ClimateResilientCITIES Action Plan - Rajkot

Climate resilience refers to the capacity of socio-ecological systems to maintain function in the face of climate change stresses and enhance sustainability through mitigation and adaptation actions.

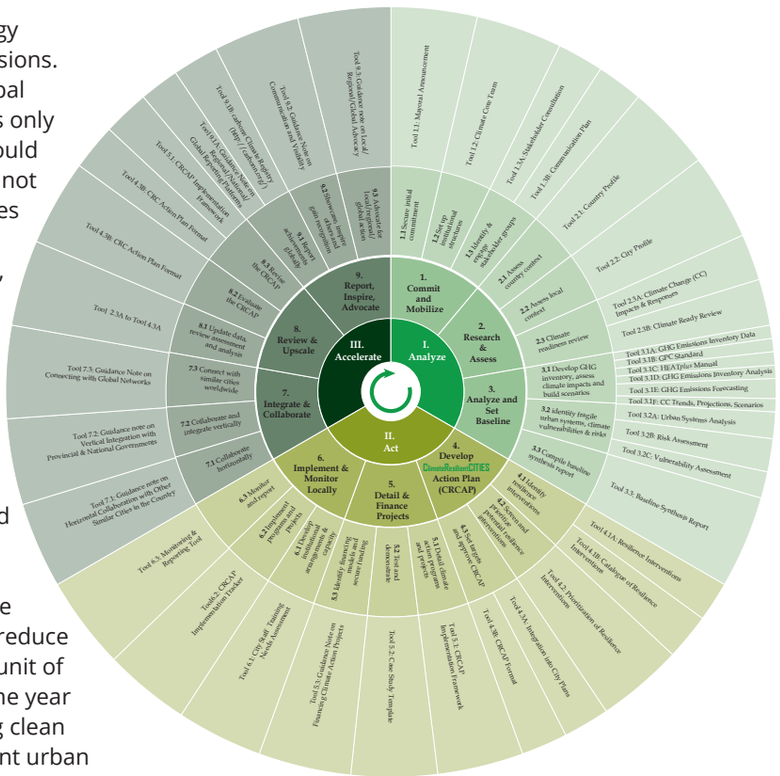
Cities consume over two-thirds of the world's energy and account for more than 70% of global CO_2 emissions. With cities projected to house over 60 % of the global population by 2030, the carbon footprint of cities is only going to increase. Planning for urban resilience should reconsider carbon intensive activities and propose not only mitigation actions that reduce emission sources but also those that help the city to adapt to the challenges of climate change, such as sea level rise, temperature changes, precipitation changes or extreme events.

India is a rapidly urbanizing country. Urban India accounted for 11.4% of the country's population in 1901. This has increased to 28.53% in 2001 and exceeded 30% in 2011, standing at 31.16% in 2018. The Indian national government is committed to Greenhouse Gas (GHG) emissions reduction and ensuring sustainable urban development. Subsequent to the Conference of Parties on Climate Change (COP 23) at Paris, India has determined to reduce its GHG emissions intensity — GHG emissions per unit of GDP — by 33 to 35 per cent below 2005 levels by the year 2030. Deployment of renewable energy, promoting clean energy, enhancing energy efficiency, climate resilient urban development, sustainable transportation and increasing forest cover to create additional carbon sinks are some of the proposed actions.

In line with national priorities, the CapaCITIES project also aims to strengthen the capacities of Indian cities to identify, plan and implement measures for reducing GHG emissions and for enhancing resilience to climate change in an integrated manner.

Methodology

The ClimateResilientCITIES methodology is an action planning process tailor made for local governments, providing step by step guidance for the development of a Climate Resilient City Action Plan that addresses both climate change adaptation and climate change mitigation. This process builds on ICLEI's Cities for Climate Protection (CCP) campaign, ICLEI's flagship mitigation program, the GreenClimateCities (GCC) program and ICLEI's adaptation toolkit, the ICLEI Asian Climate Change Resilience Network (ACCCRN) Process or IAP toolkit. This ClimateResilientCITIES methodology, shown below, is implemented in all the four project cities.



The City of Rajkot

Rajkot, an industrial town famous for its foundry and machine tools industry, is the fourth largest city in the state of Gujarat, with a population of 1,286,678 (2011 census of India), covering an area of 129 sq. km. It is located on the banks of the Aji and Nyari rivers at the center of peninsular Saurashtra region, in the central plains of Gujarat state. Rajkot is ranked 22nd in the list of global fastest growing cities and urban areas from 2006 to 2020. Climate Resilient City Action Plan for Rajkot.

Population:	**1,286,678 (2011 Census of India)**
Area:	**129 sq. km.**
No of Wards:	**18 wards**
Gender Ratio:	**908/1000 males**
Literacy rate:	**87.80%**

Climate Resilient City Action Plan for Rajkot

The Climate Resilient City Action plan has been developed for the city, through the CapaCITIES project. It includes both mitigation and adaptation measures.

Vulnerability Assessment

The baseline situation analysis of the urban systems in the city has been carried out in Rajkot. Vulnerability of each of these systems to climate change impacts of increase in temperature and increase in precipitation, were assessed and climate risk was analysed. Water, Sewerage, health, Solid Waste Management, and Transportation were identified as vulnerable urban systems. Vulnerability of wards and actors was analysed for each of these urban systems. Vulnerability maps were then prepared and overlayed together to identify the vulnerability hotspots.

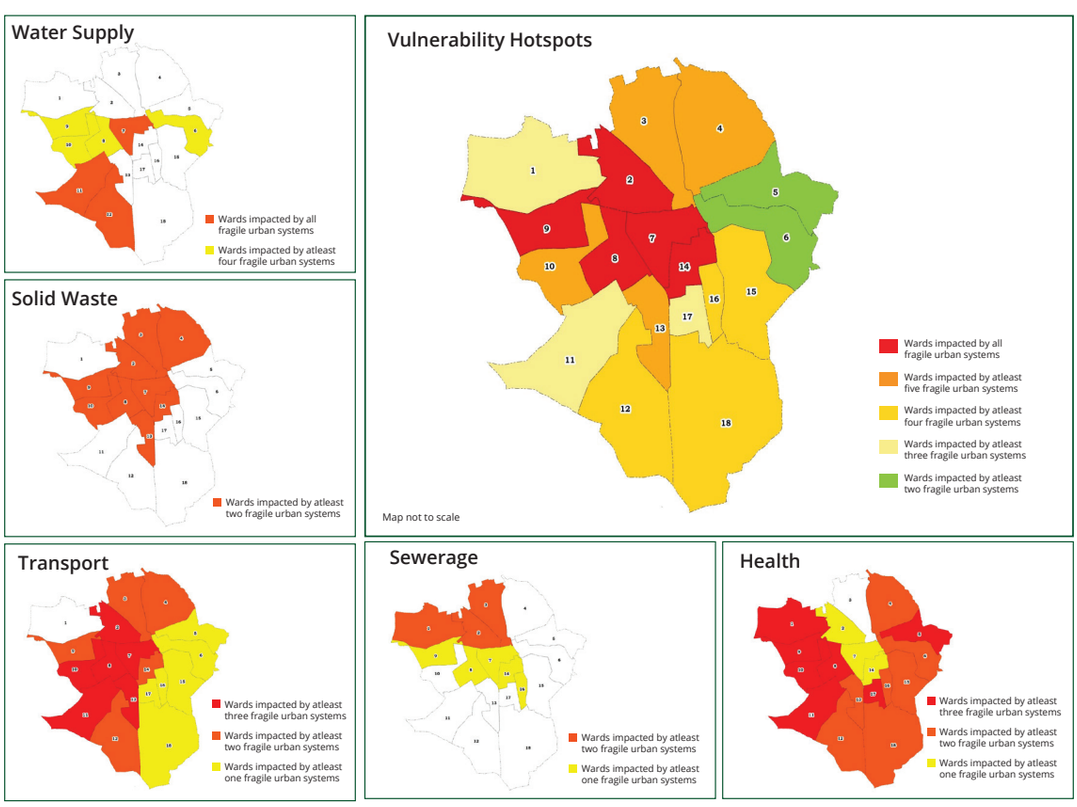
Climate Projections: A 69% rise in mean annual rainfall (2017-2100) from a baseline of 660 mm (1961- 90) and rise in maximum temperature of 3.8°C during the period (2071-2100) from a 1960-90 baseline, is projected.

Climate risk and vulnerability assessment of fragile urban systems in Rajkot

Fragile Urban Systems	Climate Risks	Climate Fragility Statements	Risk*
(Health)	temperature, rainfall	• Existing primary public health care infrastructure will be unable to address increasing health issues	High
		• Preventive health measures will be rendered inadequate	Medium
(Water)	temperature	• Increased exposure of the community to poor quality ground water due to increase in demand for water	Medium
	rainfall	• Increased chances for potential contamination of surface water supply with untreated sewage	High
(Sewerage)	rainfall	• Sewage treatment systems may be rendered ineffective due to higher mixed sewer overflow	Medium
(Storm Water Drainage)	rainfall	• Increased instances of back-flow of sewage into households, posing a health risk due to contamination in the water supply network	Medium
(Solid Waste)	temperature	• Increase in decomposition rates and increased probability of landfill fires	Medium
	rainfall	• Increased instances clogging of storm water drains, leading to greater knock on impact on public health	Medium
(Transport)	temperature, rainfall	• Already inadequate public transport services, already challenged by limted last mile connectivity, will be further stressed	Medium
	temperature	• Increased air pollution due to increased use of private vehicles	High
	rainfall	• Increased incidences of traffic congestion due to water logging	Medium

*** Risk Score (likelihood x consequence) –** Low: 1-4; Medium: 5-10; High: 11-20; Extreme: 20-25

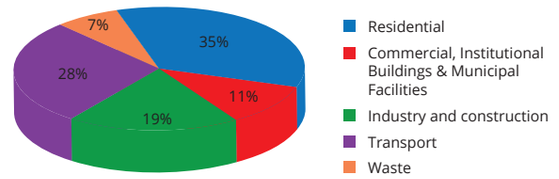
temperature increase; rainfall increase



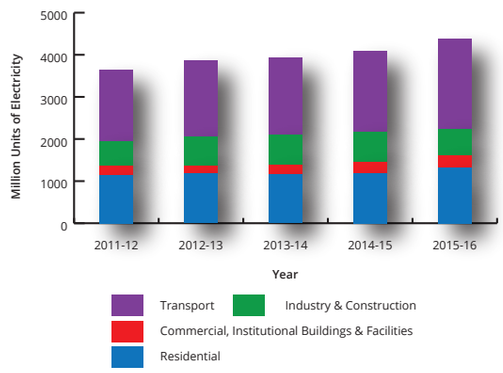
GHG Emissions Inventory

The GHG emissions inventory for the city has also been developed. The inventory for 2015-16 shows that the total GHG emission for Rajkot city amounted to 1.88 million tonnes of carbon dioxide equivalent (tCO_2e), which translate to an average per capita GHG emission of 1.32 tCO_2e. This is less than the per capita GHG emission for India in 2010, which stood at 1.56 tCO_2e.

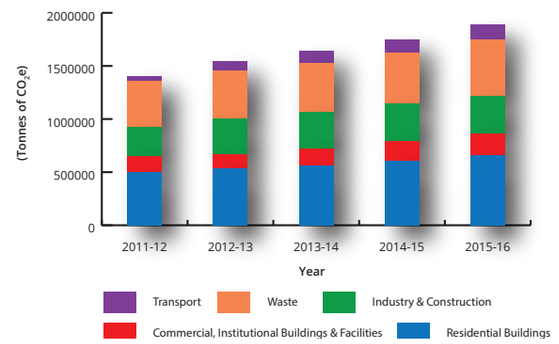
Sector-wise Share of GHG Emission in Rajkot, 2015-16



Annual Trend in Energy Consumption



Annual Trend in GHG Emissions



Action Plan

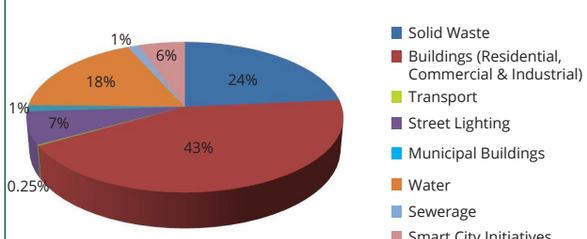
A basket of climate adaptation and mitigation actions has been detailed in the Climate Resilient City Action Plan of Rajkot. The Climate Resilient City Action Plan addresses economy wide sectors. A snapshot of the Climate Resilient City Action Plan is illustrated below.

Sector	Example Resilience Interventions	Total Mitigation Potential (tCO_2e)	Overall Resilience Impact
Buildings (Residential, Commercial & Industrial Buildings)	• Solar PV & solar water heating systems • Energy Efficient fixtures (LED lamps, EE fans, EE star rated appliances) • Implementation of green building designs	189,939 (43.24% of total)	Reduction of GHG emissions and improvement in ambient micro climate conditions
Municipal Buildings	• Solar PV systems • Energy Efficient fixtures (LED lights, EE fans) • Reduction of heat ingress through adopting heat prevent measures	5,894 (1.34% of total)	Reduction of GHG emission footprint and increase in social adaptive capacity through promotion of climate actions
Solid Waste	• 18 compost plants • 7.5MW waste to energy plant • Scientific capping of landfill • Notification by RMC on waste segregation	89,310 (23.52% of total)	Almost all waste generated within city will be treated for next 8 to 10 years (~700MT per day capacity), which will reduce the GHG emissions and improve socio-economic co-benefits through improved health and livelihood of vulnerable sections.
Transport	• Deployment of electric buses, with solar PV based charging • Public bike-share system • CNG goods vehicles in place of Chhakda (locally made diesel vehicles)	15,141 (0.25% of total)	Reduction of GHG emissions from public and private vehicles, improved air quality, reduced traffic congestion and accident rate, improved livelihood
Street Lighting	• Energy Efficient Street Lighting (52000 street lights)	30,729 (6.99% of total)	Reduced GHG emissions with better visibility and improved safety

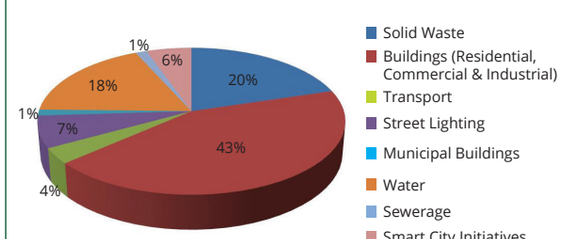
Sector	Example Resilience Interventions	Total Mitigation Potential (tCO_2e)	Overall Resilience Impact
Water	• Reuse of water • EE pumps for WTP and pumping stations • Solar PV systems for pumping stations and WTP • Augmenting local water resources and ground water recharge • Reduction in NRW: Replacement of existing distribution pipeline with DI network	78,563 (17.88% of total)	Improved water resource management, reduced water scarcity, better health and lower GHG emission. Also, due to reduction in NRW,14MLD water will be saved which can be served to additional ~100,000 people in city.
Sewerage	• EE pumps for STP and pumping stations • 100% sewerage network • Improve treatment quality and adequacy of STP • Stop direct emission from digesters	5,980 (1.36% of total)	Reduction in direct methane and GHG emission, contamination of groundwater and related health issues
Smart City Initiatives	• Solar Park in smart city area • Implementation of Green Building Policy	23,695 (5.39% of total)	Reduction in GHG emission and impacts on urban heat island effect by better building design and urban planning
	Total	**439,251**	

The Climate Resilient City Action Plan (2018-2023) proposes actions with an annual GHG emission mitigation potential of 23% by 2022-23, over the 2015-16 (financial year) baseline.

Sector-wise Energy Reduction Potential



Sector-wise Mitigation Potential



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