

## Climate Resilient City Action Plan – Nagpur

Climate resilience is the ability of socioecological systems to prepare and respond to climate related events, trends, or disturbances. Improving climate resilience involves enhancing sustainability through mitigation and adaptation actions to cope and/or manage current climate risks better.

Cities inhabit 3% of the world's land but account for 60-80% of energy consumption, and 75% of global greenhouse gas (GHG) emissions. Urban areas contribute to nearly 44% of India's carbon emissions, driven by transport, industry, building and waste.

India's national climate action plan (NDC) aims to reduce its GHG emissions intensity by 33% to 35% below 2005 levels by the year 2030. India's NDC strongly recognizes the role and contribution of urban areas to achieve its climate commitments and improve climate resilience. National and state-level initiatives such as the Climate Smart Cities Assessment Framework (CSCAF) and *Majhi Vasundhara Abhiyan* are supporting urban climate action.

In line with national priorities, the Urban-LEDS II project supports participating cities on low emission and climate resilient development to bring down greenhouse gas emissions and reduce vulnerability to climate change.

### 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<sup>1</sup>. This ClimateResilientCITIES methodology, as shown in Figure 1, is implemented in all the Urban-LEDS II model project cities in India and Bangladesh. The Climate Resilient Cities Methodology is a 9-step process in 3 phases: Analyze, Act and Accelerate - each unfolding into further steps - outlining how climate fragility can be assessed and climate resilient options can be explored.

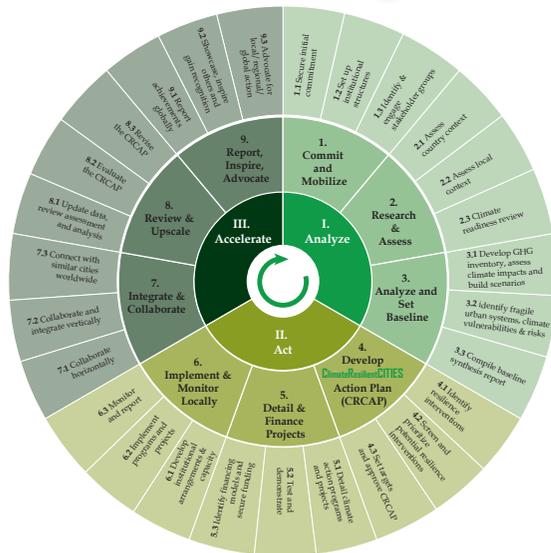


Figure 1: ClimateResilientCITIES Methodology

### Nagpur City Profile

Nagpur is the third largest city in the Indian state of Maharashtra. It serves as the winter capital of the state, and thereby is an important administrative centre. Nagpur is known as the "Orange City" for being a major trade centre of Oranges cultivated prominently in the region. It has also been ranked as the cleanest city and the second greenest city of India. The peripheral areas of Nagpur city are home to various industries such as chemicals, cement, electrical, electronics, textile, ceramics, pharmaceuticals, food processing, wood, and paper-based industries. These industries contribute to the city's economy and support local economic development.

<sup>1</sup> 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.

**Coordinates:** 78°30"E-79°30" E (Long) and 20°30"N-21°45" N (Lat)  
**Population:** 2.4 million (Census 2011)  
**Area:** 227.36 km<sup>2</sup> (87.78 sq mi)  
**No of Wards:** 138 (10 major zones divided into 38 *Prabhags*)  
**Electricity consumption:** 1822 Million kWh (2017-18)  
**Water Supply:** 652 Million liters per day (2018-19)  
**Waste generation:** 1100 tonnes per day (2018-19)  
**Local Authorities:** Nagpur Municipal Corporation, Nagpur Metropolitan Region Development Authority, Nagpur Smart and Sustainable City Development Corporation Limited (NSSCDCL), Nagpur Improvement Trust

## Climate Resilient City Action Planning for Nagpur

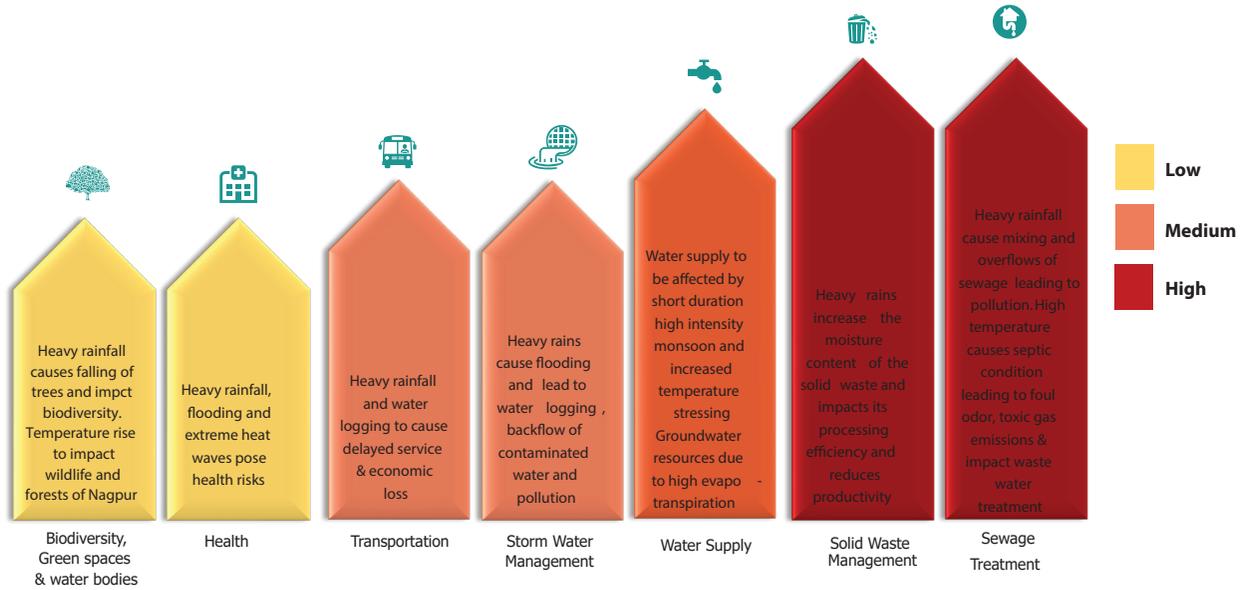
The Climate Resilient City Action Plan developed by the city, through the Urban-LEDS II project, has been guided by the step-by-step process of the Climate Resilient CITIES Methodology.

### Vulnerability Assessment

The baseline situation analysis of the urban systems in the city has been carried out in Nagpur. Vulnerability of each of these systems to projected climate change impacts of increase in temperature and increase in precipitation, were assessed and climate risks were analysed. Solid waste, water, sewerage, storm water, health, transportation, and biodiversity were identified as the fragile urban systems. Climate vulnerability of wards and actors was analysed for each of these urban systems. Vulnerability maps were then prepared for each fragile urban system and overlaid together to identify the vulnerability hotspots.

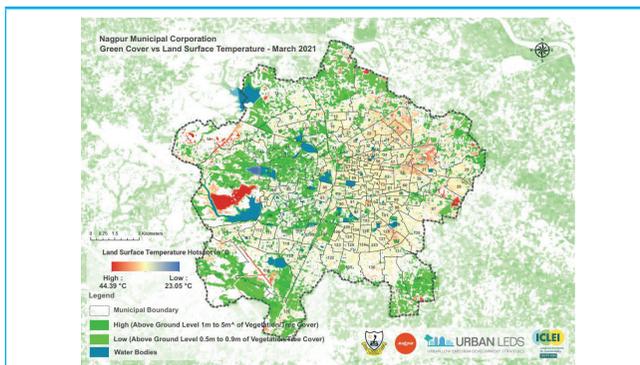
## Climate Projections:

- Nagpur will see an increase in monsoon rainfall of 12.5-30% by 2050s and an increase in annual mean temperature of 1.95 - 2.2°C as compared to the average climate during 1970-2000.

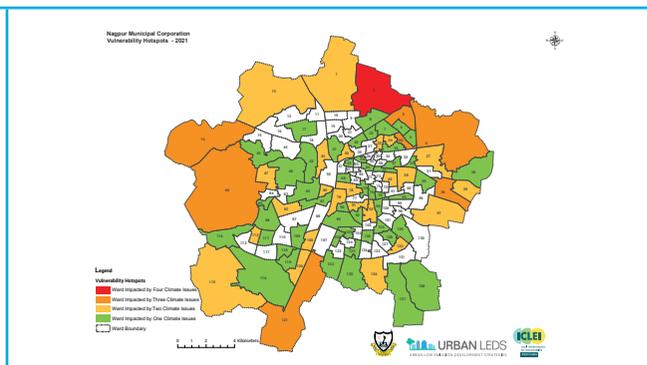


\* Risk Score (likelihood x consequence) – Low: 1 -4; Medium: 5 -10; High: 11 -20; Extreme: 20 -25

**Figure 2:** Climate Risks and Vulnerability Assessment for Nagpur City



**Figure 3:** Land surface temperature and green cover mapped together for Nagpur



**Figure 4:** Vulnerability hotspots of Nagpur City

## GHG Emissions Inventory

Economy-wide GHG emissions inventory for the city was developed for years 2013-14 to 2017-18. For year 2017-18, Nagpur's total GHG emissions stand at 3.03 million tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e), which translates to average per capita GHG emissions of of 1.13 tCO<sub>2</sub>e.

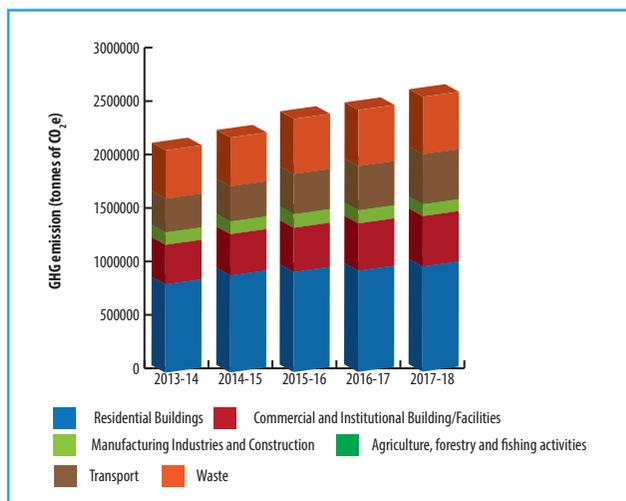


Figure 5: Trend of GHG Emissions in Nagpur from 2013-14 to 2017-18

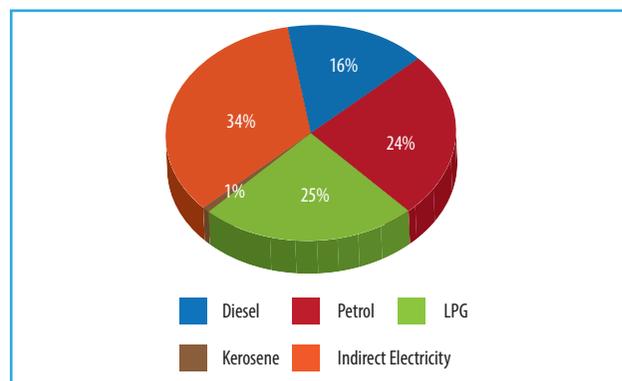


Figure 6: Share of Energy Consumption by Energy Source

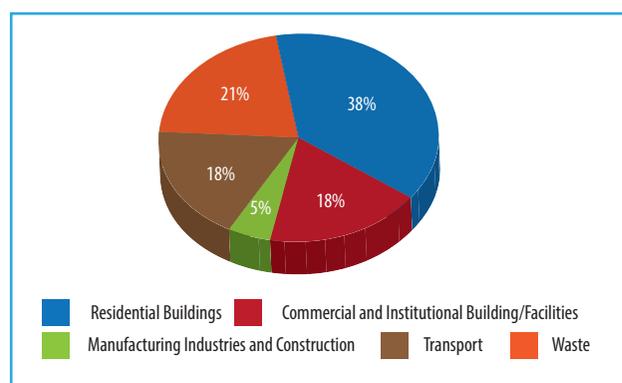


Figure 7: Sector-wise GHG Emission in Nagpur in 2017-18

## Action Plan

Sectors	Key Interventions	Mitigation Potential (tCO <sub>2</sub> e)	Overall Climate Resilience Impact
Solid Waste	<ul style="list-style-type: none"> <li>Waste to compost and RDF plant; promote decentralized bio-methanation</li> <li>Scientific closure of existing landfill</li> <li>Strengthen 3R implementation with IoT</li> </ul>	286,968	Highest potential to reduce carbon emissions. PPP model will lower financial impact on ULB
Residential Buildings	<ul style="list-style-type: none"> <li>Adopt existing Guidelines for Climate Responsive Homes in Nagpur</li> <li>Scale-up rooftop solar and solar water heaters</li> <li>Optimize energy efficiency of homes and apartments</li> <li>Green Building measures in new affordable housing</li> <li>Cool roof programme</li> </ul>	208,700	Reduction of GHG emissions. Improved awareness among citizens regarding uptake of RE & EE.
Commercial Buildings	<ul style="list-style-type: none"> <li>Expand benchmarking of energy consumption to additional commercial buildings</li> <li>Map rooftop solar PV potential and scale-up implementation through demand aggregation</li> <li>Assess potential for district cooling system</li> <li>Adopt energy efficient star-rated equipment</li> <li>Promote adoption of evaporative coolers</li> </ul>	56,670	Reduction of GHG emissions. Improved building energy performance. Participation by Private sector and citizens. IEC activities.
Industrial Buildings.	<ul style="list-style-type: none"> <li>Map solar PV potential in large industries</li> <li>At-scale installation of solar PV with energy storage</li> <li>Adoption of energy efficient appliances</li> </ul>	16,354	Reduction in GHG Emissions, improved building energy performance. Participation by industrial associations
Transport	<ul style="list-style-type: none"> <li>Map solar PV potential in large industries</li> <li>At-scale installation of solar PV with energy storage</li> <li>Adoption of energy efficient appliances</li> </ul>	32,558	Reduction of GHG emissions, improved air quality, reduced traffic congestion. Improved public health.
Street Lighting	<ul style="list-style-type: none"> <li>Expansion of on-going LED street lighting retrofits</li> </ul>	3,665	Reduced GHG emissions, better visibility & safety

Sectors	Key Interventions	Mitigation Potential (tCO <sub>2</sub> e)	Overall Climate Resilience Impact
Municipal Buildings	<ul style="list-style-type: none"> <li>Continue energy benchmarking and undertake energy efficiency retrofits for existing buildings</li> <li>Design and construct all new public buildings as Green buildings</li> <li>Net-metered rooftop solar PV systems</li> </ul>	1,888	Reduced GHG emissions, visibility, awareness. Improved public building operations and monetary savings.
Water	<ul style="list-style-type: none"> <li>Implement city-wide rainwater harvesting and groundwater recharge plan</li> <li>Reduction in NRW, water and energy audits</li> <li>Solar PV systems at water supply facilities</li> <li>Install automated Water ATMs</li> </ul>	7,024	Equitable and clean water supply. Improved water supply system efficiency with reduced emissions.
Sewerage	<ul style="list-style-type: none"> <li>Implement Nag River Pollution Abatement project;</li> <li>Dual plumbing, greywater reuse in large residential, commercial and institutional properties</li> <li>Decentralized wastewater treatment systems</li> <li>Faecal sludge management Policy</li> </ul>	549	Conservation of ecosystems – rivers. Reduction in methane emissions, contamination & health risks.
Storm water	<ul style="list-style-type: none"> <li>Strengthening the storm water coverage network and avoiding mixing of storm water &amp; sewage;</li> <li>IoT based storm water grid; Hydro-geological studies; Sustainable urban drainage systems;</li> <li>Enhancing capacity and authority of Nuisance Detection Squad to prevent solid waste dumping in storm water drains;</li> </ul>	-	Improved storm water network, prevention of urban floods and water logging
Disaster management, Biodiversity, Pollution control and Health	<ul style="list-style-type: none"> <li>Implementation of Local Biodiversity Strategy Action Plan</li> <li>Integration of Climate Risk and Vulnerability Assessment with Disaster Management Plan</li> <li>Lake Rejuvenation Plan</li> <li>Clean Air Action Plan</li> </ul>	-	Improved conservation of existing ecosystems – water bodies and rivers. Improved urban air quality and health of citizens. Improved resilience against local climate risks
<b>Total</b>		<b>614,706</b>	

**The Climate Resilient City Action Plan (2021-25) proposed actions with an annual GHG emission mitigation potential of 20% by 2025-26 over the 2017-18 baseline.**

The Accelerating climate action through the promotion of Urban Low Emission Development Strategies (Urban-LEDS II) project is a global initiative being implemented in more than 60 cities in eight countries. Urban-LEDS II supports participating local governments on low emission and climate resilient development to reduce greenhouse gas emissions and to adapt to climate change.

The project is funded by the European Commission and implemented jointly by UN-Habitat and ICLEI – Local Governments for Sustainability. It follows on from the first phase (Urban-LEDS I) that took place from 2012 to 2015.

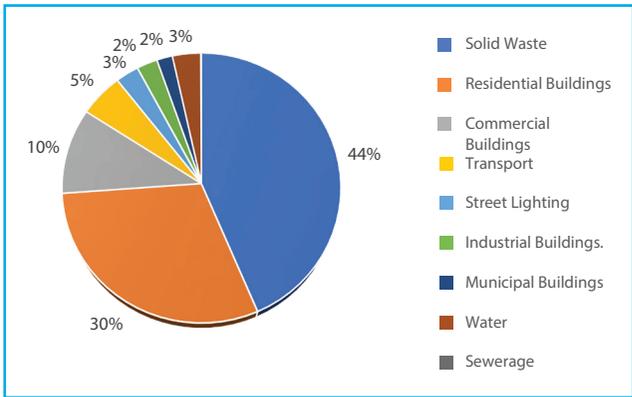
ICLEI South Asia is leading implementation of Urban-LEDS II in India and Bangladesh with support from UN-Habitat.

**Project Duration:** 2017-2021

**Model cities in India: Nagpur & Thane (deep-dive implementation), Rajkot (knowledge-sharing)**

**Satellite cities in India:** Coimbatore, Gwalior, Panaji, Pimpri-Chinchwad, Shimla (learning cities)

To know more, please visit [www.urban-leds.org](http://www.urban-leds.org)



**Figure 8: Total Annual Mitigation Potential of CRCAP-Nagpur**

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