

## 4.2 Urban Planning, Green Cover and Biodiversity



### Indicator 1: Rejuvenation & Conservation of Water Bodies & Open Areas

**Rationale:** Urban Environment consists of many aspects including water bodies, open spaces and built-up area. From climate adaptation and mitigation perspective all three aspects play a critical role. Rejuvenation of water bodies is significant to combat water crises. Water bodies are essential as reservoirs for drinking, as retention basins for groundwater recharge, for protection in case of floods and for maintaining biodiversity. Having local sources of fresh water decreases the dependence on energy for pumping purposes. Open spaces, namely recreational spaces, planned greens and green buffer zones (as per URDPFI Guidelines 2014) in any city play a critical role in terms of climate mitigation and adaptation aspects by decreasing local temperature and help recharge groundwater. Increase in build-up areas and decrease of water bodies and open spaces lead to an increase in the local temperature within a city

**Description:** Is the city undertaking rejuvenation and conservation of water bodies & open areas thus trying to combat the heat-island effect.

**Methodology:**

The information concerning the current extent and status of water bodies and open areas can be mapped using data sourced from concerned department/agencies. The area within the municipal boundary has

to be considered. This figure has to be compared with the existing masterplan (percentage and area). For this indicator the definitions of water bodies and open areas are given as follows:

**Water Bodies:** All natural and manmade water bodies bound on all sides, listed under Census of Water body and 6th MI Census of Ministry of Water Resources, urban & peri-urban lakes under NCLP and wetlands identified as per Wetland Management Conservation Rules 2017 will be considered for the purpose of this indicator. For water quality, CPCB guidelines for water quality monitoring to be referred.

**Open Areas:** Open areas are defined as recreational spaces, planned greens and green buffer zones as per URDPFI Guidelines, 2014.

An urban heat island is an urban area or metropolitan area that is significantly warmer than its surrounding areas/ rural areas due to human activities. Developing an urban heat island map along with the informed actions taken by the ULBs/Planning authorities for combating urban heat island, and for increasing rejuvenated and conserved water bodies and open areas, will be useful in assessing the implementation status of such projects and its effectiveness.

**Formula:**

NA

**Unit:** NA

**Maximum Score:** Total score for the indicator is 100. Cities are marked in 5 levels with scores ranging from 0-100. In this indicator the level 3 and 4 have been merged taking into consideration the initiation of rejuvenation work and allocation of budget that goes hand in hand. Out of the total 50 marks allocated, cities will receive incremental scores ranging from 1-25 based on the evidence(s) provided for actions initiated. Similarly, for evidences(s) provided on fund allocation and expenditure for the actions, cities will receive another 1-25 marks. Finally, cities scoring a total of >25 and >50 marks will be considered in level 3 and level 4 respectively.

### Performance Evaluation Levels:

**Table 4.7: Rejuvenation & Conservation of Water Bodies & Open Areas**

	1	2	3/4	5
<b>Progression Levels</b>	No Action Initiated	Assessment of urban water bodies and open areas	Allocation of Budget and Implementation	Monitoring, Review & Maintenance
<b>Evidence/ Data sources</b>	No Action Initiated	<ul style="list-style-type: none"> <li>Mapping of water bodies which includes their location, area, depth, volume and current status (ownership, encroachment, protected/ conserved/ maintained as per prescribed guidelines) has been carried out for the current year.</li> <li>Mapping of open areas (planned greens) with details of current status (including ownership, encroachment, protected/ conserved/ maintained as per prescribed guidelines) has been carried out for the current year.</li> <li>Urban heat island map for the city has been prepared</li> </ul>	<ul style="list-style-type: none"> <li>Informed actions for rejuvenation and conservation of water bodies and open areas have been initiated (with supporting documents: photographs, proof of contracts, etc.) based on mapping and assessments conducted at level 2.</li> <li>Proof of fund allocation and expenditure for conservation and rejuvenation</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring, review &amp; maintenance mechanisms in place for long-term sustainability of rejuvenation &amp; conservation actions</li> <li>Evidence on change/ improvement in status and quality of open areas and water bodies. as per relevant guidelines</li> <li>Map of rejuvenated &amp; conserved water bodies &amp; open areas as a .kml file (polygon geometry)</li> </ul>
<b>Responsible Department/ Agency</b>	ULB, Development Authority, Town Planning Department, National Remote Sensing Agency, State Remote Sensing Agency, Horticulture department, Environment officer			
<b>Reference</b>	<p>Lake Rejuvenation in Udaipur <a href="http://smartnet.niua.org/sites/default/files/resources/22.pdf">http://smartnet.niua.org/sites/default/files/resources/22.pdf</a>            URDPFI Guidelines, 2014  <a href="http://mohua.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20Vol%20I.pdf">http://mohua.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20Vol%20I.pdf</a>  <a href="http://mohua.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20IIA-IIB(1).pdf">http://mohua.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20IIA-IIB(1).pdf</a></p> <p>Manual for Data Collection for Census of Water bodies <a href="http://mowr.gov.in/sites/default/files/Instruction%20Manual%20for%20Census%20of%20Water%20Bodies.pdf">http://mowr.gov.in/sites/default/files/Instruction%20Manual%20for%20Census%20of%20Water%20Bodies.pdf</a></p> <p>Wetland Management Conservation Rules 2017  <a href="https://yamuna-revival.nic.in/wp-content/uploads/2019/02/Wetlands-Conservation-Management-Rules-2017.pdf">https://yamuna-revival.nic.in/wp-content/uploads/2019/02/Wetlands-Conservation-Management-Rules-2017.pdf</a></p> <p>Guidelines for National Lake Conservation Plan  <a href="https://smartnet.niua.org/sites/default/files/resources/NLCP_guideline_0.pdf">https://smartnet.niua.org/sites/default/files/resources/NLCP_guideline_0.pdf</a></p> <p>CPCB guidelines for water quality monitoring 2017  <a href="https://cpcb.nic.in/wqm/Guidelines_Water_Quality_Monitoring_2017.pdf">https://cpcb.nic.in/wqm/Guidelines_Water_Quality_Monitoring_2017.pdf</a></p> <p>Advisory on Conservation and Restoration of Water Bodies in Urban Areas <a href="http://mohua.gov.in/upload/uploadfiles/files/Advisory%20on%20Urban%20Water%20Bodies.pdf">http://mohua.gov.in/upload/uploadfiles/files/Advisory%20on%20Urban%20Water%20Bodies.pdf</a></p> <p>Water Conservation Measures Guidelines of MoHUA under Jal Shakti Abhiyan <a href="http://mohua.gov.in/upload/uploadfiles/files/Guidelines%20for%20Urban%20Water%20conservation%20Jal%20Shakti%20Abhiyan.pdf">http://mohua.gov.in/upload/uploadfiles/files/Guidelines%20for%20Urban%20Water%20conservation%20Jal%20Shakti%20Abhiyan.pdf</a></p>			
<b>Score</b>	0	25	75	100



## Indicator 2: Proportion of Green Cover

**Rationale:** Sufficiently large and protected greenspaces reduce the impact of human activities on climate.

The ecosystem services provided by the urban greenspaces help the city in general and its citizens to adapt to the adverse effects of climate change and disasters

**Description:** To what extent is the city developing and increasing its green cover. Green Cover, defined as natural or planted vegetation covering a certain area of terrain, functioning as protection against soil erosion, protecting the fauna, and balancing the temperature. For the purpose of this indicator, green areas are 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 the Wildlife Protection Act, 1972.

**Methodology:** Data available on area of urban greens can be analysed from satellite imagery. Recent imagery can be procured from the state or National Remote Sensing Centre (NRSC). Baseline year: 2019. Comparative analysis using the formula given below on a yearly basis will help to understand the increase/decrease over time. This data is also being reported by cities for the Ease of Living Index (Indicator 3.2.1) and may be sourced from there.

### Formula:

$$\frac{\text{Green Cover in sq.km}}{\text{Municipal area in sq.km}} \times 100$$

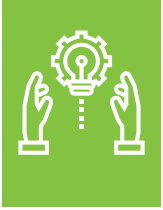
**Unit:** %

**Maximum Score:** Total score for the indicator is 100. Cities will be marked in 5 levels with scores ranging from 0 – 100. In this indicator, certain bonus marks will be provided for cities that are taking additional desirable measures towards protection of green cover.

1. Additional 10 marks for reporting on additional qualitative data – list of native tree species, tree density, and tree canopy density. ( Applicable for levels 1 to 4)
2. Additional 10 marks for developing the strategy for increasing Green Cover in the city in line with the National Clean Air Plan (NCAP). ( Applicable for levels 1 to 4)
3. Additional 5 marks for providing evidence on action initiated for points 1 and 2 above. ( Applicable for levels 1 to 4)

### Performance Evaluation Levels: Table 4.8: Green cover

	1	2	3	4	5
<b>Progression Levels</b>	0% to <5% Green Cover	5% to < 9% Green Cover	9% to < 12% Green Cover	12% to < 18% Green Cover	≥ 18% Green Cover
<b>Evidence/ Data sources</b>	• Map of green cover within municipal boundary for this year as a .kml file (polygon geometry)				
<b>Responsible Department/ Agency</b>	National Remote Sensing Centre, State Remote Sensing Centre, Urban Planning or Development Authority, Forest Department				
<b>Reference</b>	Advisory on Urban Green Cover and Biodiversity, WWF, 2019 <a href="https://tinyurl.com/v4b7tlh">https://tinyurl.com/v4b7tlh</a> Water Conservation Measures Guidelines of MoHUA under Jal Shakti Abhiyan <a href="http://mohua.gov.in/upload/uploadfiles/files/Guidelines%20for%20Urban%20Water%20conservation%20Jal%20Shakti%20Abhiyan.pdf">http://mohua.gov.in/upload/uploadfiles/files/Guidelines%20for%20Urban%20Water%20conservation%20Jal%20Shakti%20Abhiyan.pdf</a> Urban Green Guidelines 2014, Town and Country Planning Organisation, MoHUA <a href="http://mohua.gov.in/upload/uploadfiles/files/G%20G%202014(2).pdf">http://mohua.gov.in/upload/uploadfiles/files/G%20G%202014(2).pdf</a>				
<b>Score</b>	0	25	50	75	100



### Indicator 3: Urban Biodiversity

**Rationale:** Urban biodiversity provides significant ecosystem services contributing to climate change mitigation and adaptation, such

as carbon sequestration, air and water purification, mitigation of impacts of environmental pollution, noise reduction, and regulation of microclimate. High biodiversity increases the resilience of the city

**Description:** To what extent is the city acting for protection, conservation and management of urban biodiversity

**Methodology:** Data on biodiversity can be obtained from the Biodiversity Management Committee and the people's Biodiversity register (instituted as per on the Biological Diversity Act, 2002). City Biodiversity Index is a self-assessment tool for cities to evaluate and monitor the progress of their biodiversity conservation efforts against their own individual baselines.

**Formula:**

NA

**Unit:** NA

**Maximum Score:** Total score for the indicator is 100. Cities will be marked in 5 levels with scores ranging from 0 – 100. For levels 4 and 5, cities will receive incremental scores ranging from 1-25 based on the measures undertaken and evidence(s) provided.

**Performance Evaluation Levels:  
Table 4.g: Urban Biodiversity**

	1	2	3	4	5
<b>Progression Levels</b>	No Action Initiated	Institutional Set-Up	Baseline Assessment	Urban Biodiversity Improvement Measures	Implementation of Actions
<b>Evidence/ Data sources</b>	No action initiated	<ul style="list-style-type: none"> <li>Establishment of City Level Biodiversity Management Committee (as per Biological Diversity Act, 2002; City council resolution; announcement to State Biodiversity Board)</li> </ul>	<ul style="list-style-type: none"> <li>People's Biodiversity Register (based on the Biological Diversity Act, 2002, Letter of State Biodiversity Board validating register)</li> <li>Inventory of urban ecosystems and species (including International Union for Conservation of Nature, IUCN listed species)</li> </ul>	<ul style="list-style-type: none"> <li>Funds/ Municipal Budget allocated</li> <li>Identification of measures to increase biodiversity within master plan/ greening plans/ rejuvenation plans</li> </ul>	<ul style="list-style-type: none"> <li>Calculation of City Biodiversity Index (Report with the calculated index)</li> <li>Evidence on implementation of measures identified in level 4</li> <li>Evidence on change/ improvement in species diversity (species list of various taxa)</li> <li>Map of areas where measures to increase biodiversity have been taken as .kml files (polygon geometry) wherever applicable</li> </ul>
<b>Responsible Department/ Agency</b>	State Horticulture Department, State Forest Department, ULB, Environment Department; Biodiversity Management Committee, State Horticulture Department, State Forest Department, TCPO, ULB, Development Authority				
<b>Reference</b>	Advisory on Urban Green Cover and Biodiversity, WWF, 2019 <a href="https://tinyurl.com/v4b7tln">https://tinyurl.com/v4b7tln</a> The Biological Diversity Act, 2002 <a href="http://moef.gov.in/environment/biodiversity/">http://moef.gov.in/environment/biodiversity/</a> User's Manual on the Singapore Index on Cities ' Biodiversity <a href="https://www.cbd.int/authorities/doc/Singapore-Index-User-Manual-20140730-en.pdf">https://www.cbd.int/authorities/doc/Singapore-Index-User-Manual-20140730-en.pdf</a>				
<b>Score</b>	0	25	50	75	100



## Indicator 4: Disaster Resilience

**Rationale:** In urban areas the brunt of any kind of disaster (human or nature induced) is borne by the urban inhabitants and also by the urban infrastructure. As effects of climate variability leading to extreme events are becoming more severe and frequent, the incidents of damage to urban infrastructure are also increasing. Therefore, it is important that all cities, especially Smart Cities, should not only be able to identify their potential hazards, vulnerabilities and risk but also be prepared for prompt response during disaster situation as well as have robust plans in place to "Build Back Better" including recovery, reconstruction and rehabilitation.

**Description:** To what extent the city is prepared and resilient to tackle natural and manmade disasters and if it aligns with the Sendai Framework for DRR, NDMA Guidelines (2010, 2014, 2019) and MoHUA's SOP on Urban Flooding (2017).

### Methodology

Disaster Management Plan: The National Disaster Management Act, 2005, the National Policy on Disaster Management 2009 (NPDM) and the National Disaster Management Authority (NDMA) provide direction and a framework to the government agencies at all levels

(National, State and Local) to prepare for all phases of disaster management cycle i.e. a) mitigation (prevention and risk reduction), b) preparedness, c) response and d) recovery (immediate restoration to long term betterment reconstruction). In accordance with the provisions of the Disaster Management Act and the policy a National Disaster Management Plan (NDMP) is prepared, which is a dynamic document and needs to be periodically updated. Similarly, each State, District / City level plans has to be prepared in line with the NDMA guidelines (2014) issued by the National Disaster Management Authority.

**Ward-level Hazard Risk, Vulnerability and Capacity Assessment:** The municipal administration along with the ward level officers shall initiate a participatory process among the community groups and the representatives of ULBs to assess the vulnerabilities and risks to various hazards in their respective areas. Wherever possible the disaster management (DM) teams shall be involved in the process. Please refer to the National Policy Guidelines, National Disaster Management Authority.

**Early Warning Systems** An effective Early warning System needs to be end-to-end, people-centred, across sectors and multiple levels with a continuous feedback mechanism for improvement.

### Formula:

NA

### Unit: NA

**Maximum Score:** Total score for the indicator is 100. Cities will be marked in 5 levels with scores ranging from 0 – 100. For levels 3, 4 and 5, cities will receive incremental scores ranging from 1-25 based on the measures undertaken and evidence(s) provided.

**Performance Evaluation Levels:  
Table 4.10: Disaster Resilience**

	1	2	3	4	5
<b>Progression Levels</b>	Disaster and Risk Reduction is yet to be prioritized	Institutional Mechanism Established	Disaster Management Plan	Plan Implementation	Monitoring, Updating Mainstreaming
<b>Evidence/ Data sources</b>	City level plan not initiated	<ul style="list-style-type: none"> <li>City level loss and damage data has been collated and documented (last 5 years)</li> <li>Institutionalizing and establishing of dedicated Disaster Management Cell/ Emergency Operation Centre (EOC) within ULB (based on NDMA Guidelines, 2010)</li> <li>First responders/ volunteers for disaster response identified. Training and mock drills conducted.</li> </ul>	<ul style="list-style-type: none"> <li>Ward-level Hazard Risk (hydromet, geophysical and public health), Vulnerability and Capacity Assessment prepared for the current year in a participatory manner (based on NDMA Guidelines, 2010)</li> <li>Map of ward wise hazard, vulnerability and capacity information as a .kml file (polygon geometry)</li> <li>City Level Disaster Management Plan, prepared as per NDMA Guidelines and vetted by State Disaster Management Authority</li> </ul>	<ul style="list-style-type: none"> <li>Establishment of Early warning systems for priority risks incl. helpline and early warning systems along Weather Forecasting System are linked to Integrated Command and Control Centers (ICCC) for regular monitoring and managing emergency situations</li> <li>Map of alert systems across the city as a .kml file (point or polygon geometry with attribute: type of alert)</li> </ul>	<ul style="list-style-type: none"> <li>Regular monitoring and review of City level Disaster Management Plan conducted</li> <li>Mainstreaming disaster risk reduction in departmental plans within the ULB</li> <li>The States/ City level Building Bylaws/ Development Controls/ Codes address hazard and vulnerability identified at level 2</li> </ul>
<b>Responsible Department/ Agency</b>	ULB in coordination with District administration, State Disaster Management Authority, State Revenue Department; State Irrigation Department				
<b>Reference</b>	Greater Chennai City Disaster Management Plan, 2018 - <a href="https://www.chennaicorporation.gov.in/images/CDMP%20Book%20Wrapper%20Full%20Book%20(%20English).pdf">https://www.chennaicorporation.gov.in/images/CDMP%20Book%20Wrapper%20Full%20Book%20(%20English).pdf</a> Ahmedabad Heat Action Plan, 2019 - <a href="https://www.nrdc.org/sites/default/files/ahmedabad-heat-action-plan-2018.pdf">https://www.nrdc.org/sites/default/files/ahmedabad-heat-action-plan-2018.pdf</a> NDMA Guidelines, 2010, 2014, 2019 ( <a href="https://ndma.gov.in/en/ndma-guidelines.html">https://ndma.gov.in/en/ndma-guidelines.html</a> ) SOP on Urban Flooding, 2017 ( <a href="https://smartnet.niua.org/content/55ad7139-2d37-4831-a74a-d228720ce584">https://smartnet.niua.org/content/55ad7139-2d37-4831-a74a-d228720ce584</a> )				
<b>Score</b>	0	25	50	75	100



## Indicator 5: City Climate Action Plan

**Rationale:** As part of the Paris Agreement on climate change (2015), many nations committed to take immediate action to keep the global temperature rise below 2°C of pre-industrial levels. 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; to achieve about 40% cumulative electric power installed from non-fossil fuel based energy resources by 2030 and to create an additional carbon sink of 2.5 to 3 billion tonnes of CO<sub>2</sub> equivalent through additional forest and tree cover by 2030. With much of India's development dependent on cities, consistent with the objectives of the Paris Agreement, cities urgently need to plan and implement climate actions in an integrated and inclusive way through the following measures: mitigation of greenhouse gas emissions and adaptation to climate change impacts to foster wider social, cultural, economic and environmental benefits.

**Description:** Climate Action Plan (mitigation and adaptation) has to be prepared and implemented by the city. It should be developed in a comprehensive manner covering all sectors, including waste management, integrated water management, mobility and air pollution, energy and green buildings; biodiversity, green cover, disaster risk preparedness and urban planning. The plan has to propose actions for both climate change mitigation and adaptation based on a GHG emissions inventory and a climate change vulnerability assessment respectively, addressing all sectors listed above. Regular monitoring,

reporting and verification (MRV) of the plan is essential to qualify and quantify the measures implemented for achieving accountability, and improved impact.

### Methodology:

**Climate Change Mitigation:** GHG emission inventory to be prepared for all sectors on the basis of the Global Protocol for Community Scale GHG Emissions (GPC). Other detailed GHG emission assessments using any other tools based on the IPCC global protocol will also be considered.

**Climate Change Adaptation:** Vulnerability Assessment for the city.: The Intergovernmental Panel on Climate Change (IPCC) identifies three components of climate change vulnerability: exposure, sensitivity and adaptive capacity. Manifold toolboxes and collections of methods to evaluate impacts, vulnerability and adaptation to climate change exist. It is recommended that a comprehensive vulnerability assessment and identification of gaps is undertaken based on the United Nations Framework Convention on Climate Change (UNFCCC) methodology.

**Climate Action Plan:** based on the GHG inventory as well as on the vulnerability assessment, a Climate Action Plan for the city addressing all issues of mitigation and adaptation has to be developed. The Guiding Principles for City Climate Action Planning from UN-HABITAT and the National Mission on Sustainable Habitat could be referred to, however the sectors to be covered under the plan should at least include all sectors as covered under the ClimateSmart Cities Assessment Framework.

### Formula:

NA

### Unit: NA

**Maximum Score:** Total score for this indicator is 100. Cities will be marked in 4 levels with scores ranging from 0 – 100.

For level 2, cities will receive incremental scores ranging from 1-50 based on the measures undertaken and evidence(s) provided. For levels 3 and 4, cities will receive incremental scores ranging from 1-25 based on the measures undertaken and evidence(s) provided.



**Performance Evaluation Levels:  
Table 4.11: City Climate Action Plan**

	1	2	3	4
<b>Progression Levels</b>	Climate Action Plan not considered	Institutional Mechanism Established and Plan prepared	Implementation	Regular Monitoring & Streamlining
<b>Evidence/ Data sources</b>	Climate Action Plan not initiated	<ul style="list-style-type: none"> <li>• ULB Level Climate coordination cell established</li> <li>• City Level Stakeholder Committee constituted and consulted regularly</li> <li>• City level climate assessments - GHG Inventory or Vulnerability Assessment (as per indicator 4) - have been conducted</li> <li>• Mitigation and/or Adaptation Areas have been assessed for the city</li> <li>• Climate Action Plan (including mitigation and adaptation strategies) prepared for the city in a participatory manner</li> </ul>	<ul style="list-style-type: none"> <li>• Funds/ Municipal Budget of last financial year shows allocation</li> <li>• Implementation of measures initiated (with supporting evidence)</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring Reporting and Verification (MRV) system prepared and implemented</li> <li>• Relevant recommendations from the Climate Action Plan is incorporated in master plan</li> </ul>
<b>Responsible Department/ Agency</b>	Municipal Corporation / Smart City SPV / Chief Climate or Resilience Officer's office; Environment Officer; Town Planning Department, Development Authority, State/ City Transport Department			
<b>Reference</b>	Surat Resilience Strategy <a href="http://scct-surat.in/download/pdf/11.pdf">http://scct-surat.in/download/pdf/11.pdf</a> Rajkot: Climate Resilient City Action Plan <a href="https://tinyurl.com/ts48gsd">https://tinyurl.com/ts48gsd</a> (Video Link : <a href="https://www.youtube.com/watch?v=Yy3duEaOqkk">https://www.youtube.com/watch?v=Yy3duEaOqkk</a> ) National Mission on Sustainable Habitat <a href="https://smartnet.niua.org/csc/assets/pdf/key-documents/phase-2/Up-GreenC-and-BIO/National-Mission-on-Sustainable-Habitat.pdf">https://smartnet.niua.org/csc/assets/pdf/key-documents/phase-2/Up-GreenC-and-BIO/National-Mission-on-Sustainable-Habitat.pdf</a> UN Habitat Guiding Principles <a href="https://smartnet.niua.org/csc/assets/pdf/RepositoryData/UP_Green_Cover/UNHabitat_Planning_for_Climate_Change.pdf">https://smartnet.niua.org/csc/assets/pdf/RepositoryData/UP_Green_Cover/UNHabitat_Planning_for_Climate_Change.pdf</a>			
<b>Score</b>	0	50	75	100