



ENVISIONING THE CLIMATE CHANGE RESILIENT CITIES IN BANGLADESH USING FORESIGHT APPROACH

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Abstract:

Since the climate change significantly alter the city dynamics, governance for urban sustainability and resilience is crucial for strategic decision making. The objective of this research is to identify the factors affecting the functional systems of vulnerable cities and find ways of achieving urban resilience in intermediate cities of Bangladesh as climate change mitigation strategy. The research methodology adopts a systematic and foresight approach that conceptualizes the city as functional system, investigates the impact of climate change, incorporates foresight tools to envision the future of cities, fleshing out the vision's implication on the functional system and lastly involving experts and stakeholders to formulate strategy. The study shows that climate refugees create huge urban demand but centralized and poor urban governance fails to support and provide services to these people leading to social discrimination and political unrests. The foresight exercise involves experts and stakeholders, whose feedback constructs the probable future scenarios, determine the implications and identify ways to enhance urban resilience.

Keywords: Climate change, Resilience; Foresight approach, Intermediate cities.

1. Introduction

Over the past few centuries, there has been a shift away from small communities towards urban areas due to mass migration. Today, more than 4.3 billion people live in urban areas worldwide, according to the UN World Urbanization Prospectus. Bangladesh is experiencing rapid urbanization and has a 39.7% urban population in 2022. However, Bangladesh is considered one of the most vulnerable countries in the world to the impacts of global climate change. By 2050, it is projected that climate change will cause the displacement of 30 million people in Bangladesh, which will create significant challenges for resources, services, and infrastructure (McAdam and Saul 2010).



Figure 1. Sylhet city (one of the case study cities) inundated by the worst flood in 2022

Source of left photo- <https://www.rusard.org/appeals/bangladesh-floods-emergency/>

Source of right photo <https://www.dhakatribune.com/nation/2022/05/20/millions-in-sylhet-afflicted-by-flooding>

“Climate Resilient City” refers to urban areas that are able to quickly adapt to climate-related shocks. Sustainability and urban resilience should be a priority in urban development policies for small and medium-sized cities to mitigate the immediate effects. Governance for Urban Sustainability and Resilience is crucial for strategic decision making to respond to climate change and the relevance of the Built Environment (Jeroen Van der Heijden 2014). To deal with upcoming challenges, it is important to conceptualize the city as an evolving-functional ecosystem and take a systematic approach reinforced by foresight tools as an integral part of the planning process (Camagni, 2003; Fernandez Guell, 2006).

2. Objective

The goal of this research is to investigate the impact of climate change on the functional systems of five middle-sized cities in Bangladesh based on their location, demography, and geographical vulnerability, as well as to find a solution to achieve urban resilience in the foreseeable future through a foresight exercise.

3. Global and Intermediate cities of Bangladesh as research Context

The global climate crisis is anticipated to have extensive impact on every region of the world. Asia will be affected the most due to highest population exposure and sea level rise. According to research by Verisk Maplecroft (2015), 99 of the 100 cities are Asian which are most vulnerable to environmental risks and hazards due to climate change.

Bangladesh is the eighth most populous country in the world with a population of over 164 million and a high-density of 1116 people per square kilometer. It is also one of the most vulnerable countries to the impacts of climate change, with Germanwatch's 2021 Global Climate Risk Index ranking it as the

seventh most vulnerable nation despite contributing only 0.56% of the world's emissions. The country's low-lying active delta geography, situated on the Bay of Bengal and with an extensive network of waterways, makes it particularly susceptible to sea-level rise, cyclones, floods, droughts, and other climate-related hazards. By 2050, it is estimated that one in every seven people in Bangladesh will be displaced due to sea-level rise, which will cost 11% of its land and threaten crops and drinking water supplies with salinization. Climate change is also making rainfall more erratic, melting Himalayan glaciers, and leaving massive swaths of the country prone to devastating floods, contributing to over 10 million people being climate refugees. Around 12 million children living in and around powerful river systems in Bangladesh are among those most affected by climate change.

For the research purpose, 05 (five) cities of Bangladesh have been selected as the Intermediate cities based on their location, demography and geographical vulnerability (Fig 2) to climate change. Khulna and Barisal are located in coastal zone with elevation of 9m and 1.2 m respectively. Both cities are highly vulnerable to natural disasters like cyclones and flood. Rajshahi and Rangpur are districts subject to drought because of climate change. Sylhet is in the region highly vulnerable to heavy rainfall and flash floods.

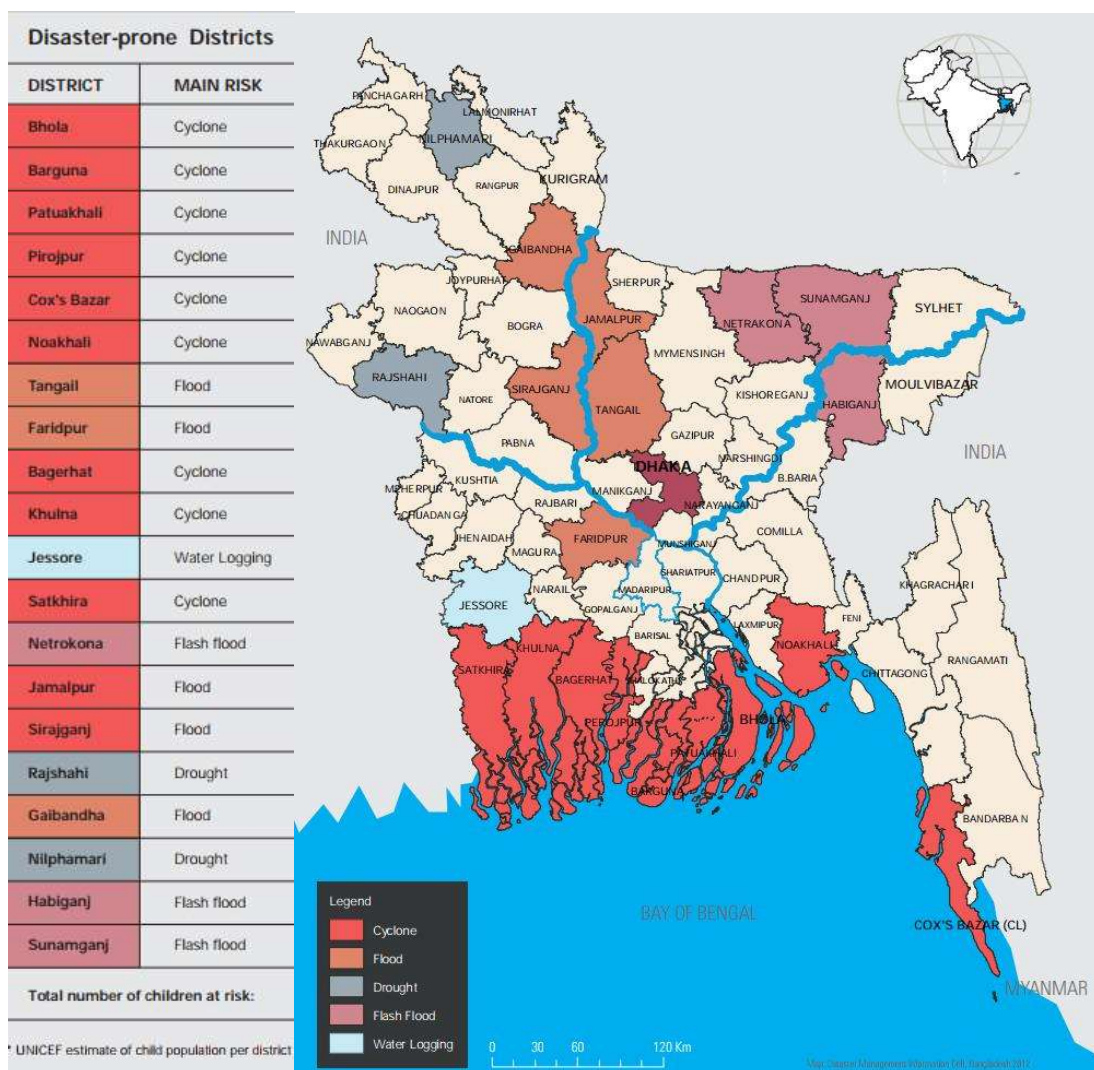


Figure 2. Disaster-prone districts in Bangladesh (Map: Disaster Management Information Cell, Bangladesh 2012)

4. Making our cities resilient for future: Key change factors

Climate resilient cities has become an urgent need and are designed to withstand the impacts of climate change in order to protect the residents and infrastructures. The consequences of climate change are not just an environmental problem for Bangladesh but also an economic and social one. In order to mitigate the impacts of climate change and ensure long term sustainability, it is essential to build climate resilient cities (ADB, 2020; Haq, 2016; Ahmed, 2019). A number of change factors are considered in building climate resilient cities, including societal, environmental, governance, economical etc. (Fig-3&4) plays a role in building cities that can adapt to the effects of climate change.

Climate change is a complex global phenomenon that requires a holistic approach through collaboration between local governments, civil society, private sectors, and the community to achieve climate resilience in cities. (UN-Habitat, 2011). Other challenges include inadequate data and information, a lack of awareness and understanding of climate risks and impacts, and institutional barriers such as conflicting mandates and regulatory frameworks (ICLEI, 2019). In recent years, the government of Bangladesh has made significant efforts to build climate resilience, such as the development of the Bangladesh Climate Change Strategy and Action Plan and the establishment of the Bangladesh Climate Change Trust Fund, supported by international organizations such as the United Nations Development Programme and the Global Facility for Disaster Reduction and Recovery (UNDP).

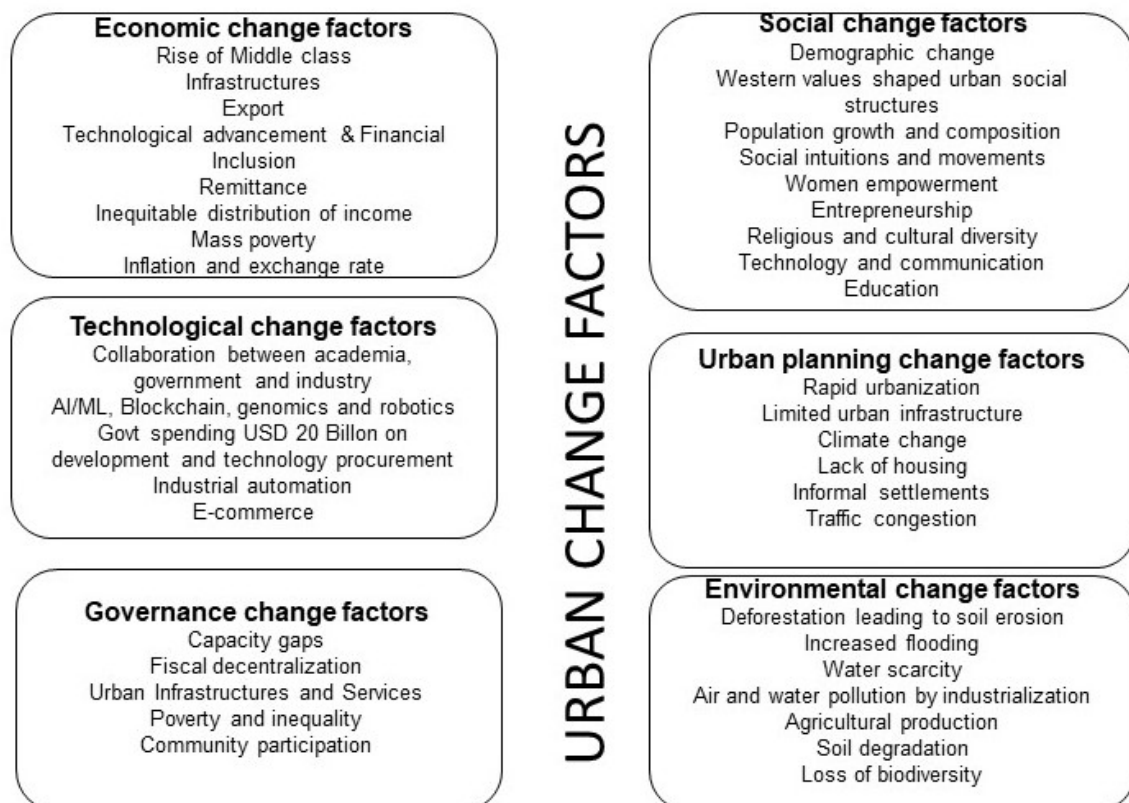


Figure 3. Urban change factors. Source: Author's elaboration (Literature Review).

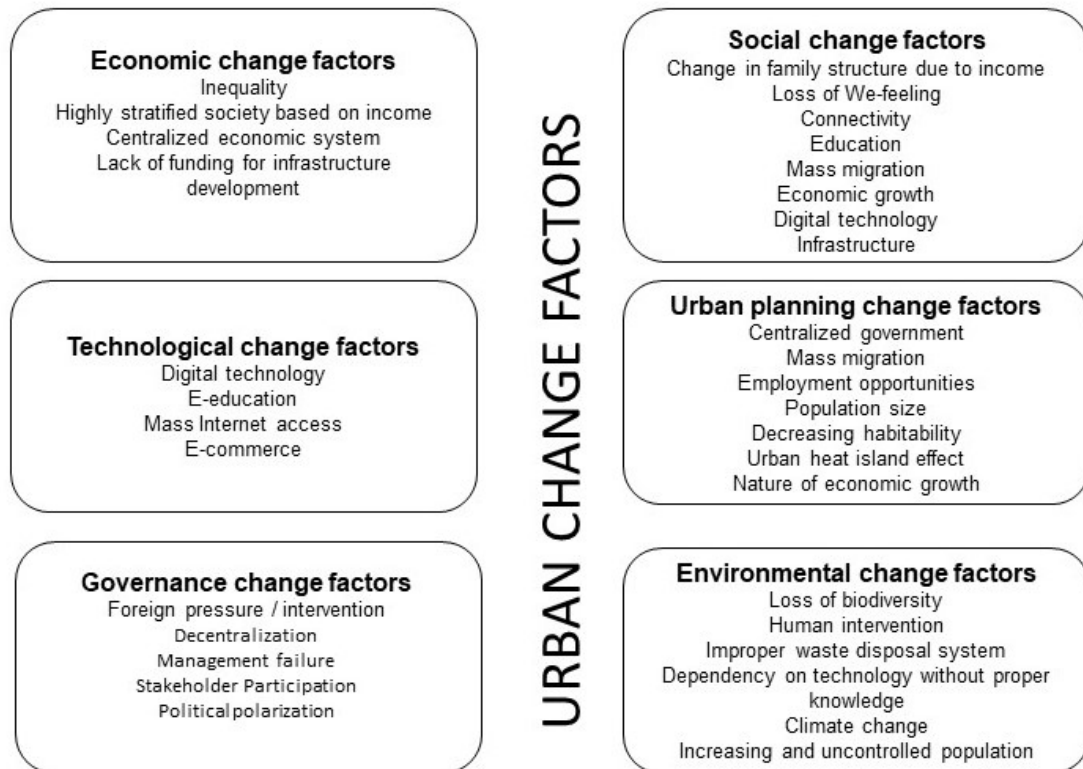


Figure 4. Urban change factors. Source: Author's elaboration (Experts Opinion).

Even though Bangladesh has many challenges to overcome, significant progress has been made over the past few decades in reducing poverty and achieving economic growth. A plan called The Vision 2041 was developed, which aims to address these challenges. This plan is built on four institutional pillars that must be leveraged by people, the primary drivers of growth and transformation. These are as follows: (i) democratization, (ii) decentralization, (iii) governance, and (iv) capacity building. It also recognizes the importance of sustainable development, including the need to protect the environment and mitigate the impacts of climate change. (GED, 2020)

5. Methodological framework

According to systems theory (Bertalanffy, 1968; Forrester, 1969; Waldrop, 1992; Kauffman, 1995), it is a very complex, dynamic, adaptive system where a large number of components interact among themselves within a relevant context. Through the self-organization, those components could generate new collective behavior and thus a complex system evolved which is not predictable in deterministic fashion.

Foresight approach can be defined as a systematic, participatory, future intelligence-gathering, and long-term vision-building process aimed at taking present-day decisions and mobilizing joint actions (FOREN, 2001; Abott, 2005). Foresight can generate insights into the dynamics of future development, visions about future affairs and shared sense of commitment to efforts leading to formulate strategies and achieve goals. The analysis of trends, assessment of possibilities and development of multiple scenarios and visions help city decision makers to plan and formulate policies.

Therefore, the methodological framework has adopted the systematic approach strengthened by foresight tools as an integral part of the planning process developed by Fernandez Guell, 2006, to deal with the three characteristics of modern cities and to understand their impending challenges. It will eventually assist the planners and stakeholders in looking past their immediate issues. For this methodological framework, five sequential steps have been introduced-

- Step 1. Conceptualize the city as a functional system.
- Step 2. Check the present validity of a functional system.
- Step 3. Incorporate foresight tools to envision the future of cities.
- Step 4. Flesh out the vision's implications on the functional system.
- Step 5. Involve experts and stakeholders.

This methodological framework will provide conceptual support and envisioned to develop climate resilient cities in Bangladesh that is struggling to display a holistic view of a city's structure and operation at present time.

6. Implementation of framework in intermediate cities

6.1 Step 1. Conceptualizing urban functional system of intermediate cities in Bangladesh:

A city has a complex and diverse ecosystem where multiple elements act for a common purpose within a given socioeconomic and physical context (Berry, 1964; Churchman, 1968; McLoughlin, 1969). Any physical change or alteration affects all elements of the functional ecosystem system. Cities consist of physical infrastructure and natural elements are interconnected with numerous economic, social and spatial relationships (Berry, 1964; Allen, 1997; Camagni, 2003), but the whole system has been constantly changing by external change factors. To understand and explain the complex functional system of a city, it is divided in different interrelated subsystems which are providing resources, services and infrastructures to satisfy the urban demand of the city. Every subsystem is described by its resource capital, operating agents and services provided. After all the urban functional system is subject to various external change factors, of which climate change and rapid urbanization play major role to make environmental, socio-economic changes, political changes for the intermediate cities of Bangladesh.



Figure 5. A Bangladeshi City's functional system based on Fernandez Guell, 2016.

6.1.1 Climate change impact upon functional subsystems of intermediate cities in Bangladesh

Each city of case studies has been assessed for climate vulnerability to provide basis for understanding both direct and indirect impact of future climatic hazards on people, infrastructures, and urban system specific to their city. The assessment will include the city's exposure of climate risks in terms of its impact on people and city's functional systems. The study will also examine the existing capacities to adapt and provide information to plan the city for a resilient future (Sarah Opitz-Stapleton, et al., 2009).

Intermediate City in Bangladesh	Environmental subsystem	Economic subsystem	Social subsystem	Political subsystem
Khulna R. Karim, et al., 2013 Md. Shamsuddoha, Rezaul Karim, 2007	1. Salinity increases due to sea level rise. 2. Cyclone causes huge damage on Sundarbans, largest Mangrove Forest in the world.	1. Loss of agricultural production 2. Loss of livelihood	1. Forced Migration 2. Increase of homeless people	1. Illegal settlements in Khulna city 2. Lack of services 3. Deterioration of law and order
Sylhet Shetu Akhter, et al., 2019 Shamsuddin Shahid, et al., 2015	1. Reduced rainfall affects the discharge of Surma river. 2. increased temperature reduced cold waves	Negative agricultural production and unstable livelihood	Loss of livelihood affects living standard	Migration to Aasam in India creates religious ethnic tensions
Rajshahi S. Kamaker, et al., 2018	1. Use of ground water increases 2. Use of chemical fertilizers increases	1. Decrease of agricultural production 2. Increase of health cost	1. Increase of social problems 2. Children and women health became vulnerable	Political pressure increases to revise water treaty with India
Rangpur BK Chakrvaorti, et al., 2018 ATM. Zinnatul Bassar, Md. Ahoshan Habib, 2017	1. Increase of lightning and thunderstorm causes huge dry air in summer season 2. Riverbank erosion due to flood	1. Property damage and loss of life 2. Food insecurity, 'Monga' due to drought	1. Less access to work 2. Migration to urban area	Poverty causes rise of radicalism

Barishal Taslima Akter, et al., 2015 Md. Mahmudul Hasan, et al., 2018	1. Water logging blocks drainage of storm water.	1. Erratic and irregular rainfall causes loss in crop production	1. increases rate of migration due to loss of livelihood	Increases political tension
	2. Cyclone and thunderstorm destroys plants.	2. Livestock production is affected	2. increases social conflict and poverty	
	3. Sealevel rise causes reduced upstream flow and causes salinity intrusion in surface and ground water.	3. Irrigation cost rises during drought and Commodity price rises		
	4. Excessive siltation and accretion of land causes loss of navigability	4. increase occupational changes, reduce employment and income, loss of valuable wealth, increases health problem, health problems,		
	5. Declining aquatic resources			

Table 1. Climate change impact on functional system of intermediate cities in Bangladesh (Hossain M, 2022)

6.2 Step 2. Check the present validity of a functional system.

The conceptual framework of the urban functional system is used to analyze the present model of intermediate cities in Bangladesh from 1990 to 2020. This period was marked by a political change from an autocratic to democratic system, which led to rapid economic development and urbanization, but also faced the adverse impacts of global climate change. The analysis was based on secondary sources and was conducted as part of a foresight exercise.

6.2.1 Urban demand:

Because of the rapid urbanization the economic activities are growing in intermediate cities as an emerging economy, Government has initiated 100 economic zones all over the country to establish industries and create job opportunities. Many foreign investments are in the pipe line to establish industries specially Garments factories which needed low paid workers. The high rate of migration creates informal settlements as well as informal economic activities in cities. These new influxes of migrated people urgently require public infrastructures, municipal services, housing, etc. but they are also vulnerable to climate change impact.

6.2.2 Economic subsystem:

Asian Development Bank (ADB) estimated that Bangladesh would lose 2% annual GDP by 2050 because of global climate change which will affect sustainable economic growth and business opportunities with extreme weather events resulting job losses and displacement. Service sectors are

contributing almost half of national GDP after industrial sectors (32%) and agricultural sector (15%). The garments industry is playing the major contributor in the export-oriented economy where mass people and infrastructure playing key role. Any disruption due to cyclones and floods could hamper domestic as well as foreign trade activities. Every year Bangladesh faces flash floods and regular floods and 20% of land areas goes under water.

6.2.3 *Environmental Subsystem:*

As the impact projected by Ali (1996) if the sea level rises up to 25 centimeters by 2050, Bangladesh will lose 6000 square kilometers of its land. In the recent times, because of salinization in the water and deterioration of agricultural production a number of people were forced to migrate from the coastal area to the capital city or in the northern part of Bangladesh (Brouwer, Akter & Haque, 2007). IPCC concluded that 5-10% increase of wind speed intensity has been contributing enhanced storm surges and coastal flooding. Ali (1996) estimated that 2°C increase and 0.3m sea level rise would result in 1.5m higher storm that will inundate 20% more land including urban areas than the 1991 cyclone. When monsoon rain is significantly decreased, drought and thus the resulting food crisis force people to migrate in cities affected the south-west and north-west part of the country.

6.2.4 *Social Subsystem:*

Any unusual change in climate pattern will certainly affect the country's food security, poverty reduction, development effort as well as achieving UN SDG's goals. Women, children, and elderly populations are more vulnerable than others because they have limited social and economic resources and access to public and private support before and after disasters (Saleh Ahmed, 2020). A UNICEF report suggested that the climate change hazards are threatening the lives and futures of 19.4 million children in Bangladesh. Research showing that Bangladesh has 6 million climate migrants already, a number that could more than double by 2050. The migrant people lose their livelihood, change their profession, get no proper services, risk their family and children, experience lack of education, health problems and get substandard life in cities.

6.2.5 *Political System*

The findings of Rafael Reuven (2007) show that severe environmental degradation compels people to displace from their homes to new settlements specially in slums of urban areas of LDCs and thus creates conflict between migrants and residents. The lack of basic services creates illegal and criminal activities in these slums which lastly turned into nightmare for the political system. These migrations create ethnic strain in those areas. It is said that due to natural calamities a large number of people migrated from Bangladesh to nearby Assam in India for employment opportunities. These migrants created ethnic strife and division in their local political system of Asam as well as affecting National government policy. National Register of Citizens (NRC act 2003) act is to strip off the Indian nationality from these migrated people who entered India after 1971. As a result, a large number of unidentified citizens from Asam are now in a possible return to Bangladesh which has created tension in two countries bilateral relation.

6.2.6 *Urban governance subsystem:*

Local urban governance becomes burdened with extra responsibilities to provide services to the newly coming migrants in urban areas. Sometimes the absence of laws or limitations of law provides opportunities of illegal activities.

6.3 Step 3. Incorporate foresight tools to envision the future of cities

To explore different potential paths that Bangladeshi cities might take towards 2050, a foresight process was initiated through a scenario design exercise. This technique was chosen because it effectively manages complexity and uncertainty while presenting a range of possible futures. Scenario design is a well-established foresight approach that combines intuitive and analytical thinking, relying on the expertise of a group of collaborators. It is primarily qualitative in nature and has been extensively studied and documented by scholars. (Schwartz, 1991; van der Heijden, 1996)

The foresight process followed the standard scenario design methodology, which included four stages in sequence:

- (1) Identifying factors of change that may influence cities and evaluating their impact and level of uncertainty;
- (2) Grouping key drivers or critical uncertainties into two scenario axes;
- (3) Creating scenarios and constructing narratives;
- (4) Assessing the implications of the scenarios.

Based on this method, the key drivers that would impact Bangladeshi cities in 2041 were organized into two axes, which are also referred to as scenario axes:

The vertical axis: represents the potential development of local stakeholders and urban policies over the next 20 years. This axis included all uncertainties regarding future social behavior, economic models, and public policies.

The horizontal axis: represents the potential changes in the environment in which Bangladeshi cities operate. This axis encompassed all the critical uncertainties related to the societal, technological, economic, and environmental context.

These axes have created four different potential outcomes for Bangladeshi cities by 2050, and below is a short description of each scenario.

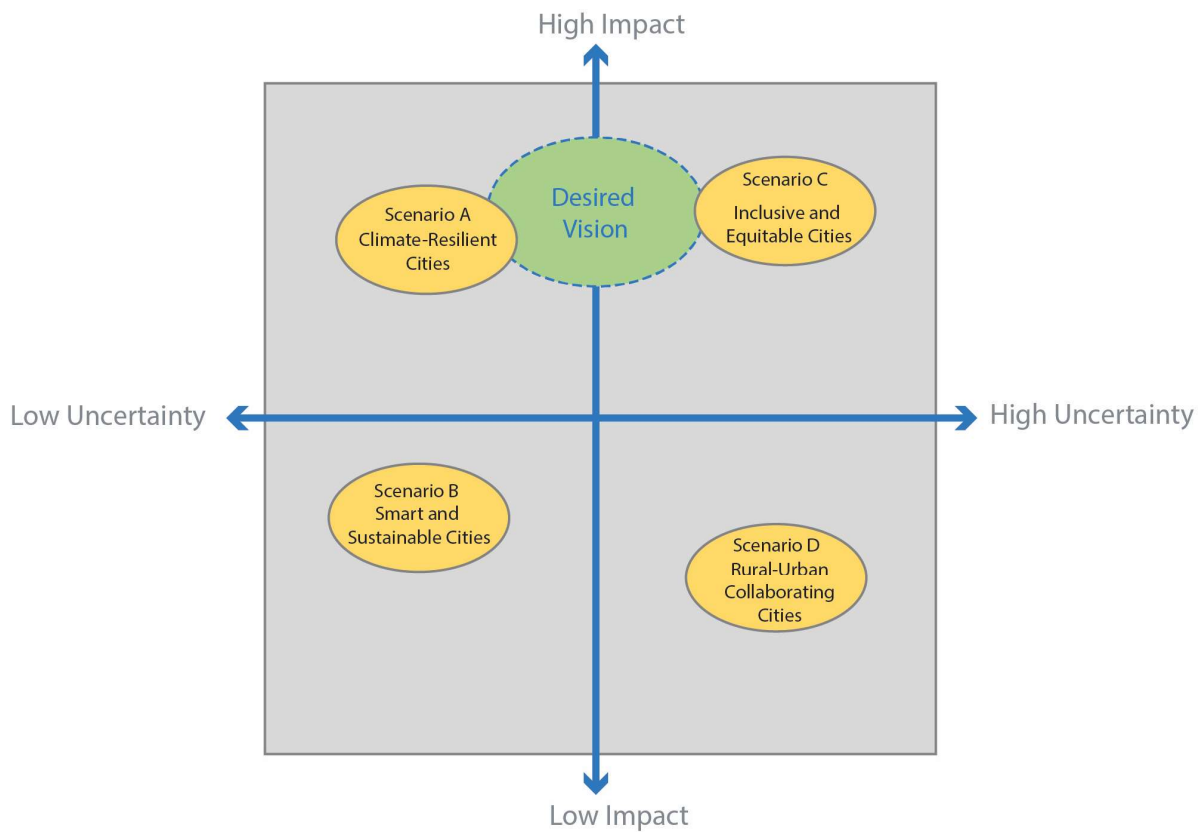


Figure 6. Alternative scenarios of intermediate cities of Bangladesh. Source- Author's elaboration

Scenario A: *Climate Resilient Cities.* Cities that are able to withstand and adapt to the impacts of climate change, such as extreme weather events, rising sea levels, water scarcity etc. These urban areas implement measure to reduce their vulnerability to climate related hazards while ensuring they remain sustainable and livable for the residents. These cities strategize to build climate resilience by including green infrastructure, enhancing emergency preparedness, promoting energy efficiency and renewable energy resources while encouraging stakeholders' participation in climate adaption efforts.

Scenario B: *Smart and Sustainable Cities.* Cities that use advanced technology and innovative practices in order to improve the quality of life for the residents while also promoting long-term environmental sustainability. These urban areas promote digital technologies and data analytics for optimization of resource management and enhanced public services; such as transportation, energy, waste management and public safety.

Scenario C: *Inclusive and Equitable Cities.* Cities that prioritize social inclusion and aim to provide equal opportunities and access to resources for all residents, regardless of their ethnicity, age, gender, income and all other factors. These urban areas try to reduce inequality and promote social cohesion by ensuring that all members of the community have access to vital resources and services like affordable housing, healthcare, education, transportation, and technology and employment opportunities.

Scenario D: *Rural-Urban Collaborative Cities.* Cities that facilitate collaboration between rural and urban communities to promote sustainable and equitable development. These urban areas acknowledge the interdependence between urban and rural areas and seek to strengthen this in a collaborative and mutually beneficial manner. In a rural-urban collaborative city, policies and initiatives

are designed to support both urban and rural areas, with a focus on building resilient and inclusive communities.

These scenarios are not exact predictions of the future, but rather hypothetical situations that could arise under certain conditions by 2041. To address the uncertainties that come with these alternative scenarios, our study included a "desired vision" between Scenario A and B, which would represent an ideal scenario for Bangladeshi cities as a strong alternative to both positive and negative contexts. While scenarios explore different potential futures, a vision is normative in that it proposes a preferred future. This approach distinguishes between exploratory scenarios and normative visions (Fernandez Guell, 2016).

6.4 Step 4. Flesh out the vision's implications on the functional system.

The contributions made by the experts during the foresight exercise are combined to create the forthcoming future visions. In pursuit of a more integrated model, all functional subsystems will be tightly interconnected and will take into account the needs, demands, and aspirations of the diverse urban demand segments. By establishing relatively well-balanced positions among demands and urban functions, city managers will avoid dominant positions among subsystems. This will necessitate urban planners maintaining open lines of communication and negotiations with various stakeholders.

6.4.1 Vision of Urban Demand: The vision for urban demand in 2041 for Bangladesh would prioritize addressing poverty, lack of resources, environmental degradation, and food security by providing basic necessities, job opportunities, and access to education and healthcare. The demand for resilient infrastructure, disaster preparedness, and accessible transportation would also be addressed, with a focus on meeting the needs of all members of the community regardless of income or demographic background.

6.4.2 Vision of Economic Subsystem: The vision of economic subsystem for 2041 for Bangladeshi intermediate cities will be sustainable, diversified and decentralized. There will be a focus on developing sectors with well-articulated clusters of businesses, technology centers, and entrepreneurs to foster innovation and creativity. The approach will promote knowledge-based development with the adoption of new technologies to increase productivity and efficiency, and the economic system will be resilient.

6.4.3 Vision of Environmental Subsystem: In 2041, Bangladesh's environmental subsystem will prioritize sustainable development and conservation of natural resources to improve the quality of life for citizens. The vision focuses on food security, water scarcity, pollution, and climate change, achieved through sustainable agriculture, innovative technologies for efficient water use, reduction of waste and cleaner technologies for pollution control.

6.4.4 Vision of Social Subsystem: The societal subsystem in Bangladesh in 2041 aims to create an inclusive, equitable, and resilient society by addressing challenges such as lack of infrastructure, crisis in housing and pollution. The vision includes increasing access to basic services and promoting sustainable use of resources, prioritizing affordable and clean energy, addressing the crisis in housing, developing infrastructure and reducing pollution through waste reduction and cleaner technologies.

6.4.5 Vision of Political Subsystem: The vision for the political subsystem could prioritize decentralization, giving more power and autonomy to local governments and promoting greater participation at the community level. Efforts to increase transparency and accountability could also

involve the use of technology and digital platforms to promote citizen engagement and increase access to information.

6.4.6 Vision of Urban governance Subsystem: In 2041, the urban governance subsystem in Bangladesh will prioritize people-oriented development, decentralization, better institutions, and improved disaster management. Institutions will be strengthened to ensure transparency, accountability, and responsiveness in governance. Disaster management will be a priority, with effective planning, preparedness, and response strategies in place to mitigate the impact of natural disasters and climate change, and ensuring that vulnerable communities are protected.

6.5 Step 5. Involve experts and stakeholders.

To strengthen the legitimacy of the whole foresight process, foresight practitioners frequently stress on how to encourage conversation and secure stakeholder participation in one or more phases. According to Fiorino's (1990) and Stirling's (2006) participation rationales, instrumental participation was required from the start of the project since stakeholders' confidence, acceptance, and commitment were sought after (Saritas, 2013).

The proposed approach emphasizes involving stakeholders throughout the entire process. To meet this requirement, in-depth interviews were conducted with stakeholders involved in Urban Planning and Climate Resilience to confirm the functionality of the urban system and the future vision for intermediate cities in Bangladesh. The interviews covered four major questions, among others, to gain insights and perspectives from stakeholders.

- What are the thoughts of stakeholders about current climate resilience initiatives that are being undertaken?
- How do stakeholders approach climate resilience planning and implementation?
- What is the level of stakeholder engagement in climate resilience initiatives?
- How do stakeholders perceive and value influence climate resilience decision-making?

Stakeholders who were interviewed regarding the proposed approach had various reactions, which are briefly described below:

1. The thoughts of stakeholders about current climate resilience initiatives vary, with some believing that initiatives are ineffective and not implemented properly, while others believe that there are positive efforts being made.
2. Stakeholders approach climate resilience planning and implementation actively by involving themselves in decision-making processes, actively participating in community-based initiatives.
3. The level of stakeholder engagement varies, with most stakeholders being actively involved while others are less engaged.
4. Stakeholders perceive and value their influence in climate resilience decision-making as important, but their voices are not always heard or considered.

7. Discussions and Results

In the urban areas, disaster impacts depend upon several factors including intensity and frequency of natural hazards, climate change, and urban stresses, among others. However, it is also assumed that resilient cities can effectively address urban stresses and impact of climate change (Joerin & Shaw, 2011). It is essential to evaluate the level of current resilience in order to build a resilient city.

The conceptualization of the functional system of cities provides a clear and simplified understanding of the complexity and diversity of current urban phenomena, including external factors such as climate change, rapid urbanization, socio-economic changes, and politics that impact the sub-systems. This systematic approach can enhance the knowledge base of professionals and stakeholders and provide a better understanding of the urbanization process.

The analysis shows that Environmental subsystem is strongly connected with social, economic and political subsystems. The frequent climate hazards are displacing people from affected areas to urban areas and thus create huge urban demand. But the centralized and poor urban governance failed to give support and services to people. Thus, the lack of services brings social discrimination and political unrests.

The driving factors for change in urban areas have been identified to assess their impact and uncertainty based on literature review. The key economic factors create fast growth as well as discrimination of wealth. Both Socio-economic change factors indicate transformation of social values with technological evolution confirming technology as the main driving factor. Climate change plays major role in future urban planning and Governance system to provide adequate services for people. Environmental degradation due to climate change is major the concern to shape our future.

As the part of the foresight exercise possible scenarios for our intermediate cities in 2041 have been done based on references from literature review. Desired vision of our intermediate cities implies that strong urban governance system adopting future technological means could ensure our preparedness as resilient cities for climate change uncertainties as well as unknown challenges,

To build future scenarios involving the stakeholders and experts the foresight exercise is still in process. Following the conventional scenario design method, the feedback from participators would construct probable future scenarios and thus determine scenarios implication.

The results of this research are providing some insight into the impacts of climate change on urban functional system of intermediate cities in Bangladesh, as well as to identify ways to enhance urban resilience withstand the major challenges yet to come.

8. Conclusions

This study shows several outcomes regarding development of resilient cities in Bangladesh as well as climate change affected cities in developing countries.

The systematic approach analyzed and explained the complexity and diversity of our city's functional system in a rational way in respect to the climate change impact. This understanding of functional subsystems explains the contextual issues and will definitely guide the planners to formulate the strategical framework of resilient urban governance to mitigate adverse impact.

The involvement of stakeholders as well as experts in foresight exercise encourages the bottom-up and inclusive process to develop policies. The diverse feedback from the stakeholders ensures their individual participation and collective responsibility to deal with future unpredictable challenges. This

approach will also facilitate the identification of stakeholders, their role in decision making and their relation among the community.

The application of foresight approach provides holistic visions of an evolving city in current context and help to have alternative developing policies by anticipating foreseeable future. It creates opportunity for planners and policy makers to use this tool to shape the future with strategic possibilities.

Since Bangladesh is at the risk of frequent climate change hazards, preparedness for future should be based on the intelligent and smart urban system. Since the resilient city concept is highly likely a possible solution for our small and middle-sized cities to tackle climate change impact, a resilient urban governance will be the key to develop an effective functional system.

Though this study shows the potential of solving our future problems regarding climate change, more study and information from affected areas is needed to refine the process and ensure the effective application of foresight approach.

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