BANGLADESH COUNTRY REPORT

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This desk review of evidence on ecosystem services and resilience in urbanizing contexts in Bangladesh supports a scoping study being carried out by a Working Group co-created by ESPA (Ecosystems Services for Poverty Alleviation Directorate) and ACCCRN (Asian Cities, Climate Change Resilience Network). It contributes by investigating the evidence base in the Bangladesh context for understanding of the threats and opportunities urban systems face and pose through ecosystem services and dis/services, and identification of related information supply and demand needed to address as part of building inclusive urban resilience in varying governance contexts across Asia.

SUMMARY

As one of the most vulnerable countries to climate change, Bangladesh was ranked the 6th most natural disaster prone country by the World Bank in 2015 while being the most adversely affected by floods. According to the National Plan for Disaster Management of the Government of Bangladesh, the country faces a variety of natural, geological and human induced hazards including floods, cyclones, droughts, tidal surges, tornadoes, river erosion, high arsenic ground water, water logging, water and soil salinity, fire, infrastructure collapse, pollution as well as earthquakes.

Urbanisation will play a major factor in Bangladesh over the next few decades since the population itself as well as rural-urban migration are most likely to continue to increase. This becomes problematic due to fast and unplanned urban developments to facilitate the rapidly increasing demand for housing and basic services which are, however, often inefficient or non-existent. This rapid growth also harms essential natural resources, particularly water bodies, wetlands and peri-urban farmlands which provide vital ecosystem services as well as disservices since wetlands are common settlement areas despite being much more prone to floods.

Though there are many policies addressing climate change adaptation, there needs to be more focus on urban contexts as well as understanding of the benefits of ecosystems so they are more likely to be incorporated into existing policies.

The urban / ecosystem nexus in Bangladesh is nascent and requires support. Yet opportunities for research to be mainstreamed and impactful exist among a plethora of donor initiatives focused on climate change and adaptation, donor partners, programmes and projects. For example, DFID focuses on poverty reduction concerning how urban activities can help the poor citizens achieve better living standards in slums that are climatically vulnerable. DFID wants increased capacity building, coordination between stakeholders, careful budgeting and expenditure on project implementation. It recognizes that there is a need for a systematic infrastructure of cities' overall development and donor co-ordination is important for getting the most favourable output.

The press is used by NGOs, universities and advocacy organisations to present easily understood evidence to advocate for better practices than those currently promoted by the government.

Background

As one of the most vulnerable countries to climate change, Bangladesh was ranked the 6th most natural disaster prone country by the World Bank in 2015 while being the most adversely affected by floods. According to the National Plan for Disaster Management of the Government of Bangladesh, the country faces a variety of natural, geological and human induced hazards including floods, cyclones, droughts, tidal surges, tornadoes, river erosion, high arsenic ground water, water logging, water and soil salinity, fire, infrastructure collapse, pollution as well as earthquakes. Yet, while climate change impacts can be felt in the whole country, they are likely to disproportionally affect societies of different geographical and socio-demographic backgrounds. It is therefore argued that climate change consequences may disturb mainly those who are already most vulnerable to other external stresses, such as people living in coastal areas, near river beds and increasingly also people living in urban areas, particularly in informal settlements. This is due to increasing climate change impacts as well as rapid and unplanned urbanisation that is mainly based on short-term goals and may therefore increase the loss and damage caused by future climate stresses. This review will address the urban context in Bangladesh with a focus on Dhaka city, outline the climate change stresses in urban contexts and critically assess existing policies and initiatives with further recommendations.

Urbanization Trends

It has been well documented that Bangladesh is one of the most vulnerable countries to the impacts of climate change due to its geographical Delta location and monsoon climate while at the same time facing increasing population pressure, particularly within urban centres. Bangladesh is the world's seventh most populated country and one of the densest populated countries with approx. 164 million people on a landmass the size of New York State [1]. It is estimated that the population growth is unlikely to reach its peak before 2060 when the population is predicted to be approx. 230 million, with more than 70% of the population living in urban areas [2]. While in 1960 slightly more than 5% of the population lived in the urban areas there has been a consistent increase to 35% in 2015 [3].

Nearly 50% of the national urban population is concentrated within four metropolitan cities: Dhaka, Chittagong, Khulna and Rajshahi [4]. Urbanisation will play a major factor in Bangladesh over the next few decades since the population itself as well as rural-urban migration are most likely to continue to increase. This becomes problematic due to fast and unplanned urban developments to facilitate the rapidly increasing demand for housing and basic services which are, however, often inefficient or non-existent. This rapid growth also harms essential natural resources, particularly water bodies, wetlands

and peri-urban farmlands which provide vital ecosystem services as well as disservices since wetlands are common settlement areas despite being much more prone to floods. As mentioned, climate change impacts are likely to disproportionally affect societies of different geographical and socio-demographic backgrounds, particularly affecting poor people who live in informal urban settlements [5]. Although the poverty rate declined from 57 percent to 25 percent between 1990 and 2014, the impacts of climate change and migration may overwhelm this progress [6]. A census conducted in 2005 indicated that 5.4 million urban poor of the six major cities in Bangladesh lived in slums situated on only 4% of the land area of those cities; among them 3.4 million – or 63% – lived in Dhaka alone [7]. Moreover, between 1996 and 2005, not only did the total population living in these settlements more than double (from 1.5 to 3.4 million) in Dhaka; but also the proportion of urban poor increased from 20 to 37% of the total population [8], which brings Dhaka into the focus of this review.

Dhaka

With currently around 16 million residents Dhaka has been the second fastest growing megacity in the world between 1975 and 2007 with an average annual growth of 5.65% [4]. Most importantly, however, "around 40% of the population of Dhaka live in informal settlements where they draw their livelihoods from industries (e.g. garments, textiles, leather etc.), the transport sector, shopping centres, hotels and restaurants, food markets, the construction sector and as domestic workers" [9]. The lack of functioning ecosystems combined with the adverse impacts of climate change are particularly felt by slum dwellers since they often live in wetlands or former wetlands; are unable to access basic services (e.g. clean water, sanitation); lack hazard-reducing infrastructures (e.g. drainage systems, roads allowing emergency vehicle access); have less adaptive capacity (e.g. the ability to move to better quality housing or less dangerous sites); less state provision for assistance in the event of a disaster (e.g. state action may increase exposure to hazards by limiting access to safe sites for housing); less legal and financial protection (e.g. a lack of legal tenure for housing sites, lack of assets and insurance); deficient information, communication and knowledge (e.g. where to move and when); and absence of institutional and community organization [10, 11] and are at the same time the first ones hit by climate change impacts such as increasing heat and floods [7].

Furthermore, an estimated 300,000 to 400,000 poor migrants arrive in the capital city annually from all over the country due to better economic opportunities, education and health-care facilities and better living conditions [12]. Yet, land use planning regulations, and public service delivery in the urban areas of Bangladesh have failed to keep up with the pace of growth. Dhaka has experienced a property boom in recent decades without any concern for available infrastructure. Moreover, some real-estate developers have encroached on the natural depressions and waterways beyond the jurisdictions of the city development authorities. The combined effect of unequal development and

management of the utility services, and improper management of the natural resources and natural hazards have degraded the overall environment of the city [13]. Because of high demand and land speculation, the urban poor of Dhaka are left with no other choice but to live in the very areas in which they will be most vulnerable. Similarly, urban development strategies and plans in Dhaka conceive the urban poor as 'illegal' in the city and hence marginalise them in accessing housing and infrastructure. Most of the informal settlements are either squats in public land or constructed in private land by intermediaries who have implicit agreements with the land-owners. Therefore, without any legal address they are commonly denied basic rights and entitlements, including the right to access water, sanitation, healthcare services, and education (Rashid 2009). Climate-induced hazards tend to increase in scale in the absence of access to housing, infrastructure and services.

Urban Hazard Profile

According to the National Plan for Disaster Management of the Government of Bangladesh the country faces a variety of natural, geological and human induced hazards including floods, cyclones, droughts, tidal surges, tornadoes, river erosion, high arsenic ground water, water logging, water and soil salinity, fire, infrastructure collapse, pollution as well as, increasingly, earthquakes [6]. While fires, floods, earthquakes and infrastructure collapses more frequently occur in Dhaka, Chittagong and Sylhet, landslides are also highly relevant in Chittagong and Sylhet. This is due to development factors but also because of Bangladesh's location at the Indian-Eurasian tectonic plate boundary and at the head of the Bay of Bengal, astride the largest river delta on Earth, formed by the junction of the Brahmaputra, Ganges, and Meghna rivers. Nearly one-quarter of Bangladesh is less than seven feet about sea level and two-thirds of the country is less than 15 feet above sea level which makes Bangladesh and its cities very vulnerable to sea level rise and floods [1]. At the same time, melting of glaciers and snowpack in the Himalayas, which hold the third largest body of snow on Earth, has swollen the rivers that flow into Bangladesh from Tibet, Nepal, Bhutan, and India. So too have India's water policies. India diverts large quantities of water for irrigation during the dry season and releases most water during the monsoon season. Furthermore, more deforestation in the South is leading to less protection from the sea and thus, increasing floods and cyclones. Hence, there are natural as well as human induced reasons for increasingly more intense, frequent and irregular floods and cyclones in Bangladesh.

A study [7] conducted in two informal settlements in Dhaka which showed that most people have noticed and were concerned about increased heat and rainfall in shorter periods over the last decades. Contrary, flash flooding and air pollution were less of a concern to slum dwellers.

In the Korail slum respondents reported damage of home (86%) and damage of infrastructure (76%) as the most dominant impacts of any natural hazards [7]. In Mohammadpur beribadh, damage to access facilities was the most dominant impact (80%) with damage of home (76%) second most important (ibid). Most of the respondents reported some form of loss of household assets during any hazardous events. However, only 20% in both areas reported displacement as an impact; people tend not to move from their houses during disasters due either to an inability to move or to fear of losing possession of their house and other assets. A considerable proportion of the respondents reported loss of working days as a direct impact of natural hazards (60% in Korail and 72% in Mohammadpur beribadh). It is important to point out that loss of livelihood and business capital was a more prevalent response in Mohammadpur beribadh, where more people work as day labourers or street vendors, capitalising on human assets to earn. These impacts are, however, disproportionally distributed between the urban poor due to social and cultural factors. Some of the most vulnerable groups include women, people with disabilities, elderly and children.

Natural, Climate and Human Induced Events

EARTHQUAKES

Moderate to large magnitude earthquakes are common in this region and will continue to occur as long as the tectonic deformation continues. Some of these earthquakes generated severe ground motion causing serious damage to buildings and infrastructures. In the last 250 years, Bangladesh has suffered from several large earthquakes, such as the 1762 Arakan earthquake, the 1869 Cacher earthquake, the 1885 Bengal earthquake, the 1897 Great Assam earthquake, the 1918 Srimangal earthquake, 1930 Dhibri earthquake and 1950 Assam earthquake [6]. The 1885 Bengal earthquake and 1918 Srimangal earthquake had their epicentres inside the country. Several active faults exist within the Chittagong-Tripura fold Belt and the Madhupur blind fault on the western margin of the Madhupur tract. The last one happened on the 3rd January 2017 of 5.5 magnitudes, origin was in the state of Tripura of India and shaked Dhaka and other major cities.

Keeping in mind that a single building (Rana Plaza) killed 1,136 people and the rescue of the wounded people took 24 days in 2013 [14], better planning and actions are required.

CYCLONES

Occurrence	Disaster	Impacts

November 1970	Cyclone Bhola	More than 500,000 people killed
April 1991	Cyclone Gorkie	More than 138,000 people killed, 10 million homeless
November 2007	Cyclone Sidr	3,406 people killed, large scale economic devastation
May 2009	Cyclone Aila	190 people killed, 1 million people homeless and economic devastation

Storm surges from more frequent and stronger cyclones are likely to push walls of water 50 to 60 miles up the Delta's rivers, affecting Dhaka city among other areas [1].

Floods

A multitude of factors contributed to floods in Dhaka city, including overflow of surrounding rivers (Turag, Burigonga, Sitolakhya and Balu), excessive rainfall, drainage congestion, and inadequate pumping facilities [15]. Illegal occupation of drainage canals and wetlands by land grabbers has further contributed to the water logging, congestion and sufferings of the city dwellers. 19.2% of Dhaka is based in a very high hazard zone [16], with higher exposure to floods in areas with lower elevation. Until 1990s most part of Dhaka city in the peripheries was flooded and the most severe floods in the recent decades are floods of 1987, 1988, 2004 and 2007.

It is estimated that a three-foot rise in sea level would submerge almost 20 percent of the country and displace more than 30 million people. Some scientists project a five-to-six foot rise by 2100, which would displace perhaps 50 million people [1].

Droughts

It is predicted that in a low crop productivity scenario due to droughts, Bangladesh would experience a net increase in poverty of 15% by 2030 [1].

Overview of Urban Land Use Planning Institutions

The disaster management and disaster management in urban areas involve a wide range of agencies and stakeholders including general community, people living in the vulnerable areas and the slum dwellers at the primary level; in the secondary level there are City Corporations (including the zone and ward), Urban Development Directorate (UDD), Rajdhani Unnayan Kortripokko (Rajuk), Fire Service and Civil Defense, Bureaucracy,

Community Based Organization/local NGOs etc.) and national level government agencies, National and International NGOs, Universities, Research Organizations, Development Partners/Donors at the at tertiary level [6].

Ecosystem dis-/services are mentioned in several policies by a variety of governmental bodies. Although there are about 35 ministries that are involved in climate change debates [17], but the most active players in this thematic area are the Ministry of Environment and Forest, particularly the Department of Environment, the Ministry of Food and Disaster Management, the Local Government Engineering Department and the Urban Development Directorate (UDD) whose activities will be addressed briefly.

Ministry of Environment and Forest, Department of Environment
The **Bangladesh Environment Conservation Act 1995** and **Environment Conservation Amendment Act 2010** aim to conserve the natural biodiversity of environmentally susceptible areas and rivers. However, these are threatened by controversial activities such as coal-fired power stations in ECAs near Khulna which shows that economic benefits outweigh natural benefits and these guidelines can be and have been overruled and powerless. Thus, they hardly address the issue of ecosystem degradation and the necessity of ecosystem services while actions or compensations are completely neglected. Furthermore, urban contexts are not specifically addressed and procedures for the protection of the environment and ecosystems are not specified.

The **National Adaptation Programme of Action** 2005 (NAPA) is the major policy document in terms of adaptation strategies in Bangladesh. While it recognises the necessity of water and forest ecosystems as well as their biodiversity, there is no focus on urban development and solutions in order to tackle the threat imposed by climate change and urbanisation [18]. The main focus is put on infrastructures in urban contexts although this lacks consideration of ecosystem benefits and conservation.

Although the **Bangladesh Climate Change Strategy and Action Plan** 2009 focuses mainly on rural areas, it mentions the necessity to improve urban planning in terms of flood protection and drainage systems as well as to monitor and research the climate change impacts on ecosystems and biodiversity. Yet, it addresses mainly the impacts of climate change rather than required actions or the process of translating policies into practice.

The **Dhaka Structure Plan** 2016-2035 is the only policy plan that stresses the need of ecosystems in urban contexts in Bangladesh, particularly wetlands within Dhaka. Although the assessment carried out by the ADB may not be thorough, it provides some critical thoughts about existing policies and actions as well as ways forward. Ecosystem services are mentioned as an important pillar for the functionality of Dhaka. However, the

assessment showed that there is a high burden on RAJUK which have worked rather ineffectively, focused on short-term rather than long-term goals/benefits and have still not specified their actions. Since RAJUK activities spread over 1528 sq.kms it currently must deal with too many responsibilities and tasks and thus, need further support [6].

There are also no effective policies to reclaim land or prevent 'land grabbing', no effective monitoring and evaluating measures for conducted activities as well as no engagement with other stakeholders. This lack of dialogue creates high inefficiency and inactivity due to overlapping functions among different organizations. For example both RAJUK and City Corporations are developing plans for their respective areas and both DCC and Dhaka WASA provide water supply to the Dhaka metropolis. At the same time multiple bodies working under different line ministries make it difficult to coordinate with each other, resulting in inefficiency, delay in work completion and mismanagement of resources. There are also limited scopes for the community to get involved in the preparation process of the Strategic Plan for Dhaka.

While also the DoE plays a role in infrastructure development, its main focus lies in improving transportation and clean air due to better transport systems while the ecosystem dis-/services are not mentioned. Yet, this is a good starting point to further increase their influence on infrastructure projects within Bangladesh and particularly cities. However, due to greater urban infrastructure needs the Local Government Engineering Department (LGED) is not only involved in rural infrastructure projects, but takes increasingly part in the planning and implementation of such in urban contexts.

The **Strategic Transport Plan for Dhaka** 2005-2035 states clearly the consideration of environmental factors within infrastructure projects. The focus has been mainly on noise and emission control with its biggest achievement on the introduction of the mandatory use of CNG fuel for 'baby taxis' which plays a significantly role in improving the air quality within Dhaka city.

Ministry of Food and Disaster Management

According to the **National Plan for Disaster Management** 2010-2015, necessary infrastructures need to be in place and well maintained [19]. This includes access to housing, safe water and sanitation while specifically urban drainage is highlighted as a necessity for dealing with the increasing impacts of climate change. Contrary, while the **Standing Order on Disasters (SOD)** mentions the plantation of trees for the benefits of cleaner air and more shade, it does not specify on urban contexts [19].

Information Demand

Dhaka still ranked as one of the most polluted cities in the world, there is also no clear guidance on construction, rule enforcement for commercial and residential infrastructures or environmental impact assessments in place. Furthermore, there is a lack of integration between land use planning and transportation planning which results in uncontrolled and unplanned development, noncompliance and a poor mix of land uses that is leading to inefficiencies in the transportation system. Thus, the lack of such adequate and well planned environment-related provisions creates adverse effects on the environment. Moreover, while there has been a focus on emissions and noise reduction, there needs to be more emphasis on green space, land regulations and more linkages between the transport and land use plans.

In consideration of disaster management and urban resilience, officials of city corporations feel other priorities are more important. They lack capacity, knowledge and skill to deal with disaster management and urban resilience. As an agenda 'Urban Resilience' is new to the City Corporations and hence they require adequate training and facilitation supports to improve their capacity at level from where they can take off and implement, carry over programmes and activities. The roles and responsibilities of the ward level DMCs have been communicated by the City Corporations recently. The DMCs are lagging and need motivation to update and equip them so that they are able take appropriate action. Most policy documents lack (detailed information on ecosystem dis-/services in urban contexts, on procedures, funding, timeframes, circumstances and responsible actors. The major policy initiatives remain inefficient in their addressing of urban issues, especially vulnerabilities of the urban poor. Although the latter recognised that with rapid and unplanned urbanisation in Bangladesh the vulnerabilities of the urban poor will become an even more urgent and pressing problem, the strategy did not spell out any specific activities to address the problem [17]. There is also a considerable lack of collaboration between stakeholders which leads to more inefficiency and unnecessary resource use.

Conclusion

Though there are many policies addressing climate change adaptation, there needs to be more focus on urban contexts as well as understanding of the benefits of ecosystems so they are more likely to be incorporated into existing policies.

There needs to be more support and inclusion of the most vulnerable people within affected communities in policy development to understand their needs and find efficient, effective and appropriate long-term solutions which consider economic as well as social and cultural factors.

Much urban development is unplanned leading to poor and improper use of land, exacerbated by high rates of in-migration that are not accounted for in planning. The implementation of policies for vulnerable communities is ineffective because of a lack of resources allocated towards law enforcement, codes and regulations. Established policies focus more on disaster response than prevention.

Yet opportunities for research to be mainstreamed and impactful exist among a plethora of donor initiatives focused on climate change and adaptation, donor partners, programmes and projects. For example, DFID focuses on poverty reduction concerning how urban activities can help the poor citizen achieve better living standards in slums that are climatically vulnerable. DFID wants increased capacity building, coordination between stakeholders, careful budgeting and expenditure on project implementation. It recognizes that there is a need for a systematic infrastructure of cities' overall development and donor co-ordination is important for getting the most favourable output.

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REFERENCES

1. Glennon, R., *The Unfolding Tragedy of Climate Change in Bangladesh*. 2017: Scientific Americal.
2. BBS, *Population Projection of Bangladesh: Dynamics and Trends 2011-2061*. 2015, Bangladesh Bureau of Statistics (BBS), Statistics and Informatics Division (SID), Ministry of Planning Government of the People's Republic of Bangladesh: Dhaka, Bangladesh.
3. World Bank. *Urban Population (% of total): Bangladesh*. 2017; Available from: http://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?end=2015&locations=BD&page=3&start=1960&view=chart.
4. UNEP, *Building Urban Resilience: Assessing Urban and Peri-urban Agriculture in Dhaka*. 2015, UNEP: Dhaka, Bangladesh.
5. Baker, J.L., *Climate change, disaster risk, and the urban poor: cities building resilience for a changing world*. 2012: World Bank Publications.
6. Save the Children, *Needs Assessment on Urban Resilience*. 2017, Save the Children: Dhaka, Bangladesh.
7. Jabeen, H. and C. Johnson, *Perceptions of climate variability and coping strategies in informal settlements in Dhaka, Bangladesh*, in *Cities at risk*. 2013, Springer. p. 149-170.
8. Islam, N., et al., *Slums of urban Bangladesh: mapping and census 2005*. 2006.
9. Yasmin, S., *Climate Change Effect in Physical and Natural Capital: A Study on Urban Poor in Dhaka City of Bangladesh'*. Journal of Geography and Natural Disasters, 2016. **6**(2).
10. Cardona, O.D., *The need for rethinking the concepts of vulnerability and risk from a holistic perspective: a necessary review and criticism for effective risk management*. Mapping vulnerability: Disasters, development and people, 2004. **17**.
11. Dodman, D. and D. Satterthwaite, *Institutional capacity, climate change adaptation and the urban poor*. IDS Bulletin, 2008. **39**(4): p. 67-74.
12. Baker, J.L., *Dhaka: Improving living conditions for the urban poor*. 2007.
13. Rabbani, G., A.A. Rahman, and N. Islam, *Climate change implications for Dhaka City: A need for immediate measures to reduce vulnerability*, in *Resilient cities*. 2011, Springer. p. 531-541.
14. Reuters, *Rana Plaza collapse: 38 charged with murder over garment factory disaster*, in *Guardian*. 2016: London, UK.
15. Alam, M. and M.G. Rabbani, *Vulnerabilities and responses to climate change for Dhaka*. Environment and urbanization, 2007. **19**(1): p. 81-97.

16. Dewan, A.M., T. Kumamoto, and M. Nishigaki, *Flood hazard delineation in greater Dhaka, Bangladesh using an integrated GIS and remote sensing approach.* Geocarto International, 2006. **21**(2): p. 33-38.
17. MoEF, *Bangladesh Climate Change Strategy and Action Plan (BCCCSAP) 2008*. 2008, Ministry of Environment and Forests, Government of the People's Republic of Bangladesh Dhaka, Bangladesh.
18. MoEF, *National Adaptation Programme of Action (NAPA) 2005*. 2005, Ministry of Environment and Forests, Government of the People's Republic of Bangladesh Dhaka, Bangladesh.
19. MoDRM, *National Plan for Disaster Management*. 2010, Ministry of Disaster and Relief Management, Government of the People's Republic of Bangladesh Dhaka, Bangladesh.