Credits:

Aerial view of Gangtok

by ICLEI South Asia

3

Urban Planning, Green Cover and Biodiversity

Urban Planning, Green Cover and Biodiversity

Cities are a complex system of natural and built environments. With 4000+ urban centres and some of the fastest growing cities, Indian cities are facing immense urban planning challenges. Climate change impacts and the increasing number of extreme weather events pose additional risk to critical infrastructure and aggravate the vulnerability of residents. It is, therefore, important for our cities to adopt a climate sensitive approach to urban planning. This theme aims to assess the preparedness of cities for addressing and mitigating climate change impacts and disaster risks. It also focuses on nature-based solutions and conservation of natural systems like the water bodies, green cover, open spaces and biodiversity in the city for climate mitigation and adaptation. To that end, cities have been assessed based on formulation of strategies and action plans, integrating and mainstreaming climate actions in the masterplans, infrastructure DPRs and city budgets, implementation of projects, and functioning institutional, monitoring and review mechanisms.

Conserving, rejuvenating and increasing blue and green cover in a city can play a critical role in terms of climate mitigation and adaptation aspects by decreasing local temperature, carbon sequestration, protection in case of floods and helping recharge groundwater. For instance, urban forests can help mitigate some of the impacts of climate change by reducing Urban Heat Islands (UHIs) and heat stress, reducing storm water runoff, improving air quality, and improving health and wellbeing. In the US, urban forests reduce building energy use by 7.2%, equating to an emissions reduction of 43.8 million tonnes of CO_2 annually[1]. For rejuvenation and conservation of water bodies and open spaces, cities may refer the various schemes and policy guidelines to promote urban forestry as identified under India's National Redd+ Strategy 2018, the National Clean Air Action Plan 2019, Jal Shakti Abhiyan, Jal Jeevan Mission, and the URDPFI guidelines.

Loss of biodiversity can result in several direct and indirect impacts including reduced resilience to disasters (for instance, mangroves provide natural protection against cyclones and storm surges), reduced air/water/soil quality, changes in pest and disease patterns, changes in hydrological systems etc. The Biological Diversity Act, 2002 mandates constituting city level Biological Management Committees (BMCs), preparing inventories for local biodiversity, formulation of Local Biodiversity Strategies and Action Plans (LBSAPs). The City Biodiversity Index or Singapore Index helps cities to evaluate and monitor the progress of their biodiversity conservation efforts against their own individual baselines.

Another critical step for cities towards resilience building is developing city-level strategies, institutional and governance mechanisms for disaster risk reduction. While it is understood that the existing framework in India provides for formulation of a disaster management plan and committee at the district level, recent experience has shown that urban centres are at the frontline of managing and facing the brunt of disasters. This calls for focused local action to mitigate the impacts of extreme events on communities and infrastructures. National Disaster Management Authority (NDMA) guidelines of 2010, 2014, 2019 and the Ministry's SOP on urban flooding, 2017 provide guidance to cities on the subject.

The last indicator under this theme focuses on a comprehensive City Climate Action Plan addressing mitigation as well as adaptation aspects for cohesive local action. National and international guidelines recommend coordinated multi-stakeholder action; applying a climate lens to urban development plans, infrastructure investments & projects; and mainstreaming climate resilience in development codes, regulations & bylaws as key steps in the process. Cities may refer to the National Mission on Sustainable Habitat that provides the overarching framework and guidance to cities to undertake these actions.

Ms. Raina Singh
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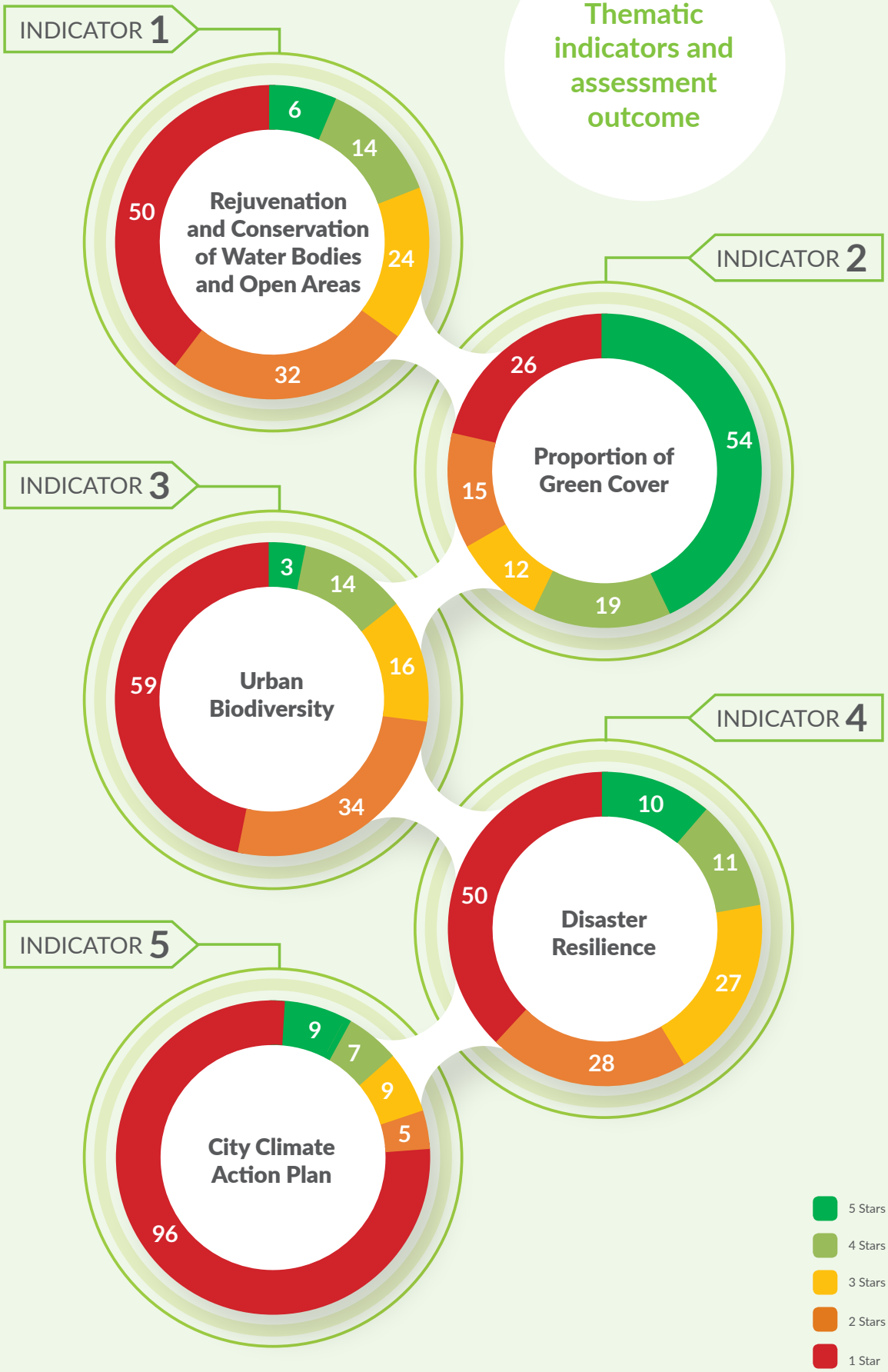
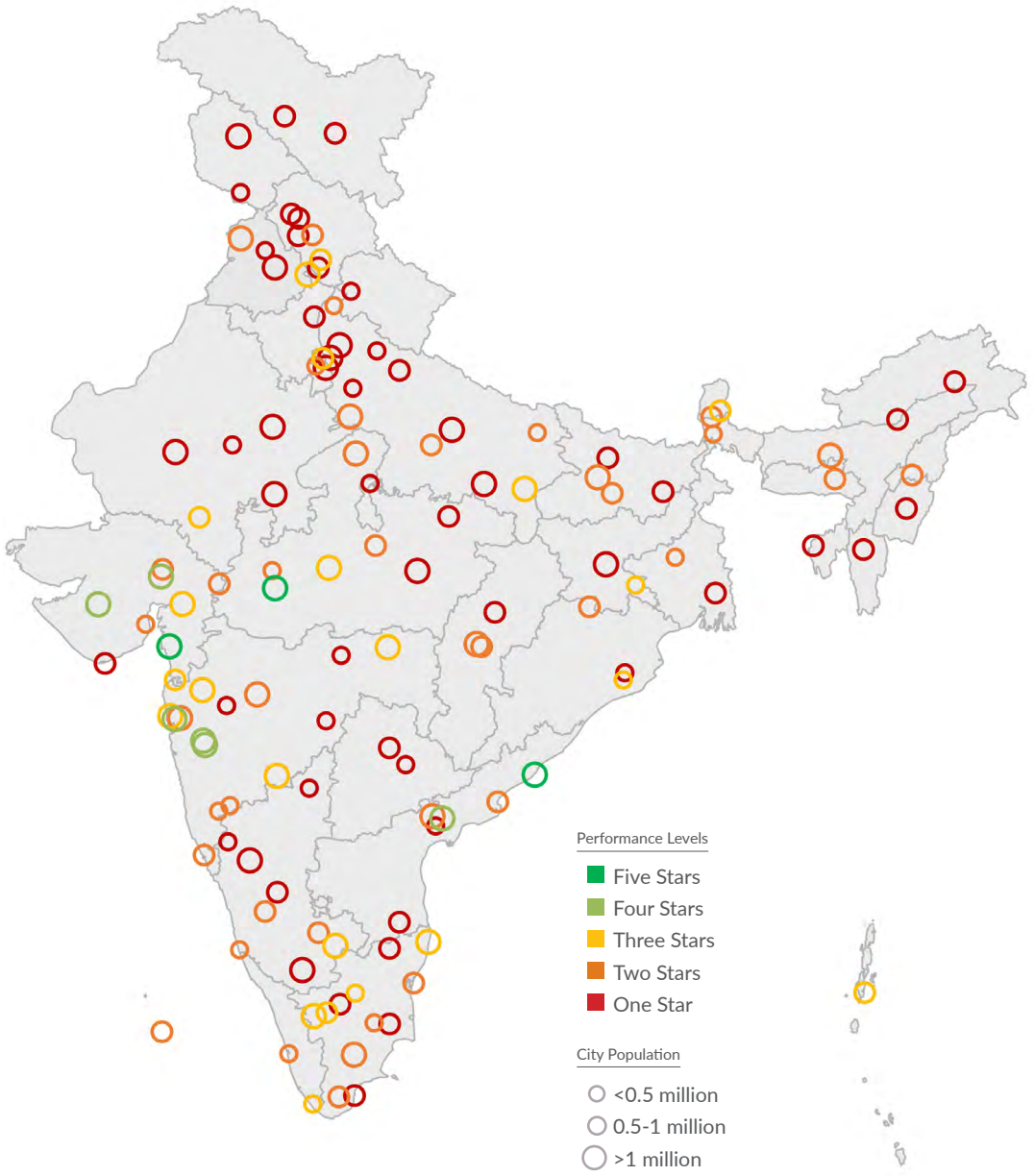
> "CSCAF 2.0 has presented a number of proofs-of-concept on city-level initiatives towards climate-smart urban planning, rejuvenation and conservation of water bodies, green cover and biodiversity. As cities increasingly face compounded risks emerging from urbanisation stresses, climate change and the pandemic, it is encouraging to note that they are acknowledging their key role and building coordinated efforts to address the same."

1. Nowak, D. J., Appleton, N., Ellis, A. & Greenfield, E., 2017. Residential building energy conservation and avoided power plant emissions by urban and community trees in the United States. Urban Forestry & Urban Greening, pp. 158-165.

Thematic indicators and assessment outcome





Performance of 126 Cities

3 cities (Visakhapatnam, Surat and Indore) are in the *Five Stars* category under the theme of Urban Planning, Green Cover and Biodiversity. The 3 cities have a population of more than a million and are covered under the Smart Cities Mission as well as AMRUT. 8 out of the 9 well performing cities (*Four Stars* and *Five Stars*) are from western and southern regions of the country. Overall, cities from the states of Gujarat and Maharashtra are relatively performing better.

Nearly all the cities are performing well in terms of the extent of green cover and water bodies present in the city. However, the evaluation indicates a gap in implementation of conservation actions and maintenance of these areas. Cities need to strengthen efforts through regular mapping, monitoring and targeted budget allocation to address these gaps. On the other hand, most cities - both under the Smart Cities and AMRUT Missions - are presently exploring the areas of urban biodiversity, disaster resilience and climate action planning at the local level. While recent guidelines from the Government of India, State Governments and the NGT have been instrumental in raising awareness and initiating the discourse on these aspects, cities are at a nascent stage of setting up institutional structures, planning and implementing measures. The evaluation reflects the key role of non-state actors in driving this process at city level.

3	5 Stars
6	4 Stars
22	3 Stars
40	2 Stars
55	1 Star

★★★★★

- **Indore**
- **Surat**
- **Visakhapatnam**

★★★★

- **Ahmedabad**
- **Pimpri Chinchwad**
- **Pune**
- **Rajkot**
- **Thane**
- **Vijayawada**

★★★

- **Bengaluru**
- **Bhopal**
- Bhubaneshwar
- Chandigarh
- **Chennai**
- **Coimbatore**
- Delhi
- Gangtok
- Jamshedpur
- Mira Bhayandar
- **Nagpur**
- **Nashik**
- Port Blair
- Salem
- Shimla
- Silvassa
- Solapur
- Tiruppur
- Tiruvanantapuram
- Udaipur
- **Vadodara**
- **Varanasi**

★★

- **Agra**
- Amravathi
- **Amritsar**
- **Aurangabad**
- Bhavnagar
- Bihar Sharif
- Dahod
- Durgapur
- Gandhinagar
- Gorakhpur
- Gurugram
- Guwahati
- **Gwalior**
- Kakinada
- **Kalyan Dombivali**
- **Kanpur**
- Kavaratti
- Kochi
- Kohima
- Kolhapur
- **Madurai**
- Mandi
- Mangalore
- Namchi
- Naya Raipur
- Panaji
- **Patna**
- Puducherry
- **Raipur**
- Rourkela
- **Sagar**
- Saharanpur
- Sangli Miraj & Kupwad
- Shillong
- Shivamogga
- Siliguri
- Tiruchirapalli
- Tirunelveli
- Tumakuru
- **Ujjain**

★

- Agartala
- Aizawl
- Ajmer
- Aligarh
- Amravati
- Bariely
- Belagavi
- Bhagalpur
- Bilaspur
- Cuttack
- Davangere
- Dehradun
- Dharamshala
- Diu
- Erode
- **Faridabad**
- **Ghaziabad**
- Gulbarga
- Guntur
- Hamirpur
- Hubli Dharwad
- Imphal
- Itanagar
- **Jabalpur**
- **Jaipur**
- Jalandhar
- Jammu
- Jhansi
- **Jodhpur**
- Kargil
- Karimnagar
- Karnal
- **Kota**
- Leh
- Loni
- **Lucknow**
- **Ludhiana**
- **Meerut**
- Moradabad
- Muzaffarpur
- Mysore
- Nanded
- New Town Kolkata
- Palampur
- Pasighat
- **Prayagraj**
- **Ranchi**
- **Satna**
- Solan
- **Srinagar**
- Thanjavur
- Tirupati
- Toothukudi
- Vellore
- Warangal

● Smart and AMRUT cities ◈ Smart cities ◆ AMRUT cities ○ Other cities *__Million + population cities__

INDICATOR 1

Rejuvenation and Conservation of Water Bodies and Open Areas

Urban Water Bodies and Open Areas play a critical role in climate change mitigation and adaptation as they help in combating urban heat islands. They also act as reservoirs for drinking water, retention basins for groundwater recharge, mitigate flooding, maintain biodiversity and help reduce the local temperature. With rapid urbanization and demand for built space, open areas and urban water bodies have been either reclaimed or encroached for development. Besides, management and maintenance the unplanned development remains a key issue catering to environmental degradation. For instance, at the beginning of 1960s Bangalore had 262 lakes, now only 10 hold water. Similarly, in 2001, 137 lakes were listed in Ahmedabad city, and over 65 were reported being built over.[2]

Recent initiatives such as the Jal Shakti Abhiyan, AMRUT and Smart Cities Mission address these key issues and provide guidelines to cities to formulate and implement conservation and rejuvenation actions. The National Guidelines for Preparation of Action Plan – Prevention and Management of Heatwave by NDMA (2019) provides guidance to prepare heat island maps.

Performance of 126 cities

- ✓ For this indicator, 6 cities have extensively mapped water bodies, open spaces and heat islands. All the 6 cities are covered under the AMRUT mission which has been a key enabler in helping these cities to formulate and implement informed actions in the form of rejuvenation and restoration of these areas. Two cities each from the states of Uttar Pradesh (Varanasi and Gorakhpur) , Gujarat (Ahmedabad and Surat) and Andhra Pradesh (Visakhapatnam and Vijayawada) constitute the cities in the *Five Stars* category.
- ✓ 32 cities have initiated mapping of water bodies and open spaces. While they have mapped the spatial extent, they need to build on attribute information and qualitative aspects to inform action planning. 38 cities (14 *Four Stars* and 24 *Three Stars*) have formulated strategies/ action plans along with budget allocation for implementation.
- ✓ 5 out of 6 *Five Stars* cities and 7 out of the 14 *Four Stars* cities are metropolitan cities. On the contrary, almost all participating small and medium towns are *One Star* cities. This reflects increased awareness and availability of resources - both technical & financial - to implement rejuvenation and conservation actions in metropolitan and large cities.
- ✓ All the 8 participating cities in the cold zones of the country are either in the *One Star* or *Two Stars* category indicating that they are beginning their efforts for rejuvenation of water bodies and open spaces. It is interesting to note that these cities fare well in terms of availability of open spaces (area wise), but lack conservation/rejuvenation efforts.

Actions

AHMEDABAD

Ahmedabad heat action plan is the first comprehensive early warning system and preparedness plan for extreme heat events in India launched in 2013 and updated in 2016. The Plan creates immediate and longer-term actions to increase preparedness, information-sharing, and response coordination to reduce the health impacts of extreme heat on vulnerable populations.

For the assessment of this indicator, all natural and manmade water bodies bound on all sides, listed under Census of Waterbody and 6th MI Census of Ministry of Water Resources, urban & peri-urban lakes under National Lake Conservation Plan (NLCP) and wetlands identified as per Wetland Management Conservation Rules 2017 were considered for assessment. For assessing the water quality monitoring, the Central Pollution Control Board (CPCB) guidelines have been considered. The open areas for this indicator are defined as recreational spaces, planned greens and green buffer zones as per URDPFI (Urban and Regional Development Plans Formulation and Implementation) Guidelines, 2014.

The indicator on rejuvenation of water bodies and open areas assesses cities based on the mapping of water bodies, open areas and heat islands. The informed actions along with the fund allocation for rejuvenation & conservation of water bodies and open spaces have been considered for advanced marking. Furthermore, cities that have provided evidence on the improvement in the status of water bodies and open areas have also been marked advantageously.

Way forward to improve Rejuvenation and Conservation of Water Bodies and Open Areas

- The cities which are in the *One Star* category can initiate the process for preparing GIS maps of water bodies with attributes for their area, depth, volume and current status including encroachments. The cities may also prepare GIS maps for open areas in the city with attributes of area, foliage cover, type of land, ownership of land, current status including encroachments and prepare GIS based temporal map series for urban heat islands. This can be done through remote sensing techniques (for example, using Landsat imagery) and by collecting air and surface area temperatures across the city.
- The cities which are in the *Two Stars* category have already mapped water bodies and open areas and are further recommended to initiate preparation of a city-wide a strategy for conservation and rejuvenation as per the guidelines for Urban Water Conservation under Jal Shakti Abhiyan and also allocate a portion of the budget for the rejuvenation and conservation of water bodies and open spaces with sub task such as utilization certificate; implementing bylaw, notification of the area, constitution of a committee, DPRs. These cities can also consider state level conservation regulations regarding encroachment and land acquisition for conservation initiatives, if any. For instance, the Akrama Sakrama Scheme 2013/14 by the Karnataka government for managing encroachments.
- 38 cities (14 *Four Stars* and 24 *Three Stars*) have initiated actions and allocated budgets for the rejuvenation and conservation of water bodies and open spaces. They are recommended to develop a spatial database to monitor the rejuvenated and conserved water bodies and open spaces over the time and monitor the changes/ improvement in the status and quality of water bodies and open spaces as per the CPCB guidelines for Water Quality Monitoring 2017. These cities can integrate the strategy for rejuvenation and conservation of water bodies and open spaces within the City Development Plan/Master Plan.

2. Centre for Science and Environment (CSE), 2012. Protection and Management of Urban Lakes in India. [Online] Available at: https://www.cseindia.org/protection-and-management-of-urban-lakes-in-india-7995 [Accessed March 2021].

INDICATOR 2

Proportion of Green Cover

Protected greenspaces reduce the impact of human activities on climate as they help in carbon sequestration, and maintaining urban microclimate, improving air and water quality, buffering noise pollution and conserving biodiversity. The World Health Organisation (WHO) prescribes 9 sqm of green space per capita in urban areas. In India, this figure varies from city to city with cities like Chennai and Pune having only 0.81 sqm per capita and 1.4 sqm per capita of green cover[3], respectively. At the national level, URDPFI (Urban and Regional Development Plans Formulation and Implementation) Guidelines, 2014, recommends at least 12%-18% green cover. Other policies and guidelines including MoHUA's Urban Greening Guidelines, 2014, the National Mission for Green India (GIM) under National Action Plan for Climate Change (NAPCC), and the National Clean Air Programme (NCAP) also provide spatial standards for city level green cover and identify key stakeholders for implementing greening initiatives like eco-restoration in urban and peri urban areas and plantation schemes for pollution hotspots. In addition, the state horticulture policies and city master plans provide context specific policies and regulations based on the city's growth pattern.

As per the CSCAF assessment of 126 cities, it is observed that cities have green cover ranging from less than 1% to

Performance of 126 cities

- ✓ Cities have performed well in this indicator with 65 cities meeting the prescribed URDPFI norm of 12% - >18% green cover within their municipal boundaries.
- ✓ The distribution of well performing cities (*Five Stars* and *Four Stars*) is almost equal across all types of towns- metropolitan cities, large cities, medium towns and small towns. Moreover, most of the participating small towns have performed well, with 7 out of the 9 participating small towns featuring among the *Four Stars* and *Five Stars* category with 12% - >18% or more green cover.
- ✓ The participating cities from Gujarat and Maharashtra have performed well with proactive local governments ensuring timely preparation and implementation of city planning and greening measures.
- ✓ Cities in the north-eastern region have also shown advanced actions with 8 out of 10 participating cities from the region in the *Four Stars* and *Five Stars* category. The hilly terrain along with conserved forest areas have contributed to this performance.
- ✓ 27 cities have taken qualitative initiatives for maintaining native tree species and density and taking measures to conserve and rejuvenate green cover under NACP and other applicable schemes.
- ✓ Of the top performing cities, 10 cities are of special mention as they have exhibited qualitative actions in addition to championing prescribed spatial standards for green cover, namely, Indore, Rajkot, Thane, Pune, Jamshedpur, Coimbatore, Salem, Varanasi, Sangli Miraj and Agra. All these cities are part of Smart City Mission and/or AMRUT except for Jamshedpur.

almost 90%. However, the equitable distribution and quality of the urban green cover remains a key issue, with most cities not monitoring or taking cohesive actions to improve the same. The Forest Survey of India and respective state forest departments have outlined measures like conducting Tree Census, but there remains a gap in its implementation at city level (by ULBs) and documentation of the qualitative aspects like tree density, canopy cover, native flora, etc. This may be attributed to limited mandate/guidelines for monitoring and reporting qualitative aspects of green cover management specific to urban areas. This indicator attempts to bridge this gap by assessing both quantitative and qualitative aspects.

The indicator on green cover assesses cities based on the proportion of existing green cover[4] within the city boundaries based on the standards set by URDPFI Guidelines, 2014. To encourage conservation of native vegetation and promote green cover action planning, bonus marks were given to cities that provided additional evidence on list of native tree species, tree density and tree canopy density, and strategy for increasing green cover in the city in line with the National Clean Air Plan (NCAP) with action initiated for the same. Cities were encouraged to provide a spatial mapping of the green cover within the municipal boundary that can help in monitoring changes over the years.

Actions

THANE

The Green Thane initiative, implemented between 2015-18, focused on a plantation drive and regeneration of degraded forest cover within the city limits. The co-benefits included recharge of ground water table to deal with water scarcity.

Way forward to increase urban green cover

- 26 *One Star* cities are encouraged to leverage on the existing schemes like Smart City Mission and AMRUT to increase and maintain green cover.
- Cities with existing environmental cells/committees, horticulture or parks & garden or forest department within the ULB may engage with various stakeholders and include representatives from town planning dept, development authority, PWD, horticulture dept., civil society and community group representatives wherever possible. Further attention can be drawn to document the establishment of the committee along with its activities such as DPR preparations, budget allocations and record of maintaining green spaces that can support in making informed decisions.
- In order to prioritize native tree species, cities are recommended to initiate a tree census in collaboration with local stakeholders like the CSOs, nature clubs, schools/colleges. At the same time, People's Biodiversity Register (PBR) can also be initiated.
- Cities can adopt various measures like:
  - » Align with state or national greening guidelines (National Greening Guidelines, MoHUA, 2014 and National Clean Air Action Plan, MoEFCC, 2019) to develop action plans.
  - » Convergence with other national/ state policies for promoting city and community level greening initiatives. For example, cities can leverage various policies and schemes to promote urban forestry as identified under India's National Redd+ Strategy, 2018. Similarly, the National Mission for Sustaining the Himalayan Ecosystem, 2010 , can be referred by cities in this region.
  - » Encourage the private sector to increase the green cover as part of Corporate Social Responsibility (CSR).
  - » Engage various stakeholders to foster community level activities such as plantations, developing community gardens, training sessions for household level gardening/ terrace gardening/vertical gardening wherever possible.

3. Imam, A. U. K. & Banerjee, U. K., 2016. [Online] Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4824703/ [Accessed March 2021].
4. For the purpose of this indicator, Green cover is defined as man-made city level and zonal/ district level greens; and reserved/ protected areas as per MoHUA's Urban Green Guidelines, 2014 and protected areas under Wildlife Protection Act 1972

INDICATOR 3

Urban Biodiversity

The SDG 11 (Sustainable Cities and Communities) and SDG 15 (Life on Land) outline the need to halt biodiversity loss. Urban biodiversity provides significant ecosystem services and any imbalance poses major challenges to sustainable development and affects the lives and livelihoods of residents. Extreme weather events due to climate change have grave impacts on urban biodiversity causing loss of habitats. The Rio Earth Summit 1992 was the first significant step towards formulating a policy/mandate for conserving biodiversity. In response to the Convention on Biological Diversity (CBD) signed at the Summit, the Biological Diversity Act, 2002, came into effect in India. The Act mandated formation of National Biodiversity Board in Chennai, State Biodiversity Boards and city level Biological Management Committees (BMCs) to strategize for local biodiversity conservation.

The Act also mandated comprehensive recording and reporting of local flora and fauna through preparation of People's Biodiversity Register (PBR). The role of local community and nature enthusiasts is key to preparation of this register. The PBR Guidelines, 2013, provide step-

Performance of 126 cities

- ✓ 3 cities of Maharashtra - Thane, Pimpri Chinchwad and Pune have performed well in urban biodiversity management.
- ✓ While more than 50% of the participating cities have instituted a BMC and have started exploring biodiversity conservation measures, most of them are yet to initiate substantial actions on this indicator. In this regard, nearly all participating cities of Maharashtra have established BMCs and are at various stages of progress in their actions.
- ✓ 17 progressive cities (3 *Five Stars* and 14 *Four Stars*) have collaborated actively with scientific and technical experts/ organisations as well as the local community. Involvement of non-state actors is seen to be advantageous for strengthening technical support which is reflected in actions taken by Kochi, Gangtok, Coimbatore and most of the cities of Maharashtra.
- ✓ More than 90% of the participating cities of Northern India (27 *One Star* and 8 *Two Stars*) require to step up their efforts significantly. Considering northern India has a climate ranging from hot-dry to cold, it is important to leverage local biodiversity knowledge to understand the species type and richness.
- ✓ Along with these, 13 cities in biodiversity rich States/UTs of Himachal Pradesh, Lakshadweep, Andaman and Nicobar Islands, Imphal, Mizoram, and Meghalaya given their geography and rich biodiversity need to strengthen their actions to preserve and manage their pristine ecosystems in a sustainable manner.
- ✓ It was also evident from the assessment that none of the participating cities have allocated separate resources for bio-diversity management within their municipal budgets as of yet..

by-step guidance to local departments/BMCs involved in preparation of PBR. The CBD Conference of Parties 2009 and 2019 introduced two other tools for self-assessment and plan making regarding urban biodiversity- the City Biodiversity Index or Singapore Index and Local Biodiversity Strategies and Action Plans (LBSAPs). The Singapore Index is a self-assessment tool for cities to evaluate and monitor the progress of their biodiversity conservation efforts against their own individual baselines. LBSAPs are integrated planning tools to manage internal and external biodiversity, and build a healthy and sustainable future for city dwellers. Therefore, the Convention of Biological Diversity (CBD) initiatives along with the Biological Diversity Act, 2002, provide the fundamental framework for urban biodiversity management in India.

The indicator on urban biodiversity assesses cities based on their compliance with the above legislation and policies in terms of institutional setup, inventory creation, action planning, review and monitoring at local level. This includes formation of Biodiversity Management Committees (BMC) and preparation of People's Biodiversity Register (PBR). The cities are ranked highly based on other advanced actions taken viz. calculation of city biodiversity index, incorporation of biodiversity conservation measures in master plans and other thematic plans, and allocation of financial resources for relevant biodiversity measures.

Actions

KOCHI

Kochi has developed Local Biodiversity Strategy and Action Plan (LBSAP) which allows the municipal corporation and other departments along with the local community to work together and deliver continued action for biodiversity stewardship. It includes the city profile, institutional and legal framework, actions and strategies, and its linkage with national and state objectives for biodiversity conservation.

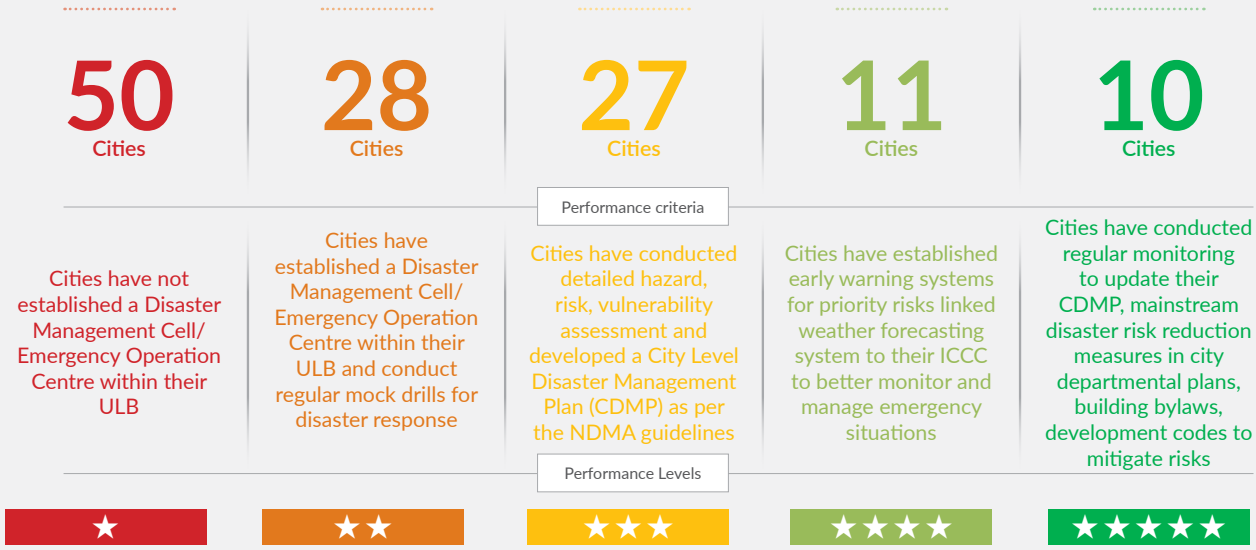
Way forward to enhance urban biodiversity

- 59 *One Star* cities are recommended to prioritize urban biodiversity in their planning and development by establishing a city-level biodiversity management committee as per the Biological Diversity Act, 2002. The committee shall include representatives from the state horticulture department, state forest department, TCPO, ULB, development authority, civil society and community representatives among others.
- 34 cities which already have BMCs instituted within their respective ULBs can initiate preparation of a People's Biodiversity Register (PBR) with active involvement of the local community. The revised guidelines for PBR by the National Biodiversity Authority (2013) can be referred for the same. Cities can also refer to the IUCN guidelines to prepare an inventory (all forms of technical reports/studies) of urban ecosystems and species (including International Union for Conservation of Nature, IUCN-listed ones).
- 16 cities that have complied with the institutional setup and baseline assessment requirements as per the legislation can initiate or update the calculation of the City Biodiversity Index (also called Singapore Index) to assess and monitor the city biodiversity status using the user's manual . Further, cities can initiate spatial mapping of biodiversity hotspots for better understanding and taking informed decisions regarding conserving biodiversity.
- Based on their baseline assessment (inventory/ PBR), 14 *Four Stars* cities are recommended to plan and implement appropriate measures for biodiversity conservation and management. This would include identifying measures to increase biodiversity within the master plan, greening plans and rejuvenation plans such as development and maintenance of a buffer zone between built and large natural areas to preserve biodiversity or also developing biodiversity parks.
- All 126 cities are recommended to prioritize allocation of funds within the municipal budget for various initiatives related to promotion of biodiversity in and around the municipal boundaries.

INDICATOR 4

Disaster Resilience

As hubs of population and economic activity, urban areas face the brunt of disasters, affecting development gains and quality of life, infrastructure investments and environment. In the last two decades, urban India has experienced unprecedented and erratic rainfall, flash floods of high intensity, super cyclonic storms and heat and cold waves in many cities across the country including Visakhapatnam, Surat, Chennai, Kochi, Srinagar, Delhi and Bangalore among others. Floods and tropical cyclones contribute almost 75% to the total mortalities per year due to extreme weather events[5]. In 2014, Visakhapatnam was ravaged by cyclone Hudhud with 40 persons losing their lives and infrastructure damages of over Rs. 21,000 crore. Thousands of trees were uprooted causing habitat loss and damage to its only biodiversity park at that time. Chennai has faced recurring urban flooding, the worst being the 2015 floods which led to loss of lives of more than 250 people with more than 1.3 lakh people rescued.[6] It is evident that cities are the frontline bearing the immediate shocks of the disaster along with responding and managing the disaster. These events coupled with the ongoing pandemic has added to the complexity of the challenges faced by



Performance of 126 cities

- ✓ 10 cities in the *Five Stars* category have adequate preparedness, response and recovery systems in place for tackling disasters. It is observed that a thrust from non-state actors has helped better performing cities like Shimla, Visakhapatnam, Surat, Vijayawada, among others. They have benefited via technical support in preparing Hazard, Risk & Vulnerability Assessment (HRVA) and mapping vulnerable areas, which is a precursor to preparing city disaster management plans.
- ✓ It is also noted that cities who have faced extreme weather events or natural disasters in the recent past have actively initiated adoption of city level guidelines for disaster management. For instance, 4 out of the 7 participating cities of Gujarat have shown increased adoption of the DM Act and NDMA guidelines at city level. With a history of plague epidemic and frequent urban flooding in Surat and Vadodara and the devastating Bhuj earthquake in 2001, city administrations have shown considerable preparedness for disaster management.
- ✓ A total of 35 cities have initiated preparation of city disaster management plans.
- ✓ 30 cities in states of Bihar, Himachal Pradesh (except Shimla), Uttarakhand, Arunachal Pradesh, Jammu and Kashmir, Ladakh, Kerala, Karnataka and West Bengal that are prone to cyclones, urban flooding and landslides, and 23 cities in Uttar Pradesh, Punjab and Rajasthan that are prone to heat and cold waves need to be proactive in gearing up their city level resilience structures considering the increased frequency of extreme weather events.

Actions

VISAKHAPATNAM

Visakhapatnam has prepared a comprehensive City Disaster Management Plan comprising of risk assessment of disasters and vulnerabilities and capabilities. The plan details out preparedness, response and action plan with focus on coastal mitigation measures.

cities. Therefore, there is an urgent need for cities to not only be able to provide prompt disaster response but also be prepared better through identification of their potential hazards, vulnerabilities, risk and capacity. It is important for cities to have robust plans in place to mitigate potential disaster risks and "build back better" including recovery, reconstruction and rehabilitation.

The SDG 11 recognises the importance of disaster risk reduction (DRR) practices for disaster management. The existing international frameworks for disaster management- the Sendai Framework for DRR and the 2030 Agenda for Sustainable Development-provide the foundational guiding principles. The Disaster Management Act, 2005, is the key legislation for disaster management in India. It mandates the setup of National Disaster Management Authority (NDMA), State Disaster Management Authorities (SDMAs) and District Disaster Management Authorities (DDMAs), and provides disaster specific guidelines/SOPs. Any transformative action based on the national and sub-national decisions needs to be implemented on-ground through local government or ULBs. The National Disaster Management Authority (NDMA) guidelines prescribe constitution of disaster management committee/cell and Emergency Operation Centre (EOC) at ULBs and preparation of City Disaster Management Plans (CDMPs).It is to be accompanied with a vulnerability and risk assessment for various hazards (HRVA) and detailed mapping of the same. In spite of the robust policy framework, disaster management initiatives are largely limited till district level with limited ULB level action. It is largely due to the fact that the city level institutional setup and planning is not a statutory requirement as per the Act, but only a prescribed guideline. This indicator seeks to address this challenge and encourage cities for prompt adoption of NDMA guidelines.

The indicator on disaster resilience assesses the readiness of cities/ULBs to tackle natural and manmade disaster events, and mitigate the loss and damages from the same by taking actions prescribed in the NDMA guidelines. This includes identifying vulnerable hotspots, developing HRV assessments, developing city disaster management plans aligning to district disaster management plans, establishing end-to-end early warning system and adopting relevant actions to reduce vulnerability to identified disasters. Cities are scored based on the progressive steps taken towards building disaster resilience such as institutionalizing a dedicated disaster management cell that can initiate basic disaster response actions, conducting assessments to understand their vulnerability and action taken towards building resilience, besides establishing communication networks in case of emergency.

Dr. Divya Sharma
India Executive Director
Climate Group

"Congratulations! CSCAF is a significant milestone for Indian cities to move towards a climate resilient future and adopt sustainable pathways. The framework captures contextual nuances, complexities of scale and diversity, and the socio-cultural, economic and political underpinning under which Indian cities operate. It can be a remarkable tool to help cities tackle climate-related vulnerabilities while building long-term resilience."

5. Ray, K. et al., 2021. An assessment of long-term changes in mortalities due to extreme weather events in India: A study of 50 years' data, 1970–2019. Weather and Climate Extremes, Volume 32.
Available at:https://www.sciencedirect.com/science/article/pii/S221209472100013X
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Way forward to build disaster resilience

- 50 cities which are at the early stage of development *(One Star)* are yet to streamline city level disaster management actions. These cities are suggested to institutionalize dedicated City Disaster Management Cell/Emergency Operation Centre (EOC) within ULB as per the NDMA Guidelines. This would involve setting up a committee /communication channel between the city, district, state disaster management cells/authority, district magistrate, revenue departments and technical experts.
- All cities, through the district disaster management authority/revenue department and disaster management cell at ULB, can start to document the annual loss and damage incurred due to disasters. This would include capturing the hazard/event, date, number of injured persons, deaths and infrastructure damage (INR), natural resource loss. Such a record of disaster events will help in understanding the trends, vulnerable hotspots/ communities/ assets, and take informed decisions in mitigating future disaster risks and stock-taking of resources.
- All cities are recommended to conduct and document regular annual mock drills as capacity building exercises to develop a trained task force and identify volunteers for disaster response.
- 28 *Two Stars* cities that have established city level EOC can prioritise spatial mapping and plan making. The cities are recommended to conduct ward level Hazard Risk, Vulnerability and Capacity Assessment (HRVA) based on the last five years of disaster profiling and socio economic profile plus community participation as per NDMA Guidelines (2010, 2014 and 2019) covering risk assessment (disaster type, frequency, impact), vulnerability profiling (social, environmental, financial,physical), and also capacity/asset mapping (for quick response).The above step paves way for a comprehensive city level disaster management plan to be prepared as per NDMA Guidelines (2010, 2014 and 2019) and the Ministry's standard operational procedure (SOP) on urban flooding (2017). Cities are suggested to prioritize spatial documentation as part of the plan by creating relevant GIS maps. The Hazard, Risk and Vulnerability Assessment can be documented spatially (as GIS files) at the ward level for better monitoring, analysis, and quick response in the emergency situation.
- 27 *Three Stars* cities that have a city level EOC and a city level disaster management plan are recommended to establish early warning systems (EWS) for disaster response which include setting up forecasting mechanisms with IMD, developing communication with facilities like SMSs, helplines, and regional coordination
- These cities can link the early warning system and weather forecasting system to the Integrated Command and Control Centre (ICCC) maintained by the Smart City SPV and/or ULB. Through this, the city can start targeting vulnerable people and locations by providing alerts using GIS.
- 11 cities with established EOCs and EWS are recommended to regularly monitor, update and maintain the city disaster management plan, the early warning system and an inventory of activities of the department wise special task force and their training modules.
- Key departments of the ULB in the 11 *Four Stars* and 10 *Five Stars* cities can have initiatives to reduce disaster risk and/or emergency management action plans of their own. This could include capacity building of the technical as well as response staff for the emergencies, precautionary measures required by the departments, equipment inventory, response team shift plans, and also separate funds for the execution. For example, drainage department should have clearance of storm water drainages prior to monsoon, should check upon equipment (JCB, waste collection trucks, etc) for the emergency situation. The city should also ensure that the states/city-level building bylaws/development controls/codes are addressing the hazards and vulnerabilities identified for the city. The Compendium of Laws on Disaster Management by NDMA (2015) can be referred.

Ms. Lauren Sorkin
Executive Director
Resilient Cities Network

"Every investment in climate readiness is an opportunity to enhance equity, to build more inclusive communities and protect people in an uncertain world. This Framework will help cities to seize this opportunity and to build and urban future that is more equitable and more resilient."

Credits:

ICCCC, Kochi:
The Integrated Command Control and Communication Centre (ICCCC) at Kochi aims to assist with disaster management operations besides supporting with governance and improved service delivery.

Smart Cities Mission, MoHUA

INDICATOR 5

City Climate Action Plan

As of 2017, India's per capita emissions are much lower - less than half - as compared to the global average. However, more than 70% of our emissions are coming from urban areas[7]. As part of the Paris Agreement on climate change (2015), wherein nations committed to take immediate action to keep the global temperature rise below 2°C of pre-industrial levels, urban areas have been identified as one of four critical global systems that can accelerate and upscale climate action. In 2016, India ratified the Paris Agreement and committed under its 'nationally determined contributions' (NDCs) among others to reduce the emission intensity of its GDP by 33-35% from 2005 level by 2030. It is estimated that by 2050, under the carbon-intensive scenario India will experience a decline of about 2%-6% in its GDP, predicted to reduce incomes by 9.8%[8].

On one side, cities are key contributors to emissions, on the other, they also experience severe impact of climate change with various degrees of risk to basic services, infrastructure, housing, livelihoods, health posing a serious threat to economic growth.

The indicator on the City Climate Action Plan assesses the cities on the basis of initiatives undertaken for mainstreaming and addressing climate change - mitigation and adaptation - in the urban planning and development process. For instance, in master plans, infrastructure development plans and allocation of municipal budgets.

Performance of 126 cities

- ✓ 9 cities have prepared and implemented city-level climate action plans, and are regularly monitoring and streamlining their climate actions. Support of non-state actors has been observed to be a key factor in this process, for e.g. Surat city has prepared a Sustainable Energy and Climate Action Plan with the support of IUC (International Urban Cooperation). Similarly, Udaipur and Rajkot have also prepared a city climate action plan with external support .
- ✓ 96 *One Star* cities are at the early stages of developing climate action planning. These cities need to initiate vulnerability assessment and GHG inventory preparation. Comprehensive training modules and climate assessment tool being developed by MoHUA will enable cities to prioritise and undertake contextualised climate actions. Cities are encouraged to initiate implementation of recommended measures in an integrated and participatory manner to build climate actions to advance in their performance.

Actions

UDAIPUR

Udaipur city has prepared the Climate Resilient City Action Plan that includes the preparation of the GHG emissions inventory for the city along with the vulnerability assessment and identification & prioritization of resilience interventions.

Cities have been scored for setting up dedicated climate change cells, nodal officers & agencies within the ULB to coordinate actions with various departments & stakeholders, prepared climate action plans including mitigation and adaptation aspects based on ward level assessment and city GHG inventory.

Way forward to prepare City Climate Action Plan

- 96 *One Star* cities are recommended to establish a city level stakeholder committee with key members from different agencies including, but not limited to, Municipal Corporation, Smart City SPV, Chamber of Commerce, Local University / Educational Institution, NGO/ INGOs, Regional or State Level Government Agencies such as State Disaster Management and civil society representatives.
- These cities may document the institutionalization of committee and climate coordination cell, and their activities (work plan timeline, initiatives/project reports, stakeholder engagement annual calendar). Climate coordination cell can develop and implement a work plan and annual reporting mechanism for activity tracking and performance evaluation in form of meeting time sheets, project reports, and annual reports. Regular monitoring/auditing of Climate Cell can be done by Climate Experts (State/Central agency) for each year. The City Municipal Commissioner/Officer may be responsible for the performance of Climate Cell of respective cities.
- Further, these cities can prepare a GHG emissions inventory for all sectors on the basis of established methodologies by IPCC, the Global Protocol for Community Scale GHG Emissions (GPC) and MoEFCC guidelines. City is also suggested to conduct a Climate Change Vulnerability assessment along with a GIS -based map of vulnerable areas/eco-sensitive zones. Cities can seek support from the Forest Department, National/State Remote Sensing Agencies, academia/ research institutions and/or civil society for this mapping exercise.
- Cities are recommended to develop a climate action plan, in a participatory manner and in accordance with national guidelines such as Guiding Principles for City Climate Action Planning from UN-HABITAT and the National Mission on Sustainable Habitat, to reduce GHG emissions and reduce the negative impacts of climate change. This would also include a financial plan and allocation of dedicated funds within municipal budget for implementation of the climate action plan.
- 9 *Three Stars* cities with climate action plans may coordinate with respective state line departments and development agencies for implementation of the same. Cities can choose to identify relevant/ responsible departments and seek their support for the same or can implement the climate action plans through public private partnerships (PPP) models.
- 7 *Four Stars* cities that have initiated implementation of climate action plans are recommended to periodically monitor the same through monitoring and review framework or third party assessments.
- City climate cells can ensure that climate action plans are reviewed and updated at least every 5 years (preferably annually) in a participatory manner through the city level stakeholder committee. Cities are also suggested to document this process.
- All cities are recommended to initiate mainstreaming climate action plans within the master plans and infrastructure development DPRs to ensure sustainability.

7. Sethi, M. (2015, May 10). Decoding Urban India's Carbon Footprint: Spatial Numerical Mapping of Thermal Energy Emissions. JSTOR, 108(No. 9), 1616-1623.
8. Mani, M., Bandyopadhyay, S., Chonabayashi, S., Markandya, A., & Mosier, T. (2018). South Asia's Hotspots: The Impact of Temperature and Precipitation Changes on Living Standards. South Asia Development Matters. Washington, DC, United States of America: The World Bank Group.

Credits:

Aerial view of Mumbai city before cyclone Nisarga, 2020

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Actions in the cities

Vijayawada

Greenery Development on Vijayawada Hills

Vijayawada has prepared a strategy for converting a dumpsite into Model Park at Ajith Singh Nagar and allocated Rs.2.37 crores for the same. The city has prepared a detailed project report for Greenery Development on Vijayawada Hills with the objective of conserving all open spaces and hillocks withing the city.

Agra

Action Plan to increase Green Cover

The city of Agra has prepared an action plan to increase green cover in the city by 15%. The action plan includes current status of green cover and assessment of the master plan of the city to devise long term strategies for increasing green cover.

Gangtok

Local Biodiversity Strategy and Action Plan (LBSAP)

The LBSAP of Gangtok sets out a framework and a plan of action for conservation and sustainable use of biological diversity and equitable sharing of benefits derived from this use. The city has defined its LBSAP vision as 'a prosperous Gangtok with focus on climate-smart development while ensuring the conservation of its cultural and ecological heritage'.

65 cities

are meeting the prescribed URDPFI norm of more than 12% green cover within their municipal boundaries

38 cities

have formulated strategies/action plans and have allocated a budget for rejuvenation & conservation of water bodies and open areas

35 cities

have initiated preparation of city disaster management plans

Shimla

Multi-Hazard Risk and Vulnerability Assessment (HRVA)

Shimla has conducted a Hazard, Risk and Vulnerability Analysis (HRVA) and developed a city level Risk Atlas to help stakeholders make risk-based choices to address vulnerabilities, mitigate hazards and prepare for response to and recovery from hazard events.

Chennai

City Disaster Management Plan

The Greater Chennai Corporation had prepared the first city disaster management plan as prescribed in the NDMA guidelines. The CDMP has taken into account the vulnerabilities present in the city based on its geography, demography, history and social and environmental aspects..

Surat

Sustainable Energy and Climate Action Plan

Surat has prepared the Sustainable Energy and Climate Action Plan that proposes actions for both climate change mitigation and adaptation based on a GHG emissions inventory and a climate change vulnerability assessment respectively.

62 cities

have instituted a Biodiversity Management Committee (BMC)

30 cities

have initiated/ completed vulnerability assessments and GHG inventory