ICLEI Local Governments for Sustainability

4th Global Forum on Urban Resilience & Adaptation

Bonn, Germany 31 May - 2 June 2013

Resilient Cities 2013

Proceedings of the Resilient Cities 2013 congress

Session Title:
H2: Urban vulnerability assessment in South Asia: Challenges and lesson learnt

Presentation: Urban vulnerability assessment in South Asia: the example of Bangladesh

Urban vulnerability assessment: Barisal City: Bangladesh

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Abstract:

Asia is the most vulnerable to climate change. Climate change and climatic variability have impacted all sectors; human health, food production, infrastructure, water and ecosystems. In Barisal city the critical impacts have been identified through a series of participatory learning processes which were collaborated with existing secondary data and baseline studies. Main consequences are saline water intrusion, loss of assets and infrastructure, health impacts – increased morbidity, water supply contaminated, sanitation and drainage systems disrupted, increasing siltation in the canals, river bank encroachment, livelihood change and biodiversity loss. Poor people of Barisal city live in low lying, flood prone riverside areas and they are most vulnerable to disasters related to climate change. Challenges to next steps are resilience city planning, mainstreaming climate smart strategies in city development programs, continued and effective coordination and collaboration with all stakeholders in resilience and adaptation and financing for resilience program adaptation.

Keywords:

Barisal City, Climate Change, Flood Cyclone, Resilience Strategy, Urban Vulnerability

1 City Profile

Barisal, formerly known as "Venice of the East", stands on the banks of the Kirtankhola. Situated at a distance of 180 Km south of capital city Dhaka, it is one of the divisional headquarters of Bangladesh. The city is located 22.48^0 North and 90.30^0 East and about 1.8 Meter above the mean sea level. Spread over an area of 58 Square Km, it is inhabited by approximately 328,278 residents. The Barisal Municipality was established in 1957 and was turned into a City Corporation in 2000. Barisal city is one of the biggest river ports in Bangladesh. Owing to its proximity to the Bay of Bengal, the city experiences an average temperature of 30^0C with highest and lowest temperatures varying from 36^0C & 26^0C. The city records an annual average rainfall of 203 mm. Natural disaster: cyclone, floods, and draughts. Population living in slums is 80,000. Population density is 1015 per sq. km. Employment rate 35%. Employment distribution: 70% male and 30% female. Nature of occupation: government service, non –government service, private service, industrial labour, construction labour, skilled and non skilled daily labour. Literacy rate: 75%. Population growth rate: 3.5%

2 Methodology

The methodology adopted for this assessment builds on several years of ICLEI's international experience in climate change adaptation work. It specifically draws on the urban vulnerability component of the ICLEI ACCCRN Process, a toolkit developed with support from Asian Cities Climate Change Resilience Network program, by ICLEI South Asia in partnership with ICLEI Oceania. A participatory approach that includes all key stakeholders and builds on past or ongoing relevant work in the city, as well as draws on existing data sources was adopted in view of the limited timeframe of this study (5 months). A stakeholder consultation methodology referred to as Shared Learning Dialogues (SLDs) was adopted to engage not only various departments within the city government but also other local stakeholders. SLDs facilitate multi dimensional information sharing with everyone contributing information and experiences, and everyone learning from the exchanges as well. It helps to break down traditional boundaries between government, academic and community actors and to conduct the process in an open manner. Finally, the process is iterative, with several opportunities for members to meet and take their thinking to the next level. Specific tools developed as part of the ICLEI ACCCRN Process were used to facilitate discussions and information sharing at the SLDs. Further, face-to-face interviews were also undertaken with some key stakeholders to assess ongoing programs and data availability.

3 Climate Scenario of Barisal

In order to better understanding the climate change vulnerabilities of Barisal a backward-looking and a forward-looking approach was adopted. The former examined significant past natural hazards, and the latter focused on existing climate projections for the city or region. In both cases, a consultative process through shared learning dialogues was also undertaken to further validate the results. This data has been

mutually agreed upon by the key stakeholders (these include city government officials from various departments) of the city.

3.1 Past climatic trends

In order to assess the past climatic trends a two-pronged approach was adopted. In the first, through discussions amongst themselves the stakeholders agreed upon which of the four general impacts of climate change - i.e. change in precipitation; change in temperature; change in frequency and/or intensity of extreme events; and sea level rise – had been observed in the city. The next step was to develop a timeline of past hazards to document these events and the impacts that these had on the various urban sectors. These approaches were adopted since there is no documentation of natural hazards for Barisal city.

Perceived climate change impacts: Discussions on the past observed changes in climatic trends led to the following results:

- **Change in temperature:** There has been a decrease in the number of cold days in winter and higher temperatures in summer
- **Change in precipitation:** Overall decrease in rainfall but, there has been an increase in short duration, high intensity rainfall events
- **Change in extreme events:** No significant change in the frequency and/or intensity of extreme events (cyclones) were observed
- **Sea level rise:** No significant impact observed

Long term weather data for the city was not available to cross-check these perceptions. Therefore, based on these collective perceptions, changes in temperature and precipitation were the main observed impacts. Flooding attributed to rainfall and cyclones events was the main cause of concern in the city. Though no significant changes in cyclones or impacts of sea level rise were reported, both of these are areas that require further investigation.

3.2 Timeline for past hazards

A participatory timeline learning exercise was undertaken to understand and document past climatic events and their impacts. The stakeholders were encouraged to agree amongst themselves and list the events and the year occurrence starting from the most recent event to previous ones, recalling events in the past 25 years. These are depicted in the timeline figure below: Fig-1. As can be seen, cyclones and flooding are the main natural hazards in the city. As mentioned above, flooding occurs due to both due to regular precipitation as well as precipitation during cyclone events.

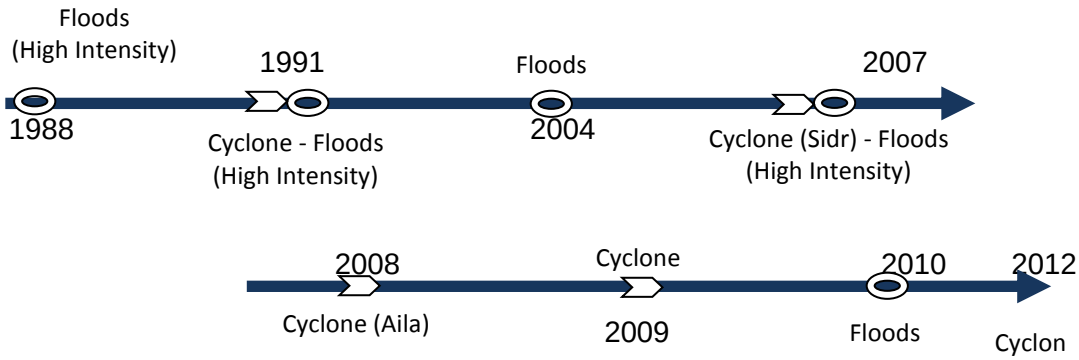

Figure 1: Hazard timeline for Barisal

Flooding is clearly an event that enhances the vulnerability of Barisal city. This point is further validated in the climate projection for the area, which is discussed below. With regards to cyclone events, even

though the perception is that Barisal has always been located in a cyclone prone area and that there has been no significant change in frequency or intensity of these events, the above timeline indicates that in a period of 5 years i.e. 2007 to 2012 there have been 3 high intensity cyclones, while in the past almost 20 years, i.e. 1998 to 2006 only one high intensity cyclone event has been reported (in 1991). This seems to indicate an increase in the frequency of high intensity cyclone events, but not conclusively so. Further, investigation is therefore required.

4 Vulnerability Assessment of the City

The critical impacts have been identified through a series of participatory learning processes which were collaborated with existing secondary data and baseline studies, where available. During the first Shared Learning Dialogue process, a time line exercise was carried out and the consequences of those climatic hazards were also chalked out. Subsequently, attempts were made to substantiate these impacts with the available data and studies.

Saline Water Intrusion: Is perceived as one of the impacts of natural hazards in Barisal city by the majority of stakeholders with urban agriculture and fisheries being directly impacted. However, the Bangladesh Climate Change Action Plan affirms the absence of any Saline Water intrusion problem even with a sea level rise up to 88 cm. A similar point was also made by the Department of Environment, Barisal. This issue clearly requires further investigation.

Loss of assets and infrastructure: Barisal city has experienced three major cyclones and corresponding flood events in three consecutive years i.e. 2008, 2009, and 2010 respectively. These have resulted in significant infrastructural and asset losses. Supporting data on losses is not available.

Health impacts – increased morbidity: According to the stakeholder's perception morbidity has increased in the city because of natural hazards. Most of the diseases in the city are mainly viral such as - diarrhorea, tuberculosis, gastric ulcer, gastritis, skin diseases etc. which are caused by frequent water logging and improper sanitation. Apart from this, the recorded data shared by the corporation attests the people's perception since 50-100 deaths have been recorded from calamities/ extreme climate events/ disasters per annum.

Water supply contaminated: In Barisal city, hand pumps and tube wells are the main source for drinking water. During the major floods most of the hand pumps and tube wells get submerged and the stagnation of water and improper sanitation systems result in the contamination of groundwater.

Sanitation and drainage systems disrupted: It has been estimated that 24.36% of total population lives in slum and out of that almost 20% have been identified as the most vulnerable group. Most of these slums have been established alongside the canals which are vulnerable to flooding. Pit latrines enclosed using temporary material (thatch, plastic) are most commonly used in these slums. During cyclone and flooding events these toilets either get destroyed or submerged. This leads to sanitation problems in these areas as well as the contamination of groundwater. The drainage system in the city is open and depends largely on natural drainage through the existing canals. Poor maintenance of these constructed drains and natural canals being converted to other land uses are only further exacerbating the flooding and sanitation problems in the city.

Heightened threat situation (fear of embankment breach): During extreme events there is always the potential threat of a breach of the embankment that protects the city. Though there is no data on such events in the past, under increased flooding scenarios this threat could become much more significant.

In-migration: There is a growing number of people migrating into the city from surrounding rural areas. Reasons for this were only speculated upon with anticipated improved livelihood opportunities being the obvious one. According to the city corporation every year approximately 8000 migrate in to the city (around 2000 people migrate out). These people settle down alongside the natural canals in un-notified slums, which as mentioned above are areas that are very vulnerable to flooding.

Increasing siltation in the canals: Decrease in rainfall and increased flooding has led to the deposition of silt in most of the natural canals in the city. This affects the availability of fish in the area as well as water available to households (mostly slums) residing along these canals. There is no data currently available on the rate of the silt deposition but there was consensus among all the stakeholders on this issue.

River bank encroachment: Informal settlements (resulting from in-migration) in the city have sprung up alongside either the river or canal banks. This encroachment is leading to blockages in the natural drainage systems, and problems with sanitation.

Livelihood Change: Climatic hazards are discouraging people from remaining associated with traditional professions such as fishing and farming. This is leading to changes in livelihood patterns and portfolios. This is an area that needs to be investigated further.

Biodiversity loss: Based on the stakeholders' perception increasing climatic hazards has been adversely affecting the biodiversity of the city. However, there is no observed data or study justifying the same.

5 Summary

Asia is arguably among the regions of the world most vulnerable to climate change. Climate change and climatic variability have impacted and will continue to impact all sectors, from national and economic security to human health, food production, infrastructure, water availability and ecosystems. The evidence of climate change in Asia is widespread: overall temperatures have risen from 1°C to 3°C over the last 100 years, precipitation patterns have changed, the number and intensity of extreme weather events is increasing, and sea levels are rising. Asia is also witnessing a relentless spread of human settlements in low lying, flood prone coastal zones against the growing risk of disasters related to climate change. It is in particular the urban poor living in hazardous areas, who are vulnerable to climate change impacts, with the most vulnerable being women, children and the elderly.

Cities as centres of economic activities cater to half of the world's population – and this share is growing. Not only as centers of growth but also as major consumers of resources, urban areas are one of the major emitters of greenhouse gases. On the other hand, these global emissions are leading to climate change and variability causing adverse impacts at the local level in terms of disruptions and damages to physical, social, economic, and environmental systems. Cities are therefore both the cause and the victims of climate change impacts.

Local governments are responsible for the decisions and actions that determine the provisioning of services to its citizens. One of the most direct influences that local governments have on the poor is their provision of water, sanitation, drainage, solid waste collection, public health and housing construction and improvement. However, increasing demands of growing urban populations are stretching the limits of urban infrastructure and systems, and thereby the provisioning of these basic services with detrimental impacts on the well being local communities, especially the poor. Further, climate change impacts such as higher frequency and intensity precipitation, floods, drought or heat stress can disrupt the infrastructure and systems in place for ensuring the provision of such services or even make them dysfunctional. For example, unexpected heat stresses can take unprepared citizens by surprise and overwhelm public health systems. Similarly, floods can substantially damage the infrastructure of cities and disrupt the provision of basic services such as freshwater, thereby triggering increased morbidity in several cases. These climate events therefore increase the vulnerability of a city's population especially that of low-income groups, the elderly, the sick and disabled, and children. To fully and effectively face these threats requires an improved understanding of the vulnerabilities to climate change – who or what is vulnerable to what and why. Important decisions with regard to resource allocation, infrastructural design, and systems for provisioning of services need to be made appropriately.

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Acknowledgements

This contribution is based on result of the short term project "Urban Vulnerability Assessment of Barisal City". The Project was funded by German Development Cooperation (GIZ) and implemented by ICLEI-South Asia.

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