Questions and Answers in PIANC Asian Seminar 2021

1. Answers to Questions by Dr. Tomoya Shibayama, Waseda University, Japan

Question 1

Apart from the edX courses on coastal engineering, are there other platforms you could recommend?

(Answer)

I am not sure about another platform. Instead, I would like to recommend the following book.

Handbook of coastal disaster mitigation for engineers and planners
edited by Miguel Esteban, Hiroshi Takagi, Tomoya Shibayama, 2015, Elsevier
ISBN 9780128010600
ISBN 0128010606

Question 2

May I know the severity of the land subsidence in Japan given the current sea level rise and climate change? How about the comparison with Jakarta, Bangkok and Shanghai? Which is worse?

(Answer)

In the Koto delta in downtown Tokyo, much groundwater was pumped up to urbanize the Tokyo Bay region in the past. It caused severe ground subsidence. The maximum value is around 4.5m. It is far more than possible sea-level rise. Jakarta, Bangkok and Shanghai have the same experiences.

Question 3

Large-scale tsunamis due to earthquakes in the Nankai Trough and storm surges caused by stronger typhoons due to global warming will make software countermeasures more and more important in the future.

As tsunami and storm surge analysis and evacuation simulation can predict disaster behavior, what will be required to return the results to the public? How will the results of numerical analysis be reflected in software measures?

(Answer)

The results of numerical analysis have been disseminated to residents through local governments, but it will be necessary to communicate the results directly to individual residents for their evacuation plans.

Question 4

May I get the research recommendations of Palu?

(Answer)

Please read the following papers.

Mikami, T., Shibayama, T., Esteban, M., Takabatake, T., Nakamura, R., Nishida, Y., Achiari, H., Rusli, Marzuki, A., Marzuki, M., Stolle, J., Krautwald, C., Robertson, I., Aranguiz, R. & Ohira, K. (2019):

Field Survey of the 2018 Sulawesi Tsunami: Inundation and Run-up Heights and Damage to Coastal Communities, Pure and Applied Geophysics, 176, 3291-3304. [doi:10.1007/s00024-019-02258-5]

Aránguiz, R., Esteban, M., Takagi, H., Mikami, T., Takabatake, T., Gómez, M., González, J., Shibayama, T., Okuwaki, R., Yagi, Y., Shimizu, K., Achiari, H., Stolle, J., Robertson, I., Ohira, K., Nakamura, R., Nishida, Y., Krautwald, C., Goseberg, N. & Nistor, L. (2020): The 2018 Sulawesi tsunami in Palu city as a result of several landslides and coseismic tsunamis, Coastal Engineering Journal, 62(4), 445-459. [doi.org/10.1080/21664250.2020.1780719]

Engineering Lessons from September 28, 2018 Indonesian Tsunami: Scouring Mechanisms and Effects on Infrastructure, Clemens Krautwald, Jacob Stolle, Ian Robertson, Hendra Achiari, Takahito Mikami, Ryota Nakamura, Tomoyuki Takabatake, Yuta Nishida, Tomoya Shibayama, Miguel Esteban, Nils Goseberg, Ioan Nistor, Journal of Waterway, Port, Coastal and Ocean Engineering 147(2)

Question 5

Please tell us about the prospects of storm surge prevention. In terms of tsunami disaster prevention, the experience of the Tohoku tsunami has greatly changed our countermeasures. Damages due to storm surges will be severer in the context of climate change impacts.

(Answer)

Based on the fact that the behavior of typhoons is changing due to global warming, we should predict future storm surges using the pseudo global warming experiment. For more details, please refer to the following paper.

Nakamura, R., Shibayama, T., Esteban, M., Iwamoto, T. & Nishizaki, S. (2020): Simulations of future typhoons and storm surges around Tokyo Bay using IPCC AR5 RCP 8.5 scenario in multi global climate models, Coastal Engineering Journal, 62(1), 101-127. [doi:10.1080/21664250.2019.1709014]

Mäll, M., Nakamura, R., Suursaar, Ü. & Shibayama, T. (2020): Pseudo-climate modelling study on projected changes in extreme extratropical cyclones, storm waves and surges under CMIP5 multi-model ensemble: Baltic Sea perspective, Natural Hazards, 102, 67-99. [doi:10.1007/s11069-020-03911-2]

Question 6

What rate have you given evacuation speed in the evacuation simulation in Kamakura? Have you given different evacuation speeds to different age groups?

(Answer)

I have given various conditions, please refer to the following for details.

Takabatake, T., Shibayama, T., Esteban, M. & Ishii, H. (2018): Advanced casualty estimation based on tsunami evacuation intended behavior: case study at Yuigahama Beach, Kamakura, Japan. Natural Hazards, 92, 1763-1788. [doi:10.1007/s11069-018-3277-0]

Question 7

You mentioned that coastal disaster prevention requires field surveys, numerical simulations, and hydraulic experiments. What is the most important that we should focus on to improve accuracy?
How accurate are the numerical simulations you are using to hindcast?
Are you also using ICT technologies such as drones in your field surveys?

(Answer)

I think the field surveys are insufficient. We use drones with sonar to obtain the seabed map. The accuracy of numerical simulations has improved, but they have not yet been able to reproduce the results of field surveys in detail.

Question 8

What types of early warning systems have been considered for coastal disasters (including indigenous/colloquial knowledge) and which of these have been most successful?

(Answer)

The most influential early warning is through television network, the internet and smartphone in Japan. There is a variety of software to inform information in case of emergency.

Question 9

How have these early warning systems been included in relevant policy development?

(Answer)

The central government control the early warning system and release necessary information to the public.

2. Answers to Questions by Dr. Hendra Achiari, Bandung Institute of Technology, Indonesia

Question 1

Whether Palu (Sulawesi) coastal areas are still feasible to be reconstructed for seaports?

(Answer)

Palu Bay coastal area suffered from 2018 Sulawesi Tsunami was concentrated at the head of the bay (south part of Bay) near to Palu City. When I visited to the area in out post Tsunami survey, we visited Port of Pantoloan (Port of Pantoloan, Indonesia - ports.com) that located at East part of the Palu Bay that some facilities building and a crane were collapsed at that time not due to tsunami, but because of the big earth quake before Tsunami. The mechanism of high-water wave in the bay or we called Seiche could be happen in Palu Bay (with the depth around 800 m at neck of bay) of 2018 Tsunami, this wave distribution was concentrated at head (south-west part) of the Bay. Conclusion: except some area in head of Palu Bay, there are still feasible to be constructed for seaport example at west part of the Bay.

Question 2

I noticed that there are many government agencies, in Indonesia, responsible for coastal disaster. Is the coordination among these government agencies done smoothly? How about relation between government (including BNPB) and regional agencies?

(Answer)

In Indonesia, there are many government agencies are involved in coastal disaster management, but once Disaster happen (during emergency response stage), the chief of command under of BNPB (National Agency of Disaster Management), every government and organization should coordinate with BNPB as example: Local government is in-charge for coordinating of local people evacuating to some refugee tend and shelter but logistics and management of evacuation process (include evacuation routes, tends or shelter logistic) are support and leaded by BNPB. In Indonesia previously, many coastal disasters happened, it become the coordinating between these government and organization become better in term of time.

Question 3

What types of early warning systems have been considered for coastal disasters (including indigenous/colloquial knowledge) and which of these have been most successful?

(Answer)

In Indonesia, there are some coastal people indigenous tradition in Simueulue Island (West offshore Southern Aceh Province of Sumatera) that in 2004 Tsunami disaster happened were not like mainland people of Aceh/Sumatera. this indigenous people have a local song that derived generation to generation from their ancestor that the big wave phenomena as local name as "Smong" in their language pronounce. It is include the characteristic of Smong when it comes to shore initially with drop of ocean water level on the beach and suggested to the people to go immediately to higher ground or hill because after that the big wave will attack to them (in their name: Smong). By this tradition, even at 2004 Tsunami disaster, many the local people in Aceh interest to catch many fish on the dried coastal ground when ocean water level drop, in term of run away from beach (because the Aceh people did not realized the hazard at that time) at the same time the people of Simeulue Island quickly went to high ground and hill at inner part of their island because of their traditional song that recognize that phenomena as Smong early warning. As you know that the number of Causality in Aceh Aceh people were a lot of number compare the local people in Simuelue Island in 2004 just 3 of 70,000 of Simeulue people reported died at that disaster.

Beside of to keep the local tradition as above success story as the early warning, Indonesian government also try to keep and increase the understanding of local people in our education through a drill / a simulation of disaster in the school and conducting many sign boards in many places as the evacuation route for giving the direction to the people when coastal disaster happens.

Question 4

How have these early warning systems been included in relevant policy development?

(Answer)

Yes, as I mentioned in the answer no 3, The Indonesian government after 2004 Indian ocean Tsunami, blended the early warning system using the wave gauge sensor warning system (-hard approach) and our education system (-soft approach) through a drill /simulation of tsunami to our students in elementary and secondary school in Indonesia especially for the school near to coastal area.

The policy of disaster management system in Indonesia increases based on some lessons learnt after many coastal disasters occurs in Indonesia significantly after 2004 Indian Ocean Tsunami.

3. Answers to Questions by Dr. Mario P. De Leon, De La Salle University, the Philippines

Question 1

Typhoon Yolanda 2013 caused very severe disasters. What kind of countermeasures did Philippine Government conducted after Typhoon Yolanda by the first priority?

(Answer)

According to the National Economic Development Authority (NEDA) Report in 2014, The Comprehensive Rehabilitation and Recovery Program, the Philippine government's response after Typhoon Yolanda in coordination with the different branches and agencies of the government was described as follows:

1. Reconstruction Assistance on Yolanda (RAY)
   The National Economic and Development Authority initiated the immediate planning process to produce the Reconstruction Assistance on Yolanda (RAY) – Build Back Better. RAY is the Government's strategic plan to guide the recovery and rebuilding of the economy, lives, and livelihoods in the affected areas. The "Reconstruction Assistance on Yolanda – Implementation for Results (RAY-I4R)," prepared by NEDA was designed to accelerate and intensify the Post-Yolanda recovery and rehabilitation process. RAY-I4R establishes the framework for recovery and presents detailed planning, implementation, and policy actions in four priority result areas highlighted in RAY, namely, livelihoods and business development, housing and resettlement, social services, and infrastructure.

2. Post-Disaster Needs Assessment (PDNA)
   In December 2013, the Office of Civil Defense (OCD) conducted the Post Disaster Needs Assessment (PDNA). Described as a multi-sectoral and multi-disciplinary structured approach for assessing disaster impacts and prioritizing recovery and reconstruction needs. It covers the Damage and Loss Assessment (DaLA) and Human Recovery Needs Assessment (HRNA), and also includes a recovery and reconstruction framework. In the PDNA development process, OCD engaged the National Government Agencies (NGAs), Local Government Units (LGUs), Civil Society Organizations (CSOs), Non-Government Organizations (NGOs), and barangay officials and residents.

3. Comprehensive Rehabilitation and Recovery Plans (CRRP)
   The CRRP is based on the policy guidance that comes from RAY and provides Projects, Programs, and Activities (PPAs) to meet the needs as identified in the PDNA. The CRRP is complemented and supplemented by the rehabilitation and recovery plans prepared at the provincial and city levels. The CRRP provides details of the implementation modalities and establishes guidance for the implementing national departments and agencies. Significant

rehabilitation and recovery efforts come from the non-government sector for projects focused on four key areas, i.e., education, health, housing, and livelihood.

Question 2

In the case of the Typhoon, we have preparation time before typhoon will actually come. What kind of prevention measures will be the most effective for saving the life of the people?

(Answer)

Disaster Prevention and Mitigation is one of the thematic areas in the National Disaster Risk Reduction and Management Plan (NDRRMP) in support to the Republic Act 10121 entitled, "An Act strengthening the Philippine Disaster Risk Reduction and Management System" also known as the Philippine Disaster Risk Reduction and Management Act of 2010 that paved the way for a paradigm shift in the country's disaster management system from one primarily focused on response and preparedness for response to one focused on reducing and managing disaster risks.

Under the Disaster Prevention and Mitigation thematic area, the outcomes and preventive measures which are effective for saving lives of the people are identified as follows:

1. Effective end-to-end monitoring system, forecasting and early warning systems and advisories that are communicated to the general public in layman's terms
2. Increased disaster resilience of infrastructure systems
3. Information and education campaign on Community-based and scientific Disaster Risk Reduction and Management (DRRM) and Climate Change Adaptation (CCA) assessment

Question 3

Do we have data estimated tsunami height in the cities of the Philippines other than Manila Bay?

(Answer)

The Philippine Institute Volcanology and Seismology (PHIVOLCS) National Tsunami Monitoring and Early Warning operates and maintains an effective tsunami monitoring and communication system; monitors all tsunami events that may affect the Philippines for timely issuance of tsunami advisories and warnings; develops a tsunami database with expected wavelengths and arrival times at certain forecast points; and releases tsunami information in time based on Standard Operating Procedures.

PHIVOLCS simulated a tsunami scenario for a M8.3 earthquake from Manila Trench with an estimated height from 3.5 to 5.5 meters having an arrival time of greater than or equal to 1 hour. For selected coastal areas and cities in the Philippines, the PHIVOLCS Geoportal (web-GIS based portal to view and collate multi-hazard and risk maps) generates tsunami hazard maps with susceptibility of tsunami inundation areas and wave height information. The earthquake and tsunami events in the

Philippines recorded by PHIVOLCS for the past 400 years can also provide basis of information for tsunami wave height.

Question 4

How about build with nature concepts? Do you think this will work in areas that are still undeveloped areas in the Philippines to protect people living in the coastal area where people are mostly fishermen and also for tourism area?

(Answer)

Considering the archipelagic and tropical condition of the Philippines where its coastal areas are fronted by coral reefs and proliferated with vegetation such as mangroves, these have been proven effective natural wave breakers and dissipators and can significantly attenuate high waves due to occurrences of typhoon or earthquake. This will then result into reduced height of water surface displacement. Therefore, the presence of these natural coastal features of coral reefs and mangroves will definitely protect coastal communities, livelihood and tourism. In coastal areas which need soft engineering or nature-based solution, development of green built areas is an effective, efficient and sustainable means of coastal protection.

Question 5

What types of early warning systems have been considered for coastal disasters (including indigenous/colloquial knowledge) and which of these have been most successful?

(Answer)

A collaborative work among several Department of Science and Technology (DOST) agencies namely the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA), Advanced Science and Technology Institute (ASTI), and the DOST-Regional Offices (ROs) implemented the deployment of early warning system in disaster-prone areas

The following are DOST's early warning systems:

1. Granular system of hydrometeorological devices (hydromet) and warning stations in selected hazard areas in the country in order to collect weather risk data to be used in aiding real time disaster mitigation efforts
2. Series of Information, Education, and Communication (IEC) campaigns
3. Flood drill activities, Familiarization of Hazard and Evacuation Maps and Signages

For indigenous and colloquial knowledge, there were studies such as Cuaton and Su (2020) that documented the local-indigenous knowledge on disaster risk reduction of the people in Basey, Samar after Typhoon Haiyan. These included the following:

1. Weather and hazard forecasts from animals that give them signs whenever calamities in the form of natural hazards are about to come.

a. Certain bird species, like rufous hornbill, Palawan hornbill, and white-eared brown dove when they suddenly stop chirping during the day, a typhoon or heavy rainfall is about to come.
b. Insects like crickets when they intermittently stop making a sound for two-three minutes during the night, an earthquake is about to come.
c. Wild pigs when they start collecting leaves and twigs to form or build a "mini house" in a relatively flat and safe spot in the mountains, a typhoon or heavy rainfall that may lead to flooding and landslide is about to happen.

2. Community elders as local hazard forecasters
   a. Upcoming natural hazards like typhoons, earthquakes, and flooding are also manifested through dreams/omens of the elders.

Based on my personal assessment and from the documented accounts and reports, all of these state-of-the-art technologies and indigenous and colloquial knowledge on early warning systems for coastal disasters are effective and successful.

Question 6

How have these early warning systems been included in relevant policy development?

(Answer)

The National Disaster Risk Reduction and Management Framework (NDRRMF) of the Philippines identified 3 key result areas, namely, 1. Disaster Risk Reduction, 2. Disaster Preparedness and response, 3. Build Back Better. Under the Key Result Area on Disaster Risk Reduction, one of the thematic pillars/areas is Disaster Prevention and Mitigation where it encompasses understanding risk and ensuring that policies, plans and budget are risk-informed and provide an enabling environment for sustained actions aimed at addressing current and reducing future risks. This also coves access, use and application of science in risk reduction and management work – from assessment to early warning actions where one of the objectives is to institutionalize timely, responsive, context-and culture-specific early warning systems.

In the case of indigenous/colloquial knowledge, although the Philippine government enacted the Indigenous Peoples' Rights Act (IPRA) in 1997, popularly known as IPRA, that cemented the State's role in recognizing, respecting, and protecting the rights of indigenous peoples in preserving and developing their cultures, traditions, and local institutions, still their role as far as involvement in policy development for disaster risk reduction management is not yet fully tapped.