SESSION DESCRIPTION

F5 Toward resilient and robust urban infrastructure

Presentations

Date: Friday, 27 April, 2018
Time: 16:30-18:00
Rooms: S29-31

Language: English
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Organized by: ICLEI World secretariat

OBJECTIVE

Urban economies and societies depend on robust infrastructure (buildings, transportation and communications systems, power lines, water and wastewater) for the delivery of goods and services. Urban growth combined with increased shocks and stressors such as climate change impacts, interferes with delivery and management systems and can put a severe strain on built assets. More importantly, it leads to disruption, damage and cascading failure of critical infrastructure (CI), which is vital for the functioning of cities. This session will explore how built infrastructure could be future-proofed and how cities could anticipate system dependencies and prevent disruptions in essential assets and systems.

The session began by exploring resilient and adaptive building and construction. The first presentation argued the urgent need for integrating mitigation and adaptation considerations in Nairobi, Kenya's infrastructure in order to deal with increased climate change impacts and population growth while achieving low-carbon and resilience goals. Stormwater has disrupted the construction and integrity of several buildings in Nairobi, with cascading functional failures for other infrastructure systems, as well as knock on effects on the economy. A representative from the National Construction Authority then highlighted the changes needed to be in place for the construction and building sector, including research into the resilience of building materials and techniques; indeed, green stormwater infrastructure is often viewed as a climate-resilient, low-cost alternative to traditional (gray) infrastructure. The next presentation put this view to the test by introducing a set of indicators to determine the resilience of green stormwater infrastructure. Could that be a solution to lessen damages in built infrastructure in cities?

Changing gears, the City of Rome shared lessons from the Smart Mature Resilience (SMR) project, especially the ones addressing the interdependencies of risk and the cascading effects of disasters on public infrastructure. Last, the Grassroots Infrastructure Dependency Model (GRID-M) was introduced – an innovative model which was developed to enable a near-real-time analysis of physical infrastructure dependencies of specific supply and demand nodes.

OUTCOMES

- Participants were exposed to the benefits of integrated adaptation and mitigation measures in urban infrastructure – especially *vis-à-vis* flood protection;
- They gained insight into selecting appropriate and effective flood resilience measures – either in gray/traditional or green stormwater infrastructure;
- They gained an understanding of physical infrastructure dependencies and how this knowledge could be applied to anticipate pre-disaster disruption, to minimize post-disaster impacts, and prioritize action during the event.

METHODOLOGY

- The facilitator provided an overall introduction to the session and contributors **(5 minutes)**
- Each presentation was allotted 10 minutes **(4 x 10 minutes)**
- The facilitator managed questions and answers **(40 minutes)**
- Closing remarks by the facilitator **(5 minutes)**

CONTRIBUTORS

Facilitator *Sunandan Tiwari, Senior Program Manager, Global Projects, ICLEI World Secretariat, Bonn, Germany*

Presenter *Ruth Onkangi, Research Officer, National Construction Authority, Nairobi, Kenya*

Phillip Dinga, Low Emission Development Officer, UNDP, Nairobi, Nairobi, Kenya

Linking adaptation and mitigation towards a resilient and robust infrastructure

This presentation addresses concerns by stakeholders and policymakers with regard to city infrastructure and climate change in Kenya. It evaluates mitigation and adaptation efforts of infrastructure in Nairobi, and identifies key gaps by practitioners and policy-makers. The presentation recommends a change from business as usual by increasing the level of awareness on disaster and infrastructure disruptions, researching into resilience of materials and technologies used locally, advocating use of resilient materials and techniques, adapting green building designs, mainstreaming climate change into the infrastructure sector through policy and introduction of incentives to increase adaptation and mitigation measures in the sector at local government level.

Presenter *Tara Kulkarni, Associate Professor, Norwich University, Northfield, USA*

Elizabeth Ells, Research Apprentice, Norwich University, Northfield, USA

Resilience metrics for Green Stormwater Infrastructure

Engineers, challenged to design affordable and resilient stormwater infrastructure, have been installing Green Stormwater Infrastructure (GSI) around the world, as a way to effectively manage stormwater flows, especially in areas with combined sewer systems. GSI is a climate resilient, low-cost alternative to traditional stormwater infrastructure. However, there is no uniform policy framework for engineering these systems to be climate resilient or metrics to assess their performance or resiliency. This presentation covers an overview of different frameworks that provide some design criteria and performance metrics for GSI. Trends and recommendations are offered on the basis of that overview.

Presenter *Pierluigi Potenza, Urban Resilience and Natural Hazards Expert, Risorse per Roma S.p.A., Rome, Italy*

Smart Mature Resilience: Lessons on disaster-proofing critical infrastructure

The H2020 SMR Project is an outstanding opportunity for cities aiming at improving their resilience against a number of resilience challenges, namely those arising from climate change, critical infrastructures and social dynamics. Thanks to SMR tools, Rome was able to understand interdependencies of risks and the cascading effects of disasters, as well as its current resilience level. The next step will be the set-up of a dedicated Resilience Office, as a new governance functionality. Synergy between SMR and the 100 Resilient Cities initiative has proven to be effective in developing such a plan.

Presenter *Kyle B. Pfeiffer, Manager, National Preparedness Analytics, Argonne National Laboratory, Washington D.C., USA*

Near-real time infrastructure dependency analysis

Situational awareness of the operational status of critical supply and demand nodes following a major disaster may inform response and recovery activities based on the ability of an infrastructure asset or system to support core facility operations. Near-real-time analysis of infrastructure dependency information is a computationally intensive process that is observed informally. To address this problem, a Grassroots Infrastructure Dependency Model was developed to enable near-real-time analysis of physical infrastructure dependencies of specific supply and demand nodes.

Further recommended reading

Smart Mature Resilience – For more Resilient Cities in Europe http://smr-project.eu/home/

Green Stormwater Infrastructure: https://www.epa.gov/water-research/stormwater-management-and-green-infrastructure-research