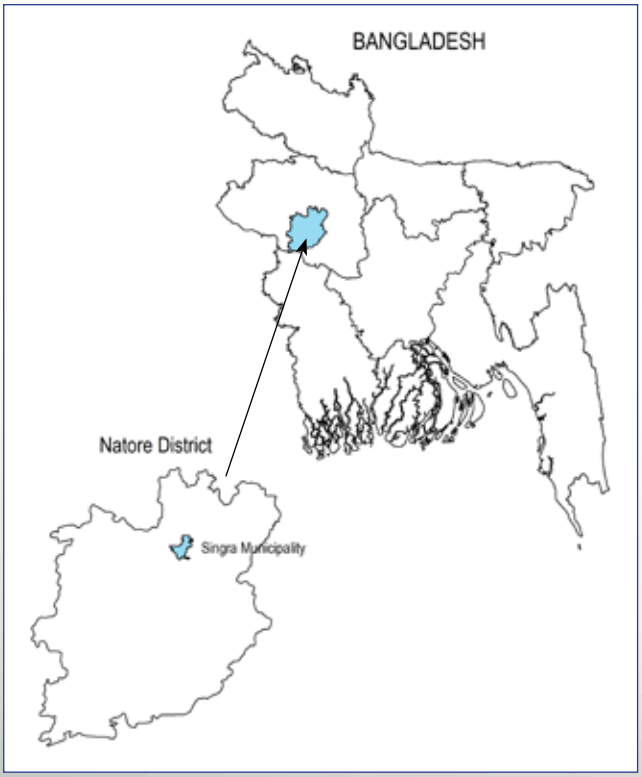
City Resilience Strategy: Singra

Singra is a municipality located between 24°24'N and 24°41' N and 89°03'E and 89°20' E, within the flood plain of Atrai River in Natore district in the division of Rajshahi, Bangladesh. The city is surrounded by the historic Chalan Beel and intersected by Natore-Bogra highway in the east-west direction. Singra also falls within the undulating Barind land. The population of Singra Municipality was 33,192 in 2011 with 7,894 households. The economy is largely dependent on agriculture and small retail businesses. Singra Municipality was constituted in the year 1999 and regulates most of the civic functions and services in the city.



The annual average maximum and minimum temperatures in the city are 37.8°C and 11.2°C respectively, and annual average rainfall is 1862 mm. The city area is comparatively low lying and below flood level and hence experiences severe flooding during river overflows and heavy monsoonal rainfall.

Climate Risks

The two major future climate risks identified through the ICLEI ACCCRN Process (IAP) for Singra are:

Changing Climate Conditions	Climate Scenario Summary Statements
Irregular rainfall	Pre-monsoon rainfall will decrease while monsoon and post-monsoon rainfall will increase. From 2051 onwards annual average rainfall and monsoon rainfall will follow a higher increasing trend.
Increased temperature	Mean temperatures across Bangladesh are projected to increase between 1.4°C and 2.4°C by 2050 and 2100, respectively.

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Vulnerability Assessment

The fragile urban systems and their corresponding climate fragility statements for Singra are:

Fragile Urban Systems	Climate Fragility Statements
	• Will increase demand of already scarce water, leading to higher energy consumption to use tube wells for irrigation.
	• Will lead to increased crises of drinking water and have adverse impact on rice production, health and economy.
	• Will result in flooding of encroached areas that will lead to loss of property and environmental damage to water resources.
	• Littering and open dumping can cause health impacts under higher temperatures that will promote faster decomposition of waste and encourage multiplication of disease causing vectors like mosquitoes and flies and in case of higher rainfall, will lead to water logging.
	• Can lead to an increase in the populations of pathogens, pests and vectors leading to increased health issues.
	• Open defecation can impact the already scarce water resource, by polluting and contaminating it during excess rainfall.
	• Sudden increase in rainfall may generate large volumes of water that cannot be drained by the limited drainage infrastructure, increasing water logging, and consequently impacting health.

Through the vulnerability assessment, the adaptive capacity of the key actors identified in the IAP was scored based on three parameters: capacity to organize and respond, availability of resources, and access to information. Actors who receive a low adaptive capacity score are classified as vulnerable while those who receive medium and high scores are classified as supporting and can aid the local government in resilience building activities. The table below presents an overall analysis of actors across the different fragile urban systems.

Actor Analysis for Singra City

Vulnerable Actors	Supporting Actors
• Urban poor • Women • Children • Farmers • Fishermen • Residents • Small business owners	• Singra Municipality • NGOs • Department of Public Health and Engineering • Hospitals

Overall Singra Municipality scored as a supporting actor because although the municipality has limited capacity to respond during emergencies their willingness and access to information is high. They have demonstrated proactivity especially in the cases of sanitation and waste collection.

The adaptive capacities of the fragile urban systems are assessed on the basis of five broad categories – economic, technology/ infrastructure, governance, social, and ecosystem services. Each of these five categories was rated as high/medium/low and averaged across all the urban systems to generate an overall score for each parameter in the city as detailed in the following table.

Overall Adaptive Capacity of Systems in Singra City

Adaptive Capacity Parameters	Adaptive Capacity Score		
	Low	Medium	High
Technological/ Infrastructural			
Economic			
Governance			
Societal			
Ecosystem services			

Through these assessments, the areas found to be the vulnerability

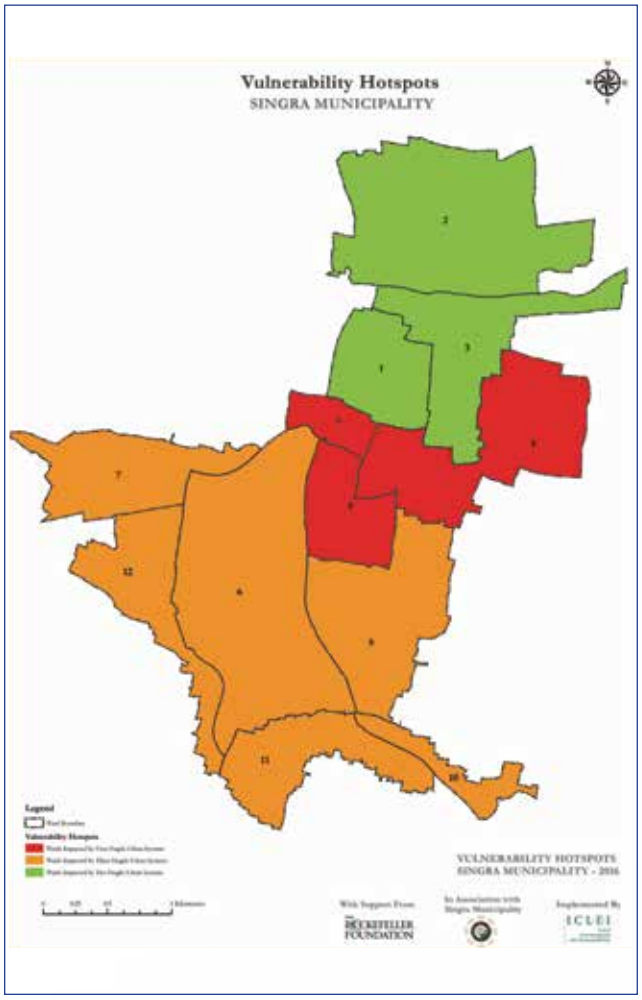
hotspots are wards 4, 5 and 8 which are vulnerable to four fragile urban systems out of the five assessed. Ward numbers 6, 7, 9, 10, 11, 12 are impacted by three fragile systems while the wards 1, 2 and 3 are impacted by two fragile systems (refer map).

Possible adaptation interventions were identified for the five fragile urban systems in Singra on the basis of their climate risks and vulnerabilities, the vulnerable areas and the vulnerable actors to adapt to the possible impacts of climate change on these systems. These prioritized interventions were inter-linked with ongoing programmes and projects. The way forward for the city to build resilience includes:

- **Inter-departmental coordination:** Building coordination between different government departments for better integration of developmental activities with urban resilience.

- **Collaborative action:** Municipality needs to collaborate with local, national and international NGOs as well as civil society to promote resilience building actions and solicit public support for a resilient city development.

- **Service level improvement:** Basic urban services in the city are poor and needs substantial improvement. Structural and policy measures can be undertaken as outlined in the resilience interventions to improve, water resource management, sanitation and drainage, and solid waste management.



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Key Interventions Identified for Singra City

Infrastructural Measures	Non-Infrastructural/ Policy Measures
Water Resource Management	
• Rain Water Harvesting (RWH) – Training workshops for technical personnel on developing rain water harvesting structures and building RWH in municipal buildings. **Costs associated** (3,000 USD to 10,000 USD – since the RWH structures vary, it is difficult to get a unit cost.): 15,000 USD for a training workshop and construction of one RWH structure in one municipal building. **Co-benefits:** Can help reduce runoff and prevent soil degradation.	• Promoting conservation of water by creating a water bill/ disconnection of water supply. **Costs associated** (Policy intervention can be made by using existing infrastructure, training of staff): USD 2,500.
River Plain Management	
• River embankment to prevent water ingress into residential areas during excessive rainfall. Maintenance of river banks to prevent river bank erosion. **Costs associated:** 30,000 to 100,000 USD depending on the height of the embankment, and materials used. **Co-benefits:** Can help in soil protection and conservation.	• Urban Development Department- Local Government Engineering Department liaison should be improved to ensure collaboration of efforts for water and river plain management. **Costs associated** (Meetings can be regularized): USD 1,000 per year can be allocated for this. **Co-benefits:** Can help in better developmental planning for the city.
Solid Waste Management	
• Pilot demonstration of segregation of waste into organic and inorganic waste & waste collection from door to door. **Costs associated** (Household or community level composting can be carried out, that can be used in the nearby agricultural fields for mulching. Low cost systems of pit composting are suitable in the area. Cost is about 10,000 USD for a one TPD unit.): 10,000 USD. **Co-benefits:** Can help promote good practices by being an example.	• Interaction with NGOs for spreading awareness on segregation and solid waste. **Costs associated** (Workshop with NGOs to understand their interest and motivate them to work with the municipality): Cost can be about 1,000 USD per workshop. **Co-benefits:** Can help in preventing water logging by keeping drains clean.
Storm Water Drainage and Sanitation	
• Septic tank management using septage suction machines and composting of septage. This is essential to avoid water pollution by release of contaminated water and health hazards. **Costs associated:** Suction machine costs between 3000 USD to 10000 USD. This does not include operation and maintenance. **Co-benefits:** Can help reduce ground water pollution.	

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