71075

Flood Risk Management and Urban Resilience Workshop

MANAGING THE RISKS OF DISASTERS IN EAST ASIA AND THE PACIFIC

May 2-3, 2012
Jakarta, Indonesia
WORKSHOP PROCEEDINGS

NATIONAL EMERGENCY MANAGEMENT AGENCY

행정안전부

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Global Facility for Disaster Reduction and Recovery

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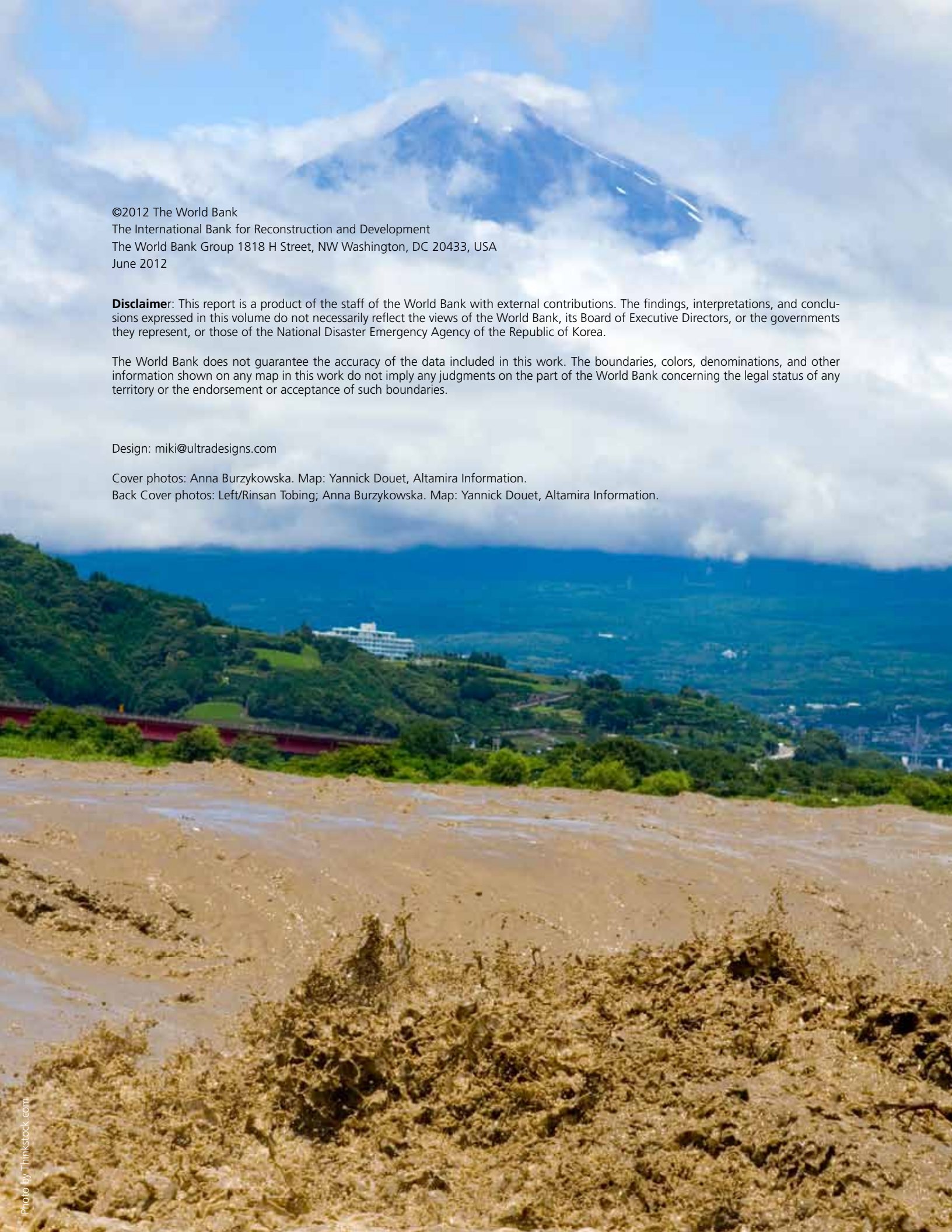

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Acronyms and Abbreviations

AIFDR	Australia-Indonesia Facility for Disaster Risk Reduction
ARC	American Red Cross
ARWS	Automated Rainfall Warning System
BMG	Badan Meteorologi dan Geofisika (Indonesian Meteorology and Geophysics Body)
BNPB	Badan Nasional Penanggulangan Bencana Indonesia (Indonesia National Agency for Disaster Management)
CCA	Climate change adaptation
CoP	Community of Practice
CSR	Corporate social responsibility
DKI	Daerah Khusus Ibukota (Special Capital Region)
DRM	Disaster risk management
DRR	Disaster risk reduction
EAP	East Asia and Pacific
EO	Earth observation
ENSO	El Niño-Southern Oscillation
GFDRR	Global Facility for Disaster Reduction and Recovery
GEJE	Great East Japan Earthquake
GIS	Geographic Information System
HAII	Hydro and Agro Informatics Institute
IDM	Iterative decision making
InaSAFE	Indonesia Scenario Assessment for Emergencies
InSAR	Interferometric Synthetic Aperture Radar
JICA	Japan International Cooperation Agency
JUFMP	Jakarta Urgent Flood Mitigation Program
LGU	Local Government Unit
MENA	Middle East and North Africa
MoPAS	Ministry of Public Administration and Security
MoU	Memorandum of Understanding
NEMA	National Emergency Management Agency
NDMC	National Disaster Management Committee
NDMI	National Disaster Management Institute
NDMO	National Disaster Management Office
NGO	Nongovernmental organization
NGPES	National Growth and Poverty Eradication Strategy
PPP	Public Private Partnership
P.R. China	People's Republic of China
PT	Perseroan Terbatas/ Limited Liability Company
SCFC	Steering Center of Flood Control
Sqkm	Square kilometer
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs

Acknowledgements

The organization of the workshop in Jakarta was led by the Disaster Risk Management (DRM) team in the East Asia and Pacific (EAP) region of the World Bank, supported by GFDRR and funded by the Republic of Korea. The team is grateful for the organizational support of the World Bank Disaster Risk Management team in Jakarta. This report summarizes the presentations and discussions which took place as part of the Flood Risk Management and Urban Resilience Workshop in Jakarta, Indonesia in May 2012. The report was compiled by Eiko Wataya and Irene Wijaya.

The graphic design of this publication was carried out by Miki Fernandez, Ultradesigns.

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EXECUTIVE SUMMARY

The "Flood Risk Management and Urban Resilience Workshop," held on May 2-3, 2012 at the Shangri-La Hotel, Jakarta, Indonesia, brought together over 50 policy makers from national and local levels from seven East Asian countries (Indonesia, Laos PDR, the Philippines, Vietnam, Thailand, China and the Republic of Korea), as well as experts, donors and partner organizations. The workshop was held to increase technical knowledge, share good practice from around the region, and foster a community of committed leaders dealing with flood risks.

Photo by Thinkstock.com. September 2, 2010 - Tropical Storm Kompasu over Korea and China.

The "Flood Risk Management and Urban Resilience Workshop," held on May 2-3, 2012 at the Shangri-La Hotel, Jakarta, Indonesia, brought together over 50 policy makers from national and local levels from seven East Asian countries (Indonesia, Laos PDR, the Philippines, Vietnam, Thailand, China and the Republic of Korea), as well as experts, donors and partner organizations. The workshop was held to increase technical knowledge, share good practice from around the region, and foster a community of committed leaders dealing with flood risks.

The workshop is part of a comprehensive program known as the "*Joint program implementation of subregional projects in Asia*" – an initiative supported by the Republic of Korea and the World Bank/ Global Facility for Disaster Reduction and Recovery (GFDRR). The program is implemented in 15 countries and includes three subregional projects focusing on the issues of *Glacier Lake Outburst Flood* (GLOF) in the Himalayan region, *Typhoons* in the Pacific, and *Flooding and Resilience* in East Asia. The organization of the workshop in Jakarta was led by the Disaster Risk Management (DRM) team in the East Asia and Pacific (EAP) region of the World Bank, supported by GFDRR, and funded by the Republic of Korea. This flagship program supports knowledge sharing, technology transfer, capacity development, and learning specific to strengthening flood risk management and urban resilience.

The workshop, which was held as part of a series of launch events, is the first step towards implementing the recommendations presented in the recently published World Bank report *"Cities and Flooding: A Guide to Integrated Urban Flood Risk Management for the 21st Century"*.[1] Echoing the key messages of the report, this two-day training event strengthened the knowledge of participants on the issues facing their cities and dwellers, and informed them of the measures currently being implemented by various countries in the region.[2] The event highlighted the following global best practices and lessons learned in the field of urban flood risk management:

Accurate identification and communication of disaster risks to stakeholders, particularly policy makers, is crucial. Sophisticated technologies and detailed data are available to identify disaster risks. Nevertheless, due to rapid urbanization, complexities of the urban environment and climate change, risks can never be fully ascertained. The development of multiple risk scenarios based on available data is an important step in understanding the probability and consequences of risks. Accurate communication of risk information to key stakeholders is a vital step in allowing policy makers to make informed decisions on structural and non-structural flood risk management measures. It also allows the public to understand the risks that it is facing and decide on appropriate actions or behaviors. Graphical information of risks, which can be created based on different scenarios, is considered as a preferable decision-support tool for policy makers and disaster managers. The use of open-source data and applications would contribute to the sustainability of an integrated flood risk management system.

Lack of coordination among stakeholders is one of the most common challenges in flood risk management. A lack of coordination often exists between government levels, sectoral agencies, governments and NGOs, and the private sector and developers. Increased coordination may lead to standardized data formats, procedures, and tools for risk analysis, harmonized policies and regulations, and identification of joint or complementary programs, which can subsequently enhance the effectiveness and sustainability of chosen flood risk management measures. Coordination among government

1 World Bank Guidebook Cities and Flooding can downloaded from the following website: www.gfdrr.org/urbanflooding.

2 All the presentations can downloaded from the following website: http://www.gfdrr.org/gfdrr/node/1185.

Photos by Rinsan Tobing

Workshop participants.

agencies can be improved by mainstreaming flood risk management into the sustainable development agenda. This can provide each agency with a common, yet specific, higher-level goal that directly or indirectly addresses flood risks.

Appropriate incentives are necessary to address the political and social context of flood risk management. The adoption of a flood risk management agenda is shaped by the specific political context. Politicians, the private sector, and developers respond to incentives. Appropriate incentives must be identified and used to promote the adoption and implementation of flood risk management among stakeholders, such as politicians and policy makers, the public and private sectors and developers. A social development approach, incorporating incentives as well as law enforcement, is required to influence the behavior of populations living in high-risk areas, especially the poor and socially disadvantaged.

Robustness is a key consideration in striking a balance between structural and non-structural measures. Rapid and unplanned urbanization, climate change, and the complexity of urban systems are generating uncertainties linked to current and future risks. Structural (hard-engineered) measures face certain limitations as they are costly and can only effectively address hazard up to a certain level. Structural measures may fail in the face of unprecedented hazard, which is always a probability. Non-structural (non-engineered) measures are more cost-efficient and can be highly effective in reducing the consequence of hazards. A combination of structural and non-structural measures is therefore required to build a robust flood risk management system that can accommodate residual risk, uncertainties, and extremities.

A number of follow-up actions were identified to implement an integrated flood risk management approach in the countries participating at the workshop. A virtual system will be put in place as an initial form of a community of practice (CoP) for urban flood risk management to encourage further peer-to-peer knowledge exchange and foster regional cooperation. This report summarizing the proceedings of the workshop serves as a knowledge resource for participants, as well as those members of the public that are interested in flood risk management and urban resilience.

OPENING AND WELCOME REMARKS

Stefan G. Koeberle, Country Director for Indonesia, World Bank

Photo by Rinsan Tobing

- Jakarta is often confronted with frequent flooding, and has taken bold steps to address the issue, notably by focusing on the social aspects of communities at risk. The World Bank is privileged to provide support and assistance to the city of Jakarta as part of its flood mitigation efforts.

- The theme of this workshop – flood risk management and urban resilience – is very pertinent considering the frequency of the occurrence and the impact of flooding in recent years in many of the rapidly growing cities in developing countries. With a higher degree of economic integration and connectivity in the East Asia and Pacific (EAP) region, major flooding in one city will unfortunately have significant economic and social impacts in other cities, regions, and countries.

- The World Bank sees rapid urbanization as both an opportunity and a challenge. Urbanization creates opportunities for increasing economic growth and poverty reduction. At the same time, with the imminent threat of climate change and increased vulnerability to disasters, urbanization also potentially exposes a greater number of people to the risk of serious catastrophic events.

- The single solution model of flood control using structural mitigation measures is very expensive and often creates new problems, both upstream and downstream. With one of the highest economic growth rates in the world, the region has a unique opportunity to consider flood mitigation as a sound investment that not only has a direct economic value but also contributes to preventing losses.

- City representatives, national governments, and private sectors participating in the workshop were invited to exchange their views and experiences in addressing urban flooding problems and building resilience. There is much innovation in the region that can be shared in this forum, with opportunities to scale up and replicate successful experiences in other cities as well, while at the same time avoiding the mistakes of the past.

- This initiative is one of the many South-South knowledge exchange opportunities that are being encouraged in the East Asia region, especially across low- and middle-income countries facing similar problems. The World Bank is very happy and privileged to facilitate these exchanges.

OPENING AND WELCOME REMARKS

Bang Ki-Sung, Deputy Administrator, National Emergency Management Agency (NEMA), Republic of Korea

Photo by Rinsan Tobing

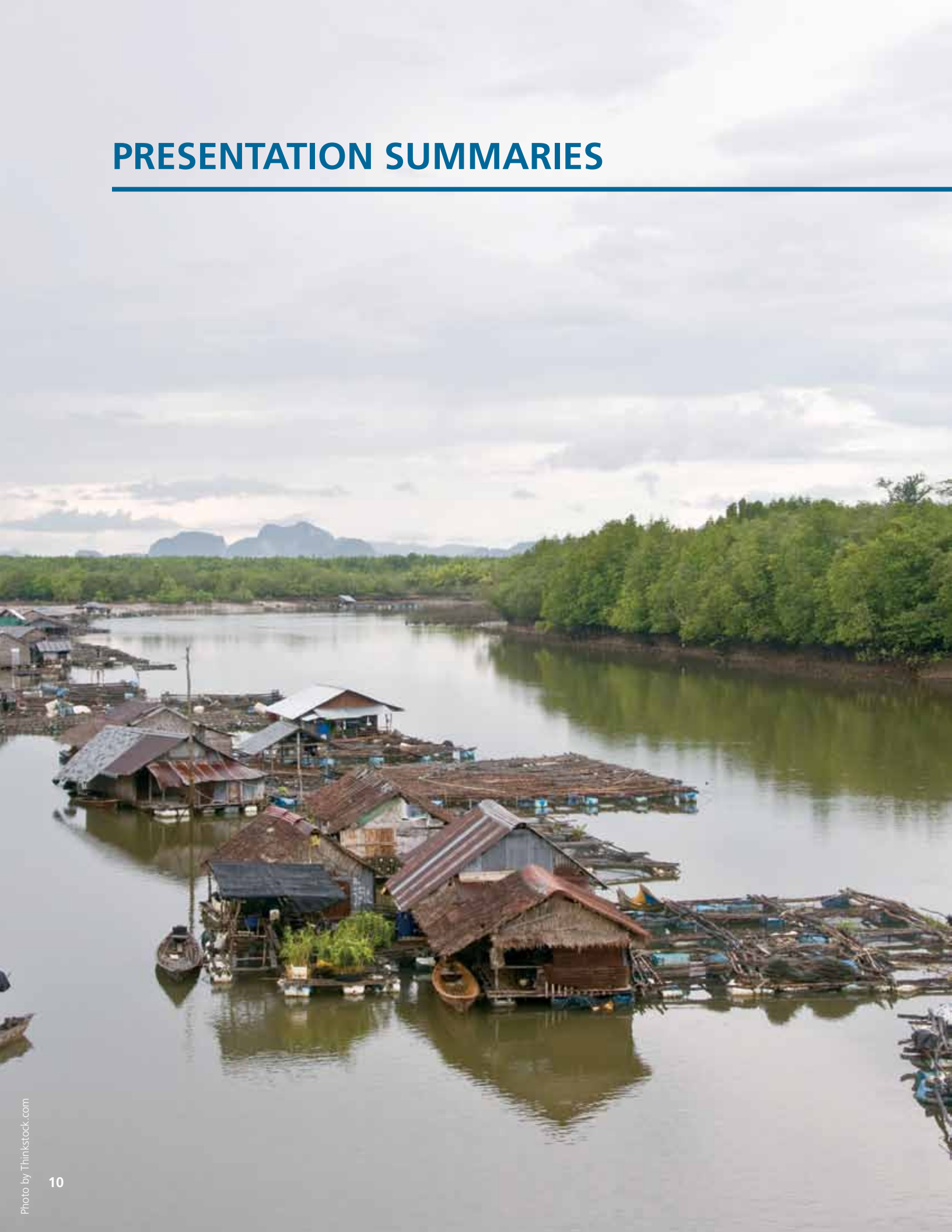
- Flood risk in the Asia Region, especially in the South East Asia, is significant. The region is highly prone to various typhoons and storms. Urban flooding has in recent years become acute due to extreme weather events. Flooding hinders growth in individual countries, the region, and the world.
- In this context, this workshop is a very important event as the experience of participants will provide good guidance for flood risk management and disaster resilience in South East Asia.
- In 2010, the Republic of Korea hosted the 4th Asian Ministerial Conference on Disaster Risk Reduction (AMCDRR) in Incheon, with the support of GFDRR. NEMA and the World Bank have signed a MoU on the implementation of the Incheon Agreement and Action Plan, which was adopted by all Asian ministers during this ministerial conference.
- This workshop is part of a comprehensive program that supports three subregional projects in Asia focused on flood risk management. These projects are being implemented in 15 countries and regions and include the Glacier Lake Outburst Flood (GLOF) project in the Himalayan region, typhoons in the Pacific region, and the East Asia Program on Flooding. This unique regional-level program supports knowledge sharing, technology transfer, capacity development, and learning on flood risk management and disaster resilience. This unique program for the Republic of Korea and GFDRR has been expanded to other parts of the region.

Fauzi Bowo, Governor of DKI Jakarta

Photo by Rinsan Tobing

- The publication of "*Cities and Flooding: a Guide of Urban Flood Risk Management for the 21st Century*," which provides guidance on the problem of flooding in the urban environment, is long overdue.
- One of the greatest challenges faced in Jakarta today is climate change.
- When Jakarta suffered massive floods in 2007, it paralyzed the city for five days and forced more than 400,000 people to leave their homes, resulting in an estimated loss of US$635 million; the people who suffered the most were the urban poor. At the time, the city administration of Jakarta was still struggling with land acquisition to complete the construction of the Eastern Flood Canal. The construction of this canal in the East of Jakarta was not only focused on building infrastructure, but also about reviving riverine communities which had been devastated by annual floods. The completion of the East Flood Canal in 2010 has successfully reduced flooding by 30 percent in Jakarta and improved the lives of 2.5 million people.
- Flood risk management implemented by cities and local government is crucial. Cities and local governments have the opportunity to design solutions that are adaptable to the needs of their local communities and are consistent with local policies and priorities. There is increasing recognition that cities and urban regions are key engines in the economic growth of countries and regions, and that flood reduction plays an integral part in this.
- Jakarta has been forced to be innovative in coming up with solutions. For example, to be safe from the threat of climate change and flooding, Jakarta must find an area of 50 sqkm to accommodate excess water that causes floods. At the same time Jakarta is experiencing substantial land subsidence due to the extraction of ground water. Parts of Jakarta have subsided 2 meters, and there is no further room for the city to expand. Jakarta is therefore planning to construct a giant sea wall in the bay of Jakarta.
- An integrated approach is being taken with regard to climate change and the environment; this approach takes into account human and welfare dimensions. Eradicating poverty and addressing welfare issues must go hand in hand with managing floods.
- Jakarta's experience shows that the success of flood risk management lies in community involvement. Policy makers and urban development experts must listen to the communities and empower them so that they can be part of the solution.

PRESENTATION SUMMARIES



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Session I: Overview of "Cities and Flooding: A Guide to Integrated Urban Flood Risk Management for the 21st Century"

Abhas K. Jha, Lead Urban Specialist and Program Leader, Disaster Risk Management for the World Bank East Asia and Pacific Region

Flooding is the most common of all natural disasters. Flooding is an Asian phenomenon, as 90 percent of people affected by floods live in Asia. Rapid and unplanned urbanization in the region is a significant contributing factor to flood disaster, as it puts more people and assets in harm's way. With the currently staggering growth of urban areas in many countries, urban flooding is going to be a growing challenge for development and poverty reduction in the coming decades.

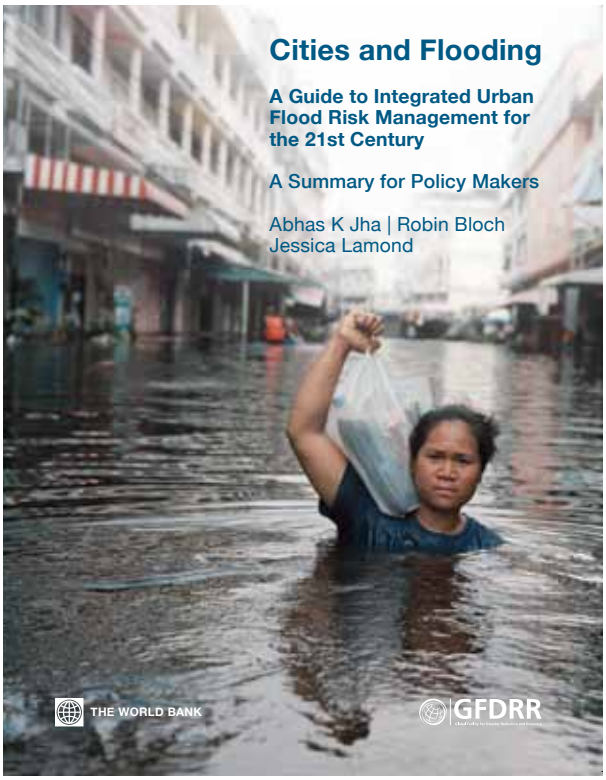


Figure 1 **Cities and Flooding**

The *Cities and Flooding* guidebook proposes an integrated approach to urban flood risk management. The guidebook targets practitioners and people on the ground dealing with issues related to urban flooding. It offers operational guidance and includes over 50 case studies, how-to sections, and 12 guiding principles that illustrate the state-of-the-art on integrated urban flood risk management.

Among the 12 principles, listed in Box 1, there are important points to highlight. Principle 6 states that it is impossible to entirely eliminate the risk of flooding. This is particularly important as it signals a shift away from the myth that we can build our way to safety. Preparedness for an unexpected hazard level is always necessary. Infrastructure and systems should be designed in such a manner as to allow them to fail gracefully should an unexpected hazard occur. Principle 11 states that continuous communication to raise awareness and reinforce preparedness is necessary. People's memory of disasters is short, so communication tools are needed to keep these memories alive and ensure that people behave in an appropriate manner. Risk information, in the form of flood hazard maps and flood forecasting, is also a very worthy investment to increase disaster preparedness.

Decision making should be based on robustness, and a proper balance should be achieved between structural and non-structural measures. Examples of non-structural measures include the "When flooded turn around don't drown" campaign in the United States, the German Flood Control Act 2005, the LiFE project and the Pacific Catastrophe Risk Assessment and Financing Initiative. An example of mixed measures is the Integrated Flood Risk Management initiative in Ho Chi Minh City, Vietnam.

The way forward and challenges on the implementation of an integrated flood risk management relies on the identification of appropriate instruments, investments, and incentives.

BOX 1. Guiding Principles for an Integrated Urban Risk Management

1. Every flood risk scenario is different: there is no flood management blueprint.
2. Designs for flood management must be able to cope with a changing and uncertain future.
3. Rapid urbanization requires the integration of flood risk management into regular urban planning and governance.
4. An integrated strategy requires the use of both structural and non-structural measures and good metrics for "getting the balance right."
5. Heavily engineered structural measures can transfer risk upstream and downstream. It is impossible to entirely eliminate the risk from flooding.
6. Many flood management measures have multiple co-benefits over and above their flood management role.
7. It is important to consider the wider social and ecological consequences of flood management spending.
8. Clarity of responsibility for constructing and running flood risk programs is critical.
9. Implementing flood risk management measures requires multi-stakeholder cooperation.
10. Continuous communication to raise awareness and reinforce preparedness is necessary.
11. Plan to recover quickly after flooding and use the recovery to build capacity.

Source: Cities and Flooding: A Guide to Integrated Urban Flood Risk Management for the 21st Century.

Session II: Show cases from Countries/Cities

Panel Session 1: Understanding Flood Hazard and Its Impact

Moderator: ***Victor Rembeth***

Speakers:

Dr. Royol Chitradon, Hydro and Agro Informatics Institute (HAII), Thailand

Khamhou Phanthavong, Ministry of Agriculture and Forestry, Lao PDR

Catalina E, Cabral Ph.D., Department of Public Works and Highways, the Philippines

Yumei Deng, Ministry of Water Resources, P.R. China

Dr. Ole Nielsen, Australia-Indonesia Facility for Disaster Reduction, Jakarta.

Key Points

- Rapid urbanization is the root of many factors contributing to urban flood risk.
- Multi-hazard and bottom-up participatory approaches are crucial for the implementation of efficient and effective measures. Communities need to be empowered to actively contribute to the design and implementation of flood management measures.
- A social perspective should be integrated into flood risk management measures. Law enforcement alone may not be effective in changing human behavior.
- Proper tools and appropriate technologies are crucial in understanding flood hazards and their impacts.
- Information on flood risk and potential impacts must be made openly available for decision making purposes, preferably using open-source data and applications to improve sustainability.

Climate Change Technology Needs and Community Water Management in Northeastern Thailand

Dr. Royol Chitradon, Hydro and Agro Informatics Institute (HAII), Ministry of Science and Technology, Thailand

Thailand has experienced an increasing trend of rainfall intensity and variability that causes some areas to suffer both droughts and floods, sometimes in the same year (see Figure 2). Extreme events, such as the ENSO cycle, have occurred more frequently. This significantly affects the agricultural sector in Thailand. Only 17 percent of Thailand's agricultural land is irrigated, while the rest is rain-fed. It is therefore important for Thailand to properly manage its water resources.

Thailand needs to simultaneously manage both droughts and floods in order to avoid redundant investments and ensure water security for all user groups, both at the macro-level for irrigated agricultural areas, industrial sector and urban/municipal areas, and at the micro level for rain-fed agricultural areas. Thailand has worked with other countries, including China and multilateral organizations, to reach a better understanding of water cycles and improve seasonal projections. To address challenges in infrastructure development, forest conservation and management of catchment areas, Thailand is currently adopting a bottom-up approach at the micro level by identifying best practices and strengthening them with the help of low-cost open source GIS mapping and micro irrigation systems.

The bottom-up community-level approach adopted in water management in northeastern Thailand can

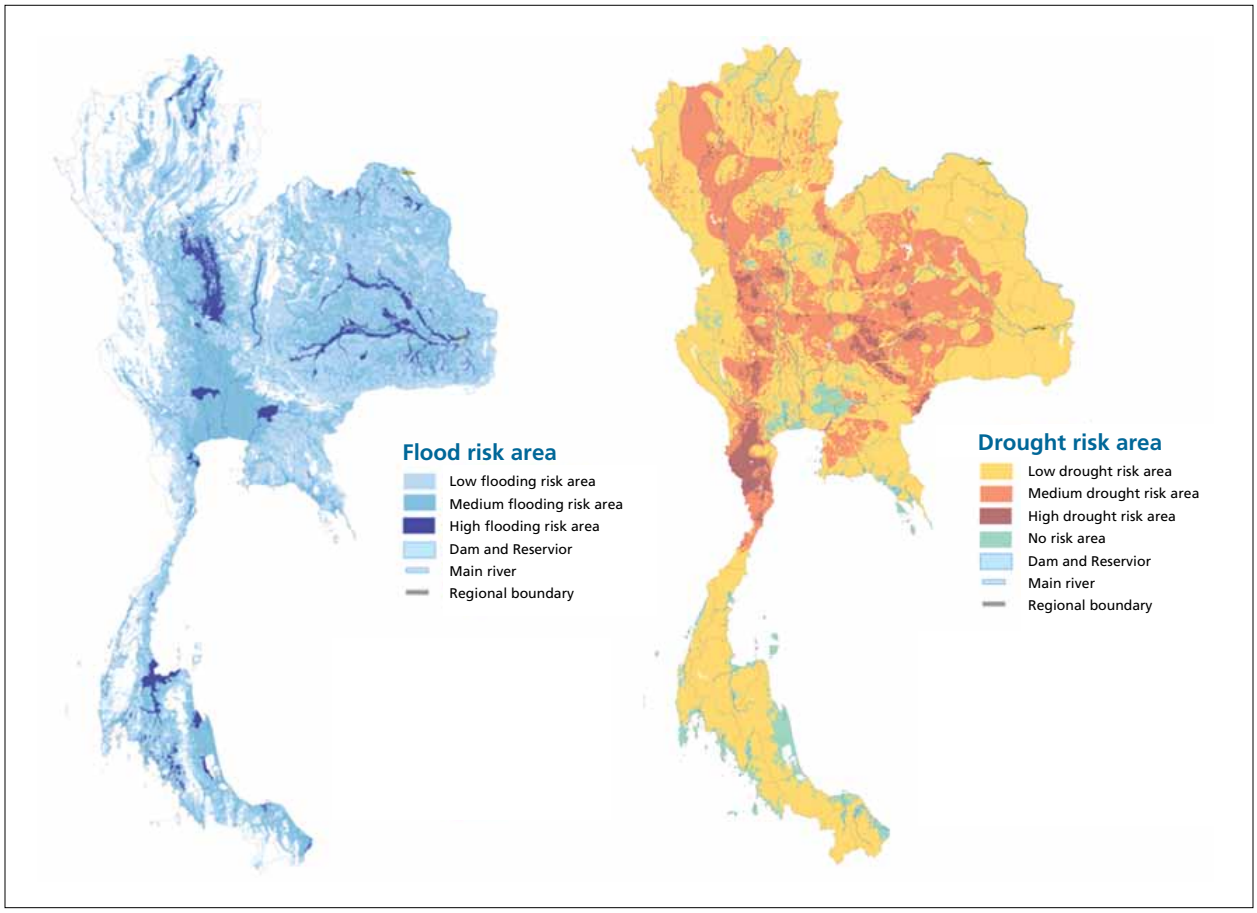


Figure 2 **Thailand - Flood Risk and Drought Risk Areas**

Source: PowerPoint presentation, Dr. Royol Chitradon, Department of Disaster Prevention and Mitigation.

be considered as best practice. Northeastern Thailand covers an area of 166,370 sqkm and is crossed by the Kong, Chi and Moon rivers; the region experiences floods and droughts as a result of increasing rainfall and seasonal variability. The construction of large reservoirs is not feasible for topographical reasons. Simple community-based traditional micro infrastructure was considered the most cost-effective solution.

In the Ban Limthong Community Water Management in Burirum province, measures such as dredging, renovating waterways, building network of people and utilizing technology to plan production processes, have successfully tripled the income of villages and reduced the frequency of floods and droughts. This community water management practice has been replicated in other areas. Through networking and cooperation, the number of villages (*rais*) applying community water resource management is expected to increase from 3,000-4,000 rais to about 60,000 rais over a period of 5 to 6 years.

The above concept forms part of the Monkey Cheek initiative launched by the King of Thailand; this initiative promotes a multi-hazard community-level approach in local water retention systems.

Status of Lao PDR's Flood Risk Management and Case Studies

Khamhou Phanthavong, Ministry of Agriculture and Forestry, Lao PDR

Lao PDR regularly experiences floods and droughts. River basin floods in areas located along the Mekong River and its tributaries, as well as flash floods in mountainous regions, are common. It is estimated that the south and central regions, where about two thirds of the country's population live, experience an average of 1.5 serious floods or droughts every year. As a developing country with a per capita income of US$753, Lao PDR struggles to provide the humanitarian response and recovery efforts required for most sectors to reach the pre-disaster level. Given the significant changes in the regional mean temperature and rainfall, Lao PDR will face even bigger challenges in natural resource management, especially in water and forest resources that are major drivers of its economy.

Disaster risk management (DRM) has been integrated into Lao PDR's development plans, namely the Lao National Growth and Poverty Eradication Strategy (NGPES-2004) and the Lao PDR's Sixth National Socio-Economic Development Plan (2006-2010). DRM will also be integrated into the Seventh National Socio-Economic Development Plan and the Country Partnership Strategy which is currently being prepared. The latter document will include environment, climate change and disaster management as its priority.

Institutional structures have also been put in place. The National Disaster Management Committee (NDMC), an inter-ministerial committee was established in 1999 to develop policies and coordinate disaster risk reduction activities throughout the country. A National Disaster Management Office (NDMO), under the Ministry of Labor and Social Welfare, was established in 2000 to serve as the secretariat of NDMC.

Lao PDR is committed to implementing its disaster risk reduction efforts. It acknowledges the support of its development DRM partners, and will continue to further develop and scale up its disaster preparedness programs to strengthen national and local capacity to manage and cope with future natural disasters.

Structural Measures for Flood Management in the Philippines

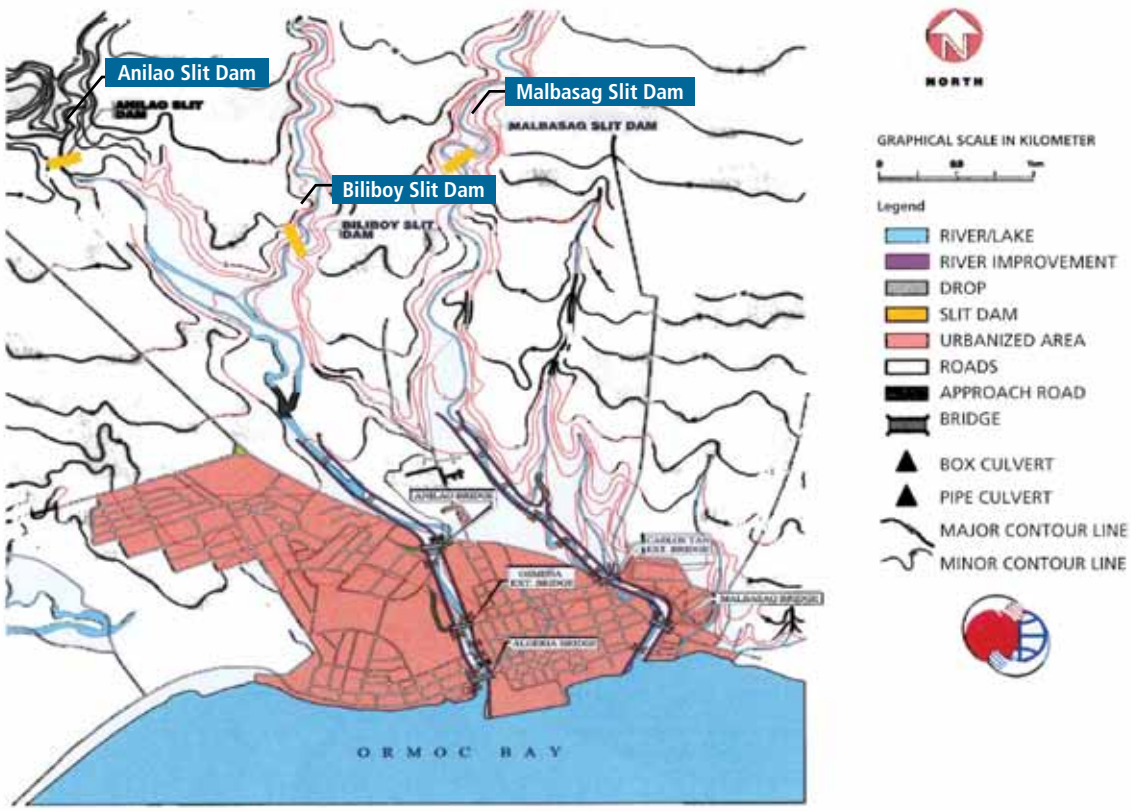
Catalina E. Cabral Ph.D., Department of Public Works and Highways, the Philippines

The Philippines is ranked third among the highest risk countries in Asia for floods. Despite the government's commitment to flood risk management, challenges still exist in the areas of infrastructure construction and maintenance, watershed/river basin management, land use planning, strengthening of institutional and local capacities for flood mitigation, forecasting technology, governance and law enforcement, mapping for decision making support purposes, public and private sector awareness, and understanding the impacts of climate change.

National flood risk management strategies have been integrated into the Philippine Disaster Risk Reduction and Management Act of 2010, Climate Change Act

of 2009 and the Philippine Development Plan 2011-2016. A National Disaster Risk Reduction and Management Council was created as an effort to move away from a top-down approach towards a bottom-up participatory approach for disaster risk reduction, following the shift from disaster response to a more integrated approach of social and human development, and a stronger focus on the vulnerability aspect of disasters. The Climate Change Commission is working closely with the National Disaster Risk Reduction and Management Council, both of which are chaired by the President, in the areas of governance, capacity development, knowledge management, and risk and vulnerability reduction. There is also a stronger push towards empowering local governments and civil societies in DRM.

A case study focusing on the 1991 flash floods in the city of Ormoc, Leyte underlines the following important lessons: (i) Construction of comprehensive infrastructure can effectively mitigate flood disaster and protect communities, but may not always be feasible due to the high cost of the investment; (ii) Aid from international organizations is critical, particularly for technology transfer; and (iii) Dense population settings in high-risk areas contribute to high casualties. A social development approach, with strong political will and support from local government, is required to address this issue.



Structural Countermeasures

Figure 3 **Case Study – Structural Countermeasures**

Source: PowerPoint presentation, Catalina Cabral, Department of Public Works and Highways.

Status of China's Flood Risk Management and Case Studies

Yumei Deng, the Office of State Flood Control and Drought Relief Headquarters, P.R. China

China experiences frequent flood disasters due to its topography, climate, and distribution of assets and population. Since 1949, an average of 3,700 people died, and 2.5 million homes are damaged due to floods. China experiences various types of floods, including rainstorm floods, flash floods, typhoons, storm tide floods and urban floods. The latter is a particularly pressing problem due to the rapid economic development of cities and the massive urbanization that has taken place over the past three decades. The amount of loss due to urban floods has been consistently increasing over the past few years.

The Government of China has adopted a strategic approach to flood control and disaster mitigation. Policies were developed in 2003 to simultaneously tackle floods and droughts and move away from flood control towards flood management. Among the structural measures taken are amendment of plans for flood control and disaster mitigation, improvement of engineering systems, expansion of flood ways to increase flow and storage, construction of dikes, reservoirs and flood diversion area. These measures are complemented by non-structural measures, such as scientific management systems, social security systems, technological supporting systems, as well as regulation, policy and legal systems. Flood control institutional structures at the state, provincial, city, and county level have also been established. These institutional structures report to the State Flood Control and Drought Relief Headquarters, which consists of 21 central government sector representatives.

China has a set of flood management-related laws and regulations. It has also initiated the development of a National Information System for Flood Control and Drought Relief. Hydrological monitoring, flood forecasting and warning system, flood dispatch, 3-D digital system for flood management, flood loss assessment and flood hazard maps, are among the features being developed for the information system. Other efforts include the development of urban flood control schemes, land-use planning and adjustments, management of flood impact assessment, and the selection of 35 regions in China for pilot practice on flood hazard mapping and flood risk management practices. An exercise aimed at identifying drivers of urban floods, challenges and the set of actions for integrating flood risk management has also been carried out.

Impact Assessment Tools

Dr. Ole Nielsen, Australia-Indonesia Facility for Disaster Reduction, Jakarta

The Indonesia Scenario Assessment for Emergencies (InaSAFE) system was developed through the collaboration of the Indonesian Agency for Disaster Management (BNPB), the World Bank GFDRR Labs/EAP DRM teams and the Australia Indonesia Facility for Disaster Reduction (AIFDR) of AusAID. InaSAFE is a graphical information system that overlays data on hazard levels with data on people and assets to produce a reliable estimate of disaster impact. InaSAFE was developed to obtain the best available science and data to support disaster management decision making. The system can generate realistic disaster scenarios for use in contingency planning and provide evidence-based quantitative impact assessments.

InaSAFE requires input in the form of hazard data (e.g. earthquake ground shaking and inundation maps) which are commonly available through science agencies, and people/asset exposure data (e.g. population density, important buildings and infrastructure, etc.) that can be taken from the bureau of statistics, local data, or public sources. Challenges related to these data requirements include the availability of hazard and exposure data, and standardization of formats, metadata and distribution methods. These challenges can, to a certain extent, be solved by using open-source data and application such as OpenStreetMap. The use of free, open-source data and application will increase sustainability in the long run.

Summary of Discussions

The discussion focused on the kinds of information required for decision makers to strike a balance between structural and non-structural measures.

- An evaluation of past experiences is required to strike a balance between structural and

non-structural measures. In the case of the 2011 floods in Thailand, it was difficult to assess whether the main cause was structural or non-structural. According to Dr. Chitradon, the first step is to have good mapping system and develop a strategy to integrate hazard and social data.

- Dr. Cabral stated that the Government of the Philippines needs an asset management system to account for and monitor the flood control structures that have been built on its many rivers. The system will make it possible for the government to understand the amount of investment and the frequency and cost of damages and consider alternative designs or approaches, as necessary. A database of waterways is also important for identifying the institutions responsible for each waterway and the tributaries. This should be a collaborative effort between national and local governments. The national government also needs a good database that should be shared with local governments. Some local governments already have this database but it needs to be updated.

- Dr. Nielsen added that when dealing with disaster managers, access to basic risk information is important for determining non-structural measures and the overall risk management system.

- According to Mr. Bhanja, there are matters to be considered when determining structural and non-structural measures. Structural measures require big investments, while non-structural measures must involve the community. In any disaster scenario, the community's capacity and involvement in the decision-making process is important. Community-level initiatives, particularly local coping mechanisms, should be integrated into local and national policies. Good community-led initiatives have been seen, for example, during Cyclone Nargis in Myanmar. Similarly, national and subnational initiatives must percolate to community level.

- Some of the causes of flood, such as climate variability and climate change, are dealt with in the course of interventions and measures managed by different agencies and jurisdictions. Mr. Gunawan stressed the importance of linking the causes, impacts, and intervention into a single platform. It is important to have a technology that allows agencies who own relevant data to easily share it with other agencies without the need to be too proactive, as well as make data publicly available, without the public having to ask for it.

- The American Red Cross (ARC), in collaboration with the Indonesian Red Cross, is launching a flood mitigation program in the greater Jakarta area. The program focuses on non-structural measures and working with communities along the Ciliwung river basin. One component of the program is solid waste management. Mr. Tom Alsea of ARC would like to hear any experiences related to non-structural measures for solid waste management.

- According to Dr. Chitradon, prevention and mitigation is more conflict-prone than adaptation. Adaptation is also better for promoting coordination. Dr. Chitradon shared the experience during the floods in northeastern Thailand, and western and eastern districts of Bangkok. In the western district of Bangkok, the collaboration between local administrations, international organizations, the army, and the private sector focused on measures that were geared less on prevention and more on adaptation. Compared to the full prevention efforts carried out in eastern districts of Bangkok, previous efforts were more successful in avoiding conflict.

- Dr. Chitradon added that jurisdiction and law enforcement were difficult to implement during a natural disaster. It was therefore important to build up and strengthen disaster management at all levels of government, including at the local level, ministry level, and central government level.

- Dr. Cabral gave an example of a law enforcement problem in Metro Manila that deals with littering and indiscriminate dumping by people living along the waterways, which contributes to flooding. In one local government unit (LGU), there is a law that bans the use of plastics. During the flood, this LGU did not experience flooding. Banning plastics is not easy as plastic manufacturers

will oppose the initiative. The cooperation of local and national government, local NGOs and the private sector is needed to help enforce solid waste management, segregation of waste and reduction of indiscriminate dumping. A database on important buildings and factories impacted by flooding will help facilitate such cooperation.

- Dr. Nielsen, based on his discussions with the Indonesian National Agency for Disaster Management (BNPB), added that the determination of a threshold is necessary in order to identify which public buildings or institutions, such as hospitals and schools, will be closed or impacted under certain scenarios.

- Mr. Santiago suggested that levels of risk perception, specifically the risk acceptance or aversion of the affected communities, as well as the public in general, should be taken into account as this affects the perception of success in implementing structural or non-structural measures. Mr. Santiago proposed the possible launch of a public information and awareness raising campaign focusing on the affected communities, particularly the poor and vulnerable, in order to inform and change their risk perception.

Panel Session 2: The Components of Integrated Flood Risk Management

***Moderator:* Victor Rembeth**

Speakers:

Dr. Ho Long Phi, Steering Center of Flood Control Program Director, Ho Chi Minh city, Vietnam

Dr. Cheong Tae Sung, National Disaster Management Institute (NDMI), Ministry of Public Administration and Security (MoPAS), Rep. of Korea

Dudi Gardesi, Department of Public Works, DKI Jakarta

Takaya Tanaka, Japan International Cooperation Agency (JICA)

Jenny Enrika and Agus Nuryadi, Pembangunan Jaya Group.

Key points

- A combination of structural and non-structural measures is required to ensure the highest level of protection against flood risk.

- Measures need to be flexible and robust in order to adapt to uncertainties.

- Uncertainties, presented in the form of multiple scenarios and probability percentages, should be clearly communicated to disaster managers to ensure informed decision making.

- Multi-stakeholder coordination will be more effective when guided by specific shared goals and objectives, and supported through standardized data and systems, a clear division of roles and responsibility and good leadership.

- Flood risk management should be mainstreamed into sustainable development policies and practices.

- The private sector and developers should be included in the dialogue on flood risk management.

- Multi-level and multi-sector coordination among government agencies promotes an integrated approach to flood risk management. To promote coordination, a basin-oriented or community-oriented approach can be used.

- Policy makers play an important role in determining flood risk management investment. Practitioners should provide policy makers with decision-support tools and supply sufficient incentive to promote commitment on longer-term flood prevention, mitigation, and preparedness measures.

- Technological innovations, such as those developed in the Republic of Korea and Japan, can greatly enhance flood prevention and mitigation efforts.

Evaluating Alternative Flood Risk Management Options

Dr. Ho Long Phi, Steering Center of Flood Control Program Director, Ho Chi Minh City, Vietnam

Ho Chi Minh City lies in a lowland area and faces increasing risk from upstream floods, increasing rainfall, increasing tidal effect, sea- and water-level rise, and land subsidence. Urbanization further aggravates inappropriate land use, which in turn heightens flood risk. The risk uncertainties make it difficult to determine appropriate structural measures.

The city has an integrated urban flood management strategy designed to deal with uncertainties. The strategy has three components: protection, adaptation, and resilience. The main component is protection, which focuses on technical, structural measures, such as construction of dikes, sewers, and water retention infrastructure, in order to ensure people's safety at 80-95 percent protection levels. The protection level of these structures decreases with time due to the uncertainty of future risks. Adaptation aims to maintain the current protection level over time, while resilience, which addresses risk rather than hazard, aims to increase the protection level to 100 percent and reduce the damage under extremity. Adaptation and resilience are mostly non-structural measures, implemented through a multi-stakeholder approach. The three components of this strategy have to be supplemented with a decision-support system.

The integrated flood management strategy does not entirely rely on a 'predict and act' approach, which is conventionally used for the design of structural protection measure. Greater attention is given to adaptation and resilience measures as they are more appropriate for dealing with uncertainties and extremities of future risks. When designing structural measures, it is important not to encourage over-confidence as this reduces adaptability and preparedness. The potential risks, which are often perceived as small in terms of probability, can be very dangerous if not considered in the design of structural measures.

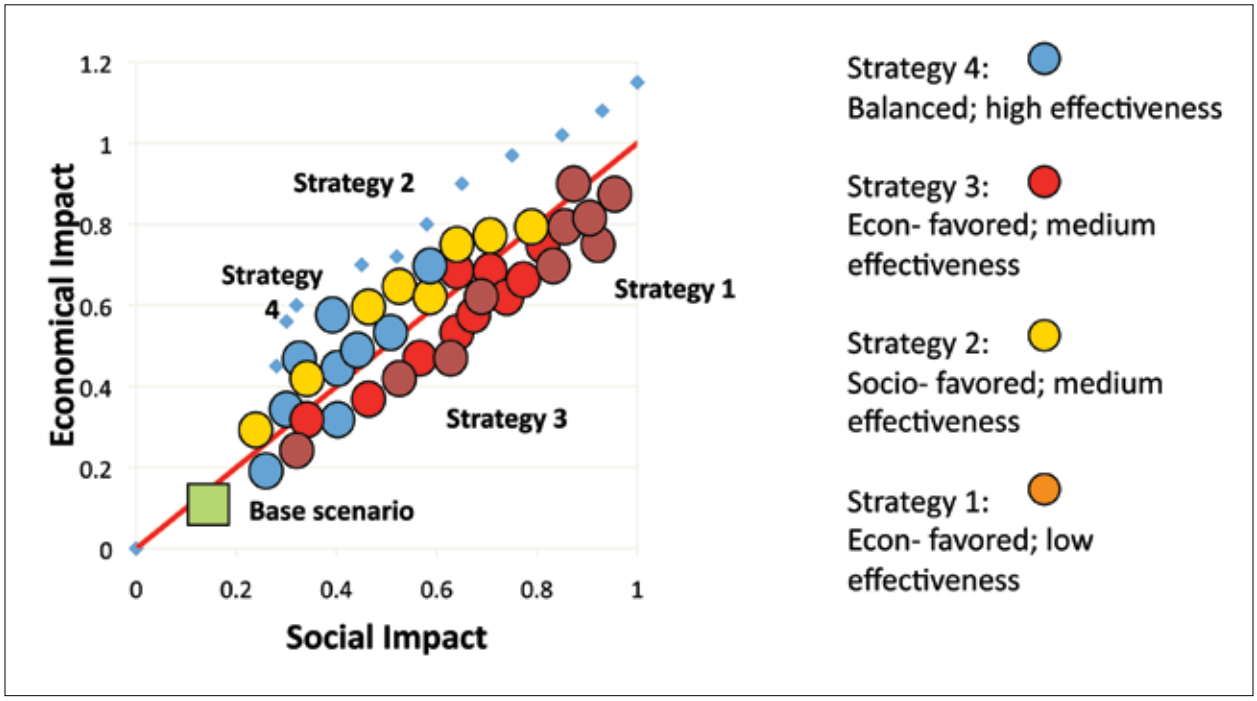


Figure 4 Ho Chi Minh City – Strategy Analysis

Source: PowerPoint presentation, Dr. Ho Long Phi.

An iterative decision-making (IDM) process is used to decide on the selection of the protection strategy, which can be a combination of measures. The process involves identification of candidate protection strategies (see Figure 4), development of multiple scenarios for each strategy to analyze vulnerability and calculate potential damages, and analysis of candidate protection strategies based on protection, adaptation and resilience criteria as well as social and economic risk analysis. Social and economic risk analysis is carried out through an overlay of vulnerability maps, hazard maps and exposure maps to identify the vulnerability and indirect cost index. The final strategy is then selected based on robustness rather than optimality, criterion or probability.

In conclusion: (i) the eventual purpose of flood management is to reduce risk not hazard; (ii) integrated strategy should consider uncertainty and extremity; (iii) economic-favored and social-favored strategies should be justified by a multi-stakeholder process; and (iv) to deal with complexity, choice should come before prediction.

Flood Risk Management Policies and Systems for CCA and DRR

Tae Sung Cheong Ph.D., Climate Change Research, National Disaster Management Institute (NDMI), Ministry of Public Administration and Security (MoPAS), Republic of Korea

The Republic of Korea has recently developed its 2050 climate change projection which indicates a significant potential increase in disaster risk and vulnerability due to rising temperatures, increasing precipitation, seasonal changes and sea-level rise. There will be higher probability for extreme weather events, such as heat waves and downpours, which may cause droughts and floods, as well as increase the risk of more frequent, large-scale natural disasters. Over the years, there have been fewer fatalities following natural disasters in the Republic of Korea, but higher amounts of financial losses due to changes in the social structure. Most damage has been caused by floods and landslides in river basins and urban areas following torrential rain, drought caused by water shortage due to a decreasing number of rainy days and increasing water needs, coastal floods due to sea-level rise and erosion of sandy beaches.

In 2011, the Prime Minister's office was tasked with setting up a task force consisting of relevant ministries, local governments, and experts to address the issue of climate change and improve existing institutions such as resetting disaster prevention standards. A number of policies to be developed will include a new guideline for disaster risk reduction (DRR) and climate change adaptation (CCA), a new design code for public facility and social infrastructures, enhancement of guidelines on sewer systems, and strengthening erosion control to reduce debris. The Republic of Korea is also developing its flood risk management system, such as an Automated Rainfall Warning System (ARWS) and a warning and dissemination system, which will allow wire/wireless warning dissemination by the Disaster Information Management Center. A flash flood forecasting system, landslide forecasting and monitoring system and a typhoon disaster management system are also being developed. These policies and systems will identify localized risk and estimate GIS-based damage information for the purpose of decision making on DRR and CCA.

Mr. Jha commented that laws should ensure the availability of permeable spaces. In the case of cities in India, green spaces are often built on top of concrete. It is therefore important to focus on permeable ground, not just greening. Rain water harvesting is seen as a good solution for ground water discharge. In the city of Delhi, for instance, all houses are required to have rain water harvesting, yet enforcement of this regulation is still weak. In other Indian cities, e.g. Chennai, this effort has been more successful. In Toronto, 60 percent of commercial building areas are required to be green, which is something that the Republic of Korea is also trying to enforce. This effort is easier to implement in new cities, while in older cities such as Seoul, many houses and factories were built in high-risk areas during the country's rapid development in the 1960s. According to Mr. Cheong, the government is trying to convert existing areas into green areas, improve sewer systems, and develop underground storage facilities similar to those built in Japan.

Flood management in Jakarta: Case from Jakarta Urgent Flood Mitigation Program (JUFMP)

Dudi Gardesi, Ministry of Public Works, DKI Jakarta

Jakarta, the capital city of Indonesia, is a low-lying delta area traversed by 13 rivers. Forty percent of Jakarta is affected by high tide. The city generally experiences medium-to-heavy intensity rainfall in the rainy season. With massive urban development taking place, Jakarta faces significant flood risk. Land subsidence, clogged river and sewerage, slum formation in high risk areas, and sea-level rise are just a few of the factors that are contributing to the flood risk.

Jakarta has initiated a number of structural and non-structural flood control measures. The measures include the creation of new water catchment areas, sea walls (see Figure 5) and a polder system; some of these measures are collaborations between the Ministry and the provincial government through the support of development partners. An example is the construction of eight sea walls built by the provincial government on a piece of land that was acquired by the provincial government. The compensation for land varies depending on land ownership. When the land is owned by the State, compensation is given only for the relocation of inhabitants, whereas when the land is privately-owned, compensation is based on the price of the land and the price it would cost to build on the land.

Figure 5 **Jakarta – Sea Wall Rehabilitation Plan**

Source: PowerPoint presentation, Dudi Gardesi.

Comprehensive Flood Management in an Urban River – A Successful Experience in Japan

Takaya Tanaka, Japan International Cooperation Agency (JICA)

The Tsurumi river basin is affected by the East Asian monsoon and has experienced rapid urbanization between the 1960s and the 1980s. Peak run-off discharge has more than doubled within that same period, resulting in frequent floods – a similar challenge to the one faced in the Ciliwung river basin in Jakarta. Urbanization and settlement in Tsurumi is predicted to increase by 14 percent between 2008 and 2030, along with a 50 percent increase of run-off discharge.

One contributing factor to urban flooding is the lack of space for water, particularly in densely populated areas. A comprehensive flood management system which essentially aims to increase space for water has been put in place in the Tsurumi river basin (see Figure 6). The system consists of three types of measures covering the river basin, the river itself and drainage systems. The three measures incorporate a range of structural measures, such as landfill control, preservation of green area, river improvement, permeable pavement, multipurpose retarding basin, reservoir, park storage, underground reservoir, and construction of gates and pumps.

As part of the river basin measures, the government works with the private sector to build flood control reservoirs. All private developers are required by national law to construct a 500-cubic meter pond per hectare of land. The government also uses new technology for ground material that allows water storage underground. The river measure includes the construction of the 84-hectare Tsurumi multi-purpose retarding basin that accommodates 3.9 million cubic meter of water. The drainage measure includes the construction of pumping stations and drainage rainwater storage pipes. As a result of this comprehensive set of flood prevention measures, the number of houses inundated during floods has consistently decreased over the years, from more than 7,500 in 1966 to close to none in 2004.

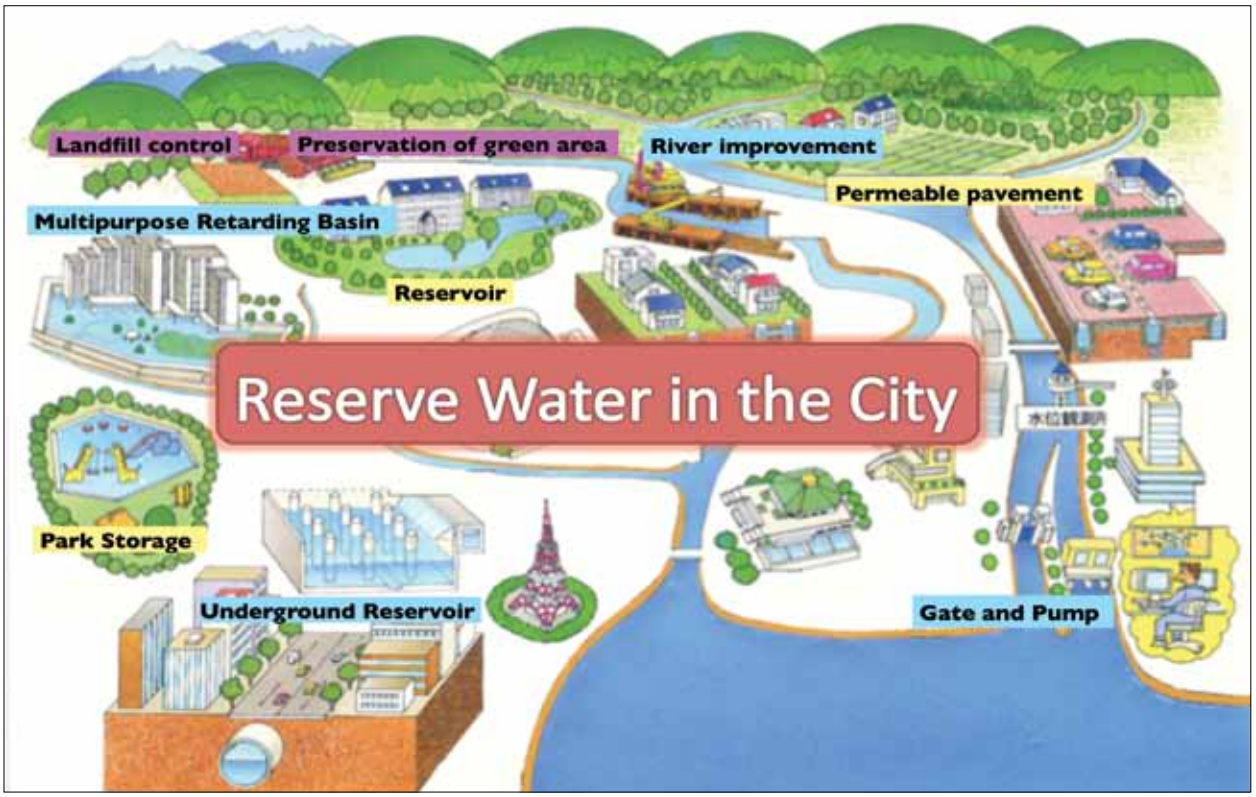


Figure 6 **Japan – Comprehensive Flood Management – Reserve Water in the City**

Source: PowerPoint presentation, Takaya Tanaka.

Flood Risk Management at PT. Pembangunan Jaya Ancol, Tbk.

Jenny Enrika, Pembangunan Jaya Group
Agus Nuryadi, Pembangunan Jaya Group

PT Pembangunan Jaya Ancol, Tbk, is a private company that operates a 552-hectare seaside property and recreation/resort area in Ancol, north Jakarta. PT Pembangunan Jaya Ancol adopts a strategic management framework that places no burden on the city's systems. It discharges no water into the city drainage system and produces its own drinking water from sea water through a reverse osmosis system and without extracting any water from the land. It constructed its own sea walls, dikes, canals, polders and a pumping system using hydro meteorological data from the Indonesian Meteorology and Geophysics Body (BMG).

PT Pembangunan Jaya collaborates with the Jakarta city government in the maintenance of water gates and pumps systems in the Ancol area to support the city's drainage. It also allocates a portion of its land for the city's waste disposal. Seventy percent of its land is designated as a green area, with paving blocks used throughout to increase water absorption.

Summary of Discussions

The discussion focused on the challenges in integrating flood risk management.

Resettlement of populations at risk is a challenge. Dr. Santiago explained that in Metro Manila, 75,000 families, who are either affected by floods or are implicated in causing them, are to be relocated. A fund of 15 million pesos has been already allocated for this purpose. The options for resettlement are on-site resettlement, in-city resettlement or resettlement along the limits or outside of Metro Manila. Each option has its own risks and benefits. A rule now requires the preparation of hazard maps for resettlement to areas outside of Metro Manila, as spaces outside of Metro Manila may not be necessarily better for resettlement purposes, although costs are lower. Another option would be constructing medium-rise buildings for resettlement within Metro Manila. This option is more costly and the area is still exposed to existing hazards. Local governments in Metro Manila are coming up with programs to generate funds at the city level to relocate populations to the city boundary areas, or in areas in adjoining provinces. There are still issues with communications, as in some areas, communities are reluctant to relocate. Recent talks with informal sector groups have shown that communities are taking a more positive stance and that attitudes on relocation-related issues have improved. The challenge is to cover the relatively high cost of resettlement in Metro Manila. Another challenge is to find sufficient space to devote to these initiatives. An AusAID-supported project is currently addressing this issue. The project employs a multi-tier approach to developing relocation units, which are not uniform. Several models are available, depending on the willingness of those being relocated to pay and the size of their respective families. The national housing agency and several city governments have expressed an interest in replicating this initiative.

According to Mr. Tanaka, another challenge is the 'wall between agencies', e.g. between sectoral agencies and the planning agency, which exists in Japan as well as Indonesia. Mr. Cheong agreed that this issue needed to be resolved. A consensus has to be reached between the national government, local governments, and the private sector. Focusing on basin-oriented and community-oriented measures may help to promote such a consensus. Hardware/structural measures are easier to agree on as they rely mainly on budget, so the focus can be placed on consolidating software/non-structural measures, such as capacity-building, early warning and decision-making systems. Information and knowledge sharing should take place within a common DRM objective. Mr. Tanaka agreed that there should a common goal between the various agencies; this common goal should be a concrete numerical goal and not merely a conceptual goal.

Mr. Jha added that developers are often neglected in the dialogue between stakeholders, and this should be corrected as they are a key partner in this process. A high degree of informality exists in this sector. In Istanbul, for instance, 50 percent of housing is informal. An informal developer community exists, so it is important to get them involved in flood risk management. Mr. Jha also included political aspects as part of the uncertainty in flood risk management. Policy makers are mostly concerned with current pressing issues, and not with future potential impacts. This

is particularly true in developing countries, such as Indonesia, India, and Brazil, where policy makers face a trade-off between providing for current needs, such as sanitation and drinking water and preparing for future risk that may or may not happen. Practitioners should therefore provide policy makers with tools to link these trade-offs, but in the final account, decisions are taken on political grounds and not on technical grounds.

Dr. Nielsen added that when developing models and maps, there needs to be clear understanding that they represent a probability, and not a certainty. Dr. Nielsen is considering assigning a rating to the input data, for instance by giving stars. The more stars, the higher the certainty and the level of trust put on the data for decision making purposes. The level of uncertainty has to be clearly communicated before any decision is made.

Ms. Enrika said that PT. Pembangunan Jaya's strategy has had little impact on Jakarta's flood risk management as a whole. Jakarta's problem is that it is lacks a green area. She proposed that countries jointly decide on a common policy, for example on a green area requirement for all cities.

Session III: The International Development Partner View – Pannel Session

Speakers:

Tae Sung Cheong Ph.D., Climate Change Research, National Disaster Management Institute (NDMI), Ministry of Public Administration and Security (MoPAS), Rep. of Korea

Dr. Hitoshi Baba, Japan International Cooperation Agency (JICA)

Yannick Douet, Altamira Information.

Key Points

- Decisions must be made based on good quality information. It is therefore useful to have GIS-based decision-support systems based on multiple scenarios.
- Flood management strategy should be contextual and should consider the local natural and social context and continually adapt to the changing local context through the process of continuous learning (the Kaizen principle).
- Accurate calculation of risk and accurate communication of risk to all stakeholders is critical for prevention, mitigation, and preparedness.
- A safe-side early warning, redundant designs, multi-player and multi-disciplinary approach are important to address uncertainty.
- A shift from a deterministic approach towards a probabilistic approach is crucial to ensure robustness.
- Satellite data and technology is now available to support more accurate prediction of hazard and risk analysis.

Korean Technology on Flood Forecasting Model and Faster Decision-making Process

Tae Sung Cheong Ph.D., Climate Change Research, National Disaster Management Institute (NDMI), Ministry of Public Administration and Security (MoPAS), Republic of Korea

The decision-support system for DRM in the Republic of Korea consists of three components: (i) an information-based DRM system; (ii) a model-based DRM system; and (iii) a decision-support system.

For the collection and sharing of information for the information-based DRM system, a standard format needs to be introduced, such as GIS-based information. Data is collected from related agencies and merged to perform analysis for decision making.

The modeling-based DRM system is basically a numerical model. The modeling based system can be easily calibrated according to the input data and validated in different locations. In the case of the Bo Chung Chun basin, the rainfall-runoff modeling is used to compare discharge at different bridges in the basin area.

The decision-support system produces animations of simulation results, which can provide an automatic

estimation of damage, both in terms of casualties and damage to properties (see Figure 7). The system can be used for early warning, emergency response, and early recovery.

There are two different scales for mapping in the Republic of Korea: a national decision-support system for general use, and more detailed systems at the subnational level. Both maps are initially established by the national government. Technology is transferred to the local government level through training, education, and information sharing.

Figure 7 **Decision-Support System in the Republic of Korea**

Source: PowerPoint presentation, Tae Sung Cheong.

Lessons Learned from GEJE 2011

Dr. Hitoshi Baba, Japan International Cooperation Agency (JICA)

The lessons learned from disaster experiences need to be identified in order to contribute to the five actions of the Hyogo Framework of Action. JICA has launched a study on the effective countermeasures against mega-disasters to obtain lessons from various catastrophic events, particularly the Great East Japan Earthquake (GEJE) of 2011, and to extract new and additional perspectives for effective DRM that is equally applicable to the international community. Box 2 provides a list of these lessons.

A number of lessons learned in the GEJE 2011 were underlined. Points b2 and h1 relate to the need to apply progressive adaptation against changing conditions (the Kaizen principle). Changes related to elements such as local natural and social conditions, as well as population, generation, lifestyles, risk

BOX 2 Lessons from GEJE 2011

a1: Probabilistic risk analysis with scientific knowledge

b1: Continuous revision and upgrading of disaster management standard

b2: Risk analysis under changing local natural and social condition

c1: Comprehensive geological, archaeological, and historical research

c2: Safe-side early warning of the largest possible hazard

c3: Realistic explanation of warning and disaster information

c4: Redundant information delivery in cooperation with various practitioners

d1: Multiple structural measures supported by subfunctional structures

d2: Redundant combination of structural and non-structural measures to minimize hazard

d3: Risk communication to raise awareness of disaster management measures, limitations, and probable risks

e1: Construction of evacuation sites and escape routes integrated with city planning

e2: Multi-combination of evacuation routes and facilities

e3: Land use planning with the lowest risks as residential areas incorporated with building regulations

e4: Evacuation system developed with disaster preparedness including management of buildings and facilities

f1: 'Self Rescue First' principle

f2: Disaster education, including capacity development of individuals

g1: Hazard map for understanding hazard instance and for evacuation drills, but not as deterministic hazard assumptions

g2: Continuous and regular risk communication to raise awareness of the possibility of hazards exceeding the hazard maps

h1: Adaptation to changing community's conditions, such as population, generation, lifestyles, risk awareness, and capacity of self-support activities

h2: Risk communication between aging population and new generation

h3: Risk communication between mature residents and newcomers

i1: Local disaster management plans continually revised on the basis of multiple damage scenarios

i2: Community disaster management capabilities enhancement through probabilistic hazard identification, disaster education, evacuation drills, and construction of evacuation sites, buildings and evacuation routes

j1: Joint efforts of multiple local governments

j2: Central level agency to carry out reconstruction projects

k1: Handing down lessons learned on disaster experiences and knowledge over generations

k2: Inducement of appropriate land use and restrictions, regulations on building structures in combination with city development plans

Source: PowerPoint presentation, Dr. Hitoshi Baba, Japan International Cooperation Agency (JICA).

awareness and capacity for self-support, must be considered in the assessment of risk and identification of counter measures. Points c2, c3, d3, g1, g2 relate to risk literacy. Safe-side early warning systems to warn of the largest possible hazard was recommended, as well as updated and more accurate communication of risk and estimation of risk. For example, there should be an appropriate level of understanding among all those affected of what a hazard map really means. Points c4, d1, d2, e1, e2, i2 highlight the need to have redundant prevention/mitigation measures and disaster management operations. Redundancy does not mean costly overlapping measures. Based on the study, redundant designs, multi-player, and a multi-disciplinary approach works effectively in the context of uncertain and extreme events. JICA uses the three

principles of Kaizen, risk literacy and redundancy in its approach towards securing finance and mainstreaming disaster risk management.

A shift is needed from a deterministic to a probability approach (see Figure 8). The deterministic approach uses a target protection level for a planned and designed hazard to determine protection and mitigation measures. This can be dangerous in the face of uncertainty. The probability approach uses multiple scenarios based on probabilistic hazard projection to determine the hazard level. Through the probability approach, damages and losses based on multiple scenarios can be minimized through a seamless combination of structural and non-structural measures and redundant measures.

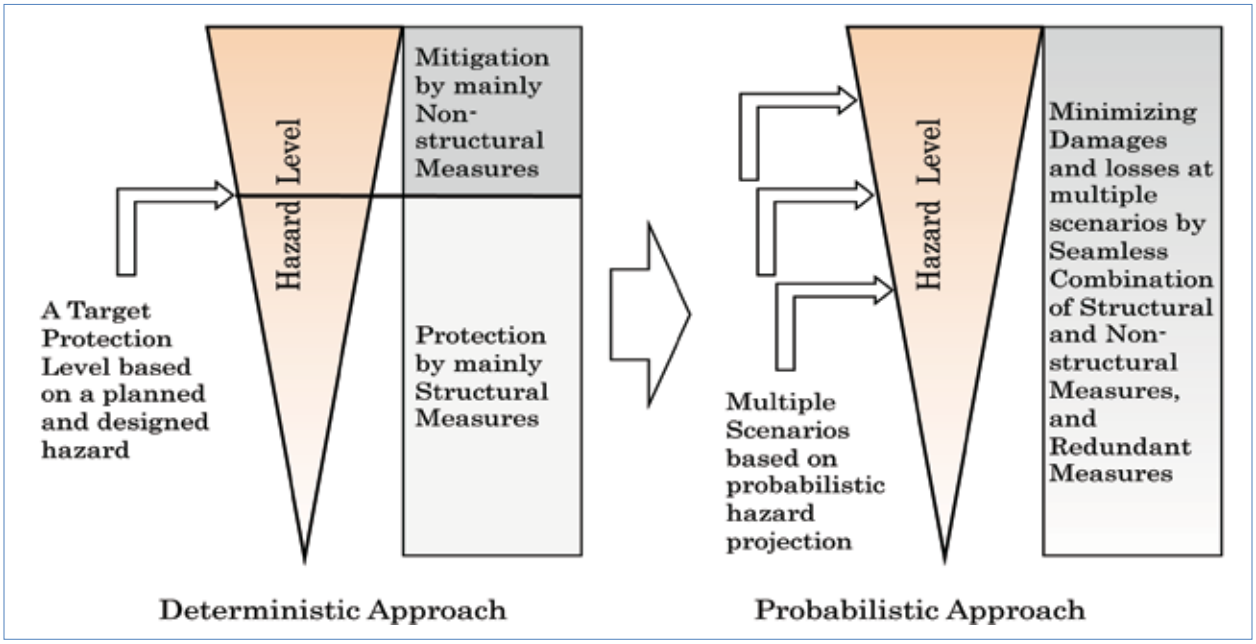


Figure 8 **A Comparison of the Deterministic Approach and the Probabilistic Approach**

Source: PowerPoint presentation, Dr. Hitoshi Baba, Japan International Cooperation Agency (JICA).

Ground Displacement Monitoring Using Radar Satellite Images

Yannick Douet, Altamira Information.

Altamira Information is an earth observation company that provides ground deformation measurements with millimeter precision and mapping solutions using satellite images. Altamira uses Interferometric Synthetic Aperture Radar (InSAR) methodology to measure vertical changes in land surface. Satellite data are collected at intervals and analyzed to produce graphical information that can be used for a range of purposes within various sectors, including infrastructures, mining, oil, and gas. The methodology offers high-quality measurement, large coverage, retrospective analysis, and up-to-date information in a cost efficient way.

This technology can provide site information and features, as well as historical information on ground deformation and subsidence, which is a key input for identifying and predicting disaster risk and vulnerability. It has been used, for example, for analyzing impact of earthquake on land subsidence in Yogyakarta, the impact of urban development in Ho Chi Minh City (see Figure 9), the impact of groundwater extraction in Semarang, coastal zone vulnerability in Alexandria, Egypt, and for measuring settlement of the southern dike port of Barcelona.

To measure difficult areas, such as buildings or grounds covered with dense vegetation or snow, new points of reference and corner reflectors will need to be added to the calculation.

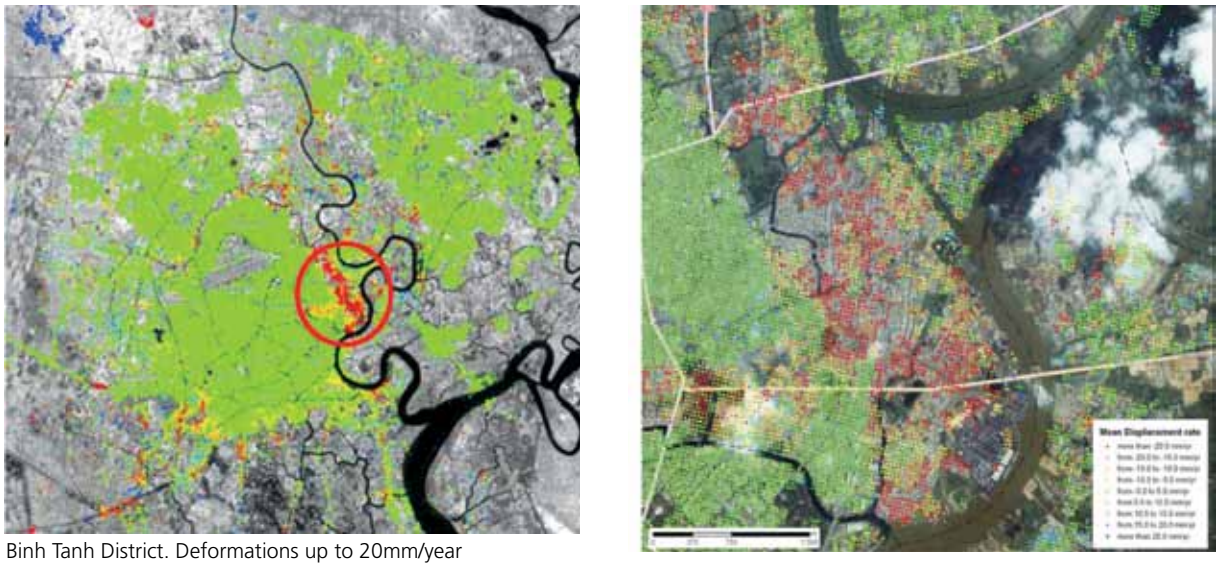
Summary of Discussions

- According to Mr. Santiago, the use of a probabilistic approach may pose additional challenge to communicating risk and eliciting response from those affected, when compared to the deterministic approach. Dr. Baba explained that risks are sometimes misunderstood and that, at times, authorities do not properly explain the possibility of higher risk or extreme events that exceed our assumptions or previous calculation of risk depending on a single scenario. This is why multiple scenarios are necessary. For instance, when producing a hazard map, the possibility of different scenarios must be communicated, as well as the fact that these maps do not yet capture the maximum probable risk.

- Dr. Nielsen stated that disaster managers do not need to know the maximum possible risk but maximum credible risk. He inquired about best ways to identify plausible maximum risk levels. Dr. Baba responded that the design of structural measures should be based on maximum probability, and should take into account the estimation on when the bigger hazard may occur. This is the practice of most scenario strategy and probabilistic approach of risk management.

- When asked about the cost of the ground deformation measurement technology, Mr. Douet explained that the cost will depend on the degree of complexity and the kind of the study to be undertaken. Dr. Nielsen added that to improve sustainability, donors should ensure that purchased datasets or technology should be made publicly available so that beneficiary countries are not burdened with subsequent licensing costs. Dr. Baba recommended that countries should enter into collaboration with research institutes in Asia or in their respective countries to obtain access to basic datasets at minimal cost.

- As a result of climate change, it is no longer possible to use past trends to predict the future, as in the case of 50-year or 100-year predictions. These kinds of prediction are not good for risk communication, as it does not help people to fully understand probability and risks. Mr. Jha underlined the importance of shifting towards a probabilistic approach and move away from a deterministic approach in which structural measures are designed to respond to a specific hazard level, which may or may not be correct.



Binh Tanh District. Deformations up to 20mm/year triggered by rapid urban development

Figure 9 **Case study: Ho Chi Minh City - Urban Risk Management**

Source: Yannick Douet, Altamira Information.

Special Session: Flood Preparedness Mapping Presentation

Photos by Rinsan Tobing

Photos by Rinsan Tobing

Remarks by Franz R. Drees-Gross, Sector Manager, World Bank, Jakarta

- Practitioners of urban flood risk management and urban resilience work at the intersection of two megatrends in East Asia: a historically unprecedented urbanization trend and challenging natural resource management issues. Urbanization has meant that larger numbers of people are placed in harm's way, and more assets are at risk. This, combined with the natural phenomena, such as the sinking of Jakarta and several other cities in Asia, adds to the recurrence of flooding events. This is a huge challenge for urban resilience and flood risk management.

- There were good discussions on using risk information data and software and placing them in the public domain for decision makers and planners, as well as extending the discussion beyond flood risk management into the realm of urban design and planning and infrastructure investments.

- This workshop is not a one-off event. Through the support of the Government of Korea and the government of DKI Jakarta, a community of practitioners from different countries can be formed to share knowledge and experience. By continuing this information sharing after the workshop, the flood risk management agenda can gain visibility and buy-in from political decision makers, not just here in Jakarta but also in other Asian cities.

Remarks by Bang Ki-Sung, Deputy Administrator, National Emergency Management Agency (NEMA), Republic. Of Korea

- The Republic of Korea is facing changing disaster risks due to climate change. Located in the East Asia Pacific region, 70 percent of the Republic of Korea's surface is mountainous terrain. In summer, the country is often hit by typhoons coming from the Pacific region, causing significant damages due to winds and concentrated rainfalls.

- As part of disaster risk reduction and prevention, NEMA implemented hardware measures and software measures. The hardware measures include, the disaster prone area enhancement project, the steep slope plane national project to reduce landslide and risk for flood disaster, and small stream management projects. Relevant policies and disaster risk management systems have been presented by Dr. Tae Sung Cheong. Software measures include the development of disaster risk management regulations on: (i) an assessment of disaster risk for every development plan in the Republic of Korea; (ii) a comprehensive integrated flood reduction plan to support local government in establishing long-term prevention measures; and (iii) an insurance system to pay disaster compensation and minimize damages resulting from natural disasters. NEMA has also established design codes and guidelines for facility and utility providers.

- NEMA would like to share its experience and technology. It will continue to strengthen the cooperation and partnership agreements between the Republic of Korea and GFDRR in various disaster management initiatives.

Visual demonstration on the OpenStreetMap flood preparedness mapping

S. Arfan Arkilie, DKI Jakarta Local Agency for Disaster Management

Jakarta first experienced flooding in 1654. It experienced a massive flood in 2007, with losses amounting to US$500 million. Jakarta subsequently implemented a number of structural measures, including the construction of the East Flood Canal, river normalization, retention dams, flood gates and pump systems and dikes. These measures were able to bring down the number of flood prone points from 78 in 2007 to 62 points. This was not considered sufficient and urgent work is still needed on a common understanding of the risks among all stakeholders, particularly among those at the community and subdistrict levels that are on the front lines during natural disasters. This reveals the need for stakeholders to have access to spatial data for infrastructure, village administrative boundaries, and public buildings such as schools, offices, clinics, hospitals and places of worship.

To respond to this need, the Jakarta provincial disaster management agency developed a participatory flood risk map. This effort is supported by the World Bank through the GFDRR, the Indonesia National Agency for Disaster Management (BNPB), UNOCHA, and AIFDR.

The starting point of the mapping exercise was the village-level (*kelurahan*) base maps produced by the Department of Spatial Planning. This was followed by the collection of data on important assets from various sectoral departments. This data was then analyzed during several workshops held in each administrative city. These workshops were attended by local government departments and heads of districts and villages. Each head of village was assisted by a mapping assistant and supported by students from the statistics department of the University of Indonesia. This process successfully identified flood prone areas and safe locations for evacuations; the data was then used to prepare 267 village-level flood risk maps. The maps are publicly available through the OpenStreetMap application.

Session IV: Implementing Integrated Urban Flood Risk Management

***Moderator:* Victor Rembeth**

The discussion focused on the use of a probabilistic approach in the context of uncertainty, the types of information required for the adoption of a probabilistic approach, the balance between structural and non-structural measures, and the importance of coordination across different agencies.

- Probability is difficult to forecast and hard to communicate in a way that is easily understood. Information provided must be reliable but not deterministic. In the case of AIFDR, the information describes the event that may happen, the impacts, and the probability of the event happening within a year. Dr. Nielsen added that emergency managers frequently preferred information on the maximum credible event, not the maximum probable event.

- A key requirement for the probabilistic approach is the availability of a database that is publicly accessible. A common approach should be identified in order to access available data, regardless of where they are located. There are many different ways to collect data with unique capabilities and features, such as historical data on ground changes and remote sensing data. Ms. Burzykowska from the European Space Agency/World Bank confirmed that the applications developed on these data were very valuable for regional knowledge sharing, and could be implemented as best practices and that the technologies could be replicated, when appropriate.

- A probabilistic approach can be reflected in the design or the selection of flood risk management measures/strategies. All measures, both structural and non-structural, need to be flexible and adaptable and based on multiple scenarios. Infrastructure measures, which are often fixed or based on a determined level of hazard, can be designed to be flexible enough to adopt a probabilistic approach. An example is the case of dike overflow. Dr. Phi advised against using projections in identifying measures, particularly long-term projections that may not be accurate. Flexible, phased (step-by-step) interventions and learning by doing is a good approach to flood risk management. Dr. Chitradon added that by nature, hazard and damage control are deterministic, but development of multiple scenarios is probabilistic. The capacity to develop a good set of scenarios, including a scenario in mismanagement of hazard, is therefore a very important requirement for adopting a probabilistic approach. In the case of Thailand, complete datasets are available, but that there were no middle management layers and tools to develop the set of scenarios.

- A probabilistic approach, which includes sets of scenarios instead of one scenario based on a determined hazard level, is more difficult to communicate to stakeholders. Dr. Baba agreed that there was still a need to further develop a standard methodology and identify the best combination of structural and non-structural measures. In Japan, many structural measures have been put in place. Each set of infrastructure addressed a specific target hazard level. Following the probabilistic approach, it is important not to rely on a single measure but to identify new methodologies to respond to different target hazard levels. In the case of evacuation, for instance, there needs to be several evacuation routes and sites, and people need to have sufficient capacity to determine the best route by themselves. Mr. Jha emphasized that a package of measures need to be available and presented in a visual format, with variables that can be easily played with or adjusted, so that policy makers can understand the risks and measures and how the combination of measures affect the risks. Such a presentation tool must incorporate advanced back-end technology, but very simple front-end interaction for ease of use.

- Dr. Cabral recommended a realistic balance between structural and non-structural measures as the balance between the two is context-specific. The Philippines, for instance, rely more on non-structural measures as they address different hazards simultaneously and require lower investments, which is appropriate for the country. Measures that are currently being prioritized in the Philippines include early warning, improving the accuracy of hazard warning, community development, and raising awareness among high-risk communities.

- A deterministic approach can be useful for policy makers in determining a risk acceptance level and the size of a given investment. Mr. Santiago proposed that a deterministic approach should not be completely abandoned, but integrated with a probabilistic approach to address hazard uncertainties. A probabilistic approach, with its multiple scenarios, introduces a lot of uncertainties which, in turn, poses challenges in the communication of risk, the identification of the risk acceptance level and the size of economic/financial investment. The introduction of a probabilistic approach into a deterministic one would be preferable. Mr. Jha added that risk acceptance assumed a willingness to live with the consequences of failure. Clear communication of such consequences, i.e. in the form of number of deaths and amount of asset loss, is required.

- In the case of flood management in Jakarta, policy makers did not respond positively to scenarios. They preferred to deal only with the currently identified hazard as they considered hazard scenarios reflections of their failure as policy makers. Mr. Gunawan agreed that a visualization tool with customizable front-end was a worthy investment as it has been to be a very useful, non-threatening tool for policy makers to identify flood risk measures. Investments in data and scenario updates should also be a priority.

- The combination of hardware and software measures is good for prevention but gaps still existed between prevention and response at the project level. To bridge the gap, Dr. Cheong proposed to place a flood risk management approach within the higher context of sustainable development, rather than the context of DRM.

- Water is an important resource for the city of Metro Manila. Although flood hazards are always imminent, Metro Manila suffered from a lack of water supply more than 2 years ago. It needs a strategy to strike a balance between water abundance and water scarcity. A convergence program between the Ministry of Public Works, Agricultural and Environment Departments has been initiated in the Philippines. Through the program, flood control structures are built upstream, thereby catching the source of water that may lead to a high-risk flood. Water upstream are reserved with dams, reservoirs and catchment basins, and released only during the dry season for irrigation purposes. This initiative has been successful for all the ministries involved. The Ministry of Agriculture is able to better manage irrigation areas that are experiencing flooding, while supporting the watershed program of the Ministry of the Environment. Success is particularly noted in the provincial cities that are mostly located in the lowlands. The program is owned by all ministries involved, including the Ministry of Home Affairs that is responsible for community development. The challenge in the implementation of the convergence program is to ensure coordination between the different ministries so that each ministry's programs can be complement each other and timed appropriately.

- Dr. Cheong agreed that many ministries and organizations are involved in DRM, as can be seen in the Republic of Korea, yet each has different perspective and needs, as well as datasets. To ensure coordination among all stakeholders, Dr. Cheong suggested the appointment of a government or group to take the lead in DRM. This group will be responsible to ensure multi-stakeholder ownership of DRM. This relates to the concept of national platforms that forms part of the Hyogo Framework of Action. Mr. Bhanja added that knowledge exchange among policy makers and line ministries is very important at the inception stage in order to promote this coordination. Strong involvement or leadership of an agency with experience in disaster management would be very useful in promoting an evidence-based approach, as well as increasing our understanding of what works and what does not work, and how it would directly affect the ministries involved. Training, capacity development, and knowledge sharing will help boost this effort.

- Practitioners need to think about how to influence governments to adopt practical risk management approach, particularly among those governments that have no incentive to do so. Mr. Jha stated that legislators can support this effort by compelling people and ministries to share information. In the Philippines, for example, the NDRRMC oversees all DRM-related matters. Leadership from such a powerful agency will help promote overall coordination.

Session V: Challenges, Opportunities and Risks

***Moderator:* Mr. Victor Rembeth**

Discussions on existing challenges, opportunities, and risks were conducted in small groups. Participants provided the following conclusions:

CHALLENGES

General:

- Existing infrastructure, such as pipes, drainage systems and canals, are often not up to date and cannot meet increasing urban challenges.
- Lack of coordinated efforts among line ministries, donor agencies, and civil societies.
- Lack of awareness on existing gaps, opportunities, and risks subsequently leads to a lack of incentives. For instance, a Ministry of Public Works should see the benefits of developing the infrastructure to counter floods or mitigate the effects of floods.
- Lack of awareness among communities.

Lao PDR:

In 2009, five provinces experienced floods in the south of the country. In response, the government assigned the Deputy Prime Minister to chair a group of four line ministries (public work, irrigation, labor and social welfare, and education); the group was coordinated by the Ministry of Welfare as it was responsible for the emergency response. In 2011, 12 provinces bordering Thailand were flooded. The four key sectors were involved in the recovery, with a total budget requirement of US$220 million. The government also provided an emergency reserve fund of US$42 million. Majority was used to rehabilitate infrastructure, such as roads and bridges. Lao PDR is still in need of funds to cover the remaining US$220 million.

Indonesia:

- In Semarang, private sector companies and factories located on river banks affected by floods have refused to relocate.
- Inconsistencies in existing regulations and law enforcement.
- Conflicting policies between central, provincial and city/district governments.

Vietnam:

Challenges were found in the implementation of all the 12 principles listed in the guidebook, except for Principle 5, which states that "heavily engineered structural measures can transfer risk upstream and downstream." Dr. Phi underlined the importance of this point in order to shift perspective from one-time intervention to a phased/step-wise intervention.

The Philippines:

1. Similarly to Indonesia, the first challenge is coordination and cooperation among local government units (LGUs) and the absence of a coordinating body to link the different issues and priorities. In the Philippines, many institutions have different responsibilities in relation to water and flood management. There should be shared goals and responsibility at different levels within each ministry, along with each sector's responsibility. There should also be an appropriate level of leadership to bring all the efforts together. In the Philippines, the President is the lead person who directs all agencies to play important roles in flood management.
2. The lack of a disposal site in Metro Manila is a problem for solid waste management.
3. The absence of an asset management system. A database is needed on existing flood control facilities to support decision making and prioritize investment.
4. Increasing ownership by LGUs to allow them to share the burden of operational maintenance and sustainability and ease the financial burden on the national government. An operational maintenance budget should already be considered at the project design stage.
5. Risk information and hazard mapping are sometimes not well-received by the general public, particularly by those directly affected by the hazard.
6. Political interventions. National government regulations will have to be adopted by local governments, which may sometimes cause friction. In the case of Metro Manila, the Metro Manila

Development Authority acts as a link to LGUs for communicating national government plans.

7. Land use planning, particularly around waterways. Due to permit issues, there are now already many buildings constructed near waterways.

OPPORTUNITIES

General:

- Flood risk management is increasingly seen as an integrated issue within cities, and there is a momentum that can be built upon.
- The recurrent floods faced in various countries and cities can help to raise greater interest for an agenda that promotes a shift from response to preparedness and mitigation.
- Access to and generation of information is increasing globally, including the growing use of open data platforms. Governments can benefit from global resources.
- Knowledge sharing and best practices exchanges are increasing due to media networks and outreach. Knowledge sharing events, such as this workshop, can be utilized to identify best practices and lessons learned.
- According to Mr. Jha, the issue of political intervention can be considered as an opportunity. There is a way to persuade politicians to get on board with the flood risk management agenda, as politicians respond to incentives. Once on board, politicians can help to educate the public and increase public awareness.

Lao PDR:

- As with most developing countries, the Government of Lao PDR is focusing on emergency response rather than on preparedness and mitigation. The government needs to shift their investments from emergency response and recovery to preparedness and mitigation. Information on risks is required for prioritizing investments.

Indonesia:

- The government is willing to collaborate with the private sector and communities. However, it needs to think 'outside the box' to accommodate the needs of private sector and communities.
- When a local action plan exist, synchronization between central policy and local policy is required.
- Promote opportunities for the private sector to contribute through their corporate social responsibility (CSR) program, and recruitment of people affected by the disaster or in vicinity of the disaster prone areas.

Vietnam:

Dr. Phi highlighted Principle 7, "many flood management measures have multiple co-benefits over and above their flood management role" as a principle that can be applied to a multipurpose project which can create long-term opportunities and benefits.

The Philippines:

- Intensified coordination among different sectors, as well as with LGUs that have been affected by disaster.
- Potential support from development partners to finance flood control projects.
- The national government has been more proactive in flood risk management.

RISKS

General:

- Clarity of available human and financial resources within each city and country for effective planning and investment.
- Assumption of 'one size fits all' solution. As there is no blueprint, solutions must always be adapted to the needs of a particular city.
- Conflicting interests, e.g. within government ministries, between the public and private sector, and between national government and communities.
- Inappropriate communication of risk may lead to panic and implementation of differing activities.

Indonesia:

- Law enforcement implementation versus political interests.

Vietnam:
According to Dr. Phi, there is a risk in the interpretation and implementation of Principle 1 of the Guidebook, which states that "every flood risk scenario is different: there is no flood management blueprint". Although there is no blueprint for managing floods, there is still a need for guidance aimed at technical people to allow them to transfer a concept into practice. The application of Principle 1, if it leads to the unavailability of guidance, could generate risk.

The Philippines:
- Political intervention, social issues, and financial constraints.

PRIORITIES

General:
- Investment in a media and communication strategy to build awareness.
- Capacity development, e.g. training on structural and non-structural measures.
- Increase donor emphasis on risk management.
- Investment in pilot initiatives for replication in different parts of the country and globally.

Lao PDR:
- Data collection for risk analysis.
- Infrastructure designs for roads, bridge, and drainage as part of 'build back better' approach.
- Hydrological data collection and institutionalization of that process through the identification of the agency accountable for data collection and conservation.

Indonesia:
- Create multi-stakeholder working group, including government, universities, NGOs, communities, and the private sector.

Vietnam:
- Principle 3, "rapid urbanization requires the integration of flood risk management into regular urban planning and governance," should be prioritized.
- Cross-boundary and regional, multi-stakeholder approach.

The Philippines:
- Continue and intensify coordination through the convergence program with various agencies.

RESOURCES REQUIRED

Role of the development agency:
- Bring all stakeholders, including the government, civil society, and the donor community together into the dialogue to identify gaps and areas in which the government is interested to invest, as well as identify possible donor contributions.
- Facilitate knowledge exchange.
- Bring technical assistance to countries and cities from the global scientific community.

Lao PDR:
- Knowledge sharing and transfer of technology, in particular procedures and tools for data collection, risk analysis, and development of scenarios on flood risks.
- Permanent institutional set-up to institutionalize flood risk management.
- Fundamental satellite datasets to be made available.

Indonesia:
- Different partners facilitate involvement of multi-stakeholder working groups from the planning to the evaluation stage of actions. Mr. Jha underlined the importance of this multi-stakeholder working group. This approach was applied in New York City and has helped the identification of new risks.

Vietnam:
- Support to solve cross-boundary issues, establish policy and facility/backbone to involve stakeholders, for instance through the establishment of an information system.

The Philippines:
- Support the implementation of priority actions in the Master Plan for Metro Manila and surrounding areas that is currently being prepared.

Session VI: Follow-up and the Way Forward

***Moderator:* Mr. Abhas K. Jha**

Follow-up actions were identified on the following three topics:

1. **Specific points of entry and next steps in each country and city to apply the integrated flood risk management approach**

- ***China****: Further discussion on urban flood risk management.*

- *Application of lessons learned in other regions.* Ms. Banerjee (World Bank, MENA Region) will take the knowledge and learning aspect of this workshop, particularly lessons from Jakarta and Metro Manila, to enhance disaster risk management efforts in Morocco and Algiers as part of a South-South initiative.

- *Continue and enhance knowledge sharing among participants*. Mr. Bhanja (World Bank, stationed in the Republic of Korea) stated that knowledge sharing has not been implemented to the level that it should be. He proposes organizing similar activities in different locations, identifying best practices and translating them into local language for country dissemination, establishing community of practice (CoP) website, and organizing a similar set of initiatives according to the strengths and unique context of each country.

Photo by Rinsan Tobing

Discussion on the next steps.

- ***Lao PDR****: Identification of priority locations based on cost-benefit calculation in Lao PDR*. Responding to this statement, Mr. Jha cautioned against the use of cost-benefit terminology as costs are often not borne by those who reap the benefits. Therefore cost-benefit calculation must clearly identify the bearer of the costs and the recipient of the benefits.

- ***Vietnam****: Promote involvement of urban planning in flood management activity in Vietnam*. Dr. Phi underlined the need to have shared goals and responsibility between urban planning and flood risk management planning. The inclusion of flood risk management into urban planning requires political commitment and awareness. Mr. Jha suggested that practitioners could help to promote ownership of flood risk management among politicians by strategically identifying quick wins that politicians can use to get re-elected.

- ***Indonesia****: Harmonize flood risk management rules and regulations between local, provincial and national government.*

- **The Philippines:** *Benchmark activities with respect of cities and planning based on guidance from the World Bank.* According to Dr. Santiago, an entry point for the Metro Manila is the Metro Manila Green Print 2030 that is currently supported by AusAID and the World Bank. Green Print already embodies some major practices and undertakings, such as risk assessment and impact analysis, and extended coordination beyond the boundaries of metro manila. The experience can be shared with other major cities for replication and collecting input. Green Print is unique in relation to previous plans as it is risk-sensitive. It integrates risk assessment as part of development process and does not address flood risk management in isolation from other hazards. Green Print also takes into consideration the flood impact caused by developments in the greater area beyond the Metro Manila region. The risk assessment makes use of new technologies that helps decision making down to the city level. Green Print also makes reference to international policies so it has international context.

- Mr. Jha added that the development of database of assets would be useful for decision making, that is, for the Department of Public Works to know the state of current assets and where to prioritize. Many developed countries have such a database and it is relatively quick and easy to develop.

2. Candidate city for the application of key methodology contained in the "*Cities and Flooding*" guidebook

Candidate cities identified for the application of Integrated Flood Risk Management are Beijing (China), Ho Chi Minh City (Vietnam), Semarang (Indonesia), Can Tho (Vietnam), Vientiane (Lao PDR), and Metro Manila (Philippines).

3. Establishment of a community of practice

Ms. Wataya (World Bank) proposed the idea of establishing a community of practice (CoP), which is a virtual platform that can support a continuing dialogue among participants in an efficient manner, and help cities share activities and experiences. The platform will require commitment and contribution from all cities. In response to the idea, Dr. Santiago proposed that participants of this workshop could initially take the form of a forum, and then be further enhanced into another format, as necessary. Dr. Cheong confirmed that the Republic of Korea would like to share its knowledge and transfer its technology and needs a platform to do so. The World Bank has developed such system and Dr. Cheong proposed utilizing that system. Ms. Wataya added that there is currently a platform on Integrated Flood Risk Management that contains information, presentations, and discussions. All workshop participants will be included in the platform. This will be an initial step towards creating a CoP that is open not only to the workshop participants but also to any interested party; Ms. Wataya asked all participants to use the platform to share information and experience as their contributions represented the lifeline of the community of practice.

Ms. Wataya explained that the current workshop was an opportunity to move towards the application of integrated flood risk management in cities. The launch stage of the "*Cities and Flooding*" guidebook is now concluding and would be followed by the implementation of the recommendations and principles. For this purpose, a good collection of information on best practices and lessons learned from the cities, as well as growing interest and active participation in the communities was necessary.

Special Session: Field Trip

Photos by Anna Burzykowska

Photos by Anna Burzykowska

A field trip to the Pluit and West Flood Canal of Jakarta was organized. The first stop was the conservation area in Pantai Indah Kapuk, which falls under the purview of the Ministry of Forestry. The conservation area lies next to the Muara Angke River, not far downstream is the Java Sea. The river is moderately polluted with solid waste, and a small slum area has formed across the conservation area. Responsibility for river management falls under the Ministry of Public Works. Right behind the slum area is a middle-class residential area, which falls under the purview of the Ministry of Public Housing. There is no coordination between the three ministries on addressing the challenges of this particular area.

The second and last stop was the water pump station in the Penjaringan Area, right next to the Java Sea. At the time of observation, the sea-water level was already higher than ground level. A sea wall was erected in 2003 to protect the communities in the Penjaringan district, yet its height is now no longer adequate to ensure protection of these communities. The sea-water level has regularly been seen to rise up to the top of the wall. The water pump, located right behind the sea wall, is used on permanent basis to pump water out to sea.

The visit illustrates the complexity of urban flood risk management, particularly in large, densely populated cities like Jakarta.

ANNEX 1: Workshop Agenda

DAY 1: May 2, 2012		
8:30-9:00	Registration	
9:00-9:30	**Opening and Welcome Remarks**	
	9:00-9:10	***Mr. Stefan G. Koeberle***, Country Director for Indonesia, World Bank
	9:10-9:20	***Mr. Bang Ki-Sung*** Deputy Administrator National Emergency Management Agency (NEMA)
	9:20-9:30	***Mr. Fauzi Bowo*** The Governor of DKI Jakarta
9:30-10:00	**Session 1: Overview of "Cities and Flooding: A guide to integrated Urban Flood Risk Management for the 21st Century"** Moderator: ***Mr. Victor Rembeth***	
	Mr. Abhas K. Jha World Bank	Outline of the guidebook, sharing key policy and methodologies and tools.
10:00-10:15	*Break*	
	Session 2: Show cases from Countries/Cities - Panel sessions Moderator: ***Mr. Victor Rembeth***	
10:15-12:15	**Panel session 1: Understanding flood hazard and its impact**	
	10:20-10:40 Thailand ***Dr. Royol Chitradon,*** Hydro and Agro Informatics Institute (HAII)	Climate Change Technology Needs and Community Water Management in Northeastern Part of Thailand Q&A
	10:40-11:00 Lao PDR ***Mr. Khamhou Phanthavong*** Ministry of Agriculture and Forestry	Status of Lao PDR's Flood Risk Management and Case Studies Q&A
	11:00-11:20 The Philippines ***Ms. Maria Catalina Cabral*** Department of Public Works and Highways	Structural Measures for Flood Management in the Philippines Q&A
	11:20-11:40 China ***Ms. Yumei Deng*** Ministry of Water Resources	Status of China's Flood Risk Management and Case Studies Q&A
	11:40-11:50 ***Dr. Ole Nielsen*** Australia-Indonesia Facility for Disaster Reduction (AIFDR)	Indonesia Scenario Assessment for Emergencies InaSAFE
	11:50-12:15 Discussion	***All presenters***
12:15-13:40	*Lunch*	

13:40-15:45	**Panel session 2: The Components of integrated flood risk management**	
	13:40-14:00 Vietnam ***Dr. Ho Long Phi*** Steering Center of Flood Control Program, Ho Chi Minh City	Integrated Flood Management Strategies for HCMC: *Evaluating Alternative Flood Risk Management Options* Q&A
	14:00-14:20 Korea ***Dr. Cheong Tae Sung*** National Disaster Management Institute (NDMI), Ministry of Public Administration and Security (MoPAS)	Flood Risk Management Policies and Systems for CCA and DRR Q&A
	14:20-14:40 Indonesia **Mr. Dudi Gardesi** Department of Public Work DKI Jakarta	Jakarta's Flood Management Q&A
	14:40-14:50 ***Mr. JanJaap Brinkman*** Deltares	Jakarta Coastal Defence Strategy (JCDS) study Flood Risk Management and Urban Resilience
	14:50-15:00 ***Mr. Takaya Tanaka*** Japan International Cooperation Agency (JICA)	Comprehensive Flood Management in Urban River-Successful Experience in Japanese
	15:00-15:10 ***Ms. Jenny Enrika*** ***Mr. Agus Nuryadi*** Pembangunan Jaya Group	Flood Risk Management at PT PEMBANGUNAN JAYA ANCOL, Tbk
	15:10-15:45 Discussion	***All presenters***
15:45-16:00	Break	
16:00-17:30	**Session 3: The International Development Partner View – Panel session** Moderator: ***Mr. Victor Rembeth***	
	16:05-16:25 ***Dr. Cheong Tae Sung*** National Disaster Management Institute (NDMI), Ministry of Public Administration and Security (MoPAS)	Korean Technology on flood forecasting model and faster decision making process
	16:25-16:45 ***Dr. Hitoshi Baba*** Japan International Cooperation Agency (JICA)	Introducing the principle approach that JICA has formulated after learning from the GEJE, reflecting comparatively to the 12 key principles of the guidebook, and promoting the management process
	16:45-17:05 ***Mr. Yannick Douet*** Altamira-information	Ground displacement monitoring using radar satellite images
	17:05-17:30 Discussion	***All presenters***
18:00	**Reception** Welcome speech, ***Mr. Franz R. Drees-Gross***, Sector Manager, The World Bank Jakarta ***Mr. Bang Ki-Sung***, Deputy Administrator, National Emergency Management Agency (NEMA) Visual demonstration on the Open Street Map flood preparedness mapping, ***Jakarta Disaster Management Agency***	
20:00	**End of Day 1**	

DAY 2: May 3, 2012		
9:00-10:30	**Session 4: Implementing Integrated Urban Flood Risk Management - Panel session** Moderator: ***Mr. Victor Rembeth***	
	All panelists (country representatives and partner organizations) of DAY 1	Reflection of key issues from the DAY 1 discussion Questions to the Panels Open discussion
10:30-11:00	*Break*	
11:00-12:30	**Session 5: Challenges, Opportunities and Risks - Panel session** Moderator: ***Mr. Victor Rembeth***	
	All panelists (country representatives and partner organizations) of DAY 1	Questions to the Panels Open discussion
12:30-13:30	**Session 6: Way forward and Wrap-up** Moderator: ***Mr. Abhas K. Jha***	
13:30 –	*Lunch*	
14:30	**Site visit -** Pluit and Banjir Kanal Barat, North Jakarta	
17:00	**End of Day 2**	

Venue of the Workshop

SHANGRI-LA, Ballroom A, Kota BNI JL. Jend. Sudirman Kav. 1, Jakarta, 10220, Indonesia.

Photo by Anna Burzykowska

MANAGING THE RISKS OF DISASTERS IN EAST ASIA AND THE PACIFIC

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