# Climate Resilient Cities - Local Governance Perspective


## Research Study

**2022-23**

Regional Centre for Urban & Environmental Studies
All India Institute of Local Self-Government, Mumbai
Established in the year 1968, is fully supported by Ministry of Housing and Urban Affairs, Government of India

# Preface

The impacts of climate change are already being felt around the world, from melting glaciers and rising sea levels to more frequent and severe heat waves, floods, and droughts. Climate change is not just an environmental issue; it is also a social and economic issue that disproportionately affects vulnerable populations such as low-income communities, indigenous people, and those living in developing countries.

The urgency of addressing climate change has become increasingly apparent, and local governments are expected to play a crucial role in mitigating its impacts as they are able to implement climate action at a more localized and targeted level, making it easier to achieve tangible results and engage with communities. However, managing and integrating the data necessary for climate action commitments can be a daunting task for urban local bodies (ULBs). It is also important to have a comprehensive understanding of climate change, vulnerability, and risk assessment frameworks, as well as methods and models relevant to climate action. Therefore, there is a need to provide holistic analysis to ULBs to make informed decisions and take effective actions toward climate change mitigation and adaptation by identifying gaps and overlaps in climate action activities and providing recommendations for managing, integrating, and reporting data.

The project aimed to study the existing climate initiatives, multiple schemes, policies (NDC, NAPCC), programs, and plans at local (CCAP), regional (SAPCC), national & international levels, identify the barriers in implementation, and facilitate the ULBs by bridging the gap on the critical segments that stalls the initiation of climate action or that prevents them from reporting the initiatives taken by them in the desired formats. The study was based on primary and secondary research. The challenges in the implementation of climate action were understood by visiting 5 selected cities from Rajasthan (Jodhpur & Ajmer) & Maharashtra (Solapur, Sangli & Nanded). The observations of challenges were found to be in alignment with those documented in the referenced literature. The major bottleneck was found to be the lack of understanding of the alignment of the objectives of various schemes, programs, and policies that the ULB is already working on with the climate action and the lack of knowledge on the reporting frameworks. Appropriate guidance is provided through the report as well as the best practices book. This serves the objective of the research project i.e. to ease the responsibilities of the ULBs by guiding them on adopting to managing and integrating the data for the city's climate action commitments, thereby reducing their burden.

# Acknowledgement

I take this opportunity to put on record our deep appreciation for the Ministry of Housing & Urban Affairs (MoHUA), Government of India (GoI) for providing us an opportunity to work on this study.
I would also like to express my gratitude to Shri. Ranjit Chavan, President, All India Institute of Local Self Government, for providing invaluable guidance and support to help us complete this report. Additionally, I extend my sincere thanks to Dr. Jairaj Phatak, IAS (Retd.), Director General, All India Institute of Local Self Government, for his unwavering support in completing this report.
This research study was undertaken by Cipher Environmental Solutions LLP, Thane with RCUES, AIILSG, Mumbai. I wish to express my heartfelt appreciation to Dr. Ketna Atul Matkar, Director of Cipher Environmental Solutions LLP, Thane, and Ms. Anuja Pimplapure, Project Associate at Cipher Environmental Solutions LLP, Thane for completing this report and coming up with governance & policy recommendations, most importantly for providing the interlinkages between existing climate initiatives at the National, Subnational & International Levels with existing schemes, policies & programs. We also acknowledge and appreciate the submission of a book on best practices titled “Climate actions in Indian cities: Special coverage on Climate Action in 5 cities from Rajasthan & Maharashtra” which has been additionally prepared as a part of the project. The efforts would help in reducing the burden of the urban local bodies and help in facilitating climate action.
I am also grateful to RCUES's research team for their continued support throughout the completion of this study. Together, we have produced a report that offers critical insights and recommendations that will help local self-government bodies take appropriate actions to mitigate climate change.

**Director**
**RCUES, AIILSG, Mumbai**

# Table of Contents

# Table of Contents

# List of Tables



# List of Figures

# Abbreviations

| | |
|---|---|
| AGWRS | Artificial Ground Water Recharge Scheme |
| AIILSG | All India Institute of Local Self-Government |
| AMRUT | Atal Mission for Rejuvenation and Urban Transformation |
| AVI | Adavanced Vegetation Index |
| BEE | Bureau of Energy Efficiency |
| BLY | Bachat Lamp Yojana |
| C & D | Construction & Demolition Waste |
| CAMPA | Compensatory Afforestation Fund Management and Planning Authority |
| CC | Cliamte Change |
| CCAP | City Climate Action Plan |
| CCR | Carbonn Climate Registry |
| CEEW | Council on Energy, Environment and Water |
| CFL | Compact fluorescent lamps |
| CO2 | Carbon Dioxide |
| CSCAF | Climate Smart Cities Assessment Framework |
| CSTEP | Center for Study of Science, Technology and Policy |
| CVI | Climate Vulnerability Index |
| EMPRI | Environmental Management & Policy Research Institute |
| GCF | Green Climate Fund |
| GCoM | Global Covenant of Mayors for Climate & Energy |
| GDP | Gross Domestic Product |
| GHG | Green House Gas |
| GIM | Green India Mission |
| GIS | Geographic Information Systems |
| GIZ | Deutsche Gesellschaft für Internationale Zusammenarbeit |
| ICLEI | Local Governments for Sustainability |
| IGEA | International Green Economy Association |
| IIMA | Indian Institute of Management Ahmedabad |
| IISc | Indian Institute of Science |
| IITB | Indian Institute of Technology |
| IMD | India Meteorological Department |
| INRM | Integrated Natural Resource Management |
| IPCC | Intergovernmental Panel on Climate Change |
| IPDS | Integrated Power Development Scheme |
| IWLDP | Integrated Waste Land Development Scheme |
| IWMP | Integrated Watershed Management Programme |
| LAHDC | Ladakh Autonomous Hill Development Council |
| LED | Light-emitting diode |
| LiFE | Lifestyle for Environment |
| LLP | Limited Liability Partnership |
| MLVI | Macro level vulnerability index |
| MoHUA | Ministry of Housing and Urban Affairs |
| NABARD | National Bank for Agriculture and RuralDevelopment |
| NAM | National Afforestation Mission |
| NAP | National Afforestation Program |
| NAPCC | National Action Plan for Climate Change |
| NAZCA | Non-State Actor Zone for Climate Action |
| NBP | National Bioenergy Programme |
| NCAP | National Clean Air Programme |
| NDC | Nationally Determined Contribution |
| NEMMP | National Electric Mobility Mission Plan |
| NGHM | National Green Highways Mission |
| NGMI | National Mission for a Green India |
| NGO | Non-Government Organization |
| NHM | National Health Mission |
| NMEEE | National Mission for Enhanced Energy Efficiency |
| NMSA | National Mission for Sustainable Agriculture |
| NMSH | National Mission on Sustainable Habitat |
| NMSHE | National Mission for Sustaining the Himalayan Ecosystem |
| NMSKCC | National Mission on Strategic Knowledge for Climate Change |

# Abbreviations

| | |
|---|---|
| NSM | National Solar Mission |
| NWM | National Water Mission |
| PAT | Perform, Achieve and Trade |
| PCCF | Principal Chief Conservator of Fores |
| PIB | Press Information Bureau |
| PMGSY | Pradhan Mantri Gram Sadak Yojana |
| PMKSY | Pradhan Mantri Krishi Sinchayee Yojana |
| PMKUSUM | Pradhan Mantri Kisan Urja Suraksha evam Utthan Mahabhiyan |
| PMMSY | Pradhan Mantri Matsya Sampada Yojana |
| R & D | Research & Development |
| R-APDRP | Restructured Accelerated Power Development and Reforms Programme |
| RCP | Representative Concentration Pathway |
| RCUES | Regional Centre for Urban & Environmental Studies |
| SAPCC | State Action Plans on Climate Change |
| SATAT | Sustainable Alternative Towards Affordable Transportation |
| SBM-U | Swachh Bharat Mission-Urban 2.0 |
| SDG | Sustainable Development Goals |
| SEI | Stockholm Environment Institute |
| SEVI | Socioeconomic Vulnerability Index |
| SLNP | Street Lighting National Programme |
| SMAF | Sub-Mission on Agroforestry |
| SNA | Social Network Analysis |
| SPI | Standard Precipitation Index |
| STP | Sewage Treatment Plant |
| SWM | Solid Waste Management |
| SWOT | Strength Weakness Opportunity & Threat |
| TERI | The Energy and Resources Institute |
| UCLG | United Cities & Local Governments |
| UDAY | Ujwal DISCOM Assurance Yojana |
| UIDSSMT | Urban Infrastructure Development Scheme for Small and Medium Towns |
| UJALA | Unnat Jyoti by Affordable LEDs for All |
| ULB | Urban Local Body |
| UN | United Nations |
| UNDP | United Nations Development Program |
| UNEP | United NationsEnvironment Program |
| UNFCCC | United Nations Framework Convention on Climate Change |
| US EPA | United States Environmental Protection Agency |
| WRI | The World Resources Institute |
| WWF | The World Wide Fund for Nature |


| | |
|---|---|
| ULB | Urban Local Body |
| UN | United Nations |
| UNDP | United Nations Development Program |
| UNEP | United NationsEnvironment Program |
| UNFCCC | United Nations Framework Convention on Climate Change |
| US EPA | United States Environmental Protection Agency |
| WRI | The World Resources Institute |
| WWF | The World Wide Fund for Nature |

# Introduction

Climate Change & Cities

Climate change is a worldwide phenomenon that significantly affects urban life. The increase in global temperatures results in rising sea levels, a surge in the frequency of extreme weather events such as floods, droughts, and storms, and a rise in the prevalence of tropical diseases. All of these factors have expensive consequences for cities, including damage to basic services, infrastructure, housing, human livelihoods, and health (UN, 2016). Moreover, cities are significant contributors to climate change, as urban activities account for a major portion of greenhouse gas emissions.

To achieve success, a coordinated approach and action at the global, regional, national, and local levels are essential. Therefore, it is crucial to make cities an integral part of the solution in the fight against climate change. Cities must act to lower greenhouse gas emissions and adopt strategies to adapt to climate change impacts, in order to minimize the negative impacts of climate change on urban life. (UNEP, n. d. a)

## Climate Change Impact-Cities

- Basic service
- Infrastructure
- Housing
- Livelihood
- Health

Cities are accountable for 75% of global CO2 emissions, with transport and buildings being the biggest contributors (UNEP, n. d. a).

# 1. Climate Resilience in Cities

# Climate Resilient Cities

The Intergovernmental Panel on Climate Change (IPCC), defines resilience as "the ability of a social or ecological system to absorb disturbances while maintaining the same basic structure and ways of functioning, self-organizing capacity, and the ability to adapt to stress and change" (IPCC, 2007; Tyler & Moench, 2012). Urban climate change resilience refers to the capacity of cities to continue functioning despite being subjected to shocks and stresses related to climate change, with a particular focus on ensuring the survival and prosperity of the poor and vulnerable populations living and working in urban areas. It involves taking actions to lower greenhouse gas emissions (mitigation) and to adjust to the changing climate (adaptation).

## Climate Resilient cities-Features:

- Reflective
- Robust
- Redundant
- Flexible
- Resourceful
- Inclusive
- Integrated

These characteristics (Arup, 2014) of resilience are believed to be crucial in averting system breakdowns or failures and ensuring timely action.

# Mitigation & Adaptation

Mitigation and adaptation both are critical strategies for addressing the challenge of climate change, and must be pursued in tandem to effectively build climate resilience. Both are closely related and frequently even overlap. E.g. Saving energy or increasing knowledge, for instance, counts as both a mitigation and an adaptation action.

## Mitigation & Adaptation

- Green Infrastructure
- Water management
- Energy Efficiency
- Awareness generation
- Disaster risk reduction
- Nature Based Solutions
  - Wetland restoration and creation
  - Coastal and marine ecosystem protection and restoration
  - Forest conservation and restoration

## Mitigation

- Renewable Energy
- Non-Motorized Transportation
- Energy efficient-Industrial processes
- Vegetarian Diet

## Adaptation

- Resilient infrastructure
- Surveillance & warning systems
- Resilient species cultivation
- Enhancing coastal defense-mangroves, dykes, gabions, etc.

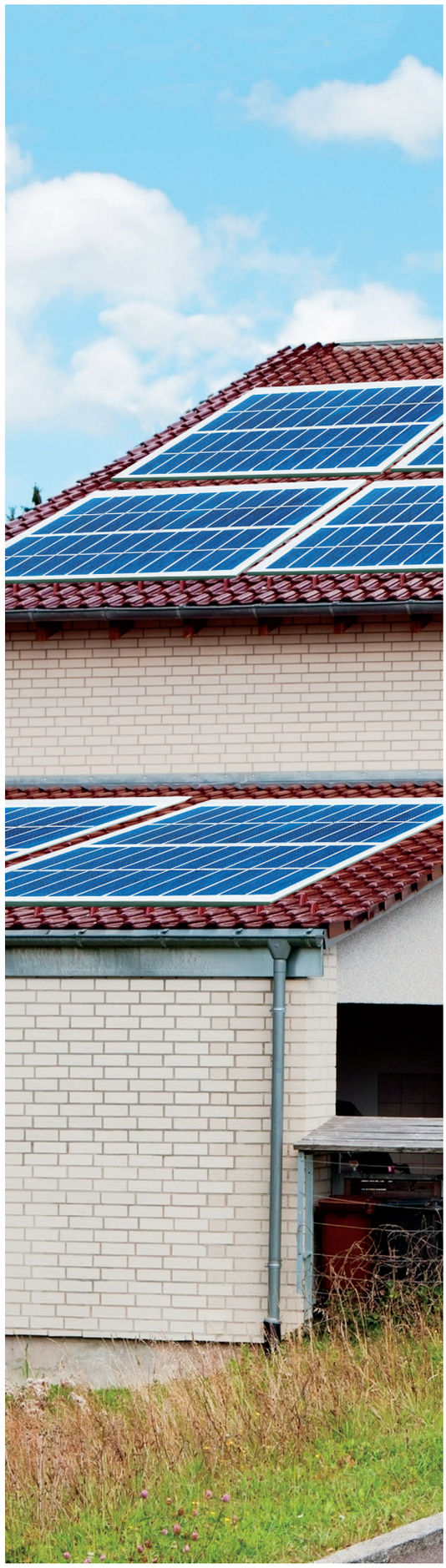
# Mitigation

Mitigation involves decreasing greenhouse gas emissions or the eliminating carbon dioxide from the atmosphere to limit the magnitude and rate of climate change (UNEP, n. d. b). The goal of mitigation is to slow down or prevent further climate change by reducing the amount of greenhouse gases emitted into the atmosphere.

Local governments have a significant role to play in implementing mitigation strategies, as they can influence emissions from buildings, transportation, waste management, and other sectors within their jurisdiction.

Some mitigation strategies that local governments can implement to reduce GHG emissions include:

1. Promoting energy efficiency: Local governments can promote energy-efficient buildings and appliances by providing incentives, such as tax rebates or grants, and by implementing building codes and standards. They can also retrofit public buildings and streetlights with energy-efficient technologies.
2. Encouraging low-carbon transportation: Local governments can promote the adoption of transportation options with low carbon emissions, such as walking, cycling, and public transportation. They can promote the use of electric vehicles by installing charging infrastructure and offering incentives.
3. Investing in renewable energy: Local governments can decrease their dependence on fossil fuels by investing in renewable energy sources like solar and wind power. Local governments have the option to incentivize private individuals and businesses to invest in renewable energy, and promote the installation of solar panels on public buildings.
4. Implementing green waste management practices: Local governments can implement waste reduction and recycling programs to reduce GHG emissions from landfills. They can also promote composting and other organic waste management practices.
5. Encouraging sustainable land use: Local governments can encourage sustainable land use practices, such as compact development and preservation of open spaces, to reduce emissions from transportation and energy use.



# Adaptation

Adaptation refers to the adjustments that individuals, communities, and systems must make in response to the impacts of climate change (NASA, n. d.). The goal of adaptation is to reduce the vulnerability of human and natural systems to the impacts of climate change, and to build resilience in the face of changing climatic conditions.

Some key adaptation strategies that local governments can implement to reduce vulnerability to climate change impacts include:

1. Green infrastructure: Green infrastructure, which may include green roofs, urban parks, and permeable pavement, can be implemented to mitigate the impacts of climate change, such as flooding and extreme heat. Green infrastructure can also improve air and water quality, provide habitats for wildlife, and enhance the aesthetic value of cities.
2. Building codes and standards: Strengthening building codes and standards can help ensure that buildings are designed and constructed to withstand the impacts of climate change. This can include measures such as improving building insulation, incorporating passive cooling and heating technologies, and using resilient materials.
3. Emergency preparedness plans: Developing and implementing emergency preparedness plans can help cities respond to and recover from climate-related disasters. This can include measures such as developing early warning systems, establishing evacuation routes, and ensuring that critical infrastructure is protected.
4. Water management: Improving water management practices, such as rainwater harvesting, stormwater management, and floodplain management, can help reduce the impacts of flooding and drought. This can also help ensure a reliable supply of water for cities in the face of changing precipitation patterns.
5. Biodiversity conservation: Protecting and enhancing biodiversity can help increase the resilience of cities to climate change impacts. This can include measures such as protecting and restoring natural habitats, promoting urban agriculture and green spaces, and managing invasive species.
6. Public health interventions: Climate change can have significant impacts on public health. Local governments can implement public health interventions, such as increasing access to healthcare, improving air quality, and promoting heat stress management, to reduce the health risks associated with climate change.

# Mitigation & Adaptation-Benefits

Implementing mitigation strategies to reduce greenhouse gas (GHG) emissions can bring a range of economic and health benefits, in addition to their primary goal of addressing climate change. Some of the key benefits of mitigation strategies include:

1. Cost savings: Many mitigation strategies, such as energy efficiency measures, can lead to significant cost savings over time. For example, investing in energy-efficient appliances and buildings can reduce energy bills and maintenance costs.
2. Job creation: Implementing mitigation strategies can create new job opportunities, particularly in the renewable energy and energy efficiency sectors. This can help boost local economies and support a transition to a more sustainable and resilient society.
3. Improved air quality: Many mitigation strategies, such as reducing reliance on fossil fuels and promoting low-carbon transportation, can also improve air quality. This can have significant health benefits, as air pollution is a major contributor to respiratory and cardiovascular diseases.
4. Reduced climate-related risks: Implementing mitigation strategies can also help reduce the risks associated with climate change, such as extreme weather events, sea-level rise, and food insecurity. This can help protect communities and businesses from climate-related losses and damages.
5. Improved quality of life: By reducing GHG emissions and promoting sustainable development, mitigation strategies can also improve the quality of life for residents. For example, promoting walking and cycling can lead to more active and healthier lifestyles, while preserving open spaces and promoting sustainable land use can help create more livable and vibrant communities.

Adaptation strategies are important for cities to build resilience to the impacts of climate change. Some potential benefits of adaptation strategies include:

1. Increased resilience: Cities may become more resilient to the effects of climate change by implementing adaptation strategies, such as extreme weather events, sea-level rise, and heatwaves. By implementing measures such as green infrastructure, building codes, and emergency preparedness plans, cities can reduce the risks of damage to infrastructure, buildings, and people's health and well-being.
2. Improved quality of life: Adaptation strategies can also enhance the quality of life for city dwellers. For example, green infrastructure can provide recreational spaces and improve air and water quality, while public health interventions can reduce the risks of climate-related diseases.
3. Cost savings: By investing in adaptation strategies, cities can potentially save money in the long run by reducing the risks of damage and loss associated with climate change impacts. For example, building codes and standards can help ensure that buildings are designed and constructed to withstand extreme weather events, reducing the need for costly repairs and renovations.
4. Economic opportunities: Adaptation strategies can also create economic opportunities. For example, implementing renewable energy and energy-efficient building practices can create jobs in the green economy.
5. Social equity: Adaptation strategies can also promote social equity by ensuring that vulnerable populations, such as low-income communities, are not disproportionately impacted by climate change. For example, green infrastructure and public health interventions can help reduce disparities in access to green spaces and healthcare.

# 2.Role of Local Governance

# Local Governance & Climate Resilience


Municipal corporations play a crucial role in making a city climate resilient. They are accountable for the management of various services and infrastructure, including water supply, waste management, transportation, land-use planning, and building codes. By integrating climate resilience into their operations and decision-making, they can help to reduce the vulnerability of their cities to the impacts of climate change.

## Important Functions-Local Governance:

- Water Supply
- Waste Management
- Transportation
- Land-use Planning
- Transportation
- Building Bye-laws

# Local Governance & Climate Resilience

Effective local governance can facilitate decision-making, coordination, resource allocation, and community engagement, all of which are critical for building climate resilience in cities.

Strengthening local governance structures and mechanisms can help cities build the capacity to adapt to the impacts of climate change, protect the well-being of their residents, and ensure their long-term sustainability.

01

**Decision Making**

Effective decision-making is essential for building climate resilience as it allows local governments to identify and prioritize measures that can reduce the vulnerability of their cities to climate change impacts.

02

**Co-ordination**

Building climate resilience in cities requires coordination among different stakeholders, including government agencies, private sector entities, civil society organizations, and community groups.

03

**Resource Allocation**

Local governments play a crucial role in allocating resources to build climate resilience, including securing funding from national and international sources, mobilizing community resources, and leveraging private sector investments.

04

**Community Engagement**

Local governments can engage with communities through various means. Engaging with communities is critical for building climate resilience as it ensures that climate resilience plans are tailored to local needs and priorities and are owned by the community.

# Local Governance -SWOT Analysis

An analysis of the strengths, weaknesses, opportunities & threats (SWOT) of the existing governance structures and mechanisms in building climate resilience in Indian cities reveals several key points:

## Strength

1. The Indian Constitution provides a clear mandate for climate resilience and sustainable development, with the 73rd and 74th Amendments devolving powers to local governments for urban and rural development.
2. The central government has developed several policies and programs to promote climate resilience in Indian cities, such as the Smart Cities Mission, AMRUT, and Swachh Bharat Mission (SBM).
3. Many cities have developed climate action plans and established dedicated climate cells to coordinate resilience efforts.
4. Many cities have also engaged in international networks and partnerships to share knowledge and best practices for building climate resilience.

## Weakness

1. Lack the capacity to manage the coordination, which can lead to incoherent efforts and a failure to achieve desired outcomes.
2. Lack access to financing mechanisms, constraining the implementation of resilience measures and limit their effectiveness.
3. Inadequate focus on equity and social inclusion, can exacerbate existing inequalities and leave communities more vulnerable to climate change impacts.
4. Limited community engagement can lead to a lack of ownership of resilience efforts among the community and a failure to address local priorities.
5. Lack of technical and institutional capacity to effectively implement & monitor climate resilience measures.

## Opportunities

1. Increasing awareness and concern about climate change can help to build political will for action.
2. International support and funding for climate resilience can provide resources and expertise to support resilience efforts in Indian cities.
3. Rapid urbanization provides an opportunity to incorporate climate resilience measures into new urban development.
4. Technological advancement can provide new and innovative solutions for building climate resilience.

## Threats

1. Limited financial resources can limit the ability of cities to invest in climate resilience measures.
2. Political instability may result in a lack of consistency and continuity in endeavors towards climate resilience.
3. Limited public awareness and engagement can limit the ability of cities to build public support for climate resilience measures.
4. Limited institutional capacity can limit the ability of cities to effectively implement climate resilience measures.

# 3. Climate Action Initiatives

# Climate Action Initiatives

There are numerous climate action initiatives being taken by countries and organizations around the world to address the urgent issue of climate change. Here are some of the key initiatives:

1. Paris Agreement: In 2015, a global agreement known as the Paris Agreement was signed by 196 countries with the aim of addressing climate change by limiting the rise in global temperature to below 2 degrees Celsius above pre-industrial levels and striving for a limit of 1.5 degrees Celsius.
2. Sustainable Development Goals (SDGs): The United Nations adopted a set of 17 goals in 2015, known as the SDGs, which aim to tackle global challenges such as poverty, inequality and climate change by 2030.
3. United Nations Framework Convention on Climate Change (UNFCCC): The UNFCCC is an international treaty signed in 1992 with the goal to stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

## Key Climate Action Initiatives:

- Paris Agreement
- Sustainable Development Goals
- UNFCCC
- The Global Climate Action Summit
- Climate Alliance
- Carbon Pricing

# Climate Action Initiatives-National

Nationally Determined Contribution (NDC)

India is currently engaged in significant efforts towards implementing climate actions across all sectors of its economy. As a part of its commitments at the UNFCCC, India submitted its Nationally Determined Contributions (NDCs) that have been last updated in 2022. Each country that has ratified the Paris Agreement is required to submit a plan outlining its intended contributions to mitigating greenhouse gas emissions, and adapting to the impacts of climate change. These plans are called nationally determined contributions (NDCs) and are submitted every five years. The NDCs are intended to reflect each country's ambition and contributions towards achieving the goals of the Paris Agreement, which is to limit the global warming to 1.5 degrees Celsius and working to keep it well below 2 degrees Celsius over pre-industrial levels. The idea behind the NDCs is to create a global effort to address climate change, with each country committing to actions that are ambitious and appropriate to their national circumstances.

## NDC can include following measures:

- Setting target for GHG emissions
- Implementing policies & measures to reduce GHG emissions
- Increase resilience to climate change impacts
- Providing Financial Support to other countries for Climate Action
- Sharing Technology & Expertise

# Climate Action Initiatives-National

Nationally Determined Contribution (NDC)

1. To put forward and further propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation, including through a mass movement for 'LIFE'– 'Lifestyle for Environment' as a key to combating climate change.
2. To adopt a climate friendly and a cleaner path than the one followed hitherto by others at corresponding level of economic development.
3. To reduce Emissions Intensity of its GDP by 45 percent by 2030, from 2005 level.
4. To achieve about 50 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030, with the help of transfer of technology and low-cost international finance including from Green Climate Fund (GCF).
5. To create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030.
6. To better adapt to climate change by enhancing investments in development programmes in sectors vulnerable to climate change, particularly agriculture, water resources, Himalayan region, coastal regions, health and disaster management.
7. To mobilize domestic and new & additional funds from developed countries to implement the above mitigation and adaptation actions in view of the resource required and the resource gap.
8. To build capacities, create domestic framework and international architecture for quick diffusion of cutting edge climate technology in India and for joint collaborative R&D for such future technologies.

## Quantitative:

- NDC no. 3, 4 & 5

## Qualitative:

- NDC no. 1, 2, 6, 7, 8

# Climate Action Initiatives-National

National Action Plan on Climate Change (NAPCC)

National Action Plan on Climate Change (NAPCC) was launched in 2008 and outlines the country's strategy to address climate change through mitigation and adaptation measures, it includes eight national missions covering different areas. The Principles of NAPCC (PIB, 2021):

- Protecting the poor through an inclusive and sustainable development strategy, sensitive to climate change
- Achieving national growth and poverty alleviation objectives while ensuring ecological sustainability
- Efficient and cost-effective strategies for end-use demand-side management
- Extensive and accelerated deployment of appropriate technologies for adaptation and mitigation
- New and innovative market, regulatory, and voluntary mechanisms for sustainable development
- Effective implementation through unique linkages – with civil society, LGUs, and public-private partnerships

## National Missions:

1. National Solar Mission
2. National Mission for Enhanced Energy Efficiency
3. National Mission on Sustainable Habitat
4. National Water Mission
5. National Mission for Sustaining the Himalayan Eco-system
6. National Mission for a Green India
7. National Mission for Sustainable Agriculture
8. National Mission on Strategic Knowledge for Climate Change

# Climate Action Initiatives-National

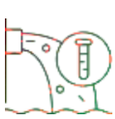
Policies/Schemes/Programs

A comprehensive list of existing Policies, Schemes, Programs that are aligned to Climate Action is presented based on the literature study (it may not be exhaustive). The list is prepared sector wise to convene the State & local body officials in aligning them to their local initiatives related to Climate Action (Details of the relevant objectives in the schemes/policies that are aligned to climate action can be referred in Annexure 2)

## Categories:

### Sustainable Transportation

AMRUT, Smart Cities Mission, National Electric Mobility Mission, Pradhan Mantri Gram Sadak Yojana, UIDSSMT, National Urban Transport Policy



### Pollution Control

NCAP, PMKSY, AMRUT, SBM-U, Voluntary Vehicle-fleet Modernization Programme, Steel Scrap Recycling Policy, Namami Gange Programme

### Water Conservation

AMRUT, IWMP, Jal Jeevan Mission, PMKSY, Rajiv Gandhi National Drinking water Mission, Pradhan Mantri Matsya Sampada Yojana (PMMSY), Jal Shakti Abhiyan, Namami Gange Programme, Atal Bhujal Yojana, National Project on Aquifer Management, Mahatma Gandhi National Rural Employment Guarantee Act

### Energy Conservation

BLY, PAT, R-APDRP, SLNP, UDAY, UJALA, Green Hydrogen Policy, 100% EV declaration, Energy Conservation Act, Steel Scrap Recycling Policy, Pradhan Mantri Sahaj Bijli Har Ghar Yojana-Saubhagya, ECO Niwas Samhita, Municipal Energy Efficiency Programme, National Smart Grid Mission, Mission Solar Charkha

### Waste Management

SBM-U, Integrated Waste Land Development Programme, Sustainable Alternative Towards Affordable Transportation (SATAT), Steel Scrap Recycling Policy, GOBAR-DHAN Scheme

### Water Body Cleaning

AMRUT, PMKSY, SBM-U, Integrated Waste Land Development Programme, Jal Shakti Abhiyan, Namami Gange Programme, Mahatma Gandhi National Rural Employment

### Green Cover

AMRUT, CAMPA, Smart city Mission, National Afforestation Programme, National Bamboo Mission, Sub-Mission on Agroforestry (SMAF), National Green Highways Mission (NGHM)

### Renewable Energy

PMKUSUM, UDAY, Integrated Power Development Scheme, Green Hydrogen Policy, 100% EV declaration, National Clean Energy Fund, Green Energy Corridor Project, National Smart Grid Mission, Mission Solar Charkha

# Climate Action Initiatives-Subnational

State Action Plan on Climate Change (SAPCC)

SAPCC stands for State Action Plan on Climate Change. It is a state-level plan formulated in India under the National Action Plan on Climate Change (NAPCC) to address the specific climate change challenges faced by individual states. The SAPCCs aim to provide a framework for state governments to identify and prioritize the actions needed to address climate change mitigation and adaptation (PIB, 2021) in their respective states.
SAPCCs (1.0) follows a general framework but also allows for the inclusion of state-specific contexts and circumstances. SAPCCs are expected to build on the current State Government policies by taking into consideration the ongoing programmes and schemes being implemented at the state level as well as the NAPCC. The SAPCCs (2.0) are under the process of revision in line with the revisions in the NDCs as well as with the new scientific knowledge to make them robust. The focal points for the SAPCC 2.0 would be:
Water use efficiency, Enhancement of carbon sinks, Farm mechanization for agriculture, Capacity building.

## SAPCC 1.0 Generic content:

- Climate profile of the state,
- Strategy of intended actions
- Outline of specific implementation activities
- Vulnerability Assessment & Climate risks
- Impacts of climate change.
- Adaptation and mitigation measures
- Monitoring & Evaluation
- Financial Resources

# Climate Action Initiatives-Subnational

SAPCC 2.0 Frame Work (MoEFCC)

The SAPCC is recommended to include the following sections, although the states have the flexibility to include additional components based on their specific priorities.

**Foreword and Table of Contents**

**Executive Summary**

## 1. Introduction

## 2. State Profile

2.1 Location, geography and size

2.2 Demographic profile

2.3 Economic profile

2.4 Natural resources like availability of land, water, energy, forestry and biodiversity resources

2.5 Agriculture and livestock

2.6 Energy profile including primary energy supply, energy demand, electricity installed capacity etc.

2.7 State development issues and priorities

## 3. Climate Profile

3.1 Climate profile and characteristics such as annual average temperature, rainfall, climatic variability and geographical features that influence climate

3.2 Past and on-going climate change trends including changes in temperature, precipitation, sea level rise etc., specific impacts, climate risks, and socioeconomic consequences and costs of projected impacts.

3.3 Development of Climate Change scenarios, i.e. projection of possible climate changes at relevant spatial and temporal scales

## 4. Vulnerability Assessment

4.1 Methodology of vulnerability assessment

4.2 Assessment of the physical and economic impact of and vulnerability to climate change in the most vulnerable sectors (agriculture, water, forestry and biodiversity, coastal-zone management, health, tourism, urban, etc.)

4.3 Assessment of the impact of and vulnerability to climate change on vulnerable groups

## 5. Climate Change Strategy- Mitigation

5.1 List of prioritized mitigation activities

5.2 Barriers and gaps in the implementation of mitigation actions

5.3 Implementation plan including the agencies responsible for implementation, required policy and budget

## 6. Climate Change Strategy- Adaptation

6.1 Identification of priority sectors for adaptation (ex. Agriculture; Forests; Biodiversity; Water; Health; Coastal Regions; Disaster Management; Rural Livelihood; Infrastructure)

6.2 List of prioritized sector-wise adaptation activities

6.3 Barriers and gaps in the implementation of adaptation actions

6.4 Implementation plan including the agencies responsible for implementation, required policy and budget

## 7. Financing the SAPCC

7.1 Financing roadmap including sectoral activity budget

7.2 Measures for mainstreaming climate actions in the State/UT budgets

## 8. Institutional Mechanism

## 9. Monitoring and Evaluation

Appendix

References

# Climate Action Initiatives-Subnational

SAPCC based projects

Projects can be designed based on the SAPCC for purpose of funding in the following area (MoEFCC, n.d.):

1. Capacity building
2. Developing knowledge networks Capacity building of nodal agency and other stakeholders
3. Setting and strengthening of climate change cells
4. Preparing and updating climate change data scenarios
5. Vulnerability and impact assessments
6. Mitigation measures/actions in various sectors
7. Adaptation measures/actions in various sectors

When designing a project to mitigate the impacts of climate change, it is essential to consider the 8 National Missions and 24 Initiatives and identify relevant actions and activities that meet the urgent needs of the State. The activities can be like:

- Prevention of flood, drought and famine,
- Protection of soil erosion and degradation,
- Deforestation and Afforestation,
- Water conservation,
- Energy conservation,
- Transport,
- Urbanization,
- Health, Protection of coastal erosion,
- Degradation of mountain system,
- Technology development,
- Education,
- Outreach Programmes,
- Employment,
- Poverty alleviation,
- Human resources etc.

## SAPCC 1.0 Principles:

- Understand climate data & its limitations
- Assess climate change interaction with existing vulnerabilities
- Go beyond risk management
- Consider both top-down & bottom-up approaches
- Reach out to a large number of sectors and actors
- Build broader stakeholder engagement ensuring inclusion & gender considerations
- Address state priorities while creating enabling environment for implementation of NAPCC
- Set effective institutional mechanism for implementation (monitor, review & refine) (Ministry of Environment, Forest and Climate Change. (2010))

# Climate Action Initiatives-Subnational

City Climate Action Plan (CCAP)

Cities are critical in reducing greenhouse gas emissions, reducing vulnerabilities, and adapting to the impacts of climate change. In India, local governments are encouraged to develop a Climate Action Plan for their city, as this being one of the key indicators in the ClimateSMART Cities Assessment Framework (CSCAF)(C-Cube. (n. d.)).

City Climate Action Plan (CCAP) involves assessing potential future climate risks, identifying future risks to various urban systems, and developing an action plan to address those risks while meeting other long-term goals such as socio-economic development and environmental protection. The success of the plan lies in implementing prioritized actions that reduce emissions and build local climate resilience. The CCAP provides an opportunity for local governments to address both climate change adaptation challenges and mitigation potential simultaneously. The State Action Plans on Climate Change (SAPCC) can be adapted and implemented at the city level.

## Guidelines for CCAP:

Different organizations and agencies may have their own specific guidelines, but some commonly followed ones include:

- The Global Covenant of Mayors for Climate & Energy
- The Climate Action Planning Resource Guide (US EPA)
- The ICLEI Local Governments for Sustainability
- Climate-Smart Cities Assessment Framework-(C-Cube)
- Based on SAPCC

# Climate Action Initiatives-Subnational

Policies/Schemes/Programs

A comprehensive list of existing Policies, Schemes, Programs that are aligned to Climate Action is presented based on the literature study (it may not be exhaustive). The list is prepared sector wise to convene the State & local body officials in aligning them to their local initiatives related to Climate Action (some of the schemes are specific to certain states). Details of the relevant objectives in the schemes/policies that are aligned to climate action can be referred in Annexure 2.

## Categories:

### Sustainable Transportation

Kisan Hit Urja Shakti Yojana, Bal Urja Rakshak Dal, Jyotirmay scheme, Urja Kerala Mission

### Pollution Control

Majhi Vasundhara Abhiyan

### Water Conservation

Jalswarajya- II Program, Majhi Vasundhara Abhiyan, Shivkalin Pani Sathawan Yojana, SUJALA Suphalam Yojana, Garib Samriddhi Yojana

### Energy Conservation

Kisan Hit Urja Shakti Yojana, Bal Urja Rakshak Dal, Jyotirmay scheme, Urja Kerala Mission

### Waste Management

Majhi Vasundhara Abhiyan, Nirmal Gujarat Yojana, Garib Samriddhi Yojana, Aapno Taluko Vibrant Taluk

### Water Body Cleaning

Majhi Vasundhara Abhiyan, Nital Goem Nital Baim

### Green Cover

Majhi Vasundhara Abhiyan, Krishi Aranya Protsaha Yojane, Samrudha Hasiru Grama Yojane

### Renewable Energy

Majhi Vasundhara Abhiyan, Surya Raitha Scheme, Urja Kerala Mission, Bal Urja Rakshak Dal

# Climate Action Initiatives-International

City Race to Zero

The City Race to Zero is an initiative launched by the United Nations Framework Convention on Climate Change (UNFCCC) and other global organizations to encourage cities to join the global effort to achieve net-zero greenhouse gas emissions by 2040 or sooner, or by mid-century at the latest, in line with global efforts to limit warming to 1.5 degree C.. The initiative calls on cities and regions to commit to reducing their emissions of GHGs in accordance with science-based targets, and to engage in collective action to build resilience to the impacts of climate change.

Participating cities are required to develop and implement comprehensive climate action plans, which outline specific measures to reduce greenhouse gas emissions and build resilience to climate impacts. Cities must also report on their progress and share best practices with other participating cities. Over 1143 cities have participated so far in the race, with many cities from India as well.

## Suggested Climate Actions:

- Create inclusive society
- Create green and healthy streets
- Reduce air pollution and ensure clean air
- Develop Zero Carbon Buildings
- Move towards a resilient and sustainable energy system
- Advance toward Zero Waste
- Create a sustainable food system
- Divest from fossil fuel and invest in a sustainable future
- Move towards resilient and sustainable construction systems

# Climate Action Initiatives-International

City Race to Resilience

Race to Resilience is the sibling campaign to the global Race to Zero. The Cities Race to Resilience seeks to prioritize and highlight the voices of climate vulnerable communities with an objective to stimulate a significant improvement in the level of global aspiration regarding climate resilience by 2030. The Cities Race to Resilience is an initiative of the broader Race to Resilience campaign that encourages cities to pledge their commitment to the global climate change fight. The Cities Race to Resilience provides cities with an opportunity to demonstrate their efforts and ambitions to tackle climate change in a way that aligns with their local context.

## Implementation partners:

- C40 Cities
- Global Covenant of Mayors for Climate & Energy (GCoM)
- ICLEI – Local Governments for Sustainability (ICLEI)
- Making Cities Resilient 2030
- Resilient Cities Network
- United Cities and Local Governments (UCLG)
- CDP
- the World Wide Fund for Nature (WWF)
- The World Resources Institute (WRI)

## Suggested Climate Actions:

- Resilient Buildings
- Digitalization (Inclusion of vulnerable)
- Energy (Resilient, decentralized)
- Food Systems (Expand access, reduce wastage, healthy nutrition, plant-based)
- Governance and community engagement (Integrating Climate, Social and Health objectives)
- Nature-based solutions (Tree plantation, green space restoration & conservation of ecosystems, Coastal & terrestrial, low carbon technologies)
- Risk and Vulnerability planning (Integrative indigenous knowledge, Warning-Hazards adaptation measures of shocks)
- Social Equity
- Urban-Rural linkage
- Waste (collection, disposal, circular economy, safe sanitation services)
- Water (Eliminate pollution, access to water, diversify Water sources, Water retention zones)

# Climate Action Initiatives-International

Policies/Schemes/Programs

A comprehensive list of existing Policies, Schemes, Programs that are aligned to Climate Action is presented based on the literature study (it may not be exhaustive). The list is prepared sector wise to convene the State & local body officials in aligning them to their local initiatives related to Climate Action (some of the schemes are specific to certain states).

## Categories:

### Sustainable Transportation

City Race to Zero

### Pollution Control

City Race to Zero, City Race to Resilience

### Water Conservation

City Race to Resilience

### Energy Conservation

City Race to Zero, City Race to Resilience

### Waste Management

City Race to Zero, City Race to Resilience

### Water Body Cleaning

### Green Cover

City Race to Zero, City Race to Resilience

### Renewable Energy

City Race to Zero, City Race to Resilience

# 4.Reporting Platforms for Climate Action

# Reporting Platforms for Climate Action


Reporting on the climate action taken by a city or a state is important for several reasons:

1. It provides transparency and accountability to the citizens, as they can track the progress of their local government in taking action to address climate change.
2. It helps to identify areas of success and areas for improvement. By reporting on the actions taken and their impact, local governments can learn from each other and create best practices models that can be followed by others.
3. Reporting can help to attract funding and support from other organizations, such as NGOs and international bodies, who may be interested in supporting climate action in a particular city or state.
4. Reporting on climate action can help to raise awareness and educate the public about the importance of addressing climate change and the role that local governments can play in this effort.
5. Reporting on climate action can help increase awareness among the decision-makers involved in global climate negotiations and inspire them to take more actions to address climate change at the national level (Rosenzweig et. al., 2015)

## Benefits of Reporting:

- Increases transparency and accountability
- Facilitates tracking of progress
- Helps to identify best practices
- Helps to raise awareness
- Opportunity to engage with international organizations, funders etc.
- Demonstrates leadership and commitment
- Financial savings and economic benefits

# Reporting Platforms for Climate Action-India

ClimateSmart City Assessment Framework (CSCAF 3,0)

The MoHUA's Smart Cities Mission, launched the ClimateSmart Cities Assessment Framework in February 2019 to align with the National Mission on Sustainable Habitat. This city assessment framework (CSCAF) is the first of its kind in India and includes climate-relevant parameters, including those from the National Clean Air Programme.

The framework aims to provide a roadmap for cities to assess their current situation and adopt relevant climate actions. It consists of 28 indicators across five categories. The objective of this framework is to provide a roadmap for Indian cities in combating climate change. CSACF 3.0 (C-Cube, n. d.) aims to cover both measures of mitigating and adapting to climate change. Each theme in the framework has been assigned a weightage based on its potential for either mitigation or adaptation.

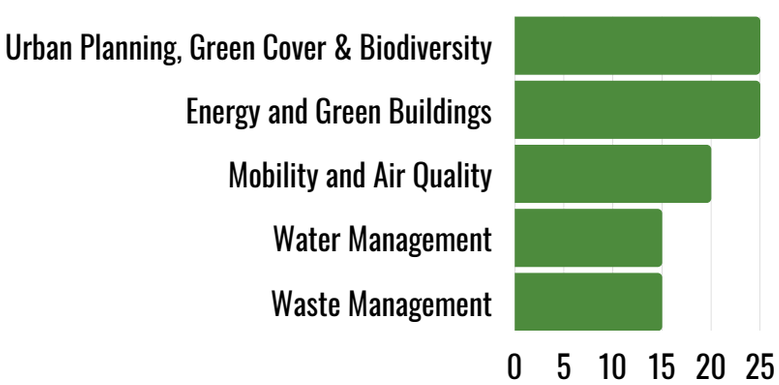



Fig. 1 CSCAF Framework themes & their percentage wise weightage

## 28 Indicators for CSCAF 3.0:

- Percent of Green cover
- Electricity Consumption (Per capita)
- Renewable Energy Factor
- Percent of Energy efficient streetlights
- BUA of Green buildings in the city
- Coverage of nonmotorized transport
- Average pollution (PM 10)
- Average pollution (PM 2.5)
- Wastewater reduce and recycle
- The extent of Nonrevenue water
- Disaster Management plan
- Climate action plan
- ECBC/ENS to building bbye-laws
- Water resource management plan
- C and D waste management Plan
- Public transport
- Pollutant monitoring
- Green building adoption
- Flood water stagnation and risk assessment
- Energy Audit for water supply
- Biodiversity Management committee
- Disaster management cell
- Early warning system for priority Risks/Hazard
- Green Building cell
- Financial resources to preserve water bodies and open areas

# Reporting Platforms for Climate Action-Global

Global

There are multiple platforms for registering the action taken to fight against Climate Change by cities, a few commonly referred are:

1. Carbonn Climate Registry (CCR): It is the world's leading global reporting platform for local and regional climate action, which enables local and regional governments to report their climate commitments and actions.
2. Global Covenant of Mayors for Climate and Energy (GCoM): It is an international alliance of cities and local governments committed to fighting climate change and transitioning to a low-carbon, resilient society. It provides a common reporting framework for cities to track their progress towards meeting their climate goals.
3. CDP Cities: It is a global disclosure platform that enables cities to measure and manage their environmental impacts, including their greenhouse gas emissions, and report on their climate action initiatives.
4. United Nations Framework Convention on Climate Change (UNFCCC) Non-State Actor Zone for Climate Action (NAZCA): It is an online platform that allows cities, regions, companies, and other organizations to showcase their climate action initiatives and commitments.

CDP-ICLEI Track is one of the leading city climate reporting platform. It also measures the progress of cities on the UN-backed climate campaigns, Race to Zero and Race to Resilience, which bring cities, businesses and investors together to create a zero-carbon and resilient future. Through CDP-ICLEI Track, cities are also able to report to multiple initiatives simultaneously such as several initiatives of ICLEI, C40, WWF and Global Covenant of Mayors initiatives.

The UNFCCC backed climate campaigns also recognizes reporting done over the CSCAF.platform.

## Requirement for reporting as per City Race to Zero & City Race to Resilience:

- CDP-ICLEI Track
- MyCovenant
- PCB/BARC (Canada)
- Other

# 5.Barriers in Implementation

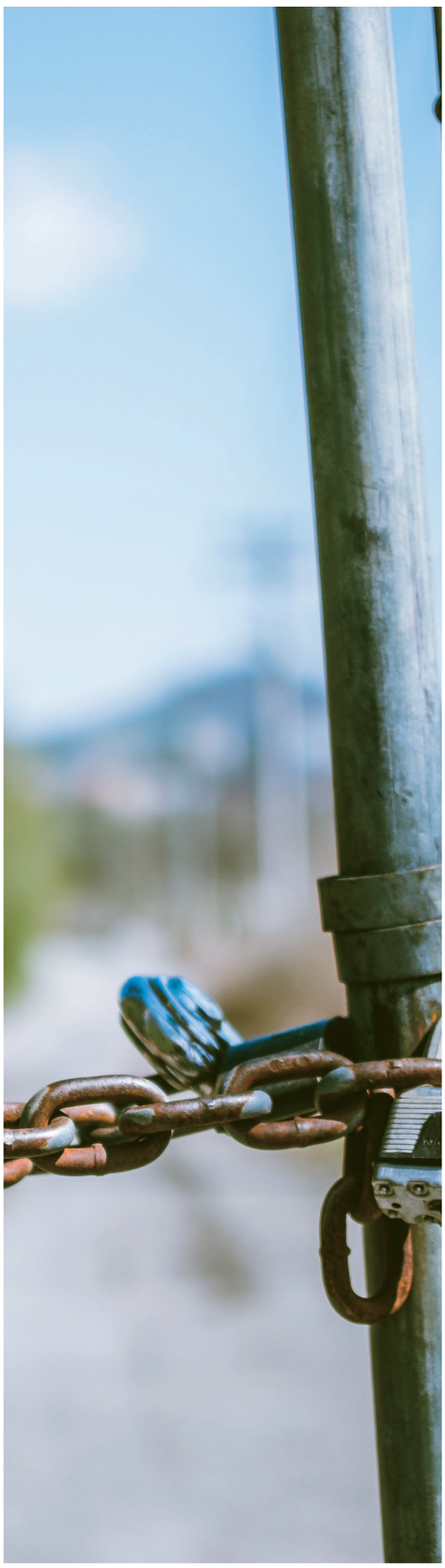
# Barriers in Implementation of Climate Action

Much of present understanding on adaptation and implementation challenges related to climate change is general and still developing. Barriers can be very context specific & so in order to address such barriers, we need to understand them carefully. Mackay (2019) has described these barriers as generic and categorizes them as-Informational barriers, Governance and policy barriers, Organizational and institutional barriers, Resource barriers and Psychological and social barriers. While we have tried to categorize the barriers as Political, Financial, Institutional & Technical as it was found more relevant based on our analysis of the SAPCCs and primary survey. Understanding the barriers can help in framing an effective approach.

## Barriers:

- Political
- Financial
- Institutional
- Technical

# Barriers in Implementation of Climate Action



India is experiencing rapid urbanization and development, which is putting increasing pressure on its cities and exacerbating the effects of climate change. Despite the urgent need for action, Indian cities are facing a number of barriers that are hindering their efforts to implement effective climate action initiatives. These barriers are preventing cities from developing and implementing the necessary policies, programs, and projects to mitigate and adapt to climate change. Identifying & enlisting these barriers will help to support policymakers, practitioners, and other stakeholders in India's cities to develop more effective and sustainable approaches to climate action, and to build more resilient and livable cities for the future. Some of the general barriers observed during the primary & secondary research are as follows:

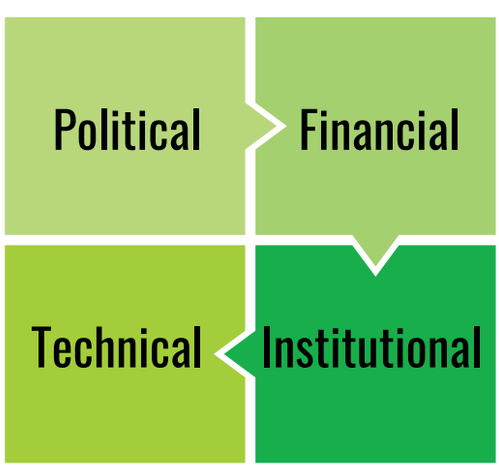
- Lack of unbiased and readily available information on effective climate governance practices is a major hurdle for Indian cities to learn from their counterparts. (Sharma & Tomar, 2010).
- Dependence on national and state-level governments for approval and financial support (Beermann et al., 2016)
- Delay in approval of collaborative & partnership projects (Beermann, 2014).
- Lack of funding (Aylett, 2014; Barata et. al., 2018)
- Competing priorities
- Incorporating climate change into existing departmental functions and procedures
- Lack of leadership & accountability (Aylett, 2014; Barata et. al., 2018)
- Lack of staff, staff timing
- Lack of technical resources
- Political focus on short-term goals
- Lack of Knowledge (Barata et. al., 2018), awareness among staff (Aylett, 2014)
- Lack of skills in local workforce to enable implementation
- Difficulty implementing policies that require collaboration between siloized local government agencies
- Senior management is reluctant to deviate from predefined job definitions.
- Lack of authority of local government in matters like land use, building codes, or transportation.
- Lack of information about local GHG emissions
- Lack of knowledge on potential local effects of climate change
- Difficulty factoring climate change into infrastructure budgeting procedures

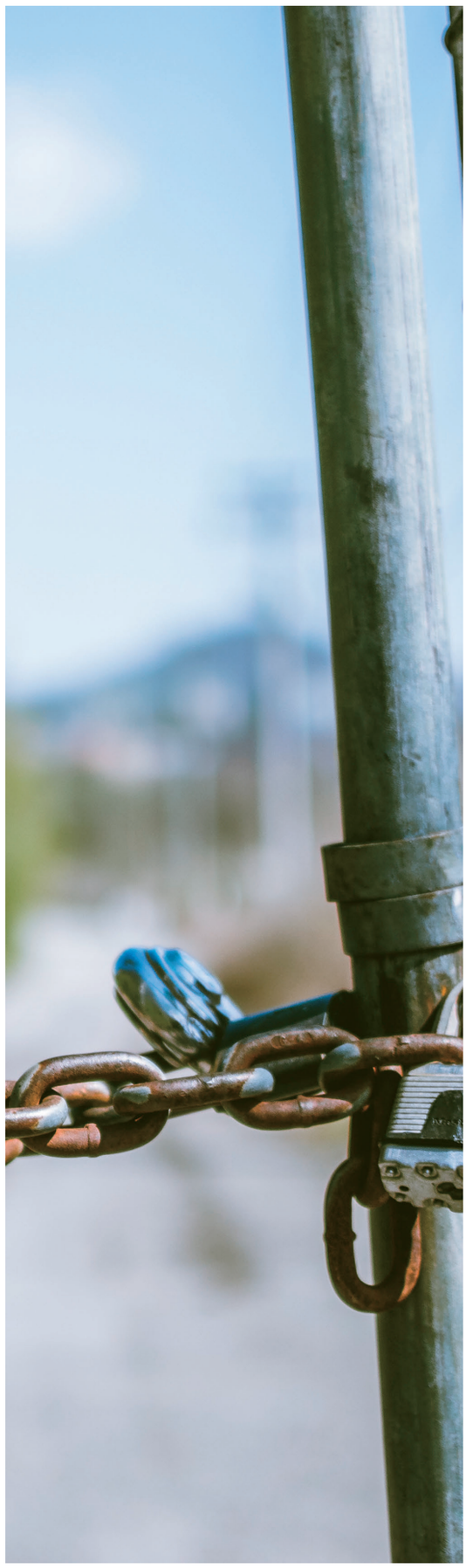
# Barriers in Implementation of Climate Action

State Action Plan on climate change (SAPCCs) are prepared by all the States & UTs while many cities in India have prepared the CCAPs and many are in the process of preparation. These plans are anticipated to align with the NDCs, NAPCC, SDGs & various schemes & programs. Yet, there are differences in their efficacy and quality, particularly how well they truly coincide with the aims of national policy (Dubash and Jogesh, 2014; Gogoi, 2017). There is confusion at local governance level due to overlapping policy frameworks and a lack of level-to-level coordination, leading to ineffective implementation on climate action (Gogoi et. al., 2017). The lack of information and knowledge on the reporting of climate action at city level is also evident from the fact that inspite of having M & E platforms like CSCAF, that is developed under one of the missions (NMSH) of NAPCC, only few cities have registered and shared some data.

Climate Smart Cities Assessment Framework (CSCAF), is the first-of-its-kind assessment system for Indian cities that considers climate-relevant factors. It is a monitoring and evaluation platform developed by the Ministry of Housing and Urban Affairs (MoHUA), Government of India, with C-Cube as the supporting implementation partner. CSCAF helps to assess the climate resilience of cities and guide them in developing climate action plans.

We attempted to identify the gaps & challenges in implementation on climate action at State level based on literature survey & information documented in the SAPCCs (18 states have mentioned the challenges). Also, the challenges in implementation at city level were learned through meetings with the officials in selected five cities from Maharashtra as well as Rajasthan. The gaps are listed into 4 categories-Political, Financial, Institutional & Technical for purpose of convenience in strategically addressing.them.



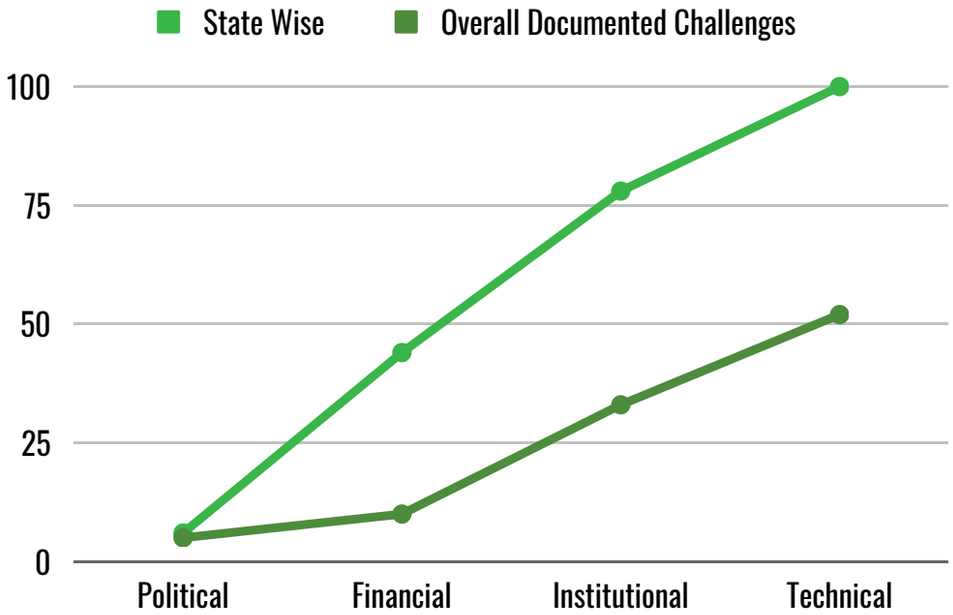



### Analysis of the major categories of the challenges faced by the States in implementation of climate action

It is important to identify and analyze the challenges faced by the subnational governments in implementation of climate action in order to address the issues.

## Barriers in Implementation of Climate Action

The data is obtained from the study of the gaps & challenges documented by the SAPCCs from 18 States




**82**

Total number of data points generated for the documented challenges in 18 States

**18**

Data obtained from 18 States Action Plans on Climate Change (SAPCCs)

**52%** Technical challenges was the major listed category amongst all the documented gaps & all the States have reported this issue.

Fig. 2 Barriers in implementation of climate action

## The data obtained is from following SAPCCs (18):

Kerala, Mizoram, Nagaland, Punjab, Himachal Pradesh, Tripura, Manipur, Rajasthan, Andhra Pradesh, Arunachal Pradesh, Assam, Goa, Gujarat, Haryana, Jharkhand, Karnataka, Uttar Pradesh, Uttarakhand

## The SAPCCs that did not specify the gaps or challenges (10):

Bihar, Chhattisgarh, Maharashtra, Meghalaya, MP, Orrisa, Sikkim, Tamilnadu, Telangana, West Bengal

# Barriers in Implementation of Climate Action

The gaps & challenges documented in the SAPCCs grouped under the four categories are as follows:

## Political

- Unplanned government and informal settlements
- Persisting vulnerability and failure to implementation
- Non-cooperation by the population to re-locate
- Gap in the prevention of cities from becoming clusters for poverty and slum

## Financial

- Lack of funds
- Lack of decentralized funds
- Improper & untimely fund allotment

## Institutional

- Lack of staff
- Lack of adequate facilities
- Lack of institutional mechanisms for collating, synthesizing and delivering knowledge products for decision-making
- Lack of required infrastructural and institutional capacity
- Absence of local governments in climate Action Plan
- Focus on detailed analysis (vulnerability) only in a few cities
- Lack of recognition and integration of climate change action plan in developmental strategies
- Lack of initiative
- Resistance to change the established practices
- Unavailability of proper standards for developing plans
- Land unavailability (planning new initiatives)
- Lack of clarity on policy framework
- Insufficient involvement of private sector
- Lack of public participation

## Technical

- Lack of knowledge
- Lack of capacity
- Lack of knowledge of the existing laws, acts, and policies
- Lack of technical assistance
- Lack of database
- Lack of understanding on Linking mitigation and adaptation
- Integration of adaptation with policy agenda
- Lack of understanding on prioritization on vulnerabilities
- Implementation of National Agenda in local context
- Gap in integration-related functionalities and addressing SDGs
- Lack of stakeholder consultation
- Knowledge gap in designing the implementation strategy
- Lack of systematic evidences of impact of various strategies
- Lack of skill sharing or ideation among different departments that are clearly interdependent

# 6.Understanding Interlinkages

# SDGs, Climate Action & Cities


The SDGs offer a comprehensive framework for addressing the interconnectedness between climate change and the objectives of eradicating poverty, safeguarding the environment, and promoting equity and well-being for all. The interplay between climate and the SDGs is a topic of growing importance in scientific literature and is essential for identifying effective mitigation measures and advancing sustainable development.

The Paris Agreement also underscores the importance of achieving the SDGs by promoting sustainable development in the long run and addressing climate change risks through adaptation and mitigation measures. As a result, the SDGs can serve as a practical framework for examining global urbanization by linking Goal 11 with indicators and targets from other SDGs. Goals, targets, and indicators are interconnected and interdependent, as contributions from various sectors can also serve as tools for making progress towards creating resilient, healthy communities and cities (Orsetti et. al., 2022).

## SDG 11 (11.2, 11.3, 11.5, 11.6, 11.7, 11.a) is interconnected with SDG 13 (13.1, 13.2, 13.3, 13.b)

The other SDGs interlinked to SDG 11 are SDG 1, 3, 6, 10, 15, 16

# SDGs & Climate Action

The basic organization of the SDG interlinkages network and the distinctive characteristics of country-specific quantified SDG networks are examined using Social Network Analysis (SNA) methodologies based on a variety of centrality metrics. It is a good tool for the policy makers, though there are certain difficulties with utilizing the tool that includes, lack of trustworthy and traceable data for the quantification. The SDG interlinkages network's structure, suggests that an integrated strategy for SDG implementation is required (Zhou, & Moinuddin. 2017).

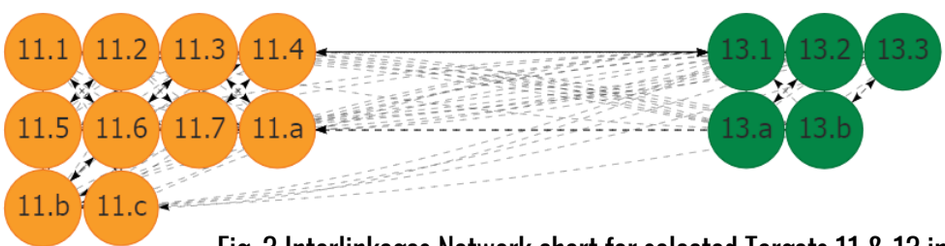



Fig. 3 Interlinkages Network chart for selected Targets 11 & 13 in India

Snapshot for selected Target-11 & 13, interlinkages network chart (India)- generated by the SDG Interlinkages Analysis & Visualisation Tool -V4.0 (Zhou, et. al., 2021). Each node represents a SDG Target, each line with an arrow linking two nodes represents a causal relation between the two Targets.

"Data and visualisation charts are provided by the courtesy of the IGES SDG Interlinkages Analysis & Visualisation Tool (V4.0) — https://sdginterlinkages.iges.jp/visualisationtool.html".

### SDG 11

11.1 Universal access to urban housing and basic services
11.2 Universal access to sustainable transport systems
11.3 Enhance inclusive and sustainable urbanization
11.4 Protect and cultural and natural heritage
11.5 Reduce losses from disasters
11.6 Reduce urban environmental impact
11.7 Universal access to green and public spaces
11.a Strengthening development planning for sustainable cities
11.b Integrated policy for disaster risk reduction
11.c Building sustainable and resilient buildings for LDC

### SDG 13

13.1 Strengthen resilience and adaptive capacity to climate change
13.2 Integrate climate change measures into national policies
13.3 Raise awareness on mitigation & adaptation
13.a Finance developing countries for mitigation
13.b Enhance capacity for climate change-related planning

# SDGs, Climate Action & Policy Coherence

There is yet another approach to looking at the interlinkages of SDG 13 with other SDGs, it is rather essential to understand the possible implications of climate change on all domains of sustainable development (IPCC, n. d.). The IPCC Special Report on 'Global Warming of 1.5°C' (2018) looked at the connections between specific climate mitigation and adaptation measures and the 17 SDGs. Although providing a valuable perspective, it does not evaluate the precise synergies and trade-offs between climate effects, climate action, and the Goals of the 2030 Agenda (Nerini et.al., 2019; Laumann et al., 2022). Such an assessment is necessary for the comprehensive evaluation of policies relating to mitigation and/or adaptation of climate change. Utilizing synergistic efforts can make it possible to accomplish both sets of goals more quickly, effectively, and efficiently. There is strong evidence of synergies between climate action and 80% of the targets in the 2030 Agenda, making a persuasive case for the integration of climate action with social and economic development policies, plans, and strategies (Nerini et.al., 2019).

In one of the study that aimed at facilitating policy coherence (Target 17.14), the interlinkage of all the SDGs with five SDGs that are positively interconnected viz. SDG 13, SDG 7, SDG 2, SDG 3 , and SDG 6 were analyzed based on the Voluntary National Reviews (VNRs) (Tosun & Leininger, 2017). The examination can provide some suggestive insights:


Target 13.2 ensures food production is not threatened (Indicator 13.2.1).
Target 13.1 & 13.3 ensures Resilient and adaptive agriculture systems.


Target 13.2 ensures energy efficiency and increasing renewable energies have mitigating effects on climate change.


Climate change theme is incorporated in nine of the other SDGs.


Target 1.5 reduce exposure & vulnerability to climate-related extreme events


Target 9.4 increasing the resource-use efficiency of industry


Target 2.4 strengthen the capacity for adaptation to climate change.


Target 11.b sustainable cities & human settlements for mitigating and adapting to climate change


Target 3.4, 3.8. and 3.9 improving public health & combatting climate change


Targets 14.1-14.6 focus on improving coastal and marine ecosystems


Target 7.1–3, 7.a–b attaining on energy governance


Target 15.2 sustainable forest management, halt deforestation, restore degraded forests, & increase afforestation and reforestation,

# NDCs & Climate Action

There is commonality between the SDGs and the Paris Agreement, both demands action in all countries of the world for benefit of everyone with a bottom up implementation model. The prime objective of NDCs is to reduce greenhouse gas emissions but it also prioritizes climate adaptation, finance, and other policy areas. Both NDCs & SDGs recognize the importance of policy coherence and interlinkages between policy domains. As a result, the actions and priorities set out in the NDCs overlap with those in the SDGs. (ndc-sdg.info)

NDC-SDG Connections (ndc-sdg.info) tool offers insights ito links between NDC's and the SDGs. The tool is developed jointly by the Stockholm Environment Institute (SEI) and the German Development Institute (DIE) (Dzebo et al., 2017).
The tool can be utilized by policymakers to plan the implementation of SDGs and climate action in a more coordinated and coherent manner. There are opportunities for more ambitious implementation of both agendas through the synergies between them.

## NDC activities (Global) link to the following SDGs most extensively: SDG 2, 6, 7, 11, 15, 17

Globally Countries have connected their climate ambition (NDCs) mostly with SDG 3, 4 & 5

# NDCs Interlinkages with SDGs

The climate actions that are representing the Nationally Determined Contributions (NDCs) corresponds to each of the Sustainable Development Goals (SDGs). There are 77 climate actions corresponding to different SDGs in India's NDCs as represented in Fig. 4

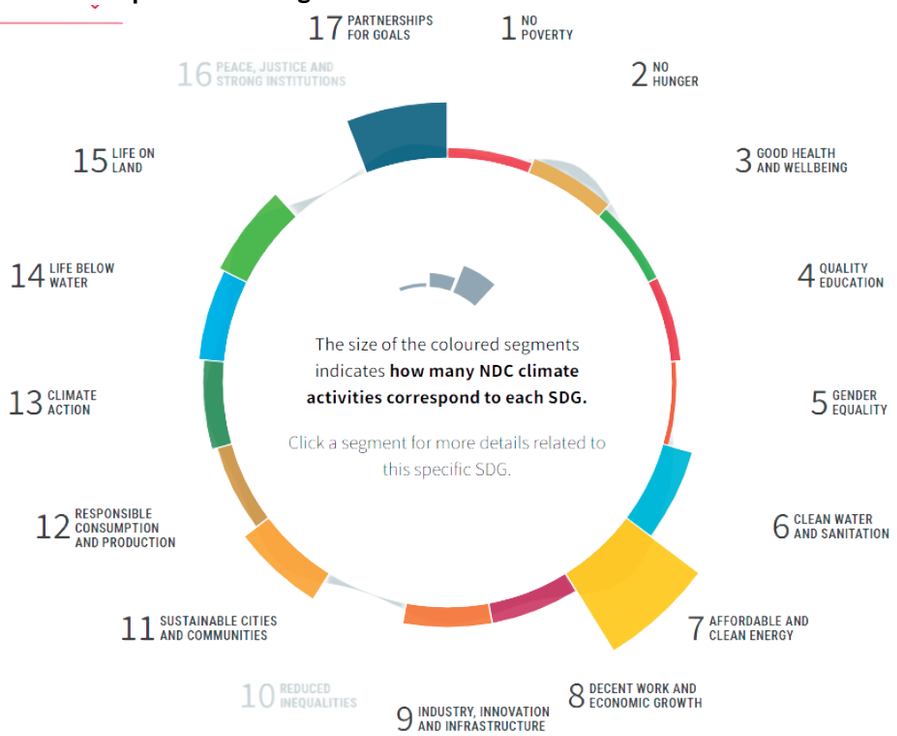



Fig. 4 Climate actions corresponding to different SDGs in India's NDCs (NDC-SDG Connections, www.ndc-sdg.info)

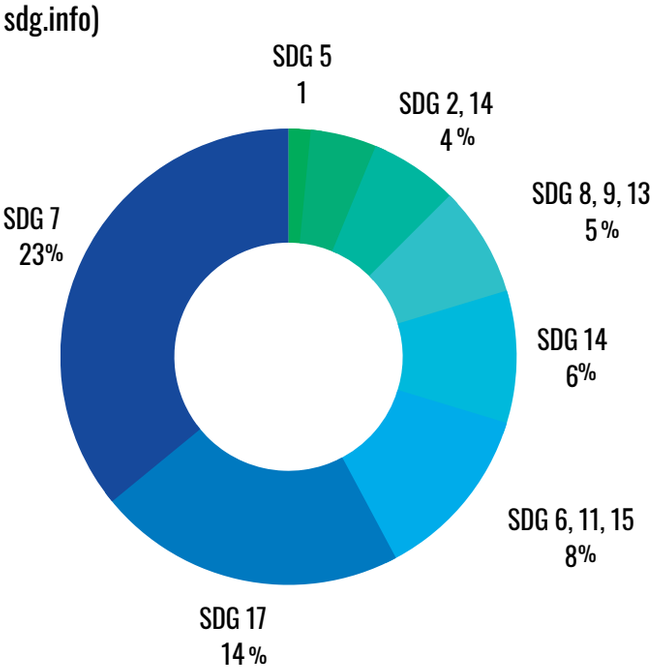



Fig. 5 Percentage wise actions for different SDGs.

Based on the NDC-SDG Connections in the Fig. 4, the total number of climate actions corresponding to India's NDCs are 77. Fig. 5 represents the percentage wise actions for different SDGs. E.g. SDG 7 represents 23% of climate actions. There are no climate actions for SDG 10 & 16 represented in the NDCs.

# NAPCC & Climate Action

The National Action Plan on Climate Change (NAPCC) is a critical component of India's efforts to address climate change and promote sustainable development. By providing a comprehensive framework for action, it helps to ensure that climate action is integrated into all aspects of policy and planning, and that India is well-positioned to meet the challenges of a changing climate. NAPCC is closely linked with the Sustainable Development Goals (SDGs) as both aim to achieve sustainable development and address global challenges such as climate change, poverty, and inequality. The NAPCC's sectoral approach complements the broad-based SDGs, and together they provide a comprehensive framework for sustainable development that addresses the challenges of the 21st century.

## NAPCC link to the following SDGs most extensively:

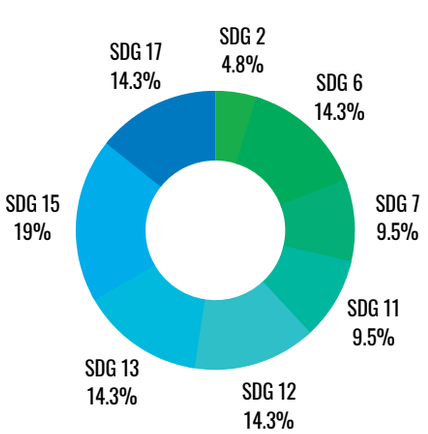



Fig. 6 Interlinkage of SDGs & NAPCC

# NAPCC Interlinkages with SDGs

The climate actions outlined in the National Action Plan on Climate Change (NAPCC) align with specific Sustainable Development Goals (SDGs), which are organized by mission in Table 1.

Table 1 Interlinkage of NAPCC & SDGs

| NAPCC Mission | Relevant SDGs |
|---|---|
| National Solar Mission |   |
| National Mission for Enhanced Energy Efficiency |   |
| National Mission on Sustainable Habitat |   |
| National Water Mission |   |
| National Mission for Sustaining the Himalayan Ecosystem |   |
| National Mission for a Green India |   |
| National Mission for Sustainable Agriculture |   |
| National Mission on Strategic Knowledge for Climate Change |   |

# Interlinkages between SDG-NDC-NAPCC-Schemes

The interlinkages of SDGs with NDC, NAPCC, and various National and subnational schemes are represented sector wise for Sustainable Transportation, Waste Management, Pollution Control, Water Body Cleaning, Water Conservation, Green Cover, Energy Conservation & Renewable Energy to serve as a template for use in plans, reports etc. involving climate action (Annexure 1).

## Sustainable Transportation

Race to Zero
AMRUT, Smart Cities Mission, National Electric Mobility Mission, PMGSY, UIDSSMT, National Urban Transport Policy
Pragathipath Yojana, Garib Samriddhi Yojana, Aapno Taluko Vibrant Taluko
NMSH

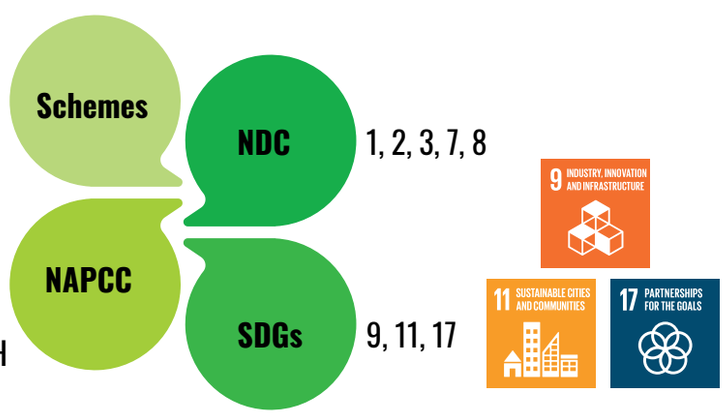



Fig. 7 Interlinkage between SDG-NDC-NAPCC-Schemes for Sustainable Transportation Sector

## Waste Management

Race to Zero, Race to Resilience
SBM-U, Integrated Waste Land Development Programme, Sustainable Alternative Towards Affordable Transportation (SATAT), Steel Scrap Recycling Policy, GOBAR-DHAN Scheme
Majhi Vasundhara Abhiyan, Nirmal Gujarat Yojana, Garib Samriddhi Yojana, Aapno Taluko Vibrant Taluk
NMSH

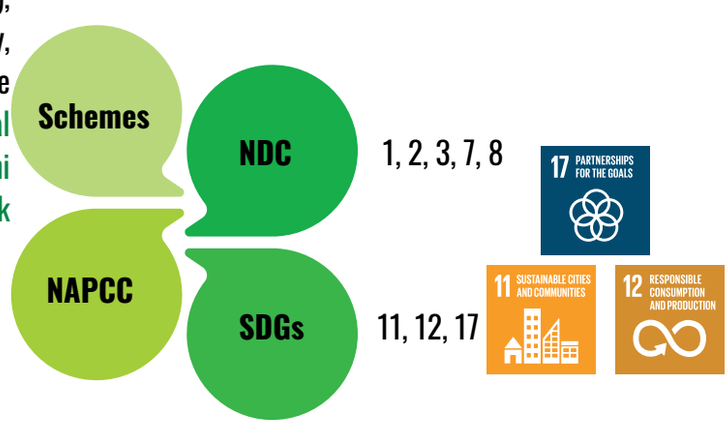



Fig. 8 Interlinkage between SDG-NDC-NAPCC-Schemes for Waste Management Sector

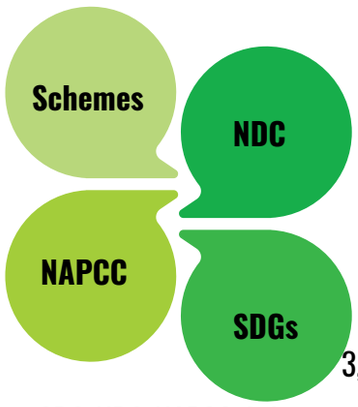
Schemes & Programs mentioned in Green are International & Subnational (State Level), while in black are National

# Interlinkages between SDG-NDC-NAPCC-Schemes

## Pollution Control

Race to Zero, Race to Resilience
NCAP, PMKSY, AMRUT, SBM-U, Voluntary Vehicle-fleet Modernization Programme, Steel Scrap Recycling Policy, Namami Gange Programme
Majhi Vasundhara Abhiyan

NMSH




1, 6, 7, 8

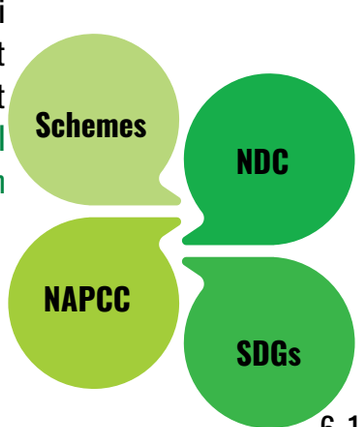
3, 6, 11, 12, 17


Fig. 9 Interlinkage between SDG-NDC-NAPCC-Schemes for Pollution Control Sector

## Water Body Cleaning & Restoration

AMRUT, PMKSY, SBM-U, IWLDP, Jal Shakti Abhiyan, Namami Gange Programme, Mahatma Gandhi National Rural Employment Guarantee Act
Majhi Vasundhara Abhiyan, Nital Goem Nital Baim

NMSH, GIM, NWM




2

6, 14, 15, 17


Fig. 10 Interlinkage between SDG-NDC-NAPCC-Schemes for Water Body Cleaning & Restoration Sector

Schemes & Programs mentioned in Green are International & Subnational (State Level), while in black are National

# Interlinkages between SDG-NDC-NAPCC-Schemes

## Water Conservation

Race to Resilience
AMRUT, IWMP, Jal Jeevan Mission, PMKSY, Rajiv Gandhi National Drinking water Mission, PMMSY, Jal Shakti Abhiyan, Namami Gange Programme, Atal Bhujal Yojana, National Project on Aquifer Management, Mahatma Gandhi National Rural Employment Guarantee Act
Jalswarajya- II Program, Majhi Vasundhara Abhiyan, Shivkalin Pani Sathawan Yojana, SUJALA Suphalam Yojana, Garib Samriddhi Yojana

NMSH, NMSA, NWM

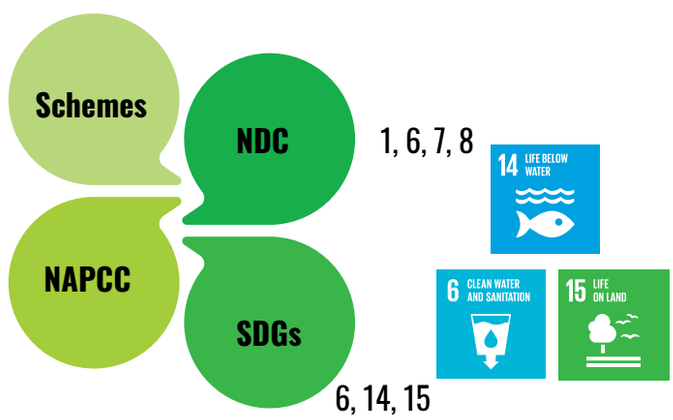



Fig. 11 Interlinkage between SDG-NDC-NAPCC-Schemes for Water Conservation Sector

## Green Cover

Race to Zero, Race to Resilience
AMRUT, CAMPA, Smart city Mission, NAP, National Bamboo Mission, SMAF, NGHM
Majhi Vasundhara Abhiyan, Krishi Aranya Protsaha Yojane, Samrudha Hasiru Grama Yojane

NMSH, NMSA, GIM

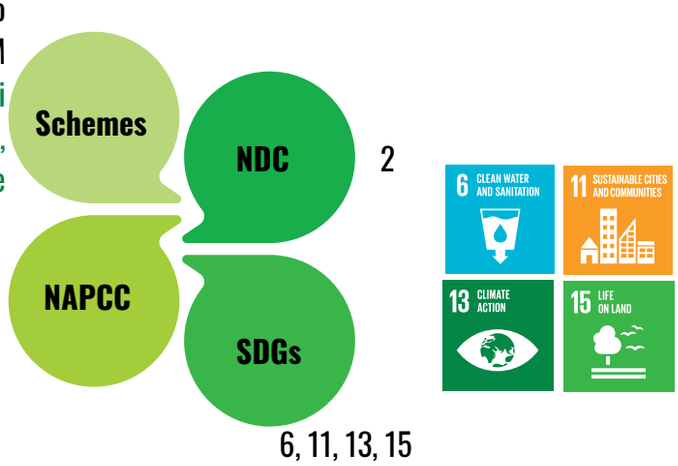



Fig. 12 Interlinkage between SDG-NDC-NAPCC-Schemes for Green Cover Sector

Schemes & Programs mentioned in Green are International & Subnational (State Level), while in black are National

# Interlinkages between SDG-NDC-NAPCC-Schemes

## Energy Conservation

Race to Zero, Race to Resilience
BLY, PAT, R-APDRP, SLNP, UDAY, UJALA, Green Hydrogen Policy, 100% EV declaration, Energy Conservation Act, Steel Scrap Recycling Policy, Pradhan Mantri Sahaj Bijli Har Ghar Yojana-Saubhagya, ECO Niwas Samhita, Municipal Energy Efficiency Programme, National Smart Grid Mission, Kisan Hit Urja Shakti Yojana, Bal Urja Rakshak Dal, Jyotirmay scheme, Urja Kerala Mission
NMEEE

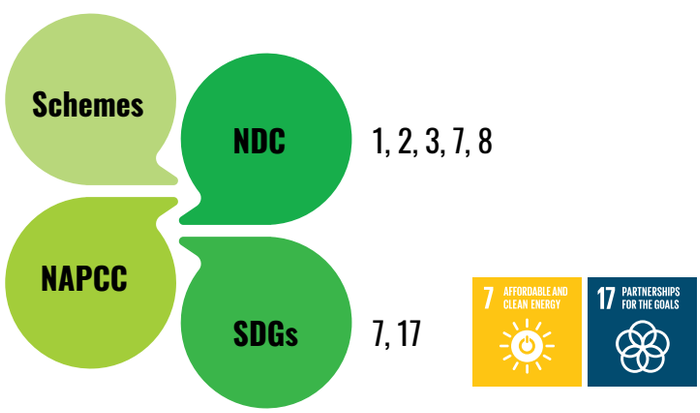



Fig. 13 Interlinkage between SDG-NDC-NAPCC-Schemes for Energy Conservation Sector

## Renewable Energy

Race to Zero, Race to Resilience
PMKUSUM, UDAY, IPDS, Green Hydrogen Policy, 100% EV declaration, National Clean Energy Fund, Green Energy Corridor Project, National Smart Grid Mission, Mission Solar Charkha
Majhi Vasundhara Abhiyan, Surya Raitha Scheme, Urja Kerala Mission, Bal Urja Rakshak Dal
NMEEE, NSM, NMSH

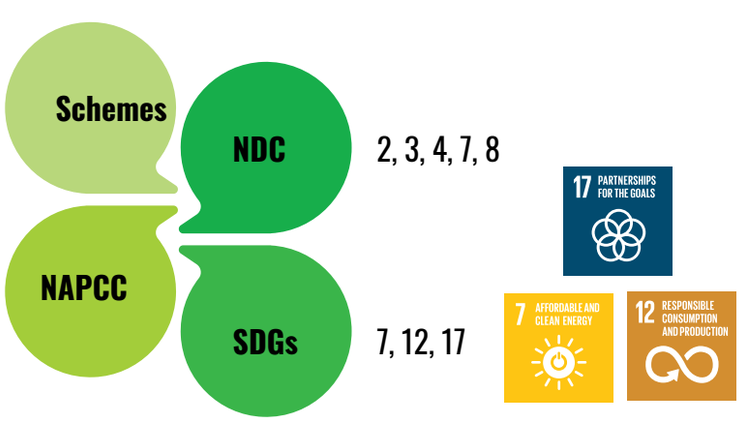



Fig. 14 Interlinkage between SDG-NDC-NAPCC-Schemes for Renewable Energy Sector

Schemes & Programs mentioned in Green are International & Subnational (State Level), while in black are National

# 7. State Action Plan on Climate Change

# State Action Plan on Climate Change (SAPCC)


SAPCC stands for State Action Plan on Climate Change. It is a comprehensive overview of the climate scenario, assessing sector vulnerabilities, and presenting adaptation and mitigation strategies tailored to the State's issues and gaps. SAPCCs provide a roadmap for states to prepare and respond to climate change by leveraging technical support and consultations to assess climate impacts, evaluate vulnerabilities, and present targeted strategies that can be continuously tracked and evaluated to ensure effective implementation.

From a city's perspective, a comparative analysis of different SAPCCs can provide valuable insights into the most effective practices employed by different states to address the unique challenges and opportunities of their urban environments. This analysis can help cities to develop targeted strategies that are specific to their local contexts while aligning with the overall goals and objectives of the state's climate change agenda. It can also serve as a blueprint for developing future plans and strategies, simplifying and enhancing the informational value of such plans. Therefore, a comparative analysis of different SAPCCs can help cities build resilience to climate change and ensure sustainable development.

## Comparison of SAPCCs on key Points:

- Agencies, Vulnerabilities & Adaptation Sectors
- Tools & Data Sources
- Adaptation Strategies
  - Agriculture
  - Water
  - Energy
  - Urban Development
  - Health
  - Forest & Biodiversity

# State Action Plan on Climate Change (SAPCC)

Table 2 Comparison of Supporting Agencies, Linkages & Stakeholder Consultations

| State | Year | Agencies | Linkages to NAPCC/ SDG/NDC | Stakholders Consulatations |
|---|---|---|---|---|
| Aandhra Pradesh | 2011 | Environment Protection Training and Research Institute | None | Yes |
| Arunachal Pradesh | 2011 | INRM, IIMA, IISc. | NAPCC | No |
| Assam | 2015 | TERI | None | Yes |
| Bihar | 2015 | UNDP | NAPCC | Yes |
| Chattisgarh | 2013 | UNDP | NAPCC | Yes |
| Goa | 2020-2030 | NABARD Consultancy Services (NABCONS) | NAPCC and SDG | Yes |
| Gujarat | 2014 | TERI and GIZ | NAPCC | Yes |
| Haryana | 2011 | INRM, IIMA, IISc. | NAPCC | Yes |
| Himachal Pradesh | 2021 | GIZ, Department of Environment, Science and Technology | NAPCC, NDC and SDG | Yes |
| Jharkand | 2014 | PCCF, Tribal developmental Society | None | Yes |
| Karnataka | 2021 | EMPRI | NAPCC and NDC | No |
| Kerala | 2023 | GIZ, CSTEP, IITM(Pune), Institute of Climate Change Studies, Kerala | NAPCC, SDG and NDC | Yes |
| Madhya Pradesh | 2012 | EPCO Housing and Environment Department Government of Madhya Pradesh | None | Yes |
| Maharashtra | 2014 | TERI and UK Met Office | None | No |
| Manipur | 2013 | Directorate of Environment, Manipur and GIZ | NAPCC | Yes |
| Meghalaya | 2012 | GIZ and CTRAN | NAPCC | No |
| Mizoram | 2012 | GIZ and CTRAN | NAPCC | Yes |
| Nagaland | 2012 | GIZ | None | Yes |
| Orissa | 2018 | Forest and environment Department | None | Yes |
| Punjab | 2014 | Punjab State Council for Science & Technology With Technical support from GIZ | NAPCC | Yes |
| Rajasthan | 2022 | IITB | None | No |
| Sikkim | 2014 | GIZ | None | Yes |
| Tamil Nadu | 2014 | GIZ | NAPCC | Yes |
| Telangana | 2017 | EMPRI | None | Yes |
| Tripura | 2012 | GIZ and CTRAN | NAPCC | Yes |
| Uttar Pradesh | 2014 | GIZ | None | Yes |
| Uttarakand | 2012 | UNDP | None | Yes |
| West Bengal | 2017 | Deaprtment of Environment | None | Yes |

# State Action Plan on Climate Change (SAPCC)

Table 3 Comparison of SAPCCs Vulnerability Indicators

| State | Vulnerability Indicators |
|---|---|
| Aandhra Pradesh | Adaptive Capacity Index |
| Arunachal Pradesh | Modelling and information of climate related vulnerability of water resources and forest |
| Assam | Basic information on vulnerability assessment of sectors |
| Bihar | Vulnerability Index |
| Chattisgarh | Adaptive capacity and Vulnerability Index |
| Goa | Coastal, Physical and economic vulnerability |
| Gujarat | Basic information about the vulnerability of State is provided. |
| Haryana | Temperature Humidity Index (THI), heat stress, humidex, Wet Bulb Global Temperature (WBGT) |
| Himachal Pradesh | Composite Vulnerability (CV) |
| Jharkand | Agricultural Vulnerability Index |
| Karnataka | Basic information on vulnerability assessment of sectors |
| Kerala | Composite Vulnerability Assessment |
| Madhya Pradesh | Composite Vulnerability Index (CVI) |
| Maharashtra | Macro level vulnerability index (MLVI) using exposure, sensitivity and adaption capacity |
| Manipur | Biophysical, Social and climatic; Composite Forest Vulnerability Index |
| Meghalaya | Basic information on climate related vulnerability |
| Mizoram | Basic information on climate related vulnerability |
| Nagaland | Agriculture vulnerability index, forest Vulnerability index |
| Orissa | Information on Hydro-met vulnerability and other vulnerabilities |
| Punjab | Basic information about the vulnerability of State is provided. |
| Rajasthan | Standard precipitation index (SPI), Mann-Kendall test, socio-economic vulnerability index (SEVI), human development index (HDI), agriculture vulnerability index (AVI) and Hazard Index |
| Sikkim | Basic information and statistics of vulnerability of some sectors and rural communities |
| Tamil Nadu | Basic information about the vulnerability of State is provided. |
| Telangana | Adaptive capacity |
| Tripura | Biophysical, Social and climatic. Agricultural vulnerability Index |
| Uttar Pradesh | Vulnerability Analysis Framework |
| Uttarakand | Vulnerability Assessment |
| West Bengal | Basic information on vulnerability assessment of sectors |

# State Action Plan on Climate Change (SAPCC)

Table 4 Comparison of SAPCCs Adaptation Sectors

| State | Adaptation Sectors |
|---|---|
| Aandhra Pradesh | Agriculture, habitat, forestry, tourism, mining, costal system, disaster management, transport and rural development with sector wise issues and adaptive plans |
| Arunachal Pradesh | Agriculture, habitat, forestry, water management, knowledge, and energy with current programs and future activities |
| Assam | Water resources, agriculture, forest and biodiversity, Habitat, and energy with overview and strategies. |
| Bihar | Agriculture and Animal Husbandry, Forests and Biodiversity, Water Resources and Disaster Management, Urban Development and Transport, Industries and Mining, Energy and Human Health with key issues, priorities, perceived climate impacts, ongoing intiative and strategies |
| Chattisgarh | Agriculture and Animal Husbandry, Forests and Biodiversity, Water Resources and Disaster Management, Urban Development and Transport, Industries and Mining, Energy and Human Health with key issues, priorities, perceived climate impacts, ongoing intiative and strategies |
| Goa | Water, Tourism, minning, Agriculture and allied sectors, forest, health, waste management, and habitat sectors adaptation startegies were mentioned. |
| Gujarat | Agriculture, Water resources, Forests and Biodiversity, health, urban development, and cross sectoral themes with strategies, state initiative and achievements, ongoing initiatives and key strategies (institutional strengthening, policy support, R and D, Capacity Building) |
| Haryana | Agriculture, habitat, forestry, water managemnt, knowledge, and energy with current programes and future activities. |
| Himachal Pradesh | Forestry and biodiversity, Agriculture, water, health, tourism, energy and urban development sectors with overview, impact of CC, key issues and challeneges, progress mapping, future plans to meet the NDC and SDG. |
| Jharkand | Agriculture, habitat, Coastal management, forestry, water managemnt, knowledge, and energy with overview, challenegs, institutional arranagment, key policies and acts, onhoing program, impact of CC and strategies. |
| Karnataka | Agriculture, habitat, Coastal management, forestry, water managemnt,and energy with specific policies |
| Kerala | Agriculture, livestock, fisheries, forest and biodiversity, water and health ongoing schemes, linkage to NDC and SDG, progress of earlier strategies, propsed new stratgies with potential barriers |
| Madhya Pradesh | Forest and Biodiversity, water, Agriculture, Health, Energy, urban development and transport, renewable energy, rural development, industry with background, policies, concerns, impact of CC and startegies. |
| Maharashtra | Water resources, Agriculture, Forest and Biodiversity, livelihood, Health, extreme rainfall and flooding, and energy and infrastructure with introduction, impact of climate change (with modelling), adaptation needs and priorities, key recommendations and adaptation action plan. |

# State Action Plan on Climate Change (SAPCC)

Table 4 Comparison of SAPCCs Adaptation Sectors

| State | Adaptation Sectors |
|---|---|
| Manipur | Agriculture, habitat, forestry, water managemnt, knowledge, himalayan ecosystem and energy missions with key facts, key issues and adaptive action plan |
| Meghalaya | Agriculture, habitat, forestry, water managemnt, knowledge, himalayan ecosystem and energy missions with key facts, key issues and adaptive action plan |
| Mizoram | Agriculture, habitat, forestry, water managemnt, knowledge, himalayan ecosystem and energy missions with key facts, key issues and adaptive action plan |
| Nagaland | Agriculture, water resources, forestry, health, urban development, energy with key indicators and statistics, institution framework, key issues and challenges, projected impacts due to CC and strategies. |
| Orissa | Agriculture, Coastal rsik and disaster management, energy, fisheries, forestry, mining, transportation, waste management, health, habitat and knowledge profile, impacts, adaptation in 2015, achievement 2015, ideal strategies, budget, co benefits |
| Punjab | Agriculture, habitat, forestry, water managemnt, knowledge, and energy with overview, challenegs, institutional arranagment, key policies and acts, ongoing program, impact of CC and strategies. |
| Rajasthan | Agriculture, Urban governance, health, Forestry and Biodiversity, with profile, climate change impact, vulnerability assessment adaption potential and recommendations |
| Sikkim | Water, agriculture, urban and rural development, forestry sectors with trends, current policies, key issues and strategies |
| Tamil Nadu | Agriculture, habitat, Coastal management, forestry, water managemnt, knowledge, and energy with overview, challenegs, institutional arranagment, key policies and acts, ongoing program, impact of CC and strategies. |
| Telangana | Agriculture, industries, torism, rural development, undustries, forestry, health, urban development, energy with key issues and interventions |
| Tripura | Agriculture, habitat, forestry, water managemnt, knowledge, himalayan ecosystem and energy missions with key facts, key issues and adaptive action plan |
| Uttar Pradesh | Water security, agriculture, forest and biodiversity, urban and rural habitats, and urvan transport with overview, key concerns, and strategies |
| Uttarakand | Agriculture and Animal Husbandry, Forests and Biodiversity, Water Resources and Disaster Management, Urban Development and Transport, Industries and roads, tourism, Energy and Human Health with key issues, priorities, perceived climate impacts ongoing intiative and strategies |
| West Bengal | Agriculture, animal husbandry, fisheries, Sundarbans, health, habitat and knowledge profile, impacts, adaptation in 2012, achievement by 2017, ideal strategies. |

# State Action Plan on Climate Change (SAPCC)

Table 5 Comparison of SAPCC Tools & Data Sources

| State | Data source for modelling | Climate Projections(Modelling) tools | Future Climatic Projections |
|---|---|---|---|
| Aandhra Pradesh | IMD | No projections | None |
| Arunachal Pradesh | IMD | Regional Climate Scenarios for India Using PRECIS(complete century). Digital Elevation Model: SRTM. Drainage Network – Hydroshed, SWAT. Climate impact model; global dynamic vegetation model (IBIS) | Precipitation and temperature for mid century and end century |
| Assam | None | None | None |
| Bihar | IMD | PRECIS and CMIP5 | Temperature and rainfall (RCP 4.5 for 2006-2050s) |
| Chattisgarh | None | None | None |
| Goa | IMD and CRU dataset, Co-Ordinate Regional Downscaling Experiment (CORDEX) | CMIP5 model | Rainfall and Temperature for 2030s, 2060s,and 2080s with RCP 4.5 AND RCP8.5 |
| Gujarat | IMD | INCAA Report and IPCC Scenario A1B used in PRECIS RCM. BIOME-3 vegetation response model. | Rainfall projections for 2030s |
| Haryana | IMD | Regional Climate Scenarios for India Using PRECIS(complete century). Digital Elevation Model: SRTM. Drainage Network – Hydroshed, SWAT. Climate impact model; global dynamic vegetation model (IBIS) | Precipitation and temperature for mid century and end century |
| Himachal Pradesh | IMD | GCAM Modelling team | Temperature, Preciptation and climate extremes till mid century |
| Jharkand | IMD | The climate projections with PRECIS | Temperature and rainfall short (2020s, i.e. 2011–2040), medium (2050s, i.e. 2041– 2070) and long (2080s, i.e. 2071–2098) |
| Karnataka | IMD | Coordinated Regional Climate Downscaling Experiment - CORDEX. InfoCrop model. Dynamic Global Vegetation model - LPJ | Temperature and rainfall projections for the 2030s and 2080s Period using RCP 4.5 and RCP 8.5. |
| Kerala | World Meteorological Organization (WMO) baseline approach, which is 30 year averages. Coordinated Regional Climate Downscaling Experiment (CORDEX). Atmosphere-Ocean Coupled General Circulation Model (AOGCM). | CMIP5, Cropping System Model (CSM) Crop Estimation through Resource and Environment Synthesis (CERES) Rice model embedded within the Decision Support System for Agro-technology Transfer (DSSAT) package. LPJ Vegetation model | Temperature, rainfall and vegetation using RCP4.5 AND RCP 8.5 for 2030s and 2080s |
| Madhya Pradesh | IMD | PRECIS | Temperature and Rainfall for 2030s (2021-2050) and 2080s (2071-2098) |
| Maharashtra | IMD, PSMSL (Sea level rise), mean sea level anomaly from the AVISO satellite product. Harmonized World Soil Database (HWSD)(water resources modelling), SPOT Vegetation (Forestry), Sea bathymetry Global Bathymetry data | INCAA Report and IPCC Scenario A1B used in PRECIS RCM. IPCC Fifth Assessment Report (AR5) used by CMIPS for sea level. Soil Conservation Service (SCS) method for water resource modelling, Crop wise threshold analysis (Agriculture), CERES (Rice modelling), MIKE 21 Flow Model(flood modelling). | Rainfall, Extreme rainfall, temperature and extreme temperature projections of 2030s, 2050s, and 2070s. |

# State Action Plan on Climate Change (SAPCC)

Table 5 Comparison of SAPCC Tools & Data Sources

| State | Data source for modelling | Climate Projections(Modelling) tools | Future Climatic Projections |
|---|---|---|---|
| Manipur | IMD, Climate Research Unit Time Series (CRU TS) 2.0, INNCA | PRECIS, INFOCROP, IBIS Vegetation model, | Relative humidity, temperature and preciptation for 2021-2050. |
| Meghalaya | None | None | None |
| Mizoram | INCA report, IMD | None | None |
| Nagaland | Climatic Research Unit Time Series (CRU TS), IMD | PRECIS | Rainfall and Temperature till mid-century |
| Orissa | IMD and World Bank Database | PRECIS | Precipitation and Temperature 2050s-2099 |
| Punjab | IMD | PRECIS, SWAT, IBIS Vegtation model | Temperature and precipitation 2021-2050 and 2071-2098 using baseline from 1961-1990. |
| Rajasthan | Data for hydrological modelling from IMD. Water demand data from the Water Global Assessment and Prognosis (WaterGAP) model | VIC | Temperature, Preciptation with RCP 4.5, RCP8.5 from 2020-2040. 2041-260, 2061- 2080s |
| Sikkim | IMD | Three QUMP12 runs of PRECIS, namely, Q0, Q1, and Q14, using A1B scenario | Temperature and Precipitation 2030s and 2050s |
| Tamil Nadu | IMD | UK Met Office Hadley Centre regional climate model PRECIS. CLIM SYSTEM - a model used for predicting sea level rise | Temperature and Precipitation 2010-2040, 2040-2070, 2070-2100 with reference to baseline (1970-2000) |
| Telangana | IMD | AOGCM, PRECIS | Rainfall (2020s, 2050s, 2080s) |
| Tripura | None | None | None |
| Uttar Pradesh | IMD | PRECIS regional climate model, IBIS and SRTM, Hydroshed | Rainfall and Precipitation regional climate model for present (1961-1990, BL) near term (2021-2050, MC) and long term (2071-2098, EC) |
| Uttarakand | None | PRECIS | Rainfall and Temperature |
| West Bengal | IMD, CORDEX. | CMIP5 | Temperature and rainfall RCP 2.6, RCP, 4.5, RCP8.5. |

# State Action Plan on Climate Change (SAPCC)

Adaptation Strategy-Agriculture


In order to tackle the adverse impacts of climate change on agriculture and ensure food security, it is important to adopt innovative and sustainable strategies. To address these challenges, the State Action Plan on Climate Change (SAPCCs) of all the States of India has developed various adaptation strategies for sustainable agriculture. These strategies aim to enhance the resilience of farming systems, secure food supply chains and improve soil and water conservation. The comprehensive overview of the major adaptation strategies is presented that encompass a wide range of measures, including crop diversification, sustainable management of crop residue, and utilization of bio-resources for enhancing soil quality and fertility. The States & Cities that are in the process of developing or revising their plans can refer these as the guideline. Also, the SAPCCs that have the best representation for adaptation strategy for Agriculture are highlighted.

## Best Practice-Adaptation Plan for Agriculture Strategy:

The Following SAPCCs can be referred:

- Kerala
- Karnataka
- Himachal Pradesh
- Maharashtra

# State Action Plan on Climate Change (SAPCC)

Adaptation Strategy-Agriculture

1. Improving farmers' access to climate services, suitable crop varieties, and information management for sustainable agriculture.

2. Enhancing the resilience of farming systems through diversified cropping patterns and farming systems, optimized jhum cultivation, promoting soil and water conservation technologies, planning cropping systems suitable for each agro-climatic zone, and establishing specific centres for critical climate analysis.

3. Enhancing the resilience of agricultural livelihoods through value addition and market access, promotion of organic farming, increasing farmer income, and promoting diverse livelihoods such as agro-processing and cooperative farming.

4. Securing food supply chains through enhanced access to cold storage infrastructure, warehousing facilities, and urban food zones, and developing strategic plans at the agro-climatic zone level.

5. Improving soil and water conservation, irrigation development through micro-irrigation systems, assessment of soil quality and moisture, and implementing measures to minimize soil and water losses through resource conservation technologies.

6. Managing the risks for sustainable productivity and risk management in agriculture and allied sectors, improving pest monitoring and surveillance techniques, and promoting the adoption of solar and wind power.

7. Promoting crop diversification, sustainable management of crop residue, conservation of soil, water, and energy, and utilizing bio-resources and composting of organic waste for enhancing soil quality and fertility.

8. Enhancing extension services, strengthening agro-meteorological advisory services, and facilitating access to information and institutional support by expanding automatic weather station networks to the Panchayat level.

9. Developing data on genotypes of local crop varieties and identification of suitable varieties for different agro-climatic zones, research on "Climate Change Implications on Crop Growth," breeding studies on major crops for climate-resilient agriculture, and developing cultivars and enhancing germplasm base.

10. Strategies for animal husbandry and dairy development sector, genetic development of less sensitive breeds, improving animal health, and promoting inland fishing and inland fisheries.

11. Assessment of paddy cultures and rainwater harvesting, enhancing dissemination of new and appropriate technologies developed by researchers and strengthening research, and upscaling no-regret interventions.

# State Action Plan on Climate Change (SAPCC)

Adaptation Strategy-Water


As the world experiences a changing climate, the availability, quality, and distribution of water are expected to undergo significant impacts, which will have far-reaching consequences for societies, economies, and ecosystems. To mitigate these challenges, governments across the globe are devising adaptation strategies aimed at conserving water and ensuring its sustainable use. Indian State's SAPCC has outlined various strategies for water conservation that target improving water security, reducing the effects of water stress on vulnerable communities, and enhancing the resilience of water systems. A compilation of all major strategies encompassing a broad range of actions, including sustainable groundwater management, infrastructure development, conservation and restoration of wetlands and lakes, and the implementation of pricing regulations for the use of water that are mentioned in SAPCCs from all the States of India is presented. The States & Cities that are in the process of developing or revising their plans can refer these as the guideline. Also, the SAPCCs that have the best representation for adaptation strategy for Water Sector are highlighted.

## Best Practice-Adaptation Plan for Water Strategy:

The Following SAPCCs can be referred:

- Assam
- Kerala
- Uttar Pradesh
- Sikkim

# State Action Plan on Climate Change (SAPCC)

Adaptation Strategy-Water

1. Sustainable groundwater management and recharging of groundwater.
2. Retaining and conserving the riparian buffer around the wetlands to improve surface runoff management.
3. Development of infrastructure to reduce the impact on water availability and enhance water security.
4. Promoting surface water development and promoting basin level integrated watershed management.
5. Restoration, conservation, and management plan for all lakes and wetlands including catchment area treatment plan.
6. Developing groundwater models for different agro-climatic zones and monitoring groundwater quality in arsenic-affected areas.
7. Construction of dams in catchments of rivers, artificial recharge and impounding reservoirs, and check dams.
8. Promoting zero-energy water purification and promoting rainwater harvesting schemes.
9. Review of networks of hydrological observation stations, automatic weather stations, and automated rain gauge stations.
10. Establishing and strengthening groundwater monitoring and geohydrology networks.
11. Building capacity among professionals from various departments/organizations associated with water resources.
12. Monitoring water quality to understand the impacts of warming of the atmosphere and provide remedies.
13. Developing and implementing a comprehensive water database and assessment of the impact of climate change on water resources of the State.
14. Mapping water availability, minor surface water bodies, aquifers in time and space, and water use.
15. Introduction of pricing regulation for the use of piped water for domestic use and drinking water.

# State Action Plan on Climate Change (SAPCC)

Adaptation Strategy-Energy


The energy sector is a significant contributor to greenhouse gas emissions and is thus a crucial area to focus on in the fight against climate change. Sustainable energy practices can not only reduce emissions but also improve energy efficiency, energy security, promote sustainable economic growth and resilience. The comprehensive overview of the major adaptation strategies for energy sector is presented that encompass a wide range of measures like promote energy efficiency, including enhancing power generation efficiency, reducing energy losses, promoting renewable energy technology, and implementing institutional and policy frameworks to facilitate energy efficiency promotion. The States & Cities that are in the process of developing or revising their plans can refer these as the guideline. Also, the SAPCCs that have the best representation for adaptation strategy for Energy are highlighted.

## Best Practice-Adaptation Plan for Energy Strategy:

The Following SAPCCs can be referred:

- Bihar
- Punjab
- Himachal

# State Action Plan on Climate Change (SAPCC)

Adaptation Strategy-Energy

1. Enhancing efficiency in power generation.
2. Undertaking demand side management to improve efficiency and reduce GHG emission.
3. Market capitalization for energy efficiency.
4. Development of Low Carbon Pathway.
5. Reducing AT&C losses.
6. Promotion of grid interactive and off-grid intervention in power generation options using renewable energy technology.
7. Upgrading transmission and distribution network for minimization of energy losses.
8. Penetration of energy-efficient devices in domestic and public utility systems facilitated by financial, supply chain and market incentives.
9. Institutional development and strengthening of Energy departments for Energy Efficiency promotion.
10. Maximizing solar power usage and Encouraging use of Solar Gadgets
11. Expansion Conversion of conventional street lights to solar LED/CFL street lights
12. Promotion of biomass energy, wind energy, Hydro power
13. Promotion and implementation of standalone solar systems, deployment of solar pumps in agriculture, Rooftop solar power generation.
14. Energy Conservation Building Codes, demonstration projects on off grid electricity supply to villages, ceiling Fans and air Conditioners should be BEE rated.
15. State energy audit policy and Implementation of pilot Energy efficiency project and IGEA.

# State Action Plan on Climate Change (SAPCC)

Adaptation Strategy-Urban Development


As the world faces the impacts of climate change, it is crucial to implement adaptation strategies in various sectors to mitigate its effects. In the urban context, there are several measures that can be taken to reduce carbon emissions and promote sustainable living. These include efficient use of resources, sustainable urban development, and climate-friendly waste management. With the implementation of such strategies, cities can become more resilient and promote low-carbon societies. A compilation of all the major strategies mentioned in the SAPCCs of all the States is presented for the category-urban planning and development. The States & Cities that are in the process of developing or revising their plans can refer these as the guideline. Also, the SAPCCs that have the best representation for adaptation strategy for Urban Development are highlighted.

## Best Practice-Adaptation Plan for Urban Development Strategy:

The Following SAPCCs can be referred:

- Bihar
- Nagaland
- Punjab
- Tamil Nadu

# State Action Plan on Climate Change (SAPCC)

Adaptation Strategy-Urban Development

1. Energy efficiency in commercial and residential buildings.
2. Efficient conservation of rainwater and promoting renewable energy options.
3. Use of alternate energy-efficient building materials and sustainable construction technologies.
4. Sustainable urban development activities and green governance for low-carbon societies.
5. Improving urban water supply, solid and waste management, and sustainable urban transport planning and management.
6. Incorporating climate concerns in urban water supply and sewage, greater water use efficiency, climate-friendly waste management, and development of satellite townships.
7. Design city level climate action plans to integrate climate risks and responses into urban planning/development processes
8. Developing market strategies to improve livelihood and increase climate change adaptive capacity.
9. Restoration of ecosystem structure and functions, improvement in water usage management, and climate-friendly waste management systems.
10. Reduction of disaster risk, energy efficiency improvement, and promotion of renewable energy usage.
11. Reduction of direct or indirect GHG emission transport management and vehicular pollution control.
12. Developing a well-integrated waste management system, city drainage system, and strategies for sewerage, sanitation, storm drainage, landslip management, and solid waste management.
13. Addressing challenges associated with projected excess rainfall scenarios and pollution in river water in a warming scenario.
14. Safe water supply, 100% coverage of sewerage and sanitation, scientific management of municipal solid waste, mandatory rainwater harvesting, and promotion of urban storm-water and drainage management.
15. Development of a plan for the resilience of vulnerable structure associated with critical services

# State Action Plan on Climate Change (SAPCC)

Adaptation Strategy-Health


Climate change poses significant risks to public health, including the emergence and spread of vector-borne diseases, malnutrition, food insecurity, and mental health issues. It is therefore crucial to develop effective adaptation strategies that address these health risks. These strategies can help reduce the vulnerability of communities to climate-related health risks and build resilience in the face of changing climate conditions. A comprehensive list of several important adaptation strategies outlined in the SAPCCs of various States that focus on enhancing the monitoring and surveillance of climate-sensitive diseases, improving early detection and control measures for vector-borne diseases, developing weather-based early warning systems, and strengthening the knowledge and skills of health workers is presented. The States & Cities that are in the process of developing or revising their plans can refer these as the guideline. Also, the SAPCCs that have the best representation for adaptation strategy for Health are highlighted.

## Best Practice-Adaptation Plan for Health Strategy:

The Following SAPCCs can be referred:

- Bihar
- Kerala
- Himachal

# State Action Plan on Climate Change (SAPCC)

Adaptation Strategy-Health

1. Enhanced monitoring and surveillance for climate-sensitive diseases
2. Research-based prioritization of regions and population groups for targeted interventions to address health risks from climate change
3. Development of institutional framework and infrastructural facilities for early detection of vector borne diseases and control measures
4. Addressing drought, malnutrition, food security, and food safety issues, and reviewing the state's health infrastructure for climate-related vulnerabilities and risks.
5. Database on climate variables and mental health variables, suited for analytics diagnosis research and decision making, Periodic Air quality data acquisition mechanism
6. Establishment/Upgradation of pathological laboratories for disease identification caused due to climate variations
7. IT-enabled system to inform the public on possible and actual disease outbreak
8. Heat wave action plan and system to predict disease outbreak
9. Enhancing the knowledge and skills of health workers
10. Weather-based Early Warning System
11. Upscaling Health Disaster management preparedness
12. Early case detection and quick control with a focus on areas with low coverage.
13. Monitoring and reporting mechanism to ensure accountability and optimize outputs, Public Awareness on health.
14. Develop climate friendly State Health Policy.
15. Strengthening supportive systems for Environment management and public awareness on health.

# State Action Plan on Climate Change (SAPCC)

Adaptation Strategy-Forest & Biodiversity


As the effects of climate change continue to unfold, the need for sustainable forest management has become increasingly urgent. To this end, the State Action Plan on Climate Change (SAPCC) of all India's states has devised a range of adaptation strategies to increase forest cover, enhance the quality of existing forests, and promote sustainable forest-based livelihoods. The comprehensive overview of the major adaptation strategies is presented for the forest and biodiversity sector mentioned in the SAPCC that can help in reversing the effect of climate change.

The States & Cities that are in the process of developing or revising their plans can refer these as the guideline. Also, the SAPCCs that have the best representation for adaptation strategy for Forest & Biodiversity are highlighted.

## Best Practice-Adaptation Plan for Forest & Biodiversity Strategy:

The Following SAPCCs can be referred:

- Goa
- Kerala
- Uttar Pradesh
- Assam

# State Action Plan on Climate Change (SAPCC)

Adaptation Strategy-Forest & Biodiversity

1. Afforestation and plantations outside forests to increase forest cover.
2. Enhancing the quality of existing forests, including protecting and conserving forests, increasing forest density, and promoting natural regeneration.
3. Rehabilitation of shifting cultivators and the restoration of shifting cultivated areas.
4. Promotion of agro-forestry and social forestry to enhance carbon sinks and increase biomass.
5. Protecting and enhancing sustainable forest-based livelihoods, including supporting private forest owners in the sustainable management of their forests.
6. Developing sustainable forest management plans for different forest types in view of climate change.
7. Strengthening of protection and conservation measures for forests, including effective fire prevention and management, checking soil erosion, and conserving moisture.
8. Creating biodiversity registers to document genetic diversity and associated knowledge.
9. Ecosystem research on climate variability
10. Promotion of urban forestry to increase tree cover in urban and peri-urban areas.
11. Valuing and improving the productivity of bamboo and promoting local value addition through establishment of market linkages.
12. Monitoring and evaluating forest conservation and management through GIS-based analysis and monitoring of carbon stocks and fluxes.
13. Institutional reforms and capacity building for effective implementation of protected area systems and enhancing public and private investments for raising plantations.
14. Assessing additional threats to biodiversity and identifying adaptive species for effective plantation.
15. Rehabilitation of degraded forests, including phasing out monoculture plantations and conversion to secondary forests.

# 8. Comparison of SAPCCs and CCAPs

# Comparison of SAPCCs & CCAPs

A comparison of State Action Plans on Climate Change (SAPCCs) and City Climate Action Plans (CCAPs) can reveal important information about climate action at different levels of governance. SAPCCs are state-level plans that outline a comprehensive approach to address climate change impacts across all sectors and regions of a state. On the other hand, CCAPs are city-level plans that focus on specific strategies and actions to reduce greenhouse gas emissions and adapt to climate impacts within a city's jurisdiction. A comparison of SAPCCs and CCAPs can reveal the extent of coherence, alignment, and prioritization of climate actions.

## SAPCCs:

- Maharashtra
- Rajasthan

## CCAPs:

- Nagpur
- Pune
- Mumbai
- Udaipur

# Cities Climate Action Plan (CCAP)

Nagpur, Pune, Mumbai CCAP compared with Maharashtra SAPCC

## Schemes:

The SAPCC for Maharashtra covers a broader range of schemes than the CCAPs for Nagpur, Pune, and Mumbai. The CCAPs for Nagpur and Pune seem to have a greater focus on employment generation schemes, while Mumbai's CCAP has more emphasis on environmental sustainability and energy conservation schemes. However, some schemes are common across all three CCAPs, indicating a shared focus on urban development and sanitation. Both SAPCC and CCAPs focus on water management, renewable energy, agriculture, urban development, forest and biodiversity conservation, disaster management, and climate resilience. However, SAPCC provides a more comprehensive and detailed approach, including specific strategies and measures for each sector and cross-cutting themes such as gender, social inclusion, and capacity building, which the CCAPs do not provide explicit information on.

**Maharashtra**

Marathwada and Vidarbha Watershed Development Missions, AGWRS, NWDPRA, RKVY, Shivkalin Pani Sathawan Yojana, MGNREGS, National Rural Health, CAMPA, NAM, IWMP, NAIS, NRHM, Jalswarajya- II Program

**Nagpur & Pune**

MGNREGS, PMKSY, AMRUT, DDUGJY, Saubhagya, SBM-U, SBM-R, Smart City Mission, Majhi Vasundhara Abhiyan, JnNURM, PMKUSUM, SLNP, PAT

**Mumbai**

UJALA scheme, SBM-U, Majhi Vasundhara Abhiyan, NCAP, Smart City Mission

## Other parameters:

The SAPCC does not explicitly mention the linkage between the identified schemes and SDGs, while the CCAPs for Nagpur and Pune have identified how the schemes are interlinked with SDGs. While the SAPCC does not include specific details on stakeholder consultation or policy evaluation, the CCAPs for Nagpur and Pune have evaluated policies for inclusion in the plan. The Mumbai CCAP has also specified stakeholder consultation as part of its plan. All the CCAPs have provided details on the GHG emission profile and financing.

# Cities Climate Action Plan (CCAP)

Nagpur, Pune, Mumbai CCAP compared with Maharashtra SAPCC

## Adaptation Sectors:

The adaptation sectors identified for the state of Maharashtra and the cities of Nagpur, Pune, and Mumbai can be compared.

**Adaptation Sectors for Maharashtra (SAPCC):**

The Maharashtra State Action Plan on Climate Change (SAPCC) identified several adaptation sectors including water resources, agriculture, forest and biodiversity, livelihood, health, extreme rainfall and flooding, and energy and infrastructure. The SAPCC provides a comprehensive analysis of the impact of climate change on these sectors, with modelling to project future impacts. It also outlines adaptation needs and priorities, key recommendations, and an adaptation action plan.

**Adaptation Sectors for Nagpur:**

The adaptation sectors identified for Nagpur include energy, habitat, transport, livestock, and waste. The CCAP provides specific recommendations for each sector, along with a time frame, budget, and district scenario. The sectors identified for Nagpur are narrower in scope than those in the SAPCC, it provides detailed recommendations and implementation plans for each sector.

**Adaptation Sectors for Pune:**

Similar to Nagpur, the adaptation sectors identified for Pune include energy, habitat, transport, livestock, and waste. The CCAP provides specific recommendations for each sector, along with a time frame, budget, and city scenario. The recommendations and implementation plans for each sector are detailed and specific to the context of Pune.

**Adaptation Sectors for Mumbai:**

The adaptation sectors identified for Mumbai include energy, sustainable mobility, waste management, urban greening and biodiversity, air quality, and water resources and flooding. The sectors identified for Mumbai are similar to those in the SAPCC, but with a greater focus on urban-specific issues such as sustainable mobility and waste management. The CCAP provides detailed recommendations and implementation plans for each sector.

Overall, all CCAPs provide valuable insights and recommendations for adapting to the impacts of climate change in their respective regions.

# Cities Climate Action Plan (CCAP)

Udaipur CCAP compared with Rajasthan SAPCC

## Schemes:

The SAPCC covers a broader range of sectors such as urban development, energy, and rural employment, while the CCAP for Udaipur has a more limited focus on urban development and energy efficiency.

When it comes to focus sectors, there are some common themes between the two plans. Both the SAPCC and CCAP for Udaipur emphasize the importance of urban development and infrastructure and include schemes such as AMRUT, Smart City Mission, and PMAY. Both plans also prioritize energy conservation and efficiency, as evidenced by the inclusion of UJALA & SLNP.

However, the SAPCC for Rajasthan has a more comprehensive approach to addressing climate change, with a specific focus on water management, agriculture, and forestry. The SAPCC includes schemes such as PMKSY, PMKUSUM, and MNREGA, which aim to promote sustainable agriculture practices, renewable energy generation, and rural employment generation. In contrast, the CCAP for Udaipur has a more limited focus on climate change, and does not explicitly include schemes aimed at promoting sustainable agriculture or forestry practices.

**Rajasthan**

PMKSY, PMKUSUM, JNNURM, Rajiv Awas Yojana, UIDSSMT, RGGVY, AMRUT, Pradhan Mantri Awas Yojana, SBM-U, MNREGA, JFM, DDUGJY, UDAY Saubhagya Yojana, Mukya Mantri Vidhyut Sudhar Yojana, UJALA, PAT, Smart City Mission

**Udaipur**

AMRUT, Smart City Mission, SBM, PMAY scheme, UJALA, SLNP

## Other parameters:

There is no mention of the linkage between SDGs and Schemes in both, the SAPCC as well CCAP. While the SAPCC does not include specific details on stakeholder consultation, the CCAPs for Udaipur has specified stakeholder consultation as part of its plan. The CCAP has also provided details on the GHG emission profile.

# Cities Climate Action Plan (CCAP)

Udaipur CCAP compared with Rajasthan SAPCC

## Adaptation Sectors:

The adaptation sectors identified for the state of Rajasthan and the city of Udaipur are compared to understand the coverage of the SAPCC into the CCAP.

**Adaptation Sectors for Rajasthan (SAPCC):**

The SAPCC for Rajasthan covers a broader range of adaptation sectors, including agriculture, urban governance, health, forestry, and biodiversity. For each sector, it includes a profile, climate change impact, vulnerability assessment, adaptation potential, and recommendations. This indicates a comprehensive approach toward addressing the impacts of climate change across various sectors.

**Adaptation Sectors for Udaipur:**

the CCAP for Udaipur city has a more limited focus on specific sectors, including water supply, sewage, transportation, solid waste management, and storm water drainage. For each sector, it highlights interventions, impact, and resilience, indicating a more targeted approach towards addressing the city's infrastructure and service delivery challenges in the context of climate change.

Overall, while the SAPCC for Rajasthan covers a wider range of adaptation sectors and provides a more detailed analysis of each sector's climate change impacts and adaptation potential, the CCAP for Udaipur has a more focused approach towards addressing specific infrastructure and service delivery challenges.

# 9. Recommendations

# Recommendations-Governance

Based on the analysis of the existing governance structures and mechanisms for building climate resilience in Indian cities, here are some recommendations for strengthening them:

1. Improve **coordination and collaboration** between different government agencies and departments at the local level, to ensure a holistic and integrated approach to climate resilience planning and implementation.
2. Develop and implement **comprehensive climate resilience strategies** that take into account local environmental, social, and economic conditions, and involve meaningful engagement and participation of local communities and stakeholders.
3. **Strengthen the capacity** of local government officials and staff to develop and implement climate resilience initiatives, including training programs, technical assistance, and capacity-building initiatives.
4. **Establish clear targets, goals, and indicators** for measuring the effectiveness of climate resilience initiatives, and develop mechanisms for monitoring and evaluation.
5. **Build partnerships and collaborations** with non-governmental organizations, academic institutions, private sector organizations, and other stakeholders to leverage resources, expertise, and knowledge for building climate resilience.
6. Promote the use of **innovative technologies**, such as remote sensing and geographic information systems (GIS), for mapping and analyzing climate risks and vulnerabilities and for supporting evidence-based decision-making.
7. Develop and implement **effective communication** and outreach strategies to raise awareness and build public support for climate resilience initiatives, including education and engagement programs targeting different stakeholder groups.

By implementing these recommendations, local governance structures and mechanisms can be strengthened to better address the challenges of climate change and build more resilient and sustainable cities in India.

# Recommendations for Policies


Breaking down information silos between departments is an essential step in assisting decision-makers in organising immediate and long-term responses to climate change and lowering community vulnerability via urban design and planning (Orsetti et. al., 2022). According to Fudge et al. (2020), finding a solution for the complex issues that cities deal with frequently necessitates cross-disciplinary dialogue and collaboration. Planning for climate change is known to be hampered by a lack of information, resources (both financial and human), local government accountability, and challenges in including stakeholders (Barata et. al., 2018).

## Key Recommendations:

- Breaking Information Silos
- Cross Disciplinary Dialogue
- Collaboration & Partnership

# Recommendations-Policy

Political Barriers 

To address political barriers such as unplanned government and informal settlements, persisting vulnerability and failure to implementation, non-cooperation by the population to re-locate, and the gap in the prevention of cities from becoming clusters for poverty and slums, the following policy recommendations may be considered:

1. Implement a participatory approach to urban planning, involving both government officials and informal settlement residents. This approach should prioritize the development of sustainable infrastructure and social amenities that meet the needs of all citizens.
2. Create a regulatory framework that ensures the effective implementation of policies aimed at reducing vulnerabilities and building resilience. This could include setting clear targets and performance indicators, as well as providing adequate funding and resources to support implementation efforts.
3. Invest in education and awareness-raising initiatives that emphasize the importance of relocating to safer areas and adopting sustainable lifestyles. Such initiatives can be targeted at communities that are most vulnerable to the effects of climate change.
4. Establish partnerships with non-governmental organizations, private sector entities, and other stakeholders to address poverty and slum clustering in urban areas. This could involve creating economic opportunities and providing social services that support the needs of marginalized communities.

## Key Recommendations:

- Participatory Approach
- Setting Clear Targets & Performance Indicators
- Awareness Raising
- Partnerships with NGOs, Private Sector & other Stakeholders

# Recommendations-Policy

Financial Barriers 

To address financial barriers to the implementation of climate action, the following policy recommendations may be considered:

1. Develop innovative financing mechanisms that can attract private sector investment and mobilize public funds for climate action. This could involve the establishment of green bonds, carbon markets, and other mechanisms that can provide financial incentives to support climate mitigation and adaptation efforts.
2. Establish decentralized funds that can provide local governments and communities with the resources needed to implement climate action plans. This can involve setting up dedicated funds at the local or regional level that are designed to support climate-related initiatives.
3. Ensure proper and timely fund allotment by establishing transparent and accountable funding mechanisms. This can involve setting up independent oversight bodies to ensure that funds are allocated and utilized appropriately, and that there is proper reporting and monitoring of results.
4. Prioritize funding for vulnerable communities and regions that are most at risk from the impacts of climate change. This can involve the allocation of additional resources to support adaptation efforts in these areas, as well as investing in education and awareness-raising initiatives that can help communities become more resilient.

## Key Recommendations:

- Innovative Financing Mechanisms
- Decentralized Funds
- Transparent & accountable funding mechanisms
- Prioritize funding for Vulnerable communities

# Recommendations-Policy

Institutional Barriers 

To address institutional barriers to the implementation of climate action, the following policy recommendations may be considered:

1. Develop human resource capacity through recruitment and training of staff. This can involve creating specialized training programs to build the skills and knowledge needed to implement climate action plans effectively.
2. Provide adequate facilities and infrastructure needed to implement climate action plans. This can involve setting up research and development centers, establishing climate data centers, and building dedicated climate action planning departments.
3. Develop institutional mechanisms for collating, synthesizing and delivering knowledge products for decision-making. This can involve setting up climate knowledge centers, data repositories and communication channels to provide timely and relevant information to decision-makers.
4. Encourage the involvement of local governments in climate action planning by creating platforms for collaboration and coordination between different levels of government. This can involve providing technical assistance and resources to support local governments in developing climate action plans.
5. Develop standardized planning processes and frameworks to ensure consistency and quality in the development of climate action plans. This can involve setting up regulatory frameworks that mandate the inclusion of climate change considerations in all planning processes.
6. Promote public participation in the development and implementation of climate action plans through awareness-raising campaigns and public consultation processes. This can involve setting up community engagement programs that facilitate dialogue and feedback between citizens and decision-makers.
7. Encourage private sector involvement in climate action planning by providing incentives and regulatory frameworks that support investment in climate-friendly infrastructure and technologies.
8. Address resistance to change by developing communication and advocacy strategies that emphasize the benefits of climate action and the costs of inaction. This can involve developing public awareness campaigns and working with stakeholders to build a shared understanding of the need for climate action.

## Key Recommendations:

- Capacity Expansion-Human Resources
- R & D centers
- Climate Knowledge centers
- Involving Local Government in action planning
- Regulatory Frameworks
- Public Participation
- Private Sector involvement
- Communication & Advocacy

# Recommendations-Policy

Technical Barriers 

To address technical barriers to the implementation of climate action, the following policy recommendations may be considered:

1. Develop training programs to build technical knowledge and capacity for climate action planning and implementation. This can involve providing **specialized training to different stakeholder groups**, including government officials, community leaders, and private sector actors.
2. **Create platforms** for sharing technical knowledge and expertise. This can involve setting up knowledge exchange networks that bring together different stakeholders to share best practices, lessons learned, and other technical resources.
3. Develop communication strategies to raise awareness of **existing laws, acts, and policies** related to climate change. This can involve creating user-friendly guides and toolkits that provide clear and concise information on relevant laws, acts, and policies.
4. Provide **technical assistance** to support the development and implementation of climate action plans. This can involve providing technical experts to support specific activities, such as conducting vulnerability assessments, developing adaptation strategies, or implementing renewable energy projects.
5. Develop **databases and information systems** to support decision-making and monitoring of climate action activities. This can involve establishing climate data centers and other information systems that provide timely and accurate information on climate-related risks and opportunities.
6. Integrate mitigation and adaptation strategies to ensure a comprehensive approach to climate action planning. This can involve promoting the development of **integrated climate action plans** that address both mitigation and adaptation strategies.
7. Integrate adaptation with policy agendas to ensure that **climate considerations are mainstreamed** into policy development and implementation. This can involve incorporating climate change considerations into existing policies and programs.
8. **Prioritize vulnerabilities** and develop strategies to address them based on evidence and stakeholder consultation. This can involve conducting vulnerability assessments and involving stakeholders in the development of adaptation strategies.
9. Ensure the **implementation of national agendas** in the local context by creating enabling environments that support the implementation of national climate action plans at the local level.
10. Ensure integration-related functionalities and address Sustainable Development Goals (SDGs) by developing integrated planning frameworks that promote the **alignment of climate action plans with SDGs**.
11. Foster stakeholder consultation by establishing platforms for **stakeholder engagement** and creating opportunities for stakeholders to participate in decision-making processes.
12. Develop **implementation strategies** based on systematic evidence of the impact of various strategies. This can involve conducting impact assessments and involving stakeholders in the development of implementation strategies.
13. Encourage **skill sharing and ideation** among different departments that are clearly interdependent. This can involve creating opportunities for **cross-sectoral collaboration** and knowledge exchange to support the development of integrated climate action plans.

# Way Forward

Building climate resilient cities in India involves a multi-pronged approach that addresses the barriers to climate action and promotes policy coherence, effective governance, and international cooperation. It requires a coordinated effort from multiple stakeholders. The way forward involves strengthening governance, promoting renewable energy, implementing sustainable urban development, enhancing education and awareness, supporting adaptation measures, and promoting international cooperation. By taking these steps, India can build a sustainable future and enhance its resilience to the impacts of climate change.

## Priorities:

- Strengthening Governance
- Promoting Renewable Energy
- Sustainable Transportation
- Education and Awareness
- Adaptation Measures

# References


1. Arup (2014). Climate Resilience Index, Research Report Volume I, Desk Study. Rockefeller Foundation. Retrieved from https://www.arup.com/projects/city-resilience-index
2. Aylett, Alexander (2014). Progress and Challenges in the Urban Governance of Climate Change: Results of a Global Survey. Cambridge, MA: MIT
3. Barata M.M.L., Kinney P.L.K., Dear K. (2018). Climate Change and Cities: Second Assessment Report of the Urban Climate Change Research Network. Cambridge University Press; New York, NY, USA Urban Health; pp. 363–398.
4. Beermann J. (2014). Urban partnerships in low-carbon development: opportunities and challenges of an emerging trend in global climate politics. URBE – Rev Bras Gestão Urbana. 6(541):170–183.10.7213/urbe
5. C-Cube. (n.d.). ClimateSmart Cities Assessment Framework. NIUA. https://niua.in/c-cube/content/cscaf#:~:text=Climate%20Smart%20Cities%20Assessment%20Framework,relevant%20parameters%20for%20Indian%20cities.
5. Dubash, N. and Jogesh, A. (2014). 'From Margins to Mainstream? State Climate Change Planning in India as a "Door Opener" to a Sustainable Future', Economic & Political Weekly.
6. Dzebo, A., C. Brandi, H. Janetschek, G. Savvidou, K. Adams and S. Chan. (2017). Exploring connections between the Paris Agreement and the 2030 Agenda for Sustainable Development. SEI Policy Brief.
7. Fudge C., Grant M., Wallbaum H. (2020). Transforming cities and health: Policy, action, and meaning. Cities Health. 2020;4:135–151. doi: 10.1080/23748834.2020.1792729.
8. Gogoi, E. (2017). The Institutional Context for Tackling Climate Change in South Asia. Working Paper. Oxford: OPM.
9. Gogoi, E., Bahadur, A. V., & Rumbaitis Del Rio, C. (2017). Mainstreaming adaptation to climate change within governance systems in South Asia: An analytical framework and examples from practice. Learning Paper. Oxford: OPM
10. IPCC (2018). Global Warming of 1.5°C: IPCC Special Report on impacts of global warming of 1.5°C above pre-industrial levels in context of strengthening response to climate change, sustainable development, and efforts to eradicate poverty (1 ed.). Cambridge University Press. doi:10.1017/9781009157940.001. ISBN 978-1-009-15794-0.
11. IPCC. (2007). Climate change 2007: Appendix to synthesis report. In A.P.M. Baede, P. van der Linden, & A. Verbruggen (Eds.), Climate change (2007): Synthesis report. Contribution of working groups I, II and III to the fourth assessment report of the intergovernmental panel on climate change (pp. 76–89). https://www.ipcc.ch/site/assets/uploads/2018/02/ar4_syr_full_report.pdf
12. IPCC. (2007). Climate Change 2007: Working Group III: Mitigation of Climate Change, The dual relationship between climate change and Sustainable Development. Retrieved March 11, 2023, from https://archive.ipcc.ch/publications_and_data/ar4/wg3/en/ch2s2-1-3.html
13. Laumann, F., Von Kugelgen, J., Uehara, T. H. K., & Barahona, M. (2022). Complex interlinkages, key objectives, and nexuses among the Sustainable Development Goals and climate change: a network analysis. The Lancet Planetary Health, 6(5), e422–e430. https://doi.org/10.1016/s2542-5196(22)00070-5
14. Mackay, S., Hennessey, N., & Mackey, B., (2019). Barriers to the implementation of climate change adaptation plans and action: Considerations for regional Victoria. Griffith University, Brisbane.
15. Ministry of Environment, Forest and Climate Change. (2010). Towards a Common Framework for preparation of State Level Strategy and Action Plans on Climate Change. https://moef.gov.in/ https://moef.gov.in/wp-content/uploads/2018/01/Experts-SAPCC-Preeti.pdf

# References

16. MoEFCC. (n.d.). Guidelines for funding SAPCC under CCAP. Climate Change Knowledge Portal, MoEFCC, India. https://cckpindia.nic.in/assets/SAPCC/SAPCC%20(CCAP)%20Funding%20Guidelines.pdf
17. NASA. (n. d.). Climate Change Adaptation and Mitigation. Climate Change: Vital Signs of the Planet. https://climate.nasa.gov/solutions/adaptation-mitigation/
18. Nerini, F. F., Sovacool, B. K., Hughes, N., Cozzi, L., Cosgrave, E., Howells, M., Tavoni, M., Tomei, J., Zerriffi, H., & Milligan, B. (2019). Connecting climate action with other Sustainable Development Goals. Nature Sustainability, 2(8), 674–680. https://doi.org/10.1038/s41893-019-0334-y
19. Orsetti, E., Tollin, N., Lehmann, M., Valderrama, V., & Morató, J. (2022). Building Resilient Cities: Climate Change and Health Interlinkages in the Planning of Public Spaces. International Journal of Environmental Research and Public Health, 19(3), 1355. https://doi.org/10.3390/ijerph19031355
20. PIB (2021). National Action Plan on Climate Change (NAPCC), Ministry of Environment, Forest & Climate Change, RU-49-03-0004-011221/FAQ. 10. https://static.pib.gov.in/WriteReadData/specificdocs/documents/2021/dec/doc202112101.pdf
21. Rosenzweig C., W. Solecki, P. Romero-Lankao, S. Mehrotra, S. Dhakal, T. Bowman, and S. Ali Ibrahim. (2015). ARC3.2 Summary for City Leaders. Urban Climate Change Research Network. Columbia University. New York
22. Sharma D, Tomar S. (2010). Mainstreaming climate change adaptation in Indian cities. Environ Urban. 22(2):451–465.10.1177/0956247810377390
23. Tyler, S. & Moench, M. (2012). A framework for urban climate resilience, Climate and Development, 4:4, 311-326, DOI: 10.1080/17565529.2012.745389
24. Tosun, J., & Leininger, J. (2017). Governing the Interlinkages between the Sustainable Development Goals: Approaches to Attain Policy Integration. Global Challenges, 1(9), 1700036. https://doi.org/10.1002/gch2.201700036
25. UN (2016). Climate Action: Why it Matters? https://www.un.org/sustainabledevelopment/wp-content/uploads/2016/08/13_Why_it_Matters_Climate_Action_letter_size_1p.pdf
26. UNEP (n. d. a). Cities and climate change. UN Environment Programme. https://www.unep.org/explore-topics/resource-efficiency/what-we-do/cities/cities-and-climate-change#:~:text=Rising%20global%20temperatures%20causes%20sea,housing%2C%20human%20livelihoods%20and%20health.
27. UNEP (n. d. b). Mitigation. UNEP - UN Environment Programme. https://www.unep.org/explore-topics/climate-action/what-we-do/mitigation
28. Zhou, X, Moinuddin, M and Li, Y. (2021). SDG Interlinkages analysis and visualization tool (V4.0). Accessed at https://sdginterlinkages.iges.jp/index.html
29. Zhou, X., & Moinuddin, M. (2017). Sustainable Development Goals Interlinkages and Network Analysis : A practical tool for SDG integration and policy coherence (ISBN: 978- 4- 88788- 199- 0). Institute for Global Environmental Strategies (IGES). https://acrobat.adobe.com/link/review?uri=urn:aaid:scds:US:ab22e7e7-b0d1-39c9-9a07-35dd19e711f5

# Annexure

# Annexure 1

## Schemes-Sector Wise

| No. | Category | International | National | Sub-national |
|---|---|---|---|---|
| 1 | Green Cover | Race to Zero, Race to Resilience | AMRUT, CAMPA, Smart city Mission, NAP, National Bamboo Mission, SMAF, NGHM | Majhi Vasundhara Abhiyan, Krishi Aranya Protsaha Yojane, Samrudha Hasiru Grama Yojane |
| 2 | Suatainable transport (walking/ cycling) | Race to Zero | AMRUT, Smart Cities Mission,National Electric Mobility Mission, PMGSY, UIDSSMT, National Urban Transport Policy | Pragathipath Yojana, Garib Samriddhi Yojana, Aapno Taluko Vibrant Taluko, |
| 3 | Energy Conservation | Race to Zero, Race to Resilience | BLY, PAT, R-APDRP, SLNP, UDAY, UJALA,Green Hydrogen Policy, 100% EV declaration, Energy Conservation Act, Steel Scrap Recycling Policy, Pradhan Mantri Sahaj Bijli Har Ghar Yojana-Saubhagya, ECO Niwas Samhita, Municipal Energy Efficiency Programme, National Smart Grid Mission | Kisan Hit Urja Shakti Yojana, Bal Urja Rakshak Dal, Jyotirmay scheme, Urja Kerala Mission |
| 4 | Renewable energy (Solar power) | Race to Zero, Race to Resilience | PMKUSUM, UDAY, IPDS, Green Hydrogen Policy, 100% EV declaration, National Clean Energy Fund, Green Energy Corridor Project, National Smart Grid Mission, Mission Solar Charkha | Majhi Vasundhara Abhiyan, Surya Raitha Scheme, Urja Kerala Mission, Bal Urja Rakshak Dal |
| 5 | Waste management (Solid waste, Plastic) | Race to Zero, Race to Resilience | SBM-U, Integrated Waste Land Development Programme, Sustainable Alternative Towards Affordable Transportation (SATAT), Steel Scrap Recycling Policy, GOBAR-DHAN Scheme | Majhi Vasundhara Abhiyan, Nirmal Gujarat Yojana, Garib Samriddhi Yojana, Aapno Taluko Vibrant Taluk |
| 6 | Water conservation | Race to Resilience | AMRUT, IWMP, Jal Jeevan Mission, PMKSY, Rajiv Gandhi National Drinking water Mission, PMMSY, Jal Shakti Abhiyan, Namami Gange Programme, Atal Bhujal Yojana, National Project on Aquifer Management, Mahatma Gandhi National Rural Employment Guarantee Act | Jalswarajya- II Program, Majhi Vasundhara Abhiyan, Shivkalin Pani Sathawan Yojana, SUJALA Suphalam Yojana, Garib Samriddhi Yojana, |
| 7 | Water bodies restoration | | AMRUT, PMKSY, SBM-U, IWLDP, Jal Shakti Abhiyan, Namami Gange Programme, Mahatma Gandhi National Rural Employment Guarantee Act | Majhi Vasundhara Abhiyan, Nital Goem Nital Baim |
| 8 | Pollution Control | Race to Zero, Race to Resilience | NCAP, PMKSY, AMRUT, SBM-U, Voluntary Vehicle-fleet Modernisation Programme, Steel Scrap Recycling Policy, Namami Gange Programme | Majhi Vasundhara Abhiyan |

# Annexure 2

## Schemes-having objectives that are aligned to Climate Action

### National Schemes

There are many schemes that have some of the objectives that aligns to the climate action, a list is provided with an intent to facilitate implementation & reporting on climate action..

- Atal Bhujal Yojana
  Atal Bhujal Yojana (Securing groundwater scheme) is being implemented since April 2020 to promote community-led groundwater management to ensure the long-term sustainability of groundwater in water-stressed villages.

- AMRUT
  1. Development of green space and parks.
  2. Improvement of non-motorized transport.
  3. Enhancing waste supply system. Arrangement of water supply for difficult areas. Reuse of wastewater. Rejuvenation of water bodies. Rehabilitation of old water supply systems.
  4. Efficient sewerage system.

- BLY
  The goal of the Bachat Lamp Yojana (BLY) initiative is to offer energy-efficient compact fluorescent lamps (CFLs) at the same price as incandescent bulbs.

- CAMPA
  To promote afforestation and regeneration activities as a way of compensating for forest land diverted to non-forest uses.

- ECO Niwas Samhita
  The scheme promotes the design and construction of homes including apartments and townships that are energy efficient.

- GOBAR-DHAN Scheme
  Support villages safely manage cattle waste, agriculture waste, and in long run all organic waste. Promote environmental sanitation and curb vector-borne diseases through effective disposal of waste in rural areas.

- Green Energy Corridor Project
  The objective of the project is to generate approx. 20,000 MW of large-scale renewable power and improvement of the grid in the implementing states.

- IPDS
  Strengthening of sub-transmission and distribution networks in urban areas in an efficient and sustainable way.

# Schemes-having objectives that are aligned to Climate Action

## National Schemes

- IWLDP
  The program's main goal is to develop the country's wastelands and degraded lands in an integrated manner based on village/micro watershed treatment plans.

- IWMP
  The main objectives of the IWMP are to preserve and conserve the ecology, restore and develop degraded natural resources by arresting soil loss, improving soil health, soil-moisture regime augmentation, promote water harvesting, recharging groundwater, enhance crop production and promote livelihood.

- Jal Jeevan Mission
  1. To assist in ensuring sustainability of water supply system, i.e. water source, water supply infrastructure, and funds for regular O&M.
  2. To empower and develop human resources in the sector such that the demands of construction, plumbing, electrical, water quality management, water treatment, catchment protection, O&M, etc. are taken care of in short and long term.
  3. To bring awareness on various aspects and significance of safe drinking water and involvement of stakeholders in a manner that make water everyone's business.

- Jal Shakti Abhiyan
  1. Rainwater harvesting.
  2. Renovation of traditional and other water bodies/tanks.
  3. Reuse bore well recharge structures.

- Mahatma Gandhi National Rural Employment Guarantee Act
  1. Providing employment for the development of check dams, ponds, renovation of traditional water bodies.
  2. Ground water management and regulation scheme to delineate and characterize the aquifers to develop plans for ground water management.

- Mission Solar Charkha
  Launched with the aim to implement 50 solar charkha clusters across the country.

# Schemes-having objectives that are aligned to Climate Action

## National Schemes

- Municipal Energy Efficiency Programme
  1. Launched to enhance energy efficiency in public waterworks and sewerage systems across 500 Indian cities.
  2. Replaces inefficient pumps in public waterworks and sewerage systems at no upfront costs.

- Namami Gange Programme
  The Programme aims to accomplish the twin objectives of effective abatement of pollution and conservation and rejuvenation of the river Ganga.

- NAP
  Increase and/ or Improve Forest and Tree Cover.

- National Bamboo Mission
  To increase the area under bamboo plantations in non-forest Government and private lands to supplement farm income and contribute towards resilience to climate change as well as the availability of quality raw material requirement of industries.

- NCAP
  1. To expand the national air quality monitoring network.
  2. To build capacity for air pollution management.
  3. To raise public awareness about the hazards of air pollution.

- NEMMP
  1. National Electric Mobility Mission Plan (NEMMP), the government is targeting to achieve 6-7 million sales of electric and hybrid vehicles in India by 2020.
  2. NEMMP aims to achieve national fuel security by promoting hybrid and electric vehicles in the country.

- NGHM
  Target of developing 140,000 km long tree plantations along the sides of the highways in the country.

- National Smart Grid Mission
  The scheme would enable smart grid rollouts including automation, microgrids and other improvements; dynamic tariff implementation; green power and energy efficiency – renewable integration; electric vehicle charging stations and energy storage systems.

# Schemes-having objectives that are aligned to Climate Action

## National Schemes

- National Urban Transport Policy
  Policy focused on integrated land use and transport planning, the creation of comprehensive mobility plans and public transport and non-motorized transport (NMT) plans, and provided guidelines to create multimodal sustainable urban transport systems.

- PAT
  It is a regulatory instrument to reduce specific energy consumption in energy-intensive industries, with an associated market-based mechanism to enhance the cost-effectiveness through certification of excess energy saving which can be traded.

- PMGSY
  1. The primary objective of the PMGSY is to provide Connectivity, by way of an All-weather Road.
  2. The PMGSY will permit the Upgradation of the existing roads in those Districts where all the Habitations of the designated population size have been provided all-weather road connectivity.

- PMKSY
  1. Efficient water use. Investment in water-saving technologies. Sustainable water conservation practices. Functionalities of Reusing treated wastewater.
  2. Functionalities of Reusing treated wastewater.

- PMKUSUM
  1. 10,000 MW of solar capacity through the installation of small Solar Power Plants of individual plants of capacity up to 2 MW.
  2. Installation of 20 lakhs standalone Solar Powered Agriculture Pumps.
  3. Solarisation of 15 Lakh Grid-connected Agriculture Pumps.

- PMMSY
  Efficient use of land and water resources to enhance fish production and productivity.

- R-APDRP
  IT enabled system for energy accounting / auditing.

- Rajiv Gandhi National Drinking water Mission
  To ensure drinking water security through measures to improve/augment existing drinking water sources and conjunctive use of groundwater, surface-water and rain water harvesting based on village water budgeting and security plan prepared by the community/local government.

# Schemes-having objectives that are aligned to Climate Action

## National Schemes

- SATAT
  SATAT aims to extract the economic value from bio-mass waste in the form of Compressed Bio Gas (CBG) and bio-manure. Bio mass from municipal solid waste, sugar industry waste and agricultural residue have significant potential for the production of CBG.

- Smart City Mission
  1. Preserving and developing open spaces.
  2. Creating non-motorized localities.

- SLNP
  1. Reduction in energy consumption.
  2. Reduction in Green House Gas (GHG) emissions.

- Steel Scrap Recycling Policy
  1. The policy has the potential to save energy savings of around 16-17%.
  2. Creation of a mechanism for treating waste streams and residues produced from dismantling and shredding facilities. Production of high-quality rods scrap for quality steel production thus minimizing the dependency on imports, as well as reducing the demand and supply gap for the industry.
  3. Reduction in Green House Gas (GHG) emissions

- SMAF
  SMAF aims to promote and enhance tree plantations on farmlands along with crops and livestock rearing.

- SBM-U
  1. Sustainable Solid Waste Management.
  2. Sustainable Sanitation and treatment of used water.

- UDAY
  1. Energy efficiency and conservation.
  2. Development of Renewable energy.

- UIDSSMT
  Improve infrastructural facilities in towns & cities. Promote planned integrated development of towns / cities.

# Schemes-having objectives that are aligned to Climate Action

## National Schemes

- UJALA

1. The UJALA scheme also known as the LED-based Domestic Efficient Lighting Programme (DELP) aims to promote the efficient usage of energy for all i.e., its consumption, savings and lighting.
2. Aims to promote efficient use of energy at the residential level.

- Voluntary Vehicle-fleet Modernization Programme

The objectives behind the scrapping policy is to do away with vehicles by scrapping vehicles without valid fitness and registration, and achieve reduction in vehicular air pollutants.

## Subnational Schemes

- Aapno Taluko Vibrant Taluko

Aapno Taluko Vibrant Taluko- (ATVT)" Scheme to provide basic amenities at the village level viz., internal village roads, sewage disposal system, drinking water and solid waste disposal system.

- Bal Urja Rakshak Dal

The program aims to educate school children about energy and the environment through various participatory activities such as energy audits, surveys, and mapping of biomass.

- Garib Samriddhi Yojana

The scheme aimed at providing overall development for the Urban Poor providing shelters and adequate basic infrastructure facilities like roads and electricity.

- Jalswarajya- II Program

Aquifer Mapping and Community based Groundwater Management. Water supply measures in water scarce habitations having population less than 500. Establishing Groundwater Level Monitoring Network in all villages of the state. Real time Groundwater Level Data Monitoring.

- Jyotirmay scheme

Replacement of LED in streetlights and their distribution.

- Kisan Hit Urja Shakti Yojana

Installation of individual DTRs and HV lines, improved voltage profile, and elimination of unauthorized connections have led to uninterrupted and reliable power supply, avoidance of excess energy purchase and commercial losses, and reduced incidents of transformer failure.

# Schemes-having objectives that are aligned to Climate Action

## Subnational Schemes

- Krishi Aranya Protsaha Yojane
  Aims at popularising afforestation programs among people, especially farmers.

- Majhi Vasundhara Abhiyan
  1. Conservation & Enhancement of Green cover & Biodiversity.
  2. Promotion of Renewable Energy.
  3. Solid Waste Management.
  4. Water Conservation, Rain Water Harvesting & Percolation.
  5. Cleaning & Rejuvenation of water bodies & Rivers.
  6. Air Quality Monitoring & Air Pollution Mitigation, Treatment of wastewater.

- Nirmal Gujarat Yojana
  The measures for waste management include the construction of toilets, introduction of a scavenging tax, shifting of Dung-Hills, installation of dust bins, the appointment of health check-up officers, and door-to-door collection of garbage.

- Nital Goem Nital Baim
  The proposal aims to provide grant-in-aid in the form of subsidy to individuals, groups of individuals or farmers for the repairs and renovation of existing wells to promote conjunctive use of water and maintain the quality of groundwater structures in the state.

- Pragatipath Yojana
  Building roads and increasing mobility.

- Samrudha Hasiru Grama Yojane
  The main objectives of the scheme is to increase the forest and tree cover in the forest and non-forest areas and to make the villages self-reliant in natural resources, especially forest resources.

- Shivkalin Pani Sathawan Yojana
  Aims to ensure continuous availability of drinking water through measures like conservation of water through traditional and non-traditional measures, empowerment of water sources, rooftop rainwater harvesting, and construction of ponds in hilly areas to intercept rainwater.

# Schemes-having objectives that are aligned to Climate Action

## Subnational Schemes

- Sujala Suphalam Yojana
  Canal building and water conservation.

- Surya Raitha Scheme
  Solar water pumps to farmers,

- Urja Kerala Mission
  Showcasing commercially proven energy efficient & renewable energy technologies and products, as well as the service providers.

## Regional Centre for Urban & Environmental Studies
## All India Institute of Local Self-Government, Mumbai

**Established in the year 1968, is fully supported by the Ministry of Housing and Urban Affairs, Government of India**

**Email:** dir.rcues@aiilsg.org; rcuestraining@aiilsg.org
**Phone:** 8657622550 / 51 / 52 / 54
**Twitter:** https://twitter.com/in/RCUESMumbai
**Website:** www.aiilsg.org