WFEO-Committee on Disaster Risk Management

Peruvian Association of Professional Engineers

National University of Engineering

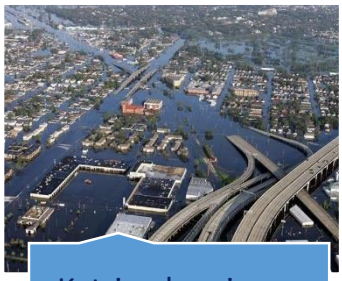
PROCEEDINGS OF THE 12th INTERNATIONAL SYMPOSIUM ON DISASTER RISK MANAGEMENT

RECONSTRUCTION FOR RESILIENT CITIES

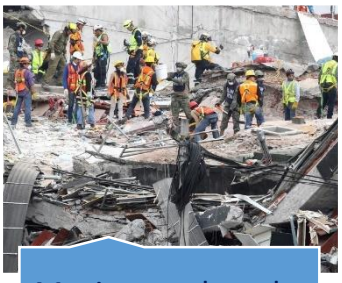
China earthquake

Peruvian floods

Haiti earthquake



Katrina hurricane



Mexico earthquake

5 - 8 September, 2018

Lima Convention Center, Lima – Peru

FOREWORD

The Disaster Risk Management Committee (GRD) of the World Federation of Engineering Organizations (WFEO), led by the Peruvian Association of Professional Engineers with the support of the National University of Engineering, organized the 12th International Symposium of Disaster Risk Management, which took place for the first time in Peru, host country of the GRD-WFEO committee. On this opportunity, the event's theme was Reconstruction aimed at resilient cities, a subject of special interest for our country that has been plunged in said process as a result of the disasters caused by the so-called Coastal El Niño of 2017.

The Symposium took place between the 5th and 8th of September, 2018 at the Lima Convention Center and included the participation of 700 attendees from the public sector, the country's regional and municipal governments, academia, the private sector, and the general public. This event took place within the framework of the activities planned in the 2018-2021 Strategic Plan of the WFEO's Disaster Risk Management Committee.

The event's four keynote conferences presented cases of post-disaster reconstruction originating from the experiences of China (Wenchuan Earthquake), Haiti (2010 Earthquake), Colombia (2010-2011 La Niña Phenomenon) and United States (Hurricane Katrina). In the 5 thematic sessions, the following themes were developed: Regulations and Planning, Research, Technology and Infrastructure, Economy and Project Management, Institutional and Social Linkages, and Capacity-Building for Resilience. National and international specialists undertook analyses, proposals, and critiques on how to focus on each subject to achieve an adequate reconstruction of the cities affected by disasters.

In line with adhering to scientific rigor, short paper sessions were organized, where 45 technical-scientific works were presented, through oral and poster media, with a focus on disaster risk management. On Saturday, September 8, last day of the event, technical visits with specialist guides were made in Lima and Ica to confirm on-site disaster risk conditions

The Symposium ended with the reading of the conclusions of the 5 technical workgroups, along with the reading of the Lima Declaration for Resilient Cities.

On behalf of the Peruvian Association of Professional Engineers, I wish to convey my sincere thanks for your participation.

Dr. Jorge Elías Alva Hurtado
Chairman
Committee on Disaster Risk Reduction
World Federation of Engineering Organizations

12th International Symposium on Disaster Risk Management:

Reconstruction Towards Resilient Cities

September 5 - 8, 2018. Lima, Peru

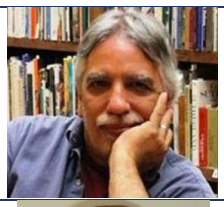
GENERAL INFORMATION

Organized by	:	WFEO-Committee on Disaster Risk Management (WFEO-CDRM), Peruvian Association of Professional Engineers (CIP), National University of Engineering (UNI)
Date	:	5 - 8 September, 2018
Venue	:	Lima Convention Center, Lima, Peru
Keynote speakers	:	Dr. Xun Guo - Chinese Earthquakes Administration Agency Ivan Bartolini - Swiss Agency for Development and Cooperation Doris Suaza – World Bank Dr. Vilas Mujumdar – World Federation of Engineering Organizations
Speakers of thematic sessions	:	MSc. Edgar Quispe Remón – Peruvian Authority for Reconstruction Dr. Shunichi Koshimura - Tohoku University MSc. Diana Rubiano Vargas – World Bank Dr. Isabelle Thomas - University of Montreal Dr. Fumio Yamazaki - Chiba University Dr. Sergio Alcocer - National Autonomous University of Mexico Dr. Mauricio Sarrazin - University of Chile Ivan Botter - World Food Program Dr. Rogelio Altez - Central University of Venezuela Ing. Julio Kuroiwa Horiuchi - National University of Engineering
Thematic sessions	:	1. Regulations and planning 2. Research, technology and infrastructure 3. Economy and project management 4. Institutional and social linkages 5. Capacity building for resilience
Short papers	:	36 - Oral format 10 - Poster format
Participants	:	700
Admission	:	General public USD 240, Academic staff USD 104, Students USD 52
Language	:	English and Spanish
Target audience	:	Specialists and professionals from governments, international organizations, NGOs, academic institutions and private sector
Web	:	http://isdrm.cip.org.pe/?page_id=2600&lang=en
Fanpage	:	@isdrm2018

PROGRAM

5 September			
17:30-18:00	**Opening remarks** Dr. Jorge Alva, WFEO-CDRM chair Dr. Javier Arrieta, WFEO-CDRM secretary		
18:00-19:30	**Keynote**		
	Dr. Xun Guo Reconstruction Experience after the May 12, 2008 Wenchuan Earthquake		China

6 September			
09:00-10:30	**Keynote**		
	Ivan Bartolini Towards sustainable changes in construction practices: from reconstruction to prevention - Evidence from Haiti		Haiti
11:00-12:30	**Thematic sessions**		
	Regulations and planning MSc. Edgar Quispe Remón Reconstruction and institutional strengthening with a vision of change		Peru
	Research, technology and infrastructure Dr. Shunichi Koshimura Paradigm shift of Japan's tsunami disaster management for enhancing disaster resilience		Japan
	Economy and project management MSc. Diana Rubiano Vargas Disaster recovery: strategies for planning and implementation		USA
	Institutional and social articulation Dr. Isabelle Thomas Rebuilding resilient communities: how to facilitate coordination between stakeholders for emergency and prevention as well as risk communication		Canada
	Capacity building for resilience Dr. Fumio Yamazaki Reconstruction towards Resilient Society: Japanese Experience		Japan

14:00-15:30	**Keynote**		
	Doris Suaza Dual purpose reconstruction: recovering the affected areas and fostering development adapted to climate change		Colombia
16:00-17:30	**Thematic sessions**		
	Regulations and planning Dr. Sergio Alcocer The recent experience of reconstruction in Mexico following the earthquakes of September 2017		Mexico
	Research, technology and infrastructure Dr. Mauricio Sarrazin Disaster management in Chile and Reconstruction Plan after the Maule earthquake on February 27, 2010		Chile
	Economy and project management Ivan Botter		
	Institutional and social linkage Dr. Rogelio Altez Building the next disaster - The reconstruction of Vargas state in Venezuela after the 1999 disaster		Venezuela
	Capacity building for resilience Ing. Julio Kuroiwa Horiuchi Disaster Risk Management - Training to Save Lives		Peru

7 September			
09:00-10:30	**Keynote** *Dr. Vilas Mujumdar* Creating Stronger Resilience in urban Regions - Lessons of Katrina Hurricane, New Orleans, USA		USA
10:30-13:00	**Short papers session**		
	18 short papers were presented simultaneously in two rooms		
14:30-16:30	**Short papers session**		
	18 short papers were presented simultaneously in two rooms		
17:00-18:00	**Round table conclusions**		
	Reading the conclusions of the five thematic sessions		
18:00-19:00	**Closing remarks**		
	Reading the Lima Declaration for Resilient Cities		

8 September	
07:00-18:00	**Technical guided visits**
	Visits to three different places in Lima to verify the risk conditions and analyze the strategies for their subsequent reconstruction

ABSTRACTS OF SPEAKERS' PRESENTATIONS

RECONSTRUCTION EXPERIENCE AFTER MAY 12, 2008 WENCHUAN EARTHQUAKE

Speaker: Dr. Xun GUO
Professor, Head of Civil Engineering Department, Institute of Disaster Prevention of China
guoxun@cidp.edu.cn

The M8.0 Wenchuan earthquake occurred on May 12, 2008. This earthquake killed 87,000 people. In the midst of the vast disaster area, Beichuan County suffered from the most serious loss. More than 20,000 people died in the earthquake, about 80% of the buildings collapsed in the county center. The whole area of Beichuan was high mountains and deep valleys; there was no suitable land for the reconstruction of the new administrative center. In the beginning of the reconstruction process the central government coordinated 300 km2 of flat land from the adjacent county. This land was used for settlement of homeless people and the construction of the new administrative center. The central and provincial government organized a strong team for planning and design of the reconstruction. Aim at a similar development level to the adjacent county not affected by the disaster, the reconstruction required vast amounts of money. One of the most developed provinces, Shandong Province, was designated by the central government for the reconstruction of Beichuan County. One city in Shandong assisted one town in Beichuan, and a rich city supported a town seriously affected by the disaster. Shandong Province provided all the money for the construction of buildings (both for public and residential use) and infrastructures. Construction teams, including labor also came from Shandong. Two years after the earthquake, the planned reconstruction was finished.

TOWARD A LASTING CHANGE IN CONSTRUCTION PRACTICES AFTER A NATURAL DISASTER: EXAMPLE OF THE SWISS COOPERATION'S RECONSTRUCTION COMPETITIVENESS CENTER IN HAITI 2010-18

Speaker: Ivan Bartolini
Head of the project Center for Reconstruction in Haiti, Swiss Agency for Development and Cooperation
ivan.bartolini@sha.admin.ch

The presentation is based on the Swiss Cooperation's experience within the framework of Reconstruction in Haiti after the earthquake of January 12, 2010, which focused on 2 programs that from their inception sought to link reconstruction to long-term effects.

1. Object of the presentation

Reconstruction is a process that offers hope for initiating a change at the level of urban planning and execution, while on the other hand it presents challenges in satisfying the numerous needs that often exceed the available resources.

Relying on the experience of the CCR program, the presentation researches the potential associated to the resources and dynamics of Reconstruction to initiate a lasting change in construction practices focused on the informal sector.

Firstly we present the strategic evolution of the program that began with support for reconstruction efforts, going on to the next stage consisting of the institutionalization of the processes within the national system of vocational training (Vocational Training Centers and universities). Finally, there comes a stage of appropriation by means of the enhancement of driving forces and the networking of construction industry professionals.

2. Results and challenges

Results are interesting at training level, with some initiatives that have plenty of potential, such as the introduction of a practical workshop in universities, the education of instructors at vocational training centers, the preparation of a new construction learning program, the integration of the training system in the reconstruction process and the launching of a support design for construction.

At the level of changes in practices in a country with few resources, weak institutions and high levels of informal activities, a change in practices is not only a technical matter but also requires an understanding of the rules that drive the informal sector and the mind-set linked to the construction process. The process of a change in practices must take into account at least 4 dimensions: Knowledge, Aptitude, Feasibility and Will. The latter two seem to be the most difficult to implement.

Traditional tools that we commonly use to foster changes in practices need to be evaluated in the light of the rules of the informal sector. In the end, the challenge is great and the rules of the informal sector are relentless: change will only arrive when each stakeholder in the construction chain finds his own benefit. When the state is weak and has no power to enforce, the best strategy may be to favor the concept of support in lieu of that of control.

All of a sudden, the informal sector with its implacable logic of short term interests may help us to think and develop a more robust system, more attuned to the reality of a considerable sector of the population.

DUAL PURPOSE RECONSTRUCTION: RECOVER THE AFFECTED AREAS AND GENERATE DEVELOPMENT ADAPTED TO CLIMATE CHANGE

Speaker: Doris Suaza

In Colombia there are broad differences in the disaster risk of the municipalities and regions. The damages and losses due to disasters occurring in Colombia in recent events, such as the torrential flooding in Mocoa (2016), the recurring landslides in Manizales, and the flooding that took place in the recent 2010-2011 La Niña Phenomenon force us to acknowledge that frequently actions taking place under complex and high-pressure situations pursuant to the declaration of a State of Disaster/Calamity leads to carrying out a series of hasty measures in an effort to normalize the situation. In many cases, decisions are taken without having access to adequate, sufficient, and accurate data, leading to subsequent actions aimed at correcting gaps that were not initially taken into account.

It is important to assimilate the lessons learned and institutional arrangements arising from experiences with previous reconstruction processes such as the one taking place after the impacts produced by the 2010-2011 La Niña Phenomenon, an event affecting more than 4 million people, with 96% of the country's municipalities suffering some kind of damage. Moreover, 1900 km of roads, 112 schools, more than 300 health facilities, 493 water systems and more than 100,000 homes were affected. Losses and damages were estimated at approximately US$ 3.7 billion[1]. Two tools were critical in leading the path in responding to this disaster.

1. Specific Action Plan (PAE)

In the first place, the PAE[2] was prepared, in order to have action guidelines and at the same time a frame of reference for post-disaster[3] attention, recovery and reconstruction in the areas affected by the 2010-2011 La Niña Phenomenon in the different sectors and territorial divisions. To this end, an inter-institutional work team was set up by means of sector forums of the National System for the Prevention and Attention to Disasters-SNPAD (currently, the Disaster Risk System).

2. Reconstruction Plan for affected zones

Based on the PAE and the damage scenarios, the National Government created two instruments to avert the crisis and bolster the economic capacity of the SNPAD: the Humanitarian Colombia sub-account of the National Disaster Fund to address the Attention and Renovation phases and the Resilience Fund for the construction and reconstruction stages to be undertaken by the Finance and Public Credit Ministry.

A dual purpose reconstruction process: recovery of affected areas and fostering of development adapted to climate change. This has been achieved via construction and reconstruction of infrastructure that meets risk reduction criteria and standards for the affected sectors; the recovery of strategic environmental ecosystems and the creation of knowledge for decision-making with regard to land use planning.

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[1] ***2% GDP for the year 2010.***

[2] ***PAE Objective, defining "the group of planning, organization and management actions for the attention, recovery and reconstruction leading to the re-establishment of fundamental rights and quality of life conditions of the Colombians affected by emergencies arising from the 2010-2011 LA NIÑA PHENOMENON and to prevent the extension of their effects over the medium and long term".***

[3] ***Pursuant to what was established in the Law: "The Bureau of Risk Management of the Ministry of the Interior and Justice will proceed to prepare, on the basis of the National Plan for Disaster Prevention and Management, a Specific Action Plan to address the situation declared that will be mandatory for all public and private entities required to contribute to its execution, in conformance to what is set out in article 20 of Decree 919 of 1989".***

CREATING STRONGER RESILIENCE IN URBAN REGIONS
- LESSONS OF KATRINA HURRICANE, NEW ORLEANS, USA -

Speaker: Dr. Vilas Mujumdar
Vice Chair, WFEO-CDRM
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Damaging natural hazards such as earthquakes, ensuing tsunamis, floods, hurricanes, et. seem to be increasing in frequency and intensity around the world. Losses due to these hazards also seem to be on increase. There are several reasons for these: C*limate change, Environmental degradation, Lack of maintenance of infrastructure causing more vulnerability, and increasing Urbanization* in the world at a rapid pace.

According to the World Bank estimate, annual direct economic losses over the decade of 2005-2014 have averaged over $180B with over 68,000 fatalities. If one includes the indirect economic losses the total loss in consumption amounts to $500B annually. Converting these figures as a percentage of a country's GDP, they have ranged from 2% to 15%.

When a natural hazard strikes, it not only causes the damage and destruction of physical facilities but also impacts the economic structure and social fabric of a society, significantly. Thus the impact on a community is much broader than just the damage to infrastructure. To minimize such an impact, a community needs to respond comprehensively in an integrated manner. There are generally three components to reducing hazard impact: *mitigation; response during event, and reconstruction after the event.* In the US, it has been well documented through robust methodology on FEMA grants, that for every one dollar spent in mitigation efforts saves four dollars in reconstruction costs. However, many countries are reluctant in investing in mitigation efforts as other societal priorities take precedent and demand economic resources. The *response during the event* is very critical as these efforts save lives and restore societal functioning. The *reconstruction,* which is the main theme of this paper, varies in its content and time, from country to country as it depends on location of the damage, available resources for reconstruction, and Government policies. In most cases the reconstruction of physical facilities are done to restore to the conditions existed prior to hazard damage without regard to building better resilience to future events.

In this paper, reconstruction efforts and challenges are presented through the example of Hurricane Katrina that occurred on Aug.29, 2005 along the Gulf coast in USA and caused major damage in the metropolitan area of New Orleans. Again the focus in this paper is urban areas where most of the population lives and this segment of the population is expected to increase in future, around the world. New Orleans is the only US city below sea level. It has been more than 10 years since the hurricane and reconstruction is supposed to have been completed, albeit the history of reconstruction is checkered. The damage was well over $100B (2005 Dollars) and caused 1465 fatalities. The main problem was the breakage of levees which caused massive flooding, disrupting transportation, railroad operations, water and wastewater systems, communications, and energy systems. Over 800,00 housing

units were destroyed displacing over one Million people. Besides, since New Orleans is a major oil refining and export port, it impacted oil prices around the world.

There has not been a detailed thought *in planning* the reconstruction as the reconstruction has been essentially to replace the lost infrastructure rather than creating a better resilient infrastructure for future. Some aspects such building above the flood level have been incorporated in the *design* of facilities but not uniformly as recommended. Private sector performed much better than Govt. facilities.

Implementation of reconstruction for better resilience also is not uniform as it varies from types of system to type of system. As an example, bridges are built better but levees are not. Per the Corp. of Engineers, the levee reconstruction should be considered as a temporary measure. Some housing is built on elevated foundations but all are not.

The paper surmises that in addition to engineering systems, most organizational systems including Govt. agencies, failed. Engineering decisions related to safety were compromised when levees were constructed, government agencies neither had the capacity nor the policies in place to deal with reconstruction on a massive scale, and they also hindered the private sector efforts to assist in reconstruction. A report by the US congress (the legislative body) described " – *Katrina was a national failure, an abdication of the solemn obligation to provide for the common welfare".*

The rebuilding for better resilience comprises of: *proactive maintenance of infrastructure; building effective institutions; climate change considerations; interconnectedness and interdependency considerations of infrastructure; flexibility in the design of infrastructure; and designing infrastructure for all.*

Finally, societal aspects must be considered in all decisions as it is the society which we serve in the final outcome. Resilient cities require functioning infrastructure, good governance, social and economic partnerships with private sector, and policies and incentives for rebuilding not only quickly but with better resilient features.

United Nations has identified two specific goals related to cities and resiliency: Make cities inclusive, safe, resilient and sustainable; and build resilient infrastructure, promote sustainable industrialization and foster innovation.

It is hoped that nations around the world who are signatories to the UN document will comply with these requirements.

THE RECENT EXPERIENCE OF RECONSTRUCTION IN MEXICO RESULTING FROM THE SEPTEMBER 2017 EARTHQUAKES

Speaker: Dr. Sergio M. Alcocer
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During September, 2017, Mexico was shaken by two strong earthquakes. The first, the Tehuantepec Earthquake, that took place on September 7 with a magnitude of M8.2 and located at approximately 87 km south of Pijijiapan, Chiapas, is the strongest quake ever recorded in the country. The tremor mainly affected the southern states, such as Chiapas and Oaxaca, as well as the states of Veracruz and Puebla.

The second earthquake, the Puebla-Morelos one of September 19, had a magnitude of M7.1, with an epicenter located 60 km south of Puebla and 112 km SSE of Mexico City. Its damage was concentrated in the states of Puebla, Morelos, Mexico and Mexico City.

In light of the extensive geographical area where both phenomena took place, a great number of buildings for residential and commercial use, churches, hospitals and schools were damaged.

More than 150,000 buildings suffered moderate and severe damage. Most of the damaged dwellings were of simple masonry (adobe or prismatic parts, generally built by hand) that experienced tilted fissures in the walls, faults outside the floor plans, as well as roofs collapsing.

In both earthquakes, 19,144 school buildings were affected.[4] Based on initial estimates, the reconstruction of the school infrastructure will cost 20 billion pesos (or one billion US dollars).[5] The Secretary of Public Education's Office (SEP), acting through the National Institute of Physical Education Infrastructure (INIFED) leads the efforts for recovery and reconstruction in the educational sector.

It is worth mentioning that in general terms, the performance of the school buildings was suitable for protecting the lives of the occupants. Nevertheless, school infrastructure needs to be designed in a manner that in an emergency situation such as an earthquake, the building will be immediately inhabitable. This is because schools need to have a safety level greater than normal buildings because of the type of occupant and due to the fact that they are used as shelters.

In the same manner, these quakes significantly affected several thousand historical buildings, both palaces and churches. As with homes, these are buildings constructed from materials vulnerable to tension (adobe and simple masonry using stone or handcrafted materials), without any steel reinforcement.

The damages to Mexico City during the September 19, 2017 earthquake received special treatment. Some thirty or so buildings collapsed; all of these, except for two, were designed or built before the 1985 earthquake.

During the conference, the chief damages resulting from the earthquakes will be presented. The efforts developed by the public and private sectors in the reconstruction of the damaged areas will be described. The principal learnings and

[4] http://www.red-crucero.com/news/2017/10/inicia-inifed-resconstruccion-de-casi-16-mil-planteles-danados-hector-gutierrez/
[5] http://www.red-crucero.com/news/2017/10/inicia-inifed-resconstruccion-de-casi-16-mil-planteles-danados-hector-gutierrez/

challenges faced in reconstruction will be faced. The adaptation and development of design and construction norms carried out in in Mexico City will be presented. Proposals will be made for reduced risk and increased resilience in the face of earthquakes in Mexican communities.

PARADIGM SHIFT OF JAPAN'S TSUNAMI DISASTER MANAGEMENT FOR ENHANCING DISASTER RESILIENCE

Speaker: Dr. Shunichi Koshimura
Professor, International Research Institute of Disaster Science, Tohoku University
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We revisit the lessons of the 2011 Great East Japan Earthquake Tsunami disaster specifically on the response and impact to discuss the paradigm shift of Japan's tsunami disaster management policies and the perspectives for reconstruction and enhancing disaster resilience. Revisiting the modern histories of Tohoku tsunami disasters and pre-2011 tsunami countermeasures, we clarify how Japan's coastal communities have prepared for tsunami. The discussion mainly focuses on structural measures such as seawalls and breakwaters and non-structural measures of hazard map and evacuation. The responses to the 2011 event are discussed specifically on the tsunami warning system and efforts to identify the tsunami impacts. The nation-wide post tsunami survey results shed the light on the mechanisms of structural destruction, tsunami loads, and structural vulnerability to inform structural rehabilitation measures and land use planning.

Remarkable paradigm shifts in designing coastal protection and disaster mitigation measures were led with a new concept of potential tsunami levels; Prevention (Level 1) and Mitigation (Level 2) levels according to the level of protection and recurrence interval of tsunami hazards. The seawall is designed with the reference of Level 1 tsunami scenario, while comprehensive disaster management measures should refer to Level 2 tsunami for protection of human lives and reducing potential losses and damage. Throughout the case study in Sendai city, the proposed reconstruction plan was evaluated from the tsunami engineering point of view to discuss how the post 2011 paradigm was implemented to the coastal communities for future disaster mitigation. The analysis revealed that Sendai city's multiple protection measures for Level 2 tsunami will contribute on substantial reduction of the tsunami inundation zone and potential losses, combined with the effective tsunami evacuation plan.

NATURAL DISASTER MANAGEMENT IN CHILE AND RECONSTRUCTION PLAN AFTER THE FEBRUARY 27, 2010 MAULE EARTHQUAKE

Speaker: Dr. Mauricio Sarrazin A.
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Firstly, there will be a review of the information systems for disaster prevention the country relies on, in particular the new National Seismological Network with its network of broad-band seismometers, accelerometers and GPS. In addition there are other data collection agencies such as the Navy Hydrological and Naval Service, SHOA, which is devoted to register and provide early warning systems for tsunamis, the National Geological and Mining Service, GERNAGEOMIN, which deals with volcanic eruptions and landslides, and the Meteorological Office, responsible for problems arising from disasters caused by climate events.

Subsequently, regulatory issues will be reviewed, in particular those related to requests on seismic data for various kinds of construction. The key policy-making instances are the General Ordinances for Construction and Urban Planning, the Road Building Manual and the various norms of the National Institute of Standardization, INN.

These instances constitute part of the preventive aspects of the National Civil Protection Plan, that will be critically presented within the Sendai framework. An important part of the plan is the response to disaster events, where a principal role is played by the National Emergency and Mitigation Bureau, ONEMI, whose organization and functions will be described briefly.
The Maule earthquake of February 27, 2010, with a magnitude of 8.9, that affected a broad, populated region of the country, put to the test the government's response system. A description will be made of the characteristics of this earthquake, as well as the impact it had on the country's industrial and civil infrastructure and its population.
We will now describe some regulatory problems that were made evident in failures in the building structures and how the norms have been amended to address the weaknesses identified. In addition, we will see how the earthquake triggered the development of new seismic protection systems, such as insulation at the base and the use of energy dissipating devices and the development of the respective regulations.
Lastly, the Reconstruction Plan developed after the 27-02-2010 earthquake will be addressed, outlining the results and the cost it represented for the country.

DISASTER RECOVERY: STRATEGIES FOR PLANNING AND IMPLEMENTATION

Speaker: MSc. Diana Rubiano
World Bank, drubianovargas@worldbank.org

Climate change may sometimes seem to be a phenomenon with long-term impacts. Unfortunately, the effects of the increase in greenhouse gases are already observable. On a global scale, since 1980 we can observe that the average annual number of disasters attributable to hydro-meteorological phenomena exacerbated by an increase in intensity and frequency has tripled. In that respect, geological and climate events (tsunamis, earthquakes, cyclones and flooding) have caused damages of close to 280 billion dollars a year, mainly affecting low and medium income countries that suffer significantly in light of their limited capacity or inadequate infrastructure for facing these shocks.

In order to face the challenges posed by a world increasingly subjected to greater and more numerous disasters, the international community has been promoting the establishment of policies aimed at reducing the impact caused by said disasters. Continuing with these efforts, the Sendai framework (2015-30) of the United Nations defines through its 4 priorities important objectives such as the substantial reduction in loss of lives, harm to people, property and essential infrastructure attributable to these disasters, the increase in international cooperation and the growth in the number of countries with national and local strategies for the reduction of disaster risks, among others.

In this latter objective, it is essential that the policies, strategies and plans cover aspects related to the identification of reduction of risks, financial protection and strategies for post-disaster recovery. In the specific case of recovery, it is necessary to have a framework or plan where all the sectors be involved in planning their reconstruction according to the required priorities. Institutional arrangements need to be defined – including the various entities involved – the private sector, NGOs, international financial institutions, and clear rules need to be put in place for their monitoring and evaluation.

On the one hand, there are a great many resources available to national and sub-national governments. For short-term needs, there are budgets with emergency allocations or reserves to facilitate access to funds immediately after the occurrence of the event. Also, for those disasters occurring with less frequency and greater severity, emergency debt/assurance financial products can be established through international bodies.

Finally, if we want to address the needs of a world prone to increasingly frequent and severe disasters, we require refocusing on the recovery processes to carry out not only the successful implementation of recovery plans, but also resilient construction (rebuild better) in order to avoid disasters from occurring again in the places that were previously affected and recovered.

REBUILDING RESILIENT COMMUNITIES: HOW TO FACILITATE COORDINATION BETWEEN STAKEHOLDERS FOR EMERGENCY AND PREVENTION AS WELL AS RISK COMMUNICATION?

Speaker: Dr. Isabelle Thomas
University of Montreal, Canada
isabelle.thomas.1@umontreal.ca

Many changes can alter communities, involving climate change, non-sustainable land use choices, economic crisis, major disasters, Uncertainty challenges disaster risk management experts and policy-makers, notably regarding long-term adaptation planning. The purpose of this talk is to present the findings of different research projects conducted by Professor Isabelle Thomas and her team from the University of Montreal in France, the United States or in Quebec. The projects aims at learning from past flood experiences in order to build resilient communities. Hence, experience Feedback analyses allow the provincial government, regional entities and local communities to identify improvement opportunities within the 4 phases of risk management for major flood events (prevention, preparation, response, and recovery). The aim is to present the strength and challenges linked to crisis management as well as long term adaption coordination between stakeholders at different levels of government. The presentation shows different tools and examples which are fostering resilience. Hence, citizen participation and empowerment will present with the case study of New Orleans how specific models can foster communities rebuilding. Moreover in Quebec, projects analyse how the uses a participatory and collaborative approach to mobilize and empower local and regional stakeholders' knowledge and expertise in the development of adaptation strategies is a successful tool to enhance coordination processes and mechanisms. Workshops have enabled environments in which stakeholders can share their knowledge and expertise through participatory cartography tools and focus groups. By pin-pointing key trans-sectorial challenges at a regional level, this collaborative approach enable collective adaptation strategies. Moreover, in France and in Quebec, specific communication tools enhance not only stakeholders and citizens awareness on risk in their specific areas but also empower them to work on adaptation and prevention, which is key to resilience building. Finally this presentation focuses on case studies from which we can create models to facilitate not only coordination between stakeholders but also adaptation strategies as well as risk communication.

BUILDING THE NEXT DISASTER. THE RECONSTRUCTION OF VARGAS STATE AFTER THE 1999 DISASTER

Speaker: Dr. Rogelio Altez
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The landslides of December 1999 on Venezuela's central coast represented the sinister climax to the International Decade for Natural Disaster Reduction, DIRDN, while at the same time presenting a unique opportunity to apply the lessons learned after a decade of institutional attention paid to the problems of risks and vulnerability. What took place was precisely the opposite. The reconstruction of the devastated region served to express that the changes in the discussions at the supranational level do not necessarily lead to societal change. Patronage-based exploitation and corruption, factors decisive in replicating vulnerabilities, presented themselves as if the lessons learned from the DIRDN had never existed. The Vargas case, an open book at all levels when it comes to the problem of risk, eloquently demonstrates that supranational policies do not always benefit the communities they seek to help, and that moreover, in the hands of clientelist and populist states, contribute to replicating all the variables that determine the occurrence of disasters. Almost twenty years after the tragedy of 1999, the region has been led toward a new catastrophe hand in hand with a reconstruction that has only benefited political interests. Vulnerability has been the only factor favored by this process.

Reconstruction towards Resilient Society: Japanese Experiences

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Once a region is hit by a significant level of disaster, "Build Back Better" is an important concept to reduce losses from future events. If the affected region is reconstructed in the similar manner as the pre-event stage, a similar or greater level of impact is expected. Because of increasing exposure due to population growth and increasing hazard level due to climate change, it is necessary to reduce physical and social vulnerabilities in order to mitigate disaster risks.

Japan has been affected by numerous numbers of natural disasters in its two-thousand year history. Even in the last fifty years, Japan was hit by a number of major earthquakes. Based on such experiences, seismic regulations and design/construction practices have been enhanced considerably. The first step for safer society is understanding disaster risks. To understand earthquake risks, seismic observation is quite important. Although Japan had the densest seismic observation networks before the 1995 Kobe earthquake, it was found to be not enough for inland crustal earthquakes. Thus new nationwide seismic observation systems were deployed after the Kobe earthquake. The new seismic observation systems as well as new GNSS network clearly demonstrated the nature of earthquakes in the 2011 Tohoku earthquake and the 2016 Kumamoto earthquake.

Japanese seismic codes have been upgraded based on the experiences from damaging earthquakes, such as the 1964 Niigata earthquake, the 1968 Tokachi-Oki earthquake, the 1978 Miyagiken-Oki earthquake, and the 1995 Kobe earthquake. But as new structures such as high-rise buildings and base-isolated structures are built, new topics such as long-period seismic motion must be considered for these structures. Research and development for safer structures should be continuously promoted as well as the retrofit of existing structures.

To perform such tasks, capacity building of professionals and government officers are necessary together with awareness raising of general public. Japanese experiences from major earthquake disasters, such as the 1995 Kobe earthquake and the 2011 Tohoku earthquake, must be transferred to other seismic prone countries in the Pacific Rim. The SATREPS project sponsored by Japanese Government is one of such schemes of technology transfer to developing and emerging countries. The Government of Japan recently published the examples of good practice for Build Back Better from these major disasters. Reconstruction planning at a pre-event stage with the involvement of all the stakeholders and citizens is suggested to achieve resilient and safer societies.

TRAINING FOR AN EFFICIENT MANAGEMENT OF DISASTER RISKS

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Disaster Risk Management is aimed at reducing human and material losses, thus requiring a good national plan that includes state policies and legal frameworks that clearly set out the objectives to be met, as well as the obligations and responsibilities of the authorities and civil society at all levels.

On December 17, 2010, the 2006-2011 Constitutional Government, by means of a National Agreement, decided that the 32nd State Policy would be Disaster Risk Management. The 2006-2011 National Government, acting through Supreme Decree N° 111-2012 of the PCM (Presidency of the Council of Ministers), decided that said policy would be mandatory for authorities at all levels.

At the end of September 2017, when there was concern throughout the country at the live viewing of the collapse of buildings in Mexico City (CDMX) during the Chiapas and Puebla earthquakes, the author, speaking on a television program, proposed to the current 2016-2021 Constitutional Government that "the best gift for the independence Bicentennial, would be that all Peruvians should be trained to react swiftly and knowledgeably in the face of different scenarios, thus saving their lives". The response of the Defense minister at that time, Jorge Nieto, was immediate. It was decided to develop the training material, updating the author's books. Economist Cesar Villanueva, President of the Council of Ministers, ratified said agreement.

In the new book one can find global-wide studies of the "La Molina Effect". The most important conclusions from the studies of the Tohoku earthquake of March 2011, MW 9.0 summarized by the Japanese government and the World Bank, were: 1) For damage reduction it is necessary to understand the cause and 2) Rebuild well. To this we add: WHERE. "The La Molina effect" clearly illustrated the damage per micro-zone in the 1940, 1966 and 1974 earthquakes, which were the subject of field research by the author in 27 notable disasters taking place in the Americas, Japan and China between 1966 and 2016, including 18 earthquakes, 4 hurricanes, 2 volcanic eruptions and 3 "El Niños".

Clear micro-zone effects were present in CDMX in the 1985 earthquake; in the Lake Texcoco area 350 km from the epicenter there was a 1000% amplification in the peak ground acceleration close to the epicenter. In Tambo de Mora in the Pisco earthquake of 2007, the intensity was IX MMI, with total destruction in soft, waterlogged soil, while on a hill intersected by firm ground on the fault plan generated by the earthquake, no damage occurred with vulnerable adobe constructions. The new book will include the most notable technical scientific advances of the past 15 years and those achieved in Peru. An illustrative summary will be presented at the International Symposium of September 6, 2018.