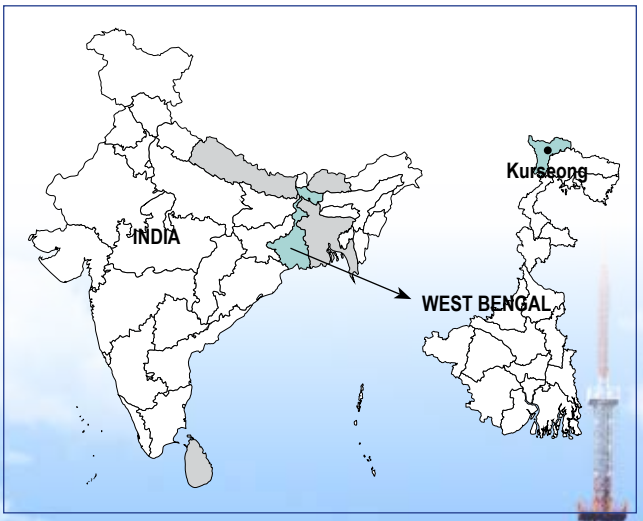
City Resilience Strategy: Kurseong

Kurseong is a hill station, located at an altitude of 1,458m, in the Darjeeling district of West Bengal in India. On the Eastern side, Kurseong is surrounded by a thick reserve forest of coniferous pines, oak and associated tree species and in the West, North West and South West by tea plantations, which hinders the physical expansion of the city. The population in Kurseong city in 2011 was 42,446. The city's economy is based mainly on educational institutions and tourism. Kurseong Municipality, which is over 125 years old (one of the oldest in the country) is the civic administration body for the city of Kurseong.

Of the four sub-divisions of Darjeeling District, Kurseong records the maximum rainfall touching almost 500 cm annually. The maximum temperature in summer rises up to 25°C and the lowest temperature in winter is between 5°C to 10°C. Kurseong is extremely vulnerable to landslides. There are at least 20 landslide prone sites within the municipal area.



Climate Risks

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

Changing Climate Conditions	Climate Scenario Summary Statements
Short duration, high intensity rainfall	With respect to the 2050s in winters, i.e. Oct-Dec there will be a slight increase in rainfall in Darjeeling, but the monsoon shows no change with respect to the baseline i.e 1970, while an overall decrease in rainfall throughout the entire West Bengal region (except the Sunderbans) occurs in Jan-Feb .
Increased temperature	In 2050s, the average daily maximum and minimum temperatures are both projected to rise by 2.2°C across the state.

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Vulnerability Assessment

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

Fragile Urban Systems		Climate Fragility Statements
		• Can lead to increased demand for water thereby, posing additional stress on the water supply system and hence the water resources available in the region.
		• Can lead to an increase in runoff and poor recharge of catchment areas, imposing larger stress on the system.
		• The biological and chemical processes that govern waste decomposition and leachate production may be altered. This may favour the growth of vectors and pathogens, spreading diseases which will have an impact on the health of the citizens as well as that of the ecosystem.
		• Drains that are blocked by solid waste, will overflow leading to flooding and water logging of surrounding areas. This can also lead to contamination of ground water.
		• Water bodies and the natural drains which are polluted by sewage, will become a breeding ground for harmful bacteria and pathogens, leading to increased health issues.
		• Coupled with a poorly functioning drainage system, may lead to landslides, which will have implications on infrastructure, finance and lives.

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 Kurseong City

Vulnerable Actors	Supporting Actors
• Local Residents • Slum population • Sanitary Workers • Councillors • Railways • Shopkeepers	• School • Hotel • Public Health Engineering Department • Forest Department • Irrigation Department • Kurseong Engineering Department

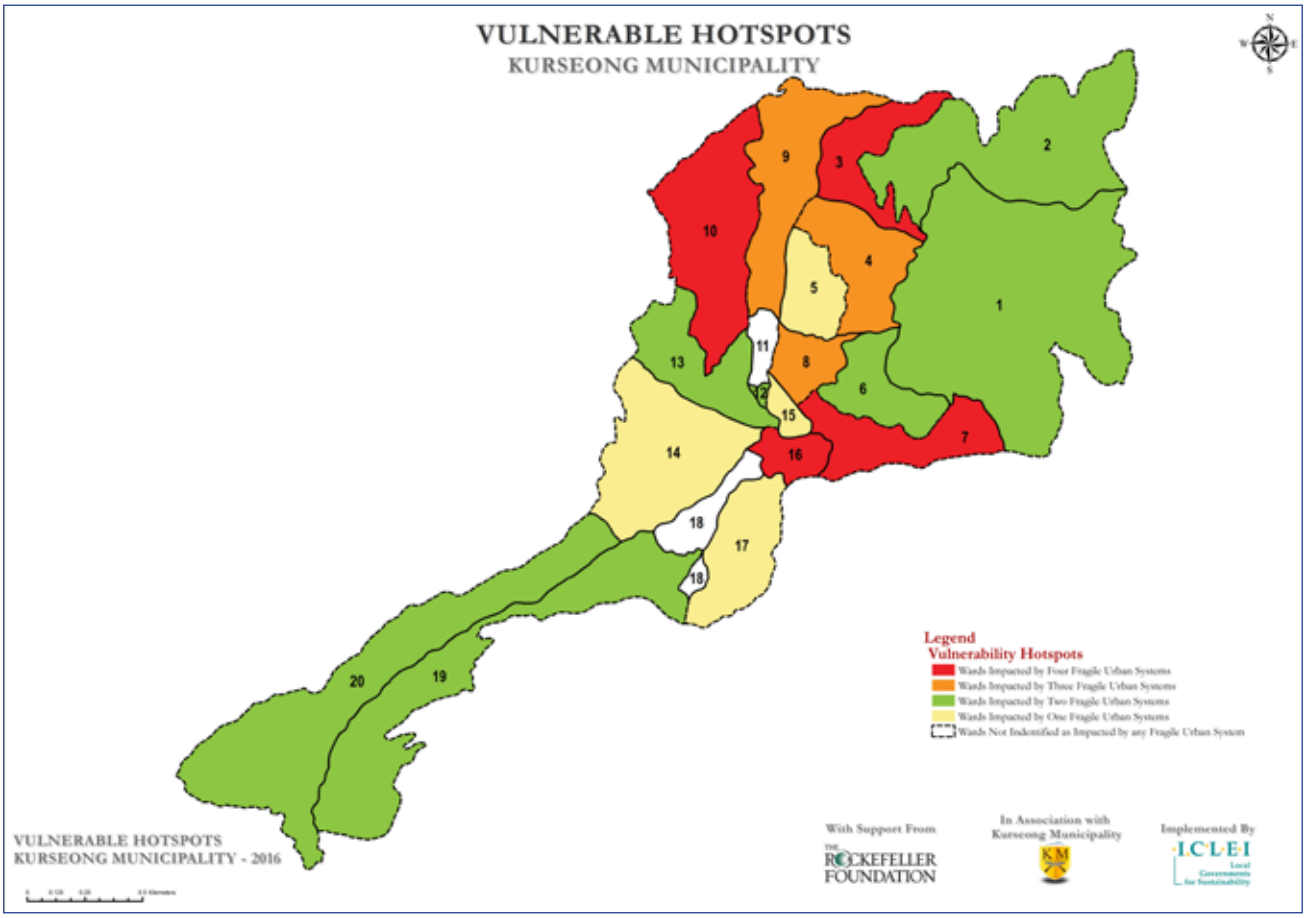
The Municipality of Kurseong, the primary stakeholder has low adaptive capacity in three of the four identified fragile urban systems. The Urban Local Body is not in position to take action on climate change due to a shortage of skilled manpower and limited finance.

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 Kurseong City

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

In Kurseong ward nos. 3, 7, 10 and 16 were identified as the vulnerable hotspots (refer map). These wards are located close to the *jhoras* which are blocked by waste thus making the area very susceptible to landslides. Furthermore, the *jhoras* have been encroached upon by some sections of the population making them even more vulnerable to events of flooding.



Among soft measures identified through the IAP, enforcement of building by-laws should take precedence as it has direct benefits on almost all fragile urban systems if implemented properly. As the community is willing to participate, awareness generation activities should focus on engaging them in disaster risk management and better maintenance of the basic infrastructure. In case of infrastructural measures, catchment restoration and protection, decentralised systems for solid waste and sewerage management, and improvement of drainage infrastructure should be undertaken on priority basis.

Photo credit: Google images

Key Interventions Identified for Kurseong City

Infrastructural Measures	Non-Infrastructural/ Policy Measures
Water Supply	
• Catchment area restoration and treatment by Engineering measures such as Step drain, Angle iron barbed wire fencing, Stone masonry, Check dams or Biological measures such as Development of nurseries, Plantation/ afforestation, Pasture development, Social forestry. **Costs associated** (Cost of infrastructure, cost of meetings with local residents): INR 25 lakh per unit. **Co-benefits:** Protection of catchment areas to augment water sources can help in soil restoration and protection.	• Developing a Management Information System to monitor the water supply system. **Costs associated** (Cost of consultant, cost of establishing system, training costs.): INR 100 lakhs.
Solid Waste Management	
• Decentralized solid waste management system with community level composting and processing units. Recyclables recovered at the processing units can be sent to recycling centres and non recyclables can be used as Refuse Derived Fuel. **Costs associated** (Staff costs, composting pit costs, maintenance costs, resource recovery infrastructure): INR 25 lakh for set up, recurring staff costs. **Co-benefits:** Can create income generating opportunities.	• Strict enforcement of anti-littering fines. **Costs associated** (Cost of meetings, cost of formulating policies that are workable): INR 2.5 lakhs. **Co-benefits:** Can generate revenue for municipality.
Sewerage	
• Construction of community pay per use toilets which can be either Ecosan or biodigestor toilets in prominent public areas. **Costs associated** (Construction and maintenance costs, staff costs, training costs): INR 1.5 lakh per toilet seat, cost may come down if larger numbers are constructed. **Co-benefits:** Can promote sustainable sanitation, improve health.	• Promotion of sanitary toilets within each household as per the guidelines of the *Swachh Bharat Mission.* **Costs associated** (Cost of training, meetings, IEC materials): INR 2.5 lakh per year. **Co-benefits:** Can be used to promote healthy hygiene practices.
Storm Water Drainage	
• Removal of encroachments over *Jhoras.* **Costs associated** (Cost of infrastructure, rehabilitation costs): Cost is dependent on location, legal status of encroaching population, rehabilitation measures, staff required and machinery required. **Co-benefits:** Can be used to provide better housing at low risk areas under Housing for All Scheme.	• Community engagement in the operation and maintenance of drains through some form of a reward system. **Costs associated** (Cost of meetings, training, awards): INR 5 lakh per community engaged. **Co-benefits:** Can build good governance practices.

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