

Challenges of Urban Resilience in India



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ABOUT THIS ISSUE

Rapid urbanization has emerged as an undeniable global trend. Ever since 2008, more people in the world live in urban areas than in the countryside. In 2014 alone, 54% of the world's population resides in urban areas. This puts an extraordinary level of pressure on urban centres which account for only 2.8% of the world's land area. All these facts point to the distending of urban infrastructure and services beyond their carrying capacity. This leaves these urban areas highly vulnerable to new risks. India's urban infrastructure too is at risk with a projected surge in the number of its urban dwellers reaching 404 million by 2050.

This issue of *Southasiadisasters.net* focuses on the Challenges of Urban Resilience in India. As repeated disasters have struck India's urban centres, new risks and vulnerabilities have emerged. Weak institutional frameworks and gross social inequalities make the urban centres of the country particularly susceptible to the adverse impacts of disasters. Climate change has added another level of complexity to the mire of existing vulnerabilities. In this context, this issue tries to explore underlying facts, observable trends and the projected impacts of these urban risks and their implications on urban resilience in India.

The scope of this issue ranges from the missing aspects in India's urban resilience to the underlying risks to marginalized groups inhabiting Indian cities. Topical and meticulously researched, this issue of *Southasiadisasters.net* underscores all major challenges that India faces in its pursuit of urban resilience. ■

- Kshitij Gupta, AIDMI

What is Missing in India's Urban Resilience?



courtesy: Google photo.

Helicopter rescue operation (Srinagar, September 2014).

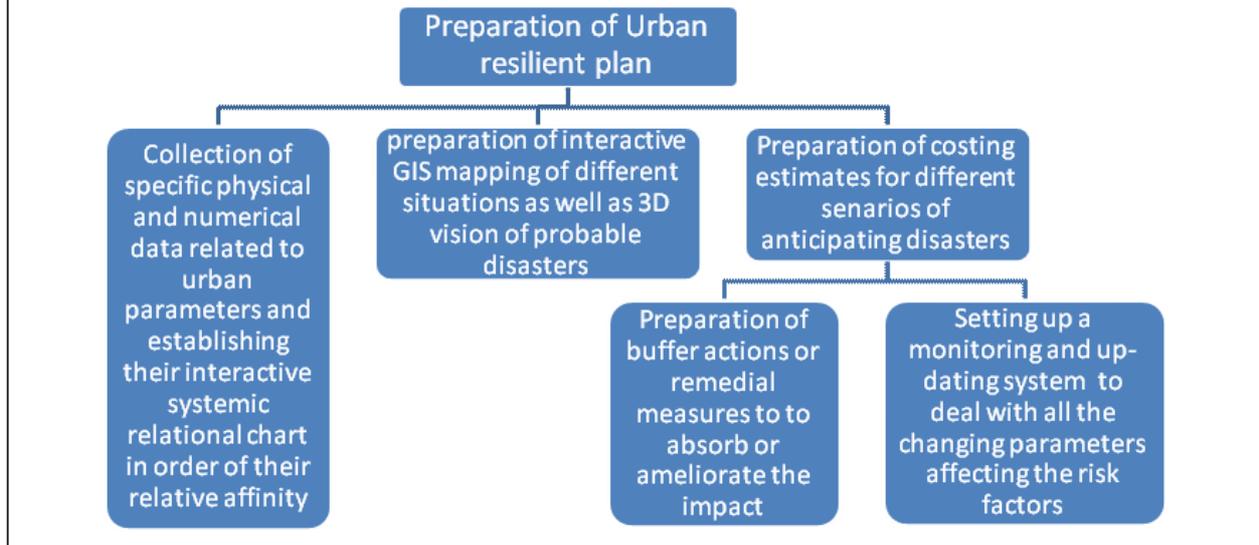
India, like all other countries of the world, is increasingly facing the severe impact of the growing climatic changes and its consequences on urban life. Events of many recent disastrous situations bear testimony to these changes like erratic monsoonal activities, floods in northern India (Sept. 2014), frequent droughts, severe flooding in coastal zones as well as inland river basins, unprecedented landslides in Himalayan areas; increasing air pollution and recurring fog formation on vast Gangetic plains and their dramatic impacts on transportation, agriculture and health situation, etc. They cost billions of rupees every year to India's economic life.

Though, many cities have started including resilient programs in their master plans, however, most of them are far from efficient to respond, *in time and in quality*, to face the effects of disasters. Some of the most

important reasons behind this situation are the lack of a holistic vision of the systemic relation between different urban parameters (inherent and developed) and also the absence of an effective operational mechanism for timely signalization and modus-operandi to face these disaster situations. **The most important is the absence of effective resilience measures' program integrated with the Master Plan of most of the India's urban development programs and, most importantly, even if it exists, they are not constantly monitored with the changing nature of these parameters.**

Although our knowledge in visualizing the causes and effects of disasters in terms of place, time and magnitude has been vastly developed thanks to the high quality of computerization of data analysis related to climatology and geography, GIS mapping, remote

A SHORT FLOW CHART OF DESIGNING A RESILIENT PLANNING STRUCTURE OF A TOWN



sensing and space imageries and their interactive interpretation through 3D visualization, there is, however, a persistent lack in their real time operation and installation of measures to achieve highly resilient urban or spatial development plans.

When we talk about the resilient capacity of towns, we look to the degree of shock resistant or absorbing capacity of the towns to face the disaster events. These events may be unforeseen or have not been appropriately considered while preparing the development plans of the towns and hence no provision has been made in the planning structure or in its operational system. **Therefore, when these events take place, the cities are helpless and bear the burnt.**

Take the transport planning system in the big cities of India, like, Delhi, Bombay, Kolkatta, Hyderabad, Bangalore, etc... Last year, I was in Delhi & in Hyderabad. I get caught in the traffic jam in both cities. I suddenly heard the frantic siren of emergency services (an ambulance and a police van) looking for passage. To my horror, both were stuck up in the traffic jam and nobody gave the way (there was no emergency lane)!! The transport

system of a city is like the arterial system of our body which assures the vital blood flow. If they are blocked, death is inevitable and so is the city's transport system.

Again, to fight against the weather vagaries, production system or emergency events, we depend highly on energy supply, or almost all cities of India are lacking them severely. The result is, longtime power cut, affecting the whole system of life, production and services and costing billions of rupees in economy.

In India, many urban expansion programs are planned in areas not ecologically susceptible for built-in

- Due to climate change India's urban infrastructure is exposed to multiple disasters such as erratic monsoons, increased incidence of floods, landslides, heatwaves, etc.
- While many cities are taking measures to prepare against such extreme events, a majority of Indian cities do not include resilience measures in their master plans.
- This proves to be a major impediment towards India achieving urban resilience.

development. We built high rise buildings, clearing virgin forests only to prepare future droughts, land subsides and water scarcity; we built on floodable lands upsetting hydrological balance, subjecting the area to future flood disasters (Delhi, Kolkata, Mumbai, Patna, Banaras, etc.); we built on steep hill slopes, cutting out the trees thus weakening the soil consolidation (Dharamsala, Dehradun, etc). **No Indian city possesses any consolidated and effective plans to face the disasters situation.** Almost all the Master Plans of cities are devoid of appropriate resilient plans to meet the future disaster events originating from their own actions as well as natural (a friend of mine, a high ranking planning officer in Delhi, told me that 60% of built-up areas of the city are non-conforming to the Master Plan provision).

Almost all cities in India are facing today serious disaster situation mostly originating from climatic changes and from man-made actions without backed up by any appropriate resilient plans. **India's cities are unable to resist the shock of worst disasters of the coming century.** ■

- Dr. Hari Baral,
Director ENVITEC, Paris

Risk on the Structural Margins

HRVA of Thakkar Bapa colony in Tilak Nagar, Mumbai

Background

Thakkar Bapa Colony is a residential and commercial area of Chembur suburb in Mumbai. It is most famous for its shoes which are manufactured by the local population. In this area, around ninety percent of the population are migrants, especially from Rajasthan, Bihar and Haryana. The focus of the study is population living below high tension wire, but during Hazard, Risk and Vulnerability Analysis it has been found that high tension wire is not only a single hazard; fire due to electrocution, stampede due to congestion of buildings makes it more vulnerable.

Methodology

To understand and analyze the vulnerability of this area, Birkmann

and Bogardi (BBC) model has been used which covers the three dimensions: social, economic and environmental, are influenced by both exposure and coping capacities. It is based on the model of Cardona (2004) and incorporates the aspects of coping capacities and exposure originally proposed by Chambers and Bohle within vulnerability.

For this analysis, the model has been modified and physical vulnerability and human dimension have been included in place of ecological vulnerability. Hazard and vulnerability are mutually conditioning situations and neither can exist on its own.

To determine the exposure to the hazards, income earning capacity,

health, population density, and institutions structure are also considered.

Physical Dimension

The internal road network are paved with bricks, concrete or tiles, the narrowness of these roads makes people highly vulnerable in any disaster situation. The internal roads are connected to each other but the complex maze of these roads is likely to make evacuation very difficult. Majority of the houses in Thakkar Bapa colony are *pucca* with few *kuccha* structures. In some areas it has been noticed that high tension wire are only about a few meters away from the top of the houses. None of the respondents reported fire outbreak or electrocution event, which gives a false impression of safety.

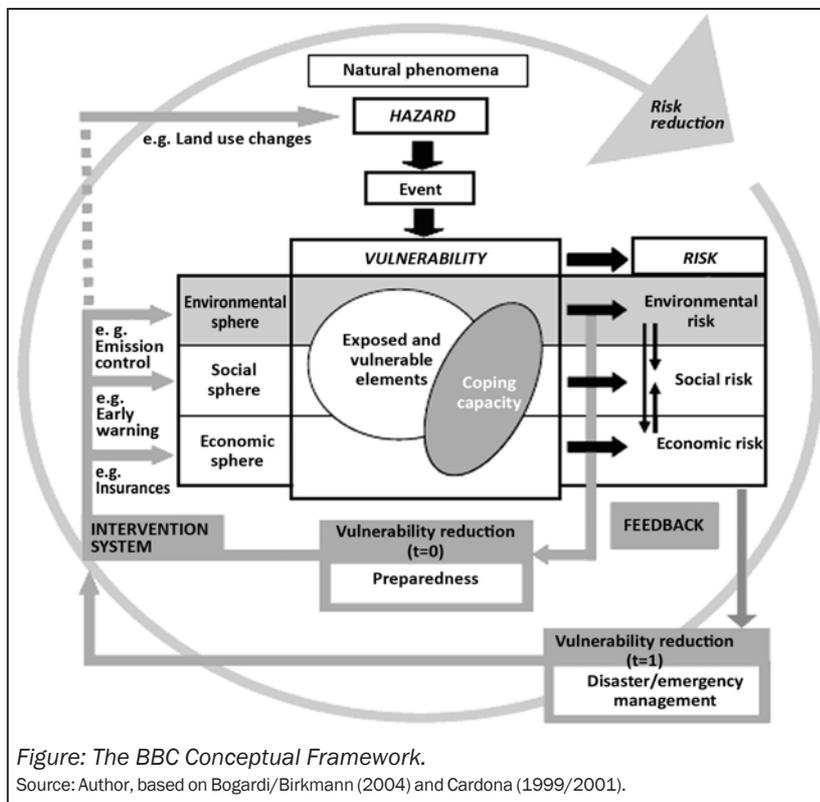


Figure: The BBC Conceptual Framework.

Source: Author, based on Bogardi/Birkmann (2004) and Cardona (1999/2001).

The communities get adequate supply of drinking water. Households have access to community taps. On an average, one tap provides water to around five to ten households. They have community toilets which are used by most residents. There are two community toilets with a total of 24 seats, twelve for men and women. In the monsoon season the area gets water logged. The roads around and leading to colonies get blocked with traffic at peak hours which can create a problem during an emergency.

Economic Dimension

Majority of people are engaged in informal sector and sources of their income are not secure. Men are mostly daily wage laborers or self employed as shoe maker, hawkers, vendors, pan shops etc. Youngsters, usually, after completing their

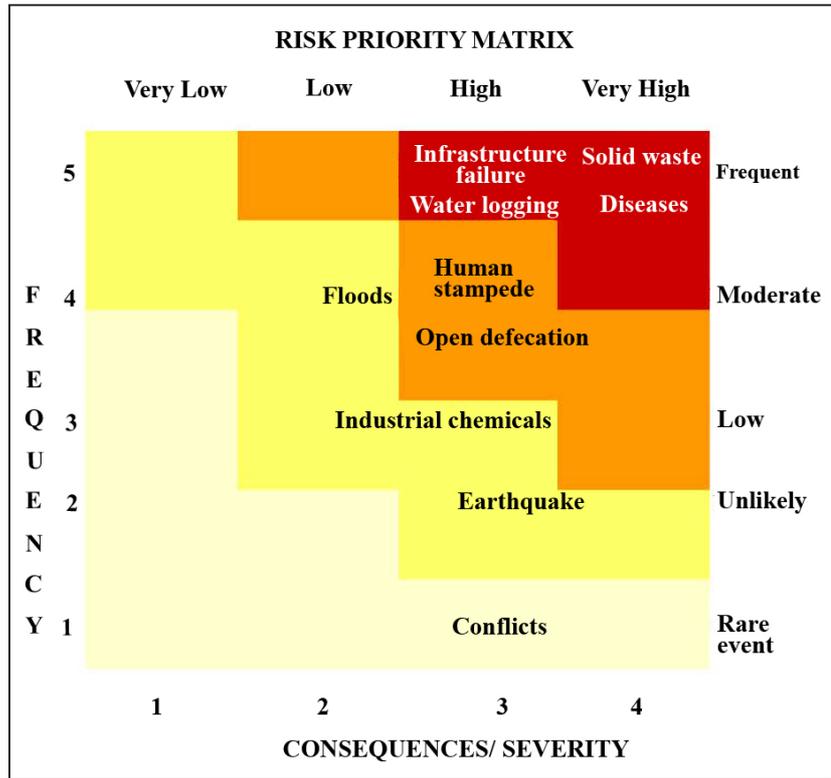
school till 10th also work in the same business in the absence of alternate jobs. Unemployed youth is a major concern for this community. Due to moderate income, most of the population is under vicious circle of debt trap, which restricts them to send their children to school and to avail basic services like health.

Human Dimension

The municipality school “Thakkar Bapa Colony Municipality Higher Secondary Hindi School” is situated near to the high tension wire area. The drop out ratio after 10th standard is high among girls. The absence of security on the premises makes the girl students vulnerable to social security factors. The health status of the people in the study area is poor as majority of the population is suffering from tuberculosis, diabetes or some allergy. They are not satisfied with the health facilities of government hospital, as there are few private practitioners but poverty restricts their options to go to private practitioners.

Social Dimension

The community involvement in collective action drastically reduces the vulnerability. Internal disputes and struggles divert people’s energy and resources and social networks will remain poor during crisis. Although, there is no overt conflict,



but there is continuous internal competition to access resources such as drinking water, sanitation facilities, etc. The members of the community share their grievances regarding facilities provided by the local administration, but they have not been able to demonstrate collective action on their concerns.

Results

A Risk matrix was prepared for detailed analysis of the types of

hazards that Thakkar Bapa colony is exposed to and to determine issues due to infrastructure failure that led to such problems.

Ethical Antithesis and Unanswered Questions

A set of issues and questions arose during field visits. The concerns revolve around the following subjects: Needs of the population vs. Needs of the report, listening to people vs. Surveying, Hollowness of opinions vs. Emptiness of technical observations, Subjectivity of classifications vs. Rigidity of Linearity, Depiction of conflicts vs. Employer Demands. We also want to propose a question; we believe, as disaster managers, how we can give back the precious time and information which people gave us. ■

- Shailendra Rai,

Jamsetji Tata Centre for Disaster Management, Tata Institute of Social Sciences, Mumbai

- The Thakkar Bappa Colony is a residential and commercial area in the Chembur suburb of Mumbai, India.
- A Hazard, Risk and Vulnerability Assessment (HVRA) was done to map out the various risks to which the residents of the colony are exposed to.
- The analysis was carried out using the Birkman and Bogardi model which mapped the physical, economic, human and social dimensions of the vulnerability of the community.
- Overhanging high tension wires, narrow and congested roads, limited employment opportunities for youth, persistence of debt, high dropout rate from schools and inadequate access to healthcare by residents were the main sources of risk for the community.

Chennai and its Urban Environmental Risks

Chennai, formerly known as Madras, is the fourth largest city in India with a population of 4.7 million. It is the capital of the Tamil Nadu state. It is the Gateway to South India and is about 400 years old. Like elsewhere, the urban population in Chennai has been burdened by the rural ones which add on to the poor basic infrastructure such as transportation, housing, and sewage disposal. Poor people migrate to cities in search of better jobs and many of them end up in slums and pavements. Although the city has night shelters for the poor who are homeless, many pavement dwellers are not in a position to move from their place of day-time stay to night shelters which may be in a distant location.

In Chennai, rising sea levels lead to saltwater intrusion, and added up with it is the vertical growth of the city and the consequent over-exploitation of groundwater. Salt water intrusion into groundwater aquifer is so much that most people of Chennai do not rely on groundwater for drinking and cooking purposes. There was a positive effect on the groundwater table after rainwater harvesting was made compulsory in Chennai a decade ago. There is a need for the restoration of the Buckingham Canal, Cooum and Adyar rivers that pass by Chennai and empty into the Bay of Bengal. Illegal sand mining, encroachments on the river banks and discharge of untreated effluents into the rivers result in a high level of pollution. The rivers are a thriving source for mosquito and other water-borne pathogens. The rivers too help keep the groundwater table up in their neighbouring areas, though



River encroachments by the poor in Chennai.

effluent chemicals leach into the groundwater aquifer. The rivers which were once used as waterways for transporting passengers (and

- Chennai, the 4th largest city in India is ailed by many risks due to its burgeoning population and crumbling infrastructure of transportation, housing and sewage disposal.
- Rising sea levels often lead to saltwater intrusion into the sources of drinking water.
- Indiscriminate dumping of toxic waste along the road, discharging untreated effluents into rivers and a high probability of drinking water contamination have escalated the risk profile of the city.
- The government authorities ought to undertake corrective measures to address these critical issues.

even for bathing and drinking) are now an eyesore. However, these rivers along with the vast Marina Beach took the pressure off much of the 2004 devastating tsunami which hit Chennai shore as well. Ever since the Chennai port was constructed by the British, accretion takes place in its south shore on the famous Marina beach though severe shore erosion takes place in the Ennore side in the north. The Marina beach is considered the world's second longest beach. Pollution in the beach by slum-dwellers using the beach for open defecation, beachgoers leaving plastic waste, and beach vendors disposing off their waste have also to be dealt with systematically. Flooding is a frequent occurrence in several parts of Chennai whenever there is heavy rainfall. Despite many streets having storm water drainage, wastes are at times dumped into them and the storm water drainage gets clogged. River width in several places is reduced because of

encroachments along the sides and this too increases the vulnerability of Chennai to floods.

Pallikaranai marshland, a freshwater swamp in the city, is the only surviving wetland ecosystem of the city and is among the few and last remaining natural wetlands of South India. This marshland also serves as a floodplain, and more it shrinks more areas are flooded. The number of bird species sighted in the wetland is significant and it is comparable to that of the Vedanthangal Bird Sanctuary. Indiscriminate dumping of toxic solid waste along the road, discharge of sewage, and construction of buildings, metro railway stations and a new road have affected the wetland to a great extent. In 2007, the undeveloped areas in the region were notified as a reserve

forest. Remnant forests elsewhere in the city are within the Theosophical Society campus, Guindy National Park-IIT complex and the Nanmangalam Reserve Forest. A large quantity of metallic sedimentation discharged into Pallikaranai from the adjoining Perungudi dump yard is being deposited in the marshland, besides a portion of the marshland itself serving as a dump yard. This also results in loss of habitat and loss of biodiversity in this ecologically-sensitive marshland.

Most areas in Chennai get metropolitan water supply for a limited number of hours on alternate days. Once in a while drainage water gets mixed with drinking water as both the lines run parallel and there is low pressure in the drinking water

line as water does not flow round the clock. When such leaks happen and water contamination occurs, people using metro water for drinking purpose are taken ill. Efforts are under way to replace old metro water underground pipelines so that such leaks are minimized.

Studies have projected that vulnerability of the Chennai coast due to climate change is moderate, though it is set to have a negative impact on economic development, ecosystem and economic activity. The increase in temperature and prolonged summer months in the recent decades are attributed to climate change. The erosion in the Ennore coast is also attributed to climate change. ■

- Dr. I. Arul Aram, Associate Professor of Environment Science, Department of Chemistry, Anna University, Chennai

OUTLIERS

Urban Risks and Vulnerabilities in India

In October 2014, cyclone *Hudhud* tore through coastal regions of Southern India, striking Visakhapatnam, Andhra Pradesh. Videos on Youtube divulge a violent gale ripping into urban sprawl, contorting trees and assaulting buildings. One salient video capturing the apex of the cyclone shows torrential rain and winds of up to 180 km/hr coalesce into an opaque mass, feigning a winter blizzard. The pseudo-Northern landscape of these frames is betrayed only by the silhouettes of palm trees: tall staves bent in the furor, leaves billowing like hair. A Category 4 cyclone, *Hudhud* claimed 84 lives in the province, mainly from Visakhapatnam. The damages caused

by the storm are currently estimated at over \$1.5 billion US. Unfortunately Andhra Pradesh is no stranger to the ravages of cyclonic storms. *Hudhud* becomes the eleventh cyclone to hit the province, and the 32nd to afflict India since 1977, with most of these cyclones having occurred within the past few years. While the latest natural calamity to hit the South Asian nation, its damage is small compared to other natural disasters occurring in the country, with earthquakes and drought accounting for most deaths, and floods causing the greatest economic loss.¹ The most affected are populations living in urban regions of the country, with the poor disproportionately vulnerable. The video footage casts

the disaster as an inevitable, and impersonal, event.

As India hastens industrialization and becomes more rapidly urbanized, weather events will pose an even greater threat to mortality and national economy. India houses a sixth of the world's population on 1/50th of the world's land and 1/25th of the world's water. While forty percent of the world's natural disasters occur within Asia, the continent is burdened with 80% of all natural disaster deaths worldwide.² These are grim statistics. Not only is India at a geographic disadvantage, its institutional and social frameworks make it particularly vulnerable.

1 Centre for Research on the Epidemiology of Disasters

2 Bush, K. (2011). Impacts of Climate Change on Public Health in India: Future Research Directions. *Environmental Health Perspectives*, 119(6), 766.

In the 2001 Third Assessment Report by the Intergovernmental Panel on Climate Change, it was determined that within the past five decades global warming had been significantly aggravated by human activities. The highest levels of global greenhouse gas (GHG) emissions are currently produced by developed nations. GHG have adversely effected changes in climate that are already experienced worldwide. However, the consequences of this excess is mostly felt in developing countries and is expected to worsen in these regions, of which India is one. These regions already suffer overpopulation, insufficient infrastructure, high rates of disease, and limited resources. The social fabric of developing countries is additionally fraught with cultural inequalities- in India specifically that of caste, religion, and gender, as well as civil unrest and conflict- that make climate change a complex, multilayered, and political problem.

An increase in GHG is correlated with more volatile climate events. Urban areas are at a substantially higher risk to these natural disasters than rural regions. The United Nations' World Urbanization Prospects 2014 edition projects that 66% of the global population will reside within urban centres by 2050. This necessitates the urgent need to adapt existing infrastructures as already high population densities in expanding cities create structural poverty. An integral component of this are urban risk assessments.

Assessing urban risk is a nuanced practice that takes into consideration

- India's geographical conditions and its weak institutional frameworks pose serious challenges to achieving resilience for its urban centres.
- Climate change has added another layer of complexity and escalated the country's vulnerability to multiple hazards.
- There is a need of domestic and community based efforts to combat this vulnerability in an inclusive manner.

institutional frameworks, hazards, and socioeconomic fabrics. Urban hazards related to climate change include: rises in sea-level resulting in erosion and saline intrusion; storm surges which wreak havoc on infrastructure; heavy rainfall that leads to flooding and increased incidence of diseases such as malaria³; heat island effect caused by the retention of heat by paved surfaces; reduction of water availability; and finally, an increase in air pollutants from factories, businesses, residences, and vehicles.⁴

The profile of a city will determine its vulnerability⁵ and contributes to its resilience. Basic assumptions of risk can be inferred through city typology; coastal, dryland, inland, and high altitude cities face unique challenges. For instance, as a coastal city, Visakhapatnam is situated on low-lying land and this increases its risk from a rise in sea level. It is also readily exposed to storm surges.

The coping capacity and adaptation of a community is correlated with income, geography, housing type, and insurance policy. This places the urban poor as most at risk as they are forced to settle on the outskirts of cities that are frequently the most hazard-prone.⁶ This demographic has low income, unsafe housing, limited access to city services, and inadequate access to social institutions. These conditions are symptoms of the larger societal issues of identity politics⁷ that must be addressed simultaneously for long-term sustainability to be achieved.

In order to effectively combat urban vulnerabilities to natural disasters, efforts have to be largely domestic and community-led. Urban centers must adhere to higher standards in planning and safety. In the July 2014 issue of *Southasiadisasters.net*, Hari Baral, Director of ENVITEC Paris, France offers the first steps towards more emboldened cities, suggesting the SWOT analysis of urban fringes. The rigorous implementation of this simple tool would locate those at greatest risk quickly and efficiently. The dissemination of information regarding the causes of natural disasters to all demographics, especially those with historically restricted access to such knowledge and information systems, is crucial to building more resilient communities.

In the recent coverage of Hudhud, there was a focus missing on how poor communities within the affected areas will be impacted in the aftermath of the cyclone. The sentiment seems to be that the cyclone favored no one, disadvantaging the rich and the poor alike. A quick Google search renders many photographs of eschewed carcasses of buildings, torn metal skeletons that emphasize the violent power of the storm against an industrial city. Media coverage of the devastation to residences in poor communities would draw attention to their general exclusion in policy-making and city planning, holding the potential and promise of instigating action. ■

– Kasia Knap, AIDMI

³ Ibid, 767.

⁴ Urban Development & Local Government Unit of the World Bank (2010). *Understanding Urban Risk: An Approach for Assessing Disaster & Climate Risk in Cities*. 8.

⁵ Ibid, 7.

⁶ Ibid, 2.

⁷ Ahmed, S., & Fajber, E. (2009). *Engendering adaptation to climate variability in Gujarat, India. Gender and Development*, 17(1), 34.

Urban Resilience in Uttar Pradesh

Uttar Pradesh is one of the largest states of India. About 22 percent of states' population resides in urban centers. There has been 30 percent increase in the number of towns and cities during 2001 to 2011. There are 630 urban local bodies in the state viz. 13 Municipal Corporations, 193 Nagar Palika Parishads, and 424 Nagar Panchayats. The population growth and the demographic shift from rural to urban areas are challenging the urban governance system and for other actors to provide the basic civic services to the urban dwellers. Growing urbanization is posing serious environmental concerns in India in terms of changing land use pattern, increasing carbon emissions, solid waste generation and disposal, air and water pollution and poor sanitation amenities.

The large segments of the western and eastern region of the state is reported to be high to moderate earth quake risk zone. Out of 13 Municipal Corporations, 5 Municipal Corporations fall under high seismic zone, 6 Municipal Corporations in moderate seismic risk zone, and 2 Municipal Corporations are in low and very low seismic risk zones. A large segment of urban population in the state resides in slums, peri urban areas, squatters and informal settlements. These settlements are often located in low lying areas prone to direct and indirect risks due to environmental degradation. Natural disasters that are of significance in Uttar Pradesh are Floods, Droughts, Fires and Earthquakes. Of the various natural disasters floods are the most commonly occurring in Uttar Pradesh, Moreover, over exploitation of ground water resources in urban centers for

quenching the thirst of increasing urban population, changing lifestyle, and water uses for various purposes is cause of concern. Due to unregulated housing and building construction, lack of proper drainage and sewer network and also ineffective functioning of sewerage system, urban centers are at high risks. The blockage and choking in drainage sewer system leads to water logging and flash flood in urban centers. Increasing urbanization, expansion of habitat into unsuitable vulnerable areas, higher population density, higher housing density, vulnerable housing and buildings construction, non engineered unsafe construction, and aging buildings and other infrastructure are some of the factors that have increased the vulnerability of hazards and disasters in urban areas. The accelerated and uncontrolled urban growth has contributed to the ecological transformation of the

cities and their immediate surroundings resulting in flash floods and water scarcity.

Strategic urban planning directly supports urban resilience as a tool for sustainable development. Urban local governments must actively coordinate and mainstream mitigation, adaption and resilience into urban planning process to prepare cities to deal with climatic risks and impacts. Strong urban planning can promote resilience by ensuring optimal use of space, energy and natural resources. Flexible and adaptable climate change planning processes are crucial. Decentralized and improved urban governance is important for practical implementation of resilience and sustainability strategies. Public-private partnerships are an important and effective means of leveraging stakeholder expertise and forming partnerships for greater community benefits. Municipal bodies often do not have appropriate data to address planning needs and development. Advanced mapping, visual and spatial technologies can promote effective resource allocation and resilience strategies in cities. In order to ensure disaster resilient development in cities, there is a need for better inter-agency coordination across ministries and departments such as urban development, housing, water resources, environment, transport, home/internal affairs, power, communications, municipal governance amongst others at national, state and local levels along with many non-governmental organizations and civil society. ■

- Dr. A.K. Singh,

Assistant Director, Regional Centre for Urban and Environmental Studies, Lucknow

- As one of the largest states of India, Uttar Pradesh (UP) faces major challenges of urban resilience due to its growing population, indiscriminate urbanization, poor sanitation facilities, carbon emissions, solid waste generation and disposal, etc.
- Effective urban governance is the foundation of urban resilience for a state like UP where disasters like floods, droughts, fires and earthquakes are frequent.
- Building effective urban resilience necessitates effective resource allocation, use of advanced mapping technologies, improved inter-agency coordination, etc.

Lima to Delhi: What can be Learned on Urban Resilience?

Fast-growing cities and urban areas in the global South can be vulnerable because they lack the web of structures and institutions that enable more long-established cities to mitigate risks and, when a disaster does strike, to bounce back quickly. But thanks to many new technologies, and some smart new thinking, it is possible to bring resilience to even the poorest and most deprived urban communities.

The essence of resilience is to build into plans and daily activities a community's ability to weather any disaster, small or large. All cities, rich or poor, can experience a disaster of some sort, be it weather, civil unrest, war, earthquakes, shortages, or economic, financial and health crises. New technologies make it possible for all cities, no matter how poor and overcrowded, to build in urban resilience. The ubiquity of mobile phones introduces a powerful city and urban planning tool. Mapping chaotic and unplanned areas is already underway in many cities of the global South (in Brazil and Kenya for example) (<http://tinyurl.com/qgba8kb>).

Impressively, innovators in the South are using affordable micro-electronics in the form of mobile phones and laptops to gather data and map it. This computing capability was once the sole domain of big information technology companies

such as IBM. Now, a single laptop computer combined with a smartphone equipped with the right software can manage a large urban area, a task that once required rooms full of computers. The data can then be used to manage growth today and re-build after a disaster. Any excuse not to be resilient has been wiped out with this technological leap.

But how to deal with the common reality of feeling overwhelmed by the many obstacles to rational planning and building for urban growth in the South? Innovators have stepped in to take matters into their own hands with simple construction technologies as the solution. One example is the Moladi system of recycled plastic moulds (moladi.net). Anybody can master this simple building technique, as the mortar-filled moulds are designed to fit easily together to construct an earthquake-resistant, beautiful home. This approach has the advantage of bypassing the failings of authorities to enforce building codes and standards in poor, urban communities, creating safer places to live and preventing the growth of unregulated shanty towns at risk to fire and earthquakes.

Others have found social ways to organize people, even in the most desperate of conditions, providing services and laying down the

groundwork for an upgrading of an urban area to improve living conditions and long-term opportunities. The concept of 'cities for all' has inspired many to re-energize civic organizations and networking in poor areas to ensure they are not left out of economic growth. In Colombia, a famous example of this is the escalator in the city of Medellin, which connects a hillside slum to the centre of the city, opening up economic opportunities to all (<http://tinyurl.com/nm47d3u>).

Still more exciting, new technologies are in the works to simplify construction of major infrastructure and new buildings. A future city will be able to gather extensive data on an expanding urban area, make detailed development plans with architects and engineers, and then have robots and 3D fabricating machines quickly lay down infrastructure and erect buildings. Sounds far-fetched? Well, in China one company recently used a 3D machine to make 10 houses in a single day (<http://www.yhbm.com/index.aspx>).

An infographic from Southern Innovator's fourth issue (<http://tinyurl.com/m9vfwur>) shows 10 ways any urban area - either planned or unplanned - can build in resilience. All are proven approaches from cities in the global South.

Southern Innovator's upcoming sixth issue will explore the interplay of science, technology and innovation in the global South and how people are making the most of 21st century advances to increase wealth and improve human development. Hopefully, all of this innovation will lead to more resilient cities in the future! ■

- David South,

Editor, Southern Innovator, UNOSSC

- New technologies are helping cities of the global south to bring in the poorest and most deprived urban communities under the umbrella of resilience.
- Use of affordable forms of micro-electronics such as mobile phones and laptops are helping innovators in the global south to build the resilience of cities.
- The use of Moladi system of recycled plastic moulds for building houses, use of escalators to connect hill side slums to city centres, use of 3D printers to build houses, etc. all point to the promising innovations for resilient cities.

Sericulture – A Potential but Vulnerable Source of Livelihood in Flood-prone Dhemaji Assam

Sericulture is the cultivation of silk through rearing of silkworm. It is an agro-based industry. It involves the raising of food plants for silkworm, rearing of silk worm for production of cocoons reeling and spinning of cocoon for production of yarn etc. for value added benefits such as processing and weaving.¹

Sericulture is of great traditional value in Assam. Muga silk is golden yellow in color and an exclusive product of India, primarily the state of Assam where it is the preferred attire during festivities. Muga silk is secreted by *Antheraea assama* that feeds on aromatic leaves of naturally growing Som (*Persia bombycina*) and Sualu (*Litsea polyantha*) plants.

The demands for outputs are not only local but are of export value. A section of population in Assam is associated with this occupation as a secondary source of livelihood and in certain cases even primary. The silk worms used for production of the silk can grow suitably in the agro-climatic situation prevalent in the State. Though the different risks associated with this occupation have largely

- The Indian State of Assam is extremely prone to the adverse impacts of Climate Change.
- Traditional livelihoods like Sericulture are an important community based adaptation measures that need to be promoted in the state.
- However, a changing climate and enhanced vulnerability of disasters threaten Sericulture in Assam.
- The onus is upon the government to devise the appropriate preventive measures and risk transfer mechanisms to ensure the longevity of Sericulture in Assam.



Photo: AIDMI

been responsible for its limited growth expansion. The underlined risks can be analyzed as under:

- 1. Vulnerability to hailstorms:** This is a potential hazard to 'silkworm breeding' in the months of March-April. These two months are one amongst three productive seasons for silkworm breeding and the usually experiences occasional hailstorms in this period of time. Even a single instance has the potential to destroy the worms.
- 2. Vulnerability to sand casting:** The district lies on the banks a number of tributaries to Brahmaputra river system. These rivers carry with them heavy silt and sand eroded from the deforested upper catchment areas of Arunachal Pradesh. This takes the form of sand casting in the plains after flooding. Sand casting in the 'Som' and other silkworm feeding tree planted areas leads to the death of the trees which in turn affects breeding of silkworms.
- 3. Vulnerability to Air pollution:** The silkworms' breeding is also highly

affected due to air pollution. Dhemaji also harbors a few tea estates and private tea plantations owned by individuals where chemical pesticides are used. The plantation where pesticide spray is done in the month of March-April adversely affects the breeding of silk worms. Particular affects are found in their size and quality of silk produced.

These factors affect the motivation and association of communities with this occupation which is still in the nature of secondary rather supplementary nature. Muga silk products in particular which are unique to Assam are costly commodities and have higher demands in the national market too. Dhemaji harbors the potential of escalating this industry as a measure to increase environment friendly and sustainable livelihood supplementing community resilience to different hazards with proper preventive measures, risk transfer mechanisms and promotion. ■

- Sonali Das, AIDMI

¹ http://218.248.11.68/textilehandloom/PDF/SericultureActivities_Orissa.pdf



30th Annual Meeting



Working together in the field for effective humanitarian response

ALNAP's 30th Annual Meeting took place in Berlin, Germany from 3 to 4 March 2015. Held over two days, this meeting focussed on taking stock and sharing experiences and best practice on collaborative and inter-organisational approaches for effective humanitarian response at the field and country level.

The issue of coordination became more pressing as the number of humanitarian actors has increased and a combination of factors – climate change, urbanisation and population growth among others – have led to responses becoming larger and more complex.

The last decade has seen a variety of approaches to improved coordination and collaboration. Among these initiatives, there are many success stories, as well as a number of significant challenges. With the projected growth in humanitarian needs, coordination and collaboration can be expected to become even more important in the years ahead. ■

for more information: <http://www.alnap.org/what-we-do/effectiveness/meeting-2015>

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