



TECHNOLOGY INFORMATION, FORECASTING AND ASSESSMENT COUNCIL
DEPARTMENT OF SCIENCE AND TECHNOLOGY, GOVT. OF INDIA



Integrated Research and
Action for Development

Session Summary

Climate and Disaster Resilient Smart Cities

28th October, 2015
New Delhi

Organized by:



Integrated Research and
Action for Development



THE
ROCKEFELLER
FOUNDATION

Introduction

IDRiM TIFAC-2015 session on the theme “Climate and Disaster resilient Smart Cities” was organized by IRADe & ACCCRN in partnership with Technology, Information, Forecasting and Assessment Council (TIFAC), DST, GoI under the 6th Conference of the International Society for Integrated Disaster Risk Management (IDRiM -TIFAC 2015) on “Disaster Risk Reduction: Challenges and Opportunities for Sustainable Growth”.

The session aimed to bring together experts working in areas of Urban Resilience, Climate Change and Disaster Management for highlighting the issues related to mainstreaming climate change concerns into urban development planning framework for planning smart cities in India

Organizer: Integrated Research and Action for Development (IRADe)

Venue: Tansen Hall (Scope Complex, 7 Lodi Road, New Delhi, India)

Date: 28th October, 2015

Chair:

Mr. Rohit Magotra, Assistant Director, IRADe

Speakers:

- **Mr. Ajith Kaliyath**, Environment Specialist, NIUA, Delhi
- **Ms. Asha Kaushik**, Research Associate, IRADe, Delhi
- **Dr. Tomoko Okayama**, Associate Professor, Taisho University, Tokyo, Japan
- **Dr. Nirmal Kumar**, Principal and Professor, Bhagalpur College of Engineering, Bihar



Panelists from left to right, Mr. Ajit Kaliyath, Ms Asha Kaushik, Mr. Rohit Magotra, Dr. Tomoko Okayama

1. Setting the context: Mr. Rohit Magotra, Assistant Director, IRADe



Mr. Rohit Magotra, Assistant Director, IRADe

Mr. Rohit Magotra commenced the session by explaining the significance and purpose of the session. He mentioned that the session would highlight the issues related to mainstreaming climate change concerns into urban development planning framework for planning smart cities in India.

Mr. Magotra stressed on the importance of disaster resilient cities and stated that we can no longer afford to ignore the huge economic impacts of disasters in the cities. In line with the same, he presented the figures of economic losses brought by disasters such as cyclone Hudhud in Vishakhapatnam city lead to around USD 11 billion losses while Srinagar floods' losses were USD 16 Trillion. Moreover, considering growing vulnerable population and lag in infrastructure and services in the cities, as well as formal protective mechanisms, the development of resilience is important for smart cities.

He briefed the participants about IRADe's work as a Centre of Excellence for Urban Development and Climate Change. The organization has been addressing issues related to urban development and climate resilience in India. IRADe has been engaged with various Indian cities for assessing their vulnerability and climate resilience and so far has covered 19 states and 29 cities. IRADe's report on vulnerability assessment of 20 cities revealed that all the cities lack the resilience to disasters. Further the organization worked on detailed vulnerability assessment of disaster resilience of 10 cities for the project 'Sustainable and Disaster Resilient Urban Development' and found that inadequacy of the existing urban infrastructure, unmet targets for Service Level Benchmarks (SLBs), poor management and governance in the cities has reduced their ability to cope and respond quickly to extreme events. Currently, there are no specific agencies or institutions within these 10 cities covered, to oversee the main streaming of sustainable and resilient measures, manage disasters and knowledge; or disseminate climate/disaster related information to the citizens. Mr. Magotra highlighted the importance of including Service Level Benchmarks, Multihazard Vulnerability Assessment, and Contingency plans in Smart City Plans.

Further, in line with the above, Mr. Magotra elaborated that IRADe is engaged in providing inputs to integrate Climate Resilience in Smart City Framework of Government of India, and working with Ahmedabad & Guwahati City Municipal Corporations for integrating Climate Resilience component in their smart city plans under the project 'Climate Resilient Smart Cities' (Supported by Rockefeller Foundation, under ACCCRN).

Mr. Magotra invited Mr. Ajit Kaliyath to present his work and informed that the recommendations put forth in this session will be further shared with the Ministry of Urban Development and other relevant agencies.

2. Ecological Stress Framework for Smart City Planning: Mr Ajit Kaliyath, NIUA



Mr. Ajith Kaliyath, Environment Specialist, NIUA

Mr. Kaliyath presented his work on Ecological Stress Framework for Smart City Planning and briefed participants the how this concept is important for fulfilling Sustainable Development Goal of enabling livelihoods and improving quality of life.

Smart Cities are envisaged as the most advance forms of planned human settlements. The Government of India's smart cities focuses on economic vibrancy and livability which cannot be guaranteed without building resilience in built environment. This brings us to the idea of ecological stress and framework to assess it. The ecological stress framework suggests a new approach to assess the socio-ecological vulnerability of communities to disasters.

He further explained that ecological stress is a unifying theme as it integrates ecology, society and behaviour and can be built based on realistic exchanges between communities and their environment. The framework developed by Mr. Kaliyath is a result of combination of socio-ecological factors which impinge on the community at a given period of time. The study has used remote sensing data in combination with household surveys which documented emotions and behaviors, social intelligence and social practices to study the varying levels of ecological stress

among these communities. In order to understand the behavioral patterns and their spatial variation between the communities, evidences were collected on travel patterns, access and need for parks and water bodies, plying facilities of children, coping up mechanism and money spent during floods, water scarce months, level of satisfaction and safety in the community through a survey of 550 households in Thoraippakkam.

Mr. Kaliyath concluded by stressing on the need of introducing City Prosperity Index in smart city planning stated that resilience depends not only on physical assets, but also policies, social capital and institutions, hence, there has to be a focus on resilient thinking in smart cities.

Mr. Rohit Magotra questioned the speaker to suggest key policy level recommendation which can be helpful for formulating Smart City framework/plans. Mr. Kaliyath suggested that the smart city framework must emphasize on historical & cultural information of ecosystem based development in the cities, as the same is needed to avoid the impacts of natural hazards.

3. Mainstreaming Disaster Resilience for Sustainable Development of Cities in India: Case study of Guwahati and Shillong: Ms. Asha Kaushik, IRADe



Ms. Asha Kaushik, Research associate, IRADe

Ms. Kaushik in her presentation stressed on the need of mainstreaming disaster resilience into developmental plans of the cities. She elaborated that the vulnerability and hazard assessment of Guwahati and Shillong cities has been done by using HIGS framework (HIGS is a vulnerability assessment framework having four components with respect to cities: Hazards, Infrastructure, Governance and Socio Economic status) and GIS based spatial analysis.

Ms. Kaushik discussed in detail the findings of the study and recommendations for building disaster resilience in the cities

- **Hazard vulnerability and Disaster Management:** Both Guwahati and Shillong are exposed to multiple hazards like earthquakes, floods and fires. Both the cities lack efficient inclusion of disaster risk reduction component in the urban planning framework. Shillong City Disaster

management plan does not include Early Warning Systems which is an essential component of disaster preparedness in any city. She pointed out that the critical support services in the cities (Hospitals, Schools etc) lie in disaster prone areas and the implementation of building by laws (though revised) is still weak in both cities. City ULBs must pay heed to the aforesaid points as for building disaster resilience, it is important to equally work on preparedness, mitigation and adaptation strategies.

- **Governance:** Gaps in governance of the cities due to presence of multiple agencies leading to coordination issues, unaccountability and inefficiency in service delivery. Moreover the ULBs are facing staff shortage, budget crunches. There is need to streamline the functions of ULBs and parastatal agencies and single body should be responsible for ensuring services in the city. Adoption of all the modules of e-governance system, efficient tax collection methods should be there.
- **Infrastructure:** Infrastructure towards sewerage, solid waste management and drainage in both the cities is poorly developed and outdated to cater present demand in cities. Service Level Benchmarks set by MoUD are not met currently. Despite the fact that Guwahati is highly prone to urban floods the storm water drainage coverage in city is very poor. Hence, it is important to set roadmap for achieving service level benchmarks in the city and build/retrofit the required infrastructure on urgent basis.
- Both the cities need to identify priority activities that respond to their urgent needs for adaptation to climate change.

Ms. Kaushik concluded her presentation by proposing an approach for Climate Resilient Smart Cities Development wherein vulnerability assessment of cities should be prioritized and should be incorporated in smart city plans of cities followed by strengthening of ULBs for bringing more investments and mainstreaming climate concerns in developmental concerns.

4. Toilet Waste Management in Shelters: Dr. Tomoko Okayama, Taisho University, Japan



Dr. Tomoko Okayama, Associate Professor, Taisho University, Japan

Dr. Okayama presented her work based on “Toilet Waste Management in Shelters”. She stated that Japan is frequently hit by natural hazards such as earthquakes and floods. As a consequence of climate change, the frequency of disaster events such as typhoons, heavy rains, tornado, and heavy snow, have increased in the recent years. When disaster strikes, the refugees evacuate to shelters which are public buildings, such as schools, university etc. However, supply of electricity and water is generally stopped during and after the disaster making it difficult for people to use the toilets.

Dr. Okayama and team conducted a survey on toilet needs of disaster stricken people. It was found out that people can tolerate without food for few hours but not toilet. Therefore, temporary toilets should be given preference over food storage. In Japan, it is usual that municipalities, national government and businesses distribute temporary toilets to a disaster-stricken municipality. However, in the case of the East Japan earthquake in 2011, only 27.6% of the earthquake-stricken municipalities could get temporary toilets within 2 days, 41.1% of stricken municipalities took more than 10 days to set enough temporary toilets after the earthquake.

Dr. Okayama and Japan Toilet Lab. researched in Feb.2012 at earthquake-stricken municipalities in Iwate, Miyagi and Fukushima prefecture. 32 municipalities answered on use of temporary toilets. The survey revealed that temporary toilets take long time to set up and they are inadequate in number. Furthermore, these toilets are perceived dangerous by women because they are usually set outside the building.

Dr. Okayama concluded her presentation by proposing that necessary provisions to be made for transferring temporary toilets to disaster stricken sites within 24 hrs and they should be set up in location, safely accessible to all. Also, a shelter is needed to stock toilet paper, sanitary napkin, wet tissue, and big plastic bags for toilet waste. A plastic bag is to be attached to existing toilets to store the waste that can be later solidified by chemical treatments.

5. Capacity Building to face Challenges due to Earthquake in Bihar, India: Dr. Nirmal Kumar, Bhagalpur College of Engineering, Bihar



Bihar State is the least urbanized state of India with 89.5% rural population. Dr. Kumar presented the case of vulnerable housing sector in Bihar. The majority of the houses are self-built with locally available materials such as mud, grass, straw and thatch. Further, the mode of construction is now changing from mud and thatch to brick and concrete without any technical inputs. From the seismic point of view, they are unsafe to live as the State of Bihar is vulnerable to major natural hazards, namely floods and earthquakes (Seismic zones IV and V).

He further informed that recently Department of Urban Development, Government of Bihar has enacted building bye laws in 2014 for regulating building construction activities in urban and rural areas. The Building by-laws are framed taking into account all seismic sensitivity to make structures safe and earthquakes resistance.

In spite of this remarkable achievement, there remains quite a large deficiency in terms of technical capacity of the Municipalities and Panchayats. Technical assistance in form of Architects, Structural Engineers, and building professional is not available in rural areas. Technological input or effective technology transfer at user end for constructing safe houses cannot happen in the absence of effective Municipal Corporation, Municipality, and Nagar Panchayat in urban areas and PRIs in Rural areas of Bihar.

The vulnerability of houses to natural onslaughts such as earthquake may be prevented only if local skills of artisans, construction workers and educated youth are developed for safe construction. He stressed on the need of a core competent team of professionals in local self-bodies are needed for enforcing standard and codes of practice to reduce the impact of seismic onslaughts.

6. Way Forward: Key recommendations

Mr. Magotra then concluded by summarizing the key recommendations of the session. With missions such as Smart City, AMRUT, HRIDAY in India there is an opportunity to include disaster and climate resilience into development plans of the cities. Also, a smart city action plan should integrate the historical data on natural resources and its cultural relationship with the people. Together with this, there has to be vulnerability assessment of each city to make them climate resilient.

At present, building bye laws are one of the effective tools to ensure resilience in our shelters. For the same, initiatives for capacity building of urban local bodies in terms of institutional and human resources are required. Furthermore, there is need for Emergency Operation Centers (EOC) which should be planned at safer locations and remain functional during and after the disasters for supporting relief and recovery operations.

Centre of Excellence – Climate Change and Urban Development

IRADe is an independent advanced research institute which aims to conduct research and policy analysis to engage stakeholders such as government, non-governmental organizations, corporations, academic and financial institutions. Energy, climate change, urban development, poverty, gender equity, agriculture and food security are some of the challenges faced in the 21st century. Therefore, IRADe research covers these, as well as policies that affect them. IRADe's focus is effective action through multi-disciplinary and multi-stakeholder research to arrive at implementable solutions for sustainable development and policy research that accounts for the effective governance of techno-economic and socio-cultural issues.

IRADe was established under the Society's Act, in 2002 at New Delhi. It is certified as a Research & Development Organization by the Department of Scientific and Industrial Research (DSIR), Ministry of Science and Technology (MoST) and provides expertise to other ministries, national and international institutions and partners with other reputed organizations.

In recognition of demonstrated long-term expertise and quality work, the Ministry of Urban Development, Government of India, designated IRADe as the Centre of Excellence for Urban Development and Climate Change. Since 2008, the Centre of Excellence has been addressing issues related to urban development and climate resilience in India. IRADe collaborates with national institutions, state urban departments, municipal corporations, urban local bodies, non-government organizations and academia for capacity building, promoting awareness, research and training on specific topics in the areas of urban development and climate change.

As a Centre of Excellence, IRADe is furthering the agenda of integrating various urban development efforts and documenting best practices and policy level prescriptions that could be understood and adopted by state and national level decision makers; local administrations to help them link climate issues with the existing programmes in urban development. The presentation on project findings, results, methodology, cities covered and future strategy for India's Urban Climate Resilience has been delivered to various forums like IPCC-SREX, European Union and others.