Creating Stronger Resilience in urban Regions
- Lessons of Katrina Hurricane, New Orleans, USA -

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Summary

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.