

**A reflection of the Symposium on  
“Risk, Resilience and Disaster Management -  
Launching the World Bosai Forum/ IDRC  
Sendai 2019”**

**Assignment Study Report**

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**Table of Contents**

- 1. Introduction.....3**
  
- 2. Risk, Resilience and Disaster Management.....3**
  
- 3. Summary of Presentations.....5**
  - 3.1. UNESCO – Engagement on Youth.....5
  - 3.2. The 29 September 2018 Sulawesi Earthquake and Tsunami.....6
  - 3.3. Outcomes of the World Bosai Forum in 2017 and International Activities: 7 years of experience after the Great East Japan Earthquake in 2011.....7
  - 3.4. Sustainability and Resilience of Engineered Systems.....8
  - 3.5. An innovative digital disaster archive system.....9
  - 3.6. Macro-economic analysis – how much investment in DRR is most appropriate for countries? .....10
  - 3.7. Hybrid Threats & Disaster Risk Management: Changing Paradigm in Security..11
  - 3.8. Risk, resilience and sustainability – bridging research and education.....12
  - 3.9. The Role of Media in DRR – the Sendai City Example.....13
  
- 4. Concluding Remarks.....14**
  
- 5. References.....15**

## **1. Introduction**

On November 23<sup>rd</sup>, a symposium on “Risk, Resilience and Disaster Management - Launching the World Bosai Forum/ IDRC Sendai 2019” was held in Davos, Switzerland. Several professors and experts in the respective fields were present to discuss pressing issues and notable research. In total, eight presentations were held by different speakers and the symposium was followed by a plenary discussion as well as an announcement of the 2nd World Bosai Forum/ IDRC 2019 in Sendai. This paper aims to provide a summary and reflection of the different topics discussed at the symposium. Each section of this paper focuses on one of the eight presentations held by providing a summary on it and shedding light on the most notable and surprising aspect of the topic at hand. Before the summary is presented, the paper will give a brief overview and definitions of the three key terms for the symposium, which are: risk, resilience and disaster management. The paper will also present the role of UNESCO in engaging the youth in topics addressing DRR, which was part of the plenary discussion.

## **2. Risk, Resilience and Disaster Management**

The topics of risk, resilience and disaster management were vital to the symposium and therefore the definitions of each of these terms will shortly be discussed in the following section.

**Risk:** Quite simply put, the definition of risk is “a situation involving exposure to danger” (Oxford Dictionaries, 2018). There are many different forms and levels of risk, some being more severe of others. Some risks we face each day and they are not as severe, while others risks can be devastating if it were to occur. When focusing more on risk in the terms of disaster, it is when there is an occurrence of a threat or a hazard process. Some of these risks that come to mind are natural hazards, viruses, fire, bacteria and climate change. There are also several values that may be exposed to certain risks, and some of these could be humans, assets, infrastructure, environments and society. An aspect of risk that is very interesting is that it even has a mathematical definition, being:  $\text{risk} = \text{hazard} \times \text{values at risk} \times \text{vulnerability}$  (Ammann, 2018). With this equation, we are able to calculate the risk of a given situation and it can be made more quantifiable. What can also be seen by this mathematical definition is that some situations will of course lead to a much greater sense of risk than others. The bigger the hazard, the more values included and the higher the vulnerability, the greater the actual risk is.

**Resilience:** This term has to do with ones ability to recovery quickly from a difficult time, and it can go to show toughness. Just as with risk, there are many different forms and levels of

resilience. It can be on a small spectrum such as a person having to overcome difficult times in their personal life, and this can show them to be very resilient. However, it can also be seen on a much bigger term. A country that for example is time and time again hit by natural disasters such as tsunamis and flooding's can show itself to be very resilient by constantly being able to overcome such difficulties and overcome them quickly. Resilience can be seen as small if the loss in functionality and the recovery time take up a large time frame. The longer a place takes to be fully functional and recover the less resilient they are. There are four main ways to measure resilience, and they are as follows:

1. Robustness: which demonstrates the ability of a system to withstand disaster forces and by doing so not having significant degradation or loss of performance.
2. Redundancy: shows how much a system is substitutable in the case of significant degradation/loss of functionality
3. Resourcefulness: has to do with the ability to mobilize material and monetary, informational and technological human resources
4. Rapidity: the ability to restore functionality in a timely way and to contain loss and avoid disruptions.

(Source: Ammann, 2018)

Disaster Management: This is the last term that will be looked at before going into the summary of the presentation held at the symposium in Davos. Disaster Management can be defined as “the organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular preparedness, response and recovery in order to lessen the impact of disaster” (IFRC, 2018). Just as the name and the definition suggest, it is all about being able to manage a disaster should it occur. There is one way to properly ensure that disaster is managed as well as possible and that is to be prepared. For example, if an organization is prepared with a plan of action in case of a disaster, when it would happen they can manage it a lot better than if they had never sat down to think ahead. Of course, no emergency will look exactly as the “plan” as each is individual in its own nature and evolves differently than the last. However, this is not a reason to not be prepared as the main points of a disaster management plan for a certain situation will remain the same. It is still very crucial that the ones attempting to manage the disaster can think quickly on the spot and divert from an original plan if it need be. If resources and responsibilities are able to be managed well prior to a disaster and in the actual occurrence to one, the total devastation can be minimized and this should be the end goal.

### **3. Summary of Presentations**

#### **3.1. UNESCO – Engagement on Youth**

Presented by Soichiro Yasukawa, DRR Programme Specialist, UNESCO, Paris. All information presented in the following section comes from the source *Yasukawa, 2018*.

During the panel discussion, Mr. Yasukawa came up with some interesting points regarding the very important partnership with UNESCO. UNESCO has four main roles in DRR, being: networking for knowledge exchange, capacity building, policy recommendation and multi-disciplinary approaches. The main focus of this presentation was to have an in-depth look at UNESCO's engagement with the youth. The first topic addressed was what issues could arise when empowering young scientists for DRR. Some points that came up were the quantity/quality of DRR science programs in higher education, the generation/gender gap of scientist, mobility and the job opportunity/brain drain of DRR scientist. Global trends were also discussed, as a steep rise in research input and output has been noted. Furthermore, research expenditures rose by 30.5%, number of researchers by 21% and scientific publications by 23%.

Another topic that was addressed was the PhD market, which is still being greatly dominated by the USA. Ten countries host 89% of international PhD students in science and engineering fields, and the USA is responsible for 49.1% of these. Malaysia had big plans in this area as they plan to attract 200,000 students by the year 2020. When looking at women's participation in research overall globally, it has been described as a "leaky pipeline". This is due to the fact that women are actively pursuing bachelor's and master's degrees and are outnumbering men at these levels as they represent 53% of graduates. However, these numbers drop abruptly at the PhD level as male graduates overtake women with 57%. When looking at employment, it could be seen that half of researchers are being employed by the higher education sector in most countries, with the notable exception being in Singapore, where half of the researchers are being employed by the industry.

UNESCO is working on increasing the engagement of the youth in this field, and is doing so with various measures, one of which being the Operational Strategy of Youth (2014-2021). This is a strategy that UNESCO is being guided by, and is the result of a long process of reviews and consultations where both young people and members of states have been engaged. With this, it serves to consolidate and innovate UNESCO's actions for youth. UNESCO's strategy also includes hosting Youth Forums. The forum, which is hosted every two years, has young women and men come together at UNESCO's headquarters in Paris. There, they debate and discuss about pertinent issues that are related to the organizations

fields of competencies. Furthermore, together with UNISDR, UNESCO co-organized the regional workshop on “Strengthening, Empowering, and Mobilizing Youth and Young Professionals in Science, Engineering, Technology and Innovation for Disaster Risk Reduction in Asia and the Pacific”. The U-Inspire initiative was also brought up, which is a youth and young professional platform for DRR, which is supported by UNESCO. It was also very impressive to hear that from 2019 to 2023 UNESCO plans to assess 11,500 schools in over 180 countries. One further topic that was mentioned was UNESCO’s use of artificial intelligence. Important aspects that were discussed here were how AI can support each of UNESCO’s domains and how AI can help prevent natural disasters. Mr. Yasukawa’s presentation was very interesting and it was very enlightening to get to obtain a better understanding of UNESCO’s dedication to furthering education.

### **3.2. The 29 September 2018 Sulawesi Earthquake and Tsunami**

Presented by Fumihiko Imamura, Prof. Tsunami Engineering, Director International Research Institute of Disaster Science, IRIDeS, Tohoku University, Sendai. All information presented in the following section comes from the source *Imamura, 2018*.

The first presentation following the introduction was that of Prof. Imamura, who addressed the 2018 earthquake and tsunami in Sulawesi. This devastating event took the lives of 2,245 people and injured 4,488. As of October 2018, over 1000 people are still missing. In order to ensure as much recovery and reconstruction as possible, all available data and information on the tsunami had to be analyzed in the hopes of giving an idea of a tsunami resilient city in the future. Here, Prof. Imamura shared interesting measures taken to analyze the tsunami and its damage. For example, one could look at watermarks on the house walls to see how often the tsunami hit. Sometimes the first floor would show damage by watermarks and the second floor would not have sustained any damage. This is an issue that arises with satellite images, as such a house will look fine from an aerial view, but the first floor is in fact completely damaged. Furthermore, they gathered eyewitness accounts to shed light on the impact of the tsunami. Again, an interesting example was brought forth about eyewitness accounts of a wave reaching the top of a statue, while others say it only reached half way. This goes to show an issue with such information gathering, as multiple accounts tell different stories.

All information that they could gather, from watermarks, eyewitness reports, sliding, ground elevation and photos from pilots were able to give a detailed overview of the impact of the tsunami. The available data was compiled and a topography and bathymetry data could be made for the numerical simulation. This was able to create run up simulations of the tsunami

with scenarios carried out to provide the inundation area and tsunami heights on the coast at the bay. It was very interesting to see what measures are being taken post a tsunami in order to be able to gather as much accurate data as possible and construct an overview of the situation. This information can then later on be used to prepare for a similar event by use of simulations. One learning about this presentation that I found really infesting was how researchers had to find ways to uncover the “real truth”. For example, looking at a house from an ariel view might show zero damage, but there is more to the story than one single view. By using multiple forms of observation one is able to gather the big picture, and this is exactly what the researchers have learnt to do.

### **3.3. Outcomes of the World Bosai Forum in 2017 and International Activities: 7 years of experience after the Great East Japan Earthquake in 2011**

Presented by Yuichi Ono, Prof. IRIDeS, Tohoku University, Foundation Chairperson, World Bosai Forum with video. All information presented in the following section comes from the source *Ono, 2018*.

The next presentation held was that by Prof. Ono, who addressed the outcome of the 2017 World Bosai Forum and went through some of the strengths and weaknesses found. The forum had almost 950 participants coming from 42 different countries and regions. One significant challenge encountered was that over 30 of the country participants failed to submit any data, which of course impacted the course of the event. The organizers were happy to see that the forum attracted a lot of media coverage, however, no international media coverage was present. As the majority of countries and regions present at the forum were from Asia, they had hoped for more international media coverage to make the event more known and attractive in other parts of the globe. They were able to see a lot of support from young people, which was a great strength for them. The younger generation and young scholars attracted many posters and presentations.

Prof. Ono stressed that this forum is of great help to all participants involved as all are helping each other by learning from past experiences and sharing their knowledge. In the end, one of the outcomes of this forum was a chair summary that put together all of the topics and major findings. This is of great benefit to all participants. After the conference, people were able to participate in study tours and over night excursions. All in all, this seemed like a very interesting and meaningful conference. I liked how they really seem to focus on the participants themselves, stating how they are all helping each other and encouraging excursions at the end. Communication and learning between the attendees is a vital part of such a forum. What I also really enjoyed from this presentation was learning how

the community really tries its best to carry on the cultures and traditions of those that have been affected by a crisis. An example of this is how during the conference, they had people perform the Tiger Dance of Namiita, a folk art performance in Kesennuma. People in this area had been affected by a disaster and they wanted to show that despite everything, their cultures and traditions live on.

### **3.4. Sustainability and Resilience of Engineered Systems**

Presented by Michael Faber Nielsen, Prof. Aalborg University, DK; GRF Davos Research Fellow. All information presented in the following section comes from the source *Faber, 2018*.

Prof. Faber's presentation may have been the one that left the greatest impact on me, probably because it brought up some extremely interesting and relevant points that one does not really consider in their day-to-day life. When one thinks of the term "risk and crisis management", it often leads back to those well known words such a tsunami, earthquake and natural disaster. These are events that we all know about, but often won't be affected by so people may not worry as much about them as they could. However, Prof. Faber made the term "risk and crisis management" a bit more "close to home" to all of us, since he introduced one issue that will most definitely impact each and everyone of us; namely population growth. According to research, the population will grow close to 40% by the year 2050. Cities keep growing at a rapid pace, more and more mega cities are introduced, and as life expectancy continues to grow, the world population continues to rise.

There are several real worries that come to mind here. One of these is the CO<sub>2</sub> emission. In 2017 the rate of CO<sub>2</sub> emission was equivalent to the rate of CO<sub>2</sub> emission of the last decade. With the growing population, human sources of CO<sub>2</sub> emission also continue to grow, and as our population continues to rise, so will these emissions. A next real worry is also the management of our resources. It is well known that the resources on earth will not be here forever, and as humans are not seen as the most sustainable of creatures, we are quickly going through more resources than are able to grow back. With the population continuing to rise it may very well one day be a real threat that certain resources are close to running out. I cannot even begin to imagine what immense crisis this will unleash, and how we will be able to tackle such a problem.

The speaker urged that we must take action now, and even though it is good to try to take care of the risk of earthquakes and the such, it will not help us if in the year 2050 we are struggling with far deeper problems. Even if we would start making changes now, it would

take about 10-15 years to see them. We must act now, and we must do it drastically. With this, one focus should be on emissions. We need to be able to find substitutes for our most used resources, so that one day these will be able to be replaced. More research needs to be focused on this, as this is a real problem that will soon have real consequences for us. This presentation was most definitely food for thought, as it was a form of risk and crisis management that one usually does not think of. By the end of the presentation it was clear that we all need to start to leave our comfort zone and act on this urgent issue, as it cannot be ignored and will soon be catching up with us.

### **3.5. An innovative digital disaster archive system**

Presented by Sebastian Boret, Assis. Prof. IRIDeS. All information presented in the following section comes from the source *Boret, 2018*.

The fifth presentation was a bit more light-hearted than the previous one, and in it, Prof. Boret offered an overview of how innovation and digitalization can aid in the creation of a disaster archive system. Accessible data is photographs, videos and street view cameras and this can greatly aid in research since this data can be used to compare what has been happening throughout time and how the community is reacting to clear the area. Images showed in the presentation were really able to demonstrate how quickly an area can be cleared up after a disaster and how immensely big these differences are. Furthermore, technology used for these purposes can store data information as well as computer modeling. There is also a concept of “master measurement” which is a lot more technical and allows one to build a model of a certain area struck by disaster. This is not so much for education but more for the purpose of research. A master measurement of the such allows one to see how debris have impacted each other and gives researchers a measurement that just cannot be delivered by photo or video. However, much of what can be done with digitalization and technology can also be used for learning. For example, they can use earthquake records in a workshop. With such records, a lot can be learned and analyzed and hopefully measures against future impacts can be taken. In summary, it was noted as very important to have and collect records of disaster as they contain a large amount of data that can be used knowledgably, for example in the re-construction of an area.

Another part of this presentation focused on events and tourism that arise from disasters. For example, there are storytelling symposiums held every year before the anniversary of an earthquake. One event of the such was a storytelling event held for the third time in Tohoku after the 2011 earthquake. It has had over 1000 participants each year and public readings are performed (with music) in order to “hand down the memories and resilient, living hopes of

the disaster". Furthermore, disaster tourism has also become more prominent. People visit disaster sites in order to learn from survivors and reconstruction activities. In addition to this, disaster education has been introduced on all levels, starting from elementary school and upwards. I found it very interesting how apart from knowing the importance of technology in risk and crisis management, they also see the importance of bringing together communities (with for example storytelling events) and of education. It shows that successfully managing risk and crisis management does not just include one single aspect, but rather many different aspects.

### **3.6. Macro-economic analysis – how much investment in DRR is most appropriate for countries?**

Presented by Kanayo Kousaka, Pacific Consultants. All information presented in the following section comes from the source *Kousaka, 2018*.

The afternoon sessions of the symposium started with Ms. Kousaka, who discussed an important issue of investment in different countries. She represented the firm Pacific Consultants, which has 66 years of experience, a global network and deals with DRR investments. A framework that his consultancy group uses and strongly believes in is the PDCA cycle (Plan, Do, Check, Act). With this, it allows them to be able to update activities in their cycle. Even though this is valuable for a consulting firm, Ms. Kousaka did make the point that of course, not everyone has the means for this.

A main focus of Pacific Consultants is to encourage investments, and they do this by constantly demonstrating the effect of it, prioritizing it and working hard to get the monetary support for it. With the importance of investments, the speaker introduced the DR2AD model (Disaster Risk Reduction Investment Accounts for Development), which is a macroeconomic model to measure the impact of DRR investments on economic growth. A pivotal reason for investments is that economic growth declines dramatically without DRR investments. Despite DRR investments an occurrence may still be damageable for a country, but it will be able to recuperate. Of course, there can also be consequences if a government ends up investing too much. Such an action may cause the government to lose out on other opportunities, such as in industrial investments. This in turn can also slow down economic growth. This presentation showed just how tricky investments can be, especially when it comes to investments dealing with DRR. As she mentioned, a country can quickly be in trouble if they choose to invest too little or too much. Finding a balance in investments is the challenge and can greatly impact the way a country is doing economically.

### **3.7. Hybrid Threats and Disaster Risk Management: Changing Paradigm in Security.**

Presented by Georg Peter, European Commission, Joint Research Center EU JRC Ispra. All information presented in the following section comes from the source *Peter, 2018*.

Mr. Peter led the audience through a very interesting presentation ongoing the topic of cyber threats also being included in disaster risk management, something that has often been overlooked. Here, it was made clear that the new reality we live in, which includes factors such as digitalization, smart infrastructure, migration, social media and complexity, brings forth new challenges. The ever changing world that we live in today includes so much data, and this in turn has the ability to make us very vulnerable as there are many more risks and possibilities of hybrid threats. One main aspect of a hybrid threat is that it is triggered by hiding the originator. It is exactly this that makes the ones targeted more vulnerable, as it is difficult/impossible for them to know where the threat is actually coming from. This in turn makes it very difficult to counter the threat.

The hybrid threat timeline includes the following three steps: 1. Priming face – this deals with undermining trust to institutions, leveraging social vulnerabilities and challenging opponent's preparedness. 2. Conduct - this includes the orchestrated attacks, intensified propaganda and fake news and attacks to technological systems. 3. Recovery – this is the last step and includes lessons learned, building resilience and awareness raising. When it comes to measures that can be taken in order to decrease vulnerability and have more resilience, several points could be seen as important. Raising awareness in the general public is always a good starting point along with enhancing good governance and trust to institutions. With this, people will be able to see the bigger picture, and along with more education on the subject people will be able to question more things and become more critical. With a raising awareness and addressing radicalization as well as social inequalities, resilience at a social level can be built.

The cycle of a cyber threat works the following way: prevention → preparedness → detection → response → recovery. Prevention is able to make one less vulnerable, while early detection can lead to better survival chances. Of course, this is a classic “cat and mouse game”, since once you detect the attackers will come back with a more sufficient attack. The solution to cyber threats offered by Mr. Peter was the following. 1. Raising awareness by reporting the incident. Often, workers are too scared to report a minor cyber attack, and will in turn “brush it under the rug” hoping it will not cause greater damage. This needs to be stopped and people must come forth will all incidents, 2. There must be a trust in the member state. This is a rather difficult step as still to this day people have difficulty sharing

classified information. 3. Lastly, algorithms play an important role as this allows people to connect the dots, making them less vulnerable of an attack in the future.

I found this presentation very interesting as it was a topic that one usually does not think about when talking about risk and crisis management. Also, this presentation provided a very interesting discussion at the end, as many other participants of the symposium had questions and comments that they wanted to share. It was interesting to hear all of these, and to see some of the different opinions between speakers ongoing this interesting topic.

### **3.8. Risk, resilience and sustainability – bridging research and education**

Presented by Linda Nielsen, PhD fellow, Aalborg University, DK. All information presented in the following section comes from the source *Nielsen, 2018*.

This presentation by Ms. Nielsen was extremely insightful as it took a look at research that she had been involved in that was looking at the education side of risk, resilience and sustainability and how it has developed over the years. What was found was that research has increased tremendously over the years when it came to the topic of risk, resilience and sustainability. However, it was found that there were no real agreed definitions, overlaps existed and much of the content was not synchronized. Even though there has been a somewhat positive development in the field it greatly lacked a systematic approach as it was completely domain specific. With this, students are also learning very outdated research methods and *focusing on inquiry based problem learning*.

When looking at the timeline of the three basic terms (risk, resilience and sustainability) from the 1990's until today, it can be seen that risk is the most dominant term and has been around for the longest. When looking at the over 200,000 publications on the topic, something else interesting could be seen. From 1990-2000 health and safety was dominant, from 2001-2010 this practically disappeared and from 2011-2017 it appeared again, however, this time in a different cluster being that of ecology and environmental science.

What was very interesting in this presentation was the point that there is a need for a new learning philosophy and educational design for risk. This is because the "integration of sustainability and resilience consideration into risk management necessitates a systems understanding of risk." However, our present educational models do not facilitate such understanding. The new way of learning that was introduced was Learning Design, which was characterized by including "liquid knowledge" (due to it constantly evolving), trans-disciplinary, co-creation and civic values (including societal needs). The theoretical

foundations of learning design is that it is a research problem based learning, has hybrid concept clusters, transitional learning and social learning.

### **3.9. The Role of Media in DRR – the Sendai City Example**

Presented by Akihiro Hojo, Kahoku Shimpo Media, Sendai City. All information presented in the following section comes from the source *Hojo, 2018*.

The last presentation that was held was one addressing the role of media in DRR, and was held by Mr. Hojo, a representative of a media company that dealt with such issues. On big issue with the media in *Japan* was that whenever disaster struck, they would report on it, however, the locals felt like they were only there to spread the news but really did little to help the situation. Apparently 72% of readers from newspapers felt as though what they were doing was “not useful” as there was a lack of intention to save the local peoples lives. With this, the media company decided to improve on this as they also wanted to be part of the solution and not only report on the problem at hand. Due to this, they introduced 3 different activates to the public to make an attempt to also make a difference. The activities were workshops, education for young people, and a round table event. The workshop has now been held over 80 times and aims to share details of disasters and discuss plans to reduce risk. The education for young people is called “next generation academy for transmission and preparation” and has over 100 students attending lectures and they are being trained as “memory keepers”. The round table discussions served as a collaboration with universities, administration and media and was established in 2015. Here, people can discuss important issues and learn form each other.

What this company also did was found the group “Kakoku Shimp Boasai and Education project office”. It was established in 2016 and aims to fulfill the duty of transmission and enlightenment. Here, they wish to put more effort to eliminate the number of deaths and to tell the stories of the disasters, not only from the people in Japan but form around the world. The motivation is to inform the people, to make them interested and to encourage them to take action. I was really impressed by this media company and speaker as they had been faced with a challenge and they really tackled it and made something great out of it. Instead of only reporting on disasters, they are now really going out and making a change, taking the opinions of the public seriously and working on finding a way to improve. In the end, rather than waiting for disaster to happen they wanted to be able to go out and educate people on it.

#### **4. Concluding Remarks**

In conclusion, the symposium on risk and crisis management in Davos was very insightful, bringing many different topics to the table, many of which are not regularly discussed. This allowed the symposium to shed light on many different issues, and the learning's from it has been immense. What was also very interesting was to see how differently people and countries view and tackle the concept of risk and crisis management. Having a very international group of speakers showed that many are focusing on different areas of risk, with topics including everything from tsunamis to education to over population. For me this was very insightful as it really showed that risk is perceived differently by different people. All in all, the symposium was able to teach me a lot and I thoroughly enjoyed partaking in such an event.

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