three years later, I was fortunate enough to attend the APRU Summer School at the University of Tohoku in Sendai. One of the biggest highlights of the summer school for me was the field trip to visit some of the sites I saw on television that day. As a PhD student who is doing his dissertation on disasters, I found visiting the disaster prevention building, where only 10 of 130 employees survived and which was almost completely wrecked by the tsunami, a poignant reminder of our vulnerability to nature's fury, despite our best efforts to protect ourselves. It also shows the folly of thinking that we can always protect ourselves from disasters by building seawalls, tide gates, and dykes. In Minami-Sanriku, the seawalls and gates were raised after the 1960 tsunami but was still not high enough to protect the town from the 2011 tsunami. This failure raises the difficult question of whether people should move away from disaster-prone areas or continue to live with risk because their livelihoods are based there and they have lived there for generations, always rebuilding after each disaster.

I also found our visit to the Rias Ark Museum fascinating. The Museum has a special exhibition on the earthquake, full of photos displaying the extent of the devastation but also household items such as bicycles and washing machines which were completely contorted and shaped in ways normally unimaginable. I think the Museum is valuable to future generations, both Japanese and foreigners, because it helps us retain memories from the earthquake. It also reminds us not to forget about past disasters and therefore urges us to instead constantly prepare for and build resilience to future disasters.

Liza Corro

Dean, University of the Philippines Cebu

I had mixed feelings on our way to Kesennuma. I was curious on how the place had recovered after its great devastation from the 2011 Great East Japan earthquake. At the same time, I was apprehensive on what I will see, with my personal experiences still very fresh in my mind on how our town in Daanbantayan, Cebu, Philippines, was levelled off, after it was left totally defenseless during the ferocious visit of typhoon Yolanda (with international code name Haiyan), last November 8, 2013.

What first struck me in our initial stop were the two skeletal buildings, left to stand as memorial of the great tsunami. It was not the tragedy which had beset the place which registered in my mind, but the heroism of those who made it possible for lives to be spared from the disaster. In the first building where we stopped, its owner's selflessness to convert his building into an evacuation center, had provided refuge to countless people. While in the other building, the woman who heroically announced continuously the evacuation, at the expense of her very own life, will forever remain a story to be told and retold.

Next in my mind were the hills or mounds with artificial forests I saw, which they constructed as barriers to the sea and future tsunamis. These varied mounds and trees were practical solutions to a very real and expected recurring natural disaster in Japan, which provides at the same time an aesthetic relief to the eyes. But more than these, all the greeneries radiated a feeling of hope among the residents, that soon, they will recover from their hardships after the calamity that devastated their place. Even the temporary site for the commercial areas amazed me with the resiliency of the tsunami survivors. I had no idea how it was then for them, before the Great East Japan Earthquake. I speculated it must had been very much different, with bigger and better facilities and more prosperous residents in their place. But how these people are able to manage and operate their make shift facilities, made me silently admire the serenity with which they accepted their conditions.

Discussions I had in the bus ride with my seat mate and the other summer school participants were quite interesting. Upon seeing houses along our field trip's travel route, it sparked a discussion on what is a disaster resilient roof. Very striking were the varied answers we each had to contend with, depending on the kind of disaster we experience in our respective places. A heavy roofing material may be ideal in an area commonly visited by typhoon, but not, if it were in an earthquake prone country like Japan.

Next were the debris I saw inside the RIAS Museum. From the stuff toys to the refrigerator and car debris, they really evoked so much sad and painful thoughts, even for someone like me who wasn't then around during the Great East Japan Earthquake in 2011 and the tsunami aftermath. Although there were no photographs inside the museum to show the people who died during the incident, but there were two to three paintings which graphically depicted how the people were swallowed by the

sea. It was as good as a picture was taken during the incident. It really took me a while to take my eyes off those paintings. All those tsunami debris and photographs and paintings inside the RIAS Museum, will forever be a constant reminder of the eventuality of another great disaster, of which we should always be ready. But at the same time, it is an innovative and therapeutic way of building back. They generate income through the ticket sales to the Museum. Even the intermittent stops we had, to shop for souvenir items along the field trip route. I really appreciated it as an effort to help the economy of those affected and dislocated by the tsunami.

What was remarkable for me to see, among the tsunami survivors, and the rest of their stakeholders, is their optimism and the steadfast support they had for each other. Natural disasters may be beyond man's control, but it really matters a lot on how man prepares before such calamities happen, and how they handle, socially, scientifically and psychologically, its aftermath.

Disaster prevention building

Minami-Sanriku Sun Sun shopping village

Shark Museum

Kasey Schultz
PhD student, Physics Department, University of California - Davis

In the 2014 Multi-hazards Summer School at Tohoku University we visited Kesennuma and Minamisanriku. It has now been 3 years since the tsunami, and most of the debris has been cleared away. The scene in Minamisanriku was hard to believe. Where there was once a thriving fishing village, now there is just nothing, only the concrete foundations of the former town. It was as if the city was wiped off the map in an instant.

It reminded me of my own experiences after Hurricane Katrina, seeing entire neighborhoods reduced to only their foundations. But hurricanes are fundamentally different than earthquakes/ tsunamis. Hurricane warnings and evacuation notices can be delivered a day or at least many hours before the storm arrives. In watching the videos of the tsunami it's hard to imagine that even with the sirens and early warning system, that anyone could expect the whole town would be destroyed in a matter of minutes. And to think that all of that happened while it was snowing is unbelievable.

The skeletons of the few buildings that remained serve as important reminders to future generations. I will never forget the 3 story tsunami evacuation building that was not tall enough to escape the tsunami, or the hotel owner who was confident in the safety of his building and was able to save many residents.

After seeing Minamisanriku, we moved on to Kesennuma city. Kesennuma had been rebuilding since the tsunami, and the most striking thing for me was the small blue signs posted around the city that marked the maximum height of the tsunami in different locations. I think there should be many more of these signs in all the tsunami affected areas to serve as an every day reminder to never underestimate the threat of a tsunami, and as a reminder for future generations once the recent memories of 3/11 fade into the past.

Also, I think if Tohoku University is going to continue the summer school, that Mr. Suzuki, the resident from Kesennuma, should be involved again. Having lost my home in a natural disaster, I know it's very difficult for him relive the event by sharing his experience of leaving his home and watching the tsunami sweep it away. But I believe his first hand account of the tragedy, and his efforts in organizing community evacuation plans and raising awareness serve as an amazing inspiration to anyone researching or working in the field of natural hazards. Too often we distance ourselves from the true impact of these disasters and we only think in terms of numbers; number of fatalities, tsunami height, earthquake magnitude etc.

The Multi-Hazards Summer School is a truly beneficial experience on many levels. It allows us to appreciate the full range of efforts to minimize the effects of future disasters, from computer simulations to urban planning to community outreach and education. I am very lucky and very grateful to have attended, and I hope that the attendance to future Multi-hazards summer schools will only increase.

Rias Ark Museum

Kesennuma Satellite

ANNEX I : APRU-IRIDeS Summer School Program

22-25 July: Seminar at the Katahira Kitamon Commons 2F, Katahira Campus, Tohoku University
24 July: Field trip to Minami-Sanriku town and Kesennuma city

July 22

09 : 25 — 09 : 40 Introduction of participants

09 : 40 — 10 : 25 “Introduction to International Research Institute of Disaster Science (IRIDeS), Tohoku University”

(Prof. Makoto Okumura, IRIDeS, Tohoku University)

10 : 25 — 10 : 55 Coffee break

10 : 55 — 11 : 55 “Disaster Medical and Public Health Management as DRR/DRM”

(Prof. Shinichi Egawa, IRIDeS, Tohoku University)

11 : 55 — 13 : 00 Lunch

13 : 00 — 14 : 00 “A Practical Guide to Global Earthquake Forecasting”

(Prof. John Rundle, University of California, Davis)

“A Brief Overview of Computational Modeling for Multi-Hazards”

(Dr. Eric Heien, University of California, Davis)

14 : 00 — 15 : 00 “Disaster“ (Research Assistant. Shinya Horie, Graduate School of Environmental Studies, Tohoku University)

15 : 00 — 15 : 20 Coffee break

15 : 20 — 16 : 20 “Tasks and Problems for Reconstruction Works from the Disaster”

(Prof. Yasuaki Onoda, IRIDeS, Tohoku University)

16 : 20 — 17 : 20 “Hyogo Framework for Action 2005-2015: Review from a Viewpoint” (Prof. Osamu Murao, IRIDeS, Tohoku University)

July 23

09 : 00 — 10 : 00 “KAKEAGARE! JAPAN”

(Mr. Shunsuke Matsushima, Dentsu Inc.)

10 : 00 — 11 : 00 “Data Are Not Enough: Reducing Risk through Information Services”

(Dr. Heather Bell, Pacific Tsunami Warning Center, Hawaii)

11 : 00 — 11 : 20 Coffee break

11 : 20 — 12 : 20 “Towards disaster risk reduction city”

(Mr. Manabu Suzuki, Tagajo City)

12 : 20 — 13 : 20 Lunch

13 : 20 — 13 : 50 “Campus Safety Survey” (Assoc. Prof. Takako Izumi, IRIDeS, Tohoku University)

13 : 50 — 15 : 50 Group discussion 1: Campus Safety

15 : 50 — 16 : 00 Coffee break

16 : 00 — 17 : 00 Group presentation and discussion

July 24: Field trip

Minami-Sanriku town and Kesennuma city

July 25

09 : 30 — 10 : 30 “Practical Education Program for Improving Response Capability to Survive from Tsunami” (Research assistant: Mari Yasuda, IRIDeS, Tohoku University)

10 : 30 — 10 : 45 Coffee break

10 : 45 — 11 : 45 “The 3rd UN World Conference on Disaster Risk Reduction”

(Mr. Kazuyuki Numata, Sendai City)

12 : 00 — 13 : 00 Lunch

13 : 00 — 15 : 00 Group discussion 2: Recommendations towards 2015

UN World Conference on Disaster Risk Reduction

15 : 00 — 15 : 20 Coffee break

15 : 20 — 16 : 30 Group presentation and discussion

16 : 30 — 16 : 45 Closing

ANNEX II : List of Participants

	Name	Status	Country	University
1	Daniel Marks	PhD student	Australia	The University of Sydney
2	Yefeng Ma	PhD student	China	Tsinghua University
3	Jingbing Feng	Research student	China	Fudan University
4	Yu Yue	MA student	China	Zhejiang University
5	Erina Gyoba	Research worker	Japan	Tohoku University
6	Sachi Suzuki	PhD student	Japan	Tohoku University
7	Sakuya Iwakawa	Under graduate	Japan	Miyagigakuin Women's University
8	Mei Orikasa	Under graduate	Japan	Miyagigakuin Women's University
9	Isaaki Tatsuta	MA student	Japan	Keio University
10	Mihoko Sakurai	PhD student	Japan	Keio University
11	Garry Leigh Miller	PhD student	New Zealand	The University of Auckland
12	Jesusa Grace Jamilosa Molina	MA student	New Zealand	The University of Auckland
13	Behrooz Balaei Langroudi	PhD student	New Zealand	The University of Auckland
14	A. Olarinkoye Ajiboye	PhD student	New Zealand	Auckland University of Technology
15	Liza Diaz Corro	Dean	Philippines	University of the Philippines, Cebu
16	Richelle G. Zafra	Assistant Professor	Philippines	University of the Philippines Los Baños
17	Tabassam Raza	Associate Dean	Philippines	University of the Philippines, Diliman
18	Chian Siau Chen	Assistant Professor	Singapore	National University of Singapore
19	Alok Bhardwaj	PhD student	Singapore	National University of Singapore
20	Nicholas Cavanaugh	PhD student	USA	University of California, San Diego
21	Eric Martin Heien	Lead Programmer	USA	University of California, Davis
22	Kasey William Schults	PhD student	USA	University of California, Davis
23	J.Quinn Norris	Graduate Student Researcher	USA	University of California, Davis
24	John B. Rundle	Professor	USA	University of California, Davis
25	Heather Bell	Dean	Hawaii,USA	University of Hawaii at Manoa
26	Masahiko Haraguchi	PhD student	USA	Columbia University
27	Andre Edelhoff	Programme Director	Singapore	APRU Secretariat
28	Andrea Donnellan	Principal Scientist	USA	NASA/California Institute of Technology
29	Eric M. Conway	Historian	USA	NASA/California Institute of Technology
30	Manabu Suzuki	Chief of Bureau	Japan	Tagajo City
31	Masashi Sato	Deputy Manager	Japan	Tagajo City
32	Shunsuke Matsushima	General Manager	Japan	Dentsu Inc.

	Name	Status	Country	University
33	Yasushi Takahashi	General Manager	Japan	Dentsu East Japan Inc.
34	Kazuyuki Numata	Section Chief	Japan	Sendai City
35	Fumihiko Imamura	Director	Japan	Tohoku University (IRIDeS)
36	Makoto Okumura	Deputy Director	Japan	Tohoku University (IRIDeS)
37	Shinichi Egawa	Professor	Japan	Tohoku University (IRIDeS)
38	Osamu Murao	Professor	Japan	Tohoku University (IRIDeS)
39	Yasuaki Onoda	Professor	Japan	Tohoku University (IRIDeS)
40	Yuichi Ono	Professor	Japan	Tohoku University (IRIDeS)
41	Hirofumi Seike	Associate Professor	Japan	Tohoku University
42	Jeremy Bricker	Associate Professor	Japan	Tohoku University (IRIDeS)
43	Anawat Suppasri	Associate Professor	Japan	Tohoku University (IRIDeS)
44	Takako Izumi	Associate Professor	Japan	Tohoku University (IRIDeS)
45	Shinya Horie	Assistant Professor	Japan	Tohoku University
46	Yasuto Jibiki	Assistant Professor	Japan	Tohoku University (IRIDeS)
47	Mari Yasuda	Research assistant	Japan	Tohoku University (IRIDeS)