



मुंबई CLIMATE ACTION PLAN 2022

Towards a Climate Resilient Mumbai



Summary for Policymakers

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TOWARDS A LOW CARBON CLIMATE RESILIENT MUMBAI

Mumbai, home to 12 million people and thriving on a diverse economy, is facing increasing climate-induced risks such as sea-level rise and extreme weather events.

Making climate change a priority, Mumbai signed the C40 Cities Deadline 2020 commitment, that aligns with the Paris Agreement, to reduce greenhouse gas (GHG) emissions to net zero by 2050. Mumbai's commitments also support the Government of India in achieving the Nationally Determined Contributions (NDCs) and are in line with the Government of Maharashtra's Majhi Vasundhara Abhiyaan, the Race2Zero campaign and other welcome policy initiatives towards sustainable and climate resilient development in Maharashtra.

In August 2021, the Government of Maharashtra, and the Brihanmumbai Municipal Corporation (BMC), launched the planning process for the city's first ever climate action plan. With technical support from the C40 Cities network and World Resources Institute India (WRI India), the Mumbai Climate Action Plan (MCAP) highlights the need for urgent climate action and envisions a safer, healthier and inclusive city for all.

KEY FEATURES OF MCAP

Data-based

Framed as a policy document, backed by data, it adopts a scientific evidence-based planning approach to mobilize resources and move from planning to implementation of strategic projects.

Streamlined

Aligned with the Mumbai Development Plan (DP) 2034, and several sector-specific plans and policies, it leverages existing institutional capital to reinforce Mumbai's climate goals.

Targets-based

Premised on a just transition to net zero pathways approach – it focuses on investments towards inclusive and transformative climate solutions and transparent and coordinated governance for a targets-based approach.

Participatory:

Followed an inclusive and consultative approach through conversations with subject experts, research organisations, citizen forums, international development agencies and municipal service providers.

Inclusivity of Process

Processes, that engage with impacted stakeholder groups

- MCAP website : **Talk to Us** page
- **Six** Subject Expert Consultations
- **Six** MCGM Departmental Consultations
- **Three** Administrative Zonal Consultations

Inclusivity of Policy

Policies, that are designed to keep people at the centre of decision making

- Climate risk and **access to goods and services** geospatially mapped
- **Inclusivity Analysis for all track-wise actions**
- **Equity & access driven action tracks**

Inclusivity of Impact

Mechanisms, that direct and distribute the outcomes equitably across citizen groups

- ICA indicators included in the actions table
- Inclusive KPIs in the MERL section
- Vulnerable Communities vertical as part of the Climate Action Cell

02 BASELINE ASSESSMENT

The MCAP is based on three assessments.

1. 'The Climate and Air Pollution Risks and Vulnerability Assessment' that places the issues of increasing risks and vulnerability in Mumbai city in the global context of climate change
2. The Green House Gas (GHG) inventory that identifies key sources responsible for emissions
3. An inventory of natural green cover in the city that can sequester carbon dioxide (CO₂)

A recent study by CEEW indicates Maharashtra is the 3rd most vulnerable state in India and Mumbai is one of five districts in Maharashtra most vulnerable to the compounded impacts of climate change. **Adaptation strategies** can help reduce Mumbai's vulnerability to climate change including the impact on its people, communities, infrastructure, systems, and services. **Mitigation strategies** work to reduce GHG emissions. The established link between GHG emissions and an increase in the frequency and intensity of extreme weather events requires us to take immediate steps to adapt to climate risks.

'The Climate and Air Pollution Risks and Vulnerability Assessment' helps evaluate the city's climate risk based on historic data. It uses a complex framework of indicators to quantify and spatialise differential vulnerabilities based on socio-economic and demographic characteristics as well as service accessibility that increases risk exposure and vulnerability in the poor and underdeveloped neighbourhoods of the city.



URBAN HEAT

Mumbai has seen a warming trend since 1973 with an increase of 0.25°C per decade, with 200+ days annually classified as extreme caution events since the mid-90s. Dense settlements, low vegetation cover and reflective building materials increase the risk of heat exposure. M/E ward is the most vulnerable to heat stress with over 40% of its population exposed to a surface temperature greater than 35°C.



URBAN FLOODING

Mumbai has been witnessing a steady increase in extreme rainfall events. Over 35% of Mumbai's population lives within a 250m radius buffer of BMC-reported flooding hotspots. Ward F/N has the highest number of flooding hotspots (54) with 65% of its population exposed to the risk of flooding. This is further aggravated by poor access to latrines within households (only 50%) in the F/N ward.



LANDSLIDES

Settlements on unstable slopes face increased prospects of rainfall-induced landslides. As per the data recorded by the Disaster Management Department at BMC, there are 287 locations within Greater Mumbai that are landslide-prone out of which 209 locations fall within the extent of informal settlements characterized by unstable structures and societal vulnerabilities.



COASTAL RISKS

As per the India Meteorological Department (IMD) Mumbai and other areas along the Arabian Sea were subjected to 18 cyclone events between 2011 to 2021. This is due to a slow, but steady, increase in annual mean sea surface temperature of the Arabian Sea. The western coastline of Mumbai doesn't show a dramatic change over years, in the form of erosion or accretion, due to 'tetrapods' that absorb strong tidal impacts. Our analysis on mangrove change based on satellite imagery (2008 - 2021) shows that 325 ha of dense mangrove cover has changed to sparse mangroves or intertidal mudflats due to excessive erosion and sedimentation, and 305 ha of mangrove cover has increased.

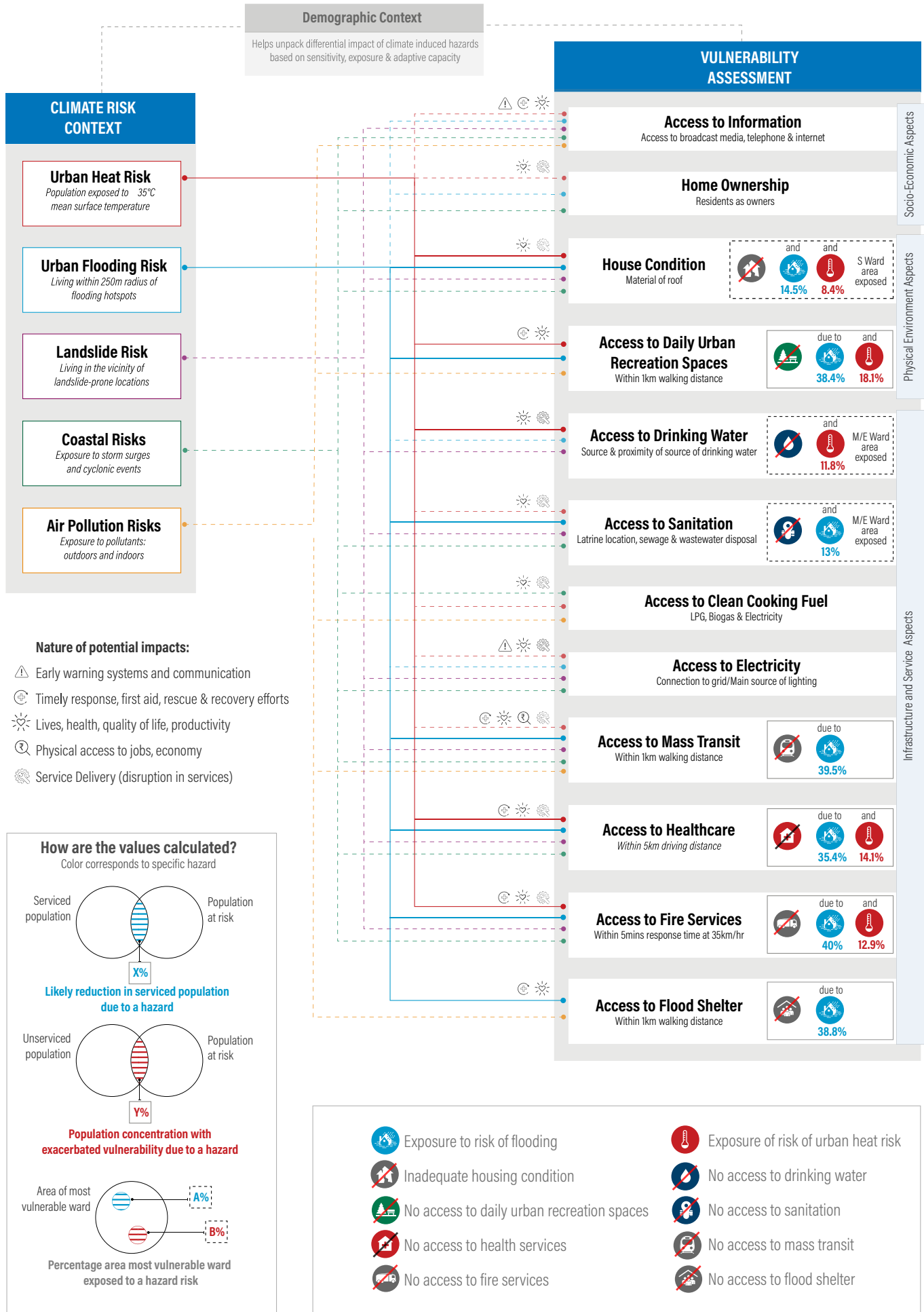


AIR POLLUTION

Although average annual concentrations of PM_{2.5} and PM₁₀ have declined over the years (2015-2020), they continue to remain above the National Ambient Air Quality (NAAQ) standards. Nitrogen dioxide is a major pollutant in Mumbai often crossing the annual permissible limit of 40 µg/m³ (2010-2020). The mean concentration levels of pollutants Sulphur Dioxide, Carbon Monoxide and Ammonia have been below the NAAQ permissible limits. Ozone also exhibited a gradual decreasing trend in annual concentration from 2015 to 2020, much below the CPCB permissible level of 51 (8hrs) ppb.

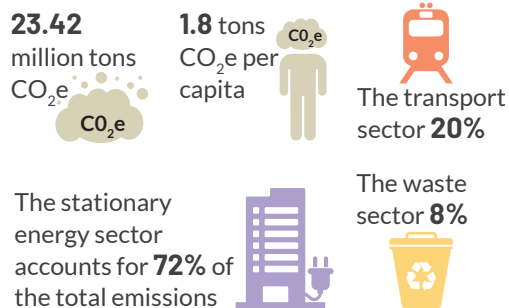


Climate and air pollution risks and vulnerability assessment framework (Source: WRI India)



03 MUMBAI'S GHG EMISSIONS (2019)

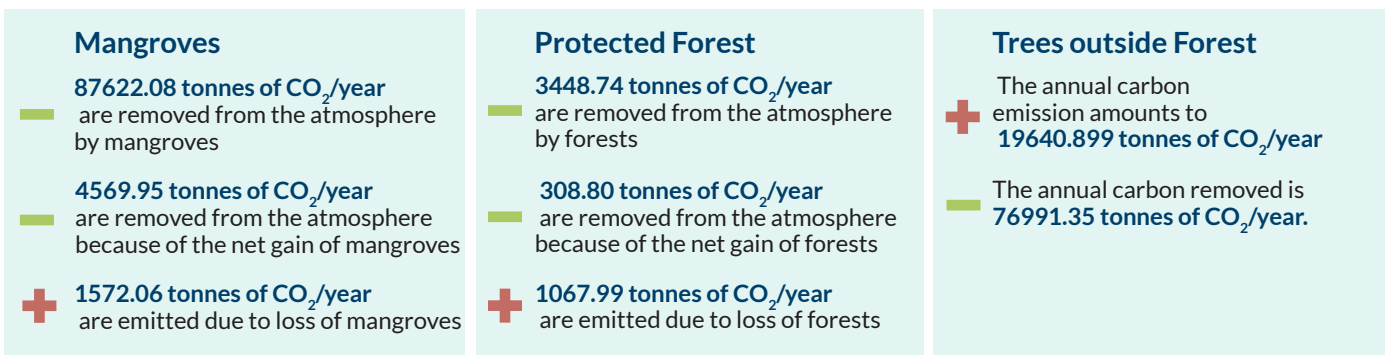
The Greenhouse Gas (GHG) Inventory for Mumbai includes an analysis of sectors and sources that emit carbon dioxide, methane and nitrous oxide and sinks that absorb (or sequester) GHGs from the atmosphere. This inventory will enable Mumbai to build evidence-based mitigation actions and policies and monitor progress.



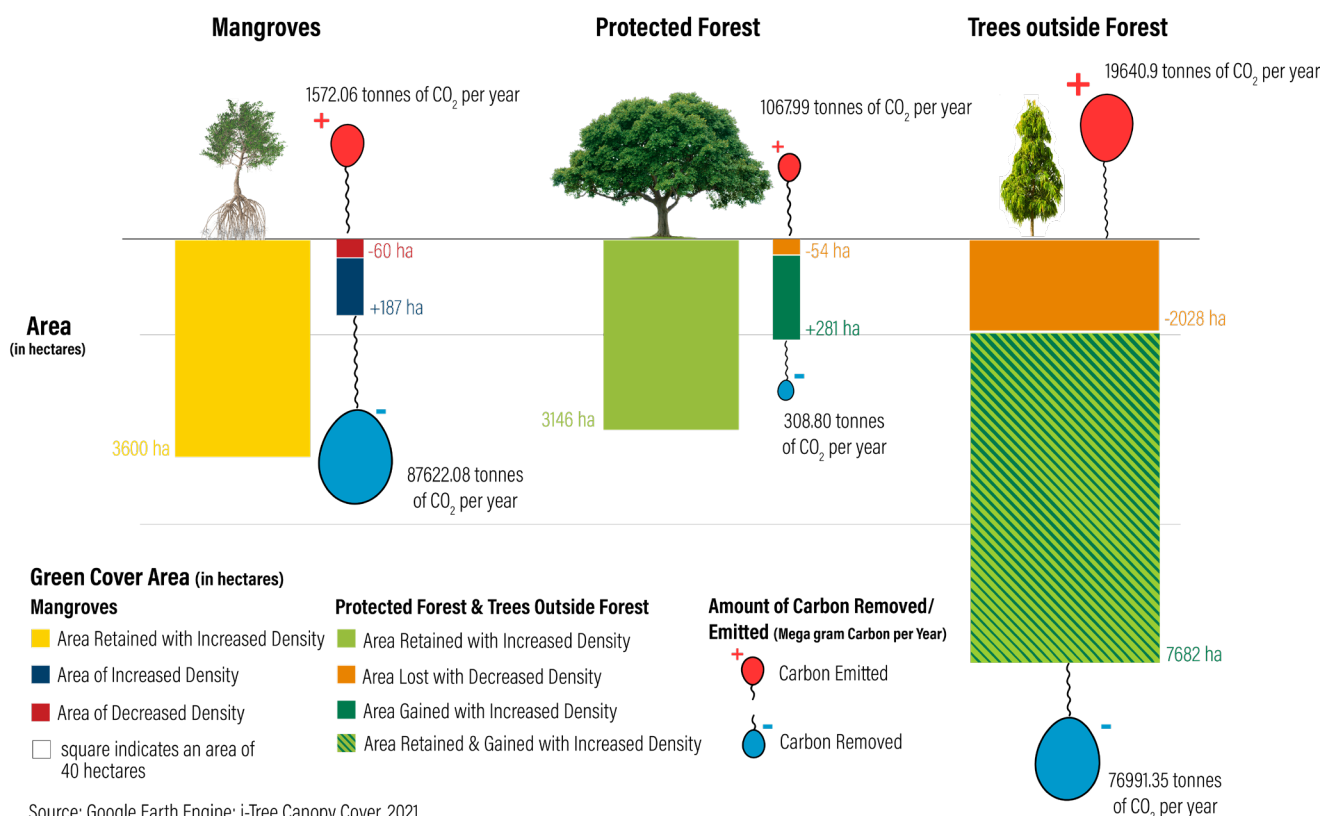
Critical Sources

In 2019, Mumbai's GHG emissions were 23.42 million tonnes CO₂e of which, the Stationary Energy sector is responsible for 16.9 million tonnes CO₂e (72% of total emissions). Most of the city's emissions come from energy use in residential buildings followed by commercial buildings and transport. Electricity consumption contributes significantly to total emissions (64.3%), due to the city's predominantly coal-based grid.

The Climate and Land Use Assessment (CLUA) helps calculate the carbon removal factor from forests, mangroves and trees.



Climate and air pollution risks and vulnerability assessment framework (Source: WRI India)



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FUTURE EMISSIONS SCENARIO ANALYSIS

Based on pathways scenarios developed under the MCAP, Mumbai has an overarching mitigation target of reaching net-zero emissions by 2050. Interim and long-term targets include 30% emissions reduction by 2030, 44% by 2040 and net zero by 2050 against base year emissions (2019).








In a 'Business as Usual' (BAU) scenario, i.e. with no actions, the emissions are expected to reach 64.8 million tonnes CO₂e/year by 2050, increasing 2.7 times between 2019-2050. This is slightly higher than the Indian level BAU trajectory of 2.5 times.

The Existing and Planned (E&P) scenario, which accounts for existing city, regional or national actions and policies and programs to reduce emissions, is expected to reach 51.3 million tons CO₂e/year by 2050, an increase of 119.4% in comparison to the base year emissions. Yet, the emission trends are not aligned with 1.5°C Paris Agreement and Deadline 2020 emission trajectories.

Therefore, an 'Ambitious' scenario was modelled to set the most 'ambitious yet achievable' trajectory for Mumbai, taking into account India's recent commitments at COP26, where the country set new targets to install 500 GW of renewable electricity capacity by 2050, source 50% of its energy demand from renewables by 2030 and announced a net zero target for the year 2070.

This scenario forecasts emissions to reduce by 27% by 2030 and 72% by 2050, amounting to a residual emission of 30% - the gap in meeting the 2050 target of net zero emissions. The majority residual emissions (approximately two-thirds) of residual emissions in 2050 is from buildings coming from LPG cooking, due to a perceived lack of policy appetite to shift cooking fuels away from LPG.

























Table: % emission reduction under E&P and Ambitious scenarios.

UNIT	SCENARIO	2019	2030	2040	2050
% reduction below base year level	Existing & Planned		 -43.3%	 -78.5%	 -119.4%
	Ambitious		 27.1%	 43.8%	 71.5%

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SECTORAL PRIORITIES AND ACTION TRACKS

The MCAP baseline assessment identifies six key sectors and associated action tracks

<p>ENERGY AND BUILDINGS</p>  <p>Decarbonize electricity grid</p>  <p>Transition to clean fuels and resource efficiency</p>  <p>Promote low carbon buildings</p>  <p>Encourage passive design strategies</p>	<p>SUSTAINABLE MOBILITY</p>  <p>Enhance public transport ridership</p>  <p>Improve access to NMT transport and infrastructure</p>  <p>Transition to zero emission vehicles</p>  <p>Shift to zero emission freight</p>
<p>SUSTAINABLE WASTE MANAGEMENT</p>  <p>Reduce landfilled waste</p>  <p>Decentralise waste management</p>  <p>Expedite remediation and scientific management of landfills</p>	<p>URBAN GREENING AND BIODIVERSITY</p>  <p>Increase vegetation cover and permeable surfaces</p>  <p>Reduce urban heat island effect</p>  <p>Promote equitable access to green open spaces</p>  <p>Restore and enhance biodiversity</p>
<p>AIR QUALITY</p>  <p>Curb pollution concentration levels</p>  <p>Improve monitoring and availability of information</p>  <p>Decentralise planning and increase awareness to enable community health resilience</p>	<p>URBAN FLOODING AND WATER RESOURCE MANAGEMENT</p>  <p>Build flood resilient systems and infrastructure</p>  <p>Localize water conservation and efficiency</p>  <p>Provide safe and affordable drinking water</p>  <p>Reduce pollution and restore aquatic ecosystems</p>  <p>Ensure clean, safe and accessible toilets</p>  <p>Manage disaster risk and reduce impacts</p>

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GOVERNANCE MECHANISMS TO OPERATIONALISE MCAP

To fulfil all of its commitments to the C40 network, as part of the Mumbai Climate Action Plan (MCAP) process, BMC has committed to three tasks:

- Create a climate action cell as a new department or within an existing department that will be responsible to implement the Mumbai CAP
- Update greenhouse gas emissions inventory and climate and air pollution risks and vulnerability assessment every two years
- Undertake Mumbai CAP revision every five years

Addressing issues of climate change require cross-sectoral and cross-departmental collaboration. While MCGM operates across city provisions, there are limitations to the capacities of the corporation when it comes to sectors like energy, regional transport, air quality and forest and mangrove conservation and restoration.

Sectoral priorities, such as decarbonizing the energy grid and large-scale forest and mangrove restoration, and low carbon and accessible transport, that fall within the jurisdiction of state and central authorities limit the scope of MCGM in influencing planning and decision-making.

There is a need for a dedicated authority for the MCAP implementation and timely updates of the inventory, assessments and the CAP. In this context, MCAP suggests MCGM to expand the duties of, and strengthen, the current Environment Department, as the Department of Environment and Climate Change (also referred to as: Climate Action Cell).

The Climate Action Cell will be part of a year-long capacity building and knowledge sharing program with C40 and the City of Oslo to develop its own Climate Budget and will -

- Be responsible for ensuring science-based planning and decision making, encouraging innovation and tracking progress of key targets and outcomes of the Mumbai CAP.
- Will be supported by the State Government of Maharashtra with a review meeting with the Maharashtra Council for Climate Change every six months.
- Have a group of honorary advisors, which can be expanded as the plan progresses, for effective implementation of the Mumbai CAP.

The Envisioned Objectives of the Department of Environment and Climate Change

Secure sufficient technical capacities within the corporation

Ensure innovation and use of latest technologies to meet climate targets

Facilitate cross-departmental conversations to mainstream climate resilience thinking and action

Develop and enforce guidelines in alignment with climate goals for new infrastructure and building projects

Monitor and evaluate Mumbai CAP progress against the set targets, at the city and local level

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CONSTITUTION OF THE DEPARTMENT OF ENVIRONMENT AND CLIMATE CHANGE (CLIMATE ACTION CELL)

The Climate Action Cell will continue to report to the Additional Municipal Commissioner – City, designated as the Nodal Officer for the MCAP, and will be headed by the Deputy Municipal Commissioner, Environment and Climate Change. The main functions of the cell will be to ensure timely implementation of the priority actions laid out in the MCAP.

In addition to the department's current duties of environmental protection, the climate action cell will include three new divisions. One that focuses on knowledge management and includes a monitoring, evaluation and reporting (MER) cell. The MER cell will be responsible to coordinate across all departments and zonal offices, and to update the GHG inventory and the Vulnerability Assessment every two years. The MER cell will also update the MCAP every 5 years. Second that focuses on climate resilience and a third that focuses on low-carbon climate solutions in the buildings and mobility sectors. The climate action cell will report to the Maharashtra Council for Climate Change every six months, to ensure timely implementation of the CAP.

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CONCLUSION

The Mumbai Climate Action Plan (MCAP) serves as a roadmap that outlines the city's strategies and actions to tackle climate change that is both a global challenge and a local crisis. The MCAP builds on policies and plans developed at city, regional, state and national levels and aligns with goals at the global (Sustainable Development Goals or SDGs) and regional (Majhi Vasundhara Abhiyan or MVA) levels.

The MCAP adopted a consultative and collaborative approach built on the contributions of several experts, Community Based Organizations, research institutions and private consultants. The process involved participation from BMC's departments and administrative wings at the zonal level, and in the future, will include suggestions and feedback from local political leaders to downscale climate actions to the local level.

Annexure 3 of the MCAP includes a list of CBOs, NGOs, think tanks, consultants and research institutes that are invested and working in Mumbai and who can be engaged and consulted during the progress reporting and learning process of MCAP.

The success of MCAP is also dependent on the residents of Mumbai and their willingness to adopt sustainable choices in their daily lives to help achieve several MCAP targets. Resident Welfare Associations, Advance Locality Management groups, civil society groups and private investors are encouraged to participate, deliberate and catalyse the success of Mumbai's first ever Climate Action Plan.





Shot in Five Gardens, Dadar by Aaran Patel

