



TOHOKU
UNIVERSITY

2018

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



**Report of the APRU-IRIDeS Multi-Hazards Program
2018 Summer School**

24-27 July 2018

Tohoku University

Sendai, Japan

IRIDeS, Tohoku University

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Background

The 6th APRU (Association of Pacific Rim Universities) Multi-Hazards Summer School was held at Tohoku University on 24-27 July 2018. In addition to the participants from the APRU member universities, the students from the Young Leaders Program (YLP) of the Northeast Asia Economic Forum (NEAEF) also attended this event on 24-25 July. The event received total more than 60 participants to learn the lessons-learned and experience from the 2011 Great East Japan Earthquake and Tsunami, the recovery efforts in the affected areas and discuss the contribution of academia in the implementation of the Sendai Framework for Disaster Risk Reduction (SFDRR).

The Association of Pacific Rim Universities (APRU) is a network of 50 premier research universities from 16 economies around the Pacific Rim. The International Research Institute of Disaster Science (IRIDeS) in Tohoku University was established in April 2012 as a new integrated interdisciplinary research team aiming at conducting world leading research on natural disaster science and disaster mitigation learning from and building upon past lessons in disaster management from Japan and around the world. IRIDeS also provides secretariat services as the regional program hub to the MH Program.

The APRU-IRIDeS Multi-Hazards (MH) Program was established 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.

The key activities of the MH Program include:

- Organization of the annual summer school
- Organization of the annual APRU MH Symposium
- Foster collaboration in disaster research and information/data sharing between APRU universities
- Contribute to DRR discussions at international and regional levels and to a policy making process.

The need for and importance of science and technology application in disaster risk reduction has been strongly emphasized especially in the Sendai Framework for Disaster Risk Reduction (SFDRR) adopted in 2015 at the UN World Conference on Disaster Risk Reduction. It underlined the importance of the role of academia in focusing on the disaster risk factors, increase research for regional, natural and local application, support action by local communities and support the interface between policy and science for decision-making. It is extremely important for academia to work with different stakeholders to play such key roles.

This summer school is designed to learn from the experience of local government, NGO as well as academia and include the lectures not only from the natural science aspect but also the social science aspect to enable the participants to understand the diversified elements of DRR. The IRIDeS continues to host the MH program and contribute to strengthening the disaster science research and contribute to discussions at international and regional levels to make an influence on DRR strategy and policy in the region.

Acknowledgement

IRIDeS as the main organizer of this summer school would like to extend a sincere appreciation to the participants and speakers from different sectors who shared wonderful experiences and knowledge regarding DRR issues from different perspectives. Their involvement and participation made a great contribution to the success of this event. In addition, IRIDeS received tremendous support from the APRU secretariat based in Hong Kong as well as Tohoku University. The organizer is also grateful for valuable suggestions and advices provided by the faculty members of IRIDeS on the program development and planning.

Lastly but not least, this summer school was never implemented without hard works and considerable support by the International Strategy for Disaster Mitigation Division of IRIDeS, Tohoku University, the Administrative Office of IRIDeS, and the International Regional Cooperation Office of IRIDeS.

OPENING REMARKS



Prof. Hideo Ohno

President of Tohoku University

It is a great pleasure for me to welcome you to Tohoku University for “the APRU-IRIDeS Multi-Hazards Summer School.”

The establishment of the International Research Institute of Disaster Science (IRIDeS) under Tohoku University is our commitment to share our knowledge and experience globally gained from a wide range of interdisciplinary research, and to contribute to building a resilient society against natural disasters. IRIDeS also launched the Multi-Hazards Program together with Association of Pacific Rim Universities (APRU) in April 2013. Since then, IRIDeS has become the program hub and coordinates the program activities. This summer school is one of the major events under the Multi-Hazards Program.

It has been seven years already since the Great East Japan Earthquake and Tsunami happened on March 11, 2011. Tohoku University has also been playing an important role in the recovery process. You will visit several affected areas on 25 July during a field trip and see the recovery efforts by local governments and communities. I hope this summer school will give you an opportunity to consider and discuss the roles of universities and academia as well as science and technology in strengthening our disaster-management capacity.

Recently West Japan was hit by extremely heavy rains which caused massive floods and landslides. More than 220 people lost their lives due to this event. Even if we think we are well-prepared for natural disasters, we are still vulnerable to such unprecedented catastrophes. They imply further need for risk analysis, risk communication, and improvement of early warning systems. There is much room for disaster science research and data, and information sharing with governments and communities. More importantly, we need to tackle these global challenges such as natural disasters and climate change in partnership with multi-stakeholders.

In March 2015, the UN World Conference on Disaster Risk Reduction was held in Sendai. More than 10,000 people participated in this event. Tohoku University made significant contributions to this Conference by participating in its preparation and organizing many events. At the end of the Conference, “the Sendai Framework for Disaster Risk Reduction” was adopted. It will be a guideline for the implementation of disaster risk reduction in the next 15 years. I expect that you will discuss universities’ roles in and contributions to its implementation process during this Summer School.

In November 2017, Tohoku University in collaboration with Sendai City organized “World Bosai Forum” that brought more than 900 attendees from 42 countries. It provided a platform for discussions and information exchange among disaster experts through more than 50 sessions on various topics. We believe it is crucial to maintain discussions on new ideas and solutions among various stakeholders, share the experience and lessons learned, and address the voices and needs of communities and citizens. The World Bosai Forum will be organized

every two years; the next one will be in November 2019. I do hope many of you will join this important event and share your research findings with us.

Tohoku University was selected as a “National Designated University” in 2017: only five universities in Japan were appointed as a recognition of the university’s abilities to lead and shape global education and research. In particular, we promote the organization for the advance studies in four areas – Materials science, Next-generation medical care, Spintronics, and Disaster science. Tohoku University recognizes the importance of disaster science research and are determined to become a global leader in this field.

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

Prof. Fumihiko Imamura

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

Good morning. It is with great pleasure that I welcome you to the 2018 APRU-IRIDeS Summer School. In addition, I am excited to welcome the members of the Young Leaders Program of the Northeast Asia Economic Forum. We have more than 70 participants from all over the world. I would like to express my appreciation for the support of the APRU International Secretariat in Hong Kong, led by Christina Schonleber.

We started the Multi-Hazards Program two years after the 2011 Tohoku earthquake and tsunami. As the director of the International Research Institute of Disaster Science (IRIDeS), and as a professor of tsunami engineering, I have been focusing on tsunami risk mitigation research from both structural and nonstructural aspects, including tsunami warnings, evacuation, and city planning for resilience against tsunami attacks, for more than 30 years.

The 2004 Indian Ocean tsunami and the 2011 Tohoku tsunami left behind catastrophic damage. The tsunami in the Indian Ocean claimed more than 250,000 lives, while 20,000 people died in Japan as a result of low-frequency but high-impact disasters. To minimize such disaster risks, our research institute, IRIDeS, was established in 2012 with a very wide expertise. In 2013, after the founding of IRIDeS, we launched the APRU-IRIDeS Multi-Hazards Program, whose major activities include summer school, campus safety workshops, and the annual symposium in which colleagues discuss issues on disaster mitigation. The program has made excellent achievements in the last six years.

In 2015, the United Nations World Conference on Disaster Risk Reduction was held here in Sendai. Around 150,000 participants, including the United Nations Secretary-General, the Emperor of Japan, Prime Minister Abe, as well as people from NGOs, world governments, international organizations, and the private sector, got together to discuss how to solve the challenges of and issues surrounding disaster risk reduction (DRR). The result was the Sendai Framework for Disaster Risk Reduction (SFDRR), which was adopted by 187 countries. This international framework strongly encourages us to work closely to mitigate the effects of disasters.

Not only natural but also manmade disasters have continued to increase. In Japan, we experienced a tremendous earthquake in Osaka followed by heavy rains in West Japan, as well as recent heat waves. This is why we continue to organize the multihazards summer school and symposium to discuss disaster issues that have become more and more important worldwide.

In the summer school, we hold a series of lectures taught by international experts, professors, and government officials to share their studies and experiences. You will be visiting the affected areas damaged by the 2011 tsunami to understand the reconstruction process better. Please share what you saw and learned when you return to your respective countries.

Once again, thank you very much for participating in the summer school.

Ms. Christina Schönleber

Director (Policy & Programs), International Secretariat,
Association of Pacific Rim Universities (APRU)

Dear Professor Imamura, dear Professor Izumi, dear colleagues and summer school participants.

Good Morning, I am Christina Schönleber from the Association of Pacific Rim Universities. For me as Director of Policy and Programs it truly is a pleasure to welcome researchers, students and practitioners from Japan and across the Asia Pacific region to the 6th Annual MH Summer School hosted by the International Research Institute of Disaster Science, IRIDeS here at Tohoku University.

The Association of Pacific Rim Universities is very proud of their long standing and close partnership with the colleagues and experts at Tohoku University. Together we set up the APRU Multi Hazard Hub in 2013 to drive forward the mission help address the challenges relating to disaster risk reduction in the region.

The aim of the APRU MH Hub is to harness the research capabilities in DRR of APRU member universities around the Pacific Rim to address the shared threats of earthquakes, tsunamis, typhoons and other natural disasters that threaten this region. As part of this highly important work IRIDeS has set up and is hosting this annual Summer School.

Over the past 6 years our esteemed colleagues from the Multi Hazard Program Hub, led and coordinated by Professor Imamura, and Professor Takao Izumi and supported by its international Advisory Group have greatly contribute to shaping the international decision and policy making process for DRR.

APRU consider capacity building across the region a key objective of this process including informing future leaders about key challenges of the Asia-Pacific region to guide their thinking how to address these through research, policy development and on the ground impact.

I want to highlight that this MH Summer School is a very important APRU activity for informing and guiding you experts and future leaders of the region by sharing latest knowledge and insights from the perspective of multidisciplinary stakeholders engaged in DRR. It really is great to see participants from all across the region including Indonesia, Mongolia, China, Afghanistan, Russia, Korea, Malaysia and the US come together for this.

Later during this summer school, I will present to you in more depth how the Association of Pacific Rim Universities works with our member universities and external partners to achieve and support policy impact across a number of programs such as this Multi Hazard Program and Hub.

Finally I thank Tohoku University and IRIDeS for their dedication and expertise in continuing to develop the MH Program and achieving such far reaching impact.

PRESENTATIONS



Overview of the International Research Institute of Disaster Science (IRIDeS), Tohoku University

Kiyoshi Itoh

Deputy Director and Professor, IRIDeS, Tohoku University



Tohoku University was founded in 1907 and is the third oldest university in Japan. IRIDeS is the newest research institute of Tohoku University. IRIDeS was established in April, 2012, approximately one year after the 2011 Great East Japan earthquake.

In 2007, prior to the 2011 disaster, some Tohoku University researchers had formed a multidisciplinary research group to cope with an earthquake off the coast of Miyagi Prefecture which was foreseen to occur in the near future. The reality of the 2011 disaster far exceeded all predictions, however, and the group was unable to respond adequately. Tohoku University undertook a major expansion of the group to learn lessons from the disaster, resulting in the establishment of IRIDeS.

IRIDeS aims at both the revival of Tohoku Disaster areas and the reduction of disaster worldwide. We have two key words. One is “multidisciplinary.” Scholars in humanities, sciences, social sciences, engineering and medicine collaborate actively. The other key word is “Practical Disaster Prevention Research.” Our ultimate objective is to contribute to the actual society.

In IRIDeS, there are 7 Research Divisions and 37 Research Fields. To date we have conducted numerous studies which can be categorized by “the disaster cycle”: “understand and prepare for a disaster,” “respond to the disaster after it occurred,” “recover from the disaster,” and finally, “mitigate future disasters through DRR education.” We also emphasize forging links with diverse stakeholders, both domestically and internationally, as researchers alone cannot realize safer and more resilient society.

Organization of IRIDeS

There are 187 members including:

- 59 researchers and 31 researchers with concurrent appointments
- 11 specially appointed visiting professors
- 3 senior researchers
- 66 lab workers/technical assistants/secretaries
- 17 administrative staff

(as of May 2018)







There is a traditional saying in Japan “Turning a disaster into happiness.” We made our logo by turning the character “disaster,” wishing to “turn the Great East Japan Earthquake into construction of a safer society.” We hope you have a fulfilling summer school with us, deepening international understanding and friendship with each other as disaster specialists.



International strategy for disaster risk reduction: implementation of the Sendai framework for disaster risk reduction (SFDRR)

Takako Izumi

Associate Professor, IRIDeS, Tohoku University



It is well-known that a major portion of the disaster management budget was spent during the post-disaster phase, such as disaster response and recovery, and not for the pre-disaster phase, such as disaster mitigation and preparedness. However, since the 2004 Indian Ocean tsunami and the adoption of the Hyogo Framework for Action (HFA) in 2005 at the UN World Conference on Disaster Reduction, people have gained more interest in and a better understanding of disaster mitigation and preparedness.

For instance, after the enactment of the HFA, countries' DRR efforts have increased, with the understanding that disasters harm the GDP and national growth. Because of the tremendous economic loss following a disaster, it takes a long time to recover from its damage; therefore, investing in DRR is extremely important and has to be strengthened. While a certain level of improvement in this field was observed, it was obvious that further DRR efforts were needed, and better involvement and collaboration by various stakeholders were indispensable.

In 2015, the SFDRR was adopted at the UN World Conference on DRR in 2016. It emphasized the importance of applying science and technology in DRR, along with scientific evidence-based policy and decision-making. To achieve the goals of DRR, academia and universities would play a critical role; in the SFDRR, the roles of academia are stated as follows:

- 1) Focus on disaster risk factors and scenarios,
- 2) Increase research for regional, national, and local application,
- 3) Support action by local communities and authorities, and
- 4) Support the interface between policy and science for decision-making.

In the science and technology application process, the following are extremely important.

- a) The fact that science and technology cannot solve everything, as they have limitations and constraints. How would one fill these gaps? Through human behavior, education-based actions, and social science-based awareness.
- b) Interdisciplinary research (combination of natural and social sciences).
- c) Working together with other stakeholders especially with practitioners. (Knowledge should not be monopolized by academia. Technology and tools have to be "usable.")
- d) Strengthening capacity development and empowerment for future DRR experts (government officials, community leaders, etc.).



Background of HFA

- The Indian Ocean Tsunami in December 2004 increased the interest in and awareness on DRR.
- The awareness and knowledge on tsunami was no sufficient. Lack of early warning system.
- Five priority of actions:
 - (1) **Governance**: ensure that DRR is a national and local priority;
 - (2) **Risk identification**: identify, assess and monitor disaster risks and enhance early warning;
 - (3) **Knowledge**: use knowledge, innovation and education to build a culture of safety and resilience;
 - (4) Reducing the **underlying risk** factors;
 - (5) Strengthen disaster preparedness for **effective response**.
- It emphasized "DRR is everyone's business". All the stakeholders need to get involved in DRR. It is not a task of only governments and other humanitarian organizations.

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Priorities for action in the Sendai Framework for Disaster Risk Reduction

1. Understanding **disaster risk**;
2. Strengthening **disaster risk governance** to manage disaster risk;
3. **Investing** in disaster risk reduction for resilience;
4. Enhancing disaster preparedness for **effective response** and to "Build Back Better" in recovery, rehabilitation and reconstruction.

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Role of academia in the Sendai Framework for Disaster Risk Reduction

Academia, scientific and research entities and networks to

- 1) *focus on the disaster risk factors and scenarios,*
- 2) *increase research for regional national and local application,*
- 3) *support action by local communities and authorities, and*
- 4) *support the interface between policy and science for decision-making*

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Urban Disaster Reduction: Japan as a disaster-prone country and learning from past disasters

Osamu Murao

Professor, IRIDeS, Tohoku University



Japan is one of the disaster-prone countries, having earthquakes, tsunamis, volcanic eruptions, typhoons, heavy rains, or floods. The presentation given by Prof. Murao at the Multi-Hazards Summer School 2018 was about Japanese disaster risk reduction experiences, consisted of the following five topics:

- 1) How do you evaluate urban disaster risk?
- 2) Disaster Life Cycle
- 3) Sendai Framework and “Build Back Better”
- 4) 1934 Hakodate Great Fire
- 5) Japan as a Disaster-prone Country and Learning from the Past Disasters

The presentation started with a question, “How do you evaluate urban disaster risk?” and explained urban disaster risk with definitions of “hazard,” “vulnerability,” and “exposed value.” The second topic focused on “Disaster Life Cycle,” an idea to deal with disaster management with sequential phases, “emergency response,” “recovery,” “mitigation,” and “preparedness.” Then Sendai Framework for Disaster Risk Reduction, which was adopted at the third World Conference on Disaster Risk Reduction 2015, was explained, with Build Back Better concept as the third topic. Japanese people have learnt many things from those disastrous experiences to make societies safer. The presentation introduced the 1934 Hakodate Great Fire and how the disaster changed the urban fabric in the process of post-disaster recovery, followed by other important recovery cases in Japanese history.



Approaches of Social Sciences to Disaster Mitigation

Sébastien Penmellen Boret

Assistant Professor, IRIDeS, Tohoku University



During his lecture "Approaches of Social Sciences to Disaster Mitigation," Dr. Boret offered an introduction to some of the fundamental concepts used to explain the socio-cultural processes that are associated with disasters. They include ideas of risk, vulnerability, and resilience. His discussion drew from a broad range of case studies that span from disasters induced by natural hazards to those human-driven catastrophes.

The first part of the lecture considered the basic assumption that disasters are not events but the products of social and cultural developments that may begin long before and end long after the events. Using the metaphor of a car accident, Dr. Boret explained that the collective behaviors that precedes (human-environment relation, development, preparedness, social inequality) and follow (reconstruction, solidarity, spiritual care, financial aids, political leadership) a catastrophe contribute respectfully to the cause and the impact of a disaster.

In the second part, Dr. Boret introduced the ideas of risk associated with the set of opportunities that produces our environment. Using the example of an Indonesian people living by an active volcanic mountain, he explained that risk is not be an objective fact but depends on people's perception that in turns dictates their disaster mitigation through socio-ecological adaptation. However, he also explained that for social scientists the perception and adaptation to risk are themselves dependent on political, economic, and social forces. As such, social scientists believe that people are more often than not the cause of their exposition to risk.

The third part engaged with the central notion of vulnerability. In disaster science, vulnerability is the degree to which people are exposed to risks. Social research shows that this exposure is rooted in ethnicity, class, gender, disability, age, poverty, education and other socio-cultural factors, and therefore varies among and within communities. Using examples such the shipwreck of the Titanic and the 2004 Indian Ocean Tsunami, Dr. Boret exemplified how particular factors such as gender and social class can explain the preponderance of a category of victims over another. He then argued that the identification of these causes via forensic research should be an integral part of disaster mitigation in order to reduce inequalities in the face of disasters.

Relating to vulnerability, the fourth concept introduced in this lecture was resilience. Originally used in civil engineering, this term came to refer by social analogy, to the capacity of a group of people to resist and adapt to disasters. Referring to recent studies in Indonesia and the Pacific region, Dr. Boret introduced elements of social resilience including oral tradition as well as more complex economic and political adaptations. Taking the example of global warming, however, he noted that the increased resilience of some people could create the vulnerability of others.

To conclude, Dr. Boret proposed that the approaches of social sciences provide a comprehensive albeit complex perspective of disaster mitigation. He advised against the recent trends that favour the study of resilience over vulnerability. His assertion echoed the view that the concept of vulnerability should not be conceived as a "negative" and the direct opposite of resilience but as its complementary approach. Putting this vision in a nutshell, he stated that "disaster mitigation must uproot the causes of vulnerability and innovate the solutions for resilience."

Medical and Public Health Needs in Disaster

Shinichi Egawa

Professor, IRIDeS, Tohoku University

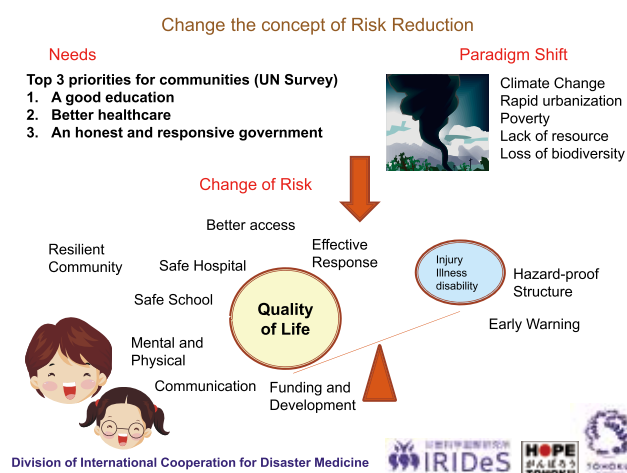


Sendai Framework for Disaster Risk Reduction (DRR) described for the first time as a DRR framework that disaster affects health. Sendai Framework aims to reduce a) mortality, b) affected people, c) direct economic loss by implementations of d) infrastructure, e) national and local strategies, f) international cooperation, and g) multi-hazard early warning system. Sendai Framework targets to reduce the damage to critical infrastructures, i.e. hospitals and schools. These movements are because of the imperative of health as a fundamental human right. Health cluster is one of the DRR clusters to improve preparedness and efficient response.

After 1995 Great Hanshin Awaji Earthquake, Japan has established national disaster medical system including Disaster Base Hospitals, Disaster Medical Assistance Team (DMAT), Staging Care Unit and Transportation System, Emergency Medical Information System (EMIS) and Disaster Medical Coordinators. This system helped many lives in 2011 Great East Japan Earthquake (GEJE), 2016 Kumamoto Earthquake and 2018 West Japan Floods. However, every

disaster has difference in medical and public health needs. Especially after GEJE, the medical needs for non-communicable diseases and mental health rather than trauma are prominent because of resilient buildings, aging of the community and focusing more on mental health. Additional improvements are already active.

Thus, flexibility and preparedness of medical and public health response is mandatory. Academia can contribute by research and development to improve disaster medicine. Agent-based or system dynamics simulation provides a better insight of disaster situation without costing human life. Ebola Virus Disease is a highly infectious and lethal disease and its outbreak claimed tens of thousands of lives in West Africa in 2014. Using an agent-based simulation model, we can find the specific condition to sustain the people's memory and educational level against this life-threatening hazard. In conclusion, DRR should be people-centered and the collaboration of health and all other DRR clusters is the best way to protect people's physical and mental health understanding the change of health risks in disaster.



Towards disaster risk reduction city – Tagajo ~Disaster-resilient city~

Takumi Fujimura

Bureau of Reconstruction Promotion, Office of Mayor, Tagajo City



Tagajo City is located in the eastern region of Miyagi Prefecture near Sendai City, about 12 kilometers away from central Sendai, with a population of 62,000. Tagajo City was greatly damaged by the Great East Japan Earthquake and Tsunami in 2011. The tsunami hit the city approximately one hour after the earthquake. The highest wave reached 4.6 meters. One-third (662 ha) of the city was inundated by water, and about 12,000 people fled to evacuation sites such as schools.

A severe and inconvenient evacuation life started. As a result of the tsunami, a total of 188 precious lives were lost, and over 11,000 houses were destroyed in the city. Factories and offices in the industrial area were almost totally destroyed. Before the Great East Japan Earthquake and Tsunami, it was estimated that there was a 99% probability of an earthquake within 30 years off the coast of Miyagi Prefecture. Therefore, citizens were relatively prepared for earthquakes, and most were aware of how terrifying tsunamis were. At the same time, however, most people knew that Tagajo City was never affected by tsunamis in the past, and thus adopted the mentality that Tagajo would be unaffected even after the large-scale tsunami warning was issued. As a result, some people did not evacuate quickly, and others who evacuated by cars were caught in traffic jams, causing many injuries and loss of lives.

There are four major points in the DRR city strategy.

1. “Developing a disaster-resilient city.” Four strategies have been drawn up, centering on the construction of infrastructure.
2. “Increasing DRR capability based on self-help and mutual help.” Two strategies have been implemented so that citizens and local communities can cope with disasters by themselves, rather than depending fully on local administrations.
3. “Sharing disaster experience.” The aim of this strategy is to pass on the experience of disasters accurately to future generations so that they are not forgotten.
4. “DRR technology.” This is a strategy that enables companies to maximize their strength and be involved in projects that only regions damaged by the disaster can engage in, enabling these areas to turn the disaster experience into something productive and positive.

Under the four goals, eight implementation strategies were established.

Strategy 1: “Building multiple barriers for tsunami.”

Although sea walls will be constructed along the coast as a result of the damages seen in the 2011 disaster, these are only sufficient to cope with tsunamis that will strike once in 100 years. Therefore, when a huge tsunami that occurs once in 1,000 years strikes, overflow and flooding will result. This strategy aims to overcome this situation by considering evacuation as the basic policy, even though multiple barriers will be built. Specifically, main projects include the development of evacuation announcement facilities to send information accurately and swiftly, the construction of evacuation roads, the designation of temporary escape buildings to rescue people who are unable to evacuate, and the building of barriers to reduce the force and

speed of tsunamis.

Strategy 2: "Developing earthquake-resilient city."

This strategy aims to increase earthquake-resistant roads and bridges, and to promote the retrofit of wooden buildings to make them earthquake-resistant.

Strategy 3: "Minimizing flood damage."

There is a higher risk of flooding due to the fact that the ground has sunk after the Great East Japan Earthquake and Tsunami, and due to a recent trend of heavy rain in a short period of time. To overcome this problem, projects such as the development of a rainwater draining system and the construction of new rainwater drain pumps have been planned.

Strategy 4: "Developing a disaster response system."

During the Great East Japan Earthquake and Tsunami, the number of people who evacuated was far greater than previously estimated. Thus, evacuation support was insufficient. By reflecting on that experience, we have reviewed our disaster response system.

Strategy 5: "Enhancing self-help ability."

The aim of this strategy is to enable citizens themselves to prepare for disasters. Paired with Tohoku University's International Research Institute of Disaster Science, we have developed the DRR handbook that outlines measures on how to cope with and prepare for disasters. We have been holding classes for citizens making use of this handbook.

Strategy 6: "Strengthening community DRR capacity."

This strategy aims for the improvement of DRR capacity, as well as mitigation of local communities by such tactics as voluntary emergency drills.

Strategy 7: "Sharing disaster experience."

Many pictures of the 2011 disaster were taken, and it is crucial to preserve and compile those records carefully, and to share it with future generations.

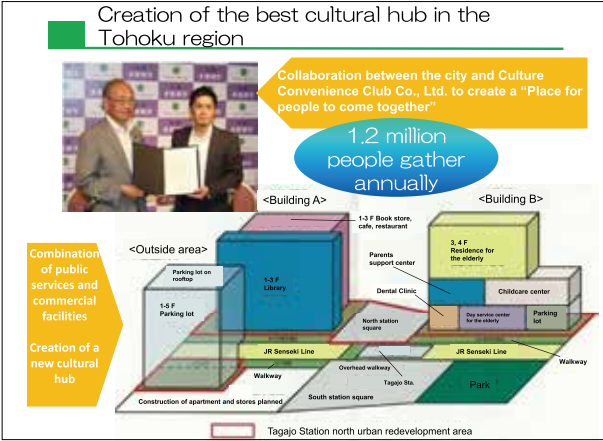
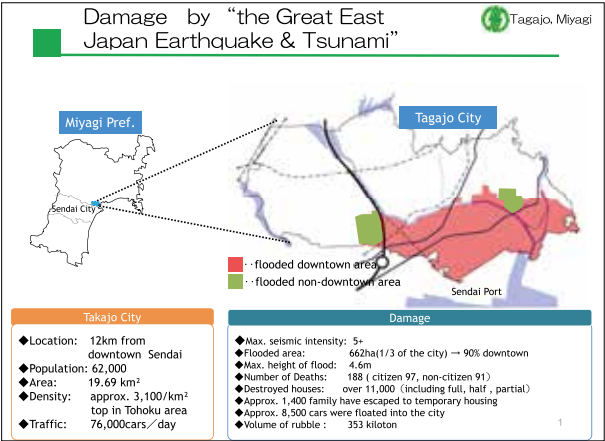
Strategy 8: "DRR Research Park Program."

This strategy seeks to promote DRR technology development as well as the accumulation and creation of industries using DRR technology by utilizing space created from factories damaged by the earthquake.

As well as to promote the DRR city strategy, the city felt the need to enhance urban development

to accomplish recovery and reconstruction. For this reason, the Tagajo City Library was built, combining restaurants, a book store, childcare center and a parents' support center. The aim is to create the best cultural hub in the Tohoku region.

Tagajo City experienced tremendous loss due to the tsunami. To change the way of thinking from negative to positive to promote urban development, the city will go on with strong determination to carry out DRR measures and reconstruction.



Disaster Prevention Learning in Elementary School after the Great East Japan Earthquake and Tsunami

Kiyoshi Araake

Principal, Kouya Elementary School in Watari town



After the 2011 great East Japan earthquake and tsunami, our school has been implementing DRR methods and education in our daily activities. It has been seven years since the disaster, and because most of the young people today do not remember it, using topics or terms that are familiar to them is important, as that would make them understand that it might also happen to them in the near future.

For example, to attract their attention, the class started with the words “There was a big disaster some time ago in Miyagi prefecture—yes, where we live now,” like an old story was being told. This is an easier and more effective approach for students to learn DRR in the regular curriculum, as DRR elements are introduced in each grade level or in regular subjects. Several facts about tsunamis were shared in class, such as how they cover a distance of 100 meters in 10 seconds, which is as fast as Olympic runners so that students gain a better understanding of tsunamis and, thus, prepare for them. This teaches the students that they cannot win a race against a tsunami the same way they cannot win against an Olympic sprinter. This way, students realize that once a tsunami hits, they will get caught in it. In math class, the students placed rulers on their own bodies to understand how high a 30-centimeter wave is; even a small tsunami of that height can wash people away. Simultaneously, the students also felt how strong the water pressure is in their swimming classes during the summer.

DRR education can be integrated into regular subjects such as math (recognizing magnitude), science (water action), and social studies (geography and the Japanese constitution). Furthermore, some emotional stories regarding the disaster were shared with the students so they feel the agony of the whole experience. An example of this was when a digital camera with priceless memories was lost when it was washed away by the tsunami. Another was when my brand-new car was lost because of the raging waters. Moreover, appreciative statements were also shared in class, such as the expression of gratitude for relief aid and to volunteers after the 2011 tsunami. It is important to encourage children to develop the initiative to support others during disasters and to offer a helping hand to their friends when they are in trouble. Although the objective of our DRR education is to “protect lives,” it also aims to promote a healthy mind-set among children through education.

In the 2011 earthquake and tsunami, vast amounts of private property were lost, and people were forced to live under difficult conditions. However, at the same time, people tried to get creative to survive under these inconvenient and difficult circumstances. Students who did not experience the 2011 disaster were taught that tremendous recovery efforts made it possible for people to return to their normal lives, which is extremely precious.

As the class ended, stories of recent disasters, such as the heavy rains and flooding in West Japan, were shared, and our students expressed sympathy and encouragement to children in the affected areas, who are currently going through a difficult time.

Memories of the disaster(Mar.13)

First **supplies** delivered on **the 3rd day**

● **Bread** **Evacuees**

$$\underline{145} \div \underline{870}$$

(How much can each person eat ?)

Memories of the disaster(Mar.13)

First **supplies** delivered on **the 3rd day**



This is the amount
one person could
eat each day.



The school had **protected** us
from the big earthquakes.

It finished resistance construction in 2010.

But, it couldn't **beat** Tsumami



Nowcasting and Forecasting Major Earthquakes

John Rundle

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



Nowcasting, Forecasting and Prediction – What's the Difference?

- A nowcast is a determination of the current state of a complex dynamical system using indirect means. An example of a nowcast is: "A region in a circle of radius 100 km around Sendai is 30% through its earthquake cycle for a magnitude 6 earthquake."
- A deterministic prediction can be defined as a deterministic statement that can be verified by a single observation. An example of a prediction is: "There will be a magnitude 6 earthquake next week in Sendai within 100 km of Sendai."
- A probabilistic forecast can be defined as a statement of probability that requires multiple observations to establish a confidence level. An example of a forecast is: "There is a 40% chance of a magnitude 6 earthquake within 200 km of Sendai during 2018."

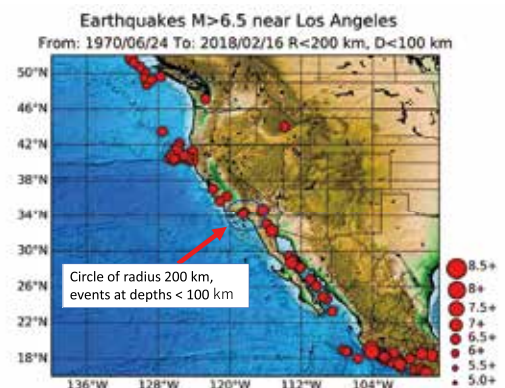
Nowcasting

Nowcasting is a term originating from economics and finance. It refers to the process of determining the uncertain state of the economy or markets at the current time by indirect means. We apply this idea to seismically active regions, where the goal is to determine the current state of the fault system, and its current level of progress through the earthquake cycle. In our implementation of this idea, we use the global catalog of earthquakes, using "small" earthquakes to determine the level of hazard from "large" earthquakes in the region.

Our method does not involve any model other than the idea of an earthquake cycle. Rather, we define a specific region and a specific large earthquake magnitude of interest, ensuring that we have enough data to span at least ~20 or more large earthquake cycles in the region. We then compute the earthquake potential score (EPS) which is defined as the cumulative probability distribution $P(n < n(t))$ for the current count $n(t)$ for the small earthquakes in the region.

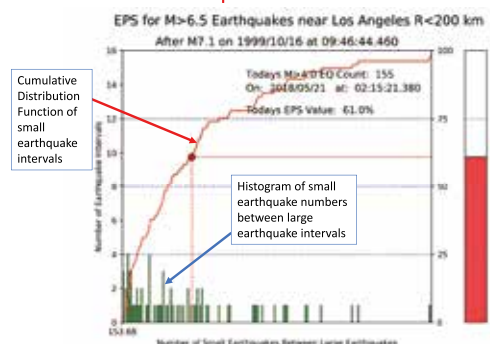
From the count of small earthquakes since the last large earthquake, we determine the value of $EPS = P(n < n(t))$. EPS is therefore the current level of hazard, and assigns a number between 0% and 100% to every region so defined, thus providing a unique measure. Physically, the EPS corresponds to an estimate of the level of progress through the earthquake cycle in the defined region at the current

Seismicity around Los Angeles



Los Angeles

Earthquake Potential Score



Los Angeles

Forecasting

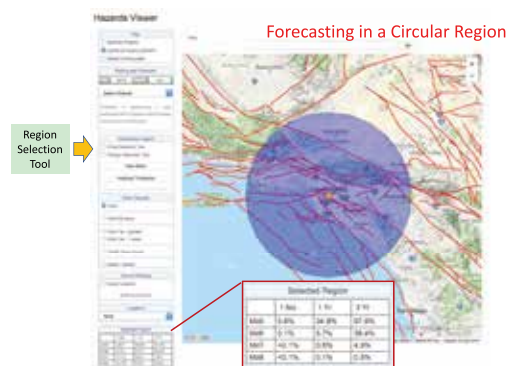
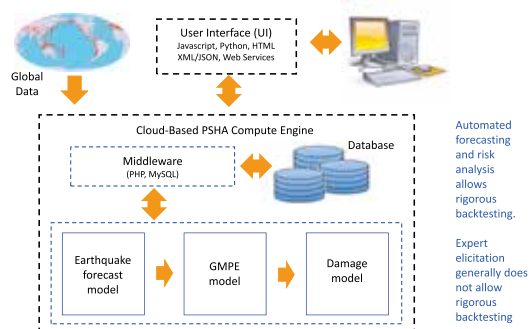
This lecture reviewed and discussed a currently operating real time earthquake forecast for California and the world. The forecast method was described in terms of the standard model of elastic rebound theory of earthquakes, and also provide a guide to its use and interpretation of results. The forecast methodology includes both a forecast and a residential damage estimator. The basic forecast method was then reduced to practice and is currently online at www.openhazards.com. A mobile app ("QuakeWorks") implementing the forecast can be downloaded from the Apple App Store.

The earthquake forecast provides a computation of the probability of a major earthquake occurring in a user-defined region over the next 3 months, 1 year, or 3 years. Magnitude ranges of earthquakes calculated for the forecast are $M > 5$, > 6 , > 7 , and > 8 . The forecast probabilities, which can change very rapidly in time, make use of a real-time seismic catalog comprised of the USGS earthquake catalog, updated with the 30-day real time feed. Calculations are performed daily at about 21:30 Pacific Time and are then updated on the web site at about midnight Pacific Time.

Both prospective and retrospective ("backtesting") have been performed on the general forecast methods to determine accuracy and reliability, yielding a 1-year accuracy of about 80%-85% in space and time. Testing has used standard methods of forecast validation and verification developed in other fields. The forecast is extensible, and is used as input to a standard ground motion algorithm, which is then used as input to a published structural damage model. The damage model assumes that structures conform to the International Building Code applicable at the time they were built.

The resulting calculations allow the user to obtain an estimate of the probability of an earthquake, the resulting peak ground acceleration, and the likely damage to residential structures having specified properties.

Open Hazards PSHA Cloud Computational Framework



GROUP WORK DISCUSSION



GROUP WORK

The following questions were given to four groups:

- 1) Develop a DRR project proposal that applies and uses your research results/findings. It has to include both natural science and social science perspectives.
- 2) Who needs to get involved in project implementation? What are their roles in the project?

GROUP A: Their idea was based on Goal 11 of the Sustainable Development Goals (SDGs): Make cities and human settlements inclusive, safe, resilient, and sustainable.

Their proposed project is titled “Reducing vulnerability by increasing social capital in an urban aging society in Japan.” Their research question is “What is the best strategy to increase the social capital of the elderly in Kobe to reduce vulnerability to disaster post-recovery?”

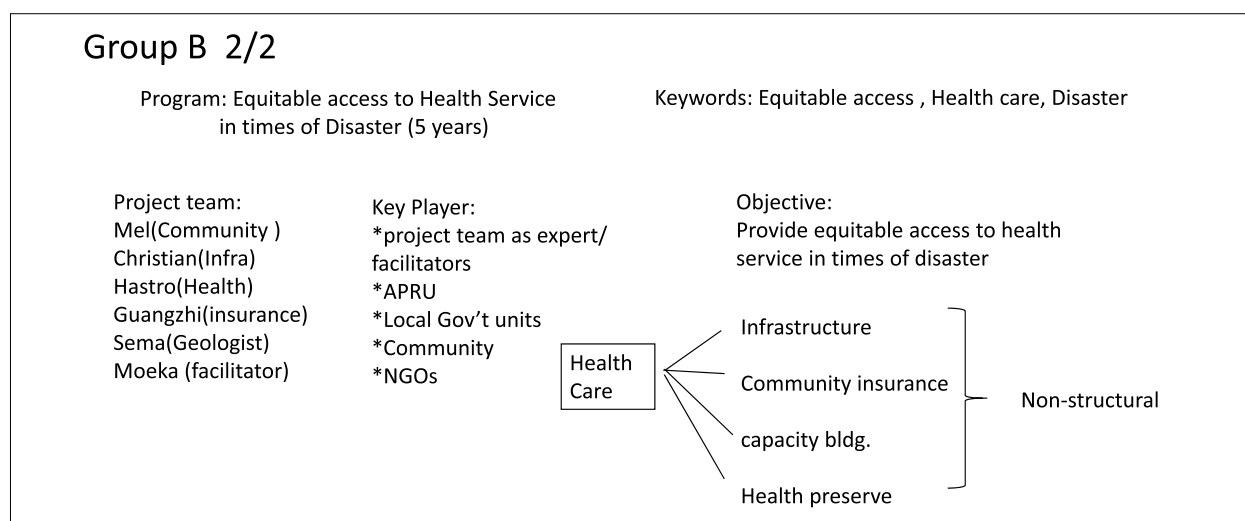
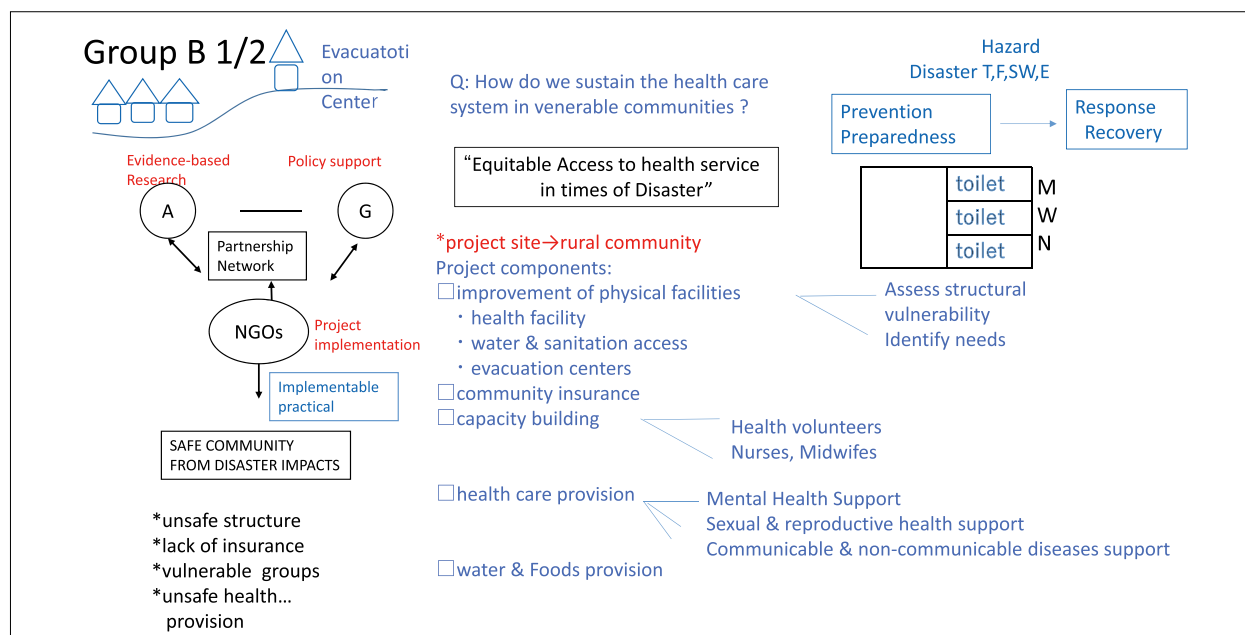


In 1995, the Hanshin-Awaji earthquake hit Kobe City in Japan. While effective recovery efforts have led to the accomplishment of physical reconstruction, social vulnerability has not been solved or reduced. The group considered that the issue can be addressed by strengthening social capital and creating social connections among the elderly. Suggested activities include (1) collecting baseline data on elderly people and (2) developing activities that can increase their interactions with the community. This would require the participation of various stakeholders (academia for data collection, local governments, communities, etc.).

Group A SDGs 11 Social-economic Build Back better?:Reducing vulnerability by increasing social capital in urban aging society in Japan Keywords: vulnerability social capital aging urban				
Research question: What is the best strategy to increase social capital of the elderly in Kobe to reduce vulnerability to disasters post disaster recovery ? (Issue)				
Strategies	Methods	Output Indicators	Implementation	Responsibility
* To build the Relationship between 2 vulnerable groups * To understand how assistive technology may aid elderly vulnerability to disasters * To introduce a co-habitation arrangement w/university students	-GIS mapping -Statistics analysis -individual surveys -Interviews (stakeholders: government, elderly ,relevant vulnerable groups)	• Proportion of elderly in Inclusive community events • Income level of elderly • Hospital visits –health status of the elderly • No. of social groups • Frequency of interaction • Agreements	Kobe - Finance - Social welfare - Emergency Response - Education dept - Kobe university ,Kyoto university - IVUSA(for example) universities Community common NPOs - Social welfare - Energy Response - Education	→ Funding monitoring & evaluation of program → EWS → Drills → Research, → Service providers → Service delivery

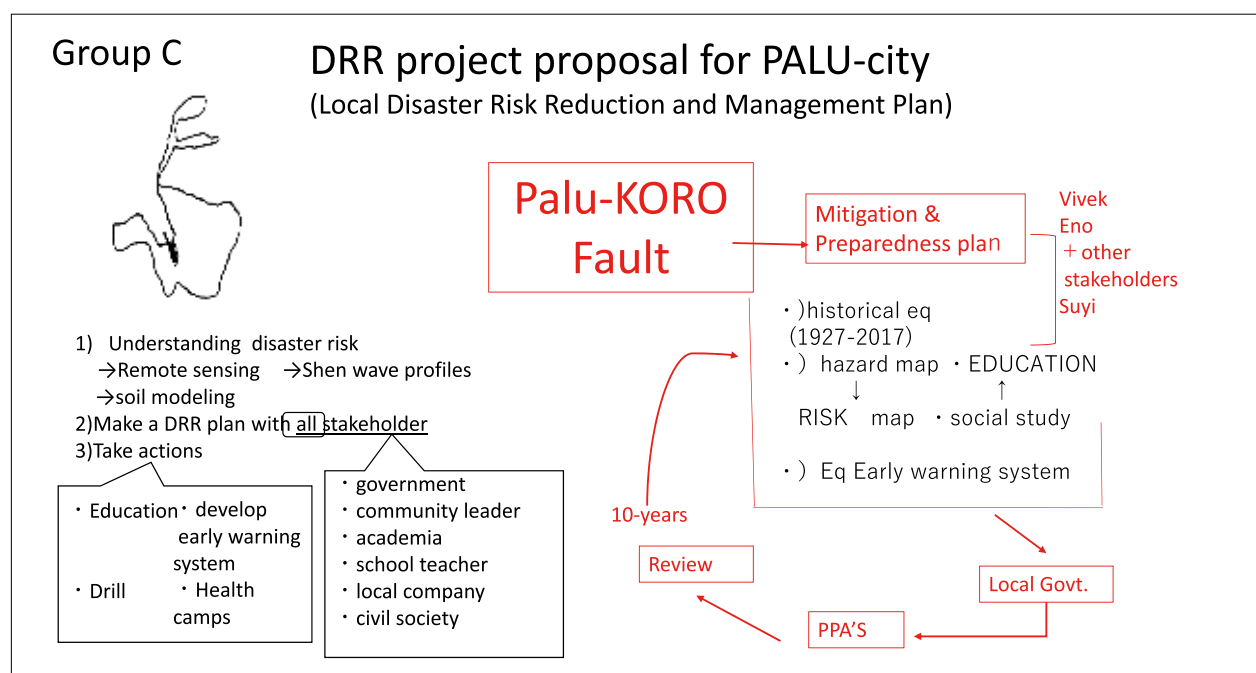
Group B: Equitable access to health services in times of disaster

It is crucial to maintain the same level of health care and service even during a disaster. Equitable access to health services in times of disaster requires a strong infrastructure, community insurance, and an adequate capacity of health workers and medical personnel such as nurses and doctors. The project proposes the inclusion of infrastructure improvement; capacity development of health volunteers, nurses, and midwives; and health-care provisions on mental health, reproductive health, and communicable and non-communicable diseases, among others.



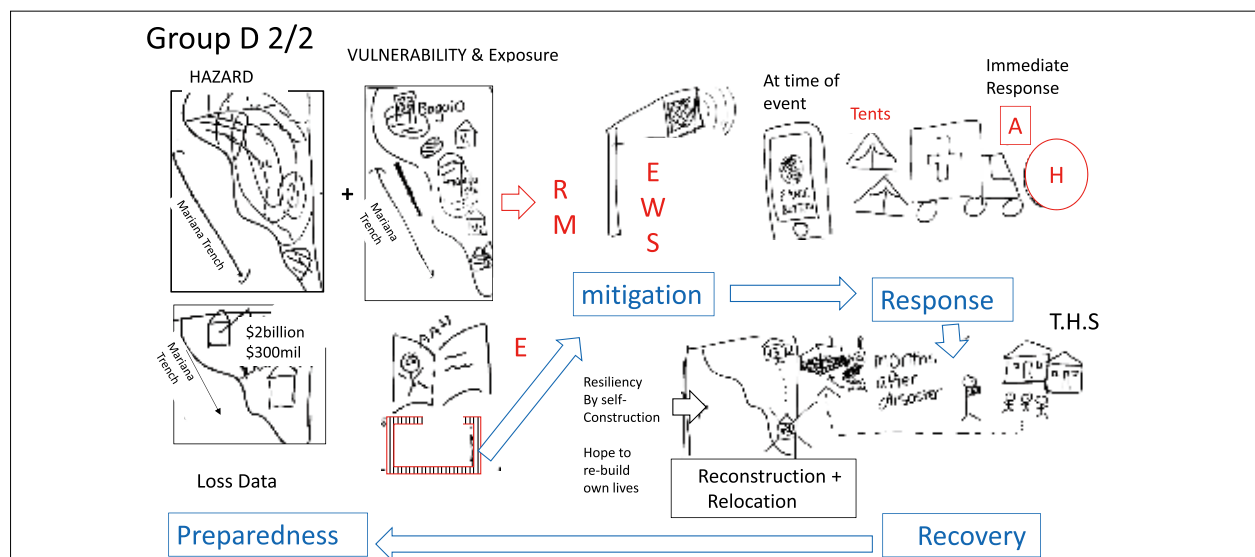
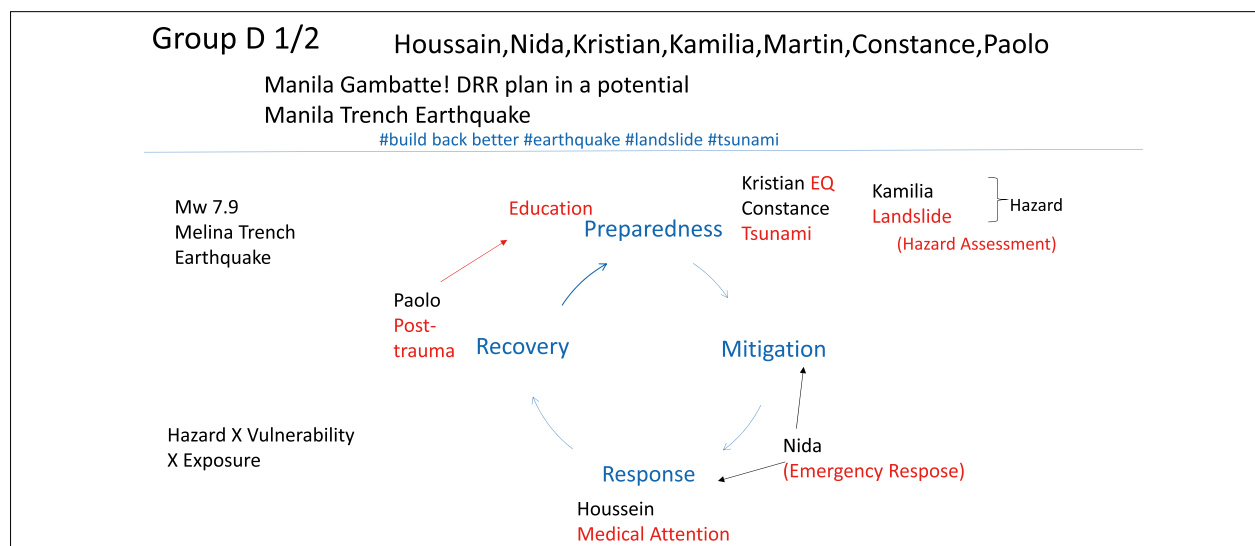
GROUP C: Local DRR and management plan

This group proposed to develop a local DRR management plan that includes a hazard map, a risk map, and an early-warning system for earthquakes. This plan will be applied by local government and would need to be reviewed every 10 years. To implement this management plan, local governments have to apply science and technology, such as remote sensing, to understand the disaster risks in their areas. Therefore, collaboration with academia/research institutes is crucial. In addition, to develop an early-warning system, conduct DRR education, and hold evacuation drills, support and cooperation with various stakeholders such as community leaders and civil society are also necessary.



GROUP D: DRR plan based on disaster management cycle

This group proposed to develop a comprehensive DRR plan that covers the entire disaster management process—response, recovery, mitigation, and preparedness. The first activity would be to assess hazards, vulnerability, and exposure. Based on these evaluations, an early-warning system and a disaster education program should be developed. During disasters, local governments especially need to prepare to provide immediate assistance such as tents and temporary housing. During the recovery stage, communities need to be considered to be involved in reconstruction efforts, as it is critical for them to learn to foster a sense of resilience as they rebuild their own lives.





FIELD TRIP



Field trip with the participants from the APRU member universities to Ishinomaki city and Onagawa town on 25 July 2018

The participants joined the field trip to the areas affected by the Great East Japan Earthquake and Tsunami in 2011. The places include the former Okawa Elementary School in Ishinomaki, Onagawa Station and the Sea Pal Pear Onagawa in Onagawa, and the Arahama Elementary School in Sendai.

Ms. Constance Chua

PhD student, Nanyang Technological University

Though unfortunate, the 2011 Great East Japan earthquake tsunami provided an opportunity – a classroom for us to learn about the complexities of disasters and disaster management. There are not many opportunities as such in the world which allows us to witness the aftermath of a disaster and engage with the local community to understand what happened on that day itself and what could they/we have done better.

The trip to the former Okawa Elementary School was an eye-opener for me. Coming from Singapore which has not suffered from natural hazards or experienced natural disasters of this scale, seeing the destruction that has been sustained by the school and hearing about the losses that the community has to go through have invoked a lot of emotions in me. The empty classrooms and the broken ceilings served to remind us of the fragility of mankind.

Many of the guides, whom we talked to, were survivors of the tsunamis. They have provided vivid account of what they have experienced during the tsunami, and detailed explanations of the choices and decisions they have made at that point. I really appreciate the guides who were doing their part for the community, by keeping the memory of the tsunami and in doing so, keep the spirits of those who have passed on.

One main lesson that I have taken away from the fieldtrip is that disasters are extremely complex, and many a times, victims of such disasters have no concept of what is happening and how to react accordingly. When a hazard occurs, the outcomes are not always straightforward and they can affect decision-making in the process.

Having lived in post-earthquake Christchurch, I was able to compare the recovery process between Christchurch and Tohoku, both of which have sustained significant damage and losses one month after another. From our trip to Onagawa town, which is still in the process of recovery, I was able to pick out some similarities and differences and also identify measures that both countries can adopt and learn from each other. This fieldtrip has definitely enhanced my knowledge of disaster recovery processes and also issues associated with them.

I would like to thank the organising committee of APRU and local guides who have made this fieldtrip possible. I would also like to thank Izumi-sensei for providing English translations during the trip, which has made it so much easier and enjoyable for the participants. The fieldtrip was very well-organised and well-paced. It gave participants time to take in the information and knowledge which was shared during the trip, as well as process their emotions in face of the magnitude that is this disaster. I have learnt much from the fieldtrip, and definitely enjoyed the experience.



Okawa Elementary School, Ishinomaki

Mr. Kristian Azul

Assistant Professor, University of the Philippines Diliman

As my area of research has been geotechnical earthquake engineering since my undergraduate days, I am always looking forward to the chance of going to the sites affected by earthquakes. I recognize that minimization of casualties in such events can only be fully realized if the technical research/hard engineering measures are tailored together with social and cultural understanding of the sites and its residents (community size, culture, location, population make-up, etc.).

The schools that were damaged by the tsunami reminded me of how great the danger really is. It's a different experience to see numbers in your study (tsunami height and earthquake shaking intensity predictions) and to actually see how much damage it can do (pushing a door or wall into a structure, breaking a structural column of a building). The trip also made me realize how important it is that the residents understand the magnitude of damages that are being relayed to them like height of a tsunami or the force of shaking. It is very much possible that people are told that the tsunami will be a certain height, and still, they are not exactly familiar as to how tall that measurement is relative to the structures that they usually see/use. It is even harder for them

to visualize how strong an earthquake can be or a tsunami force is just by imagining it. It is imperative now that, when we discuss disaster management and plans to the residents, we are able to show them the things we are discussing with them in a manner that they can easily visualize the dangers. For example, comparing a tsunami height with a nearby building or having a demonstration of how much shaking can be expected using shaking tables that can carry people on them. This can also help them make better decisions should they see that the disaster happening is of a greater scale than what was expected and taught to them.

We also visited a site that has been reconstructed significantly already after that 2011 earthquake. I am very much grateful for this part of the trip as this made me realize again that my plan to study DRR on both engineering and community planning side is a choice that will, hopefully, benefit many in the future. It showed me how much engineering planning and community involvement must be bridged better so that everyone understands why certain things are done. While engineers always do what is best for everyone's safety, it is very possible that what they have planned is inefficient for the community (placement of residential areas, ban of usage in high risk areas, restriction of certain activities). By communicating with the residents, engineers and planners can make plans and structures more suited to the community so that it can address both safety and convenience for the people. As it is, everything in this world is a compromise, and I believe it is sensible to listen to the voices of the people who will be part of the communities that will be planned and rebuilt after a disaster. In reconstruction, it is also important to look at new information that we not around before the disaster, and keep those in mind in rebuilding and making better communities and evacuation plans.

Overall, the trip reminded me that everyone has to work together both before, during, and after a disaster. It is never just the government's work, or engineer's work, or the residents' work that will make a community survive and build back better after a disaster. The combination of hard engineering measures, proper urban planning, and soft measures (evacuation planning, etc.) will all work together to help us achieve zero deaths and minimal damages to properties. More importantly, never forget the lessons from the past – keep them alive in different forms such as art and literature (stories and poetry) – as the people who survived will be gone someday but their knowledge should be passed on to the next generations.



Onagawa town



Arahama Elementary School, Sendai

ANNEX I: APRU-IRIDeS Summer School Program

24, 26-27 July: Seminar at the IRIDeS building on the Aobayama New Campus, Tohoku University

25 July: Field trip to Ishinomaki city and Onagawa town

24 July:

Lessons learnt from the 2011 Great East Japan Earthquake and Tsunami

08 : 20 — 08 : 45 Registration (please be seated by 8:45am)

08 : 50 — 09 : 05 Opening

Opening remarks by Prof. Fumihiko Imamura (IRIDeS)

Welcome address by Ms. Christina Schönleber (APRU Secretariat)

09 : 05 — 09 : 50 Movie [Great Tsunami]

09 : 50 — 10 : 20 “Overview of the International Research Institute of Disaster Science (IRIDeS), Tohoku University” by Prof. Kiyoshi Itoh (IRIDeS)

10 : 20 — 10 : 40 Coffee break

10 : 40 — 11 : 35 “International strategy for disaster risk reduction: implementation of the Sendai framework for disaster risk reduction (SFDRR)” by Prof. Takako Izumi (IRIDeS)

11 : 35 — 12 : 35 “The problem of embankment” by Prof. Katsuya Hirano (IRIDeS)

12 : 35 — 13 : 50 Lunch

14 : 00 — 14 : 10 Welcome address by President Hideo Ohno, Tohoku University

14 : 10 — 14 : 20 Group photo

14 : 20 — 15 : 20 “Urban Disaster Risk Reduction: Japan as a disaster-prone country and learning from past disasters” by Prof. Osamu Murao (IRIDeS)

15 : 20 — 16 : 20 “Approaches of social sciences to disaster mitigation” by Prof. Sebastien Boret (IRIDeS)

16 : 20 — 16 : 35 Coffee break

16 : 35 — 17 : 35 “Medical and Public Health Needs in Disaster” by Prof. Shinichi Egawa (IRIDeS)

18 : 30 — Reception at Hotel Metropolitan Sendai

25 July: Field trip

[Course A (APRU team)]

Sendai Station → Okawa Elementally School (Ishinomaki City) → Onagawa town →

Arahama Elementally School (Sendai City) → Sendai Station

[Course B (YLP team)]

Sendai Station → Arahama Elementary School (Sendai City) → KIRIN Beer Port Sendai (Sendai)

→ Ishinomaki Community & Info Center → Sendai Station

26 July:

Role of different stakeholders: Academia, Local government and NGO

- 09 : 30 — 10 : 15 “APRU Introduction” by Ms. Christina Schönleber (APRU Secretariat)
- 10 : 15 — 11 : 30 “Towards disaster risk reduction city -Tagajo ~disaster resilient city~”
by Mr. Takumi Fujimura (Tagajo City)
- 11 : 30 — 11 : 45 Coffee break
- 11 : 45 — 13 : 00 “Disaster Prevention Learning in Elementary School after the Great East
Japan Earthquake and Tsunami” by Mr. Kiyoshi Araake (Kouya Elementary School)
- 13 : 00 — 14 : 00 Lunch
- 14 : 00 — 15 : 00 “Innovation and Leadership; A Luxury to Necessity” by Mr. Takeshi Komino
(Church World Service)
- 15 : 00 — 16 : 30 Group work 1: Learning from each other: Poster presentation (including coffee break)
- 16 : 30 — 17 : 00 Group presentation

27 July :

Seminar and Group work

- 9 : 00 — 10 : 00 “Nowcasting and Forecasting Major Earthquakes” by Prof. John Rundle
(University of California Davis)
- 10 : 00 — 11 : 00 “Instructive Warning by Media and Transdisciplinary Approach”
by Prof. Kuniyoshi Takeuchi (University of Yamanashi)
- 11 : 00 — 11 : 15 Coffee break
- 11 : 15 — 12 : 15 “APRU Multi-Hazard Summer Seminar Climate Change and Disaster”
by Dr Riyanti Djalante (UNU)
- 12 : 15 — 13 : 15 Lunch
- 13 : 15 — 14 : 15 “Economic impacts of natural disasters: a survey” by Prof. Nori Tarui
(University of Hawaii, Manoa)
- 14 : 15 — 15 : 30 Group work 2:
- 3) Please develop a DRR project proposal that applies and uses your research results/
findings. It has to include both natural and social science perspective.
- 4) Who needs to get involved in the project implementation?
What are their roles in the project?
- 15:30—15:45 Coffee break
- 15:45—16:30 Group presentation
- 16:30—16:45 Closing

ANNEX II: List of Participants

1) APRU Summer School Participants

	Name	Title	University location	University/Organization
1	Shabir Ahmad Kabirzad	Assistant Professor	Afghanistan	Kabul University
2	Guangzhi Wang	Master Student	China	Fudan University
3	Srinivas Vivek Bokkisa	Master Student	China	Hong Kong University of Science and Technology (HKUST)
4	Nida Hanifah Nasir	Master Student	Indonesia	Universitas Indonesia
5	Ike Pujiriani Sadjiman	Research Assistant	Indonesia	Universitas Indonesia
6	Syamsidik	Vice Director of TDMRC	Indonesia	Syiah Kuala University
7	Yeoju Jung	PhD Student	Japan	Tohoku University
8	Ai Tashiro	PhD Student	Japan	Tohoku University
9	M M Aeorangajeb Al Hossain	PhD Student	Japan	Nagoya University
10	Kotoe Uchiyama	PhD Student	Japan	Nagoya University
11	Moeka Yokosawa	Undergraduate Student	Japan	Miyagi Gakuin Women's University
12	Megumi Nishigawa	Doctoral Student	Japan	University of Kochi
13	Martin Garcia Fry	Research Student	Japan	IRIDeS, Tohoku University
14	Paoloregel Bagongahasa Samonte	Student	Japan	United Nation University
15	Meghana Shukla	Student	Japan	United Nation University
16	Hastoro Dwinantoaji	Graduate Student	Japan	University of Kochi
17	Masyitha Retno Budiati Kiraman	PhD Student	Japan	Tohoku University
18	Kamilia Sharir	Master Student	Malaysia	The National University of Malaysia (UKM Bangi)
19	Gerardo Castaneda Garza	PhD Student	Mexico	Tecnologico de Monterrey
20	Christian Rodriguez Orozco	Assistant Professor	Philippines	University of the Philippines Diliman
21	Ramon Iñigo Mequi Espinosa	Associate Coordinator	Philippines	Philippine School of Business Administration
22	Kristian Macalalad Azul	Assistant Professor	Philippines	University of the Philippines Diliman
23	Kristine Aspiras	Assistant Professor	Philippines	University of the Philippines Diliman
24	Emmanuel M. Luna	Professor	Philippines	University of the Philippines
25	Suyi Wong	Laboratory Technologist	Singapore	National University of Singapore
26	Constance Chua	PhD Student	Singapore	Asian School of the Environment, Nanyang Technological University
27	Ozge Uzunkol	Public Officer	Turkey	Istanbul Metropolitan Municipality, Directorate of Earthquake and Ground Research

	Name	Title	University location	University/Organization
28	Sema Kara	Public Officer	Turkey	Istanbul Metropolitan Municipality, Directorate of Earthquake and Ground Research
29	Christina Schönleber	Director for Policy and Programs	China	APRU International Secretariat
30	Kuniyoshi Takeuchi	Professor Emeritus	Japan	University of Yamanashi
31	Nori Tarui	Professor	Japan	University of Hawaii, Manoa
32	Riyanti Djalante	Academic Programme Officer	Japan	United Nations University
33	Kiyoshi Araake	Principal	Japan	Kouya Elementary School
34	Takumi Fujimura		Japan	Tagajo City Government
35	Takeshi Komino	General Secretary	Japan	Church World Service (CWS)
36	Fumihiko Imamura	Director	Japan	Tohoku University [IRIDeS]
37	Kiyoshi Ito	Deputy Director	Japan	Tohoku University [IRIDeS]
38	Osamu Murao	Professor	Japan	Tohoku University [IRIDeS]
39	Shinichi Egawa	Professor	Japan	Tohoku University [IRIDeS]
40	Katsuya Hirano	Associate Professor	Japan	Tohoku University [IRIDeS]
41	Sébastien Penmellen Boret	Assistant Professor	Japan	Tohoku University [IRIDeS]
42	Akihiro Shibayama	Associate Professor	Japan	Tohoku University [IRIDeS]
43	Takako Izumi	Associate Professor	Japan	Tohoku University [IRIDeS]
44	John Rundle	Distinguished Professor	USA	University of California Davis

2) Participants from Northeast Asia Economic Forum's Young Leaders Program (Joined the summer school only on 24-25 July)

	Name	Title	University location	University/Organization
1	Fangfei Jiang	Assistant Research Fellow / Foreign Affairs Officer	China	Institute of Literature, Chinese Academy of Social Sciences
2	Ji Miao	Assistant Professor / Research Fellow	China	Center for China-Japan-Korea Trilateral Cooperation, China Foreign Affairs University
3	Hechong Wang	Senior Associate	China	PICC Investment Holding Company Limited
4	Tiang Wu	Master student	China	Nankai University
5	Nikolai Mukhin	PhD student	China	The University of Hong Kong
6	Hyorim Lee	Masters student	Japan	Kyoto University
7	Kyoko Yanagi	Research Associate	Japan	Japan Electric Power Information Center, Inc.
8	Yoshinori Shimosakai	PhD student	Japan	Tohoku University

	Name	Title	University location	University/Organization
9	Muzhen Liu	Masters student	Japan	Tohoku University
10	Zheqin Chen	MA student in Economics	Japan	Tohoku University
11	Siele Kipkorir Weldon	Masters student	Japan	Tohoku University
12	Yasuhiro Chiba	Vice Chairman	Japan	Board Member of Northeast Asian Studies & Exchange Network , Japan
13	Weonbin Choy	Assistant Director	Korea	Ministry of Strategy and Finance
14	Kyle Ferrier	Director of Academic Affairs and Research	Korea	Korea Economic Institute of America (KEI)
15	Junhyun Jun	Staff	Korea	API Korea
16	Jongseo Lee	Intern	Korea	API Korea Intern
17	Sungwoong (Brice) Park	Global supply manager	Korea	Apple
18	Lee-Jay Cho	Chairman	Korea	Northeast Asia Economic Forum
19	Bayartsengel Batjargal	Lecturer	Mongolia	Department of International Relations, National University of Mongolia
20	Ariunaa Damdinsuren	Research Fellow	Mongolia	Institute of International Affairs, Mongolian Academy of Sciences
21	Enkhzul Ganzorig	Project Manager	Mongolia	Mongol Global LLC
22	Wrenn Yennie	Research Fellow	Norway	Norwegian Institute of International Affairs (NIIPI)
23	Olga Petrova	Manager	Russia	Higher School of Economics, National Research University (Moscow, Russia)
24	Ekaterina Polkhova	PhD student	Russia	Saint Petersburg State University
25	Elena Soboleva	Lecturer	Russia	The Russian Language and Culture Institute
26	Evgeniya Tolstoguzova	Chief Specialist of International Projects Center	Russia	Federal State Unitary Enterprise Rossiya Segodnya International Information Agency
27	Mikhail Tomilov	Post-graduate student	Russia	Economic Research Institute, Far Eastern Branch of the Russian Academy of Sciences
28	Xi Hu	LWP Post-doctoral Fellow	USA	Harvard University
29	Wentao Zhou	Ph.D. student	USA	University of Wisconsin - Madison
30	Thomas Giles	PhD student	USA	Florida International University
31	April Goodwin	Academic Affairs Program Officer	USA	University of Hawaii at Manoa
32	Nicholas Seltzer	Masters student	USA	Middlebury Institute of International Studies
33	Walter Thulin	Undergraduate student	USA	Yale University
34	Mel Lorenzo Accad	Staff	USA	NEAEF



International Research Institute
of Disaster Science (IRIDeS),
Tohoku University

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